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SOURCES OF GROWTH IN SOUTH AFRICAN AGRICULTURE – A CORPORATE FINANCE PERSPECTIVE

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Abstract. The capital structure theory has been applied extensively in corporate firms with mixed results. This article examines the role of capital structure on the performance of firms in South Africa's agricultural sector following the pecking order theory. Survey data was collected from smallholder farmers in Mpumalanga and North West provinces during 2013. A total of 500 respondents were included in the survey using the multi-stage sampling technique of which 362 responses were received. Using the structural equation modeling approach, the study observes a positive and significant relationship between capital structure and the performance of smallholder farmers. Both short-term and long-term debt contributes to improved productivity through the purchase of working capital requirements and the acquisition of capital equipment. Furthermore, the study reveals that land size has a positive influence on agricultural output. These empirical results suggest that channelling debt capital to farmers will improve their productivity. All models fit indices applied confirm the model was a good fit to the data.

Key words: agriculture, capital structure, South Africa

INTRODUCTION

South Africa is one of many African countries whose economies have been characterised by a growing population and rising unemployment in the last decade. According to the Statistics South Africa (Stats SA) mid-year 2014 report, South Africa's annual population growth rate rose from 1.29% in 2004 to 1.58 in 2014. Its estimated population is 54 million (Stats SA, 2014). It is clear that this population growth needs to be supported by a food secure economy. An examination of the determinants of the growth of the agricultural sector is imperative. Successful farm businesses are characterised by significant growth over time in agricultural firm's equity capital (Nurmet, 2011). Such growth directly affects the accumulation of wealth, improvement in solvency positions, expanded credit capacity, and strengthening of future income-generating capacity.

Although growth in the agricultural sector lags behind mining, manufacturing and retail sectors, the focus of stakeholders has turned to agriculture, which currently contributes approximately 3% to Gross Domestic Product (GDP) (SARB, 2013), because of its employment creation potential. The sector currently employs approximately 653 000 people (RSA and DAFF, 2011). A worrying trend has been the declining number of workers on farms which can be attributed to the poor performance of farms due to lack of resources (see Figure 1 below).

South Africa's agricultural sector comprises of large-scale commercial farmers who are well established and operate formally, and smallholder farmers. Historically smallholder farmers operated as family units aimed at feeding the family (Baiphethi and Jacobs, 2009). In cases where surpluses were realised, these would be sold to deficit economic units. Overtime, smallholder farmers have evolved from being just subsistence farming units to commercially run entities. Farming now constitutes

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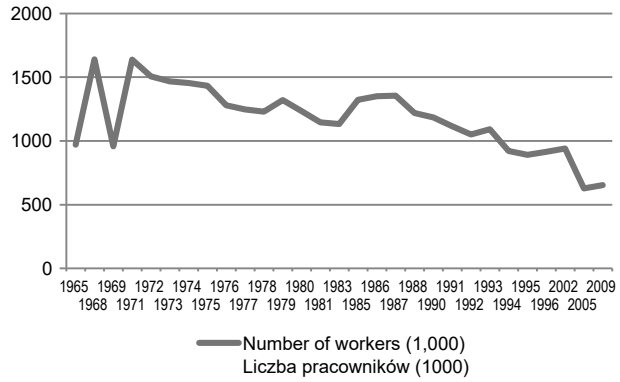

Fig. 1. Employment in South African agricultural sector
Source: RSA and DAFF (2011).
Rys. 1. Zatrudnienie w sektorze rolnym w Afryce Południowej
Źródło: RSA i DAF (2011).

a major source of income for many rural communities in South Africa and, therefore, plays a major role in poverty alleviation (Machethe, 2004, p. 11).

What is clear from empirical evidence is that smallholder farmers operate with limited financial and non-financial resources. For instance, access to finance has been observed to impede their growth (Coetzee et al., 2002). The supply of credit by formal financial institutions has also been low when compared to commercial farmers and the non-farm private sector (Chisasa and Makina, 2012). Nurmet (2011, p. 190) posits that a firm's financing need depends on the quantum of its internal cash flows relative to its investment opportunities. If the firm has a strong market base, its cash generating capacity is high and will be able to finance investment internally.

There are a few studies on the impact of debt or credit on the performance of farm enterprises. For instance, Barry and Ellinger (1988, p. 45) observed debt to stimulate growth and vice versa. Zhengfei and Lansik (2006, p. 644) used data from Dutch arable farms and demonstrated that debt has no effect on productivity growth. In Latvia, Bratka and Praulins (2009, p. 144) concluded that the relationship between debt and farm performance is positive. The debt-to-asset ratio was observed to be growing as performance increased. Empirical studies done on the finance growth nexus in the agricultural sector in South Africa, have confirmed that the relationship between bank credit and agricultural productivity is positive and significant (Chisasa and Makina, 2013).

Despite the importance of lines of credit in the provision of liquidity in the economy, the absence of data has resulted in limited empirical studies on the role of debt in financing decisions in agriculture (see Sufi, 2009, p. 1058). Furthermore, studies that have investigated the relationship between capital structure and agricultural performance are scant. Ana et al. (2012) observed capital structure to have a positive influence on the financial performance of agricultural companies in Macedonia. This paper examines the impact of capital structure of firms and productivity growth in South Africa's agricultural sector. Since the capital structure of firms is dominated by debt and equity, the paper presents empirical literature on the impact of equity on the one hand and debt on the other. No study has been done to establish this relationship for South Africa.

The paper proceeds as follows. Section 2 presents the literature guiding this study. The methodology is presented in section 3. Section 4 presents the results and discussion of the results. Section 5 concludes the study and provides recommendations for further research.

LITERATURE REVIEW

Capital structure theory and firm performance

The impact of capital structure on firm performance has been widely documented in the corporate finance literature. In their seminal paper, Modigliani and Miller (1958) demonstrated that in the world of perfect capital markets finance is irrelevant for investment decisions. However such view is widely disputed because the assumption of perfect capital markets can't be maintained in the real world (see Hubbard, 1998 for a survey) as market imperfections exist due to information asymmetry and agency costs. Market imperfections create differences in the cost of internal and external financing making the former cheaper than the latter. Thus firms naturally are inclined to use cheaper internal sources of finance at the first instance to finance their investment. When internal sources are not enough or exhausted then they resort to the costly external sources of finance. This is consistent with the pecking order hypothesis of Myers and Majluf (1984).

Available literature on this topic has covered the manufacturing and service sectors but an optimal capital structure remains elusive (Ahmadinia et al., 2012, p. 4). For example, Nosa and Ose (2010, p. 50) conducted an

empirical investigation of the link between debt and corporate performance in Nigeria. They concluded that debt has not sustained effective funding required for growth and development of corporations. Rather, corporations need to be adequately funded by both money and capital markets, subject to a conducive legal environment for which government has a responsibility.

Empirical evidence suggests that smallholder farmers have limited access to bank credit and that credit is needed for meeting operational requirements (Olawale and Garwe, 2010). Yet the performance of agricultural firms engrosses many production factors; agricultural credit is one of them (Kumar et al., 2010, p. 262). Farming requires finance to fund operations, acquire capital goods as well as to meet working capital requirements (Bernard, 2009); in South Africa, this has arguably been the largest challenge for farmers but mostly smallholder farmers. For instance, in the Wild Coast spatial development initiative (SDI) for small businesses in tourism and agriculture, Mitchell et al. (2008, p. 129) observed a dramatic fall-off in food production due to lack of funding. They observed that fewer households had bank loans in 2004 than in 1997, while more were taking loans from loan sharks than from banks.

To understand whether or not credit has an implication on agricultural output, we must first explore the reasons for credit demand. Previous studies have identified factors (for example, age of the farmer, interest rates, education, farm size and inputs) that influence the demand for credit (see for example Byiers et al., 2010) and how credit affects output via these factors (Khan and Hussain, 2011). According to Singh et al. (2009, p. 313), farmers in their bid to make high capital investments to sustain high output rate and incomes for maintaining their improved living and social standards, borrow from both formal and non-formal institutional sources.

An important advantage of debt financing is the tax benefit from the tax-deductible interest incurred from debtors. The tax benefit increases the firm value and therefore induces firms to increase debt. An increase of debt, however, results in an increased probability of default, which is costly to firms. When applied to farming, the tax benefit is not realised due to the legal form of the farm enterprise which is either a sole proprietorship or a partnership. In this instance farmers pay an income tax rather than a corporate tax. The income consists of farm and nonfarm income. Thus, the traditional financial theory on capital structure may not apply to agriculture in the same way as it applies to nonfarm firms because of fundamental differences between farms and corporate firms.

Nonfinancial factors of production in agriculture

Agriculture is largely dominated by family farms in which family members supply the labour. When compared to corporate firms, hiring labour from competitive labour markets or firing employees is not an option in financial difficulties. Excess labour cannot be disposed of easily. As farming provides employment and livelihood to the whole family, this presumably influences the decision-making of farms.

Land is an important fixed input with a unique characteristic not observable in other industries (Zhengfei and Lansik, 2006). It has no life expectancy and depreciation, of which the impact is unclear with respect to land investment and financing.

The availability of water is a precondition for successful agricultural activity. Water can either be rain-fed or available through irrigation. South Africa is a semi-arid nation characterised by erratic rainfall patterns. Farmers need to monitor weather patterns very closely. In times of excess rains, crops get waterlogged, resulting in poor yields. During drought periods, crops wither also resulting in less than optimal yields (DBSA, 2011).

METHODOLOGY

The paper used survey data obtained from Mpumalanga and North West provinces of South Africa using a multistage random sampling strategy. In the first stage two out of nine provinces were selected, that is, Mpumalanga and North West. In the second stage, five districts from the eight districts making up the two provinces were selected. In the final stage, 100 farmers were surveyed from each of the five districts (500 in total). A total of 362 responses were received (72%). The survey used a self-administered questionnaire containing closed-ended questions. The questionnaire satisfied both reliability and validity tests. Data was captured and analysed using the Analysis of Moment Structures (AMOS) Version 21 software package.

As the objective of this paper was to determine the relationship between capital structure and smallholder farm output, the following null and alternate hypotheses were postulated.

H_0: Capital structure does not stimulate smallholder farm output in South Africa.

H_a: Capital structure stimulates smallholder farm output in South Africa.

Structural equation model (SEM)

The overall objective of structural equation modeling is to establish that a model derived from theory has a close fit to the sample data in terms of the difference between the sample and model-predicted covariance matrices. However, Tomer and Pugesek (2003) warn that even if all the possible indices point to an acceptable model, one can never claim to have found the true model that has generated the analysed data. SEM is most concerned with finding a model that does not contradict the data. That is to say, in an empirical session of SEM, one is typically interested in retaining the proposed model whose validity is the essence of the null hypothesis. Statistically speaking, when using SEM, the researcher is usually interested in not rejecting the null hypothesis (Raykov and Marcoulides, 2000, p. 34). This study also uses structural equation modeling because of the multiple indicators for each of the latent constructs dictated by theoretical considerations. Both the hypothesised and final models are presented diagrammatically for ease of reference (Schreiber et al., 2006, p. 334).

Goodness of Model Fit Indices

The reporting done here follows the guidance of Schreiber et al. (2006) who provide a basic set of guidelines and recommendations for information that should be included in confirmatory factor analysis and structural equation modelling. However, as a point of departure, the researcher must first conduct a Chi-square test of association of the predictor variables and the endogenous variables. Fit indices are used to inform the researcher how closely the data fit the model (see Table 1 for the most widely used indices).

Hypothesised SEM for growth in agricultural productivity

This study hypothesised that capital structure does not influence the level of farm output. The first step was to develop a model based on theory, time, logic and previous research, as recommended by Quirk, Keith and Quirk (2001). In this model, agricultural output (AOutput) is argued to be a function of land size (LS), labour (L), capital structure (CS) and rainfall. The hypothesised structural equation model is depicted in Figure 2 below.

Table 1. Interpretation of Model Fit Indices
Tabela 1. Interpretacja indeksów dopasowania modelu

Index Indeks	Recommended value Wartość zalecana
CMIN	<0.05
GFI	≥ 0.95 (not generally recommended) ≥ 0,95 (ogólnie niepolecane)
TLI	≤1 (values close to 1 indicate a very good fit) ≤1 (wartości zbliżone do 1 wskazują bardzo dobre dopasowanie)
CFI	≤1 (values close to 1 indicate a very good fit) ≤1 (wartości zbliżone do 1 wskazują bardzo dobre dopasowanie)
PCFI	sensitive to model size wrażliwe na wielkość modelu
RMSEA	<0.06 to 0.08 with confidence interval <0,06 do 0,08 z przedziałem ufności
NFI	≤1 values close to 1 indicate a very good fit); indices less than 0.9 can be improved substantially ≤1 wartości zbliżone do 1 wskazują bardzo dobre dopasowanie; indeksy mniejsze niż 0,9 mogą być znacząco poprawione
PCLOSE	<0.05

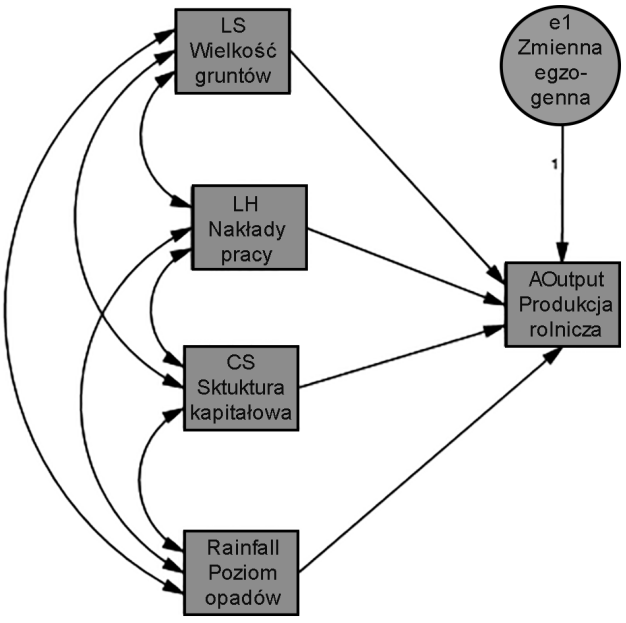

Fig. 2. Hypothesised Model – Impact of capital structure on farm performance
Rys. 2. Hipotetyczny model – wpływu struktury kapitału na produktywność gospodarstwa rolnego

Although there are four variables in the model, the main variable of concern was the path from capital structure (CS) to agricultural output (AOutput). Since this study investigates sources of growth with capital structure as the key explanatory variable, agricultural output has been used as the dependent variable. This is in line with Hazell and Hojatti (1995) in Zambia. Similarly, Udoh (2011) examined the relationship between public expenditure, private investment and agricultural sector growth in Nigeria. Agricultural output was used as the dependent variable wherein output was defined as the sum total of crop production, livestock, forestry and fishing. The farmer's agricultural output in value terms is used as a proxy for farm output. This is consistent with Enoma (2010) in Nigeria and Sial et al. (2011) in Pakistan.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 above shows that the average total valid observations summed to n = 362. The descriptive statistics depict that farmers have land sizes (LS) of between 16 and 20 hectares (mean score = 3.22). Workers spend 6 to 8 labour hours (LH) on the farm. Annual average rainfall is in the region of 504 mm with a standard deviation of 129.

Table 2. Descriptive Statistics
Tabela 2. Statystyki opisowe

	N	Minimum	Maximum Maksimum	Mean Średnia	Std. Deviation Odchylenie standardowe
LS Wielkość gruntów	362	1	5	3.22	1.417
LH Nakłady pracy	362	1	5	2.70	1.139
CS Struktura kapitałowa	362	0.00	1.00	0.4448	0.49763
Rainfall Poziom opadów	362	360	620	504.36	129.383

Table 3. Chi-Square Tests between agricultural output and Predictors
Tabela 3. Testy chi-kwadrat między wynikiem a przewidywaniami

Relationship Relacja	Pearson Chi-square Chi-kwadrat Pearsona		
	value wartość	df	assmp. sig (s-sided) istotność hipotetyczna
Farm size and agricultural output Wielkość gospodarstwa a produkcja rolnicza	38.242	20	008***
Labour (hours) and agricultural output Nakłady pracy a produkcja rolnicza	57.729	20	000***
Capital structure and agricultural output Struktura kapitałowa a produkcja rolnicza	23.450	16	000***
Family networth and agricultural output Wartość netto osiągana przez rodzinę a produkcja rolnicza	84.521	16	000***
Family networth and agricultural output Wartość netto osiągana przez rodzinę a produkcja rolnicza	4.447	5	0.487

*; **; *** denotes significance at 1%, 5% and 10% respectively.
*; **, *** oznacza istotność odpowiednio na poziomie 1%, 5% i 10%.

The variables were subjected to further tests for association using the Pearson Chi-Square Test. The results of the analysis are shown in Table 3 below. All the predictor variables are observed to have a positive and significant association with agricultural output.

The correlation discussed above has highlighted the presence of associations between agricultural output and its predictor variables, access to credit and its determinants, the effect of capital structure on access to credit and agricultural output. These relationships have portrayed overlaps and interrelationships among the specified variables. All relationships were observed to be significant. The overall chi-square test (Table 4) revealed a significant association between agricultural output and the predictors ($p < 0.05$).

Table 4. Chi-Square Test for SEM
Tabela 4. Test chi-kwadrat dla SEM

	Chi sq Chi-kwadrat	df Różnica	p-value Wartość p	Remark Uwaga
Final model Model końcowy	0.000	0	Cannot be computed Nie można było obliczyć	Poor fit Słabe dopasowanie

In the next section these relationships are subjected to more robust analyses using structural equation modeling.

Maximum likelihood estimates

The regression model shown in Table 5 below confirmed the presence of causal relationships between the endogenous variable agricultural output (AOutput) and the exogenous variables land size (LS) and capital structure (CS). Both causal relationships are significant with p-values indicated by *** on the 0.001 level (two-tailed). Two asterisks (**) would indicate a p-value for the 0.1 level (10%), and one asterisk (*) would indicate a p-value for the 0.05 level (5%) (Garson, 2009:60). Only one intercorrelation (covariance) was observed from the analysis.

Table 6 depicts the strongly significant intercorrelation between land size and capital structure with a p-value below 0.05 at the 0.001 (two-tailed) level. All the other paths linking exogenous variables (see Fig. 1) were found to be insignificant and therefore excluded from the final model depicted in Fig. 3 below.

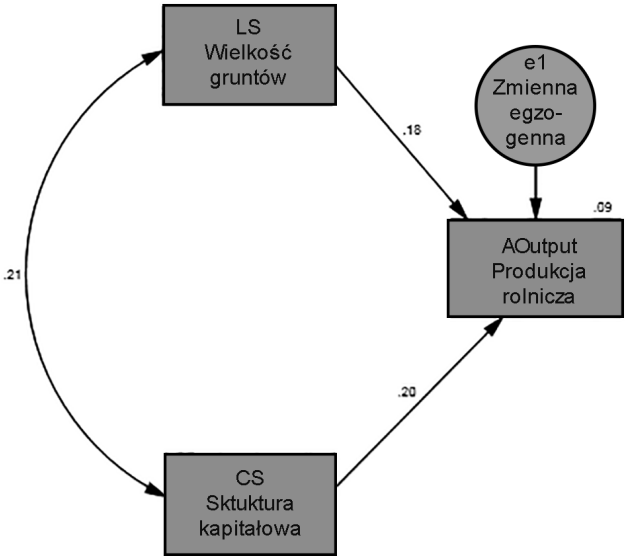

Fig. 3. Final Model – Impact of capital structure on farm performance
Rys. 3. Model końcowy – wpływ struktury kapitału na produktywność gospodarstwa

Table 5. Regression weights (group number 1 – default model)
Tabela 5. Wagi regresji (grupa 1 – model domyślny)

			Estimate Oszacowanie	S.E. Równanie strukturalne	C.R. Typowe relacje	P Obecnie
Agricultural output (Q14) Produkcja rolnicza (Q14)	<---	Land size (Q7) Wielkość gruntów (Q7)	0.130	0.037	3.465	***
Agricultural output (Q14) Produkcja rolnicza (Q14)	<---	Capital structure (Q21b_Q22b) Struktura kapitałowa (Q21b_Q22b)	0.418	0.107	3.916	***

Table 6. Covariances (group number 1 – default model)
Tabela 6. Kowariancje (grupa 1 – model domyślny)

			Estimate Oszacowanie	S.E. Równanie strukturalne	C.R. Typowe relacje	P Obecnie
Land size (Q7) Wielkość gruntów (Q7)	<-->	Capital structure (Q21b_Q22b) Struktura kapitałowa (Q21b_Q22b)	0.146	0.038	3.871	***

Table 7. Squared multiple correlations (group number 1 – default model)
Tabela 7. Wielokrotność korelacji dokwadratu (grupa 1 – model domyślny)

	Estimate Oszacowanie
Agricultural output (Q14) Produkcja rolnicza (Q14)	0.087

Table 7 shows that approximately 8.7% of agricultural output is attributable to capital structure and land size.

Results of the chi-square test show no model fit, with $p < 0.05$. As the chi-square test is often criticised for weaknesses of sample error or bias, this result was not considered conclusive and further analysis was conducted using fit indices. After excluding the variables labour and rainfall (which were found to be insignificant) from the hypothesised structural equation, agricultural output was observed to be influenced by capital structure and land size. In other words, the mix of debt and equity significantly determines the level of smallholder farm performance, holding other factors constant. Therefore, the hypothesis that capital structure does not influence smallholder farm output could not be supported. The reported model fit indexes confirm these results, as they satisfy the goodness-of-fit criteria for the estimated model (CMIN = 0.000, GFI = 1.000, TLI = 0.000, CFI = 1.000, PCFI = 0.000 and NFI = 1.000). Only RMSEA shows a poor model fit (RMSEA = 0.206).

Discussion of results

The aim of this paper was to examine the extent to which capital structure influences performance in farming businesses proxied by seasonal output. From the review of related literature, capital structure has been observed to influence the performance and hence the value of the firm (Ebrati et al., 2013). Since Modigliani and Miller (1958, 1963)'s seminal work, later referred to as the irrelevancy theory, several empirical studies have observed capital structure to positively and significantly influence firm performance depending on whether a firm has high or low financial leverage. However, Soumadi and Hayajneh (2012) demonstrated for firms in Jordan that capital structure is negatively associated with firm performance. Furthermore, they found no significant difference on the impact of capital structure on firm performance between firms with low leverage and those with high leverage. Similar results were reported by Salim and Yadav (2012) for Malaysian listed companies. More precisely, the authors observed a negative relationship to subsist between firm performance, measured by return on equity (ROE) and short-term debt, long-term debt and total debt.

While much work has been done to explain the relationship between capital structure and firm performance, studies that focus on the impact of capital structure on farm performance are scant. In this study, we argue that the performance of agricultural farms is a function of land size and capital structure and the relationship is significant. It is argued further that farmers need large pieces of land to cultivate on in order to increase their output. This finding is in line with that of Schneider and Gugerty (2011) who argue that initial asset endowments, and land assets in particular, are significant determinants of households' ability to access and effectively use productivity enhancing knowledge and technologies. The availability of long-term debt enables farmers to purchase land and capital equipment required for farming operations. Furthermore, access to short-term debt enhances access to farming inputs and other working capital requirements. The total debt available to farmers provides tax shield opportunities thereby reducing the overall cost of funds taking into account the high agency costs of equity emphasised by Jensen and Meckling (1976) when compared to debt. Our results contradict those of Salim and Yadav (2012) who posit that for the plantation sector, short-term debt and long-term-debt have a negative and significant influence on the performance of the farm. However, this study concurs with Patrick and Eisgruber (n.d.) who observe a positive and significant relationship between capital structure and farm performance. Precisely, the authors argue that the long-term loans determined the timing of acquisition of land. They observed that the sooner the farmer was able to buy land, the greater was his net-worth accumulation. These arguments are in line with the findings of O'Toole ert al. (2014) who investigated the effects of financing constraints on Irish agricultural performance post the 2007–2009 financial crisis.

O'Toole et al. (2014) observed that after the financial crisis, credit constraints increased significantly. Farmers are now more dependent on internal funds to drive investment expenditures. Furthermore, farmers are finding it more difficult to access credit from financial

markets to finance capital expenditures. Thus the increase in credit constraints in Ireland may present significant challenges for the agricultural sector in driving investment and expansion plans.

CONCLUSIONS

There is an abundance of empirical literature on the role of capital structure on firm performance. Since Modigliani and Miller's (1958) seminal paper, subsequent studies have confirmed that both equity and debt are important for firm productivity. However, similar studies for agricultural firms are scant. The performance of smallholder farmers in South Africa has received much attention from researchers and policy makers in the recent past in an attempt to identify factors that can improve productivity and employment opportunities. The purpose of previous studies has been to find solutions to the poor performance characterising this sector while unleashing its productive potential.

This paper investigates the role of capital structure in the performance of agricultural firms by modeling agricultural performance using survey data collected from Mpumalanga and North West provinces of South Africa. Using structural equation modeling, capital structure is observed to have a positive and significant influence on the performance of agricultural firms. Both short-term and long-term debt is found to be necessary in financing working capital and capital expenditure respectively. Furthermore, the size of the farm (land size) is found to have a positive contribution to agricultural output. Thus the paper concludes that both debt and equity are necessary elements in the capital structure of agricultural firms and that the relationship between capital structure and agricultural productivity is positive and significant. The results of this study have policy implications on the supply of debt to agricultural firms, suggesting that more credit should be extended to the agricultural sector in South Africa if food security and employment creation are to be sustained.

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ŹRÓDŁA WZROSTU W ROLNICTWIE AFRYKI POŁUDNIOWEJ Z PERSPEKTYWY FINANSOWEJ PRZEDSIĘBIORSTW

Streszczenie. Teoria struktury kapitału jest powszechnie, choć z różnymi efektami stosowana przez korporacje. W niniejszym artykule omówiono wpływ struktury kapitału na działalność przedsiębiorstw rynku rolnego Afryki Południowej z zastosowaniem teorii hierarchii ważności. Dane pozyskano od rolników prowadzących niewielkie gospodarstwa, podczas badań terenowych przeprowadzonych w 2013 roku w obrębie Mpumalanga i na terenach północno-zachodnich prowincji kraju. Łącznie zbadano 500 respondentów, stosując wielostopniową technikę losową, i otrzymano 362 odpowiedzi. Podczas badania zastosowano metodę SEM (Structural Equation Modelling) i zaobserwowano istotny pozytywny związek między strukturą kapitału a efektami działalności rolników. Zarówno krótko-, jak i długoterminowe pożyczki przyczyniły się do poprawy produktywności dzięki spełnieniu potrzeb dotyczących kapitału obrotowego, jak i nabycia potrzebnego sprzętu. Wykazano również, że wielkość gospodarstwa ma pozytywny wpływ na wyniki działalności rolniczej. Te empiryczne dane sugerują, że ukierunkowanie kapitału pożyczkowego w stronę rolników poprawi ich produktywność. Wszystkie zastosowane modele i obliczone wskaźniki potwierdzają właściwe dopasowanie modelu do zebranych danych.

Słowa kluczowe: rolnictwo, struktura kapitału, Afryka Południowa

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