Capital structure and value firm: an empirical analysis of abnormal returns

Structura capitalului şi valoarea firmei: o analiză empirică a randamentelor anormale

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Abstract

This study investigates whether capital structure is value relevant for the equity investor. In this sense, the paper links empirical corporate finance issues with investment analysis. This study also integrates the Miller-Modigliani (MM) framework (1958) into an investment approach by estimating abnormal returns on leverage portfolios in the time-series for different risk classes. For most risk classes, abnormal returns decline in firm leverage. Descriptive statistics, simple and multiple regressions are used to test the hold indicator significance. The results reflect that the designed measures are the negative relationship between returns and leverage could also be due to the market's pricing of the firm's ability to raise funds if need be. Further avenues for research in this area include examining the stock return performance of companies based on the changes in leverage of the firms relative to their risk classes. It would be particularly noteworthy to examine the rate at which the information content of said changes is incorporated in the share prices of companies as well as in their long run returns This study encompasses all non-financial firms across the five sectors that cover all the various classes of risk. This study investigates neither the determinants of multiple capital structure choices nor changes in capital structures over time. Our main goal is to explore the effect of capital structure on cumulative abnormal returns. This study also examine a firm's cumulative average abnormal returns by measuring leverage at the firm level and at the average level for the firm's industry. And also examine other factors, such as size, price earnings, market-to-book and betas.

Keywords: *capital structure; agency cost; firm value*

Rezumat

Acest studiu investighează dacă structura de capital reprezintă o valoarea relevantă pentru investitorul de capital. În acest sens, lucrarea leagă aspectele empirice de finanţe corporative cu analiza investiţiilor. De asemenea, studiul integrează, modelul Miller-Modigliani (1958) în abordarea investiţiilor prin estimarea randamentelor anormale pe portofolii bazate pe efectul de levier în serii de timp pentru diferite clase de risc. Pentru cele mai multe clase de risc, randamentele anormale se diminuează în efectul de levier al firmei. Pentru a testa semnificaţia indicatorului propus sunt folosite statistici descriptive, regresia simplă şi multiplă. Rezultatele reflectă faptul că măsurile propuse arată relaţia negativă dintre randamente şi efectul de levier care, de asemenea, ar putea fi datorită preţului de piaţă cu privire la abilitatea firmei de a strânge fonduri dacă este *necesar. Alte căi de cercetare în acest domeniu includ examinarea performanţei de randament al stocului companiilor pe baza modificărilor în efectul de levier al firmelor în raport cu clasele de risc al acestora. Ar fi extrem de interesantă examinarea ratei la care conţinutul de informaţii al acestor schimbări este inclus în preţurile acţiunilor companiilor, precum şi în randamentele lor pe termen lung. Acest studiu cuprinde toate firmele non-financiare din cele cinci sectoare care acoperă toate clasele variate de risc. Acest studiu nu investighează nici factorii care determină alegerea structurii multiple de capital, nici modificările în structurile de capital de-a lungul timpului. Scopul nostru principal este de a explora efectul structurii capitalului asupra randamentelor cumulative anormale. Acest studiu examinează, de asemenea, media randamentelor cumulative anormale ale unei firme prin măsuarea efectului de levier la nivelul firmei şi la nivelul mediu al industriei firmei. De asemenea, sunt examinaţi şi alţi factori, cum ar fi dimensiunea, câştigurile de preţ, valoarea de piaţă faţă de valoarea contabilă şi indicii beta.*

Cuvinte-cheie: *structura capitalului; costul agenţiei; valoarea firmei*

JEL Classification: G32, G34, G20

Introduction

Theoretical finance has always regarded debt as one of the principle sources of financial risk. According to Miller-Modigliani (MM)'s seminal work on capital structure, firm value is independent of financing decisions. The authors rigorously show that the value of a firm is determined by the rate of return on real assets—and not by the mix of securities that are issued. An immediate implication of MM's propositions on equity returns is that they should increase in leverage. This is indeed the case in the cross section of firms in a certain risk class of Utilities and Oil & Gas industries as revealed by the authors' findings. Hence, we classify our sample by type of industry.

In MM, equity returns are represented by the average cost of capital in a one year period and estimations are conducted in a cross-section of a particular risk class. We represent equity returns as cumulative abnormal returns for a holding period of one year, which representation is easier for an investor to interpret. We use panel data that contains information for a 25-year period and combines the cross-section with the time series. In MM, the only independent variable is the leverage ratio and it's square to test the linearity of the relationship. In our study, in addition to the leverage ratio and its square, we use five additional variables that reflect idiosyncratic risk, including the risk factors described by Fama and French (1992) and the particular environment's cost of borrowing in order to account for changes in the cost of capital in the time series that explain abnormal returns. MM conduct their tests within two industries, each representing a coherent risk class, namely the oil and utilities sectors. We, however, do not limit our research simply to two sectors. Instead, our study encompasses all non-financial firms across the nine sectors that cover all the various classes of risk.

The relationship between capital structure and firm value has been the subject of considerable debate, both theoretically and in empirical research. Throughout the literature, debate has centered on whether there is an optimal capital structure for an individual firm or whether the proportion of debt usage is irrelevant to the individual firm's value.

In their seminal articles, Modigliani and Miller (1958; 1963) demonstrate that, in a frictionless world, financial leverage is unrelated to firm value, but in a world with tax-deductible interest payments, firm value and capital structure are positively related. Miller (1977) added personal taxes to the analysis and demonstrated that optimal debt usage occurs on a macro-level, but it does not exist at the firm level. Interest deductibility at the firm level is offset at the investor level.

Other researchers have added imperfections, such as bankruptcy costs (Baxter & Nevins, 1967; Kim, 1978), agency costs (Jensen & Meckling, 1976), and gains from leverage-induced tax shields (DeAngelo & Masulis, 1980), to the analysis and have maintained that an optimal capital structure may exist. Empirical work by Bradley, Jarrell and Kim (1984), Long & Malitz (1985) and Titman and Wessels (1988) largely supports bankruptcy costs or agency costs as partial determinants of leverage and of optimal capital structure.

DeAngelo and Masulis (1980) demonstrated that with the presence of corporate tax shield substitutes for debt (e.g. depreciation, depletion, amortization, and investment tax credits), each firm will have "a unique interior optimum leverage decision with or without leverage related costs" (p. 3). The DeAngelo-Masulis model implies that a firm's optimal capital structure will be industry related in part because of the evidence that tax rates vary across industry (Rosenberg, 1969). Masulis (1983) argues further that when firms which issue debt are moving toward the industry average from below, the market will react more positively than when the firm is moving away from the industry average.

The remaining sections of the paper are organized as follows: Section 2 presents a review of literature. Section 3 describes data and research methodology. Section 4 reports results of the statistical analyses. Section 5 summarizes the main conclusion and recommendations of the study.

Literature review

Korteweg (2004) also tests the aforementioned MM proposition. His tests are based on pure capital structure changes (i.e., exchange offers). He controls for business risk by assuming non-zero debt betas and uses a time series approach. In our study, we use a cross-sectional approach to test whether leverage is value-relevant by investigating excess returns generated by holding portfolios based on a company’s leverage. Since our sample is not limited and includes a cross-section of all firms, we do not assume zero debt betas and avoid additional assumptions when calculating separate debt betas and asset betas. Hull (1999) measures market reaction to common stock offerings with the sole purpose of debt reduction and reports a negative immediate response — increasingly more so for firms further from the industry norm. Our sample is not as limited as Hull's and includes a cross-sectional examination of all firms. Additionally, we do not employ a short-run perspective. While Hull measures immediate wealth maximization using three-day cumulative returns, we assume a one-year holding period for our portfolios, which assumption is in keeping with MM and Schwartz (1959).

Dimitrov and Jain (2005) measure the effect of leverage changes on stock returns as well as on earnings-based measures of performance. Their results reveal a negative correlation between debt-to-equity ratio and risk-adjusted stock returns. The authors study how changes in levels of debt are negatively associated with contemporaneous and future-adjusted returns. In this paper, we investigate the ability of leverage to predict stock returns by using a cross-section of these ratios rather than changes over time. Also, we do not distinguish between the operating and investing activities of a firm, as we are concerned with the excess returns an investor can make from the overall activities of a company in a one-year investment horizon.

Miao (2005) develops an industry model of equilibrium between capital structure choices and production decisions made by firms facing idiosyncratic technological shocks. His results show that technology (i.e., productivity) is important in determining a firm's probability of survival and leverage ratio. His work also looks into understanding the theoretical impact of financing policies on firm turnover. In this paper, we classify our sample according to industry in order to study cross-sectional cumulative abnormal returns. We do not individually address the financing needs or production decisions of each industry.

Alti (2006) finds that hot-market firms leverage ratios increase significantly two years following the Initial Public Offering; however, cold market firms appear to be content with the leverage ratios they attain at the IPO. He concludes that market timing is an important determinant of financing activity in the short-run but that its long-run effects are limited. Ahn et al. (2006) investigate the relationship between investment patterns and leverage. They show that firms with diversified investments have higher leverage than firms with more focused investments.

Li et al. (2006) show that financial institution owner- ship is determined by macro corporate governance factors such as corporate disclosure requirements. Ferreira and Matos (2008) use total stockholdings of financial institutions from around the world and find that banks have no discernable impact on firm value. Studies that focus on bank ownership use primarily Germany (Gorton & Schmid, 2000; Chirinko & Elston, 2006). However, recent evidence from China suggests a negative effect of bank ownership on firm performance (Lin et al., 2009).

Gillan and Starks (2003) state that the rise of professional money managers as a large shareholder group in companies can increase the potential for monitoring of firm management. Cornett et al. (2007) show that better .firm performance is associated with the presence of institutions without potential business relationships with the firm.

In Germany, Gorton and Schmid (2000) examine both cash own rights and voting rights of banks and find that firm performance is positively affected by bank shareholding, while Chirinko and Elston (2006) report that bank control affects company profitability negatively, although significance is weak. Barucci and Mattesini (2008) investigate large Italian .firms and find little support for the existence of a virtuous bank non-financial company shareholding relation associated with governance/monitoring arguments. Furthermore, Lin et al. (2009) provide evidence of a negative effect of bank ownership on firm performance in China.

More recently, a branch of the literature examines the monitoring activities of institutional investors for cross-country samples. Li et al. (2006) show that strong governance environments act to strengthen monitoring ability such that more financial institutions are encouraged to hold concentrated equity positions. Chen et al. (2007) find that banks and insurance companies are more supportive of management actions than other types of institutional investors in ant takeover amendment proposals. Finally, Ferreira and Matos (2008) find that all institutional investors have a strong preference for the stock of large .firms and .firms with good governance. Firms with higher ownership by independent institutions, with potentially fewer business ties to firm, have higher firm valuations whereas bank ownership has no impact on firm value. They interpret this as evidence for the monitoring role of independent institutions.

This study investigates neither the determinants of multiple capital structure choices nor changes in capital structures over time. Our main goal is to explore the effect of capital structure on cumulative abnormal returns. In doing so, we control for idiosyncratic risk factors commonly used in investments. These risk factors include price-earnings ratio, size (Banz, 1981; Chan & Chen, 1991), book-to-market ratio (Chan, Hamao & Lakonishok, 1991)) and a combination of these, including beta (Fama & French, 1992; Fama & French, 1996).

We also investigate the impact of industry leverage on stock returns. Schwartz (1959) explains that the optimal capital structure varies for firms in different industries because asset structures and stability of earnings, which determine inherent risk classes, vary for different types of production. We argue that industry leverage should prove useful in predicting the direction and magnitude of stock returns when investors evaluate a stock’s true worth. Titman (1984) concludes that firms manufacturing machines and equipment should be financed with relatively less debt. Titman and Wessels (1988), while examining the determinants of capital structure, find that debt levels are negatively related to the uniqueness of a firm’s line of business. While our model does not study the determinants of capital structure, we do examine the relevance of industry leverage on stock returns.

Data and methodology

Sample and variables models

The sample was chosen from all Jordanian industrial firms listed on the Amman stock exchange3 (ASE) for the period 2005 to 2008. The data used in the analysis were collected from the annual reports of the Amman stock exchange. The final sample contains 58 firm-observations. The number chosen of sample depend on available of information on financial reports.

In this study we use the capital gearing definition to represent the leverage of companies in the sample. It represents the total debt to total financing of the firm and is defined as:

Leverage (%) = (Long term debt+ Short term debt & Current Portion of Long term debt) / (Total Capital+ Short term debt & Current Portion of Long term debt)

Schwartz (1959) argues that the narrow definition of financial structure — i.e., that it is restricted to stocks and bonds—ignores the large measure of substitutability between the various forms of debt; thus, a broader definition encompassing the breadth of all liabilities and claims of ownership must be used. He proposes the ratio of total debt to net worth as the best single measure of gross risk Firms in various industries have different asset structures that are financed by cash flows generated from various forms of debt and equity. The use of both variables' book values ensures that we measure the capital structure via the cash flows generated at the time those assets are financed. Schwartz (1959) also argues that an optimum capital structure for a widely held company is one which maximises the long-run value of the common stock per share. Our analysis is based on the same understanding. The use of book values for debt and equity has the additional advantage of using the market value of equity neither to define the change in value nor in concurrent capital structure

Following Fama and French (1992), we account for the difference between the two by using book-to-market ratio as a risk factor. Kayhan and Titman (2007) suggested that the significance of the historical book-to-market in leverage regressions may be due to the noise in the current book-to-market. We use a company's market value to represent company size. Market capitalisation is the share price multiplied by the number of ordinary shares in issue. The price-to-book value refers to a company's share price divided by the net book value. The market risk measure is the beta coefficient (β), which we estimate over a five-year period in a rolling window using monthly data. We also take into account the impact of market conditions on capital structure by examining interest rate.

Stock returns for each company are calculated monthly using percentage change in consecutive closing prices adjusted for dividends splits and rights issues, Cumulative Abnormal Returns ($CAAR_{it}$) on portfolios are calculated starting on May 1 each year.

Abnormal return on day t for stock i is given as:

$$AR_{it} = R_{it} - E(R_{it}),$$

where:

R_{it} – is the monthly return of the share i on day t;

$E(R_{it})$ – is the expected return on stock i in day t, which is represented by the return on FTSE-All share index.

Cumulative abnormal returns (CAARs) are calculated for the 12 months following the period of portfolio formation and t-tests (Lo and MacKinley, 1988) are used to test if CAARs are significantly different from zero using the following equations:

$$CAAR = Sum\ AR_{it} \quad (1)$$

$$t\text{-}test = (CAAR_T) / s(CAAR_T), \quad (2)$$

where $s(CAAR_T) = s(AR_T)/(T+1)^{1/2}$, and $s(AR_T)$ is the variance over T months.

The next step in our analysis is to determine whether cumulative abnormal returns at the stock level can be explained by the leverage of the firms and to examine a number of idiosyncratic risk factors in the cross-section and interest rates that control for changes in cost of capital within the environment of the time series. Idiosyncratic risk factors include: market risk; size price-to-earnings ratio; and price-to- book ratio. First, we run the below regression in the full sample. Then we partition the data according to the different risk classes represented by each industry, formally testing for the effect of leverage in each risk class while accounting for the effect of these additional factors on CAARs.

$$CAAR = a + b1LEVERAGE_{it} + b2BETA_{it} + b3SIZE_{it} + b4BM_{it} + b5PE_{it} + \varepsilon_{it} \quad (3)$$

In equation (3), CAAR is defined as in equation (1); *a* stands for constant; LEVERAGE is measured as the ratio of total debt to total equity plus debt; BETA is the market risk estimated over the preceding five years; SIZE refers to the log of total market capitalisation; BM and PE refer to the ratio of price-to-book and the ratio of price to earnings respectively; and ε is the error term. We estimate equation (3) using GMM estimators3 and fixed effects for firms.GMM estimators ensure that no assumptions are made about the variables' distributional properties, most of which are not normally distributed. Following Flannery et al. (2004), we use fixed effects for firms in the panel to account for the richness of individual firms' unique information and for the possibility of varying degrees of risk acceptance in ownership decisions (Schwartz, 1959).

Descriptive statistics

Table 1 presents the descriptive statistics for the six variables: cumulative average abnormal returns (CAARs); leverage; beta; size; price to earnings and price are calculated from yearly data; leverage are as of year end. The mean leverage is 0.615 and standard deviation 0.709, The mean beta is 78.52 and standard deviation 11.60, The mean size is 7.11 and standard deviation 0.77, The mean price to book value is 49.4 and standard deviation 27.8, The mean price to earnings is 535.6 and standard deviation 27.8, The mean cumulative average abnormal return 0.615 and standard deviation 0.714.

Descriptive statistics for (LEVERAGE, BETA, SIZE, BM, PE and CAAR) overall years

Table 1

Year	Index	LEV	BETA	SIZE	BM	PE	CAAR
2005 to 2008	**Mean**	.615	78.52	7.11	49.41	53.56	.615
	N	232	232	232	232	232	232
	Std. Dev	.709	11.60	.77	14.8	27.8	.714
	Maximum	5.15	16199.7	9.47	774.0	13475.0	6.5
	Minimum	001	3825.6	.001	22464.0	22068	.003

Empirical regression results

Tables 2-6 from *Appendix*, report Cumulative Average Abnormal Returns (CAARs). Stock returns for each company are calculated monthly using percent change in consecutive closing prices that have been adjusted for dividends splits and rights issues across the leverage deciles for the entire sample as well as for each risk class.

We understand from the above analysis that the relationship between leverage and holding period returns is not the same for all risk classes. For most risk classes, CAARs decrease in leverage; firms with low leverage ratios can earn significantly higher CAARs than can firms with high leverage.

The CAARs for portfolios based on leverage as well as on market risk. Overall, cumulative abnormal returns are higher for companies with low market risk and low leverage. For example, companies in the lowest beta coefficient deciles and the lowest debt deciles earn excess returns, while companies in the highest market risk and highest leverage deciles earn negative abnormal returns of companies with high beta coefficients and low debt levels earn high abnormal returns, while companies with high beta coefficients and high leverage earn negative abnormal returns as low as companies with low market risk earn positive abnormal returns in most leverage levels, with higher abnormal returns for lower debt levels.

The results indicate that the CAARs for portfolios based on leverage and price-earnings (PE) ratios. Overall cumulative abnormal returns are higher for companies with low leverages and low PE ratios. The CAARs for portfolios based on leverage and price-to-book value (PTBV). Our results indicate that CAARs are higher for companies with low leverage and low PTBV. The CAARs for portfolios based on leverage and size. Our results indicate that CAARs are slightly higher for small companies with low leverage.

The results indicate of the cross-sectional regressions for the full sample as well as for the different risk classes. Coefficients for fixed effects are significant in all estimations. For the overall sample, cross-sectional regressions reveal a negative and significant relationship between leverage and cumulative abnormal returns. Cumulative abnormal returns decline in leverage. All other variables, including price-earnings ratio, price-to-book ratio, size, beta and interest rates, have negative and significant coefficients. CAARs are higher for low PE, low BTMV, as well as during periods of low beta size except the variable size in year 2006, 2007 and 2008, variable PE in year 2006, 2008 and variable BM in year 2008.

This is an interesting result, as it implies that MM's proposition—that returns increase in leverage—holds true for overall increases in leverage in a risk class, while for individual firms that increase in leverage, returns fall—as shown in more recent studies (Korteweg, 2004). There is a considerable amount of literature on the differences in leverage due to industry characteristics. Other show that there is a difference between mean industry capital structures and that each industry tends to have an optimal debt ratio due to tax benefits. Bradley et al. (1984) report that leverage decreases with R&D expenditures. Barclay et al. (1995) illustrate that leverage is high for regulated firms and low for high-tech industries. Others provide evidence that firms that rely on debt is more likely to reduce their investment in market share-building during downturns. Hull (1999) shows that industry debt-to-equity ratio is a useful benchmark with which investors can evaluate a stock's attractiveness. Since MM, other risk factors have been introduced which have become popular in academic as well as practitioner-oriented contexts. Of course, the question arises whether leverage ratio is the sole contributing factor or rather only one of the contributing factors in the cumulative returns. Below, we will undertake a series of tests in order to investigate if other factors or combination thereof could have contributed to the obtained results.

Conclusion and recommendations

This study is an empirical work that investigates whether capital structure is value-relevant for the equity investor firms' capital structure policies appear to be largely consistent with the existence of leverage targets. Because capital structure is endogenous, we argue that the optimal financial policy is one that advocates low leverage, so as to mitigate agency problems while preserving financial flexibility. Profitable firms may keep their leverage levels low so as to prevent too a proportion of profit being used for interest payments. This notion leads to another school of thought: i.e., whether firms, in their attempt to keep leverage levels low, avoid taking on profitable opportunities and investments.

Hence throwing away their firm value, the negative relationship between returns and leverage could also be due to the market's pricing of the firm's ability to raise funds if need be. Further avenues for research in this area include examining the stock return performance of companies based on the changes in leverage of the firms relative to their risk classes. It would be particularly noteworthy to examine the rate at which the information content of said changes is incorporated in the share prices of companies as well as in their long run returns.

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Appendix

Regression Analysis: Capital Structure and Firm Value (2005)

Table 2

Dependent Variable: CAAR							
year	**Index**	**LEV**	**BETA**	**SIZE**	**BM**	**PE**	**Total**
2005	**R**	.440	.284	.389	.377	.012	.517
	R^2	.320	..081	.151	.126	.000	.267
	Adj- R^2	.112	.065	.136	-.212	-.018	.196
	SIG	.045**	.030**	.003***	.087*	.042**	.005***
	F- test	----	---	---	--	--	3.784
	T-test	-1.060	-2.221	-3.158	-.576	-1.089	---
	Beta Coefficient	-.140	-.284	-.389	-.077	-.012	---

Significant at p <0.10 * Significant at p< 0.05 ** Significant at p< 0.01***

Regression Analysis: Capital Structure and Firm Value (2006)

Table 3

Dependent Variable: CAAR							
year	**Index**	**LEV**	**BETA**	**SIZE**	**BM**	**PE**	**Total**
2006	**R**	.415	.340	.168	.320	.123	.538
	R^2	.346	..116	.028	.102	.015	.289
	Adj- R^2	.229	.100	.011	.086	-.003	.221
	SIG	.021**	.009***	.209	.014**	.360	.003***
	F- test	----	---	---	--	--	4.235
	T-test	-1.650	-2.705	-1.272	-2.526	-.360	---
	Beta Coefficient	-.215	-.340	-.168	-.320	-.123	---

Significant at p <0.10 * Significant at p< 0.05 ** Significant at p< 0.01***

Regression Analysis: Capital Structure and Firm Value (2007)

Table 4

Dependent Variable: CAAR							
year	**Index**	**LEV**	**BETA**	**SIZE**	**BM**	**PE**	**Total**
2007	**R**	.303	.322	.027	.309	.147	.422
	R^2	.241	..104	.001	.212	.022	.178
	Adj- R^2	.224	.068	-.017	-.116	.004	.099
	SIG	.067*	.014**	.840	.056*	..078*	.063*
	F- test	----	---	---	----	---	2.254
	T-test	-1.554	-2.547	-.203	-.823	-1.112	--
	Beta Coefficient	-.203	-.322	-.027	-.109	-.147	---

Significant at p <0.10 * Significant at p< 0.05 ** Significant at p< 0.01***

Regression Analysis: Capital Structure and Firm Value (2008)

Table 5

Dependent Variable: CAAR							
year	**Index**	**LEV**	**BETA**	**SIZE**	**BM**	**PE**	**Total**
2008	**R**	.420	.416	.071	.071	.102	.327
	R^2	.214	.247	.005	.005	.010	.177
	Adj- R^2	-.123	.330	-.013	-.013	-.007	-.212
	SIG	.007***	.032**	.594	.594	.446	.078*
	F- test	----	---	---	--	--	3.866
	T-test	-2.903	-2.654	-.536	-.536	-.768	---
	Beta Coefficient	-.120	-.216	-.071	-.071	-.102	---

Significant at p <0.10 * Significant at p< 0.05 ** Significant at p< 0.01***

Regression Analysis: Capital Structure and Firm Value (2005- 2008)

Table 6

Dependent Variable: CAAR							
year	**Index**	**LEV**	**BETA**	**SIZE**	**BM**	**PE**	**Total**
2005 - -2008	**R**	.211	.315	.447	.538	.331	.231
	R^2	.123	.213	.232	.321	.231	.217
	Adj- R^2	-.234	.119	-.122	-.143	-.233	-.325
	SIG	.056*	.081*	.089*	.032**	.067*	.043**
	F- test	----	---	---	--	--	2.786
	T-test	-.166	-1.755	-.708	-.573	-1.478	--
	Beta Coefficient	-.011	-.115	-.047	-.038	-.031	---

Significant at p <0.10 * Significant at p< 0.05 ** Significant at p< 0.01***