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## Leverage and firm performance: New evidence on the role of firm size

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### ABSTRACT

In this paper, we draw on the Hansen (1999) threshold regression model to examine the empirical links between leverage and firm performance by means of a new threshold variable, firm size. We ask whether there exists an optimal firm size for which leverage is not negatively related to firm performance. Accordingly, with a panel data of 101 listed firms in Nigeria between 2003 and 2007, we explore whether the ultimate effect of leverage on firm performance is contingent on firm size; that is, whether the type of impact that leverage has on the performance of a firm is dependent on the size of the firm. Our results show that the negative effect of leverage on firm performance is most eminent and significant for small-sized firms and that the evidence of a negative effect diminishes as a firm grows, eventually vanishing when firm size exceeds its estimated threshold level. We find that this result continues to hold, irrespective of the debt ratios utilized. In line with earlier studies, our results show that the effect of leverage on Tobin's Q is positive for Nigeria's listed firms. However, our new finding is the evidence that the strength of the positive relationship depends on the size of the firm and is mostly higher for small-sized firms.

### 1. Introduction

There is a widespread view that the impact of leverage on firm performance is ambiguous, with some studies finding a negative relationship (see [Chen, 2004](#); [Tian and Zeitun, 2007](#); [Salawu, 2007](#)) and others reporting either a positive or no significant relationship (see [Azeez, 2015](#); [Brick and Ravid, 1985](#)). Theoretically, the divergence in previous studies can be partly explained by competing theories such as the signalling theory which posits that debt, in the presence of asymmetric information, should be positively related to firm profit performance, and the agency costs or pecking order theory which predicts a negative relationship between leverage and firm performance resulting from the agency costs between firm owners and lenders. Empirically, one plausible explanation for this ambiguity, in our view, may be the failure of existing empirical studies to model the contingent role that the size of a firm plays in the relationship between leverage and firm performance. If firm size impacts firm performance and the relationship between leverage and firm performance remains a subject of discussion, then firm size should provide some explanation for the ambiguous relationship between leverage and firm performance. This is the hypothesis advanced in this paper and forms the basis on which our empirical analysis is built. To reiterate, we ask whether the size of a firm helps to better understand and explain the ambiguous relationship between leverage and firm performance that has been documented in previous studies. As a by-product of this question, we determine whether there exists an optimal level of firm size at which leverage does not diminish firm performance.

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**Table 1**  
Summary Statistics.

Variables	Mean	Median	Std Dev.	Minimum	Maximum
ROA	0.0804	0.0927	0.448	-6.0208	3.7104
ROE	4.5907	0.707	77.3011	-696.34	1558.61
TOB Q	0.9332	0.7038	0.9872	0.0871	7.1684
TDTA	0.735	0.521	0.9195	0.0143	6.8064
LTDTA	0.2757	0.1377	0.4704	0.000	6.5521
STDTA	0.4592	0.2642	0.6930	0.000	5.5809
SIZE	6.1719	6.3017	1.2999	0.000	8.1378

Note: ROA is the return on assets (EBIT/total assets), ROE is the return on equity (EBIT/ equity), Tob Q (Tobins Q) equals (Market value of equity + book value of debt)/book value of assets; TDTA is the total debt divided/ total assets; LTDTA is the long-term debt/total assets; STDTA is the short-term debt/total assets; Size represented as log of turnover, Tax = total tax to earnings before interest and tax (EBIT). Leverage is TDTA, LTDTA or STDTA.

In addressing the main question posed in this paper, we employ the concept of threshold analysis, à la Hansen (1999) which is most suitable when nonlinearities between financial variables are to be explored. The concept of threshold regression modelling has a wide variety of applications in economics and finance. Our motivation to draw on the framework of threshold analysis stems from our main objective – we wish to determine whether the relationship between leverage and firm performance depends on firm size. That is, whether size is an advantage for firms and whether large-sized firms in Nigeria are better able to reap the benefits of leverage than their smaller counterparts. We have focused on Nigeria's listed firms because several studies (see Akinlo and Asaolu, 2012; Jeleel and Olayiwola, 2017; Olokoyo, 2013; Patrick and Ogebe, 2013, among others) have mostly concluded that debt is generally bad for firms in the real sectors as it is responsible for the weakening firm performance that has been observed across these firms over the years. This has led many listed firms across the different real sectors of Nigeria's economy to favour corporate governance policies and business strategies that promote less debt relative to other funding sources. The danger with such policies in a frontier emerging market such as Nigeria is that it stifles the opportunity for organic growth of firms, especially in the likely instances where other funding sources are either very limited or completely absent.

Furthermore, these studies on the leverage-performance nexus in Nigeria have an important drawback. They did not consider the contingent role that other factors such as firm size might play in the leverage-performance nexus, and little is known about whether the size of a firm could be a game changer regarding the empirical relationship between leverage and firm performance. It is this specific issue that we set out to address in this paper. Moreover, Nigeria's listed firms are a special case in that the debt component of their capital structure relies on short-term debt and has a low amount of long-term debt (Nwanko, 2014), partly due to the non-existence of a robust debt capital market in the country. Thus, a study that examines the impact of leverage, particularly short-term leverage, on firm performance is crucial in this instance as it will uncover the consequences of the preference for such form of leverage and reveal conditions for it to be less or more deleterious to firm performance.

To address the problem, we will test whether the relationship between leverage and firm size is invariant to sample splitting, where the sample is split based on firm size and where the firm size represents the threshold variable. We do not impose a pre-determined estimate of firm size; instead we follow the procedure in Hansen (1999) which determines, from available data, estimates of thresholds based on minimizing the concentrated sum of squares. If we find evidence that such a split yields relationship between leverage and firm performance that is different across the split samples, then this would be an evidence for nonlinearities between leverage and firm performance, where the nonlinear agent is the firm size – that is, firm size influences the link between leverage and firm performance, so that there exists a level or 'cut-off point' for firm size such that the relationship between leverage and firm performance changes. For instance, it could be that leverage decelerates firm performance when firm size is below a certain level, say  $x$ , but accelerates firm performance when firm size is above  $x$ . On the other hand, it could also be that whether firm size is above or below  $x$ , the link between leverage and firm performance is unchanged, i.e. leverage either accelerates or decelerates firm performance irrespective of firm size. The advantage of this empirical exercise is that it provides a fresh perspective among researchers, policymakers and business managers that promotes the monitoring of not just leverage and how it affects performance but also how firm size might, positively or negatively, influence this relationship. One important consequence of this paper is its potential to inspire a tradition where firms take size into consideration before reaching a decision on the amount of debt to include on their balance sheets in a bid to unlock the positive benefits or at least mitigate the negative effects of leverage on performance.

Utilizing a panel of 101 firms listed on the Nigerian Stock Exchange from 2003 to 2007, we find compelling evidence of a difference in the impact of leverage on firm performance for different firm sizes. Specifically, our results show that the negative effects of leverage on ROA and ROE (accounting measures of firm performance) are evident and significant only when firm size is small, falling below its estimated threshold level. Beyond this level, leverage has no significant negative impact on firm performance. This seems to suggest that the much-emphasized demerits of leverage, such as exposure to greater financial distress which dampens firm performance, are more of a concern for small firms and possibly of less concern for large firms. Thus, the agency costs theory, which suggests that debt affects firm performance negatively, appears to be supported for the small size firms while the signalling theory, which posits that leverage is positively related to firm performance, garners no support. We also find that leverage is positively related to Tobin's Q, a measure of firm (market) performance, and that the strength of the positive association depends on firm size and is mostly higher for small-sized firms. These results are robust to different measures of leverage, the inclusion of other determinants of firm performance such as taxes and firm age to control for tax effects and the prolonged existence of firms.

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