CAPITAL STRUCTURE DETERMINANTS OF PUBLICLY LISTED COMPANIES IN SAUDI ARABIA

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ABSTRACT

This paper investigates the capital structure of listed firms in Saudi Arabia, using firm specific data to study the determinants of leverage. The study is based on an analysis of the capital structure of 93 Saudi listed companies. The study extends from 2000 to 2010 and employs cross-sectional pool data methodology. The results suggest there exists a positive relationship between size, growth of the firm and leverage. On the other hand, the results show there are negative relationships between tangibility of assets, profitability, risk and leverage.

JEL: G32

KEYWORDS: Capital Structure Determinants, Leverage, Saudi Arabia, Tradeoff Theory, Pecking Order Theory

INTRODUCTION

The capital structure decision is one of the most controversial subjects in corporate finance and has been extensively researched since the seminal paper of Modigliani and Miller (1958). A huge body of financial literature exists relaxing many assumptions of the Modigliani and Miller paper. From that, several competing theories of capital structure choice were formed including trade-off theory, agency theory, and pecking order theory. Nonetheless, the capital structure decision is an empirical concern as well. Numerous scholarly papers examine the financing decision of public companies theoretically and empirically. In the early stage, the majority of empirical papers examined the case of US companies (Warner 1977, Castanias 1983, Altman 1984, Bradley et al., 1984, Titman and Wessels 1988, Crutchley and Hansen 1989, Harris and Rivav 1991). Rajan and Zingales (1995) extend the analysis of capital structure to G-7 countries focusing on four factors as determinants of leverage: tangibility of assets, the market to book ratio, profitability, and size. Moreover, Booth *et al.* (2001) extend the analysis of capital structure decision across 10 developing countries. The paper finds that the determinants of capital structure in developed countries are also significant in these 10 developing countries. Since then many financial researchers investigate capital structure decisions in individual countries around the world (Shah and Hijazi 2004, Gaud et al. 2005, Correa *et al.*2007, Gajural 2005, Waliullah and Nishat 2008).

This paper attempts to explain the capital structure decision and its determinants in listed companies of Saudi Arabia. One main characteristic of the Saudi financial market environment is the absence of a corporate tax, a vague and general bankruptcy law, and a undersize and illiquid bond market. Our focus will be trying to determine factors that affect capital structure decisions in a unique institutional environment such as the Saudi Arabia case. We assume that the macroeconomic variables such as inflation and economic growth play minimal role in capital structure decision for Saudi Companies. Thus, for our analysis we consider only specific company factors such as size, growth, tangibility, profitability and risk.

Our results indicate that factors affecting capital structure decision in developed and developing countries prevail for the Saudi public companies as well. Size and growth opportunities are found to be positively related to leverage while risk, profitability and tangibility are found to be negatively related to leverage.

Moreover, profitability and risk were the most important independent variables as determinants of the leverage ratio.

This paper proceeds as follows. Section 2 briefly reviews the relevant theoretical and empirical capital structure literature. Section 3 is a brief discussion of the Saud Capital Markets and Institutional factors. Section 4 discusses the dataset and the hypotheses. Section 5 briefly explains the methodology. The results are discussed in section 6. Section 7 discusses briefly the decomposition of leverage ratio. Section 8 provides a summary and conclusions.

LITERATURE REVIEW

Theoretical Literature Review

The publication of Modigliani and Miller (1958) is the most important development in financial economics dealing with capital structure. Modigliani and Miller(henceforth M&M) make the following assumptions: Capital markets are perfectly competitive and frictionless, firms and individuals can borrow and lend at the risk free rate (implying that there is no bankruptcy cost), investors are with homogenous expectations, all cash flow streams are perpetuities (no growth), all firms are assumed to be in the same risk classes, firms issue only risk free debt and risky equity, no agency cost (managers always maximize shareholders wealth) and there exists no signaling opportunity (insiders and outsiders have the same information. Under these specific set of assumptions, M&M argued that in the absence of taxes, the capital structure of the firm is irrelevant to its value.

In their 1963 paper, M&M extend the basic propositions in their original article by allowing for a corporate profit tax under which interest payments are deductible. They conclude that the value of the firm is a function of leverage and the tax rate. There are two extreme conclusions of the above theories. On the one hand; M&M (1958) suggest that capital structure is irrelevant while, on the other hand, in (1963) theorize the optimal structure is all debt.

Miller (1977) extends the M&M model to consider the effects of personal taxes. Miller argues the M&M model with corporate taxes overstates the advantages of corporate debt financing. Personal taxes offset, to some extent, the benefits from the tax deductibility of corporate interest payments. Therefore, in the equilibrium, the value of the firm will still be independent of its capital structure. The following we will discuss briefly the four main theories of Capital Structure.

Modigliani and Miller (1958) assumed implicitly that there are no bankruptcy costs. With relaxing this assumption, many researches argue that with the existence of bankruptcy costs an optimal debt-equity ratio will exist. This is referred to as the trade-off theory. The optimal debt to equity ratio is determined by increasing the amount of debt until the marginal tax gain from leverage is equal to marginal expected loss from bankruptcy costs.

In providing the capital structure irrelevancy theorem, M&M implicitly assume no agency cost and mangers will act in the best interest of the firm's shareholders. Jensen and Meckling (1976), however, furnish an agency cost-based rationalization for optimal capital structure determination. Separation of ownership and control as well as conflict of interest between corporate managers, shareholders, and bondholders give rise to agency costs. Thus, the optimal capital structure mix of the firm is established through the efforts of all parties involved (agents, and investors) to minimize total agency-related costs. Therefore, it is possible to establish an optimal financial mix in a world without taxes or bankruptcy cost. Myers (1977) also provides an agency type of argument for the determination of a firm's capital structure. In Myer's model, a firm's capital structure decision is influenced by the value of its underlying real options (in the form of growth opportunities). The greater this value, the less likely that a firm will take

on risky debt. As the proportion of risky debt rises, there is an incentive for managers to take on suboptimal investment strategies, because good investments will tend to benefit bondholders, rather than shareholders.

The M&M approach to capital structure irrelevance also assume that the market possesses full information about the activities of a firm. Ross (1977), however, proposes an alternative formulation for the firm's capital structure determination that is based on the existence of symmetric information between the firm's insiders and outsiders. Ross argues that if managers possess inside information, the managerial decisions about the financial structures signal information to the market. Thus, managerial decisions to alter financial structure will alter the market's perception of the firm. Consequently, the value of the firm will rise with leverage.

Myers (1984) noted that if we relax the homogenous expectation assumption, asymmetric information by different groups of market participants is admitted. Myers' work resulted in the symmetric information theory of capital structure. In world with asymmetric information, corporations should issue new shares only if they have extraordinary profitable investments that cannot be postponed or financed by debt, or if management thinks the shares are overvalued. Moreover, investors recognize this tends to reduce the firm's share price when it announces plans to issue new shares (signaling bad news). Finally, Myers suggests a pecking order theory of capital structure. Firms are said to prefer retained earnings as their main source of funds, next in order of preference is debt, and last comes external equity financing.

Empirical Literature Review

Warner (1977) discussed the role of bankruptcy costs in capital structure decisions and presents evidence of the direct costs of bankruptcy for a number of US railroad firms. Warner collects data for 11 railroad bankruptcies that occurred from 1933 to 1955. The study shows that direct bankruptcy costs may not be large enough to be a determinant factor in capital structure decisions. Castanias (1983) and Altman (1984) follow Warner's research of bankruptcy costs. Castanias analyzes the relation between failure and leverage in small firms. The study finds that firms with high rates of failure tend to have low debt-equity ratios. Although Castanias' results indicate the possibility of an optimal capital structure, the study focuses on industry data and does not account for indirect bankruptcy costs. Altman, in contrast, provides evidence of indirect costs. Altman compares expected profits with actual profits and shows that indirect costs are 8.1% of the value of the firm three years prior to bankruptcy and 10.5% the year of bankruptcy. The study indicates that total bankruptcy costs are not trivial.

Bradley, Jarrell and Kim (1984) use cross-sectional, firm specific data to test for the existence of an optimal capital structure. BJK analyze three firm specific factors that influence the optimal capital structure: the variability of firm value, the level of non-tax shields and the magnitude of the cost of financial distress. Bradley et.al. find that firm leverage ratios are related inversely to earnings volatility provided there are significant cost of financial distress. However, BJK's results indicate a strong positive relationship between leverage and non-tax shields. Titman and Wessels (1988) analyze the explanatory power of various factors that have been proposed by a number of capital structure theories as attributes that influence the choice of optimal capital structure.

Crutchley and Hansen (1989) present an empirical test of the Agency theory. They focus on equity agency costs that result from the conflict of interest between managers and stockholders. C&H identify five proxies for agency costs; i.e., earning volatility, discretionary investment (advertising expenses and R&D), flotation costs, diversification loss to managers from holding firm's common stock, and firm size. The results are consistent with the Agency theory. An increase in earnings volatility will have a significant negative impact on leverage. Also, if discretionary expense increased, the firm uses less debt. Moreover, the authors find that large firms tended to rely more on debt. Thies and Klock (1993) provide

some support for Pecking Order theory. They suggest that the pecking order theory provides one explanation for the inverse relationship found in their study between profitability and all forms of leverage.

Rajan and Zingales (1995) examines the capital structure of G-7 countries (US, UK, Japan, Germany, France, Italy, and Canada). The authors focus on four factors as determinants of leverage: tangibility of assets, the market to book ratio, profitability, and size. The results of the study indicate that tangibility of assets is positively correlated with leverage in all countries. The results also indicate that leverage increase with size in all countries except Germany. On the other hand, the market to book ratio is negatively correlate with leverage in all countries except Italy where it is positively correlated. Furthermore, profitability is negatively correlated with leverage in all countries except Germany. However, Bevan and Danbolt (2002), based on analysis of capital structure of 822 UK firms, examine the sensitivity of Rajan and Zingales' results to variation in leverage measures. They find that Rajan and Zingales' results are highly dependent upon the precise definition of leverage being examined. Thus, the authors argue that the determinant of leverage vary significantly depending on the nature of the debt sub-component being studied.

Booth et al. (2001) analyzed capital structure decisions of firm across 10 developing countries (Brazil, Mexico, Jordan, Indi, Pakistan, Turkey, Zimbabwe, Korea, Thailand, and Malaysia) for the period 1980-1990, utilizing both firm specific and institutional factors. The authors find that related factors for explaining capital structure in developed countries are also relevant in developing countries. In general, the results show that for developing countries profitability was the most successful independent variable and negatively related to leverage. Size and tangibility of assets are positively related to the leverage ratio.

Shah and Hijazi (2004) analyze the determinants of capital structure in listed firms in Pakistan for the period 1997 to 2001. They follow Rajan and Zingales (1995) of selecting only four independent variables: size, tangibility of assets, growth, and profitability. The results show that asset tangibility and size are positively correlated with leverage. In contrast, growth and profitability are negatively correlated with leverage.

Gaud et al. (2005) analyses the determinants of the capital structure for 104 Swiss listed companies from 1991-2000, employing a dynamic panel framework. The results show that size and tangibility of assets are positively related to leverage, whereas profitability and growth are negatively related to leverage. Following the same methodology of dynamic panel framework, Correa *et al.* (2007) examines the determinants of capital structure decisions of the largest 500 Brazilian companies for the period 1999-2004. The results show that profitability and tangibility of assets are negatively related to leverage, while business risk is positively related to leverage. Gajural (2005) investigates the pattern and determinants of capital structure of Non-financial Nepalese firms for the period 1992-2004. The analysis shows that asset structure and size are positively related to leverage ratio. While liquidity, growth opportunities, profitability, and non-debt tax shield are negatively related to the leverage ratio.

Frank and Goyal (2009) investigate the relative importance of several factors in the capital structure decision of listed US companies for the period of 1950-2003. Among these factors they found a core of six reliable factors that correlated with cross-sectional differences in leverage. The results of the study indicate that leverage is positively related to firm size, tangible assets, median industry leverage, and expected inflation. On the other side, leverage is negatively related to profits and market-to-book ratio. According to the authors all six factors, except profit, have the sign predicted by the static tradeoff theory in which the tax saving of debt are traded-off against deadweight bankruptcy costs.

Waliullah and Nishat (2008) examines capital structure determinant choices of 533 non- financial firms publicly listed on Karachi Stock Exchange (KSE) for the period from 1988 to 2005. Employing autoregressive distributed lag (ARDL) methodology, the paper divided the determinants of financiering behaviors into firm's specific characteristics, reforms and industry characteristics. The results indicate that size of the firm and growth opportunities are positively related to the debt ratio. On the other hand, the results suggest that profitability and liquidity are negatively correlated with debt financing. Furthermore, the results show that firms with high risk and more tangible assets will rely more on equity financing and use less debt.

SAUD CAPITAL MARKETS AND INSTITUTIONAL FACTORS

Equity Market

As of the end of 2010 there are 146 listed companies in Saudi Arabia with a market capitalization of about 80 percent of GDP. Market Capitalization is dominated by petrochemical companies (36.6 percent), financial companies (27.6 percent) and telecoms (10 percent). In April 2008, the Capital Market Authority restructured the Saudi stock market sectors based on the nature of business of each listed company, its income, and earnings structure. After the new market structure, the Saudi stock market consists of 15 sectors instead of its previous eight sectors. Since the new industry coding established only at the end of the period for our study, we will not include the average leverage of the industry as an explanatory variable in the study. The following table shows Saudi capital market indicators over the period 2000-2010.

Table 1 illustrates some important characteristics of the Saudi Equity market during the period of the study. For instance, the number of listed company increased from 75 companies at the end of year 2000 to 111 companies at the end of year 2007 and reached 146 at the end of year 2010. Furthermore, Table 1 indicates the importance of the equity market in the Saudi economy, which can be approximated by market capitalization of listed companies to the GDP. The ratio of market capitalization to GDP was 32 percent at the end of 2000, then reaches its peak of 208% at the end of 2005, then fell to 79.6 percent at the end of 2010. The main characteristic of the stock market during the period of study, 2000-2010, is the high volatility of the market. The main index, the Tadawul All Share Index (TASI) was only 2,258 point at the end of 2000. Then from the year 2003 on it started to accelerate rapidly until reaching its peak of 20,635 points on February 25, 2006. Thus, between 2003 and its peak the index gained a staggering 700 percent. From that peak, the correction started and the market collapsed reaching 7,933 points at the end of 2006. Another collapse occurs during the world financial crises of 2008 when the Saudi index reach its bottom at the end of the year 2008 of 4,803 points. For the years 2009-2010 the index swings between 6,000-7,000 points. In general, even with this very obvious fluctuation, the equity market becomes an important financing tool for Saudi companies during the period of study.

Bond Market

Bond market development in Saudi Arabia traces its roots back to mid-1988, when government securities were issued in the domestic market to fund government fiscal deficits. The market stagnated until 2009 when the Capital Market Authority (CMA) approved the trading of Sukuk (Islamic bond) and traditional bonds for the first time in Saudi Arabia. This is an important step towards launching a second regulated market. However, the Saudi bond market is still viewed as illiquid and thin. The total amount of issued Sukuks and Bonds since the foundation of the market to end of 2010 stood at only at SRs 35.7 billion with 7 issuances by 3 companies. Thus, with such undersized bond and Sukuk market companies continue to rely heavily on short term bank loans as a the main debt instrument.

Table 1: Saudi Equity Market Indictors

End of Period Year	Listed Companies		Market Capitalization of issued shares (Billion RLs)		Market Capitalization to GDP (%)	Share Price Index (1985= 1000)	
	No.	Annual % Change	Value	Annual % Change		Index	Annual % Change
2000	75	9	255	11.3	32.2	2258.29	65
2001	76	1	275	7.8	40.5	2430.11	8
2002	68	-11	281	2.5	40.2	2518.08	4
2003	70	3	590	100.1	74	4437.58	76
2004	73	4	1149	94.7	123	8206.23	85
2005	77	5	2439	100.12	208	16712.64	104
2006	86	12	1226	-49.7	92.5	7933.29	-53
2007	111	29	1946	58.8	136	11038.66	39
2008	127	14	924.5	-52.5	52.2	4802.99	-56
2009	135	6	1195	29.3	82.8	6121.76	27
2010	146	8	1325	11	79.6	6620.75	8

This table shows some indicators of the Saudi equity market for the period under the study (2000-2010). These indicators include: number of listed companies, market capitalization of issued shares, market capitalization to GDP, and share price index. The number of listed companies increases from 75 companies in year 2000 to 146 companies in year 2010. The ratio of market capitalization to GDP was only 32 percent at the end of the year 2000, reaches its peak of 208% at the end of the year 2005, then dropped to 79.6 percent at the end of year 2010. The main index (TASI) was only 2,258 point at the end of 2000, then reaches its peak of 20,635 point in February 25, 2006. During the world financial crises of 2008 the Saudi index reaches its bottom at the end of 2008 at 4,803 points. The Sources of the data are: Saudi Stock exchange Company (Tadawul) and Saudi Arabian Monetary Agency (SAMA).

Bank Lending

Historically commercial bank loans have been the main source of financing corporations in Saudi Arabia. According to the Saudi Arabian Monetary Agency (SAMA), at the end of year 2010, there were 21 commercial banks operating in Saudi Arabia including branches of five foreign banks. During the 1980s and 1990s, bank financing and lines of credit dominated corporate financing channels. Bank credit continues to be the most popular financing channel, catering to more than 80% of the total funding needed. The main characteristic of bank loans is their short-term nature. For example, 59% of total loans to companies were short-term loans with less than one-year maturity. This is in a line with Booth et al. (2001) findings that for ten developing countries the amount of long-term debt is much lower in comparison with developed countries.

During the 1970's the Saudi Government created five major lending institutions namely; Public Investment Fund, Saudi Credit Bank, Saudi Industrial Development Fund, Saudi Agricultural Bank, and the Real Estate Fund. These government institutions provided direct credit programs to major business sectors in Saudi Arabia. These programs are medium and long-terms credit programs. They charge minimal fees. The total loans distributed by these institutions since their inception up to the end of 2010 is SRs 414.3 billion.

Tax System

Saudi Public companies are not subject to income tax. Instead, they are subject to an Islamic Tax called 'Zakat', which is a religious tax based on Islamic law (the Sharia) and is assessed on earnings and holdings. Zakat is levied at a flat rate of 2.5% and is chargeable on the total of the company's capital resources and income that are not invested in fixed assets. These include the company's capital, net profits, retained earnings and reserves not created for specific liabilities. Moreover, loans used to finance

acquisition of capital assets, investments, and inventory are added to Zakat bases. Only resources (including income) which have been held for at least 12 months are subject to Zakat. Thus, we presume that there are no obvious tax advantages for debt financing for Saudi Companies and therefore the tax will not be considered as a factor for determining capital structure decisions for Saudi companies.

DATA AND HYPOTHESES

The sample consists of non-financial Public Saudi Firms over the years 2000-2010. The data are annual and the data source is Gulf Base (Zughaibi and Kabbani Financial Consultants (ZKFC)). The database contains balance sheet, profit and loss, and cash flow statement information for all Saudi public companies. The exclusion of financial firms was motivated by the fact that these firms have to comply with very strict legal requirements pertaining to their financing (Gaud et al., 2005). There were 146 listed companies in the Saudi market by the end of the year 2010. However, after excluding financial firms (11 banks and 31 insurance companies) the number of companies in the study is 104 companies. Moreover, we omitted any company with less than 3 years of available data. As a result we exclude all listed IPOs companies in the years 2009 and 2010 (11 companies). These procedures resulted in smaller number of 93 companies in our sample, with a total of 967 observations available for analysis. Table 2 shows basic statistics of selected financial statement items of Saudi companies for the period under the study.

One important element from Table 2 is that almost 36% of total observations have no long term debt, and the value long term debt to total assets is around 20%. This assures the notion that Saudi companies depend heavily on short-term bank loans as a main source of leverage. The low long-term debt ratio are consistent with Booth et al. (2001) findings that companies in developing countries have substantially lower long term debt compared with companies in developed countries.

Table 2: Statistics of Selected Financial Statement Items

Variable	Observations (N)	Median (SR Million)	Mean (SR Million)	Standard Deviation	Percentile 0.10	Percentile 0.90
Total Assets	967	1,122,984	6,897,762	26,195,388	183,157	9,641,749
Current Liabilities	967	173,286	1,284,519	4,910,702	19,750	1,418,089
Long Term Debt	625	19,202	1,347,604	7,001,614	0	1,337,799
Book Equity	967	659,070	3,150,109	10,241,793	117,073	5,177,969
Book Liabilities	967	272,080	3,747,312	16,374,737	28,269	3,327,414
Profit	967	61,117	374,113	2,218,699	-13,492	538,288

This table shows the number of observations, the median, mean, standard deviation, the .10 percentile and the .90 percentile of some key financial statement items for Saudi listed companies (excluding the financial institutions) covering the period 2000-2010. The number of companies under the study is 93 companies. From the total of 967 observations, only 625 of them have some form of long term debt.

In accordance with previous studies concerning capital structure decision, proxies of the variables covered were used for analysis of leverage determinants. Numerous definitions of leverage have been suggested in the literature. In this study, the leverage ratio is defined as the ratio of book value of total debt divided by book value of total assets. We consider the book leverage rather than market leverage since we think the Saudi stock market was very volatile during the period of the study. Thus, using market leverage will be unreliable since there will be stock mispricing across the stock market over the period of the study. Furthermore, many empirical studies use long term debt only in calculating the leverage ratio. However, as mentioned before, looking carefully at the data we notice that many Saudi companies have zero long term debt which can be attributed to the new and illiquid bond market in Saudi Arabia. Thus, many of those companies depend mainly on short commercial banking loans as the only source of debt. Therefore, we consider the total debt (short + long term debt) in the measurement of the leverage ratio. In this study we define the dependent variable (leverage ratio) as follows:

$$\text{Leverage Ratio} = \frac{Total\ Liablities}{Total\ Assets} \quad (1)$$

For the independent variables we extend Rajan and Zingales' model (1995) to include business risk. Thus, our independent variables include: size, growth opportunities, tangibility of the assets, profitability, and business risk.

Large firms are usually more diversified and have more stable cash flow. Therefore, they are less risky. This results in lower cost of debt as well as easier access to the external debt markets. Accordingly, we predict a positive relationship between size and leverage. In this study, firm size is measured by the natural log of sales.

$$\text{Size} = \ln(\text{Sales}) \quad (2)$$

Hypothesis 1: Firm size will have a positive relationship with leverage.

Due to the agency cost of debt firms with high growth opportunities are expected to rely more on retained earnings and stakeholders co-investment than debt financing. Thus, we expect a negative relationship between growth opportunities and leverage. While the majority of empirical studies employ the market-to-book value as a proxy for growth opportunities, we measured it by the change in log of sales. Even though many studies employ log assets as a proxy of the firm growth, we employ log of sales as a proxy of growth. This is will not affect the analysis since there exists high correlation between change in assets and change in sales. The main reason for not using the market-to-book value is that, as mentioned before, the Saudi Stock market witnessed great volatility during the period under study. Thus using any market value will be unreliable. Therefore, following Titman and Wessels (1988), the growth rate of sales will be used as a proxy for growth opportunities.

$$Growth = \frac{Sales_t - Sales_{t-1}}{Sales_{t-1}} \quad (3)$$

Hypothesis 2: The percentage change of sales will have a negative relationship with leverage.

Tangible assets can be used as collateral and are less subject to information asymmetries. As a result, tangible assets minimize the agency cost of debt. According to agency cost and information asymmetry theories, firms with high tangible assets tend to depend more on debt financing. Tangibility of assets is defined as the ratio of fixed assets to total assets. We expect a positive relationship between tangibility of assets and leverage.

$$Tangibility\ of\ Assets = \frac{Fixed\ Assets}{Total\ Assets} \quad (4)$$

Hypothesis 3: The greater the proportion of tangible assets the higher the leverage.

The relationship between profitability and leverage is an unresolved issue in capital structure theories. In one hand, according to pecking order theory, firms prefer retained earnings as their main source of funds. Next in order of preference is debt, and last comes external equity financing. On the other hand, trade-off theory suggests that profitable firms prefer debt financing to benefit from the tax shield. However, in the case of Saudi Arabia where there is no tax advantage of debt and most profitable companies usually maintain large retained earnings, we believe that Saudi companies will exploit retained earnings as the first source of fund before turning to raise debt. Profitability will be measured by return on assets and we anticipate a negative relationship between profitability and leverage.

$$Profitablity = \frac{Net\ Profit}{Total\ Assets} \quad (5)$$

Hypothesis 4: Profitability of the firm will have a negative relationship with leverage.

Firms with high volatility of earning might find some difficulty of honoring the payment of debt obligations, which will result in high probability of bankruptcy. Thus, firms with high volatility of cash flow can lower their risk by reducing debt levels. We measure risk by variability of the return on assets (standard deviation of return on assets) and anticipate a negative relationship between risk and leverage.

$$Risk = Standard\ deviation\ of\ the\ return\ on\ assets = \sigma(ROA) \quad (6)$$

Hypothesis 5: The variability of the return on assets will have a negative relationship with leverage.

Table 3 shows a large difference for the leverage ratio for the Saudi companies which range from only 9.4% for the 10th percentile to 63.2% for the 90th percentile. The average debt ratio is 33.6% for Saudi public companies, which is comparable to the debt ratio of some of developing countries (*Booth et al*, 2001) such as Brazil 30.3%, Mexico 34.7%. However, the debt ratio is much lower in comparison to debt ratios of other developing countries included in Booth et al. study. Examples include the debt ratio for South Korea 73.4%, India 67.1%, Pakistan 65.5%, and Turkey59.1%. Furthermore, the debt ratio of Saudi Companies is much lower than the debt ratio of developed countries. Rajan and Zingales (1995) find debt ratio for listed companies in Germany 73%, France 71%, Italy 70%, Japan 69%, US 58%, Canada 56%, and UK 54%.

Table 3: Descriptive Statistics for Leverage Measure and Explanatory Factors

Variable	Observations (N)	Median	Mean	Standard Deviation	Percentile	
					.10	.90
Leverage Ratio	967	0.292	0.336	0.205	0.094	0.632
Firm Size	967	12.726	12.281	3.073	9.714	14.815
Firm Growth	967	0.069	0.441	3.827	-0.172	0.474
Tangibility of Assets	967	0.681	0.651	0.211	0.330	0.896
Profitability	967	0.055	0.066	0.103	-0.025	0.185
Risk	967	0.0455	0.055	0.047	0.017	0.097

This table presents descriptive statistics of the leverage ratio and five independent variables: firm size, firm growth, tangibility of assets, profitability, and risk. The sample contains 93 companies listed in the Saudi stock exchange (TASI). The data covers 2000-2010.We define the leverage ratio as total liabilities divided by total assets. We measure size as the natural logarithm of sales. We define growth as the parentage change of sales. We measure asset tangibility by fixed assets divided by total assets. Profitability is net profit divided by total assets. Risk is defined as standard deviation of return on assets. The leverage ratio for Saudi Companies, with a mean of 33.6 percent, is low in comparison to the leverage ratio of most developed and developing countries.

For the independent variables the table shows the size of Saudi companies generally rang between mid-size companies to large-size companies, ranging from 9.7 to 14.8. The growth opportunities demonstrate significant variability ranging from negative 17.2% to positive 47.4%. The value of the mean of the growth opportunities is about 44.1% which is much higher than the value of the median 6.9%. The table also shows high mean and median of tangibility of assets (65.1% and 68.1%), in which reflect the intense use of fixed assets for the Saudi's public companies. Table 4 shows the correlation coefficients between and among leverage ratio and each of the expletory variables, as well as the correlation among the independent variables.

Table 4 shows the leverage ratio has a positive and significant correlation with size and growth. Conversely, the leverage ratio has a negative and significant correlation with tangibility, profitability and risk. The correlations among independent variables show that growth has non-significant correlations with any of the explanatory variables. Size has a positive significant correlation with tangibility and

negative but non-significant correlation with risk. Moreover, we examine the variance inflation factor (VIF) to evaluate for the presence of multicolinearity among the independent variables. The VIF statistics are substantially lower than 10 indicating no multicolinearity between the independent variables. This implies we do not need to eliminate any independent variables for reasons of multicolinearity.

Table 4: Correlations between Individual Variable and VIF Coefficients

		Leverage Ratio	Size	Growth	Tangibility	Profitability	Risk	VIF
Leverage Ratio	Pearson Correlation	1	0.302***	0.083**	-0.152***	-0.117***	-0.116***	
Size	Pearson Correlation		1	-0.034	0.256***	0.279***	-0.002	1.134
Growth	Pearson Correlation			1	0.047	0.001	-0.001	1.004
Tangibility	Pearson Correlation				1	-0.246***	0.027	1.113
Profitability	Pearson Correlation					1	-0.134***	1.145
Risk	Pearson Correlation						1	1.020

*This table presents Pearson correlation coefficients for the variables used in the analysis and VIF (variance inflation factor) tests between independent variables. The sample contains 93 companies listed in the Saudi stock exchange (TASI). The data cover the period 2000-2010. Leverage ratio is defined as total liabilities divided by total assets. Size is defined as the natural logarithm of sales. We define growth as the parentage change of sales. We measure asset tangibility by fixed assets divided by total assets. Profitability is net profit divided by total assets. Risk is the standard deviation of return on assets. ***, **, and * indicate significant at the 1, 5 and 10 percent level respectively.*

METHODOLOGY

We follow the literature by using a cross-sectional pooled data model to study capital structure decision determinant factors of Saudi Companies. The firm's debt ratio will be regressed against the natural log of its sales, the change in log of total sales, the tangibility of its assets, its return on assets, and the standard deviation of its return on assets. The coefficients are estimated using ordinary least square (OLS). For the outliers in our data sample we follow Bevan and Danbolt (2002), eliminate them by winsorising the dependent variable and all independent variables at the one percent level. The regression equation is:

$$Leverage = f\begin{pmatrix} size, growth\ opportunities, tangiblity\ of\ assets, \\ profitablity, business\ risk \end{pmatrix} \quad (7)$$

$$Leverage(firm_{i,t}) = \alpha + \beta_1 \ln sales_{i,t} + \beta_2 \Delta \ln sales_{i,t} + \beta_3 tangiblity\ of\ assets_{i,t} + \beta_4 return\ on\ total\ assets_{i,t} + \beta_5 \sigma\ return\ on\ total\ assets_{i,t} + \varepsilon_{i,t} \quad (8)$$

Where *i* denote firm and *t* denotes the time, α is the intercept and $\varepsilon_{i,t}$ is error term.

EMPIRICAL RESULTS

From the result of our analysis we construct our regression model as follows:

$$Leverage = 0.207 + 0.023 \ln sales + 0.004 \Delta \ln sales - 0.125 tangiblity\ of\ assets - 0.521 return\ on\ total\ assets - 0.638\ \sigma return\ on\ total\ assets + \varepsilon_{i,t}$$

Tables 5 shows the regression model summery as well as the output of the regression analysis. For our model in general, the R^2 is 17.2%, which means these five independent variables account for only 17.2% of the variation in leverage ratios for listed Saudi companies. This value is close to the R^2 of Frank and

Goyel (2003) of 17.5%. The F-statistics shows the validity of the model with a value of 41.140 which is significant at the one percent level meaning the model is capable of determining variation of the total debt ratio of Saudi listed companies.

Table 5: The Model Summary and Cross Sectional Regression Results

				95.0% Confidence Interval for B	
Coefficients	B	Std. Error	t-value	Lower Bound	Upper Bound
(Constant)	0.207***	0.036	5.718	0.136	0.278
Size	0.023***	0.002	10.885	0.019	0.027
Growth	0.004***	0.002	2.640	0.001	0.007
Tangibility	-0.125***	0.030	-4.174	-0.184	-0.066
Profitability	-0.521***	0.062	-8.399	-0.643	-0.399
Risk	-0.638***	0.128	-4.975	-0.889	-0.386
R-Square	0.176			MSE	0.035
Adjusted R- Square	0.172			Durbin-Watson	0.535
F	41.140			AIC	-3243.835
Prob (F Statistic)	0.0001				

This table shows results of the estimates from the Ordinary Least Square (OLS) Model. The sample contains 93 Saudi Firms listed in the Saudi Stock Exchange for which there is a minimum of 3 consecutive years of data for the 2000-2010 period. The leverage ratio was regressed against five independent variables: size, growth, tangibility, profitability, and risk. The estimated model is: $Leverage(firm_{i,t}) = \alpha + \beta_1 \ln sales_{i,t} + \beta_2 \Delta \ln sales_{i,t} + \beta_3 tangiblity\ of\ assets_{i,t} + \beta_4 return\ on\ total\ assets_{i,t} + \beta_5 \sigma\ return\ on\ total\ assets_{i,t} + \varepsilon_{i,t}$ *. We define the leverage ratio as total liabilities divided by total assets. Size is the natural logarithm of sales. We define growth as the parentage change of sales. We measure asset tangibility by fixed assets divided by total assets. Profitability is net profit divided by total assets. Risk is defined as standard deviation of return on assets. ***, **, and * indicate significant at the 1, 5 and 10 percent level respectively.*

The results of the study show that size has a positive and significant relationship with leverage, though the size of the coefficient tends to be small. This suggests that size of the company has limited impact on the capital structure of Saudi Companies. Growth has a significant and positive relationship with leverage, contrary to our expectations, though the size of the coefficient tends to be small. This finding is consistent with the pecking order theory which predicts that growth companies accumulate more debt over time. One the other hand, this finding is contradictory to the agency theory prediction where firms with greater growth opportunities are expected to use less risky debt. Since the coefficient of growth is small, growth has very little effect of the capital structure of Saudi Companies.

Tangibility has a negative and significant relationship with leverage, opposite from what we anticipated. This negative relationship is in accordance with the pecking order theory which asserts that because of low asymmetric information, large tangible assets makes equity issuance less costly. Another explanation for this unanticipated relationship between tangibility and leverage is that, as Beger and Udell (1994) argue, firms with close relationships with creditors need to provide less collateral because the relationship substitutes for physical collateral. With only 11 commercial banks in Saudi Arabia, at the time of the study, the close relationship between banks and listed companies is obvious. Furthermore, this outcome confirms the results of Booth et al. (2001) that total debt ratios decrease with the tangibility of assets.

Profitability has a significant and strong negative relationship with leverage, with a size of a coefficient of -0.521. This result is consistent with the pecking order theory where profitable firms are predicted to use less debt. Booth *et al.* (2001) argue that the strong negative relationship can be related to agency and information asymmetry problems as well as the underdeveloped nature of the long-term bond market, which we believe is the case in Saudi Arabia.

Risk has a significant and strong negative relationship with leverage. This means firms with more volatile cash flow will use less debt. This result is consistent with agency theory which predicts that an increase in

earnings volatility will have a significant negative impact on leverage. In summary, it seems that risk and profitability are the strongest explanatory powers of capital structure determinants for Saudi companies.

DECOMPOSITION OF LEVERAGE RATIO

Bevan and Danbolt (2002) suggest that the determinants of leverage are sensitive to the components of debt being analyzed. In addition, since we found that almost 36% of the study observations have no long-term debt, we think it more accurate if we divide the debt ratio to long term debt ratio and short term debt ratio. Thus, we decompose the leverage ratio into its sub-component as long and short term debt ratios, and then estimate the extent to which each of these ratios might be related to our five explanatory variables. The long-term debt ratio is defined as total liabilities minus current liabilities divided by total assets. The short-term debt ratio is defined as current liabilities divided by total assets.

As discussed in the main body of the paper all five explanatory variables have significant relations with the total debt ratio. However, growth opportunities and tangibility of assets appeared with signs contrary to expectations. As noted earlier, total debt ratio risk and profitability, both negatively related to leverage, are the major factors determining the capital structure for Saudi companies. However, when we decompose the total debt ratio into long-term ratio and short-term ratios we get different results for some of coefficients as shown in Table 6.

For the long-term debt ratio model, size is negatively related to leverage instead of positively related to leverage with total debt model, still for both models size have very small effect on the capital structure of Saudi companies. Growth is positively related to long term leverage but with a small effect. Tangibility of assets becomes positively related to the long-term leverage. Both profitability and risk have the same sign as before but with less effect when measuring long-term debt than the total debt ratio. Adjusted R^2 and F-statistic are a little lower with long term debt ratio with values of 0.165 and 23.932 respectively.

For the short-term debt model, all coefficients are significant and have the same signs as the total-debt model. However, tangibility becomes the most important factor for explaining the capital structure, followed by profitability and risk. Thus, the order of the importance of these three factors reverses. Additionally, the short-term model comes with the best explanatory power compared with the other two models. The adjusted R^2 increased to 28.7 which mean these five independent variables account for 28.7% of the variation in short-term leverage ratios for listed Saudi companies. The F-statistics shows better validity of the model with a value of 78.678 in comparison to 41.140 for the total-debt ratio and only 23.932 for the long-term debt model. The short-term model is best fits the data set of listed companies in Saudi Arabia. These results assure the claim of Bevan and Danbolt (2002) that the determinants of leverage are significantly sensitive to the components of debt being analyzed.

CONCLUSION

This paper presents a study of capital structure determinants for 93 listed companies in Saudi Arabia for the period 1999-2010. The analysis is conducted using a cross-sectional pooled model. The study suggests size and growth opportunities are positively related to leverage. Tangibility, profitability and risk are negatively related with leverage. Moreover, the results indicate that risk and profitability are the major factors driving capital structure decisions for listed companies in Saudi Arabia. Our results provide some unexpected signs for some coefficients namely growth opportunities and tangibility of assets. In general, most empirical results of the study support the pecking order theory. This study can be extended by considering ownership structure and median industry leverage as explanatory variables for capital structure decision of Saudi companies.

Table 6: Cross-sectional Results of Decomposed Leverage Ratio

Model	Coefficient	St. Error	t-Value
1. Total Debt Ratio Model			
Constant	0.207***	0.036	7.718
Size	0.023***	0.002	10.885
Growth	0.004**	0.002	2.64
Tangibility	-0.125***	0.03	-4.174
Profitability	-0.521***	0.062	-8.399
Risk	-0.638***	0.128	-4.975
Adjusted R2	0.172		
F-statistic	41.14		
Prob. of (F-Stat.)	0.0001		
2. Long Term Debt Ratio Model			
Constant	0.108**	0.035	3.115
Size	-0.006**	0.002	-3.087
Growth	0.003*	0.001	2.498
Tangibility	0.194***	0.028	6.96
Profitability	-0.158**	0.051	-3.064
Risk	-0.467***	0.095	-4.921
Adjusted R2	0.165		
F-statistic	23.932		
Prob. of (F-Stat.)	0.0001		
3. Short Term Debt Ratio Model			
Constant	0.263**	0.024	10.781
Size	0.013***	0.001	9.344
Growth	0.000**	0.001	0.314
Tangibility	-0.306***	0.02	-15.174
Profitability	-0.227***	0.042	-5.434
Risk	-0.112***	0.086	-1.304
Adjusted R2	0.287		
F-statistic	78.678		
Prob. of (F-Stat.)	0.0001		

This table shows estimates from Ordinary Least Square (OLS) models. The sample contains 93 Saudi Firms listed in the Saudi Stock Exchange. for 2000-2010. Model 1 defines the total debt ratio as total liabilities divided by total assets. Model 2 defines the long-term debt ratio as total liabilities minus current liabilities divided by total assets. Model 3 defines short term debt ratio as current liabilities divided by total assets. In each model the leverage ratio was regressed against five independent variables: size, growth, tangibility, profitability, and risk. The estimated model is: $Leverage(firm_{i,t}) = \alpha + \beta_1 \ln sales_{i,t} + \beta_2 \Delta \ln sales_{i,t} + \beta_3 tangiblity\ of\ assets_{i,t} + \beta_4 return\ on\ total\ assets_{i,t} + \beta_5 \sigma\ return\ on\ total\ assets_{i,t} + \varepsilon_{i,t}$. ****, **, and * indicate significance at the 1, 5 and 10 percent level respectively.*

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