

Investigating the Effect of Credit Ratings on the Pecking Order Theory of the Capital Structure: Empirical Evidence from the UK Market

Riyad Mohammad Al-Hindawi and Abdel Razaq Mohammad Said Al-Farah

ABSTRACT

The aim of this paper is to empirically investigate one of the most influential theories of capital structure; the pecking order theory in the UK market during the period 1999-2005. Furthermore, the paper examines the effect of credit ratings on capital structure decision making. The study employs and extends the approaches used by Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) to investigate the pecking order theory. The results of this paper support the pecking order theory, that is in line with Shyam-Sunder and Myers (1999). Moreover, the results indicate that credit-rated firms are more likely to finance their deficits using equity rather than debt, due to the fact that credit rated firms target credit ratings and take into consideration the disadvantageous effects that the issuing of new debt is likely to have on their credit ratings.

Keywords: Capital Structure, Pecking Order Theory, Credit Rating.

INTRODUCTION

Since the seminal work of Modigliani and Miller (1958), researchers have continued to investigate how firms finance their projects. Modigliani and Miller (1958) argue that the firm's value is independent of its financial structure under certain assumptions. However, Modigliani and Miller (1963) contend that due to the deduction of interest payments from the firm's taxable income, the capital structure mix is relevant to a firm's value.

The pecking order theory is proposed by Myers (1984). Myers (1984) argues that firms finance their projects by using internal resources first, then through using debt, and finally, by issuing equity as the last resort. Shyam-Sunder and Myers (1999) argue that the pecking order theory suggests that a change in debt levels happens when there is an imbalance between internal cash flow, net of dividends, and real investment

opportunities (Thus, highly profitable firms with limited investment opportunities try to reduce their debt levels, while firms that have more investment opportunities, will borrow more debt). Frank and Goyal (2003) argue that under the pecking order theory, it is the firm's deficit that matters. A unit increase in any of the components of the deficit must have the same unit impact on the change of debt.

This study differs from other previous studies as most of the previous studies examined -The pecking order theory of capital structure- using US market data. Therefore, it is important to investigate such a theory in other developed markets such as the UK market. It is worth noting that most of the previous studies that investigated the capital structure theories have not included the period from 1999-2005 in their empirical investigation. Hence, this makes the study different from other studies in the UK market. Moreover, there is still a need for a study that investigates one of the most influential theories of capital structure, the pecking order theory in the UK market during 1999-2005.

Received on 24/2/2009 and Accepted for Publication on 18/4/2010.

Furthermore, this study differs from the other studies because it employs two approaches to investigate the pecking order theory in the UK market. The study employs and extends the approaches of Shyam-Sunder and Myers (1999) and Frank and Goyal (2003).

In addition to that, the study discusses the reasons why credit ratings may be relevant for managers in the capital structure decision process. Additionally, the study empirically investigates the effects of credit ratings on capital structure in the UK market. It is worth noting that previously little research has addressed the relationship between the credit rating and financial gearing. Moreover, the research in this area has been done using data from the US market (Kisgen, 2006, 2007; Graham and Harvey, 2001; and Shivdasani and Zenner, 2005). It appears that no study has investigated the effects of credit ratings on capital structure in the UK market. Hence, it is important to investigate this issue in the UK market. Furthermore, the study investigates how the effects of credit rating on financial complement the existing capital structure theories such as the pecking order theory.

The aim of this paper is to empirically investigate the evidence of the pecking order theory in the UK market during the period 1999-2005. The study employs a set of models to achieve this aim. Firstly, the study uses the approaches proposed by Shyam-Sunder and Myers (1999) and Frank and Goyal (2003). Secondly, the study extends Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) approaches by employing two models instead of one model. Thirdly, the study modifies the specifications of the Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) models in order to improve them. Furthermore, the paper aims at investigating the effect of credit ratings on capital mixture. The study extends the works of Kisgen (2006, and 2007), Graham and Harvey (2001), Bancel and Mitto (2002), and

Shivdasani and Zenner (2005) using a UK data during the period 1999-2005.

The paper is organized as follows: section two considers the literature of the pecking order theory, and the effects of credit rating on capital structure. The data are discussed in section three. The models and results of the study are reported and discussed in section four. Finally, conclusions are drawn in section five.

THE LITERATURE REVIEW

The Pecking Order Theory

It could be argued that the pecking order theory is one implication of the Myers and Majluf (1984) analysis of how asymmetric information influences investment and financing choices (Myers, 1984). According to asymmetric information theory, a firm's capital structure is designed to mitigate the inefficiencies in the firm's investment decisions that are caused by the information asymmetry (Myers and Majluf, 1984; and Myers, 1984). It is worth mentioning that because investors have less information compared with managers regarding the value of the firm, the issued equity value will be underpriced by the market. One way to avoid this situation is by financing with a security not undervalued by the market, such as internal funds or riskless debt (Myers and Majluf, 1984). Myers (1984) suggested that "the pecking order" theory of financing, in which firms prefer to raise their new investment, first from their internal funds through using retained earnings, second by low-risk debt, and finally by issuing equity as the last choice.

Myers (2001) argued that when the firm can issue either debt or equity to finance its new investment, debt has the prior claim on assets and earnings; equity is the residual claim. Thus, investing in debt is less exposed to errors in valuing the firm. The announcement of a debt issue should have a smaller downward impact on stock prices than announcement of an equity issue.

It is worth mentioning that, in the pecking order theory, the attraction of interest tax shields and the threat of financial distress are assumed to be second-order (Myers, 1984; Myers and Majluf, 1984; and Shyam-Sunder and Myers, 1999). Myers (1984) contended that in the pecking order approach, managers who make financing decisions are not really taking into consideration an optimal capital structure. Instead, they simply take the “path of least resistance” and choose what then appears to be the low-cost financing instrument, which is debt. Shyam-Sunder and Myers (1999) contended that changes in debt ratios are driven by the need for external funds, not by any attempt to reach an optimal capital structure.

Shyam-Sunder and Myers (1999) argued that the pecking order theory suggests that a change in debt levels happens when there is an imbalance between internal cash flow, net of dividends, and real investment opportunities. Thus, highly profitable firms with limited investment opportunities try to reduce their debt levels, while firms that have more investment opportunities, will borrow more debt. Shyam-Sunder and Myers (1999) proposed a model to investigate the pecking order theory. They claim that if pecking order theory holds, the slope of a firm's deficit equals one, and the coefficient of the intercept is zero when regressing them to the change of debt in year_t. Shyam-Sunder and Myers (1999) assumed that under the pecking order, each component of the financing deficit should have the predicted dollar-for-dollar impact on corporate debt. Frank and Goyal (2003) contended that the pecking order theory implies that the financing deficit should wipe out the effects of other explanatory variables. Frank and Goyal's (2003) model indicated that there are two sources to finance the company's deficit. Firms usually issue either debt or equity or both to finance their deficit. The total amount of debt issued and/or equity issued from one year to another year must, by definition

be equal to the total deficit at the end of the year. Frank and Goyal (2003) argued that under the pecking order theory, it is the firm's deficit that matters. A unit increase in any of the components of the deficit must have the same unit impact on the change of debt. Chirinko and Singha (2000) questioned the interpretation of Shyam-Sunder and Myers (1999) regression test. Chirinko and Singha (2000) noted that the Shyam-Sunder and Myers's assumption that the slope of the deficit should be close to one is neither a necessary nor a sufficient condition for the pecking order theory to be valid. Chirinko and Singha (2000) claimed that the slope coefficient could fall well short of unity when the pecking order theory holds, and be close to unity when it does not.

Several studies have investigated the empirical evidence of the pecking order theory in the US market. Shyam-Sunder and Myers (1999) found that the pecking order is an excellent first-order descriptor of corporate financing behavior. Furthermore, when testing the pecking order model and target adjustment model jointly, the results show a greater confidence in the pecking order theory than in the target adjustment model. Frank and Goyal (2003) found that firms' deficit does not wipe out the effects of the conventional variables that affect capital structure mixture (tangibility, market to book ratio, size, and profitability). Leary and Roberts (2005) found evidence consistent with the prediction of the pecking order theory that firms are less likely to use external capital markets when they have sufficient internal funds, but are more likely to use it when they have large investment needs. Fama and French (2002) found evidence that supports the pecking order theory, in which more profitable firms are less levered. They found that firms with more investment opportunities have less market leverage, which is in line with the trade-off model and complex version of the pecking order theory.

In the UK market, Panno (2003) found a negative effect of the available reserves which are used as a proxy for internally generated funds. Jordan *et al.* (1998) found that the pecking order theory is a very important determination of capital structure in the UK small firms. Chittenden *et al.* (1996) found that the pecking order theory emerges as a good explanation of small unlisted firms' capital structure with a heavy reliance on internally generated funds being the key factor. Michaelas *et al.* (1999) found that profitability is negatively related to gearing which provides some evidence for the pecking order theory. Support for the pecking order theory is also provided by the negative relationship between the age of the firm and gearing. Brounen *et al.* (2005), used data from four European countries (UK, Germany, Netherland, and France) claimed that their results are in line with the predictions of the pecking order theory. Bentio (2003), used data from the UK and Spanish markets, pointed out that the results for the UK market are in line with the pecking order theory and against the trade-off model.

The Influence of Credit Ratings on Capital Structure Mixture

Graham and Harvey (2001), used a survey to 392 CFOs in the US market, found that credit ratings are the second most important factor after financial flexibility in debt policy. Bancel and Mitto (2002) replicated Graham and Harvey's (2001) approach, using survey from European countries; found that credit rating is the second important factor influencing the debt policy.

Kisgen (2006) examined how credit rating complements the current capital structure theories, especially the target capital structure and the pecking order theories. Kisgen (2006 and 2007) argued that credit rating and capital structure hypotheses state that a credit rating change has a discrete cost/benefit. Kisgen (2006)

contended that the trade-off and credit rating effects together imply firms that will balance the traditional trade-off benefits of higher leverage against the traditional benefits of lower leverage and those discrete credit rating benefits of lower leverage. Kisgen (2006) suggested that contrary to the implications of the pecking order, in some cases firms that are near an upgrade may choose to issue equity instead of debt in order to obtain the benefits of a higher rating and firms that are near a downgrade may avoid issuing debt to prevent the extra costs that result with a downgrade. Kisgen (2006 and 2007) argued that an implication of discrete benefits of higher rating levels in the context of the trade-off theory is that a firm's optimal leverage can be lower than the optimal leverage implied by traditional trade-off factors. Firms may choose a lower leverage to obtain the discrete benefits associated with a higher credit rating. Firms then optimally conduct capital structure behavior consistent with targeting the minimum credit rating over the long-term. The lower leverage implied by targeting a minimum credit rating might to some extent explain why firms appear to use debt too conservatively, as found in previous studies (Miller, 1977 and Graham, 2000). Shivdasani and Zenner (2005) contended that there is a crucial debate about benefits and the costs of more or less leverage and the corresponding credit rating. Shivdasani and Zenner (2005) suggested that highly rated firms face a question of whether they should use their financial flexibility to lever up and buy back shares. On the other hand, low-rated firms take financing strategies that keep or strengthen their credit rating. The trade-off theory predicts that profitable firms generating a lot of cash should issue debt to reduce their corporate income taxes. However, in practice, most profitable firms have high credit ratings and low leverage ratios.

Shivdasani and Zenner (2005) proposed the target

credit rating as an explanation to the effect of credit rating on capital structure. Steeman (2002) claimed that debt levels can be linked to a certain credit rating, the higher the leverage, the lower the credit rating, and the better the business position, the more leverage is acceptable. Steeman (2002) contended that firms should be concerned about the influence of using debt. Steeman (2002) claimed that an increase of debt is likely to lead to a deterioration of the credit rating. However, the issuance of equity is generally having a positive impact on the credit rating.

Heine and Harbus (2002) claimed when the firm's cash flows are strong, debt is likely to pay back to a level consistent with the firm's target credit rating. If the firm's cash flows are not enough, management is likely to increase its leverage ratio to move to a temporarily higher level in order to finance investment. Hence, the firm's target credit rating controls its "permanent" debt capacity.

DATA AND SAMPLE

The sample of the study is composed of two kinds of data. First, the firms' financial information over the period 1999-2005. The source of this data is the OSIRIS database. The set of financial information included in the study is taken from the firms' financial statements during the period 1999-2005. Second, the firms' credit ratings. The source of this data is the Standard and Poor's long-term credit rating for the period 1999-2005 (e.g. Adams *et al.*, 2003; Shin and Moore, 2003; Crabbe and Post, 1994; and Nayar and Rozeff, 1994).

Following the previous studies related to investigating the capital structure mixture and the credit ratings firms that operate in the financial sector (banks, insurance and investment firms) are excluded (e.g., Shyam-Sunder and Myers, 1999; Frank and Goyal, 2003; Rajan and Zingales, 1995; Titman and Weasels, 1988; Lasfer, 1995; Ozcan, 2001 and Kisgen, 2006).

Moreover, all the firms engaged in merger during the period of the study are excluded from the sample (Shyam-Sunder and Myers, 1999). The study includes only firms whose financial statements are available on the Osiris database. Firms with missing observations for any variable and for any year in the models are included in the sample. Finally, the sample includes only the firms that are listed in the London Stock Market. The initial sample is a set of all the firms for which credit ratings are available on Standard and Poor's ratings for the UK market during the period 1999-2005. After taking into consideration the previous criteria, this restricted the rated-firms sample to 69 credit-rated firms over the period 1999-2005.

Due to the fact that one of the aims of the study is to investigate the effects of credit rating on the capital structure between rated and non-rated companies, the study adds a set of non-rated firms to the 69 credit rated firms. Therefore, we selected 69 non-rated firms, using simple random sampling technique, out of the whole firms (1866 firms) available on Osiris database using a random number generator in order to match the rated firms sample with non-rated sample. This makes the whole sample consist of 138 firms over the period 1999-2005 (The sample is a pooled sample for the period 1999-2005). Kervin (1992), Zikmund (2000) and Thiétart *et al.* (2001) contended that the simple random sample has two defining features: First, all cases in the population have an equal chance of appearing in the sample. Second, all possible samples of a given size have an equal chance of being selected. Saunders *et al.* (2003) argued that random numbers allow you to select your sample without bias.

The study uses the SIC classification for the firms' industry classification. Eight sectors are represented in the sample. Table (I) explains the distribution of the industries of the sample.

Table (I): Industry classification for credit rated and non-rated firms

Industry Classification SIC	Total number of firms	Number of rated firms	Number of non-rated firms
Mining and Quarrying	4	3	1
Manufacturing	60	27	33
Electricity, Gas and Water Supply	10	7	3
Construction	4	2	2
Wholesale and Retail Trade	17	8	9
Hotels and Restaurants	5	2	3
Transport, Storage and Communication	12	9	3
Business Activities	26	11	15
Total	138	69	69

THE MODELS AND RESULTS

The Pecking Order Theory Models

The study employs a set of models to investigate the pecking order theory in the UK market. The study extends the works of Shyam-Sunder and Myers (1999) and Frank and Goyal (2003). This study differs from Shyam-Surnder and Myers (1999) and Frank and Goyal (2003) in the pecking order theory in which it is tested using two models. In the first model, the dependent variable measures the change in debt from year_t to year_{t+1} as a function of the deficit. The dependent variable in the second model is the change in equity from year_t to year_{t+1} as a function of the deficit. The aim of testing the two models is to investigate the firm's use of equity or/and debt to finance their deficit. This can be demonstrated by Model (1). Frank and Goyal (2003) showed that Model (1) indicates that there are two sources to finance the firm's deficit. Model (1) indicates that firms usually issue either debt or equity or both to finance their deficit. The total amount of debt issued and/or equity issued from one year to another year must, by definition be equal to the total deficit at the end of the year.

$$\Delta E_{it} + \Delta D_{it} = DEF_{it} \quad 1$$

Where:

ΔD_{it} : is the change in the total debt from year_t to

year_{t+1}. It equals the change on the long-term debt + the change of short-term debt.

ΔE_{it} : is the net equity issued in year_t. It equals sale of common stock minus stock repurchases from year_t to year_{t+1}.

DEF: is the deficit of firm_i at year_t. Frank and Goyal (2003) employs the following formula in order to calculate the firm's deficit.

$$DEF_t = DIV_t + I_t + \Delta W_t - C_t = \Delta D_t + \Delta E_t$$

Where:

DIV_t : is the cash dividend payment in year_t.

I_t : is the net investment in year_t.

ΔW_t : is the change in working capital in year_t.

C_t : is the operating cash flow after interest and taxes.

Shyam-Surnder and Myers (1999) contended that in the strict the pecking order theory model all components of the deficit are exogenous as long as safe deficit can be issued. There is no incentive to move down the pecking order and issue stock. Shyam-Surnder and Myers (1999) contended that the simple pecking order's predictions do not depend on the sign of the deficit. In principle, the firm could become a net lender if funds surpluses persist.

In order to investigate the pecking order theory in the UK market, models (1) and (2) are estimated. Shyam-Surnder and Myers (1999) and Frank and Goyal (2003) employed model (2) in the investigation of the pecking

order theory. The study extends their works by using model (3). Shyam-Sunder and Myers (1999) argued that because the pecking order is driven by asymmetric information, capital structure depends on the net requirement for external finance. No balance-sheet variables appear in model (2).

$$\Delta D_{it} = \alpha_0 + \alpha_1 DEF_{it} + \varepsilon_{it} \quad 2$$

$$\Delta E_{it} = \beta_0 + \beta_1 DEF_{it} + \varepsilon_{it} \quad .3$$

In order to address statistical problems such as heteroskedasticity, the different sizes of firms, all the variables are scaled by the total assets of firm_i at the end of each year. Frank and Goyal (2003) claimed that the pecking order theory does not require such scaling. However, Frank and Goyal (2003) argued that scaling is most often justified as a method to control the differences in a firm's size.

It is important to note that the results from testing models (1), (2), and (3) provide important specifications. First, the sum of the deficit coefficients (DEF) in models (2) and (3) must equal one. This is due to the fact that the deficit equals the change in debt (ΔD) plus the change in equity (ΔE). Second, the sum of the intercepts in model (2) and (3) must equal zero. This is a consequence of the first point above.

Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) argued that if the pecking order theory holds, the intercept should equal zero ($\alpha_0 = 0$) and the slope of the deficit variable should equal one ($\alpha_1 = 1$) in model (2). Shyam-Sunder and Myers (1999) assumed that under the pecking order, each component of financing the deficit should have the predicted dollar-for-dollar impact on corporate debt. We extend the previous assumption by hypothesizing that the slope of the deficit in model (3) should not be different from zero ($\beta_1 = 0$), this means that firms do not issue equity to

finance their deficit if pecking order theory holds. We also hypothesize that the error term is more important, i.e. larger in model (3) than in model (2). In addition, that β_0 in model (3) will be positive, as a consequence of which α_0 in model (2) will be negative.

It is worth noting that the scaling of models (2) and (3) that Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) employed, needs to be modified. This is due to the fact that when we multiply models (2) and (3) by total assets, the intercept in both models becomes the total assets variable. Therefore, we modify models (2) and (3) by scaling all the variables in both models (including the intercept) by the firms' total assets. A new intercept that equals one for all firms should be added to both models. This is necessary for the $\sum \varepsilon_i = 0$ property (the total residuals equal zero). The modified scaled models are:

$$\Delta D_{it} = \alpha_0 + \alpha_1 DEF_{it} + \alpha_2 ATA + \varepsilon_{it} \quad 4$$

$$\Delta E_{it} = \beta_0 + \beta_1 DEF_{it} + \beta_2 ATA + \varepsilon_{it} \quad 5$$

Where:

ATA: is the reciprocal of the firms' assets.

If we now multiply models (4) and (5) by the total assets, α_2 and β_2 , respectively this will be the intercept for the unscaled model, and α_0 and α_1 , respectively this will become the total assets variable.

Following Shyam-Sunder and Myers (1999) and Frank and Goyal (2003), all the models that are employed in the study are tested using pooled sample. The pooled data is the data that contains pooling of time series and cross-sectional observations (combination of time series and cross-section data) (Gujarati, 2003: 636).

The study employs the pool sample analysis because of the advantages of pooling the sample. It has been argued that the pool sample has many advantages. Pooling data generates more informative data, more

variability, less collinearity among variables, more degrees of freedom, and more efficiency. Furthermore, aggregating data of many observations minimises the

bias that might result if we aggregate individuals or firms into broad aggregates (Gujarati, 2003).

Table (II): Descriptive statistics for the pooled sample of the study (credit rated and non-rated firms)

Variable*	Pool sample		Credit –rated firms		Non-rated firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
DEF	0.148	2.469	0.0456	0.305	0.254	3.503
ΔD	0.133	2.492	0.0147	0.260	0.234	3.517
ΔE	0.0189	0.174	0.0303	0.139	0.0282	0.207
Number of Firms	138		69		69	

DEF: is the deficit of firm, at year, ΔD : is the change in the total debt from year, to year_{t+1}, and ΔE : is the net equity issued in year,
* The details of the variables will be discussed in the coming sections.

Table (II) illustrates the descriptive statistics for the whole sample (credit-rated and non credit-rated firms) that the entire mean values of the deficit variable (DEF) and the change in debt ΔD variables for the credit-rated firms are higher for non-rated firms than for rated firms. Furthermore, the change of debt covers most of the deficit for the non-credit rated firms, the change in equity covers most of deficits for credit-rated firms. This could be attributed to the fact that credit-rated firms have to target credit ratings and that they take into consideration the disadvantageous effects that the issuing of new debt is likely to have on their credit rating.

The Results of Estimating the Pecking Order Theory Models

The results presented in table (III) strongly support the pecking order theory. The estimated coefficient of the deficit variable in models (2) and (4) is strongly significant and positive which indicates that firms finance their deficit by using debt. Moreover, the slope of deficit is statistically not

different from one. Furthermore, the intercept in models (2) and (4) are negative and close to zero and not significant. The explanatory power of the models (2) and (4) are very high, 90%, and 91%, respectively. Considering the simplicity of the model, the pecking order model does very well. The deficit variable in models (3) and (5) is not significant. This again indicates that firms in the UK do not finance their deficit by issuing equity. The pecking order models' results show that external funding is dominated by debt. These results are in line with those of Shyam-Sunder and Myers (1999) who found evidence that supports the pecking order theory. However, Sunder and Myers (1999) only estimated a change in debt equation, (model (2)). It is worth noting that there is no great change in coefficients of the deficit and intercept in the modified models (4) and (5), compared with the (2) and (3) models. However, the explanatory power of models (4) and (5) are higher than model (2) and (3). We believe that models (4) and (5) perform better than models (2) and (3).

Table (III): The results of estimating models (2-5)

	Model (2)	Model (3)	Model (4)	Model (5)
A	- 0.009 (0.008)	0.009 (0.008)	- 0.004 (0.007)	0.004 (0.007)
ATA	-	-	- 193.7*** (16.3)	193.7*** (16.3)
Def	0.89***	0.11	0.88***	0.12

	Model (2)	Model (3)	Model (4)	Model (5)
	(0.07)	(0.07)	(0.08)	(0.08)
R ²	0.90	0.13	0.91	0.22
N	512*	512	512	512

Model(2): $\Delta D_{it} = \alpha_0 + \alpha_1 DEF_{it} + \varepsilon_{it}$ Model(3): $\Delta E_{it} = \beta_0 + \beta_1 DEF_{it} + \varepsilon_{it}$

Model (4): $\Delta D_{it} = \alpha_0 + \alpha_1 DEF_{it} + \alpha_2 ATA_{it} + \varepsilon_{it}$ and Model (5): $\Delta E_{it} = \beta_0 + \beta_1 DEF_{it} + \beta_2 ATA_{it} + \varepsilon_{it}$

Where: ΔD_{it} : is the change in the total debt from year_t to year_{t+1}, ΔE_{it} : is the net equity issued in year, DEF_{it} : is the deficit of firm_i at year_t, A: is the intercept, ATA: is the reciprocal of the firms' assets, and ε_{it} is the error term.

The sample is a pool sample for the period 1999-2005. The dependent variables are ΔD : is the change in the total debt from year_t to year_{t+1} and ΔE : is the net equity issued in year. A is the intercept, ATA is the scaled intercept by the total assets, and DEF_{it} : is the deficit of firm_i at year_t scaled by the total assets of each firm. The standard errors are corrected for heteroskedasticity after using Breusch-Pagan test. Numbers in bracket and in bold are the standard errors.

* Statistically significant at 10%.

** Statistically significant at 5%.

*** Statistically significant at 1%.

* The pool data of the study consists of 137 firms for 7 year time span, the number of observations in table III and V is 512. This is due to the missing observation during that period. As discussed earlier firms with missing observations for any variable and for any year in the models are included in the sample. It is worth noting that Limdep 7.0 enables us to estimate the models with samples that have missing observations.

The interpretation of the intercept in models (2) and (3) is that there is a fixed amount affecting the dependent variable: the change in total debt/total assets, and the change in total equity/total assets. If we unscale all the variables in models (2) and (3) to return to 'level' measures, we need to multiply each by total assets. This makes the intercept the total assets variable, which is thus a measure of size. The fact that the intercept is not significant in models (2) to (5) indicates that the size of the firm does not affect the debt to equity choice.

In order to see whether there is an intercept for the level of debt, the variable, ATA variable is added in models (4) and (5). This, when multiplied by total assets, becomes an intercept in a "level" model. ATA variable is significant in models (4) and (5) and has an important interpretation. It is strongly significant in both models and the coefficient values and standard errors are the same because of the OLS method of estimation. The fact that the estimated coefficient is negative in the debt model (4) and positive in the equity model (5) provides strong support for the pecking order theory. Taking the changes in equity results first, the strongly positive ATA

estimated coefficient means that a proportion of the change in equity is exogenous, that is, it is not determined by the other variables in the model. In the debt equation the same, but negative value indicates the amount of the deficit not financed by debt, and hence not determined by the size of the deficit. This further supports the pecking order theory.

As mentioned earlier, the sample of the study is pooled for the period 1999-2005 following Shyam-Sunder and Myers (1999) and Frank and Goyal (2003). The study investigates whether using panel data analysis would have been better than pooling the data. The study employs Lagrange Multiplier test for that purpose. It is worth mentioning that the null hypothesis of Lagrange Multiplier test is that the pooled regression is better than panel methods. The results presented in table (IV) indicate that we cannot reject the null hypothesis of Lagrange Multiplier test as the probability of significance is 0.22 (not significant). Accordingly, using pooled analysis is more suitable than using panel data analysis.

Table (IV): The results of Panel data diagnostic test

Dependent Variable	Model (2)	Model (3)
Lagrange Multiplier test	1.520 (0.220)	1.520 (0.220)

Lagrange Multiplier is a test of classical regression (pool) with no group specific variables against panel. The numbers in brackets and in bold below the coefficient, are the probabilities of significance. According to the results of Lagrange Multiplier test, we cannot reject the null hypothesis that pooled regression is better than panel methods.

The Effect of Credit Ratings on the Pecking Order Theory

The study investigates the effect of credit ratings on the pecking order theory. The study investigates the effect of being a credit-rated or a non-credit rated firm on the financial gearing. In order to achieve this, the CRDEF variable is added to the models (2-5). CRDEF is constructed by multiplying a dummy variable equal to one for credit-rated firms and zero otherwise, by the deficit of the firm in the same year.

Shivdasani and Zenner (2005) contended that there is a crucial debate about the benefits and the costs of a more or a less leverage and the corresponding credit rating. Steeman (2002) argued that firms' level of debt is an indicator of the inherent credit risk (the firms' risk of

default). Steeman (2002) claims that debt levels can be linked to a certain credit rating, the higher the leverage, the lower the credit rating. Steeman (2002) contends that firms should be concerned about the influence of using debt. Steeman (2002) claimed that an increase of debt is likely to lead to a deterioration of the credit rating. However, the issuance of equity appears to generally have a positive impact on the credit rating. Kisgen (2006 and 2007) argued that firms may choose a lower leverage to obtain the discrete benefits associated with a higher credit rating. Therefore, the hypothesis is that CRDEF will be significant and have a negative sign in the change in debt models, and positive sign in the change in equity model. This implies that rated firms prefer to use equity rather than debt in financing their projects.

Table (V): Investigating the effect of credit rating on capital structure

	ΔD	ΔE	ΔD	ΔE
A	- 0.008 (0.008)	0.008 (0.008)	-0.030 (0.007)	0.030 (0.007)
ATA	-	-	- 192.2*** (11.7)	192.2*** (11.7)
Def	0.910*** (0.060)	0.090 (0.060)	0.910*** (0.070)	0.090 (0.070)
CRDEF	- 0.240** (0.110)	0.240** (0.110)	- 0.230** (0.110)	0.230** (0.110)
R ²	0.90	0.18	0.91	0.27
N	512*	512	512	512

The sample is a pool sample for the period 1999-2005. The dependent variables are ΔD : is the change in the total debt from year_t to year_{t+1} and ΔE : is the net equity issued in year. A is the intercept, ATA is the scaled intercept by the total assets, and DEF: is the deficit of firm_i at year_t scaled by the total assets of each firm., and CRDEF is constructed by multiplying a dummy variable equal to one for credit-rated firms and zero otherwise, by the deficit of the firm in the same year. The standard errors are corrected for heteroskedasticity after using Breusch-Pagan test. Numbers in brackets and in bold are the standard errors.

*The pool data of the study consists of 137 firms for 7 year time span, the number of observations in table III and V is 512. This is due to the missing observation during that period. As discussed earlier firms with missing observations for any variable and for any year in the models are included in the sample. It is worth noting that Limdep 7.0 enables us to estimate the models with samples that have missing observations.

* Statistically significant at 10%.

** Statistically significant at 5%.

*** Statistically significant at 1%.

The results presented in table (V) show that the estimated coefficient of the deficit variable in the change in debt models is strongly significant and positive which indicates that firms finance their deficit by using debt. The slope of deficit is statistically not different from one. However, the deficit variable in change in equity models is not significant. This again indicates that firms in the UK do not finance their deficit by issuing equity. These results are in line with those of Shyam-Sunder and Myers (1999). The intercept in the change in debt models is negative and close to zero and not significant. This supports the pecking order theory. The explanatory power of the change in debt models is very high, 90%, and 91%, respectively.

The dummy variable of being credit-rated or non-rated (CRDEF) in change in debt and equity models is statistically significant. This implies that being credit-rated or not rated have strong impact on firms' choices of using debt or equity in financing their projects. It is worth mentioning that the sign of the CRDEF in debt models is negative as predicted. This indicates that there is a negative relationship between issuing debt and being credit rated firms when finance projects. However, the CRDEF variable in equity models is positive as predicted, which implies a positive relationship between issuing equity and non-credit rated firms. These results are a modified version of the pecking order theory. This is because the pecking order theory permits issuing equity as the last resort. This behavior of credit-rated firms may be attributed to the fact that credit rated firms are targeting credit rating and they take into consideration the disadvantageous effects of issuing new debt, compared with the advantages of issuing equity, on their credit rating up-grading or down-grading. These results are in line with Kisgen (2006 and 2007) and

Shivdasani and Zenner (2005).

The interpretation of the intercept in change in debt models is that there is a fixed amount affecting the dependent variable: the change in total debt/total assets, and the change in total equity/total assets. If we un-scale all the variables in all models in table (V) to return to 'level' measures, we need to multiply each by total assets. This makes the intercept the total assets variable, which is thus a measure of size. The fact that the intercept is not significant in all models indicates that the size of the firm does not affect the debt to equity choice. ATA variable is significant in the modified models. The fact that the estimated coefficient is negative in the debt model and positive in the equity model provides strong support for the pecking order theory.

It is worth mentioning that there is no large change in coefficients of the deficit and intercept in the modified models, compared with the unmodified models. However, the explanatory power of the modified models is higher than unmodified models. We believe that modified models perform better than the unmodified models.

CONCLUSION

This paper empirically investigated one of the most influential theories of capital structure: the pecking order theory in the UK market during the period 1999-2005. Furthermore, the paper investigated the effect of credit rating on capital structure decision making (Kisgen, 2005, 2006, and 2007).

The study employs and extends the approaches used by Shyam-Sunder and Myers (1999) and Frank and Goyal (2003). This study differed from other studies that it employs and extends the approaches proposed by Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) in order to investigate the pecking order theory.

In addition, the study empirically investigated the effects of credit ratings on the capital structure mixture (Kisgen, 2005, 2006, and 2007).

The results showed support for the pecking order theory, in which firms prefer to finance their deficits by using debt. These results are in line with Shyam-Sunder and Myers (1999). Moreover, the results indicated that credit-rated firms are more likely to finance their deficits using equity rather than debt. These results were attributed to the fact that rated firms have to target credit

ratings and they take into consideration the disadvantageous effects that issuing of a new debt is likely to have on their credit rating.

Future research could be directed toward using other techniques to investigate the effect of credit ratings on the pecking order theory. Furthermore, further research could be prepared in this area by adding new control variables like the firms' stock price to the equity models in order to investigate the effect of market timing on issuing new equity.

REFERENCES

- Adams, M., Burton, B. and Hardwick, P. 2003. The Determinants of Credit Ratings in the United Kingdom Insurance Industry. *Journal of Business Finance and Accounting*, 30(3/4): 539-572.
- Bancel, F. and Mittoo, U.R. 2004. Cross-Country Determinants of Capital Structure Choice: A Survey of European Firms. *Financial Management*, 33(4):103-132.
- Brounen, D., Jong, A.D. and Koedijk, K. 2005. Capital Structure Policies in Europe: Survey Evidence. *Journal of Banking and Finance*.
- Chirinko, R.S. and Singha, A.R. 2000. Testing Static Tradeoff against Pecking Order Models of Capital Structure: A Critical Comment. *Journal of Financial Economics*, 58(3): 417-425.
- Chittenden, F., Hall, G. and Hutchinson, P. 1996. Small Firm Growth, Access to Capital Markets and Financial Structure: Review of Issues and an Empirical Investigation. *Small Business Economics*, 8(8): 59-67.
- Fama, E.F. and French, K.R. 2002. Testing Trade-Off and Pecking Order Predictions about Dividends and Debt. *Review of Financial Studies*, 15(1): 1-33.
- Frank, M.Z. and Goyal, V.K. 2003. Testing the Pecking Order Theory of Capital Structure. *Journal of Financial Economics*, 67(2): 217.
- Graham, J. and Harvey, C. 2002. How Do CFOs Make Capital Budgeting and Capital Structure Decisions? *Journal of Applied Corporate Finance*, 15(1): 8.
- Graham, J.R. and Harvey, C.R. 2001. The Theory and Practice of Corporate Finance: Evidence from The Field. *Journal of Financial Economics*, 60(2/3): 187-243.
- Gujarati, D.N. 2003. Basic Econometrics Fourth Edition, .
- Heine, R. and Harbus, F. 2002. Toward A More Complete Model of Optimal Capital Structure. *Journal of Applied Corporate Finance*, 15(1): 31.
- Jordan, J., Lowe, J. and Taylor, P. 1998. Strategy and Financial Policy in UK Small Firms. *Journal of Business Finance and Accounting*, 25(1/2): 1-27.
- Kervin, J.B. 1992. Methods for Business Research. Harper Collins Publishers New York.
- Kisgen, D. 2005. Do Firms Target Credit Ratings or Leverage Levels? Working paper.
- Kisgen, D. 2006. Credit Ratings and Capital Structure. *Journal of Finance*, 61(3):1035-1072.
- Kisgen, D. 2007. The Influence of Credit Ratings on Corporate Capital Structure. *Journal of Applied Finance*, 19(3):65-73.
- Lasfer, M.A. 1995. Agency Costs, Taxes and Debt: The UK Evidence. *European Financial Management*, 1(3): 265.
- Leary, M.T. and Roberts, M.R. 2005. Do Firms Rebalance

- Their Capital Structures? *Journal of Finance*, 60(6): 2575-2619.
- Marsh, P. 1982. The Choice between Equity and Debt: An Empirical Study. *Journal of Finance*, 37(1): 121.
- Michaelas, N. and Chittenden, F. 1999. Financial Policy and Capital Structure Choice in U.K. SMEs: Empirical Evidence from Company Panel. *Small Business Economics*, 12(2): 113.
- Miller, M.H. 1977. Debt and Taxes. *Journal of Finance*, 32(2): 261.
- Modigliani, F. and Miller, M.H. 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, 48(3): 261-297.
- Modigliani, F. and Miller, M.H. 1963. Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review*, 53(3): 433-443.
- Myers, S.C. and Majluf, N.S. 1984. Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have. *Journal of Financial Economics*, 13(2): 187-221.
- Myers, S.C. 1984. The Capital Structure Puzzle. *Journal of Finance*, 39(3): 575.
- Myers, S.C. 2001. Capital Structure. *Journal of Economic Perspectives*, 15(2): 81-102.
- Ozkan, A. 2001. Determinants of Capital Structure and Adjustment to Long Run Target: Evidence from UK Company Panel Data. *Journal of Business Finance and Accounting*, 28(1/2): 175-198.
- Panno, A. 2003. An Empirical Investigation on The Determinants of Capital Structure: The UK and Italian Experience. *Applied Financial Economics*, 13(2): 97-112.
- Rajan, R.G. and Zingales, L. 1995. What Do We Know about Capital Structure? Some Evidence from International Data. *Journal of Finance*, 50(5): 1421-1460.
- Saunders, M.N.K. and Lewis, P. 2003. Research Methods for Business Students. Prentice Hall.
- Shivdasani, A. and Zenner, M. 2005. How to Choose a Capital Structure: Navigating the Debt-Equity Decision. *Journal of Applied Corporate Finance*, 17(1): 26-35.
- Shyam-Sunder, L. and Myers, S.C. 1999. Testing Static Tradeoff against Pecking Order Models of Capital Structure. *Journal of Financial Economics*, 51(2): 219-244.
- Steeman, M. 2002. Corporates and Credit Ratings. NIB Capital Bank.
- Thietart, R.A. 2001. Doing Management Research: A Comprehensive Guide. Sage.
- Titman, S. and Wessels, R. 1988. The Determinants of Capital Structure Choice. *Journal of Finance*, 43(1): 1.
- White, L.J. 2001. The Credit Rating Industry: An Industrial Organization Analysis. New York University Salomon Center.
- Zikmund, W. 2000. Business Research Methods: The Dryden Press.

** " "

2005-1999

(1999) (2003) (1999) (2003)

* Al-Balqa' Applied University, Mobile: 0799492281, Email: hindawir@yahoo.co.uk
** Al-Balqa' Applied University.

.2010/4/18 2009/2/24