THE IMPACT OF LEVERAGE ON DISCRETIONAL INVESTMENT: AFRICAN EVIDENCE

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Abstract

This study explores the impact of leverage on investment on in Africa. We employ the system generalised method of moments estimation technique on the panel data of listed African non-financial firms in order to control for unobserved heterogeneity, endogeneity, autocorrelation, heteroscedasticity and dynamic panel bias. Using two different measures of leverage, we found evidence that leverage constrains investment in African firms. The negative impact is more pronounced in firms with low-growth opportunities than in firms with high-growth opportunities. Our results are inclined to the theory that leverage plays a disciplinary role to avoid over-investment.

Keywords: Leverage, Investment, Africa, Generalised Methods of Moments.

1. Introduction

Corporate financial strategic decisions on value creation are pinned on financing policy, pay-out policy and investment. It is upon these pillars that a firm's value maximisation is controlled. The interplay between financing and investment is a central issue in corporate finance and has stirred a lot of debate. Contentious and inconclusive findings warrant further investigations in this discipline. A firm's decisions on financing inexorably impact on investments, the worth of such investments, and the corporation value at large. Financial theory reveals that leverage is power; it amplifies performance liquidity and cash flows are a firm's life blood. Given the fundamental role of leverage, numerous studies on the relationship between capital structure and firm value in both developed and developing economies can be found in financial literature. However, studies centred on leverage and investment have not gained much attention. The few existing studies in this area were conducted in developed economies yielding inconclusive results. This study seeks to provide novel substantiation evidence on the association between investment and firm-level leverage in the context of developing markets particularly in Africa.

There is persistent behavioural and structural heterogeneity between firms in developing and developed economies, resulting in diverging economic implications for a firm's fundamentals. This study has been motivated by the observation that leverage levels in African firms are generally low as compared to firms in developed economies. The Global Credit Report (CGR) by Moody's (2015) reveals that there is a divergence in leverage trends between developed and developing economies. Leverage of firms in developing countries is very low, being almost half that in developed countries (Souza et al., 2015). Firms in developing economies can increase their leverage from their low levels while their compatriots in developed economies may have to reduce their high-leverage levels. Given the progressively vital role developing economies have for global growth it is thus important to find how these rising levels of leverage are impacting on investment in African listed firms, which is a potential concern for the global economy.

Leverage confers crucial benefits of industrious investment and foster economic growth as advocated by financial theory. Studies reveal book values of debt above 60 per cent on average in firms in developed economies, compared to African firms where we found less than 20 per cent on average debt values. Previous studies reveal that leverage constrains investment and this indicates that low-leveraged firms should invest more. Firms in African countries use leverage conservatively; however, investment is stagnant and insignificant, and the economies of these countries are not growing The European Parliamentary Research Service (EPRS) reports economic stagnation in most countries in Sub-Saharan African (SSA) countries in the period 2000-2015 (Zamfir, 2016). The United Nations 2014 Economic Development Report in Africa states that if Africa is to make substantial improvement it will have to sustain growth rates of at least 7 per cent, and this will require investment rates of 25 per cent of gross

domestic product (GDP) and above (Clarke, 2013). However, the investment rate in Africa on average for the past two decades has hovered around 18 per cent of GDP, which is well below the 25 per cent estimated as a requirement, and so the continent has not achieved the 7 per cent average growth rate necessary for significant progress towards growth (UNCTAD, 2014 p. 4). Over the past two decades, the investment level was either unchanged or declining in many countries in Africa (UNCTAD, 2014).

The conservative leverage levels of African firms leave many questions unanswered. Considering that investment in Africa is not growing one may ask whether low leverage is a good practice? Studies in developed economies reveal a negative relationship between leverage and investment. In line with those findings low-leverage levels of African firms should lead to more investment. However, investment stagnation remains amidst low-leverage levels in developing economies. Alternatively, does this situation reflect a different relationship because of the region's peculiar characteristics? Considering these unanswered questions, it becomes necessary to explore the African evidence on the relationship between leverage and investment. To the best of our knowledge no study has analysed this relationship in Africa.

Previous studies have been restricted to firms in developed economies such as the United States of America (USA) and Canada. Lang et al. (1996) used a pooling regression to analyse firms in the USA, and Aivazian et al. (2005) analysed panel data using the fixed effects model. Using a pooled regression ignores the individual effects and hence results may be biased. The fixed effects model may fall short on endogeneity issues. In this paper, African evidence is of particular interest given that developing economies have different institutions, economic conditions, financial situations, imperfect markets, and regulations compared to the developed economies.

This paper contributes to the literature on the relationship between investment and financial leverage in a number of ways. It provides from Africa, a developing continent, evidence that has not been explored. The few existing studies are concentrated in developed nations, and given that firms in developing nations may behave differently due to different market implications and conditions it is worthwhile to analyse firms in developing nations separately. This study extends the existing literature in several important dimensions, showing how conservative leverage levels of African firms, which have been reported to be rising, are impacting on investments. Pertaining to empirical methodology, we employ a dynamic panel data model which controls for heterogeneity in individual countries and firms. The generalised method of moments (GMM) estimation technique, which is robust in controlling endogeneity, and a possible bidirectional causality between leverage and investment through differencing and use of natural instruments as a system of equations both in levels and at first difference with orthogonality conditions. Given the nature of our data, a dynamic approach and GMM become

handy tools. To our knowledge this is the first paper to use a dynamic model and GMM to estimate the association between leverage and investment.

In spite of different settings, markets and methodologies, the negative relationship between leverage and investment is confirmed. In support of the agency cost theory by Myers (1977), we found that leverage has a significant negative impact on investment using African evidence. This concurs with findings from different markets in developed economies, including those of Aivazian et al. (2005) from Canadian firms, Lang et al. (1996), Seoungpil et al. (2005) using USA firms, and Yuan and Motohashib (2014) in China. The negative impact is maintained even for non-constrained firms. Our results also indicate that the negative impact is stronger in firms with low-growth opportunities than in firms for which the markets recognise better prospects.

African firms' investment policy does not solely depend on the neoclassical fundamentals determinants of profitability, net worth and cashflows. Financing strategy also has a considerable bearing on the investment policy. African Firms' should consider maintaining their low debt levels and rely more on internally generated funds so as not to supress any available cash flows to interest payments and loan covenants from debt holders. Low debt will reduce the shareholder-bondholder conflict and the firm can freely take on investment opportunities as they arise. Policy makers should discourage firms especially on the growth stage of the life cycle from accumulating too much debt as it constrains investment and lowers growth.

The rest of the paper is structured as follows: Section two presents the theoretical aspects on leverage and investment; Section three provides the research design; Section four presents the results and findings; Section five provides the limitations of the study and areas for further research. Section six concludes.

2. Literature Review

Leverage is a financial measure that looks at the ratio of capital that comes in the form of debt (Krämer, 2014). It can also be viewed as the use of borrowed money to influence production (Goldsmith, 2001). Differing measures of financial leverage that have been used in the financial literature include debt to total assets (DTA), debt to equity (D/E), and equity to debt (E/D), based on book values and market values. Firm investment takes into consideration funds used to acquire and upgrade physical assets (Baglioni et al., 2013). Investment is mainly measured through capital expenditure (CAPEX). An expense is considered to be a CAPEX if it is a newly acquired capital asset or an investment that improves the existing asset's useful life (Aivazian et al., 2005).

Economic theory postulates an interaction between financing and economic growth via investments (Mishkin, 2007, Benhabib and Spiegel, 2000, Kargbo11 and Adamu, 2009). Leverage fuels investments and investment leads to economic growth. Financial theory implies that leverage is power; it amplifies shareholders' returns (Guschanski and Onaran, 2016). However, this benefit is in exchange for greater financial risks. Firms can support and fuel their profitable growth expansions using leverage if their operations generate higher returns and they currently have insufficient funds. On the other hand, too much debt can lead to financial distress, liquidation and underinvestment rising from bondholder interest to maintain liquidity. There is no general consensus on the effect of leverage on a firm's decisions. African firms' leverage levels are increasing from their lows, investment is low and their economies are not growing (Souza et al., 2015). This contribution examines how conservative use of leverage by African firms is impacting on investment.

2.1 Theoretical Framework on Leverage and Investment

The impact of leverage on firm investment is a topical issue in corporate finance. The theory underlying the relationship between leverage and investment stems from the works of Modigliani and Miller (1958) who argue that leverage does not matter. A firms' value is dependent on its investment policy and not on how it is financed. If their proposition holds, a firm's investment policy should depend only on those factors that increase profitability, net worth and cash flows. Several theories have challenged this position over the years, advocating for the benefits of leverage through tax shields emanating from taking on debt trade-offs with the bankruptcy dead weight costs, a point where the cost of capital is minimised (Kraus and Litzenberger, 1973, Kim, 1978, Scott Jr, 1976, Myers and Majluf, 1984, Myers, 1984, Frank and Goyal, 2007).

The Miller-Modigliani (1958) irrelevance proposition is based on an assumption of a perfect market. However, in the real-world information asymmetry and an imperfect market are inevitable. The interactions of shareholders, managers and bondholders generate friction resulting from agency conflict and this friction induces both over-investment and under-investment incentives. In view of the agency cost theory, its founders, Jensen and Meckling (1976), proposed the trade-off between benefits (discipline of managers) and agency costs in the context of increasing debt financing (as shareholders take on additional risk) (Zane, 2012). Per the agency cost theory, leverage could have a negative impact on investment through two channels. Firstly, the debt overhang hypothesis (Myers, 1977; Stulz, 1990) argues that leverage induces under-investment. High debt commitments increase interest payments burdens and reduce cash flows available for investments for companies with better investment prospects. Leverage overhang reduces the incentive to invest in valuable investment opportunities since the benefits accrue to bondholders rather than fully to shareholders (Myers, 1977). In this respect, highly leveraged firms will have a lower capacity to exploit valuable investment opportunities compared to

lowly leveraged firms. The liquidity effect hypothesis also argues that irrespective of growth opportunities, firms that are more committed to interest payments invest less. In contrast with these theories we would expect high-growth firms to have lower leverage and a negative relationship between leverage and investment. According to the information asymmetry hypothesis, managers would lower leverage when they expect valuable growth opportunities to be able to exploit such investments. Hence, low leverage could signal growth opportunities to the market, and this is referred to as the endogeneity problem (Aivazian et al., 2005). Lang et al. (1996) found the effect of debt on growth for core and non-core business segments not to be significantly different across the segments, suggesting that leverage does not proxy only growth opportunities. Firms' corrective measures will always reduce the effect of underinvestment from debt overhang since leverage could be lowered if growth prospects are recognised beforehand.

The over-investment theory relates to investment expenditure beyond the sustainable level to maintain assets in place and finance other upcoming positive net present value projects (Franklin John and Muthusamy, 2011). Managers having the propensity to increase the scale of a firm may over-invest even in projects with negative effect, reducing shareholder value. Jensen (1986) argues that debt can help reduce over-investment. The availability of free cash flows restrains managers' abilities or gives them room to make such a policy. Hence, increasing leverage through issuance of debt commits cash flows to debt servicing and reduces unworthy investments, suggesting a negative relationship between leverage and investment for such firms. Jensen claims that the availability of growth prospects fundamentally controls whether debt will restrain over-investment. The argument in these theories is that leverage has a negative effect of causing under-investment in high-growth firms and a positive effect of restricting over-investment in low-growth firms. However, too much debt can also lead to financial distress.

2.2 Empirical Framework

There is extensive empirical research on capital structure choice as well as extensive research on the relationship between leverage and firm value, and leverage and size across the world (Marsh (1982); Gwatidzo and Ojah (2009) Rajan and Zingales (1995)); Nevertheless, there is mixed empirical evidence regarding firm leverage. Very few studies were done to analyse the relationship between leverage and investment in selected developed economies of Europe and America.

Harris and Raviv (1990) reported a positive relationship between leverage and investment for USA firms. Fama and French (2002) also found a positive relationship between leverage and investment. These findings are in support of the view that leverage is valuable to firms with growth prospects. On the other hand, in support of the under-investment hypothesis, McConnell and Servaes (1995)used

cross-sectional data for USA firms and found a negative relationship between corporate value and leverage for firms with solid growth opportunities, and a positive relationship for firms with low-growth opportunities. On the contrary, inclined to the over-investment hypothesis, Lang et al. (1996) used pooled regression across non-financial firms in their core and non-core businesses segments in the USA and found a negative relationship between leverage and investment only for firms with weak growth opportunities. By separating firms into core and non-core businesses they proved that leverage does not only proxy for growth opportunities it is a significant determinant of investment. Aivazian et al. (2005), using a fixed-effect estimator and an instrumental variables technique, found a negative relationship between leverage and investment to be stronger for low-growth firms, implying that leverage has less impact on investment in firms where the market recognises lucrative growth opportunities.

In contrast some empirical evidence in developed economies indicates that leverage constrains investments more in high-growth companies, as indicated by the findings by Seoungpil et al. (2005) in the USA, Rasa et al. (2008) in Baltic companies, and Yuan and Motohashib (2014) for Chinese firms. Denis et al. (1997) show a significant reduction in capital expenditures following an increase in leverage. Studies done on the relationship between leverage and investment, based on developed economies are contrary and inconclusive as to the effect of leverage on a firm's decisions. They have different implications for leverage on investment for high-growth and low-growth firms in different markets. In this regard, it is thus compelling to add to the scanty literature and reveal more on the impact of leverage on investment in high-growth and low-growth firms using African firms, which are lowly levered compared to those in developed economies.

3. Research design

Data and the variables

We consider firms listed on all African stock exchanges. The sample comprises 815 firms from 22 stock exchanges in Africa for a period of 20 years for the period 1996-2015. Data was obtained from the Bloomberg financial database. Listed firms were specifically selected because of the availability of reliable financial data. Financial firms were excluded because of the complexities in their capital structure natures and because their capital structures are regulated (Akhtar and Oliver, 2009). The study employed an unbalanced panel data of 16300 observations after checking and screening for apparent coding errors and missing variables. Panel data enables observation of multiple phenomena over many periods of time and the ability of reducing co-linearity in explanatory variables, hence improving the efficiency of econometric estimates (Akhtar, 2005).

We employed two differing measures of financial leverage in line with the existing financial literature, these being total debt and long-term debt. Total debt incorporates both long-term and short-term debt. Long-term debt emphasises the dominant role of long-term financing on investments (Aivazian et al., 2005). Firm level investment was measured as relative investment (investment per one unit of net fixed assets) calculated as net capital expenditures to net fixed assets ratio. Other standard variables in the literature, which influence investment intensity were used as explanatory variables. Cash flow to control for internal funds availability was measured as cash before extraordinary plus depreciation. Tobin's Q was a proxy for growth opportunities measured as a ratio of market value of assets to book value of a firm's assets. Sales volume to control for size measured as net sales for the period deflated by net fixed assets.

3.1 Descriptive Statistics and Trend Analysis

Table 1 reports descriptive statistics for financial data of sample firms. Inspection of the data reveals high volatility of investment in Africa as depicted by a very high standard deviation (4.94) relative to the mean (0.372). The analysis of the data also reveals that leverage levels in African firms are still very low, with an average of 9 per cent long-term debt relative to total assets as compared to developed nations levels above 30 per cent (Atkins, 2015).

Table 1 Descriptive statistics for investment, leverage and control variables

Variable	Variable construction	Mean	25%	Median	75%	Std. Dev.
Investment	$\frac{Net\ Investment}{Net\ fixed\ assets}$	0.3724	0.0545	0.15	0.3032	4.9422
Long-term debt to total assets	$\frac{Long\ term\ debt}{Total\ Assets}$	0.0922	0.0000	0.0305	0.1317	0.1561
Total debt to total assets	$\frac{Total\ debt}{Total\ Assets}$	0.1889	0.0229	0.1364	0.289	0.2327
Cash flow to fixed assets	$\frac{EBITDA}{Net\ fixed\ assets}$	0.6812	0.0668	0.2668	0.6203	17.3460
Sales to fixed assets	$\frac{Net\ sales}{Net\ fixed\ assets}$	9.3831	1.2966	2.9725	7.305	49.1219
Tobin's Q	$\frac{Market\ value\ of\ total\ assets}{Book\ value\ of\ total\ assets}$	2.1130	0.9469	1.2542	1.8392	32.6755
Long-term to total debt	$\frac{Long\ term\ debt}{Total\ debt}$	0.4443	0.0624	0.4513	0.7535	0.3524

Source: Author's calculations based on data obtained from Bloomberg online database.

The average long-term debt to total assets ratio is 9 per cent, while the total debt to total assets ratio stands at 19 per cent, the percentage long-term debt to total debt is 44.4 per cent over the sample period, and the remaining 56 per cent accounts for short-term and medium-term debt, and this indicates a significant reliance on medium- and short-term debt in African firms. Moreover, the sample middling Tobin's Q of 1.58 reflects high market expectations of strong growth opportunities in African firms, and this implies that on average most African firms are regarded as high-growth firms because of the better prospects expectations by the market. There is also highest variability in sales levels and cash flows as shown by the highest standard deviations, and this can be explained by too much uncertainty and business cycle volatilities in most African nations.

Table 2 shows that on average the ratio of total debt to investment is 0.64 suggesting that on average 64 per cent of total debt finance is invested in long-term assets, 30 per cent of total debt finances is in the form of long-term debt, and short-term and medium-term debt accounts for 34 per cent of total debt finances for investment. This signifies that more investment is financed through short- and medium-term debt. There is higher variation in the total debt to investment ratio with a relative standard deviation of 0.44 (0.2795/0.6388) compared to long-term debt to investment ratio with a relative standard deviation of 0.40, suggesting that African firms maintain their leverage levels in the long run with little adjustment.

Table 2: Leverage Relative to Investment

Variable		Mean	Std. Dev	min	max
% Long-term to total debt		0.4815	0.0435	0.3738	0.5374
% Long-term debt to investment		0.3040	0.1272	0.0593	0.5361
% Total debt to investment		0.6388	0.2795	0.1145	1.2042

Source: Author's calculations based on data obtained from Bloomberg online database.

The ratio of total debt to investment shows that 64% of debt on average is invested in long-term assets. Medium- and short-term debt forms the major source of funds for investment purposes in African firms. There is higher variation in total debt to investment compared to long-term debt investment suggesting that African firms maintain their leverage levels in the long run with little adjustment.

Figure 1 depicts leverage and investment trends in Africa from 1996 to 2015. The graph shows that there is significant variation in investment levels over the years, and the two-year moving average trend line superimposed on investment reveals a general decline in investment levels over time. This trend is in line with the 2014 UN economic development report in Africa (UNCTAD, 2014), which reports economic stagnation and a notable decline in investment levels in the current decade from 2008 through

2015. Long-term debt ratio is more stable over the sample period as shown by the graph, implying that African firms maintain their debt to equity positions over the long run without much capital structure adjustment. In Figure 1 a notable increase in total debt from 2010 to the current period can be seen. This increase concurs with Souza et al.,(2015) in Moody's GCR research, which documents an increase in African firms' leverage. An increase in total debt with long-term debt being more stable, attests to an increase in short- and medium-term borrowing to finance investment in African firms.

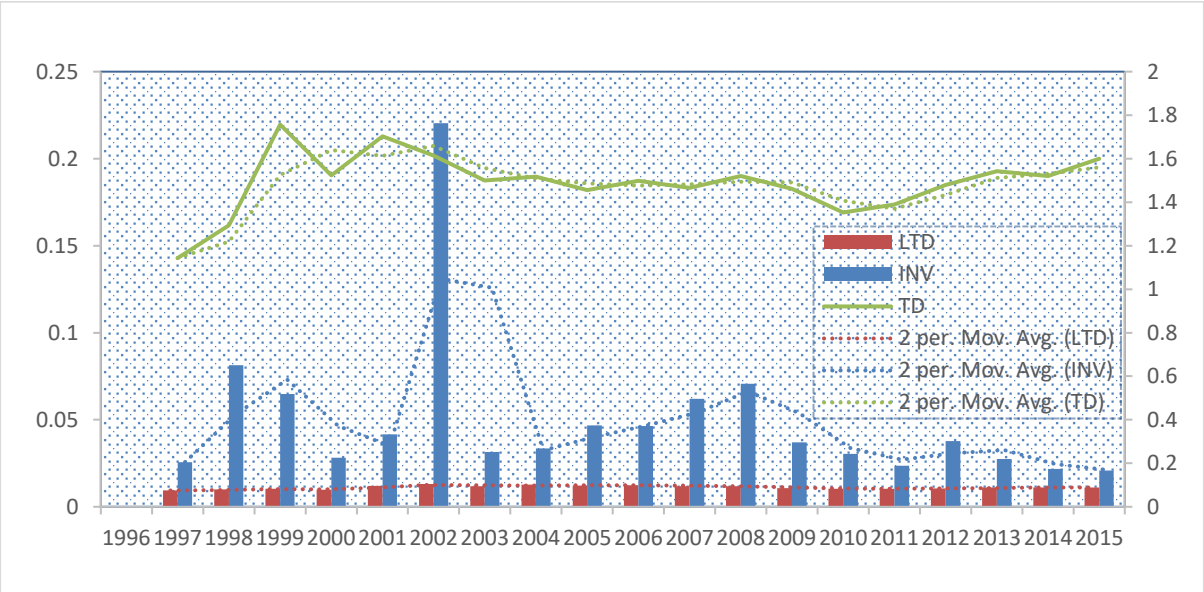

Figure 1 Investment and debt ratio trends in Africa

Source: Author's calculations based on data obtained from Bloomberg online database.

Figure 2 shows the investment to leverage ratio, where there is high variability of leverage to investment ratio. The leverage to investment ratio is measured as leverage divided by investment and leverage is measured as a ratio of long-term debt and total debt to total assets. There is high volatility with a trending increase as shown by the three-year moving average trend in leverage to investment ratios. The increase in this ratio means that leverage is increasing more than investment or investment is decreasing relative to leverage levels and this indicates that African firms are borrowing more than they are investing. In Figure 1 we show an increase in total debt and a decline in investment levels and this explains the increase in leverage to investment ratio. Figure 2 also indicates a trending decline in long-term debt to total debt ratio and this implies an increase in short-term and medium-term debt as a source of financing relative to long-term debt. There is higher volatility in the ratio of total debt to investment than on long-

term debt to investment and this is evidence of the dominant role of long-term finances as a source of investment funds.

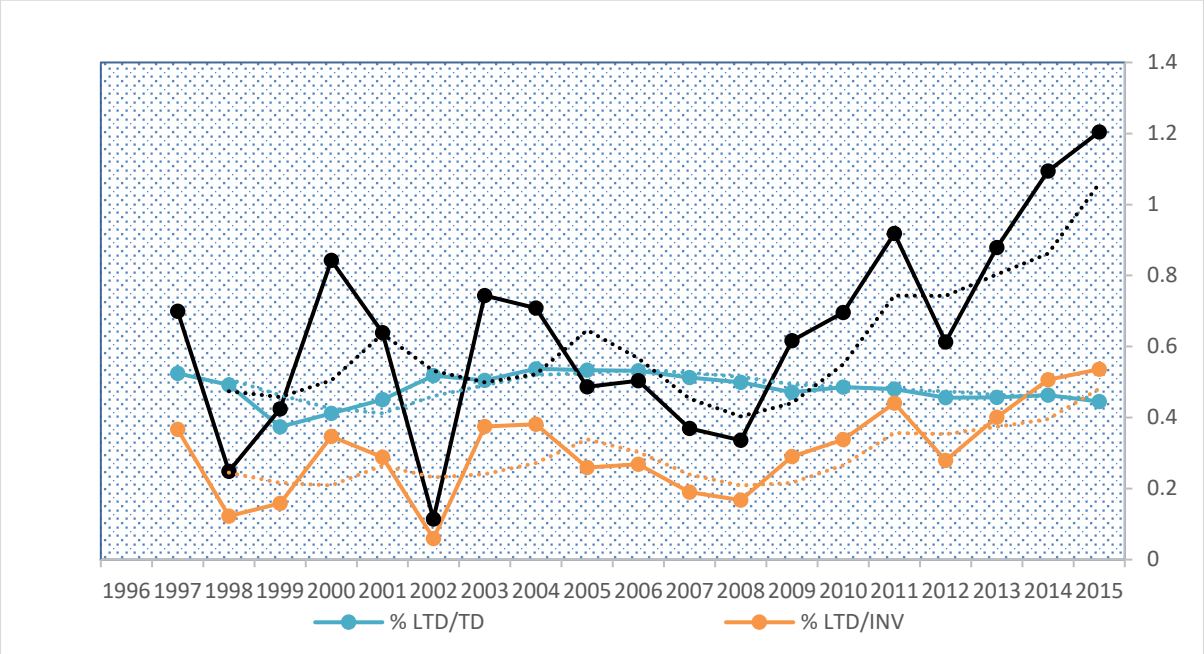

Figure 2 Leverage to investment trends

Source: Author's calculations based on data obtained from Bloomberg online database.

3.2 Correlation of Variables

Table 3 reports a correlation matrix of the explanatory variables of investment. For all the variables correlations are less than 0.3 suggesting that multicollinearity is not a problem in this analysis. Concurring with previous studies leverage correlates negatively with cashflows, sales and growth opportunities. As expected there is a positive relationship between cashflows sales and growth opportunities.

Table 3 Correlation of explanatory variables

	Lev-LTD	Lever-TD	CF	Sale	Tobin' s Q
Lev LTD	1				
Lev TD	0.7606	1			
CF	-0.0052	-0.0255	1		
Sale	-0.1179	-0.0117	0.233	1	
Tobin's Q	-0.0139	-0.0396	0.0636	-0.0067	1

Source: Author's calculations based on data obtained from Bloomberg online database

3.3 Model Specification

The influence of specific corporate factors on investments is mostly frequently assessed through reduced form investment formulation (Lang et al., 1996). The standard reduced form investment model given by:

$$\frac{I_{i,,t}}{K_{i,t-1}} = \beta_0 + \beta_1 LEV_{i,,t-1} + \beta_i X_{i,t-1} + \varepsilon_{i,c,t} \qquad (eq.1)$$

where, $I_{i,t}$ is the net investment for firm i period t; $LEV_{i,ct-1}$ is lagged leverage; and $X_{i,t-1}$ lagged vector of control variables.

We extend the specification to a dynamic panel data setting. Our dynamic model includes the lagged investment variable as one of the explanatory variables. Given that investment trends are dynamic, current levels of investment are driven also by past investments, and a lagged investment variable captures previous investment trends. Firms generally want to smoothen their investment pattern, hence their past behaviour influences current behaviour. Lagging the investment variable helps to examine the impact of previous investment trends on current investment levels. A lagged dependent variable reduces autocorrelation that may arise from any misspecification. Investment dynamics over time are captured, and the estimation method deals with endogeneity problems and Nickell bias in fixed effects. A dynamic model also allows partial adjustment mechanism modelling (Baum et al., 2001).

We consider a dynamic model, which caters for individual effects, as given by

$$y_{i,t} = \gamma y_{i,t-1} + x_{it}\beta + \eta_i + \varepsilon_{i,t}; |\gamma| < 1 \qquad (eq.2)$$

where η_i is a fixed effect, β_i parameters to be estimated, x_{it} is a vector of explanatory variables with k factors (k=1. . ,4). In our model these are measures of leverage, cash flows, size and growth opportunities. $\varepsilon_{i,t} \backsim N(0, \sigma^2{}_\varepsilon)$ is a random disturbance and assuming $\sigma^2{}_\varepsilon > 0, \in (\varepsilon_{i,t}, \varepsilon_{j,s}) = 0$

We extend equation 1 to a dynamic panel fixed model by adding a lagged investment variable as one of the independent variables, and a fixed effects parameter to cater for individual firms and country's effects as shown by Judson and Owen (1999).

$$\frac{I_{i,c,t}}{K_{i,ct}} = \alpha_0 + \left(\frac{I_{i,c}}{K_{i,c}}\right)_{t-1} + \beta_1 LEV_{i,c,t} + \beta_2 \frac{CF_{i,c,t}}{K_{i,c,t}} + \beta_3 Q_{i,c,t} + \beta_4 \frac{SALE_{i,c,t}}{K_{i,c,t}} + \mu_{i,c} + \varepsilon_{i,c,t} \qquad (eq.3)$$

where, $I_{i,c,t}$ is net investment of firm i, in country c, at period t; $K_{i,c,t}$ is net fixed assets; $CF_{i,t}$ is cash flow; $Q_{i,c,t}$ is Tobin's Q; $LEV_{i,c,t}$ is leverage; $SALE_{i,ct}$ stands for net sales; $\mu_{i,c}$ is time invariant unobservable specific effects and $\varepsilon_{i,c,t}$ is the error term. The variables are standardised by scaling with net fixed assets.

3.4 Estimation technique

Previous studies including Lang et al. (1996) assumed non-unobservable individual effects, and used a pooling regression to estimate the investment equation. The pooling method is inefficient given that μ_i is not directly observable and it correlates with other explanatory variables (Antoniou et al., 2008). Even if we take first differences of the variables to eliminate the time invariant fixed effects, Ordinary List Squares (OLS) will still be inefficient due to the correlation of $\Delta I_{i,t}$ $\left(I_{i,t} - I_{i,t-1}\right)$ and $\Delta\varepsilon_{i,t}$ $\left(e_{i,t} - e_{i,t-1}\right)$. There is also high heterogeneity across firms, noting that we extended to a panel of many countries, heterogeneity is inevitable. Aivazian et al. (2005) used the fixed effects estimator. A fixed effects estimator, however, cannot control for endogeneity problems, which they controlled for using the instrumental variables (IV) technique. Nevertheless, the Anderson and Hsiao (1982) IV technique might not be efficient since it does not use all the available moment conditions. Muñoz (2013) highlights that the endogeneity problem arises from possible measurement errors, omitted variables, possible bi-directional causation between leverage and investment, and the likelihood that Tobin's Q can be an endogenous variable. This results in the explanatory variables being correlated with the error term. The introduction of a lagged investment variable as an explanatory variable in equation 3 introduces autocorrelation with the error term, dynamic bias that cannot be controlled by the IV and the traditional techniques. In such a model, there is a need to introduce stochastic variation into the model. Given endogenous explanatory variables, the presence of heteroscedasticity and serial correlation from idiosyncratic disturbances are beyond fixed effects. The system GMM attests to it being the suitable technique in such conditions (Roodman, 2006).

System GMM enhances efficiency by employing additional instruments of the lagged first difference variable ($Investment_{t-1}$). This solves the problem of weak instruments with difference GMM. The technique instruments levels equations with first differenced instruments and instruments differenced equations with levels instruments generating a system of equations. Firm-specific effects are eliminated by taking first differences.

From equation 3 we are considering an equation of the form:

$$I_{it} = \beta_0 I_{i,t-1} + \beta_1 Lev_{it} + \beta_2 X_{i,t} + u_{i,t} \qquad (eq.4)$$

Leverage (Lev_{it}) is assumed to be endogenous because of the possible bi-directional relationship between leverage and investment, and causality may run in both directions. The system GMM technique, in addition to exogenous instruments, uses level and lagged endogenous variables and makes endogenous variables predetermined and not correlated with the error term. Estimation of the model in first differences and levels using differenced lagged regressors to instrument levels equation controls for individual heterogeneity. Variations among firms are also partially retained (Antoniou et al., 2008).

$u_{i,t}$ in equation 4 consists of country unobservable effects v_i and specific errors $e_{i,t}$

$$u_{i,t} = v_i + e_{i,t} \qquad (eq.5)$$

GMM uses first difference to transform equation 4, to

$$\Delta I_{it} = \beta_0 \Delta I_{i,t-1} + \beta_1 \Delta Lev_{it} + \beta_2 \Delta X_{i,t} + \Delta u_{i,t} \qquad (eq.6)$$

The country fixed effect does not vary over time and by differencing the regressors it is removed, thus equation 5 becomes:

$$\Delta u_{i,t} = \Delta v_i + \Delta e_{i,t} \qquad (eq\ 7)$$

$$u_{i,t} - u_{i,t-1} = (v_i - v_i) + \left(e_{i,t} - e_{i,t-1}\right) = e_{i,t} - e_{i,t-1} \qquad (eq8)$$

assuming independent error terms across firms and serially uncorrelated.

$$\left[E\left(\mu_{i,t}\mu_{i,\tau}\right) = 0\ for\ \tau \neq t\right]$$

Initial conditions satisfy:

$$E\left[\left({}^{I}/_{K_i}\right)\mu_{i,t}\right] = 0\ for\ t > 2$$

The presence of $I_{i,t-1}$ (lagged investment) is a source of autocorrelation, which is controlled by instrumentation with past levels and differenced instruments in system GMM. T should be > 2 for differencing to be applicable, the number of available instruments increases with T, in this case where T=20 a valid instrument for $I_{i\,20} - I_{i,19} = I_{i,19}$. System GMM uses the levels equation together with the AB type orthogonality conditions to obtain a system of equations in levels and the other differenced. The second equation provides additional instruments and increases efficiency (Blundell and Bond, 1998). The two-step system GMM estimator uses one-step residuals to construct asymptotically optimal weighting matrices, hence yielding efficiency rather than one-step estimators.

The two-step system GMM technique developed by Blundell and Bond (1998) was employed to estimate the model. The utilisation of the orthogonal conditions on the variance covariance capacitates control for the correlation of errors over time, heteroscedasticity in firms, simultaneity, and measurement errors (Antoniou et al., 2008), and the ability to address the problems of endogeneity from the relation between leverage and growth opportunities through instrumentation of the system of equations at levels and at first differences. Under these considerations, Blundell and Bond establish that the system-GMM estimator becomes a handy tool.

4. Empirical Results

4.1 The Impact of Leverage on Investment

Table 4 presents the regression output of the investment model. We used two methodologies to estimate our model: the difference GMM and the two-step system GMM with orthogonal option since we have unbalanced panel data. The results provide evidence that there is a negative relationship between leverage and investment. Leverage has a significant adverse effect on investment in African firms. In other words, African firms that use more debt in their capital structure in financing their investments and day to day operations have lower investment ratios or they invest less compared to firms that use less debt. In addition, the increase in debt levels of African firms is resulting in the reduction in investment levels. Implying that leverage is constraining investment. The negative relationship is maintained in all four models and robust for the two estimation techniques the difference and system GMM and the two leverage measures used long term and total debt to total assets. the negative relationship between leverage and investment in African firms is inconsistent with the expectation for African firms. African firms use leverage conservatively, are still young and have more investment opportunities, the expectation was that an increase in leverage should boost financing of more investments for most growth firms in Africa. However, the empirical results show that leverage is actually constraining investment in these firms.

The coefficient of the lagged dependent variable is significant and negative. Consistent with dynamic stability the lagged investment coefficient is less than one. The significant negative lagged variable implies lack of persistence in African firms' investment behaviour, firms that invest cannot sustain the same investment trend rather they lower their capital expenditures. The rate of convergence given by 1- α , where α is the coefficient of the lagged dependent variable, in all four models is almost one implying that African firms adjust their investment behaviour completely and instantly to any deviation in past investment levels. In other words, there is an instant reflection of the effect of the past investment decisions on current firm investment in African firms. A negative association indicates that a period of higher investment is followed by a period of lower investment in African firms. In other words, firms that have higher capital expenditures in the current period will invest less in the next period, and those firms with low investment levels invests more in the next period. This could be explained by lack of finances in the period following a significant investment to sustain more investment opportunities among African firms.in addition the negative association between previous investment levels and the current level may signal longer pay back periods on investment African firms undertake. The longer the payback period more capital will be tied up in the current project hence reducing the capacity for next projects. The negative relationship can also imply less profitability, inefficiency and low cashflow generation on investments undertaken by African firms which reduces the capacity for future investments. This shows that previous investment levels are a significant determinant of future investments a firm undertakes.

Consistent with financial theory, the availability of internal funds proxied by cash flows has a significant positive impact on investment. This means that firms that generate more cash flows invest more. Firm size as measured by sales growth also has a positive impact on firm investment. As firms generate more sales and expand they tend to investment more. Growth opportunities as measured by Tobin's Q have a significant positive impact on investment, and high-growth firms have high investment ratios implying higher investment levels compared to low growth firms.

Table 4 Dynamic panel-data estimation two-step difference and system GMM

	leverage= [LTD: TA]		**leverage= [TD: TA]**	
	Diff GMM	***SYS GMM***	***Diff GMM***	***SYS GMM***
L.investment	-0.00485***	-0.00170***	-0.00531***	-0.00253***
	(-0.000503)	(-0.000345)	(-0.000782)	(-0.000259)
Leverage	-0.395***	-0.414***	-0.686***	-0.262***
	(-0.00336)	(-0.00254)	(-0.00713)	(-0.00187)
CF	0.113***	0.108***	0.108***	0.108***
	(-0.00156)	(-0.00101)	(-0.00251)	(-0.000534)
Sales	0.00173***	0.00180***	0.00401***	0.00114***
	(-0.000128)	(-0.000068)	(-0.000223)	(-0.0000299)
Tobin's Q	0.159***	0.171***	0.123***	0.178***
	(-0.000994)	(-0.000474)	(-0.00175)	(-0.000294)
Observations	5,063	5,708	5,063	5,708
Number of id	627	645	627	645
Groups	627	645	627	645
Instruments	201	257	157	297
AR (2)	0.73	0.68	0.75	0.68
Sargan test	0.22	0.68	0.98	0.97

This table shows the regression outputs of leverage on investment for African firms using two methodologies: the difference and system GMM. Standard errors are given in parentheses. The two measures of leverage are long-term debt (LTD : TA) and total debt (TD: TA), CF is cash flows scaled by net fixed assets, Sales are sales scaled by lagged net fixed assets, and Tobin Q is a proxy for growth opportunities measured as market to book ratio, and L.investment is the lagged dependent variable. The AR (2) tests for autocorrelation, and the Sargan test tests for overidentification of instruments. The results show a negative relationship between leverage and investment for both measures of leverage and estimation methods.
**** p<0.01 significant at 1% level, ** p<0.05 significance at 5 % level, * p<0.1 significance at 10% level*

Economic Impact of regression results

Table 4A Economic impact of the regression estimates.

	LEVERAGE = LTD: TA		LEVERAGE = TD: TA	
VARIABLE	**Diff GMM**	**SYS GMM**	**DIFF GMM**	**SYS GMM**
L.INVESTMENT	-0.0047	-0.0017	-0.0054	-0.0026
LTD: TA	-0.0124	-0.0131		
TD: TA			-0.03230	-0.0123
CASHFLOW	0.3965	0.3789	0.3789	0.3789
SALES	0.0172	0.0179	0.0399	0.0113
TOBIN'S Q	1.0510	1.1304	0.8131	1.1767

$$Economic\ impact = \frac{SD_{EXPLANATORY\ VAR} \times Regression\ Coefficient}{SD_{DEPENDENT\ VAR}}$$

The coefficients shown in table 4 of the two measures of leverage estimated range from -0.26 to -0.69 for the two estimation techniques and measures of leverage. The economic implication shown in table 4A is that one standard deviation change in leverage will result in 0.0124% to 0.0323% decrease in investment for the four models. The range of the impact values of investment on all the four models (0.0124 to 0.0323 %) per one standard deviation change in leverage shows that for a given percentage increase in leverage, there is a smaller corresponding decline in investment among African firms. One standard deviation change in cashflows results in 0.3789 to 0.3965% change in investment. These figures show that investment is more sensitive to cashflows compared to leverage as there is higher percentage change in cashflows than in leverage. For sales growth one standard deviation change in sales leads to a 0.0113 to 0.0399 percentage change in investment for the four models and the two measures of leverage. Above all with respect to investment opportunities, there is an interesting observation. One standard deviation change in growth opportunities results in a range of 1.1304 and 1.1767 % increase in investment for long term and total debt to total assets under system GMM respectively. The results from table shows that investment in African firms is more sensitive to growth opportunities than leverage, cashflows and sales growth as shown by higher percentage changes per one standard deviation. This implies that for a given change in growth opportunities investment changes with a greater magnitude. In other words, for a given increase in growth opportunities investment increases by a higher magnitude. This is line with our expectation for African firms, which are still young and at their growth stage and have more investment prospects hence they should invest more.

The findings are inclined to the agency costs theories that the increase in leverage in the capital structure of the firm complicates the investment policy through the conflicts of interest between managers and shareholders and on the other side shareholders and bondholders. Both Shareholders and bond holders want to act on their best interest which contradicts and suffocates the firm's investment decisions

(Jensen and Meckling 1976). The negative association between investment and leverage is in line with Myers (1977) who found that debt overhang reduces the incentives to shareholders to invest in positive net present value projects in an analysis of possible externalities of debt on optimal investment strategy. Thus, leverage lead to under investment for firms with low growth opportunities. On the other hand, the conflict between managers and shareholders give rise to over-investment for firms with limited investment opportunities (Myers 1977).

The results concurs with Lang et al (1996) who used the pooling regression method in industrial firms in the United States of America, Aivazian et al, (2003) using the fixed effects and the instrument variable technique in Canadian firms also found a negative association between investment and leverage in support of the under-investment hypothesis. Firth et al. (2008) with a panel of China's listed firms using the fixed effects estimation to eliminate unobserved individual time invariant effects found a negative relationship between leverage and investment. Zarutskie (2006) In the United States market also found that firms at the growth stage borrow and invest less suggesting a negative relationship between leverage and investment. Ahn et al., (2006) found that diversified firms tend to have higher leverage than focused firms, diversified firms invest more than their focused counterparts. They indicate that leverage influence investment decisions. Yuan and Motohashib (2014) in Chinese firms report a negative relationship between leverage and investment. However, on the other hand our findings are in contrary to Franklin John and Muthusamy (2011) by demarcating small, medium and large firms in India and used the pooled ordinary least squares, random effects and fixed effects estimation techniques found a positive relationship between leverage and investment.

Using a panel of African listed non-financial firms and a novel dynamic panel model estimated with the generalised method of moments estimation methodology which has not been used in the previous studies. We also found a significant negative relationship between leverage and investment in African firms. Implying that an increase in debt is associated with a decline in investment and firms with low debt levels invest more due to low financing costs and agency constraints. Previous studies have been concentrated in developed economies where firm's leverage levels are generally high, using African firms with low leverage levels the negative relationship is confirmed. Leverage constrains investment for African firms.

This suggest that leverage constrains investment for both highly leveraged firms and those firms that uses less leverage. This implication is in contrary to the capital structure theories that advocate for the advantages of debt owing to tax advantages. An increase in leverage to exploit the tax advantage will be offset by the costs associated with debt issues, the covenants imposed by the bond holders and commitment to debt servicing there by reducing the ability to take on investment opportunities as they arise.

Testing the legitimacy of instruments and model specification is crucial in dynamic panel data analysis. The GMM estimation technique is consistency in the absence of second-order serial correlation in error terms. We used the serial correlation AR (2) test as proposed by Arellano and Bond (1991). Our models passed the AR (2) test of no serial autocorrelation. Our model also passed the overidentification of instruments test given by the Sargan test. The coefficient of the lagged dependent variable is also less than one, which is consistent with dynamic stability. These attests to the correct specification of the model.

Our sample consists of all non-financial firms listed across African stock exchanges. Out of the 878 firms included in the sample almost 30 per cent accounts for South African firms only. This is quite a big margin that can also affect our results. South Africa is classified as an emerging market; its financial structures are more developed than in other emerging markets and in other African countries. Table 5 shows that on average, South African firms' leverage is higher than the continental average. Long-term debt to total assets averages 0.15 compared to 0.09 for the continent as a whole and 0.08 for the rest of the continent excluding South Africa. Total debt to total assets has an average of 0.25 for South African firms compared to 0.188 for all African firms. These figures indicate that South African firms are using more leverage relative to other African countries, and this is due to the country's advanced financial market development. On the same note, investment levels for South African firms are very high with an average 7.8 ratio of capital expenditures to net fixed assets compared to 0.37 for the rest of the continent. This also shows that South African firms are accounting for a larger proportion in our investment ratio. To check the robustness of our results for African firms we repeated the regressions of equation 3 excluding South Africa, and we also analysed South Africa on its own to check if this largest economy is not influencing our results.

Table 5 leverage and investment averages for all African firms versus South Africa

	All African firms		**Excluding SA**		**South Africa**	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Investment	0.3724	4.9422	0.272132	1.788119	7.831899	0.547004
Long-term debt to total assets	0.0922	0.1561	0.088624	0.157378	0.153342	0.099043
Total debt to total assets	0.1889	0.2327	0.19478	0.223044	0.249874	0.177713
Cash flow to fixed assets	0.6812	17.3460	0.472952	5.126828	28.30785	1.060633
Sales to fixed assets	9.3831	49.1219	6.712313	54.49658	35.43886	14.72933
Tobin's Q	2.1130	32.6755	1.671015	2.786816	54.86164	2.922873

Source: Author's calculations based on data obtained from Bloomberg online database.

Table 6 shows the regression output for African firms excluding South Africa. As South Africa is the largest economy in Africa and it accounts for almost 30% of the firms included in the sample of 21 stock exchanges, this may have the capacity to influence the results. The results reveal that the negative impact of leverage is maintained in the absence of South African firms, suggesting that our results are robust and they are not influenced by any one large economy. We also performed the analysis for South African firms only. The results are shown in Table 7, and we also found a significant negative relationship between leverage and investment for South African firms. Our results are robust in all situations tested, suggesting a significant negative relationship between investment and leverage in African firms.

Table 6 Dynamic panel estimation of leverage on investment excluding South Africa

	leverage= [LTD: TA]		**leverage= [TD: TA]**	
	Diff GMM	***SYS GMM***	***Diff GMM***	***SYS GMM***
L.investment	-0.0785***	0.0639***	-0.163***	0.0066***
	(-0.00975)	-0.0162	(-0.00574)	(-0.0016)
Leverage	-0.421***	-0.229***	-0.632***	-0.780***
	(-0.0959)	-0.0657	(-0.0682)	(-0.0131)
CF	0.141***	0.122***	0.149***	0.165***
	(-0.00565)	(-0.00399)	(-0.00328)	(-0.00142)
Sales	0.0685***	0.0261***	0.0283***	0.0106***
	(-0.00239)	(-0.00152)	(-0.000581)	(-0.00015)
Tobin's Q	0.0699***	0.0275***	0.253***	0.256***
	(-0.0106)	(-0.00501)	(-0.00971)	(-0.00166)
Observations	2,928	3,383	2,928	3,383
Number of id	441	455	441	455
AR(2)	0.232	0.149	0.48	0.36
Sargan Test	0.99	1	0.99	0.65
Hansen test	0.47	0.448	0.5	0.545

Source: Author's calculations based on data obtained from Bloomberg online database

*The two measures of leverage are long-term debt (LTD: TA) and total debt (TD: TA), CF is cash flows Tobin Q is a proxy for growth opportunities, L.investment is the lagged dependent variable. The AR (2) tests for autocorrelation, and the Sargan test tests for overidentification of instruments. Standard errors in parentheses *** p<0.01 significant at 1% level, ** p<0.05 significance at 5 % level, * p<0.1 significance at 10% level*

Table 7 Dynamic panel data estimation for South African firms

	leverage= [LTD: TA]		leverage= [TD: TA]	
	Diff GMM	***SYS GMM***	***Diff GMM***	***SYS GMM***
L.investment	0.00547***	-0.00211***	-0.00124***	-0.00299***
	(-0.00000492)	(-0.0000117)	(-0.000184)	(-0.0000199)
Leverage	-0.875***	-0.537***	-0.528***	-0.636***
	(-0.0000258)	(-0.000177)	(-0.000783)	(-0.000135)
CF	0.0989***	0.0950***	0.0981***	0.0950***
	(-0.0000361)	(-0.0000456)	(-0.000551)	(-0.0000625)
Sales	0.00132***	0.00179***	0.0008***	0.00194***
	(-0.00000775)	(-0.00000226)	(-0.000253)	(-0.00000408)
Tobin's Q	0.173***	0.183***	0.227***	0.214***
	(-0.0000203)	(-0.0000282)	(-0.000307)	(-0.0000304)
Observations	2,135	2,325	2,135	2,325
Number of id	186	190	186	190
AR (2)	0.45	0.38	0.4	0.38
Sargan test	0.29	0.43	0.2	0.58
Hansen test	0.68	0.99	0.27	0.8

Source: Author's calculations based on sample data

The constraining effect of leverage on investment is evidence of the important role of capital structure in a firm's investment policy. The results support the theory that agency problems between shareholders and bondholders may cause leverage to have a constraining impact on investment (Myers, 1977). Managers may give up on some positive net present value projects due to debt overhang. Based on agency conflict between shareholders and managers, the theories of Jensen (1986), Stulz (1990) and Grossman and Hart (1982) also suggest a negative relation between leverage and investment, arguing that firms with free cash flows but low-growth opportunities may underinvest, and firms with no growth opportunities may take on projects with negative net current value (over-invest). However, over-investment will come back adversely to the manager in the long run.

4.2 Growth Opportunities and the Role of Leverage

Our empirical analysis shows that leverage has a significant negative impact on investment in African firms. The results concur with most empirical studies in developed economies that found that there is a negative relationship between leverage and investment. Previous studies in developed markets reveal that leverage constrains investment; however, they report different implications for high-growth as

against low-growth firms. The over- and under-investment theory of leverage also suggests a negative relationship between leverage and investment, but only for firms with little or no growth opportunities. Recent empirical studies, such as Aivazian et al. (2005), found the inverse relationship to be stronger for low-growth opportunity firms. However, Seoungpil et al. (2005) and Rasa et al. (2008) found the constraining effect of leverage on investment to be stronger with regard to high-growth opportunities firms.

To examine the variances on the impact of leverage on high- and low-growth opportunity firms, we follow Aivazian et al. (2005). Extending from equation (3) to include a dummy variable for high- and low-growth firms to interact with leverage the following specification will be used to examine the effects of growth opportunities.

$$\frac{I_{i,c,t}}{K_{i,ct}} = \left(\frac{I_{i,c}}{K_{i,c}}\right)_{t-1} + \alpha_0 + \beta_1 LEV_{i,c,t} + \beta_2 D_{i,,c,t} * LEV + \beta_3 \frac{CF_{i,c,t}}{K_{i,c,t}} + \beta_4 Q_{i,c,t-1} + \beta_5 \frac{SALE_{i,c,t}}{K_{i,c,t}} + \mu_{i,c} + \varepsilon_{i,c,t} \qquad (eq\ 10)$$

Where, D is a dummy variable = 1 if Tobin's Q>1, and 0 otherwise. D*LEV has been added to the regression. Hence, for firms with Q>1, the coefficient for leverage will be $\beta_1 + \beta_2$ and for firms with Q≤1 it will be β_1.

Table 8 shows the regression output for high-growth firms. The coefficient of β_2 is significant and positive ranging from 0.351 for long-term debt and 0.112 for total debt both under system GMM. As indicated by Table 9 the coefficients for high-growth firms under system GMM will be -0.169 (-0.526+0.351) for long-term debt and -0.151 for total debt versus -0.526 and -0.263 for low-growth firms. The results imply that leverage has a greater constraining effect on investment for firms with low- or no-growth opportunities than for high-growth firms in Africa. These findings concur with Aivazian (2005) using Canadian evidence and Lang (1996) using USA firms. Using African firms, we also found evidence supporting the theory that leverage is a tool for disciplining firms with no-growth opportunities to avoid overinvestment. Managers having the propensity to increase the scale of the firm may overinvest even in projects with a negative effect that reduces shareholder value. Jensen (1986) argues that debt can help reduce overinvestment. The availability of free cash-flows restrains managers' abilities or gives them room to make such policy. Hence, increasing leverage through the issuance of debt commits cash flows to debt servicing and reduces unworthy investments, suggesting a negative relationship between leverage and investment in such firms. Jensen claims that the availability of growth prospects fundamentally controls whether debt will restrain overinvestment. Our results are in line with this theory and we found the negative effect of leverage to be greater in low-growth firms.

Table 8 Dynamic panel-data estimation for high-growth firms

	leverage= [LTD: TA]		leverage= [TD: TA]	
	Diff GMM	***SYS GMM***	***Diff GMM***	***SYS GMM***
L.investment	-0.00439***	0.000935***	-0.0675***	0.0497***
	(-0.000443)	(-0.000149)	(-0.00434)	(-0.000988)
Leverage	-0.693***	-0.526***	-0.854***	-0.263***
	(-0.0634)	(-0.0119)	(-0.0183)	(-0.00214)
D* lev	1.106***	0.351***	0.480***	0.112***
	(-0.0633)	(-0.0117)	(-0.0116)	(-0.00169)
CF	0.109***	0.107***	0.00435**	0.0877***
	(-0.00159)	(-0.000394)	(-0.00199)	(-0.0004)
Sales	0.00171***	0.00166***	0.00998***	0.000148***
	(-0.000122)	-2.38E-05	(-0.000234)	(-0.000015)
Tobin's Q	0.236***	0.178***	0.105***	0.120***
	(-0.000932)	(-0.000279)	(-0.00303)	(-0.000628)
Observations	4,987	5,630	5,063	5,708
Number of id	621	643	627	645
AR (2)	0.761	0.65	0.516	0.3
Sargan Test	0.252	0.7	0.99	0.98
Hansen test	0.221	0.49	0.23	0.075

Source: Author's calculations

Table 9 Coefficients of leverage for high- and low-growth firms

	Coefficient	**Long-term debt**	**Total debt**
High-growth firms	$\beta_1 + \beta_2$	-0.169	-0.151
Low-growth firms	β_1	-0.526	-0.263

Source: Author's calculations

Table 9 the coefficients for high- growth firms from system GMM estimation will be -0.169 (-0.526+0.351) for long-term debt and -0.151 for total debt versus -0.526 and -0.263 for low-growth firms, suggesting a higher negative impact of leverage on investment for low-growth firms.

Financing policy has a considerable bearing on investment levels. African firms should consider internal financing adopt a residual pay out policy to avail more internal funds. This enables maintenance of low debt levels to reduce the bondholder-share holder conflict and avail more cashflows for investment requirements. Low debt will easy pressure on cash flow commitments to interest payments and other

debt covenants and the firm can freely take on investment opportunities as they arise. We used the two GMM estimation techniques, these being the difference GMM and system GMM, and two different measures of leverage, these being long-term debt and total debt as ratios of total assets to examine the impact of leverage on investment. Confirming previous studies in developed economies, we found a negative relationship between leverage and investment in African firms. In light of growth opportunities, the analysis revealed that the negative impact of leverage is greater for firms with low-growth opportunities than high-growth firms. Leverage levels in African firms are rising from their historical low levels. We have shown that this is having a negative impact on investment and the negative effect is more pronounced for low-growth firms.

4.3 Additional Tests

Our results are robust with the two different methodologies used and the different measures of leverage. We also performed additional tests to ascertain whether the findings are affected by the inclusion of distressed firms, and financially constrained and unconstrained firms. Distressed firms are not able to service their debts and finance operations; hence, additional investment is unlikely if the firm is in such a situation. This situation may cause a negative relationship between leverage and investment. Hence, we need to ascertain if our results are not influenced by distressed firms.

Table 10 Dynamic panel data Estimation Distressed and non-Distressed firms

	leverage= [LTD: TA]		**leverage= [TD: TA]**	
	Diff GMM	***SYS GMM***	***Diff GMM***	***SYS GMM***
L.investment	-0.00430***	-0.00792***	-0.00361***	-0.00575***
	(-0.000318)	(-0.00131)	(-0.000301)	(-0.0000727)
Distressed	-0.181***	-0.759***	-1.008***	-0.974***
	(-0.0152)	(-0.0325)	(-0.0206)	(-0.00813)
Non-distressed	-0.572***	0.107***	-0.0563***	-0.0513***
	(-0.0152)	(-0.0305)	(-0.0202)	(-0.00817)
CF	0.112***	0.108***	0.110***	0.106***
	(-0.000963)	(-0.000915)	(-0.00128)	(-0.000244)
Sales	0.00490***	0.000826***	0.00458***	0.00134***
	(-0.000098)	(-0.0000173)	(-0.0000972)	(-0.00000684)
Tobin's Q	0.0650***	0.176***	0.0785***	0.261***
	(-0.000715)	(-0.00113)	(-0.000729)	(-0.000128)
Observations	4,417	5,025	4,417	5,025
Number of id	583	608	583	608
AR(2)	0.85	0.81	0.96	0.97
Sargan Test	0.95	0.15	0.17	0.36
Hansen test	0.42	0.366	0.56	0.3

Source: Author's calculations based on Bloomberg financial data.

4.3.1 Testing for Distressed Firms

Following Ahn and Denis (2004), distressed firms are defined as those firms with interest coverage of less than 1. The main regressions were re-estimated after separating distressed firms from non-distressed firms to examine whether distressed firms are influencing the results.

Table 10 shows the regression results for non-distressed firms. The negative impact of leverage on investment is maintained for non-constrained firms, suggesting that our results are not controlled by financially constrained and troubled firms. The negative relationship is robust for stable and financially strong and sound firms, these being those actively able to service their debt and make investments.

5. Limitations of the study and areas for further research

The use of accounting data for estimation is likely to present some well-known impediments, which include the potential for "creative accounting" by firms to reduce their tax bills, and possible inconsistencies in the timing and the use of different accounting conventions and reporting standards across African countries. The quality and accuracy of this study depends heavily depends on the quality and accuracy of the financial statements used in this study.

Our study broadly analysed capital expenditures as a variable for investment and doesn't decompose the sources of investment for the firms. The balance sheet figures do not specify the nature of investments undertaken by the firms. Further studies on this subject where the investments are decomposed into organic investments, investment through mergers and acquisitions, disinvestments through divestitures and unbundling distinctly and ascertain the drivers of investment reported in balance sheet figures among African listed firms. The decomposition will also ascertain how leverage affect the specific forms of investment determinants.

6. Summary and Conclusions

This paper provides a novel evidence on the relationship between leverage and investment based on African firms. There is structural and behavioural heterogeneity between firms in developing and developed economies hence, analysing African firms on their own is valuable. Our analysis employed a novel approach a dynamic panel model and system GMM which controls for the problem of endogeneity in the relationship between leverage and investment which has not been used in previous studies. This study also allows a comparison of the effect of leverage on investment on highly levered

firms in the developed economies and the lowly levered firms in Africa. There is overwhelming evidence verifying that a) African firms use leverage conservatively, and b) the leverage levels in African firms are increasing, and in analyzing this peculiar market we found a constraining effect of leverage on investment. These results suggest that a negative relationship exists for both highly levered and lowly levered firms. The negative effect of leverage on investment was found to be greatest for firms with little or no growth opportunities. Our findings are inclined to the over investment and under investment hypothesis of the Agency costs theory. The results are robust for the two techniques of the GMM used and the different measures of leverage. African firms should consider internal growth, lower their pay-out policies and increase their earnings retention to finance their investments with internally generated funds. Maintaining low debt levels reduces interest payment commitments and loan covenants from debt holders (shareholder-bondholder conflict). This will avail more free cash flows and enable the firm to freely take on investment opportunities as they arise. However, for firms with no growth opportunities investors in Africa should consider higher leverage to reduce the propensity of over-investment in non-profitable projects by management.

Reference list:

Ahn, S. & Denis, D. J. 2004. Internal capital markets and investment policy: evidence from corporate spinoffs. *Journal of Financial economics,* 71**,** 489-516.

Aivazian, V. A., Ge, Y. & Qiu, J. 2005. The impact of leverage on firm investment: Canadian evidence. *Journal of corporate finance,* 11**,** 277-291.

Akhtar, S. 2005. The determinants of capital structure for Australian multinational and domestic corporations. *Australian journal of management,* 30**,** 321-341.

Akhtar, S. & Oliver, B. 2009. Determinants of capital structure for Japanese multinational and domestic corporations. *International review of finance,* 9**,** 1-26.

Anderson, T. W. & Hsiao, C. 1982. Formulation and estimation of dynamic models using panel data. *Journal of econometrics,* 18**,** 47-82.

Antoniou, A., Guney, Y. & Paudyal, K. 2008. The determinants of capital structure: capital market-oriented versus bank-oriented institutions. *Journal of financial and quantitative analysis,* 43**,** 59-92.

Baglioni, A., Beccalli, E., Boitani, A. & Monticini, A. 2013. Is the leverage of European banks procyclical? *Empirical Economics,* 45**,** 1251-1266.

Baum, C. F., Barkoulas, J. T. & Caglayan, M. 2001. Nonlinear adjustment to purchasing power parity in the post-Bretton Woods era. *Journal of International Money and Finance,* 20**,** 379-399.

Benhabib, J. & Spiegel, M. M. 2000. The role of financial development in growth and investment. *Journal of economic growth,* 5**,** 341-360.

Blundell, R. & Bond, S. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics,* 87**,** 115-143.

Clarke 2013. Economic development in Africa. *UNCTAD.* The United Nations: The United Nations.

Denis, D. J., Denis, D. K. & Sarin, A. 1997. Agency problems, equity ownership, and corporate diversification. *The Journal of Finance,* 52**,** 135-160.

Fama, E. F. & French, K. R. 2002. Testing trade-off and pecking order predictions about dividends and debt. *Review of financial studies,* 15**,** 1-33.

Firth, M., Lin, C. & Wong, S. M. 2008. Leverage and investment under a state-owned bank lending environment: Evidence from China. *Journal of Corporate Finance,* 14**,** 642-653.

Frank, M. Z. & Goyal, V. K. 2007. Trade-off and pecking order theories of debt. *Available at SSRN 670543*.

Franklin John, S. & Muthusamy, K. 2011. Impact of leverage on firms investment decision.

Goldsmith, A. A. 2001. Foreign aid and statehood in Africa. *International organization,* 55**,** 123-148.

Grossman, S. J. & Hart, O. D. 1982. Corporate financial structure and managerial incentives. *The economics of information and uncertainty.* University of Chicago Press.
Guschanski, A. & Onaran, Ö. 2016. Determinants of the wage share: a cross-country comparison using sectoral data.
Gwatidzo, T. & Ojah, K. 2009. Corporate capital structure determinants: evidence for five African countries. *African Finance Journal,* 11**,** 1-23.
Harris, M. & Raviv, A. 1990. Capital structure and the informational role of debt. *The Journal of Finance,* 45**,** 321-349.
Jensen, M. C. 1986. Agency cost of free cash flow, corporate finance, and takeovers. *Corporate Finance, and Takeovers. American Economic Review,* 76.
Jensen, M. C. & Meckling, W. H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics,* 3**,** 305-360.
Kargbo11, S. M. & Adamu, P. A. 2009. Financial development and economic growth in Sierra Leone.
Kim, E. H. 1978. A mean-variance theory of optimal capital structure and corporate debt capacity. *The Journal of Finance,* 33**,** 45-63.
Krämer, W. 2014. Kahneman, D.(2011): Thinking, Fast and Slow. *Statistical Papers,* 55**,** 915.
Kraus, A. & Litzenberger, R. H. 1973. A state-preference model of optimal financial leverage. *The journal of finance,* 28**,** 911-922.
Lang, L. E., Ofek, E. & Stulz, R. 1996. Leverage, investmentand firm growth. *Journal of Financial Economics,* 40**,** 3-29.
Marsh, P. 1982. The choice between equity and debt: An empirical study. *The Journal of finance,* 37**,** 121-144.
Mcconnell, J. J. & Servaes, H. 1995. Equity ownership and the two faces of debt. *Journal of financial economics,* 39**,** 131-157.
Mishkin, F. S. 2007. *The economics of money, banking, and financial markets*, Pearson education.
Modigliani, F. & Miller, M. H. 1958. The cost of capital, corporation finance and the theory of investment. *The American economic review,* 48**,** 261-297.
Muñoz, F. 2013. Liquidity and firm investment: Evidence for Latin America. *Journal of Empirical Finance,* 20**,** 18-29.
Myers, S. C. 1977. Determinants of corporate borrowing. *Journal of financial economics,* 5**,** 147-175.
Myers, S. C. 1984. The capital structure puzzle. *The journal of finance,* 39**,** 574-592.
Myers, S. C. & Majluf, N. S. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics,* 13**,** 187-221.
Rajan, R. G. & Zingales, L. 1995. What do we know about capital structure? Some evidence from international data. *Journal of Finance,* 50**,** 1421-1660.
Rasa, N., Stan, K. & Rytis, K. 2008. The Impact of Loan Capital on the Baltic Listed Companies' Investment and Growth.
Roodman, D. 2006. How to do xtabond2: An introduction to difference and system GMM in Stata. *Center for Global Development working paper*.
Scott Jr, J. H. 1976. A theory of optimal capital structure. *The Bell Journal of Economics***,** 33-54.
Seoungpil, A., David, J., Denis, D. & Denis, K. 2005. Leverege and Investment in diversified firms. *Journal of Financial Ecnomics,* 79**,** 317-337.
Souza, L. M. V. D., Ellis, C. & 2015. Private leverage trends in developed and developing economies. *Global Credit Reserach* Moody.
Stulz, R. 1990. Managerial discretion and optimal financing policies. *Journal of financial Economics,* 26**,** 3-27.
Yuan & Motohashib 2014. Impact of Leverage on Investment by Major Shareholders: Evidence from Listed Firms in China

China Economic Journal,, Vol. 7,**,** 299-319.
Zamfir, L. 2016. Growth of Africa. *Members' Research Service January 2016 — PE 573.891.* European Parliamentary Research Service European Parliamentary Research Service
Zane, G. 2012. Corporate finance theories. challenges and trajectories. *Management & Marketing Challenges for the Knowledge Society,* 7**,** 277-294.