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Government Debt and Corporate Leverage: Sectoral Analysis of Pakistan

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Abstract

This study examined the effect of government debt on corporate leverage and analyzed the impact of government debt on all firms at sectoral level enlisted in Pakistan Stock Exchange (KSE-100). For this purpose, it analyzed the panel data of the selected firms from 2006 to 2018. The study utilized the fixed effect linear regression model as determined by the Hausman test. Two variables (book leverage and market leverage) were used to measure corporate leverage. One variable (debt-to-capital ratio) was used to measure debt ratio, while six control variables (market-to-book ratio, GDP per capita, inflation, unemployment rate, tangibility, and return on assets) were used to identify the impact of government debt on corporate leverage and corporate debt. The results of this study revealed that government debt is negatively associated with corporate leverage and has a significant association with the debt ratio of firms. It was also noted that the control variables significantly affect the corporate leverage and debt ratio of firms. These findings have significant implications for the financing decisions of firms.

Keywords: book leverage, debt-to-capital ratio, government debt, market leverage

Introduction

In the neoclassical loanable funds theory of interest, Ohlin et al. ([1937](#)) explained that interest rate channels affect the investment and savings of a country. These channels also balance the investment and savings of firms Theoretically, when a government increases its borrowing to finance expenditure or cut taxes, it crowds out private sector investment because of

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higher interest rates. Increased government borrowing leads to a higher rate of interest since it creates a greater demand for money and loanable funds. Hence, private sector investment, especially those which are interest-sensitive, decreases because of a lower rate of return. This phenomenon is referred to as private investment being crowded out.

Recently, inflation in Pakistan has touched a double-digit figure. High public debt levels may cause public spending to be higher as compared to the previous years. This imposes upward pressure on interest rates and inhibits crowding out of private investments (Economics survey of Pakistan, 2018-19). Government debt affects the capital structure of firms existing in a country in different ways. For example, when the provision of government securities increases at competing rates, profitable and larger firms face lower cost to switch the debt to equity. Thus, the crowding out effect of government debt is much stronger in profitable firms (Demirci et al., 2019).

Global Financial Report (2019) explained that during the global financial crises, the world faced the brunt of low GDP growth. As a consequence, firms paid higher interest rates which caused substantial deterioration of corporate vulnerabilities and rose the uncertainty of economic activities. Firms also faced lower profitability, valuation pressure, hefty debt loads, and limitation of market liquidity. They were also not able to deleverage themselves quickly. Additionally, the report described that the corporate debt burden increased due to the global financial crisis, due to which burdened investors held riskier and illiquid assets. For this reason, market economies grew to rely on external borrowing for investment instead of looking for domestic investment.

Debt levels and government budget deficit plays an important role during a financial crisis. The increase of public debt levels restricts the financing choices. Government debt may affect the capital structure of a firm and crowd out corporate debt development. Whenever the supply of government debt increases, it may cause an increase in the expected return on bonds. It may increase the financing cost of securities to give fixed return. As a response, firms try to reduce their financing cost of fixed return security which causes a decrease in corporate debt and crowd outs (Demirici et al., 2019).

Stock markets in a country play a crucial role to diversify the portfolios of investors. They also provide different options to enter into investments in more profitable terms (Kunt & Maksimovic, 1996). It transmits the information of financing decisions of investors and creditors. To illustrate this point, Allen (1993) described the advantages of the transmission of investment projects through financial institutions and stock markets. Furthermore, he reports that stock markets help out with the issuance of debt and equity to finance the investments. The development of stock markets facilitates the issuance of debt and equity which affects the financial decision of firms.

Investors always prefer those firms in the stock market which possess a higher risk exposure. Investors are motivated to invest in those firms that have a higher risk disclosure and give a higher return on investment. Such an investment increases the profitability and size of a firm. Thus, investors would invest in those firms which are trustworthy and possess more chances to increase profitability (Linsly & Shrives, 2006).

Governments borrow money by selling bonds. Conversely, investors prefer to hold safe assets since they are a less risky form of investment with regards to their yields. For economies, the rising government debt is an alarming situation since it adversely effects corporate debt. In response, during the period of rising government debt the investors would be attracted to hold cash and short-term liquid assets because it puts upward pressure on the issuance of corporate bonds which causes its cost increase.

In such cases, firms will not choose to make long-term investments. Financial institutions supply short-term securities, such as treasury papers, when the decrease in debt levels creates the demand for safe securities. With the increase in the supply of treasuries, corporations reduce long-term investments and debt issuance, which places a negative impact on corporate leverage and corporate debt crowd-outs (Graham et al., 2014).

Excess Indebtedness became a formidable challenge for developing countries since the start of the 21st century. Pakistan is also facing the same challenges due to increasing budget deficits and debt levels. The government needs more funding to fulfill the needs of private and government investments. When facing a fiscal deficit, governments borrow

from scheduled banks which increases the overall debt levels up to alarming levels. Higher public spending increases pressure on interest rates, which, in return, discourages private investment such as crowding out private investment (Khan & Gill, 2009).

Government debt also places a burden on corporate leverage[1] since an increase in the budget deficit causes an increase in the government debt over time. In the case of Pakistan, the fiscal deficit is the main driver of government debt. According to Figure 1, in FY2008, the budget deficit was 7.3 percent of GDP. It increased up to 8.8 percent of GDP in 2012. Although it decreased slightly and reached 6.5 percent of GDP in FY2018, it is still very high. With the recent adherence to the condition of IMF that budget deficit is financed by borrowing from commercial banks and not from the borrowing by State Bank of Pakistan (SBP). Hence, all budget deficit is now financed by borrowing from commercial banks Thus, the budget deficit affects government debt levels. If its amount remains significantly high, such as in the case of Pakistan, then it will affect the debt market and possess some corporate leverage.

Figure 1

Budget Deficit of Pakistan

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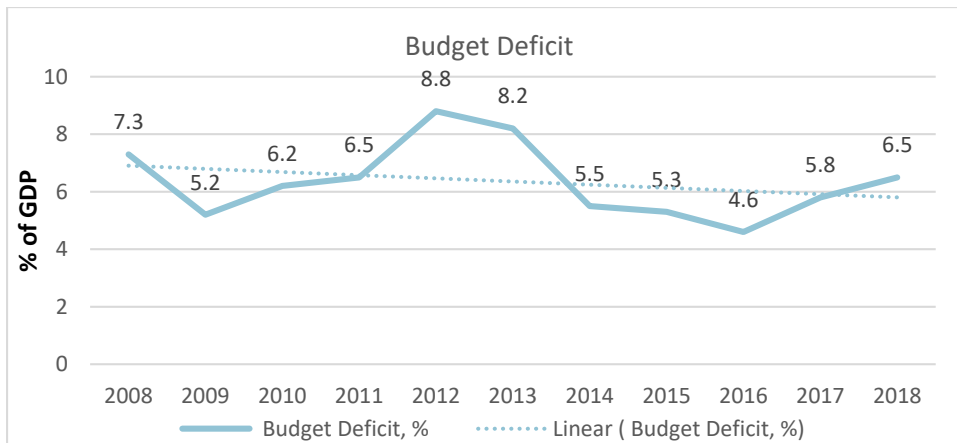
[1] Corporate or financial leverage describes the share of the capital injected in an enterprise with reference to the amount of the total assets.

The government debt ratio was 65.22% of GDP in FY2017, this ratio slightly decreased to 63.97% of GDP in FY2018. Additionally, there were 6 debt securities of firms issued with the worth of 25.992 billion in FY2017, it increased to 16 debt securities of firms issue with the worth of 277.31 billion in FY2018 (Economics survey of Pakistan, 2018-19). As depicted in the above given graph, the increase in budget deficit as the percentage of GDP is consistent with the declining movement of the debt ratio of firms in 2017 and 2018. The movement of debt ratio, corresponding with corporate debt, is inversely related to budget deficit, which shows that increase in government debt reduces the debt ratio of firms.

Governments borrow money by issuing bonds and other instruments to financial institutions such as banks. This affects the availability of loanable funds. As a result, banks are not left with enough funds for investment and eventually crowd out the private sector credit for investment purposes. The basic motive of a firm is to make profits. To accomplish this purpose, firms make more investments by using funds taken either from internal resources or from external resources. However, due to the persistent deficit and rising government debt levels in Pakistan, there is a decrease in loanable funds for investment. Consequently, investors face problems while making investment decisions because they do not have enough resources or funds to make investments. Such a situation places a financial burden on the investors and the financial performance of firms. Financial burden affects the capital structure of firms regarding debt and equity. Firms prefer equity rather than debt, thus, firm leverage decreases.

Many studies have done panel work on government debt and corporate leverage separately. Similar work has also been done using different macroeconomic and firm-specific variables. Many of these studies employed data from different countries to analyze the influence of government debt on firm leverage. In Pakistan, (Habib et al., 2016; Rehman, 2016) analyzed the influence of government debt on firm profitability and the impact of macroeconomic variables on the capital structure of the textile industry, respectively. However, the influence of government debt and corporate leverage in Pakistan has not been explored. Through the review of literature, it was identified that no study on Pakistan has estimated the effect of government debt on firm leverage. Furthermore, the novelty of the

present work is that it has used firms from all sectors of Pakistan Stock Exchange (PSX) underlined in Karachi Stock Exchange-100 index (KSE-100) to evaluate the link between government borrowing and firm leverage in Pakistan, instead of looking at the specific sectors.

Thus, this study explored the influence of government debt on the firm leverage of Pakistan. The main objective of the study was to explore the effect of government debt on firm leverage in the corporate sector of Pakistan listed in KSE-100.

Literature Review

The government of Pakistan is facing considerable difficulties due to the increasing debt and persistent fiscal deficits. As discussed above, government debt negatively affects firm leverage. Whenever government debt increases, it burdens the resources of the next generation. The flow of income increases for those firms who are holding these debts in the second period of next generation. In response, the private capital stock will increase.

As a result of increasing capital stock, the investment opportunities will increase for investors allowing them to invest more. In response, the GDP will grow. Higher GDP growth is accompanied by a decrease in bankruptcy costs and an increase in stock prices. In response, firms start to hold more cash and start to find more fund resources, which keeps the corporate leverage pro-cyclical. Studies have presented different views on the relationship between government debt and firm leverage. None of these works has been carried out in detail. Many of the studies examined the influence of different macroeconomics variables on the capital structure of firms. In this section, we have provided a review of some empirical studies to highlight the theoretical underpinnings of government debt and corporate leverage.

Shuetrim et al. (1993) analysed the determinants of corporate leverage in Australian firms for the period 1974-1990. They revealed that firm size is a dominant and significant determinant of leverage; whereas, real asset prices and consumer price inflation do not have a significant effect on firm leverage. Mahmud (2003) studied the association between the economic growth of a country and the capital structure of firms of three Asian

countries (Japan, Malaysia, and Pakistan). He took a sample size of 505 firms from Japan, 109 from Malaysia, and 104 from Pakistan. By regressing leverage (liabilities/ assets, long term debt/capital ratio, and debt/equity ratio) on the independent variables (growth rate in assets, sales, return on assets, total asset and total sales etc.), he found out that Pakistani and Japanese companies show higher leverage ratios than Malaysian companies.

Chen and Zhao (2006) examined the association between market/ book ratio, leverage ratio, and growth opportunity. The study used data of 72,082 firms from COMPUSTAT[2] firms sample size for the period 1971-2002. This study predicted a negative association between market/book ratio and firm leverage. However, for some firms, the relation between market/book ratio and firm leverage was positive since firms with higher market/ book ratios had more growth opportunities. Such firms borrow more because the acquired debt is cheaper for them.

Conversely, Ilyas (2008) worked on capital structure determinants by taking evidence from 364 non-financial 100-index firms of Pakistan from the period 2000-2005. He claimed that Pakistani firms lean towards equity financing or internal funding rather than debt financing. He used panel OLS and WLS techniques to find out that profitability is negatively correlated with firm capital structure (debt to equity ratio). He also found out that a firm's size is negatively correlated with the debt ratio calculated via OLS regression model estimation. It was also determined that it significantly impact the debt ratio calculated via WLS regression model estimation. Both techniques suggested that a firm's financial leverage degree, tangibility, and taxes are positively related to debt ratio; whereas, non-debts tax shield positively affects debt ratio in the OLS regression model and negatively affects debt ratio in the WLS regression model. This study used OLS to determine that a firm's growth negatively affects debt ratio; however, in WLS, it is positively correlated.

Mokhovaa and Zinecke (2014) investigated the link between macroeconomics and capital structure of firms of 7 developed and emerging

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[2] COMPUSTAT is a database of financial, statistical and market information on active and inactive global companies throughout the world.

European economies in the period of 2009-2011 by applying the regression method. They concluded that government debt negatively affects the capital structure of firms of developed economies and positively affects the capital structure of firms in emerging markets. Both short- and long-term interest rates positively affect the capital structure of firms. The inflation rate positively affects the capital structure of firms in emerging economies such as Germany, and negatively affects the capital structure of France and Greece. Onofreia et al. (2015) analyzed the corporate leverage by examining country-level determinants between 3 years (2008-10). They analyzed debt/asset ratio (dependent variable), profitability, asset tangibility, liquidity of firm, firm size, and growth opportunity (independent variables). They applied the fixed effect regression model to determine the explanatory variables that are negatively significant to leverage.

Khanna et al. (2015) discussed the effect of the macroeconomic variable on financing choices of firms by taking data of Indian firms from the period 1992-2013. They used the vector autoregressive approach and vector error correction model to find out that macroeconomic factors such as GDP growth, inflation rate, and stock market indicator have significant effect on dependent variables, such as book leverage, net equity, and retained earnings, both in the long-run and short-run. Furthermore, the stock market indicator proxy BSE (formerly Bombay stock exchange) sensitivity index positively affects book leverage and retained earnings, and negatively affects the net equity. GDP growth negatively affects book leverage and retained earnings, and positively affects net equity, the Proxy of Inflation, and WPI. Whole sale price index positively affects book leverage and net equity, and negatively affects retained earnings.

Thusyanthi and Yogendrarajah (2016) examined the factors that affected the firm leverage of 33 Sri Lankan firms from the period 2011-2015. They claim that tangibility negatively affects the total leverage of firms which is measured as the total debt of firms divided by their total assets. It is positively related to long term leverage. Other variables such as profitability negatively affect both leverages (total leverage and long-term leverage). The firm's size is negatively associated with long-term leverage and positively associated with the total leverage ratio. The growth rate of

firms positively affects long-term debt leverage and negatively affects the total leverage of firms.

Rehman (2016) examined the influence of macroeconomic variables on the capital structure choices of Pakistan's textile industry for the period 2004-13. He concluded that by applying fixed effect panel regression, corporate taxes, stock market development, real interest rate, and GDP growth rate are positively associated with economic measure (ROE/ ROA), while public debt and exchange rate is negatively associated with economic leverage. Habib et al. (2016) took evidence from Pakistani non-financial firms to determine the impact of government debts on firm profitability. They used asset return to examine profitability (dependent variable), long-term and short-term debt ratio, and total debt/asset ratio (independent regressors). They used control variables such as size, sales, and opportunity in growth. According to them, debt is significantly and negatively associated with profitability.

Herwadkar (2017) worked on the question of *did financial crises change the determinants of corporate leverage in EMEs?* He took sample data of 10 countries from the period 1996-2014. He used a partial adjustment model and concluded that in post crises, large but profitable firms raised more resources through debt because there is more liquidity during the post crises period. Whereas, global GDP influenced leverage negatively while prolonged low interest rate builds up firm leverage.

Reddy et al. (2017) discussed the determinants of capital structure of firms by examining small-medium capitalized firms of European countries. They applied the OLS technique and revealed that the growth rate and volatility of firms has no significant effect on leverage. Conversely, they claimed that government debt is significantly associated with market leverage and asset, while tangibility is positively associated with leverage.

Zafar et al. (2019) examined the determinants of leverage decision by taking evidence from emerging Asian countries from 2006 to 2014. After computing the estimation, they revealed that profitability, tangibility, and liquidity positively affects leverage; whereas, growth opportunity, size of the firm, and opportunity growth of firms are positively associated with leverage. The effect of country-specific regressors, such as GDP growth,

are negatively associated with firm leverage, while inflation and banking industry are positively associated with firm leverage. Likewise, Dakua (2019) observed the effect of profitability, growth opportunity, size of firms, asset structure, risk, and liquidity on the steel industry of India by taking data from the period 2010-2017. He demonstrated that the manufacturing sector of India cannot increase economic performance by itself; rather, economic performance relies on the exports of iron and steel. Overall development in the country is dependent on external resources such as taking debt. To purchase these resources, they need to take on more debt. The results of this study showed that profitability is highly linked to the increased performance of firms. Other determinants also have a significant impact on the debt ratio of firms.

Nguyen (2020) studied the efficiency of Vietnamese firms with respect to profitability by examining the effect of human capital and capital choices of firms on profitability. He took data from 48,673 Vietnamese firms in 2016 and by regressing the cross-sectional model, he demonstrated that more debt in capital choice increases the performance of a company. Debt is directly associated with profitability, but their mutual association is declining. Human skills play an important role in boosting the performance of firms and increasing the profitability of firms.

As mentioned earlier, there are very few studies that examined government debt as a macroeconomic determinant for making firm leverage decisions. For example, Jinxiang et al. (2020) worked on the association of government debt and firm leverage of 266 cities in China from the period 2007-2017. They concluded that government debt is negatively associated with the leverage of local firms. They explained that short term loans and micro changes in government debt have strong crowding out effect on debt-ratio of local firms. In the presence of higher government debt, less profitable and public welfare companies crowd their leverage. In our paper, we evaluated that higher government debt is negatively associated with firm leverage ratio of Pakistan. The findings of this paper hold significance for developing countries with insufficient financial inclusion, such as Pakistan. Government debt is revealed to be a significant player in the debt markets and thus, affects the financing decisions of firms.

Data and Methodology

The data used for the study is mainly secondary. Annual panel data was used to analyze the effect of government borrowing on the corporate leverage of Pakistani firms, along with controlling for both macroeconomic and firm level variables. The sample data is taken from the period 2006-2018.Country-specific macroeconomic variables such as government debt, inflation, GDP per capita, and unemployment, and firm-specific variables such as market leverage, tangibility, book leverage, ROA, market/book ratio, and debt/capital ratio were used for the analysis.

According to (Mayer, 1984; Frank & Goyal, 2009; Agrawal & Matsa, 2013), these variables represent the true picture of firm leverage. kse-100 enlisted firms at sectoral level would be analyzed for this study by examining the number of observations of firms. each sector has its own firm-specific information. The KSE-100 index was used because it is a leading market performance indicator for the non-financial (firms/companies) and financial markets (banks/financial institutions). It displays the overall performance of financial and non-financial institutions. A total of 650 observations of 50 firms of 20 sectors were used for panel data analysis. Ten variables were used to conduct empirical analysis of three models. Out of the ten variables, three variables, namely book leverage, debt-to-capital ratio and market leverage, were dependent. Government debt was one of the seven independent variables, it was also the main explanatory variable; whereas, other seven tangibility, ROA, market/book ratio, unemployment rate, GDP and inflation acted as controls variables in the three models.

Data on government debt was taken from International Monetary Fund (IMF), it is measure as debt-to-GDP-ratio. The data was taken in debt/GDP ratio because various scholars used it as an independent variable in their model. Different studies measured the government debt in Debt-to-GDP ratio, especially in Pakistan. Burney et al. (1988) used the public debt in debt-GDP ratio as a dependent variable to identify the determinants of the government debt in Pakistan. This study also determined the debt-servicing capacity of Pakistan. Macroeconomic variable data was collected from World Development Indicator (WDI). GDP was adjusted for population and taken as GDP per capita. The unemployment rate was taken as a percentage

of the labour force, while inflation was measured through the consumer price index (CPI). While other financial variables such as tangibility, market to book ratio, book leverage, market leverage, debt-to-capital ratio, and return on asset (ROA) were measure in ratio, indicating the percentage unit of each variable.

The panel data model specified below is an econometric regression model consisting of firm-specific variables such as dependent variables, country-specific variables, and leverages. Firm-specific variables account for variables that are time-invariant but vary from firm to firm. Country specific variables account for those variables that vary from sector to sector. Estimation of a regression model with firm-specific variables and sector-specific variables corrects possible omitted variable bias. The effects of these variables can be firm-specific or sector-specific. They may also be fixed or random. In the case of fixed effects, the error terms (μi) were assumed as fixed regressors. In the case of random effects, the error terms (μi) were assumed to be random regressors.

Assuming that the sample is representative, we use Hausman's specification test to check whether the panel variables effects were fixed or random (Baltagi, 2008). The Hausman test was used as a model specification test. For the analysis of panel data, Hausman test was used to choose from the random or fixed effect econometric model. The null hypothesis (Ho) of Hausman test described that the preferred model is random effect econometric model, while the alternative hypothesis (H1) of Hausman test described that the preferred model is the fixed effect econometric model. The tests also considered the correlation between regressors and errors term in the regression model. Correlation has a null hypothesis, which suggests that no correlation exists between these regressors and errors term; whereas, the alternate is that there is a correlation. Rehman (2016) and Demirci et al. (2019) also used the fixed-effect econometric model to regress the model of the study.

Fixed Effect Model

Since the data was available for 13 years it did not represent a random sample over time. Thus, the fixed effect econometric model was used for the time period as recommended by (Baltagi, 2008). Hausman test

recommended that the fixed effect econometric model technique is a better estimation technique to estimate the influence of government debt on leverage. The fixed model is a linear model technique. The assumption of this technique is that the intercept term should be cross-sectional specific to account for the heterogeneous other/excluded variables effect. One of the main advantages of fixed-effect econometric model is that it deals with unobserved heterogeneity in the model.

In fixed-effect model error term (εit) varies non-stochastically with respect to t or i. Fixed effect model leads towards the model with dummy variable of each cross section. The fixed effect model of k factors is as follow:

$$y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \quad ……………… + \beta_k X_{kit} + \varepsilon_{it}$$

Individual specific term αi determines the unique intercept for each individual while the slope of β is the same for all individuals (Sheytanova, 2015).

Economic Model

With reference to market timing, Setyawan (2015) argues that when stock prices rise, firms finance their projects through debts. When firms are underrated, firms would rely on equity for their project financing. This theory concludes that the market/book ratio negatively affects a firm's market leverage and significantly affects a firm's book leverage. (Market timing theory (MTT) was introduced by Baker & Wurgler in 2002). The analysis models are given below:

$$BL_t = f((M/B), PPE, EAT, TA)$$

$$ML_t = f((M/B), PPE, EAT, TA)$$

Where BL= book leverage, ML= market leverage, M/B= market to book ratio, PPE= property, plant and equipment (which represents the tangibility of firms), EAT= earnings after tax (which represents the profitability of firms), and TA= total debt to asset ratio.

The above given economic model suggested the use of market timing theory which explains that a firm's financial leverage (market leverage, book leverage) depends upon the market to book ratio, tangibility,

profitability and total asset ratio. The theory states that all determinants of financial leverage significantly affect book leverage and market leverage.

Description of Variables

Market leverage is a firm-specific dependent variable, it is defined as the total book debt of firms in a country to the total market value of assets in percentage (Welch, 2004; Demirci et al., 2019). Book leverage is also a firm-specific dependent variable, it is defined as the total book debt of firms in a country to the total book value of assets in percentage (Graham & Harvey, 2001; Demirci et al., 2019).

Debt-to-capital ratio (dependent variable) is defined as the ratio of book debt to total capital of firms. It is measured through book debt plus book equity in percentage (Demirci et al., 2019). It is proposed by (Welch, 2004).

Return on Assets (ROA) evaluates the profit percentage of a firm with respect to its resources. It evaluates the profitability of a firm and measures how proficiently a company is using its assets to generate profit (Demirci et al., 2019).

Tangibility is defined as the ratio between the values of PPE (plant, property and equipment). It is measured in percentage or in other terms, such as it is measured as companies' fixed asset to their total asset (Demirci et al., 2019). Market-book ratio (%) is defined as the ratio between the market value of assets of firms to their book value of assets of firms (Demirci et al., 2019).

Government debt is the main independent variable used in the model. The data of government gross debt is taken for the variable government debt. It is measured as the percentage of GDP (government debt-to-GDP ratio). Gross debt includes all liabilities including the payment of interest and/or the principal amount by the debtor to the lender at a specified due date. This includes debt liabilities in the form of special drawing rights (SDRs), currency and deposits, debt securities, loans, insurance, pensions, and other payable accounts. (World Economic Outlook, 2019).

Inflation acts as the control variable in the model. For measuring inflation, CPI was used as a proxy. It was taken in its average term. The consumer price index (CPI) measures changes in the prices of goods and

services that households consume. Such changes impact the real purchasing power of a consumer's incomes and welfare. When prices of different goods and services do not change at the same rate, CPI can only affect their average movement (World Economic outlook, 2019).

GDP per capita is another macroeconomic variable used in the regression model. It also acts as the control variable in the model. GDP per capita is measured in annual percentage and its aggregate is based on constant 2010 U.S. dollar (i.e. real variable form). It is calculated by dividing GDP by midyear populations. Data values of GDP per capita were taken as 'GDP per capita in constant local currency' (The World Bank, 2019).

Unemployment is measured as labour force. According to ILO, people of ages 15 years and older, who wish to labour to produce commodities and services during a given period but are not selected are considered as unemployed labour. It consists of first time job seekers, people who are currently working and those people who are not working but are searching for work (The World Bank, 2019).

Market leverage, book leverage and debt-to-capital ratio data were taken from financial statement analysis of PSX (Pakistan Stock Exchange) enlisted firms published by the State Bank of Pakistan (SBP). The data of return on assets (ROA served as a proxy for the profitability of firms), was taken from financial statements analysis of PSX and its unit was taken in percentage. For calculating the tangibility of firms, the company's fixed asset (property, plant, equipment) data was collected from the annual reports of firms. The data of market/book ratio was taken from annual reports published by the State Bank of Pakistan (SBP).

Econometric Models

Three models were used in this study. The firm's book leverage and market leverage was used to examine how government debt affects firm leverage. Whereas, debt/capital ratio was used to see the effect of government borrowing on the corporate debt ratio. The study used the following model studies of (Rehman, 2016; Demirci et al., 2019). To study the effect of government borrowing on firms, the leverage models used are as follows:

$$BL_{it} = \alpha_i + \beta_1 DGDP_{1it} + \beta_2 INF_{2it} + +\beta_3 GDP_{3it} + \beta_4 UNE_{4it}$$
$$+ \beta_5 ROA_{5it} + \beta_6 TAN_{6it} + 7 MB_{7it} + \mu_{it} \qquad (1.1)$$

$$DC_{it} = \alpha_i + \beta_1 DGDP_{1it} + \beta_2 INF_{2it} + +\beta_3 GDP_{3it} + \beta_4 UNE_{4it}$$
$$+ \beta_5 ROA_{5it} + \beta_6 TAN_{6it} + 7 MB_{7it} + \mu_{it} \qquad (1.2)$$

$$ML_{it} = \alpha_i + \beta_1 DGDP_{1it} + \beta_2 INF_{2it} + +\beta_3 GDP_{3it} + \beta_4 UNE_{4it}$$
$$+ \beta_5 ROA_{5it} + \beta_6 TAN_{6it} + 7 MB_{7it} + \mu_{it} \qquad (1.3)$$

Where BL = book leverage, DC = debt-to-capital ratio, ML = market leverage, DGDP = debt to GDP ratio, INF = inflation, ROA = return on assets, GDP = gross domestic product per capita, UNE = unemployment, TAN = tangibility, MB = market to book ratio, and μ = error term.

Here, 'i' represents the number of observations and 't' represents the time period in this study. This study used a fixed effect regression model to analyze the impact of government debt on corporate leverage as suggested by the Hausman test. It also used descriptive statistics to describe and understand the basic features of the data used in this study. Correlation analysis, a statistical tool, was also used in this study to describe the degree to which one variable was linearly related to another.

Empirical Results and Discussion

Descriptive Statistics

The following section comprises descriptive analyzes of KSE-100 index firms listed in PSX. Table 1 shows the results of summary analysis of each variable used in the study. The results revealed that the average value of 100 index companies' book leverage was 51.78. This leverage is considered positive. The standard deviation value of book leverage was 23.68. It shows a 23.68 unit deviation from its mean. The minimum value of book leverage between the companies was 2.37 and the maximum was 171.9. This value reveals a considerable deviation in leverage decisions. The skewness value was 0.44. This value reveals a positively skewed distribution of book leverage. It is also considered to be on the higher side. The kurtosis value was 3.59. This value reveals the mesokurtic distribution of the Book leverage.

Table 1

Descriptive Statistics

	BL	DC	ML	DGDP	INF	GP	UNE	ROA	TANG	MB
Mean	51.78	51.871	79.91	60.944	0.08	1.93	5.80	11.88	3.197	65.049
Std. Dev	23.68	23.087	18.11	4.361	0.04	1.481	.320	13.242	1.516	28.29
Min	2.371	2.371	13.232	51.955	0.03	-0.60	5.2	-59.24	-9.421	10.81
Max	171.9	148.843	99.569	66.887	0.17	3.770	6.2	58.23	6.294	239.24
Skewness	0.441	0.283	-1.305	-0.685	0.77	-0.47	-0.88	0.128	-4.34	1.4843
Kurtosis	3.59	2.798	4.359	2.366	3.22	1.89	2.33	6.12	28.25	8.30

The results of debt-to-capital ratio indicate that its average value was 51.87. It is a positive value and its deviation is 23.08. The minimum value for the companies was 2.37 and the maximum value was 148.8. The skewness value shows positive skewness distribution. The kurtosis value was 2.79 which reveals the mesokurtic distribution of the debt/capital ratio. Hence, the value do not differ from the previously calculated values.

The arithmetic mean of the market leverage ratio of firms was 79.91. This value is positive. The value of standard deviation expresses that the market leverage ratio deviates 18.11 units from its mean value. The minimum and maximum values among the companies were 13.23 and 99.56, respectively. The negative value of skewness shows that the distribution of market leverage is negatively skewed. The calculated kurtosis value was 4.35, which reveals the leptokurtic distribution of debt/capital ratio. The results of government debt indicate that on average government debt was 60.94 among the companies. It shows a 4.36 unit deviation from its mean value. The minimum and maximum values of government debt were 51.95 and 66.88, respectively. It was deduced that the data distribution of government debt is negatively skewed. Its kurtosis value was 2.36 which expresses platykurtic distribution behaviour.

The mean value of inflation was determined to be 0.08. It deviates 0.039 units from its average value. The minimum and maximum values of inflation among all companies used in this study were determined to be 0.02 and 0.17, respectively. It was concluded that the distribution of inflation is

positively skewed and mesokurtic. The GDP mean value was determined to be 1.93, it is considered a positive number. GDP deviates 1.48 units from its mean value. The result revealed that the minimum and maximum GDP value was -0.601 and 3.77, respectively. The negative value of skewness was -0.47. This value is negatively skewed and platykurtic.

The average unemployment was determined to be 5.80. It deviates 0.32 units from its mean value. The minimum value of unemployment among all companies was 5.2, while the maximum value was 6.2. From the results of the analysis, it was determined that unemployment distribution is negatively skewed and platykurtic. The average value of ROA was determined to be 11.88. It is a positive value and deviates from its mean value by 13.24 units. The minimum value maximum ROA value of all studied companies was is -59.24 and 58.23, respectively. ROA distribution is positively skewed and leptokurtic. The arithmetic mean value of tangibility was determined to be 3.197. It deviates 13.24 units from its mean value. The maximum value minimum value of tangibility for all studied firms was 6.294 and -9.421, respectively. The data distribution of tangibility was negatively skewed and leptokurtic.

The results of the market/book ratio revealed that the average market/book ratio of all companies was 65.04. It deviates 28.96 units from its men value. The minimum value and maximum value of market/book ratio of all studied firms for 13 years were 10.81 and 239.24, respectively. The skewness value was greater than 0 which shows that the distribution of the market/book ratio is positively skewed. The kurtosis value was greater than 3, which means that its distribution is leptokurtic.

Correlation Analysis

This section provides the empirical results for the multicollinearity of the variables. The correlation analysis identifies whether there exists a linear relationship between regressors or not. The correlation matrix technique was used to detect multicollinearity. The results revealed (see in the appendix) that the coefficient sign of market leverage is negative. It also highlighted a negative and linear relationship between market leverage and government borrowing. It was also determined that there exists a negative association between a firm's book leverage and government borrowing,

such an association means that if the government debt goes up then the book leverage would go down. On the other hand, book leverage is positively associated with market leverage, debt/capital ratio, market/book ratio, and inflation.

The results revealed that the coefficient sign of debt/capital ratio is negative with government debt and positive with market leverage. After examination of the results, it was determined that there exists a negative and linear relationship between government borrowing and debt/capital ratio, while the relationship between debt/capital ratio and market leverage is positive and linear. Tangibility is negatively correlated with debt/capital ratio, book leverage, government borrowing, and market leverage. This indicates that when tangibility increases, then the debt/capital ratio, government debt, book leverage and market leverage decreases. It was also determined that ROA is negatively correlated with government debt, debt/capital ratio, book leverage, market/book ratio, and market leverage. Conversely, ROA is positively correlated with inflation, tangibility, unemployment, and GDP.

The coefficient sign of market/book ratio is positive with government debt, debt/capital ratio, book leverage, and negative with market leverage, tangibility and ROA of firms. This indicates that when the market-to-book ratio increases, then the government debt, book leverage, and debt/capital ratio also increases, while market leverage, ROA, and tangibility decreases.

Correlation analysis of unemployment revealed that unemployment is positively associated with government debt. This indicates that when the unemployment in the country increases, then the government debt also increases. The results also revealed that unemployment is positively associated with ROA and market/book ratio, and is negatively associated with debt/capital ratio, market leverage, tangibility, and book leverage. An examination of the coefficient signs of GDP revealed that it is positively associated with ROA, government debt, market/book ratio, and unemployment, and negatively associated with market leverage, book leverage, tangibility, and debt/capital ratio.

Correlation analysis of inflation indicated that inflation has a negative linear connection with government borrowing, market/book ratio, GDP, and

unemployment. Conversely, inflation is positively correlated with market leverage, book leverage, debt/capital ratio, tangibility, and ROA. The results also indicated if inflation increases in a country, then government debt, market/book ratio, GDP, and unemployment rate will decrease, Whereas, market leverage, book leverage, debt/capital ratio, tangibility, and ROA increases.

Hausman Test Results

Hausman test indicated that the fixed effect econometric model or random effect econometric model is more preferable. Table 3 presents the values of the Hausman panel test.

Table 3

Hausman Test Results

Hausman test	Chi Square	p-value
Book Leverage	15.58	0.0292
Debt to Capital Ratio	26.41	0.0004
Market Leverage	15.27	0.0327

Note. This table shows the outcomes of fixed effects econometric model for all three models

The Hausman probability value of the above-mentioned three models is below 0.05. Therefore, the null hypothesis is rejected and the alternative hypothesis of fixed effect is accepted. Thus, it is concluded that the fixed effect econometric model is the best fit for all three models. The results of random and fixed effect regression of all three models are mentioned in the appendix. The results of the fixed effect of all three models indicated that the fixed effect regression is the best fit for all three models.

Government Debt and Book Leverage

The main estimation results are given in this section. It is observed from the results of the model (equation 1.1) that book leverage and government debt is a good fit model since the probability value of F-statistics is 0.0000, which is less than 0.05.

The result revealed that the government debt *p*-value is less than 0.05, which shows that it is a significant value. The coefficient sign of government debt is negative, which shows a negative relationship between government borrowing and the book leverage of a firm. The results are consistent with (Demirici et al., 2019; Mokhovaa & Zineckera, 2014) who claimed that whenever government debt increases, it places a burden on the activities of firms. For this reason, firms borrow less to finance their investment activities. The coefficient value expresses that if government borrowing increases by 1%, then book leverage tends to decrease 69%.

The result of tangibility revealed that tangibility places an empirically significant influence on the book leverage of firms. The given sign of tangibility coefficients is negative and shows a negative relationship with the dependent variable. Onofreia et al. (2015) depicted the same negative result. Its value indicates that if tangibility increases by 1%, then there would be a 24% reduction in book leverage and vice versa.

The result of unemployment revealed that unemployment is positively and significantly impacts the book leverage of firms. It is directly and positively associated with book leverage. Its probability value is 0.000. It has a strongly significant impact on the dependent variable. Mokhovaa and Zineckera (2014) estimated the same outcome in their study. Its coefficient value indicates that if unemployment increases by 1%, then there would be a 75% increase in book leverage.

Model 1

Government debt and Book Leverage

Book Leverage	Coefficients	Std. Err.	t-values
Government Debt	-0.695 (0.000)*	0.122	-5.70
Return on Assets	-0.419 (0.000)*	0.045	-9.29
Tangibility	-2.499 (0.004)*	0.870	-2.87
Unemployment	7.494 (0.000)*	1.858	4.03

Book Leverage	Coefficients	Std. Err.	t-values
Market/Book ratio	0.508 (0.000)*	0.023	21.82
GDP per Capita	-2.108 (0.000)*	0.477	-4.41
Inflation	29.148 (0.065)**	15.761	1.85
Constant	32.218 (0.002)*	10.112	3.19

Prob > F =0.0000, R-square = 0.66
p-values are in parentheses
*, ** indicate the significant level at 1% and 5%, respectively.

The results of the market/book ratio revealed that its probability value expresses a strong, significant, and positive impact on the dependent variable. Chen and Zhao (2006) indicated that there are a few firms that have a higher market/book ratio and prefer to borrow more for financing. The outcome value indicated that if there is a 1% increase in market/book ratio, then there would be a 50% increase in book leverage of firms.

The GDP coefficient has a negative sign which reveals that GDP is negatively related to book leverage. Basso (2009), Dincergok and Yalciner (2011), Khanna et al. (2015), Bokpin (2009), and Camara (2012) claimed that a higher GDP reflects better macroeconomic growth and tends to make firms more profitable. Thereby, firms borrow less and rely more on internal financing rather than external funding. Its coefficient value indicates that if GDP increases by 1%, then book leverage would decrease by 21%. Its *p*-value also shows a significant impact on book leverage.

Inflation shows a positive and significant connection with the book leverage of firms. Its coefficient value is 29.14, which means that if inflation increases or decreases by 1%, then book leverage would increase or decrease by 294%. Several studies have expressed the same result in their study. It places a statistically significant effect on book leverage with *p*-value of 0.06 (Mokhovaa & Zinecke, 2014; Khanna et al., 2015).

Government Debt and Debt-to-Capital Ratio

The empirical analysis of the model presented in equation 1.2 revealed that this model is a good fit since its f-statistics has a significant value that is less than 0.05.

The results of the analysis show a negative and significant relationship between government debt and debt-to-capital ratio, which means that government debt is significantly related to the debt ratio of firms. Its coefficient value indicates that if the government debt increases by 1%, then the debt-to-capital ratio would increase by 67%. Government debt places a strongly significant effect on the dependent variable.

Some studies (Mokhovaa & Zineckera, 2014; Demirici et al., 2019) found that higher government debt negatively affects the debt ratio of firms and this finding is in line with the results of the previous studies. Taggart (1985) explained the crowding out of corporate debt ratio. The author theorizes that an increase in the supply of government borrowing may be soaked up by investors. Those who are less likely to take debt are forced to increase the yields on corporate debt, in response the investors will issue less corporate debt thus, the issuance of corporate debt will decline.

By examining the results of ROA, it was concluded that ROA places a negative and significant influence on the debt-to-capital ratio. According to these findings, when firms get more return on their assets, they choose to take up less financial debt. The ROA value indicates that if the asset return of firms increases by 1%, then firms have 43% less chance to choose debt. Similarly, Zafar et al. (2019) showed in their study that profitability negatively affects leverage. These results also indicate that firms would rather use internal funding than external funding for investment. By examining the outcome of tangibility, it is observed that tangibility has a significant and negative effect on the debt-to-capital ratio. (Onofreia et al., 2015; Sahin, 2018) explained that since companies prefer more their own property, plant, and equipment, it places less focus on debt financing. The findings indicated that if tangibility (company's fixed asset) increases by 1%, then firms have 37% less chance to choose less debt ratio.

Model 2

Government debt and Debt-to-Capital ratio

Debt to Capital ratio	Coefficients	Std. Err.	t-values
Government Debt	-0.670 (0.000)*	0.120	-5.56
Return on Assets	-0.433 (0.000)*	0.044	-9.73
Tangibility	-3.760 (0.000)*	0.859	-4.38
Unemployment	6.627 (0.000)*	1.833	3.61
Market/Book ratio	0 .439 (0.000)*	0.023	19.08
GDP per Capita	-1.665 (0.000)*	0.471	-3.53
Inflation	36.205 (0.020)*	15.554	2.33
Constant	*43.081 (0.000)**	*9.979*	*4.32*

Prob > F =0.0000, R-squared = 0.61
p-values are in parentheses
* indicate the significant level at 1%.

The results of unemployment revealed that there is a positive and significant association between the unemployment rate and debt-to-capital ratio. According to these findings, firms with a higher unemployment rate have more chances to lie on debt financing, which increases their debt/capital ratio. These results are in agreement with a study conducted by Mokhovaa and Zineckera (2014). Its value indicates that if the unemployment rate increase by 1%, then the debt/capital ratio would also increase by 66%. The *p*-value describes the strong significance of the positive relationship between debt-to-capital ratio and unemployment.

The results of the market/book ratio revealed that there is a positively significant connection between the market/book ratio and debt/capital ratio. The results also revealed that firms with higher market/book ratios are more

preferred by investors to firms with lower debt/capital ratio. Chen and Zhao (2006) indicated that a higher market/book ratio for some firms with lower earnings causes them to focus on external funding. As a result, these firms rely on debt for investment and financing and consequently, firm leverage increases. The result of GDP revealed that a higher GDP value negatively affects a firm's debt/capital ratio. It is also strongly and significantly associated with the debt-to-capital ratio. If GDP per capita is high, then firms disregard debt financing. These results are in agreement with previous studies conducted by (Dincergok & Yalciner, 2011; Basso, 2009; Bokpin, 2009).

The results of inflation revealed that there is a positive connection between inflation and the debt-to-capital ratio. The results highlighted that inflation is directly related to the debt/capital ratio of firms with a *p*-value of 0.02. This value indicates that if inflation increases by1 %, then the debt/capital ratio would also increase by 362%. This means that firms would prefer to take on debt to finance their financial decision because of high inflation in the economy (Khanna et al., 2015).

Government Debt and Market Leverage

The empirical analysis of the model presented in equation 1.3 revealed that it is a good fit since its probability (F-statistics) is less than 0.05. From analyzing the results, it is estimated that government debt is adversely related to market leverage.

The results indicated that if government debt increases by 1%, then market leverage will decrease by 76%. Government debt has a strongly significant impact on the related dependent variable having 0.000 *p*-value. These results are in agreement with Reddy et al. (2017). They suggested that government debt is significantly related to market leverage. The results also revealed a negative and significant association between ROA and market leverage. Such an association means that firms with higher ROA have fewer chances of market leverage. Its coefficient value indicates that if ROA increases by 1%, then market leverage would decrease by 50% with a strongly significant probability value. Thusyanthi and Yogendrarajah (2016) describe that highly profitable firms would be likely to have less debt and lower leverage firms.

Model 3

Government debt and Market leverage

Market Leverage	Coefficients	Std. Err.	t- values
Government Debt	-0.769	0.132	-5.80
	(0.000)*		
Return on Assets	-0.502	0.049	-10.23
	(0.000)*		
Tangibility	-2.122	0.947	-2.24
	(0.025)*		
Unemployment	11.501	2.020	5.69
	(0.000)*		
Market/Book ratio	-0.063	0.025	-2.52
	(0.012)*		
GDP per Capita	-2.701	0.519	-5.20
	(0.000)*		
Inflation	59.396	17.139	3.47
	(0.001)*		
Constant	*77.265*	*10.996*	*7.03*
	*(0.000)**		

Prob > F =0.0000, R-square = 0.30
p-values are in parentheses
* indicate the significant level at 1%.

The results of tangibility revealed that tangibility is negatively and significantly associated with market leverage. Firms that have more property, plant, and equipment have 21% less chance to choose market leverage. Thusyanthi. and Yogendrarajah ([2016](#)) indicated that tangibility negatively affects the total leverage. The results indicated that a higher

unemployment rate in the country also causes an increase in the market leverage of firms. These results are in agreement with (Mokhovaa & Zineckera, 2014; Frank & Goyal, 2009). The results indicated that if the unemployment rate is increased by 1 % then market leverage is increased by 115%. After examining the *p*-value of unemployment, it is concluded that the unemployment rate has a strong and significant effect on the dependent variable.

The results of market/book ratio results revealed that a higher market to book ratio leads to lower market leverage of firms. The market/book ratio places a significant and negative effect on the dependent variable. This result is in agreement with the result of the market timing theory of (Baker & Wurgler, 2002).

When firms achieve peak profits, then their stock prices rise. In such a case, firms rely less on debt financing and more on equity financing. This indicates that the market/book ratio induces negative market leverage of firms, which is measured as (total debt/MV of asset). It also reduces corporate debt. By analyzing the empirical outcome of GDP, it is observed that there is a negatively strong and significant connection between GDP and market leverage. This means higher GDP per capita lead to lower market leverage of firms. Thus, it is deduced that firms rely less on market leverage to finance their capital decision.

This result is in agreement with the results of the study conducted by Herwadkar (2017). According to the results of the inflation variable, inflation has a positive and significant association with market leverage. If there is higher inflation in the economy, then the market value of assets in the economy increases. This phenomenon directly affects the market leverage of firms since they choose a higher market leverage ratio. This result is in agreement with the results of the study conducted by (Frank & Goyal, 2009; Zafar et al., 2019).

Conclusion

The core objective of this study was to analyze the influence of government debt on leverage of firms of all sectors enlisted in KSE-100 index of Pakistan Stock Exchange (PSX). Furthermore, this study analyzed the impact of government debt on debt-to-capital ratio of PSX enlisted

firms. For this purpose, we have used panel data of KSE-100 index firms over the period 2006-2018.

Private sectors play an important role in Pakistan since they generate more income, employment, and additional funding for social services. They are also responsible for the generation of revenues for public expenditure. This study used panel regression and fixed effect regression model to measure the impact of government debt on book leverage, market leverage, and debt-to-capital ratio. The results revealed that government debt is significantly and negatively associated with the corporate leverage of firms of all sectors enlisted in the KSE-100 index. Additionally, it was also noted that government debt significantly affects the debt ratio of firms. The result of this study is in agreement with the results of a study conducted by (Mokhovaa & Zineckera, 2013; Demirici et al., 2019).

Other control variables such as tangibility, unemployment, market-to-book ratio, return on assets (ROA), inflation, and GDP per capita also significantly affect corporate leverage and debt ratio. The government borrows money to meet its expenditures. By doing so, it places an additional burden on the investors, which discourages their investment endeavours. The findings of this study suggest that whenever the demand for government debt increases, chances of investment decreases.

For this reason, firms prefer other financial resources rather than taking on debt as financial aid. Firms finance their investment decisions by using debt and equity. When there is an increase in government debt, the availability of excess government debt is absorbed by the investors of the firms who insist to increase the yields on corporate debt, which may lead to less issuance of corporate debt, in response the corporate debt will crowd out. Thus, the increase in government debt may cause a decrease in corporate leverage and debt ratio of firms. This association displays the crowding-out effect of government debt on the leverage of firms.

Policy Recommendation

The findings highlighted that firms tend to focus on internal funding and swap debt funds with equity to increase investment. In this regard, firms should issue new or additional shares to increase the cash flow and help repay existing liabilities. After the liabilities are paid, firms can improve

their book leverage and debt ratio, which, in turn, will improve their corporate leverage. Firms should also focus on increasing their sales to bring in more cash. They can use their profits to finance their capital and recover their market leverage.

Firms should rely on internal financing and efficiently use their internal funds. This would increase the profitability of firms, which, in turn, would improve their leverage as well. Firms should also focus on improving tangibility (property, plant, and equipment) efficiency since it is directly associated with the performance of a firm. Firms should rely on their internal tangibility equipment rather than external equipment. This would improve the output stability of firms by improving leverage ratio.

Conversely, the government should take important steps to eliminate the crowding-out effect of investments. High government debt is an alarming situation for developing countries such as Pakistan since it reduces economic growth and induces higher borrowing. A higher borrowing ratio places a burden on investors by imposing taxes, which discourages and demoralizes investors. The government needs to implement policies and regulations that manage and maximize chances of investment in the market. This will not only increase revenue generation and reduce government debt, but it will also improve the infrastructure of the country. These policies would also positively affect the book leverage, debt ratio, and the market leverage of firms. The government need to discourage the investment regulations on investors and makes some policies and regulations which must maximize the investment and innovation space in the market so that more goods are produced and the more revenues will be generated which would help in reducing the government debt as well as it will improve the investment infrastructure in a country. Sustainable growth and investment in a country can only be profitable if the country implements proper policies to cater to needs of the investors.

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Appendix

Correlation Matrix of Variables

	dgdp	ml	bl	dc	tang	roa	mb
dgdp	1.0000						
ml	-0.1385	1.0000					
bl	-0.0571	0.5883	1.0000				
dc	-0.0550	0.5950	0.9846	1.0000			
tang	-0.0872	-0.0268	-0.1992	-0.2060	1.0000		
roa	-0.1079	-0.5158	-0.3841	-0.3912	0.2095	1.0000	
mb	0.0518	-0.0399	0.7294	0.7130	-0.1393	-0.0546	1.0000
une	0.5413	-0.0979	-0.0477	-0.0431	-0.0673	0.0211	0.0358
gdp	0.2487	-0.2421	-0.0960	-0.0873	-0.0481	0.0362	0.0639
inf	-0.4491	0.2794	0.1020	0.1010	0.0560	0.0011	-0.0748

	une	gdp	inf
une	1.0000		
gdp	0.6450	1.0000	
inf	-0.4558	-0.7329	1.0000

.

Model 1 (Book Leverage) Random Effect Model

```
Random-effects GLS regression              Number of obs      =         650
Group variable: firmscode                  Number of groups   =          50

R-sq:                                       Obs per group:
    within  = 0.5348                                          min =          13
    between = 0.7523                                          avg =        13.0
    overall = 0.6779                                          max =          13

                                            Wald chi2(7)       =      823.79
corr(u_i, X)   = 0 (assumed)                Prob > chi2        =      0.0000
```

bl	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
dgdp	-.697964	.1214478	-5.75	0.000	-.9359973	-.4599306
roa	-.4450312	.0428141	-10.39	0.000	-.5289454	-.361117
tang	-1.796078	.6415895	-2.80	0.005	-3.053571	-.538586
une	7.731537	1.871886	4.13	0.000	4.062708	11.40037
mb	.5278749	.021807	24.21	0.000	.485134	.5706158
gdp	-2.122211	.4814801	-4.41	0.000	-3.065895	-1.178527
inf	29.0692	15.88378	1.83	0.067	-2.062445	60.20084
_cons	27.82619	9.688724	2.87	0.004	8.836639	46.81574

sigma_u	9.1810974	
sigma_e	9.3863041	
rho	.48894936	(fraction of variance due to u_i)

Model 1 (Book Leverage) Fixed Effect Model

```
Fixed-effects (within) regression              Number of obs     =          650
Group variable: firmscode                      Number of groups  =           50

R-sq:                                          Obs per group:
    within  = 0.5356                                         min =           13
    between = 0.7309                                         avg =         13.0
    overall = 0.6660                                         max =           13

                                               F(7,593)          =        97.70
corr(u_i, Xb)  = 0.2205                         Prob > F          =       0.0000
```

bl	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
dgdp	-.6958312	.1221686	-5.70	0.000	-.935767	-.4558954
roa	-.41927	.0451365	-9.29	0.000	-.5079168	-.3306232
tang	-2.499442	.870888	-2.87	0.004	-4.209842	-.7890419
une	7.494523	1.858306	4.03	0.000	3.84486	11.14419
mb	.5088703	.0233177	21.82	0.000	.463075	.5546656
gdp	-2.108939	.4778671	-4.41	0.000	-3.047456	-1.170421
inf	29.1482	15.76138	1.85	0.065	-1.806716	60.10312
_cons	32.21814	10.11234	3.19	0.002	12.35778	52.07851

sigma_u	10.699606	
sigma_e	9.3863041	
rho	.56510591	(fraction of variance due to u_i)

```
F test that all u_i=0: F(49, 593) = 14.19                   Prob > F = 0.0000
```

Hausman Test on Model 1 (Book Leverage)

```
Test:  Ho:  difference in coefficients not systematic


            chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =        15.58
          Prob>chi2 =       0.0292
          (V_b-V_B is not positive definite)
```

Model 2 (Debt-to-Capital ratio) Random Effect Model

```
Random-effects GLS regression                Number of obs     =         650
Group variable: firmscode                    Number of groups  =          50

R-sq:                                        Obs per group:
    within  = 0.4928                                    min =          13
    between = 0.7237                                    avg =        13.0
    overall = 0.6479                                    max =          13

                                             Wald chi2(7)      =      702.61
corr(u_i, X)    = 0 (assumed)                Prob > chi2       =      0.0000
```

dc	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
dgdp	-.6551582	.1205488	-5.43	0.000	-.8914296	-.4188868
roa	-.449891	.0425463	-10.57	0.000	-.5332802	-.3665017
tang	-2.497581	.6405446	-3.90	0.000	-3.753025	-1.242136
une	6.8824	1.857671	3.70	0.000	3.241433	10.52337
mb	.4663446	.0216798	21.51	0.000	.423853	.5088361
gdp	-1.673677	.4778194	-3.50	0.000	-2.610186	-.7371683
inf	36.4328	15.76298	2.31	0.021	5.537916	67.32768
_cons	35.05162	9.626017	3.64	0.000	16.18497	53.91827
sigma_u	9.1900892					
sigma_e	9.2632394					
rho	.496036	(fraction of variance due to u_i)				

Model 2 (Debt-to-Capital ratio) Fixed Effect Model

```
Fixed-effects (within) regression            Number of obs     =         650
Group variable: firmscode                    Number of groups  =          50

R-sq:                                        Obs per group:
    within  = 0.4951                                    min =          13
    between = 0.6653                                    avg =        13.0
    overall = 0.6130                                    max =          13

                                             F(7,593)          =       83.06
corr(u_i, Xb)   = 0.1614                      Prob > F          =      0.0000
```

dc	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
dgdp	-.6703473	.1205669	-5.56	0.000	-.9071373	-.4335573
roa	-.433426	.0445447	-9.73	0.000	-.5209106	-.3459415
tang	-3.760996	.8594697	-4.38	0.000	-5.448971	-2.073022
une	6.627522	1.833942	3.61	0.000	3.02571	10.22933
mb	.4390048	.023012	19.08	0.000	.3938099	.4841997
gdp	-1.665617	.4716018	-3.53	0.000	-2.59183	-.7394046
inf	36.20581	15.55473	2.33	0.020	5.656742	66.75487
_cons	43.08187	9.97976	4.32	0.000	23.48189	62.68184
sigma_u	11.565187					
sigma_e	9.2632394					
rho	.60918588	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(49, 593) = 15.16                    Prob > F = 0.0000
```

Hausman Test on Model 2 (debt-to-Capital ratio)

```
Test:  Ho:  difference in coefficients not systematic

          chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                  =          26.41
        Prob>chi2 =      0.0004
        (V_b-V_B is not positive definite)
```

Model 3 (Market Leverage) Random Effect Model

```
Random-effects GLS regression                 Number of obs    =
Group variable: firmscode                     Number of groups =

R-sq:                                         Obs per group:
    within  = 0.3306                                    min =
    between = 0.3789                                    avg =
    overall = 0.3469                                    max =

                                              Wald chi2(7)     =      31
corr(u_i, X)   = 0 (assumed)                  Prob > chi2      =      0.
```

ml	Coef.	Std. Err.	z	P>|z|	[95% Conf. Inter
dgdp	-.7589394	.1320343	-5.75	0.000	-1.017722	-.500
roa	-.5321238	.0465094	-11.44	0.000	-.6232806	-.440
tang	-.9188027	.6947705	-1.32	0.186	-2.280528	.442
une	11.76123	2.035322	5.78	0.000	7.772071	15.7
mb	-.0545559	.0236822	-2.30	0.021	-.1009722	-.008
gdp	-2.697197	.5235219	-5.15	0.000	-3.723281	-1.67
inf	58.94936	17.27074	3.41	0.001	25.09933	92.
_cons	71.02061	10.52667	6.75	0.000	50.38871	91.6

sigma_u	9.8889137				
sigma_e	10.206916				
rho	.48417967	(fraction of variance due to u_i)			

Model 3 (Market Leverage) Fixed Effect Model

```
Fixed-effects (within) regression              Number of obs      =         650
Group variable: firmscode                      Number of groups   =          50

R-sq:                                          Obs per group:
    within  = 0.3330                                          min =          13
    between = 0.2833                                          avg =        13.0
    overall = 0.3045                                          max =          13

                                               F(7,593)           =       42.30
corr(u_i, Xb)  = 0.0309                         Prob > F           =      0.0000
```

ml	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
dgdp	-.7699645	.1328494	-5.80	0.000	-1.030877	-.5090519
roa	-.5021671	.0490826	-10.23	0.000	-.5985639	-.4057702
tang	-2.122267	.9470267	-2.24	0.025	-3.982202	-.262333
une	11.50157	2.020772	5.69	0.000	7.532835	15.47031
mb	-.0638217	.0253563	-2.52	0.012	-.1136208	-.0140227
gdp	-2.701778	.5196454	-5.20	0.000	-3.722348	-1.681209
inf	59.39657	17.13934	3.47	0.001	25.73537	93.05777
_cons	77.26517	10.99643	7.03	0.000	55.66848	98.86186

sigma_u	11.643487		
sigma_e	10.206916		
rho	.56546279	(fraction of variance due to u_i)	

```
F test that all u_i=0: F(49, 593) = 13.84                      Prob > F = 0.0000
```

Hausman Test on Market Leverage

```
    Test:  Ho:  difference in coefficients not systematic


           chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                   =         15.27
         Prob>chi2 =       0.0327
         (V_b-V_B is not positive definite)
```