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**İbrahim YARBA**  
**Zehra Nuray GÜNER**

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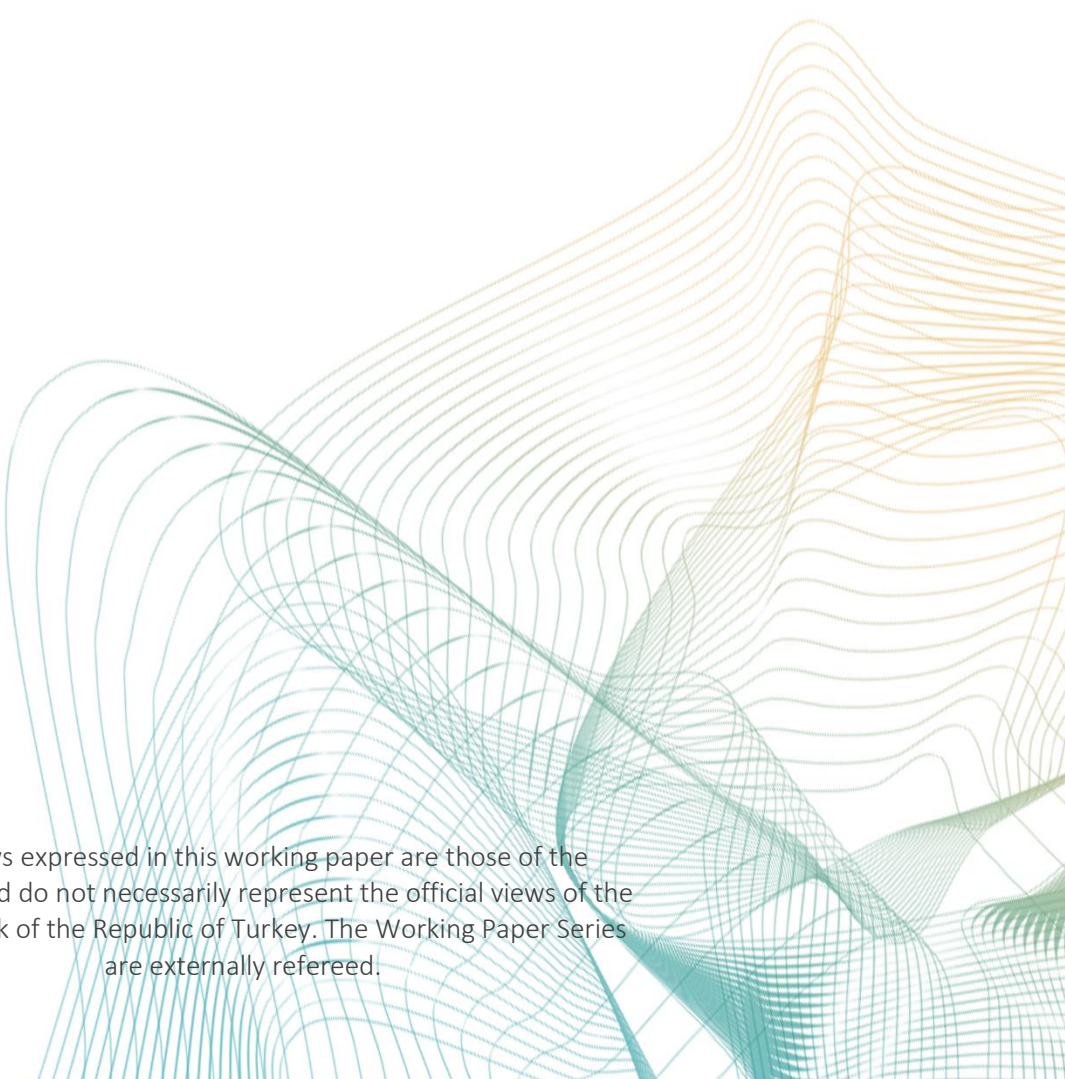
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Address:  
Central Bank of the Republic of Turkey  
Head Office  
Structural Economic Research Department  
Hacı Bayram Mh. İstiklal Caddesi No: 10  
Ulus, 06050 Ankara, Turkey

Phone:  
+90 312 507 80 04

Facsimile:  
+90 312 507 78 96

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# Leverage Dynamics: Do Financial Development and Government Leverage Matter? Evidence from a Major Developing Economy

İbrahim Yarba\*, Zehra Nuray Güner\*\*

## *Abstract*

*This study analyses leverage dynamics of Turkish non-financial firms over the last 20 years using a confidential and unique firm-level dataset. Results of dynamic panel estimations reveal that financial development fosters corporate leverage while government indebtedness inhibits it. Both impacts are more pronounced for private firms rather than public firms. Besides, even though improvements in financial development foster long-term debt usage for both SMEs and large firms, this impact seems stronger for SMEs. Conspicuously, results reveal that SMEs suffer much more than large firms in crowding-out periods of government leverage while both SMEs and large firms benefit in crowding-in periods. Moreover, higher business risk hinders corporate leverage of private firms and SMEs, which is not the case for either large firms or public firms. Results are robust to alternative firm size classification schemes and alternative model specifications.*

**JEL codes:** G31, G38, H32, O16

**Key words:** Leverage dynamics, financial development, government leverage, capital structure, dynamic panel regression

\* Corresponding author. Central Bank of the Republic of Turkey, Structural Economic Research Department.

\*\* Middle East Technical University, Department of Business Administration.

E-mails: [ibrahim.yarba@tcmb.gov.tr](mailto:ibrahim.yarba@tcmb.gov.tr); [nurayg@metu.edu.tr](mailto:nurayg@metu.edu.tr)

## **Non-technical Summary**

Despite the extensive empirical research carried out on capital structure theory, which has been one of the most prominent topics in finance literature, evidence provided is mixed and the ambiguity in findings seems to be much more severe for emerging countries. In accordance with the importance of the issue, this study aims to analyze leverage dynamics of non-financial firms over a long period from 1996 to 2015 for an important transition economy, Turkey.

Results of the dynamic model estimations reveal that not only firm specific and industry specific variables but also economic environment factors account for variation in leverage of Turkish non-financial firms. We document significant evidence that financial development fosters corporate leverage while government indebtedness inhibits it. Both impacts are more pronounced for private firms rather than public firms. Besides, even though improvements in financial development foster long-term debt usage for both SMEs and large firms, this impact seems stronger for SMEs. Conspicuously, results reveal that SMEs suffer much more than large firms in crowding-out periods of government leverage while both SMEs and large firms benefit in crowding-in periods. Moreover, higher business risk hinders corporate leverage of private firms and SMEs, which is not the case for either large firms or public firms.

Thus, results provide an indirect evidence on the important role of financial institutions, financial markets and institutional development in mitigating frictions regarding information asymmetry and agency costs, and easing the access of firms to capital. However, despite the improvement in financial development in the last decade, number of public firms is still limited in Turkey, and there are only around 400 firms listed on Borsa Istanbul. Stock market capitalization as a percent of GDP is also low in comparison to her peer countries. This suggests a room for growth and results of this study highlight the importance of policies that should be implemented to deepen the Turkish capital markets.

Results in this paper also provide support for the findings of previous research regarding the financial constraints on Turkish SMEs, which limits their potential in the economy. In Turkey, SMEs' dominant source of external finance is bank lending, and external financing alternative to straight bank debt is quite limited. In that sense, results of this study shed light on the importance of developing appropriate policies to broaden the range of financing instruments available to SMEs as alternatives to straight bank debt in order to enable them to continue to play their crucial role in investment, growth, innovation and employment.

## **1. Introduction**

Capital structure theory has been one of the most prominent topics in finance literature and hence extensive empirical research has been carried out on this topic. Majority of these studies are concentrated on advanced countries while there exists limited research for emerging countries. In accordance with the importance of the issue, this study aims to analyze leverage dynamics of non-financial firms over a long period from 1996 to 2015 for an important transition economy, Turkey.

Previous studies present mixed results and no single theory seems to be adequate in explaining leverage dynamics of companies. Although, the issue is clarified for neither the advanced nor the emerging countries, the ambiguity seems to be much more severe for the latter. The legal and institutional environments of developed countries are quite similar while there are significant differences in those of emerging markets. These differences might explain the inconsistencies in findings from emerging countries (Wald, 1999).

One of the main drawbacks of the previous studies for most of the emerging countries is the lack of representativeness of their samples which can be attributed to data availability. Furthermore, available data usually cover a relatively short period. Therefore, a detailed analysis of this issue using data for a representative sample of firms over a long period is especially important for emerging countries. In that sense, the contribution of this study to the current literature is to provide further evidence to shed some light on this issue for emerging markets.

On the other hand, despite the importance of this issue, there exist only a few studies analyzing the leverage of privately held Turkish firms and findings of these papers are in conflict with each other. To reconcile the differences in findings of these papers, this study aims to present a more complete picture of leverage dynamics in Turkey by analyzing the most comprehensive and representative database for Turkish non-financial firms. This unique dataset, which is one of the novel aspects of this study, is the confidential firm level data compiled by the Central Bank of the Republic of Turkey (CBRT). It contains information on about 10,771 firms each year on average and it includes both public and privately held small and large firms from different industries. Besides, this study utilizes the most recent data over the longest time period (1996-2015) compared to other studies for Turkey.

Furthermore, previous studies on Turkey utilized only descriptive analyses, pooled OLS and the fixed effects panel models but not the dynamic panel models. However, in light of the

arguments evidenced in the literature regarding slow adjustment of firm leverage to the optimal leverage due to adjustment costs, the prior period's leverage is considered as essential to be controlled (Flannery and Hankins, 2013). In that sense dynamic panel model is employed in this study in order to control prior period's leverage in addition to firm heterogeneity and time invariant (unobserved) differences across firms.

Moreover, Graham et al. (2015), one of the most recent and extensive study on the issue, find significant evidence that traditional empirical models fall short in explaining capital structure decisions. They argue that changes in economic environment rather than firm characteristics play a prominent role in explaining these decisions in the US. In order to examine whether this is also the case for Turkey, we incorporate economic environment factors to the empirical model namely, financial development, government borrowing and stock market return in addition to firm specific, industry specific and other macroeconomic variables.

According to Bank for International Settlements (BIS) database, government indebtedness of Turkey has substantially decreased from 78 percent to 32.9 percent of GDP over the period from 2001 to 2015 while the trend is reverse for the preceding period. Thus, it is worthwhile to assess the possible crowding out/in effect of government leverage on corporate leverage. Meanwhile, both financial markets and institutional development in terms of efficiency, depth and access have improved significantly in Turkey over the same period. Given the vital role played by financial institutions in mitigating problems associated with information asymmetry and agency costs and in easing the firms' access to capital, corporate debt levels are expected to increase with financial development (Leland and Pyle; 1977, Diamond, 1984). In order to examine the issue, we incorporate the most recent financial development index introduced by Svirydenka (2016), which takes into account the complex multidimensional nature of both financial markets and institutional development.

In the first place, in contrast to Graham et al. (2015) results of the empirical dynamic model reveal that not only economic environment factors but also firm specific and industry specific variables account for variation in leverage of Turkish non-financial firms. Results show that profitability and industry median leverage are significantly associated with firm leverage. The association is negative for the former while it is positive for the latter. Besides, firm growth and business risk have significant negative associations with both short term and long term leverage, whereas firms with higher tangibility tend to have higher long term but lower short term debt ratios.

Besides, we do find that improvement in financial development has a significant negative impact on short term leverage and a positive impact on long term leverage while the impact is more pronounced for the latter. Moreover, results indicate that government leverage has a significant negative association with the corporate leverage.

In order to examine possible differences in leverage dynamics across firms and over time, we re-estimate the model for different specifications based on public/private status of firms, alternative time periods and firm size classifications. Results suggest that the negative impact of government leverage and positive impact of financial development on corporate leverage are more pronounced for private rather than public firms. Besides, higher riskiness hinders borrowing capacity of private firms and SMEs, which is not the case for either large firms or public firms. Moreover, improvement in financial development fosters long term debt usage for both SMEs and large firms while this impact seems to be stronger for SMEs. Most strikingly, results suggest that SMEs suffer much more than large firms in crowding out periods of government leverage while both SMEs and large firms benefit in crowding in periods.

We also include capital flows (net capital flows to GDP ratio) in empirical models as an additional explanatory variable in order to assess the impact of capital flows on corporate leverage. Results show that capital flows foster short term corporate leverage. This impact is more pronounced for SMEs and private firms.

The remainder of the study is organized as follows. A brief review of the literature regarding leverage determinants is given in Section 2. Measurements and hypotheses development are discussed in Section 3, while the dataset is presented in Section 4. Methodology is explained in Section 5, and results are reported in Section 6 and 7. Finally, concluding remarks are presented in Section 8.

## **2. Literature Review**

In light of the capital structure theory framework introduced in pioneering works of Modigliani and Miller (1958, 1963), Jensen and Meckling (1976), Myers (1977, 1984, 2001), Myers and Majluf (1984) and Fama and French (2002), extensive empirical research has been carried out to identify and analyze the determinants of firm leverage. However, evidence provided in these studies is at best mixed and no single theory seems to be adequate in explaining leverage dynamics of firms.

Different results from different countries can be attributed to differences in country specific factors as well as variations in firm specific characteristics controlled for in the models.

However, country specific factors are consistently documented in the literature as reliable and significant leverage determinants (Booth et al., 2001; Bancel and Mittoo, 2004; Demircuc-Kunt and Maksimovic, 1999; Antoniou et al., 2008; De Jong et al., 2008; Psillaki and Daskalakis, 2009; Hanousek and Shamshur, 2011; Oztekin and Flannery, 2012; and Fan et al., 2012).

Booth et al. (2001) report a consistent relation between leverage and firm specific factors by using data from 10 developed countries. They also find significant evidence in support of the claim that there exist systematic differences in country specific determinants of leverage such as inflation, capital market development and GDP growth among these countries.

In line with findings of Booth et al. (2001), De Jong et al. (2008) show that country specific factors have significant impact on firm leverage and there is variation in firm specific factors affecting firm leverage by using data from 42 different countries over the period of 1997-2001.

On the other hand, for the developed countries, firm size, profitability, tangibility and growth opportunities are shown to be factors that reliably explain leverage dynamics of firms as in two pioneering studies, Frank and Goyal (2009) and Rajan and Zingales (1995). Frank and Goyal (2009) investigate the role of a long list of factors analyzed in the related literature in predicting firm leverage. Using a large dataset of publicly traded US firms over the period from 1950 to 2003, they find that six factors namely, industry median leverage, tangibility, profitability, firm size, market to book ratio, and expected inflation account for more than 27% of total variation in firm leverage and the rest of variables add only 2% to the explanatory power of models. The said core factors are identified by using a market based leverage definition. Besides, only three of these said core factors, namely, industry median leverage, tangibility and profitability are found to be robust for all different leverage definitions. Rajan and Zingales (1995), on the other hand, examine the determinants of corporate leverage in the US as well as in Germany, Japan, Canada, France, United Kingdom, and Italy. They point out that firm size, tangibility, profitability and market-to-book ratio are the dominant determinants of leverage in all of these countries.

However, in contrast to aforementioned common findings, Graham et al. (2015) argue that capital structure decisions are not explained by firm characteristics. They provide convincing evidence that changes in economic environment play a more prominent role in explaining the variation in capital structure decisions of firms in the US over the last one hundred years. Using a large unique dataset over 1920-2010 period from CRSP stock files, S&P Compustat and Moody's industry manuals, Graham et al. (2015) provide a more complete picture of capital



structure decisions of non-financial US firms by taking into account both aggregate and cross sectional trends. They report a systematic increase in aggregate leverage ratios of unregulated industries during the last century. It is also found that traditional empirical models fall short in explaining the said trend. Furthermore, economic environment factors account for variation in capital structure of firms rather than firm characteristics. In particular, their results show that government leverage (federal debt held by public/GDP) is negatively related with corporate leverage. The negative relation between government and corporate leverage is significantly stronger than the relation between corporate leverage and rest of the macroeconomic variables such as inflation, yield spread and GDP growth.

Even though most of the studies are concentrated on advanced countries, there also exists a growing literature focusing on emerging countries, such as Latin American Countries (Espinosa et al., 2012), China (Huang and Song, 2006), Malaysia (Pandey, 2004), Chile (Maquieira et al., 2007), Pakistan (Sheikh and Wang, 2011, Qureshi, 2009), India (Chakraborty, 2010) and Brazil (Correa et al., 2007). However, evidence from these studies are mostly inconclusive and conflicting with those from advanced economies. This contradistinction might be explained by the similarities in the legal and institutional environments of developed countries and significant differences in legal and institutional environments of emerging countries (Wald, 1999). Furthermore, there is limited research on capital structure decisions of firms in emerging countries which can be attributed to data availability. Thus, although the issue is not clarified for both the advanced and the emerging countries, the ambiguity seems to be much more severe for the emerging countries. This ambiguity in findings emphasizes the importance of further analysis of this issue for emerging markets.

Maquieira et al. (2007) study the determinants of firm leverage for Chilean firms using a dataset of 113 public firms over 1990-1998 period. Their results show that only profitability and tangibility have significant relationships with firm leverage. While the former has a negative impact on firm leverage, the latter has a positive one. Findings from this emerging market are partially in line with those in Rajan and Zingales (1995).

On the other hand, Espinosa et al. (2012) analyze the issue by using a dataset of 133 Latin American firms from Mexico, Argentina and Peru in addition to Chile over the period from 1998 to 2007. They also analyze data for 486 US firms over the same time period. Their results show that Chile is the only country that has similar leverage determinants as the US, whereas Peru, Mexico and Argentina have not.

Huang and Song (2006) analyze the determinants of leverage for Chinese firms over 1994-2003 period. Based on a dataset consisting of more than 1200 publicly traded firms, their results suggest a positive relation between leverage and fixed assets, firm size and industry mean leverage, a negative relation between leverage and profitability, growth opportunities and non-debt tax shields.

In another study, Chakraborty (2010) examines the leverage determinants of Indian firms over the period from 1995 to 2008 by utilizing a sample of 1169 publicly traded firms. Results of this study show that firm leverage is increasing with tangibility and non-debt tax shields, and decreasing with firm size, profitability, and research and development expenditures. However, industry specific and macroeconomic variables are not included in the models used in this study. This omission might explain the conflict between findings of this paper and other studies in the literature.

Sheikh and Wang (2011) study determinants of capital structure for 160 publicly traded firms from Pakistan over 2003-2007 period. Their results show that tangibility, profitability, earnings volatility and liquidity are negatively related with the firm leverage while firm size is positively related with it. However, no significant relations between firm leverage and growth opportunities and tax shield are documented.

Recently, there is a growing number of articles analyzing the determinants of corporate leverage for Turkey as well. Aydın et al. (2006) study the capital structure of Turkish non-financial firms by using the dataset compiled by the CBRT for the period 1990-2004. Some stylized facts are reported in this paper. For example, Turkish firms are shown to rely mostly on short term debt and to have high levels of leverage with low level of tangible assets. However, they provide only descriptive statistics and do not conduct any formal tests of the issue.

On the other hand, Sayılğan et al. (2006) examine the determinants of leverage for 123 Turkish manufacturing firms listed on Borsa Istanbul over the period from 1993 to 2002. They show that firm size and growth in total assets are positively related with leverage while tangibility, profitability, non-debt tax shields, growth in plant, property and equipment are negatively related with it. However, neither economic condition variables nor industry specific factors are accounted for in the models used in this study.

Similarly, Yıldız et al. (2009) also investigate the issue by using only firm specific factors for manufacturing firms listed on Borsa Istanbul over 1998-2006 period. They report that profitability is negatively associated with leverage while firm growth and size is positively

associated with it. Tangibility is found to be significant for only short term leverage whereas tax and non-debt tax shields are found to be insignificant.

Okuyan and Taşçı (2010a) analyze the determinants of capital structure by using a dataset compiled by Istanbul Chamber of Commerce which contains data on 1,000 largest Turkish industrial firms over the period from 1993 to 2007. Their results show that firm leverage is decreasing with firm size and profitability. In another study, Okuyan and Taşçı (2010b) analyze the issue by using a dataset containing a sample of 196 firms trading on Borsa Istanbul. Employing a panel methodology and using quarterly data over the period of 2001-2008, they show that the impacts of firm specific factors, namely size, tangibility, volatility of return, firm growth and profitability, on leverage depend on whether debt is short term or long term. However, they did not incorporate variables to account for neither the macroeconomic conditions nor the industry specific factors in any of their studies.

Köksal and Orman (2015) also examine the determinants of firm leverage and conduct a comparative test of pecking order and trade off theories for non-financial Turkish firms over 1996-2009 period. Conducting fixed effects panel methodology and using the database compiled by the CBRT, they find that firm leverage is decreasing with profitability, GDP growth and business risk, and increasing with firm size, tangibility, potential debt tax shield, inflation and industry mean leverage. Capital inflows do not have a significant effect on leverage decisions of public firms while they have a positive and significant effect on that of non-public firms.

In two recent studies, Güner (2016) and Karaşahin and Küçükşaraç (2016) analyze the issue for non-financial public firms listed on Borsa İstanbul. Güner (2016) focuses on only firm specific variables over the period 2008-2014 while Karaşahin and Küçükşaraç (2016) incorporate firm specific, industry specific and macroeconomic factors over the period 1994-2014. Güner (2016) reports that leverage, defined as the ratio of total liabilities to total assets, is negatively related with firm size, profitability, growth opportunities and liquidity and not related with non-debt tax shield. On the other hand, Karaşahin and Küçükşaraç (2016) analyze both market leverage and book leverage in their study. Employing a pooled OLS with industry dummies and panel methodologies with firm fixed effects, they show that size, tangibility, industry average leverage are positively related with both market and book leverage whereas profitability and liquidity are negatively related. Growth opportunities are shown to have no impact on book leverage but a significant negative impact on market leverage. Moreover, no

significant relationship is found between business risk and firm leverage. In addition, the impacts of corporate tax rate, capital flows and other macroeconomic variables on firm leverage are found to be ambiguous.

However, most of findings of these studies for Turkish non-financial firms need to be accepted with some skepticism. One of the main drawbacks of these studies is the lack of representativeness of their samples. They mostly confine their samples to public firms only, hence mostly large firms. Moreover, most of them do not incorporate all relevant leverage determinants in their models. Furthermore, their samples cover relatively short periods of time.

### **3. Variable Measurements and Hypothesis Development**

In this section, the measurements of the variables and hypotheses development are discussed. Variables related with capital structure decision of firms can be classified as economic environment, firm characteristics, industry-specific and macroeconomic variables. Definitions of the variables are presented in Table 1.

#### **3.1. Dependent Variable: Leverage**

Different definitions of leverage, book and market leverage, are used in the existing literature. Myers (1977) claims that debt is more related with assets in place rather than the growth opportunities of the firm, thus book leverage of firms should be used rather than market leverage. Chava and Roberts (2008) also argue that book leverage is mostly the focus of financing decisions specifically the credit decisions. Moreover, Graham and Harvey (2001) argue that managers mostly do not adjust their capital structure as a result of changes in the equity markets due to the costs associated with adjustments. On the other hand, some researchers, such as Welch (2004), argue that market leverage is more relevant and more economically meaningful since market leverage is forward looking while book leverage is backward looking. Hence there is no agreement regarding which definition of leverage should be used in empirical analyses.

Moreover, different definitions of debt based on the maturity of liabilities are used in the literature, as well. Long term debt is considered as financing long term plans and investments of firms, while short term debt is mostly financing the current operations of the firm. Besides, short term debt is considered as having a significant impact on the financial risk of the firm such as maturity risk and therefore, plays a significant role in increasing the vulnerability of the firms to the economic environment fluctuations, which has potential effects on capital structure

**Table 1 Variable definitions**

<b>Variables</b>	<b>Definitions</b>
Total leverage	Calculated as the book value of total financial debt divided by total assets
Short term leverage	Calculated as the book value of total short term financial debt divided by total assets
Long term leverage	Calculated as the book value of total long term financial debt divided by total assets
<b><i>Economic Environment Factors</i></b>	
Financial Development	Index created by Svirydzhenka (2016) and extended by the authors
Government Borrowing	Calculated as the government debt divided by GDP
Stock Market Conditions	Calculated as the annual return on BIST 100 index
<b><i>Firm Characteristics</i></b>	
Profitability	Calculated as the operating income divided by total assets
Size	Calculated as the log of sales deflated by GDP deflator
Growth	Calculated as the difference in the net sales between current year and previous year divided by the net sales in previous year
Tangibility	Calculated as the total net plant, property and equipment divided by total assets
Business Risk	Calculated as the standard deviation of the ratio of operating income to total assets for the last three consecutive years
<b><i>Industry Specific Factors</i></b>	
Industry median total leverage	Calculated as the median of related total leverage ratio of all the firms operating in the same industry as the firm, excluding the firm itself. Sector classification is based on economic activity classification, NACE Rev.2 which is released by EUROSTAT
Industry median short term leverage	Calculated as the median of related short term leverage ratio of all the firms operating in the same industry as the firm, excluding the firm itself.
Industry median long term leverage	Calculated as the median of related long term leverage ratio of all the firms operating in the same industry as the firm, excluding the firm itself.
<b><i>Macroeconomic Factors</i></b>	
GDP growth	Calculated as the percentage change in annual real GDP
Inflation	Calculated as the difference in the Consumer Price Index between current year and previous year divided by the Consumer Price Index in previous year

The table reports the definitions of the dependent and the independent variables used in this study.

decisions, financial health of firms and health of the financial system. These effects are considered as more relevant for developing countries (Demirgüç-Kunt and Maksimovic, 1999; Schmukler and Vesperoni, 2006). Thus, in addition to long term debt, it is useful to consider short term debt in this study since short term debt is used much more dominantly than long term debt by our sample firms. For robustness, all above mentioned leverage measures with the exception of market leverage, since majority of the sample firms are private firms, are used in this study.

## **3.2. Economic Environment Variables<sup>1</sup>**

### **3.2.1. Financial Development**

Information asymmetry and agency costs are the main frictions in theory of capital structure (Jensen and Meckling, 1976; Myers, 1977; Myers, 1984). In mitigating these frictions as well as in easing firms' access to capital, financial intermediaries play an important role (Leland and Pyle, 1977; Diamond, 1984). Hence, corporate debt is expected to increase with financial development.

In recent decades, both financial markets and institutional development in terms of efficiency, depth and access to capital have improved significantly in Turkey. This can be seen through the most recent financial development index (FDI) created by Svirydzenka (2016). According to this index, financial development in Turkey has increased by 26 percent from 2001 to 2015. Similarly, according to BIS data corporate debt as a percent of GDP in Turkey has increased by 35 percent over the same period, which is consistent with expectations.

In the literature, it is common to measure financial development as the ratio of domestic credit to private sector to GDP, and the ratio of stock market capitalization to GDP. However, in one of the most recent studies, Svirydzenka (2016) argues that the aforementioned measures do not take into account the complex multidimensional nature of financial development. She constructs six lower level sub-indices using a list of indicators to measure how efficient, accessible and deep the financial markets and the financial institutions are. These sub-indices are FME, FMA, FMD, FIE, FIA, and FID. The letters M and I denote markets and institutions, and the letters E, A, and D denote efficiency, access, and depth, respectively. In order to construct these indices, first the indicators are normalized, and then aggregated by the weights which are obtained from the principal component analysis. Moreover, these sub-indices are aggregated into FM and FI in order to measure development of financial markets and institutions, respectively. Finally, these two indices are aggregated in order to obtain an overall measure of financial development. In this study, this overall measure of financial development is used, and it is obtained from Svirydzenka (2016) and updated by authors for the last year analyzed in this paper.

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<sup>1</sup> Another commonly used macroeconomic control variable, namely, corporate tax rate did not exhibit significant variation in Turkey during our sample period, especially after 2000. Besides, too many tax advantages as well as unprecedented tax amnesties are given to various sectors and these make measurement impossible. Hence, tax incentive is not incorporated into models as an economic environment factor.

### **3.2.2. Government Leverage**

Taggart (1985) states that the interaction between investor demand for securities by firms and supply of securities by firms determines the aggregate level of leverage in the economy. Besides, in line with Friedman (1986), and McDonald (1983), Graham et al. (2015) present the illustration of this theoretical concept based on the model of Miller (1977), and point out that an increase in the supply of competing securities, such as government bonds, leads to a reduction in corporate debt in equilibrium by shifting the demand curve of corporate debt. Thus, government leverage is expected to have a negative relation with corporate debt. Consistent with the expectation, government debt in Turkey has substantially decreased from 78 percent to 32.9 percent of GDP while the corporate debt increased from 24 percent to 56 percent of GDP over 2001-2015 period. Following the common practice in the literature, government leverage is measured as the ratio of government debt to GDP in this paper.

### **3.2.3. Stock Market Conditions**

Previous literature presents ample evidence regarding the stock market and capital structure decisions of firms (Welch, 2004, Choe et al. 1993; Korajczyk et al. 1990, Bayless and Chaplinksy, 1991 and others). Equity market return is also considered as the cost of a financing source which is an alternative to the corporate debt (Graham et al., 2015). Thus, equity market return is incorporated into the models for public firms as an economic environment variable and measured as the annual return on the BIST 100 index in this study.

## **3.3. Firm Characteristics as Control Variables**

Firm characteristics which are related with capital structure decision of firms and proxying for frictions regarding imperfect elasticity of supply of debt are identified from the previous literature. Therefore, firm specific factors such as profitability, firm size, tangibility, growth and business risk are used in this study following Rajan and Zingales (1995), Frank and Goyal (2009) and Graham et al. (2015).

### **3.3.1. Profitability**

Profitability reduces financial distress costs of firms and interest tax shields become more valuable for profitable firms. Hence a positive relationship is expected between leverage and profitability according to the trade off theory (TOT). However some studies such as Strebulaev (2007) and Kayhan and Titman (2007) argue that the said relation is not as straightforward as claimed and the relation can be negative due to frictions. Besides, Myers (1977) and Jensen (1986) argue that profitability of firms can increase the free cash flow problem, which can be

mitigated by the discipline provided by debt. On the other hand, according to the pecking order theory (POT), firms with more profits are expected to have less debt since internal funds are preferred to external funds considering the adverse selection problem associated with external funding. In this study, profitability is measured as the ratio of operating income to total assets following Graham et al. (2015), De Jong et al. (2008), Frank and Goyal (2009) and others.

### **3.3.2. Firm Size**

Default risk and agency costs are considered as decreasing with the firm size. Besides, retained earnings are expected to increase with the firm size. Hence, corporate leverage is expected to be negatively (positively) related with the firm size according to POT (TOT). Firm size is measured as the natural log of sales deflated by GDP deflator following Rajan and Zingales (1995), Graham et al. (2015) and Titman and Wessels (1988).

### **3.3.3. Firm Growth**

Majority of the growth firms' value comes from the growth opportunities that they have. The value of these growth opportunities declines significantly during times of financial distress. On the other hand, holding profitability constant, growth firms with more investment opportunities need more debt due to insufficiency of their internal funds. Hence, POT predicts a positive relationship between leverage and firm growth while TOT predicts the opposite. In this study, growth is measured as the annual percentage change in sales following Frank and Goyal (2009).

### **3.3.4. Tangibility**

Financial distress costs are expected to be decreasing with tangibility of assets since collateralization is easier with tangible assets than intangible assets. Moreover, asymmetric information can be considered as decreasing with tangibility, which decreases the cost of issuing equity (Harris and Raviv, 1991). Thus, a positive (negative) relation is expected between leverage and tangibility according to TOT (POT). Tangibility is measured as the ratio of net plant, property and equipment to total assets following Frank and Goyal (2009), Demirgüç-Kunt and Maksimovic (1999), Graham et al. (2015), and others.

### **3.3.5. Business Risk**

Volatility in earnings and cash flows increases expected financial distress costs as well as adverse selection between firms and creditors. Hence, the relationship between leverage and risk is expected to be negative according to both POT and TOT. Following De Jong et al. (2008) and Graham et al. (2015), it is measured as the standard deviation of the ratio of operating income to total assets which is calculated over the trailing last three years.



### **3.4. Industry Specific Control Variables**

Previous literature provides ample evidence in support for the claim that leverage ratios significantly differ across industries. Median leverage of the industry is argued to be a benchmark for a firm in an industry, hence, a proxy for target leverage. It is also argued to be a proxy for some omitted common industry factors (Hull, 1999; Hovakimian et al., 2001; Flannery and Rangan, 2006; Frank and Goyal, 2008, 2009). Thus, corporate leverage is expected to be increasing with industry median leverage according to TOT while the said relation is not certain according to POT. In this study, following the common practice in the literature, median leverage ratio of all the firms operating in the same industry as the firm, excluding the firm itself is used as a proxy for industry conditions. Sector classification is based on economic activity classification, NACE Rev.2, which is released by EUROSTAT.

### **3.5. Macroeconomic Factors as Control Variables**

Existing literature provides ample evidence regarding significant impact of macroeconomic variables on capital structure decision of firms. Following the literature, key macroeconomic variables, namely GDP growth and expected inflation are incorporated in the analysis.

#### **3.5.1. GDP Growth**

During economic expansions, expected bankruptcy costs fall while corporate profits and cash increase. Besides, it is more likely that collateral value of firms increase during expansions. Hence, according to TOT, leverage is expected to be procyclical. On the other hand, if POT holds, corporate leverage is likely to decrease since internal funds of firms increase and agency problem between managers and owners becomes less severe during expansions (Frank and Goyal, 2009). Following Graham et al. (2015) and others, GDP growth is measured as the annual percentage change in real GDP.

#### **3.5.2. Inflation**

Expected inflation is considered to be a less reliable factor, and there is no consensus regarding its impact on firm leverage in the literature. It is also expected to be even less reliable when book based leverage is used since expected inflation is forward looking while book leverage is backward looking. However, it is one of the common variables included only as a macroeconomic factor in order to examine the influence of the economic environment on capital structure decisions (Frank and Goyal, 2009). Following Graham et al. (2015) and others, expected inflation is roughly proxied by realized inflation, and measured as annual percentage change in Consumer Price Index (CPI).

#### **4. Data**

The confidential firm level data utilized in this study is provided by the CBRT. This unique data is the most representative and comprehensive database for Turkish non-financial firms. As a part of the Official Statistics Programme of Turkey, this database which consists of annual balance sheets and income statements of Turkish non-financial firms prepared according to Tax Procedure Law of Turkey is compiled by the CBRT. The aggregated reports by sectors and company sizes are released on the CBRT's web site annually while the firm level data is not publicly available for confidentiality reasons.<sup>2</sup>

In contrast to most of earlier studies, the data utilized in this study does not cover only Turkish publicly traded non-financial firms, but also privately held firms. It is also well diversified in terms of firm size. Of the firms included in the sample, 14.14 percent are micro sized firms, 37.49 percent are small firms, 33.91 percent are medium firms, and 14.46 percent are large firms on average when the classification is based on number of employees according to European Union (EU) criterion. Moreover, Small and Medium-Sized Enterprises (SMEs) included in the sample analyzed in this paper account for 16.99% of total assets, 12.58% of owners' equity, and 15.92% of total net sales of all Turkish SMEs covered in the database of Ministry of Science, Industry and Technology of Turkey in 2015. The same ratios for large firms included in the sample analyzed in this paper are 35.67%, 40.5%, 31.31%, respectively.

Dataset spans the last 20 years over the period 1996-2015 which is the longest and most recent period in comparison with other studies for Turkey. It includes about 10,771 firms each year on average, and each of these firms has at least 3 years of consecutive data. Following the common practice, data is winsorized at 0.5% in order to minimize the possible effects of outliers. The end result is an unbalanced panel data with 215,436 firm year observations.<sup>3</sup>

##### **4.1. Descriptive Statistics**

Table 2 reports descriptive statistics for the dependent and independent variables used in this paper for all the firms included in the sample. In addition, Tables 3 and 4 report the descriptive statistics for SMEs and large firms, respectively. Based on European Union and Turkish official criterion, a firm is classified as an "SME" if its number of employees is less than 250, and "large" otherwise. Panel A of each of these tables reports the descriptive statistics for the full

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<sup>2</sup> Please see the CBRT's web site for detailed information on the database including data collection process. (<http://www.tcmb.gov.tr/wps/wcm/connect/tcmb+en/tcmb+en/main+menu/statistics/real+sector+statistics/company+accounts>)

<sup>3</sup> Financial development index used in this study is obtained from Svirydzhenka (2016). Remaining economic environment and macroeconomic variables are obtained from Electronic Data Delivery System (EDDS) of the CBRT, Turkish Statistical Institute and Undersecretariat of Treasury of the Republic of Turkey.

**Table 2 Descriptive statistics, full sample**

Variable	Obs	Mean	Sd	1 <sup>st</sup> Quartile	Median	3 <sup>rd</sup> Quartile
<b>Panel A: Full Sample</b>						
Total leverage	215,436	25.55	25.22	2.59	19.86	41.10
Short term leverage	215,436	15.44	19.09	0.11	8.30	24.24
Long term leverage	215,436	9.98	18.18	0.00	0.00	12.93
Profitability	215,436	5.94	15.91	0.37	4.87	11.33
Firm size	209,172	16.16	1.99	15.14	16.29	17.34
Firm growth	175,570	24.92	89.19	-0.86	20.48	48.32
Tangibility	215,436	26.64	24.28	6.57	19.69	40.37
Firm business risk	149,092	7.43	11.97	2.07	4.32	8.55
Industry median leverage	400	19.24	11.65	10.53	18.17	26.54
Industry median leverage short term	400	7.82	5.68	2.99	6.94	12.18
Industry median leverage long term	400	3.83	7.43	0.00	0.00	5.57
GDP growth	20	4.88	4.76	4.17	6.24	7.81
Inflation	20	28.75	30.42	8.34	10.26	46.41
Government leverage	20	42.05	12.65	32.00	38.00	45.25
Financial development	20	0.44	0.05	0.40	0.43	0.49
<b>Panel B: 1996-2002</b>						
Total leverage	62,428	18.98	25.39	0.00	8.01	29.79
Short term leverage	62,428	14.04	20.68	0.00	4.17	20.84
Long term leverage	62,428	4.72	14.02	0.00	0.00	0.00
Profitability	62,428	9.11	20.40	0.65	7.55	18.43
Firm size	60,924	15.83	1.93	14.67	15.86	17.01
Firm growth	47,573	46.17	82.35	21.77	47.54	73.08
Tangibility	62,428	24.37	23.83	5.13	16.37	37.17
Firm business risk	37,716	10.81	14.43	3.55	7.11	12.98
Industry median leverage	140	10.70	7.08	4.91	10.04	14.63
Industry median leverage short term	140	5.58	4.89	0.43	5.01	8.12
Industry median leverage long term	140	0.28	1.85	0.00	0.00	0.00
GDP growth	7	3.00	5.58	-0.54	6.43	7.01
Inflation	7	64.95	23.62	53.78	68.79	74.75
Government leverage	7	44.29	17.88	32.00	37.00	53.50
Financial development	7	0.38	0.03	0.38	0.39	0.40
<b>Panel C: 2003-2015</b>						
Total leverage	153,008	28.23	24.65	6.34	24.46	44.00
Short term leverage	153,008	16.01	18.37	0.50	9.91	25.30
Long term leverage	153,008	12.12	19.22	0.00	1.31	17.88
Profitability	153,008	4.65	13.45	0.29	4.30	9.35
Firm size	148,248	16.29	2.00	15.36	16.44	17.45
Firm growth	127,997	17.02	90.33	-4.90	14.00	34.10
Tangibility	153,008	27.57	24.40	7.37	21.03	41.54
Firm business risk	111,376	6.28	10.77	1.82	3.69	7.08
Industry median leverage	260	24.10	10.70	16.85	23.48	30.60
Industry median leverage short term	260	9.18	5.62	4.13	9.36	13.18
Industry median leverage long term	260	5.74	8.52	0.00	2.38	8.32
GDP growth	13	5.90	4.15	5.03	6.06	8.49
Inflation	13	9.25	3.13	7.40	8.81	10.06
Government leverage	13	40.85	9.43	34.00	38.00	44.00
Financial development	13	0.47	0.04	0.44	0.48	0.50

This table reports the descriptive statistics for the dependent and the independent variables used in this study. Panel A reports the descriptive statistics for the full sample period, 1996-2015, while Panels B and C report the descriptive statistics for the subperiods 1996-2002 and 2003-2015, respectively. Definitions of variables are given in Table 1. All variables are expressed as percentages, with the exception of firm size and financial development.

**Table 3 Descriptive statistics, Small and Medium-Sized Enterprises (SMEs)**

Variable	Obs	Mean	Std. Dev.	1 <sup>st</sup> Quartile	Median	3 <sup>rd</sup> Quartile
<b>Panel A: SMEs, full sample</b>						
Total leverage	184,282	25.68	25.63	2.23	19.72	41.50
Short term leverage	184,282	15.71	19.54	0.04	8.26	24.84
Long term leverage	184,282	9.83	18.47	0.00	0.00	12.02
Profitability	184,282	5.77	16.01	0.25	4.70	11.05
Firm size	178,151	15.81	1.86	14.92	16.02	16.94
Firm growth	147,810	25.02	93.70	-2.35	20.85	49.89
Tangibility	184,282	26.22	24.76	5.85	18.50	39.98
Firm business risk	124,617	7.69	12.65	2.05	4.35	8.80
Industry median leverage	400	19.24	11.65	10.53	18.17	26.54
Industry median leverage short term	400	7.82	5.68	2.99	6.94	12.18
Industry median leverage long term	400	3.83	7.43	0.00	0.00	5.57
GDP growth	20	4.88	4.76	4.17	6.24	7.81
Inflation	20	28.75	30.42	8.34	10.26	46.41
Government leverage	20	42.05	12.65	32.00	38.00	45.25
Financial development	20	0.44	0.05	0.40	0.43	0.49
<b>Panel B: SMEs, 1996-2002</b>						
Total leverage	54,858	18.19	25.35	0.00	6.85	27.90
Short term leverage	54,858	13.66	20.77	0.00	3.47	19.88
Long term leverage	54,858	4.30	13.84	0.00	0.00	0.00
Profitability	54,858	8.98	20.53	0.56	7.34	18.23
Firm size	53,402	15.52	1.76	14.50	15.62	16.61
Firm growth	41,347	45.30	85.28	19.55	46.86	73.58
Tangibility	54,858	23.53	24.01	4.50	14.75	35.62
Firm business risk	32,741	11.20	15.11	3.62	7.30	13.46
Industry median leverage	140	10.70	7.08	4.91	10.04	14.63
Industry median leverage short term	140	5.58	4.89	0.43	5.01	8.12
Industry median leverage long term	140	0.28	1.85	0.00	0.00	0.00
GDP growth	7	3.00	5.58	-0.54	6.43	7.01
Inflation	7	64.95	23.62	53.78	68.79	74.75
Government leverage	7	44.29	17.88	32.00	37.00	53.50
Financial development	7	0.38	0.03	0.38	0.39	0.40
<b>Panel C: SMEs, 2003-2015</b>						
Total leverage	129,424	28.85	25.08	6.46	25.18	44.94
Short term leverage	129,424	16.57	18.93	0.43	10.33	26.38
Long term leverage	129,424	12.18	19.65	0.00	0.82	17.83
Profitability	129,424	4.41	13.42	0.16	4.12	9.03
Firm size	124,749	15.94	1.89	15.13	16.18	17.05
Firm growth	106,463	17.14	95.63	-6.62	13.96	35.76
Tangibility	129,424	27.36	24.99	6.64	20.09	41.62
Firm business risk	91,876	6.44	11.39	1.78	3.66	7.15
Industry median leverage	260	24.10	10.70	16.85	23.48	30.60
Industry median leverage short term	260	9.18	5.62	4.13	9.36	13.18
Industry median leverage long term	260	5.74	8.52	0.00	2.38	8.32
GDP growth	13	5.90	4.15	5.03	6.06	8.49
Inflation	13	9.25	3.13	7.40	8.81	10.06
Government leverage	13	40.85	9.43	34.00	38.00	44.00
Financial development	13	0.47	0.04	0.44	0.48	0.50

This table reports the descriptive statistics for the dependent and the independent variables used in this paper for SMEs. Panel A reports the descriptive statistics for the full sample period, 1996-2015, while Panels B and C report the descriptive statistics for the subperiods 1996-2002 and 2003-2015, respectively. Definitions of variables are given in Table 1. Based on European Union as well as Turkish official criterion, a firm is classified as an “SME” if its number of employees is less than 250, and “large” otherwise. All variables are expressed as percentages, with the exception of firm size and financial development.

**Table 4 Descriptive statistics, large firms**

Variable	Obs	Mean	Std. Dev.	1 <sup>st</sup> Quartile	Median	3 <sup>rd</sup> Quartile
<i>Panel A: Large firms, full sample</i>						
Total leverage	31,154	24.75	22.63	4.95	20.56	39.05
Short term leverage	31,154	13.85	16.10	0.74	8.44	21.32
Long term leverage	31,154	10.83	16.33	0.00	2.61	16.38
Profitability	31,154	6.99	15.29	1.20	5.96	12.85
Firm size	31,021	18.16	1.44	17.31	18.11	19.04
Firm growth	27,760	24.41	59.61	4.35	19.07	40.88
Tangibility	31,154	29.14	21.00	12.46	25.34	41.92
Firm business risk	24,475	6.08	7.46	2.16	4.21	7.54
Industry median leverage	400	19.24	11.65	10.53	18.17	26.54
Industry median leverage short term	400	7.82	5.68	2.99	6.94	12.18
Industry median leverage long term	400	3.83	7.43	0.00	0.00	5.57
GDP growth	20	4.88	4.76	4.17	6.24	7.81
Inflation	20	28.75	30.42	8.34	10.26	46.41
Government leverage	20	42.05	12.65	32.00	38.00	45.25
Financial development	20	0.44	0.05	0.40	0.43	0.49
<i>Panel B: Large firms, 1996-2002</i>						
Total leverage	7,570	24.66	25.01	2.01	18.67	39.68
Short term leverage	7,570	16.76	19.83	0.40	9.45	26.55
Long term leverage	7,570	7.75	14.97	0.00	0.00	10.02
Profitability	7,570	10.05	19.40	1.30	9.03	19.59
Firm size	7,522	18.08	1.49	17.28	18.08	18.98
Firm growth	6,226	51.96	58.98	32.74	50.58	70.44
Tangibility	7,570	30.47	21.48	13.31	26.71	43.99
Firm business risk	4,975	8.23	8.32	3.18	6.07	10.36
Industry median leverage	140	10.70	7.08	4.91	10.04	14.63
Industry median leverage short term	140	5.58	4.89	0.43	5.01	8.12
Industry median leverage long term	140	0.28	1.85	0.00	0.00	0.00
GDP growth	7	3.00	5.58	-0.54	6.43	7.01
Inflation	7	64.95	23.62	53.78	68.79	74.75
Government leverage	7	44.29	17.88	32.00	37.00	53.50
Financial development	7	0.38	0.03	0.38	0.39	0.40
<i>Panel C: Large firms, 2003-2015</i>						
Total leverage	23,584	24.78	21.82	5.86	21.00	38.85
Short term leverage	23,584	12.92	14.57	0.87	8.23	20.03
Long term leverage	23,584	11.82	16.62	0.00	4.33	18.24
Profitability	23,584	6.01	13.56	1.17	5.44	11.20
Firm size	23,499	18.18	1.42	17.31	18.12	19.06
Firm growth	21,534	16.45	57.37	1.28	14.12	28.05
Tangibility	23,584	28.72	20.83	12.17	24.97	41.27
Firm business risk	19,500	5.53	7.12	2.00	3.83	6.84
Industry median leverage	260	24.10	10.70	16.85	23.48	30.60
Industry median leverage short term	260	9.18	5.62	4.13	9.36	13.18
Industry median leverage long term	260	5.74	8.52	0.00	2.38	8.32
GDP growth	13	5.90	4.15	5.03	6.06	8.49
Inflation	13	9.25	3.13	7.40	8.81	10.06
Government leverage	13	40.85	9.43	34.00	38.00	44.00
Financial development	13	0.47	0.04	0.44	0.48	0.50

This table reports the descriptive statistics for the dependent and the independent variables used in this paper for large firms. Panel A reports the descriptive statistics for the full sample period, 1996-2015, while Panels B and C report the descriptive statistics for the subperiods 1996-2002 and 2003-2015, respectively. Definitions of variables are given in Table 1. Based on European Union as well as Turkish official criterion, a firm is classified as an "SME" if its number of employees is less than 250, and "large" otherwise. All variables are expressed as percentages, with the exception of firm size and financial development.

sample period, 1996-2015, while Panels B and C report the descriptive statistics for the subperiods 1996-2002 and 2003-2015, respectively.

The increase in corporate leverage is remarkable between these two subperiods. Total leverage increases by almost 49% from 1996-2002 period to 2003-2015 period on average. The mean of long term corporate leverage almost triples while short term leverage remains relatively stable between the two subperiods. Hence, this increase in the long term leverage mainly accounts for the increase in total leverage ratios. A similar trend in total leverage and the shift in maturity structure can be seen in the median industry leverage ratios. In addition, firm riskiness decreases dramatically from 1996-2002 period to 2003-2015 period, which can be attributed to a more stable economic environment during the latter period. The mean of firm business risk decreases to 6.28% from 10.81% while standard deviation of firm business risk decreases to 10.77% from 14.43%. Moreover, the improvement in financial development and decrease in government leverage are worthwhile to note for the latter period.

On average, total leverage and firm riskiness of SMEs are higher than those of large firms. Similarly, on average 59% increase in total leverage of SMEs from 1996-2002 period to 2003-2015 period is significantly higher than that for large firms. Even though, maturity structure shift in corporate leverage is considerable for both SMEs and large firms, increase in the usage of long term debt between the two subperiods is significantly higher for SMEs than large firms (183% vs 53%).

## **5. Methodology**

Firm heterogeneity and time invariant (unobserved) differences across firms are considered as essential to be controlled in empirical studies of capital structure. In addition, in light of the arguments in the literature regarding slow adjustment of firm leverage to the optimal leverage each period due to adjustment costs, a lag of the dependent variable (firm leverage) must be included in the model to control for the prior period's leverage (Flannery and Hankins, 2013). However, serious econometric biases are introduced due to using lag of the dependent variable as an explanatory variable and firm fixed effects together. OLS ignores longitudinal structure of the data. Therefore, in OLS, the coefficient estimates of the lag dependent variable is biased due to the correlation between error term and the said lagged variable (Nickell, 1981; Bond, 2002; Baltagi, 2008). On the other hand, fixed effect dynamic model captures the longitudinal structure of the data but it also produces biased estimations by ignoring correlation between error term and the lagged dependent variable (Nickell, 1981).

In order to overcome this bias, Arellano and Bond (1991) introduce the first-difference generalized method of moments (GMM) estimator which uses a first difference transformation of the model to remove the fixed effects and then employs the second lag of dependent variable as a valid instrument for the first difference of lag dependent variable. It deals with the lack of efficiency issue of Anderson and Hsiao (1981, 1982) approach by using longer lagged dependent variables as additional valid instruments. However, potential weakness of Arellano and Bond (1991) approach is revealed by Arellano and Bover (1995) and Blundell and Bond (1998). They argue that the lagged values of the dependent variable may be poor instruments and provide inadequate information for the first differenced variables, especially if they are serially correlated. Hence, Blundell and Bond (1998) introduce an alternative GMM system estimation, which employs a two-equation system of regression both in levels and in first differences.

However, we prefer fixed effect dynamic panel model to Arellano and Bond (1991) and Blundell and Bond (1998) which are widely used approaches in the corporate finance literature as dynamic panel models for three reasons. First, the aforementioned bias of fixed effect dynamic panel is shown, in the literature such as Judson and Owen (1999), and Flannery and Hankins (2013), to decrease with the length of the panel data as the impact of an error term becomes relatively small in the average error, which leads to a decrease in the correlation between the error term and the said lagged variable. Second, results of the Arellano – Bond test (AR(2)) reject the null hypothesis of no second order autocorrelation for our data, which violates the main assumption of Arellano and Bond (1991) and Blundell and Bond (1998), and make it impossible to use the instrumental variables suggested by them to estimate these models (Baltagi, 2008, Hahn et al., 2007). Third, Flannery and Hankins (2013) show that fixed effect dynamic panel model is one of the most accurate estimators of panel data with second order serial correlation and endogenous independent variables. Their results also suggest that fixed effect dynamic panel model should also be considered when dependent variable is clustered and when there is an unbalanced panel data. Since we have an unbalanced long panel data with second order serial correlation, fixed effect dynamic panel model is our best alternative.

The fixed effect dynamic panel model employed in this study is given below:

$$CL_{it} = \alpha + \lambda CL_{it-1} + \sum_k \gamma_k F_{k,it-1} + \sum_l \beta_l I_{l,it} + \sum_m \delta_m EE_{m,it} + \sum_n \theta_n X_{n,it} + \mu_i + \varepsilon_{it} \quad (1)$$

where  $CL_{it}$  denotes corporate leverage of firm  $i$  in year  $t$ ;  $F$  is the vector of firm characteristics while  $I$  is the industry specific components;  $EE$  denotes the proxies for economic environment and  $X$  is the macroeconomic control variables mentioned in Section 3.  $\mu_i$  is (unobservable) time invariant firm specific effect, and  $\varepsilon_{it}$  is the idiosyncratic error term.

## 6. Results

Table 5 presents estimation results of the dynamic panel model in equation 1 for the full sample over the period 1996-2015. We estimate the model using short term, long term and total financial debt to total assets ratios as leverage in the first, second and third columns, respectively.

### 6.1. Economic environment factors

Panel estimations in Table 5 show that there is a significant association between financial development and corporate leverage.<sup>4</sup> The coefficient of FDI is significantly negative for short term leverage (column 1) while it is significantly positive for long term and total leverage (column 2 and 3). These relationships suggest that financial development has a significant impact on the maturity structure of corporate debt in Turkey. Results provide evidence that improvement in financial development has significant impact on decreasing short term leverage and increasing long term leverage. Moreover, it is worthwhile to note that FDI is the explanatory variable that has the highest impact on long term leverage in the model. Economically, results suggest that a 10 percent increase in financial development is associated with a 2.1 percentage points increase in long term leverage, which amounts to almost a 21% increase in long term leverage ratios of firms (from 9.98% to 12.08%). On the other hand, the association between this variable and short term leverage is not that high; short term leverage decreases by only -0.5% when FDI increases by 10%.

Besides, government leverage has a significant adverse impact on both short term and total corporate leverage (columns 1 and 3). In other words, results provide significant supporting evidence from a firm level data that government debt crowds in/out short term and total corporate debt during the sample period, 1996-2015. This finding is in line with Graham et al.

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<sup>4</sup> Küçükkaya and Soytaş (2011) construct a financial development index for Turkey for the period 1991 to 2005 by using Principal Component Analysis. Using the same methodology, we reconstructed their index for the period 1991 to 2015. For robustness, this reconstructed index is also used as an alternative measure of financial development in addition to the index created by Svirydzhenka (2016). Since the results obtained by using this alternative index are in line with those in Table 5, they are not reported to conserve space but available from authors upon request.



**Table 5 Leverage dynamics**

	Leverage		
	Short Term	Long Term	Total Leverage
	(1)	(2)	(3)
<i>Firm Characteristics</i>			
Lag of leverage	0.378*** (0.007)	0.461*** (0.008)	0.500*** (0.006)
Profitability	-0.008* (0.005)	-0.018*** (0.003)	-0.018*** (0.006)
Size	0.010*** (0.001)	0.005*** (0.001)	0.012*** (0.001)
Growth	-0.002*** (0.001)	-0.001** (0.001)	-0.002*** (0.001)
Tangibility	-0.015*** (0.004)	0.017*** (0.004)	0.004 (0.006)
Business risk	-0.012* (0.007)	-0.021*** (0.006)	-0.036*** (0.009)
<i>Industry Specific Factor</i>			
Industry median leverage	0.296*** (0.024)	0.095*** (0.017)	0.152*** (0.013)
<i>Macroeconomic/Economic Environment Factors</i>			
GDP growth	0.045*** (0.009)	0.005 (0.008)	0.066*** (0.010)
Inflation	0.031*** (0.004)	0.015*** (0.003)	0.038*** (0.004)
Government leverage	-0.022*** (0.005)	0.004 (0.003)	-0.012** (0.006)
FDI	-0.048*** (0.018)	0.210*** (0.016)	0.096*** (0.022)
Constant	-0.067*** (0.016)	-0.131*** (0.014)	-0.154*** (0.019)
Observations	112,917	112,917	112,917
Adjusted R <sup>2</sup>	0.646	0.714	0.744

This table presents full sample results from the estimation of dynamic panel model with firm fixed effects in Eq. (1);  $CL_{it} = \alpha + \lambda CL_{it-1} + \sum_k \gamma_k F_{k,it-1} + \sum_i \beta_i I_{i,it} + \sum_m \delta_m EE_{m,it} + \sum_n \theta_n X_{n,it} + \mu_i + \varepsilon_{it}$  where  $CL_{it}$  denotes corporate leverage (financial debt to assets) of firm  $i$  in year  $t$ ;  $F$  is the vector of firm characteristics while  $I$  is the industry specific components;  $EE$  denotes the proxies for economic environment and  $X$  is the macroeconomic variables.  $\mu_i$  is (unobservable) time invariant firm specific effect, and  $\varepsilon_{it}$  is the idiosyncratic error term. Definitions of variables are given in Table 1. Robust standard errors clustered at firm level are reported in parentheses. Statistical significance at the 1%, 5%, and 10 % levels is indicated by \*\*\*, \*\*, and \*, respectively.

(2015), Friedman (1986), Taggart (1985), McDonald (1983) and Miller (1977). Moreover, this is the first study documenting this relationship for Turkey.

## **6.2. Firm specific and industry specific factors**

Results show that that firms with higher profit ratios and smaller size tend to have lower leverage in all maturity terms. Besides, firms with higher tangible assets tend to have higher long term debt ratios and lower short term debt ratios. This reveals that firms tend to match maturities of their assets and liabilities in Turkey. These results are in line with previous studies regarding Turkish non-financial firms.

Besides, firm growth and firm business risk have significant negative associations with both short term and long term leverage. This indicates that growth firms with inherently higher expected financial distress costs tend to have lower leverage. Besides, riskier firms tend to have difficulty in accessing credit due to adverse selection and/or higher expected financial distress costs. Although the aim of this study is not a formal testing of the capital structure theories, this result is consistent with both the pecking order and the trade off theories. On the other hand, results regarding profitability are consistent with the pecking order theory while results regarding firm size, growth and tangibility are consistent with the trade off theory.

Moreover, results show that industry median leverage is significantly and positively associated with both short term and long term leverage. Median leverage of the industry is argued to be a benchmark for a firm in that industry and can be taken as a proxy for target leverage (Hull, 1999, Hovakimian et al. 2001, Flannery and Rangan, 2006, Frank and Goyal, 2008, 2009). In that sense, results seem to be in line with the trade off theory.<sup>5</sup>

## **6.3. Macroeconomic factors**

In column 1 of Table 5, the coefficient of GDP is significantly positive for short term leverage. This suggest that short term leverage is procyclical in line with the trade off theory. On the other hand, the impact of inflation is significantly positive on both short and long term leverages. These results suggest that firms increase their leverage with inflation. One explanation for this can be that increase in inflation-adjusted nominal interest rates increases the tax advantage of corporate debt which is in line with the trade off theory. However, given the arguments in the measurements section regarding inflation, we argue that these results should be taken with skepticism.

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<sup>5</sup> For robustness, we re-estimate all alternative specifications of the model excluding industry median leverage. Results are in line with those reported in all tables that has industry median leverage as an explanatory variable. To converse space they are not reported in the paper but available upon request from authors.

## **7. Analyzing possible differences in leverage dynamics based on ownership status of firms, alternative time periods and firm size classifications**

In order to examine possible differences in leverage dynamics, in this section we re-estimate the model for different specifications based on ownership status of firms, alternative time periods and firm size classifications. These analyses can also be viewed as additional robustness checks on our main results in Section 6.

### **7.1. Does ownership status of firms matter?**

There are several studies in the literature showing the impact of firm ownership status on main frictions such as information asymmetry and agency costs. Furthermore, ample evidence is provided regarding the relationship between stock market return and capital structure decisions of firms (Welch, 2004; Choe et al., 1993; Korajczyk et al., 1990; Bayless and Chaplinksy, 1991 and others). Accordingly, we re-estimate the panel model for private and public firms separately in order to assess the potential differential impact of ownership status on determinants of firm's capital structure. Results are reported in Panel A and Panel B of Table 6 for private firms and public firms, respectively.

Graham et al. (2015) and others argue that equity market return should be considered as the cost of an alternative financing source. Thus, equity market return measured as the annual return on BIST 100 (*BIST\_Return*) index is also incorporated into the model for public firms as an additional explanatory variable. Results are reported in Panel C of Table 6.

In the first place, results for private firms (Panel A) are in line with those presented in Table 5. This is expected due to the dominant share of private firms in the sample. On the other hand, there is a remarkable difference between public and private firms regarding the impact of economic environment factors on leverage. For public firms, financial development appears to have a positive effect on only short term leverage (columns 4 and 7). For private firms, on the other hand, it has a negative impact on short term and a positive impact on long term leverage ratios, respectively (columns 1 and 2). Similarly, the significant negative association between government leverage and total corporate leverage exists only for private firms.

These results suggest that crowding out/in effect of government leverage and significant positive impact of financial development on corporate leverage are more pronounced for private firms than public firms. Moreover, Table 6 exhibits similar results regarding impacts of industry specific, and firm specific factors on capital structure of public and private firms with the exception of business risk and tangibility. Conspicuously, the significant positive impact of tangibility on maturity structure of private firms turns out to be insignificant for public firms.

**Table 6 Leverage dynamics, private versus public firms**

	Leverage								
	Panel A: Private firms			Panel B: Publicly traded firms			Panel C: Publicly traded firms		
	Short Term	Long Term	Total Leverage	Short Term	Long Term	Total Leverage	Short Term	Long Term	Total Leverage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Firm Characteristics</b>									
Lag of leverage	0.374*** (0.007)	0.459*** (0.008)	0.494*** (0.007)	0.464*** (0.029)	0.492*** (0.035)	0.619*** (0.023)	0.462*** (0.029)	0.492*** (0.035)	0.618*** (0.023)
Profitability	-0.006 (0.005)	-0.017*** (0.003)	-0.016*** (0.006)	-0.075** (0.035)	-0.061** (0.029)	-0.090*** (0.035)	-0.064* (0.035)	-0.059** (0.029)	-0.079** (0.035)
Size	0.010*** (0.001)	0.005*** (0.001)	0.012*** (0.001)	0.018** (0.008)	0.009* (0.005)	0.021*** (0.006)	0.017** (0.008)	0.009* (0.005)	0.020*** (0.006)
Growth	-0.002*** (0.001)	-0.001* (0.001)	-0.002** (0.001)	-0.011* (0.006)	-0.011** (0.004)	-0.016** (0.007)	-0.010 (0.006)	-0.011** (0.004)	-0.015** (0.007)
Tangibility	-0.016*** (0.004)	0.017*** (0.005)	0.003 (0.006)	-0.007 (0.025)	0.018 (0.021)	-0.004 (0.021)	-0.000 (0.025)	0.019 (0.021)	0.002 (0.021)
Business risk	-0.013* (0.007)	-0.021*** (0.006)	-0.036*** (0.009)	-0.011 (0.065)	-0.023 (0.052)	-0.058 (0.056)	-0.006 (0.066)	-0.022 (0.052)	-0.054 (0.055)
<b>Industry Specific Factor</b>									
Industry median leverage	0.307*** (0.025)	0.092*** (0.017)	0.151*** (0.013)	-0.031 (0.120)	0.224*** (0.081)	0.145** (0.058)	-0.023 (0.120)	0.215*** (0.081)	0.105* (0.059)
<b>Macroeconomic/Economic Environment Factors</b>									
GDP growth	0.047*** (0.009)	0.007 (0.008)	0.070*** (0.010)	-0.025 (0.042)	-0.028 (0.039)	-0.057 (0.047)	-0.091** (0.042)	-0.040 (0.041)	-0.128** (0.051)
Inflation	0.026*** (0.004)	0.016*** (0.003)	0.034*** (0.005)	0.140*** (0.017)	0.010 (0.015)	0.140*** (0.018)	0.162*** (0.019)	0.014 (0.016)	0.163*** (0.019)
Government leverage	-0.024*** (0.005)	0.003 (0.003)	-0.015*** (0.006)	0.015 (0.028)	0.033** (0.016)	0.054* (0.031)	-0.022 (0.028)	0.026 (0.017)	0.007 (0.031)
FDI	-0.053*** (0.019)	0.216*** (0.016)	0.099*** (0.023)	0.252*** (0.092)	0.022 (0.075)	0.210** (0.107)	0.209** (0.091)	0.020 (0.074)	0.210** (0.106)
BIST_RETURN							-0.010*** (0.002)	-0.002 (0.002)	-0.011*** (0.002)
Constant	-0.059*** (0.016)	-0.133*** (0.015)	-0.150*** (0.020)	-0.397*** (0.140)	-0.148 (0.099)	-0.456*** (0.112)	-0.349** (0.141)	-0.141 (0.099)	-0.415*** (0.112)
Observations	109,719	109,719	109,719	3,198	3,198	3,198	3,198	3,198	3,198
Adjusted R <sup>2</sup>	0.647	0.714	0.742	0.646	0.709	0.818	0.649	0.709	0.820

The table presents full sample results from the estimation of dynamic panel model with firm fixed effects in Eq. (1);  $CL_{it} = \alpha + \lambda CL_{it-1} + \sum_k \gamma_k F_{k,it-1} + \sum_l \beta_l I_{l,it} + \sum_m \delta_m EE_{m,it} + \sum_n \theta_n X_{n,it} + \mu_i + \varepsilon_{it}$  where  $CL_{it}$  denotes corporate leverage (financial debt to assets) of firm  $i$  in year  $t$ ;  $F$  is the vector of firm characteristics while  $I$  is the industry specific components;  $EE$  denotes the proxies for economic environment and  $X$  is the macroeconomic variables.  $\mu_i$  is (unobservable) time invariant firm specific effect, and  $\varepsilon_{it}$  is the idiosyncratic error term. Definitions of variables are given in Table 1. Results for private and public firms are given in Panels A and B, respectively. Results with an additional economic environment variable, equity market return measured as the annual return on *BIST 100* (*BIST\_Return*) index for public firms are given in Panel C. Robust standard errors clustered at firm level are reported in parentheses. Statistical significance at the 1%, 5%, and 10 % levels is indicated by \*\*\*, \*\*, and \*, respectively.

Moreover, the impact of business risk on capital structure is significantly negative for only private firms. These findings may not be surprising since publically held firms have to disclose a lot more information to the public and this higher information disclosure helps reduce the information asymmetry between its creditors and the firm, hence, makes it easier for public firms to have access to capital.

## **7.2. SMEs versus large firms**

Prior literature provides ample evidence that leverage determinants differ among firms with different sizes. Besides, in Turkey, financial constraints and difficulty in accessing credit markets have been considered as the main problems for SMEs in contrast to large firms. In order to examine this issue, we re-estimate the empirical dynamic panel model for large firms and SMEs separately.<sup>6</sup> Results are reported in Table 7.

The most remarkable difference between SMEs and large firms is in terms of the impact of economic environment variables. Results show that improvements in financial development decrease short term debt usage for SMEs and foster long term debt usage for both SMEs and large firms. Another striking result is that the government leverage has significantly negative impact on total leverages of SMEs only. Moreover, firm growth and business risk have significant negative impacts on only SMEs` leverage. These results suggest that increase in government borrowing as well as firm growth and higher riskiness hinder SMEs borrowing capacity.

## **7.3. Analyzing subsamples: Is there any structural break?**

In last decades, Turkey has experienced financial turmoils which had severe effects on all economic agents such as crises in 1994, 1998-1999 and 2000-2001. After the last and the most influential crisis in 2000-2001, Turkey has adopted economic stabilization programs as well as structural regulations in her financial system. The period following this crisis can be considered as a relatively more stable period in terms of general economic conditions. Besides, that is the period over which corporate debt level of Turkish non-financial firms has substantially increased while government indebtedness has decreased. Financial development has gained momentum during this period as well.

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<sup>6</sup> For robustness, another classification scheme based on firm sales is also used. In this approach, firms are divided into quartiles by the value of their net sales, and a firm is classified as “large” if it is in the highest net sales quartile and as an “SME” otherwise. Since the results based on this classification scheme are qualitatively the same as those based on number of employees, they are not reported in the paper but available upon request from authors.

**Table 7 Leverage dynamics, SMEs versus large firms**

	Leverage					
	SMEs			Large firms		
	Short Term	Long Term	Total Leverage	Short Term	Long Term	Total Leverage
	(1)	(2)	(3)	(4)	(5)	(6)
<b><i>Firm Characteristics</i></b>						
Lag of leverage	0.347*** (0.008)	0.432*** (0.010)	0.468*** (0.007)	0.457*** (0.013)	0.503*** (0.014)	0.571*** (0.012)
Profitability	-0.005 (0.005)	-0.013*** (0.004)	-0.013** (0.006)	-0.041*** (0.011)	-0.037*** (0.009)	-0.055*** (0.013)
Size	0.011*** (0.001)	0.004*** (0.001)	0.012*** (0.001)	0.008*** (0.002)	0.005** (0.002)	0.011*** (0.003)
Growth	-0.002*** (0.001)	-0.001 (0.001)	-0.002*** (0.001)	-0.001 (0.001)	-0.001 (0.002)	-0.002 (0.002)
Tangibility	-0.017*** (0.005)	0.017*** (0.005)	0.002 (0.006)	-0.017* (0.009)	0.013 (0.011)	-0.002 (0.012)
Business risk	-0.015** (0.008)	-0.019*** (0.007)	-0.036*** (0.010)	-0.010 (0.018)	-0.010 (0.015)	-0.028 (0.021)
<b><i>Industry Specific Factor</i></b>						
Industry median leverage	0.326*** (0.028)	0.063*** (0.021)	0.149*** (0.015)	0.177*** (0.051)	0.184*** (0.031)	0.168*** (0.026)
<b><i>Macroeconomic/Economic Environment Factors</i></b>						
GDP growth	0.054*** (0.011)	0.003 (0.009)	0.072*** (0.012)	0.004 (0.016)	0.010 (0.015)	0.026 (0.019)
Inflation	0.023*** (0.005)	0.015*** (0.004)	0.029*** (0.005)	0.071*** (0.008)	0.018** (0.007)	0.083*** (0.009)
Government leverage	-0.022*** (0.006)	-0.001 (0.004)	-0.017*** (0.006)	-0.033*** (0.012)	0.029*** (0.009)	0.006 (0.013)
FDI	-0.037* (0.022)	0.224*** (0.019)	0.111*** (0.027)	-0.032 (0.033)	0.153*** (0.031)	0.076* (0.040)
Constant	-0.074*** (0.018)	-0.122*** (0.016)	-0.146*** (0.021)	-0.070* (0.039)	-0.120*** (0.040)	-0.166*** (0.050)
Observations	92,224	92,224	92,224	20,693	20,693	20,693
Adjusted R <sup>2</sup>	0.645	0.715	0.739	0.666	0.721	0.782

The table presents results from the estimation of dynamic panel model with firm fixed effects in Eq. (1);  $CL_{it} = \alpha + \lambda CL_{it-1} + \sum_k \gamma_k F_{k,it-1} + \sum_l \beta_l I_{l,it} + \sum_m \delta_m EE_{m,it} + \sum_n \theta_n X_{n,it} + \mu_i + \varepsilon_{it}$  where  $CL_{it}$  denotes corporate leverage (financial debt to assets) of firm  $i$  in year  $t$ ;  $F$  is the vector of firm characteristics while  $I$  is the industry specific components;  $EE$  denotes the proxies for economic environment and  $X$  is the macroeconomic variables.  $\mu_i$  is (unobservable) time invariant firm specific effect, and  $\varepsilon_{it}$  is the idiosyncratic error term. Definitions of variables are given in Table 1. Based on European Union as well as Turkish official criterion, a firm is classified as an “SME” if its number of employees is less than 250, and “large” otherwise. Robust standard errors clustered at firm level are reported in parentheses. Statistical significance at the 1%, 5%, and 10 % levels is indicated by \*\*\*, \*\*, and \*, respectively.

Previous studies such as Reinhart and Rogoff (2009) and IMF (2009) showed that such financial crisis typically prompt a sharp recession that last approximately 2 years. Besides, IMF (2002) stated that Turkish economy exhibited strong signs of recovery by the end of 2002. Accordingly, in order to analyze whether this financial crisis created a structural break that caused a difference in impact of leverage determinants after the break, we divide the whole sample into two subperiods as 1996-2002 and 2003-2015. We re-estimate the empirical model for these subperiods separately based on different firm sizes. Results are presented in Table 8, 9 and 10.<sup>7</sup>

Prominent difference in results is that government leverage is negatively associated with short term leverage of only SMEs in the first subperiod (column 1 of Table 9) while it is negatively associated with short term and long term leverage of both SMEs and large firms in the second subperiod (columns 1, 2, 4 and 5 in Table 10). This can be explained by the difference in behavior of government leverage during these two subperiods. In the second subperiod, government indebtedness has a downward trend whereas the trend is reverse in the first subperiod. Hence, in general, 2003-2015 period can be considered as a “crowding in” period of government leverage while the preceding one can be considered as a “crowding out” period. Thus, results in this paper indicate that only SMEs suffer in crowding out periods while both SMEs and large firms benefit in crowding in periods in Turkey. Furthermore, significant impact of government leverage only on short term leverage of SMEs in the first subperiod is not surprising given the dominant share of short term borrowing in firms’ capital structure during this time period. Debt maturities of Turkish firms have significantly been prolonged in the last decade which can be attributed to improvements in financial development. Accordingly, results show that financial development has a significant and positive impact on long term leverage of both SMEs and large firms in the second subperiod.<sup>8</sup>

The impacts of other variables for 2003-2015 period are mostly in line with the whole sample period while results regarding firm specific and macroeconomic factors are mostly mixed for the period from 1996 to 2002. This is not surprising since the first subperiod is a relatively less stable period in terms of general economic conditions in Turkey.

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<sup>7</sup> All the models for short term and long term leverages and different firm sizes based on net sales, and based on number of employees are re-estimated for the subperiod 2002-2015 as well. Results are in line with those for the subperiod 2003-2015. To conserve space they are not reported in the study however are available from authors upon request.

<sup>8</sup> There is not a significant variation in financial development index during the first subperiod, thus coefficient of this variable cannot be estimated.

**Table 8 Leverage dynamics, subperiod analysis**

	Leverage					
	1996-2002			2003-2015		
	Short Term	Long Term	Total Leverage	Short Term	Long Term	Total Leverage
	(1)	(2)	(3)	(4)	(5)	(6)
<b><i>Firm Characteristics</i></b>						
Lag of leverage	0.064*** (0.014)	0.138*** (0.021)	0.146*** (0.015)	0.304*** (0.007)	0.403*** (0.009)	0.439*** (0.007)
Profitability	-0.017* (0.009)	-0.012* (0.006)	-0.025** (0.011)	-0.014** (0.006)	-0.019*** (0.005)	-0.021*** (0.008)
Size	0.009*** (0.003)	0.001 (0.002)	0.007*** (0.003)	0.009*** (0.001)	0.003*** (0.001)	0.010*** (0.001)
Growth	-0.002 (0.002)	-0.001 (0.001)	-0.002 (0.002)	-0.002*** (0.001)	0.000 (0.001)	-0.001 (0.001)
Tangibility	-0.026** (0.012)	0.020** (0.010)	-0.009 (0.014)	-0.011** (0.005)	0.016*** (0.005)	0.008 (0.006)
Business risk	-0.021 (0.019)	-0.020 (0.013)	-0.046* (0.026)	-0.010 (0.008)	-0.013* (0.008)	-0.025*** (0.009)
<b><i>Industry Specific Factor</i></b>						
Industry median leverage	0.404*** (0.064)	-0.068 (0.201)	0.257*** (0.050)	0.234*** (0.032)	0.060*** (0.019)	0.079*** (0.018)
<b><i>Macroeconomic/Economic Environment Factors</i></b>						
GDP growth	-0.063 (0.415)	0.142 (0.288)	-0.248 (0.436)	0.018* (0.010)	0.004 (0.009)	0.045*** (0.011)
Inflation	0.001 (0.133)	0.051 (0.092)	-0.057 (0.139)	0.125*** (0.018)	0.091*** (0.015)	0.223*** (0.022)
Government leverage	-0.038 (0.039)	0.028 (0.027)	-0.033 (0.041)	-0.039*** (0.011)	-0.071*** (0.009)	-0.123*** (0.014)
FDI	_ <sup>a</sup>	_ <sup>a</sup>	_ <sup>a</sup>	0.024 (0.022)	0.162*** (0.019)	0.146*** (0.025)
Constant	-0.002 (0.098)	-0.022 (0.071)	0.083 (0.102)	-0.067*** (0.020)	-0.045** (0.018)	-0.069*** (0.023)
Observations	26,091	26,091	26,091	86,826	86,826	86,826
Adjusted R <sup>2</sup>	0.693	0.693	0.762	0.672	0.737	0.769

The table presents results from the estimation of dynamic panel model with firm fixed effects in Eq. (1);  $CL_{it} = \alpha + \lambda CL_{it-1} + \sum_k \gamma_k F_{k,it-1} + \sum_l \beta_l I_{l,it} + \sum_m \delta_m EE_{m,it} + \sum_n \theta_n X_{n,it} + \mu_i + \varepsilon_{it}$  where  $CL_{it}$  denotes corporate leverage (financial debt to assets) of firm  $i$  in year  $t$ ;  $F$  is the vector of firm characteristics while  $I$  is the industry specific components;  $EE$  denotes the proxies for economic environment and  $X$  is the macroeconomic variables.  $\mu_i$  is (unobservable) time invariant firm specific effect, and  $\varepsilon_{it}$  is the idiosyncratic error term. Definitions of variables are given in Table 1. Results for subperiods 1996-2002 and 2003-2015 are given in Panels A and B, respectively. Robust standard errors clustered at firm level are reported in parentheses. Statistical significance at the 1%, 5%, and 10 % levels is indicated by \*\*\*, \*\*, and \*, respectively.

<sup>a</sup> There is not a significant variation in the financial development index during the period 1996-2002. Thus, the coefficient for financial development could not be estimated.



**Table 9 Leverage dynamics, SMEs versus large firms, 1996-2002**

	Leverage					
	SMEs			Large firms		
	Short Term	Long Term	Total Leverage	Short Term	Long Term	Total Leverage
	(1)	(2)	(3)	(4)	(5)	(6)
<b><i>Firm Characteristics</i></b>						
Lag of leverage	0.045*** (0.015)	0.117*** (0.025)	0.118*** (0.017)	0.153*** (0.036)	0.219*** (0.041)	0.290*** (0.034)
Profitability	-0.009 (0.009)	-0.009 (0.007)	-0.017 (0.012)	-0.064** (0.030)	-0.039** (0.019)	-0.067** (0.030)
Size	0.009*** (0.003)	0.001 (0.002)	0.007** (0.003)	0.010 (0.010)	-0.004 (0.008)	0.003 (0.009)
Growth	-0.003* (0.002)	-0.001 (0.001)	-0.003 (0.002)	0.008 (0.006)	-0.002 (0.004)	0.009 (0.006)
Tangibility	-0.028** (0.013)	0.017 (0.011)	-0.013 (0.016)	-0.009 (0.032)	0.050 (0.031)	0.027 (0.034)
Business risk	-0.026 (0.020)	-0.020 (0.014)	-0.049* (0.027)	0.041 (0.060)	0.029 (0.042)	0.021 (0.060)
<b><i>Industry Specific Factor</i></b>						
Industry median leverage	0.383*** (0.072)	-0.025 (0.256)	0.250*** (0.057)	0.566*** (0.154)	-0.177 (0.112)	0.388*** (0.113)
<b><i>Macroeconomic/Economic Environment Factors</i></b>						
GDP growth	-0.579 (0.459)	0.389 (0.304)	-0.494 (0.482)	3.054*** (1.083)	-1.609* (0.894)	1.520 (1.094)
Inflation	-0.168 (0.147)	0.133 (0.097)	-0.137 (0.154)	1.031*** (0.346)	-0.523* (0.286)	0.530 (0.349)
Government leverage	-0.093** (0.044)	0.042 (0.028)	-0.070 (0.045)	0.285*** (0.105)	-0.083 (0.083)	0.210* (0.107)
FDI	_ <sup>a</sup>	_ <sup>a</sup>	_ <sup>a</sup>	_ <sup>a</sup>	_ <sup>a</sup>	_ <sup>a</sup>
Constant	0.126 (0.107)	-0.074 (0.075)	0.153 (0.112)	-0.787*** (0.288)	0.461* (0.252)	-0.325 (0.280)
Observations	22,389	22,389	22,389	3,702	3,702	3,702
Adjusted R <sup>2</sup>	0.693	0.695	0.755	0.702	0.685	0.805

The table presents results from the estimation of dynamic panel model with firm fixed effects in Eq. (1);  $CL_{it} = \alpha + \lambda CL_{it-1} + \sum_k \gamma_k F_{k,it-1} + \sum_l \beta_l I_{l,it} + \sum_m \delta_m EE_{m,it} + \sum_n \theta_n X_{n,it} + \mu_i + \varepsilon_{it}$  where  $CL_{it}$  denotes corporate leverage (financial debt to total assets) of firm  $i$  in year  $t$ ;  $F$  is the vector of firm characteristics while  $I$  is the industry specific components;  $EE$  denotes the proxies for economic environment and  $X$  is the macroeconomic variables.  $\mu_i$  is (unobservable) time invariant firm specific effect, and  $\varepsilon_{it}$  is the idiosyncratic error term. Definitions of variables are given in Table 1. Based on European Union as well as Turkish official criterion, a firm is classified as an "SME" if its number of employees is less than 250, and "large" otherwise. Robust standard errors clustered at firm level are reported in parentheses. Statistical significance at the 1%, 5%, and 10 % levels is indicated by \*\*\*, \*\*, and \*, respectively.

<sup>a</sup> There is not a significant variation in the financial development index during the period 1996-2002. Thus, the coefficient for financial development could not be estimated.

**Table 10 Leverage dynamics, SMEs versus large firms, 2003-2015**

	Leverage					
	SMEs			Large firms		
	Short Term	Long Term	Total Leverage	Short Term	Long Term	Total Leverage
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Firm Characteristics</i>						
Lag of Leverage	0.278*** (0.008)	0.374*** (0.010)	0.408*** (0.008)	0.375*** (0.016)	0.454*** (0.016)	0.511*** (0.015)
Profitability	-0.011* (0.007)	-0.013** (0.005)	-0.014 (0.009)	-0.041*** (0.011)	-0.043*** (0.012)	-0.060*** (0.015)
Size	0.010*** (0.001)	0.003*** (0.001)	0.010*** (0.001)	0.004 (0.002)	0.000 (0.002)	0.003 (0.003)
Growth	-0.002*** (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.002 (0.002)	0.001 (0.002)
Tangibility	-0.013** (0.005)	0.016*** (0.006)	0.006 (0.007)	-0.005 (0.009)	0.020* (0.012)	0.019 (0.013)
Business risk	-0.011 (0.009)	-0.011 (0.008)	-0.024** (0.010)	-0.026 (0.018)	0.001 (0.018)	-0.021 (0.023)
<i>Industry Specific Factor</i>						
Industry median leverage	0.246*** (0.039)	0.023 (0.023)	0.065*** (0.021)	0.243*** (0.056)	0.140*** (0.034)	0.098*** (0.033)
<i>Macroeconomic/Economic Environment Factors</i>						
GDP growth	0.033*** (0.012)	0.004 (0.010)	0.060*** (0.013)	-0.043** (0.017)	-0.003 (0.017)	-0.015 (0.022)
Inflation	0.112*** (0.021)	0.082*** (0.017)	0.200*** (0.025)	0.190*** (0.038)	0.133*** (0.035)	0.332*** (0.047)
Government leverage	-0.042*** (0.013)	-0.076*** (0.010)	-0.131*** (0.017)	-0.032* (0.019)	-0.071*** (0.019)	-0.135*** (0.027)
FDI	0.018 (0.026)	0.167*** (0.022)	0.145*** (0.030)	0.044 (0.040)	0.121*** (0.039)	0.133*** (0.048)
Constant	-0.064*** (0.023)	-0.039* (0.020)	-0.057** (0.027)	-0.023 (0.048)	0.013 (0.051)	0.011 (0.064)
Observations	69,835	69,835	69,835	16,991	16,991	16,991
Adjusted R <sup>2</sup>	0.668	0.738	0.764	0.693	0.746	0.800

The table presents results from the estimation of dynamic panel model with firm fixed effects in Eq. (1);  $CL_{it} = \alpha + \lambda CL_{it-1} + \sum_k \gamma_k F_{k,it-1} + \sum_l \beta_l I_{l,it} + \sum_m \delta_m EE_{m,it} + \sum_n \theta_n X_{n,it} + \mu_i + \varepsilon_{it}$  where  $CL_{it}$  denotes corporate leverage (financial debt to assets) of firm  $i$  in year  $t$ ;  $F$  is the vector of firm characteristics while  $I$  is the industry specific components;  $EE$  denotes the proxies for economic environment and  $X$  is the macroeconomic variables.  $\mu_i$  is (unobservable) time invariant firm specific effect, and  $\varepsilon_{it}$  is the idiosyncratic error term. Definitions of variables are given in Table 1. Based on European Union as well as Turkish official criterion, a firm is classified as an “SME” if its number of employees is less than 250, and “large” otherwise. Robust standard errors clustered at firm level are reported in parentheses. Statistical significance at the 1%, 5%, and 10 % levels is indicated by \*\*\*, \*\*, and \*, respectively.

#### **7.4. Additional robustness<sup>9</sup>**

We also include capital flows (net capital flows to GDP ratio) in the empirical model as an additional explanatory variable in order to assess the impact of capital flows on corporate leverage. Findings of previous studies for Turkish non-financial firms regarding capital flows are mixed. International capital flows are expected to have significant impacts on domestic capital markets of developing countries, an evidence documented in the literature (Antoniou et al., 2008). As a result net capital inflows are expected to affect the allocation and the availability of credit sources and ease lending conditions. On the other hand, it might lead domestic currency appreciation, which decreases the value of existing foreign debt of firms in domestic currency. Results show that capital flows have a significant positive impact on short term corporate leverage. This impact is more pronounced for SMEs and private firms.

Moreover, in order to control for the possible bias induced by firm entry or exit, we re-estimate all model specifications for the firms that have at least T years of consecutive data, where  $T \in [4, 20]$ .  $T=3$  represents the full sample since the sample of this study consists of firms that has at least 3 years of consecutive data. No bias due to exit or entry of firms is evident in results.

#### **8. Concluding Remarks**

Despite the extensive empirical research carried out on capital structure theory, evidence provided is mixed and the ambiguity in findings seems to be much more severe for emerging countries, which can be attributed to data availability. In order to shed some light on the issue, we analyze leverage dynamics of non-financial firms in Turkey, one of the most important transition economies by utilizing a confidential and unique firm level data over the last 20 years.

We document significant evidence that financial development fosters corporate leverage while government indebtedness inhibits it. Both impacts are more pronounced for private firms rather than public firms. Besides, higher business risk level inhibits borrowing capacity of private firms but not public firms. Thus, results provide an indirect evidence on the important role of financial institutions, financial markets and institutional development in mitigating frictions regarding information asymmetry and agency costs, and easing the access of firms to capital. However, despite the improvement in financial development in the last decade, number of public firms is still limited in Turkey, and there are only around 400 firms listed on Borsa Istanbul. Stock market capitalization as a percent of GDP is also low in comparison to her peer

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<sup>9</sup> To conserve space, these results are not reported in the paper. However, they are available from authors upon request

countries. This suggests a room for growth and results of this study highlight the importance of policies that should be implemented to deepen the Turkish capital markets.

Most strikingly, results reveal that SMEs suffer much more than large firms in crowding out periods of government leverage while both SMEs and large firms benefit in crowding in periods. Besides, we document that firm growth and business risk have significant negative impacts on only SMEs' leverage. Therefore, results in this paper provide support for the findings of previous research regarding the financial constraints on Turkish SMEs, which limits their potential in the economy (e.g. World Bank, 2011; Mutluer Kurul and Tiryaki, 2016; Cilasun et al., 2019; Yarba and Guner, 2019). In Turkey, SMEs' dominant source of external finance is bank lending, and external financing alternative to straight bank debt is quite limited. Even though bank financing is important for the SME sector, it is necessary to broaden the range of financing instruments available to SMEs, in order to enable them to continue to play their role in investment, growth, innovation and employment (OECD, 2015). In that sense, results of this study shed light on the importance of developing appropriate policies to improve equity and bond markets and help broaden the financing options available to SMEs and entrepreneurs in Turkey.

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