



## The Lerner Index and Firm Profitability: Empirical Evidence from the Sweet Potato Industry in Kenya

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**Abstract:** This study examines how the market power of sweet potato wholesalers in Kenya influences their profitability, using the Lerner Index as the main measure. Drawing on cross-sectional data from 50 wholesalers in Homa Bay County, the research applies both linear and nonlinear regression models to assess how pricing freedom, cost efficiency, firm size, product differentiation, and overall market structure shape gross profit margins. The linear results suggest that wholesalers who can exercise more control over their prices generally earn higher profits. However, the nonlinear model provides a more nuanced insight: profitability rises with market power only up to a certain point, after which it begins to fall. This inverted U-shaped pattern indicates that while moderate market power is beneficial, too much dominance may create inefficiencies that ultimately reduce returns. The study also finds that cost efficiency and larger firm size meaningfully enhance profitability, whereas market concentration and product differentiation do not show direct independent effects. With strong  $R^2$  values of 0.77 and 0.80 and no signs of autocorrelation, both models are statistically reliable. The study recommends fostering a competitive environment that still allows reasonable pricing flexibility, while emphasizing improvements in cost management, logistics, storage, and transport to boost wholesalers' financial performance.

**Keywords:** Lerner Index; Firm; Profitability; Sweet Potato; Industry

**JEL Classification:** according to The Journal of Economic Literature

### 1. Introduction

Understanding how market power influences firm profitability remains a central concern in industrial organization, competition economics, and value-chain studies. One of the most widely used indicators of market power is the Lerner Index, first proposed by Lerner in 1934. The index shows the degree to which a firm can set prices above marginal cost, directly reflecting the logic behind monopoly pricing. When the index is close to zero, the market is highly competitive and firms have little room to raise prices. Higher values, on the other hand, signal substantial pricing power and weaker competitive

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pressure. As highlighted by Elzinga and Mills (2011), the Lerner Index endures because it provides a clear and intuitive measure that bridges economic theory and empirical analysis.

Recent scholarship has expanded the use of the Lerner Index far beyond its original applications in industrial organization. It is now employed in studies examining how market power shapes the effectiveness of industrial policies (Aghion et al., 2015), influences optimal tax design under imperfect competition (Kaplow, 2021), and affects the outcomes of corrective taxes, including sin taxes (O’Connell et al., 2024). These diverse applications underscore the index’s adaptability and its importance in understanding how pricing power affects performance in different sectors.

Empirical evidence especially from the banking sector—consistently shows a positive association between the Lerner Index and profitability. Research by Shair et al. (2019) and Yuanita (2019) indicates that banks with greater market power tend to report higher returns on assets and wider interest margins, even after accounting for structural characteristics and risk profiles. Cross-country analyses by Maudos and Fernández de Guevara (2004) and IMF assessments (2019) report similar results, noting that higher Lerner values often coincide with stronger bank performance. However, this relationship is not always linear. Measures such as the Boone indicator and the Panzar–Rosse H-statistic sometimes reveal efficiency improvements under competitive pressure, which can offset the profitability advantages of market power (Carbó-Valverde et al., 2009). Other studies also warn that excessive pricing power may encourage complacency often described as “quiet-life”, behavior which can reduce efficiency and undermine long-term performance (Beck et al., 2011).

Studies from African markets echo this general pattern, though the strength of the relationship varies depending on regulation and market openness (Akande, 2017). Evidence from Kenya largely aligns with global findings. Muriithi (2021) shows that market power significantly raises net interest margins, while Kariuki (2024) observes an inverted U-shaped relationship, with very high levels of market power ultimately harming performance due to inefficiencies. Yet, while Kenya’s banking sector has received extensive attention, agricultural value chains where market imperfections are often more pronounced have been studied far less.

Kenya’s agricultural markets display structural characteristics that make the Lerner Index particularly useful. Smallholder farmers frequently transact with large, well-coordinated intermediaries and processors that possess the ability to influence prices. Although applications of the Lerner Index in agriculture remain limited, the evidence that does exist is revealing. Nzuma (2006), studying the seed maize market, reports a Lerner Index of roughly 0.45, suggesting significant oligopoly power. Bergquist and Dinerstein (2020) report related findings in maize trading, where traders secure mark-ups approaching 40 percent. These patterns indicate that intermediaries in agricultural markets often enjoy considerable pricing discretion, which has important implications for how value and profits are distributed along the chain.

The sweet potato value chain in Kenya illustrates this dynamic clearly. Odondo (2014) reports that wholesalers operate with exceptionally high market power, with Lerner Index values near 0.80, while farmers and retailers face more competitive conditions. Follow-up studies (Odondo et al., 2014; Odondo, Mukras & Momanyi, 2013; Odondo, 2025) point to high concentration, strong entry barriers, and persistent excess margins among intermediaries. Similar findings from Sierra Leone, Ghana and Bangladesh (e.g., Nabay et al., 2020) show that high pricing power among root-and-tuber traders is not

unique to Kenya. Despite this, little work has been done to link market power directly to profitability outcomes within these value chains.

Existing research typically documents mark-ups or computes Lerner-type measures but stops short of estimating models that connect market power to profitability using trader- or firm-level data. Although wholesalers appear to hold substantial pricing power, no study has yet examined how variations in this power influence profitability after accounting for differences in cost structures, scale, product differentiation, and risk.

## **2. Literature Review**

The Lerner Index, first introduced by Lerner (1934), remains one of the most commonly used empirical indicators of market power in industrial organization and applied microeconomics. It measures how far a firm can push its prices above marginal cost: values near zero imply strong competitive pressure and little room for price mark-ups, while higher values indicate greater pricing power and weaker competition. Elzinga and Mills (2011), in their well-cited review, emphasize both the conceptual appeal of the Lerner Index especially its direct grounding in mark-up pricing and its practical limitations, while reaffirming its lasting importance in assessing monopoly behaviour and competitive conditions.

Over time, scholars have extended the use of the Lerner Index far beyond its original industrial organization roots. Aghion et al. (2015), for example, rely on Lerner-based price–cost margins to analyse how the effectiveness of industrial policy depends on the intensity of competition. Kaplow (2021) incorporates a Lerner-style mark-up into an optimal taxation model to show how deviations of price from marginal cost shape welfare and the design of corrective taxes in imperfectly competitive markets. In public finance, O’Connell et al. (2024) use Lerner-type mark-ups to explore how market power affects the performance of sin taxes and other policies designed to address externalities. Together, this body of work demonstrates the versatility of the Lerner Index as both an analytical device and an empirical tool.

The global evidence linking the Lerner Index to profitability is particularly extensive in the banking sector. Many studies support the Structure–Conduct–Performance (SCP) view that greater market power leads to higher profits. Using multi-country bank panels, Shair et al. (2019) find that banks with higher Lerner values tend to achieve stronger returns on assets and wider net interest margins, even after controlling for risk and other bank-specific characteristics. Yuanita (2019) also shows that non-structural measures of competition such as the Lerner Index consistently reveal a positive link between market power and profitability, whereas structural concentration measures like the HHI often yield mixed results. Cross-country studies such as Maudos and Fernández de Guevara (2004) similarly demonstrate that higher Lerner indices are associated with wider interest margins once cost and risk factors are accounted for. The IMF (2019) also reports a post-crisis rise in Lerner values in advanced economies, accompanied by persistently high profitability suggesting that bank-level pricing power, rather than market concentration alone, increasingly drives margins.

Yet, the relationship between the Lerner Index and profitability is not always linear. Some studies find that the direction and magnitude of the relationship depend on how competition is measured. When competition is captured using the Lerner Index, greater market power generally boosts profitability. However, when alternative measures such as the Boone indicator or Panzar–Rosse H-statistic are used, stronger competition is sometimes associated with greater efficiency and improved risk-adjusted

performance (Carbó-Valverde et al., 2009). Research on multi-product banks also raises concerns about aggregation: Koetter et al. (2012) show that differences in how bank-level Lerner indices are combined can influence their correlation with profitability and risk. Studies touching on financial stability further complicate the picture. Beck et al. (2011), for instance, report that higher Lerner values tend to improve bank soundness but also increase profit volatility, highlighting a trade-off among competition, profitability, and stability.

In Africa, studies on the Lerner Index have predominantly examined the banking sector. Akande (2017), using data from 440 commercial banks across Sub-Saharan Africa, concludes that banks operate under monopolistic competition firms hold some pricing power but entry is not completely blocked. Although the focus is primarily on competition, the findings suggest that banks with stronger capital positions and particular balance-sheet characteristics are able to sustain higher mark-ups, resulting in higher interest margins and increased profitability. Other regional studies similarly find a positive link between Lerner-based market power and profitability, though the strength of the relationship varies with regulatory conditions and levels of financial liberalization. Additional African research highlights broader implications, noting that while market power may enhance profits and stability, it can also restrict credit access and slow real-sector growth.

Kenyan evidence largely mirrors these regional and global patterns while adding important nuances. Studies typically use the Lerner Index as a non-structural competition indicator, complementing it with traditional structural measures such as CR5 and HHI. Using a panel VAR model, Muriithi (2021) finds that market power, as measured by the Lerner Index, significantly increases net interest margins, whereas structural concentration measures have weaker explanatory value. The estimated average Lerner value approximately 0.98 points to strong oligopolistic behaviour and substantial pricing discretion. Kariuki (2024) extends this line of inquiry by documenting an inverted U-shaped relationship between market power and bank performance. Moderate levels of market power increase profitability and stability, but beyond a certain threshold, additional market power begins to erode performance due to inefficiencies and regulatory pressures. Other Kenyan studies (Kiemo, 2020; Mugo & Kiemo, 2021; Wahinya, 2023; Ndwiga, 2020) show that market power interacts with consolidation, technological change, and risk-taking in complex ways, but these analyses focus almost exclusively on banking and do not extend to agriculture.

In contrast to banking, applications of the Lerner Index in agriculture both in Kenya and internationally remain relatively limited but offer valuable insights. Agricultural markets often involve smallholder farmers transacting with concentrated groups of intermediaries and processors, making the Lerner Index a useful tool for examining how market structure translates into pricing power and value capture. In Kenya, Nzuma (2006) uses a New Empirical Industrial Organization approach to examine the seed maize industry, estimating a Lerner Index of around 0.45, which indicates significant oligopoly power and high mark-ups. Bergquist and Dinerstein (2020), studying maize grain markets, combine field experiments with structural modelling and estimate average trader mark-ups of roughly 39 percent essentially a Lerner value of 0.39 suggesting that traders capture a substantial share of market surplus. Broader analyses of Kenyan agricultural input and output markets also reveal high price–cost margins, consistent with Lerner-type predictions of strong intermediary power.

Within this wider agricultural landscape, the sweet potato value chain in Kenya presents a particularly relevant and understudied case. Using the Structure–Conduct–Performance framework, Odondo (2014)

estimates Lerner indices for different market participants and shows that while farmers and retailers face competitive conditions, wholesalers hold substantial pricing power, with a Lerner value of approximately 0.80. This implies that over 80 percent of the wholesale price reflects mark-up above marginal cost. The study also shows that barriers to entry reinforce this market power and are positively associated with wholesale profitability aligning with SCP predictions. Follow-up work (Odondo et al., 2014; Odondo, Mukras & Momanyi, 2013) documents high concentration ratios and persistent excess margins among intermediaries. More recent evidence from Odondo (2025) demonstrates that market concentration, market share, entry barriers, and product differentiation all increase gross profit margins, further illustrating the role of market structure in shaping performance. International studies of sweet potato marketing, including those from Sierra Leone, Ghana, and Bangladesh (e.g., Nabay et al., 2020), report similar patterns: intermediaries with more control over marketing channels tend to earn higher margins and profits. Although many of these studies do not explicitly calculate Lerner indices, their focus on price–cost margins aligns conceptually with Lerner’s framework.

Despite this substantial body of work, notable research gaps remain, particularly in relation to the Kenyan sweet potato sector. First, most empirical analyses that formally link the Lerner Index to profitability are concentrated in the banking literature; applications in agricultural value chains are sparse, and only a handful of Kenyan sweet potato studies report Lerner-type measures. Even where Lerner indices are estimated (e.g., Odondo, 2014), profitability is not modelled explicitly as a function of market power; instead, the relationship is inferred indirectly. Second, although wholesalers exhibit high Lerner values, existing studies provide little evidence on how variation in market power across traders translates into differences in profitability once cost structures, scale, product differentiation, and risk are controlled for. Put differently, the marginal impact of an increase in the Lerner Index on profitability has not been empirically quantified. Third, virtually no research incorporates the sweet potato value chain into the broader debate on competition, stability, and welfare that has emerged in the banking sector. It remains unclear whether the very high levels of market power observed among sweet potato wholesalers lead to “quiet-life” inefficiencies, increase vulnerability to shocks, or impose distributional costs on farmers and consumers.

Together, these gaps justify a focused empirical investigation into how the Lerner Index influences profitability in Kenya’s sweet potato industry. A study that explicitly models profitability as a function of Lerner-based market power, while incorporating appropriate controls and recent sector-specific data, would fill a clear void in the literature. It would extend Lerner profitability research beyond the banking sector, deepen understanding of market power dynamics in agricultural value chains, and generate evidence with direct relevance for competition policy, value-chain upgrading, and inclusive agricultural development.

### **3. Methodology**

#### **3.1. Research Design**

This study employed a cross-sectional analytical design to assess the relationship between market power measured using the Lerner Index and firm profitability in Kenya’s sweet potato industry. A cross-sectional approach was appropriate given the seasonal fluctuations in agricultural markets and the need to capture comparable firm-level price and cost data at a single point in time (Odondo, 2014; Nabay et

al., 2020). The design is grounded in the Structure–Conduct–Performance (SCP) paradigm (Mason, 1939; Bain, 1951) and complemented by the New Empirical Industrial Organization (NEIO) framework, which emphasizes behavioural indicators of market power such as the Lerner Index (Tirole, 1988; Elzinga & Mills, 2011).

### **3.2. Study Area**

Fieldwork was conducted in the Rachuonyo region of Homa Bay County, a major sweet potato-producing zone supplying over 60% of Kenya’s output (CIP, 2015). The area hosts active wholesale and retail markets and displays substantial variation in market conditions and concentration levels (Odondo, 2014; Odondo, Mukras & Momanyi, 2013; Odondo et al., 2014).

### **3.3. Sampling**

The study targeted sweet potato wholesalers, who literature identifies as key market actors with significant pricing discretion (Odondo, 2014; Nzuma, 2006). A multi-stage sampling strategy was applied: major markets were purposively selected (Odondo, 2014; Bergquist & Dinerstein, 2020), after which a census of 50 of the 55 registered wholesalers (ROSPOGO, 2012) was undertaken, following a pre-test involving five wholesalers.

### **3.4. Data Sources**

Primary data were collected through structured, face-to-face questionnaires, suitable for informal markets where formal records are uncommon (Nzuma, 2006; Odondo et al., 2014). Information gathered included prices, quantities, variable and fixed costs, marketing expenses, differentiation practices, market share, and entry barriers variables required for computing the Lerner Index (Lerner, 1934). Secondary data were obtained from county reports and relevant literature (Nabay et al., 2020; Odondo, 2025).

### **3.5. Data Analysis**

Profitability was measured using gross profit margin, consistent with SCP and market power studies (Maudos & Fernández de Guevara, 2004; Shair et al., 2019; Yuanita, 2019). Market power was operationalized through the Lerner Index, with marginal cost approximated by unit variable cost (Bergquist & Dinerstein, 2020; Nzuma, 2006). Control variables: firm size, market share, differentiation, entry barriers, experience, and market concentration were included based on prior evidence (Odondo, 2025; Akande, 2017; Kariuki, 2024).

Ordinary Least Squares (OLS) served as the baseline estimation method (Maudos & Fernández de Guevara, 2004; Shair et al., 2019). A quadratic specification incorporating the squared Lerner Index tested for a potential inverted U-shaped relationship between market power and profitability (Hicks, 1935; Beck et al., 2011). Diagnostic tests for multicollinearity (VIF) and residual autocorrelation

(Durbin Watson) were conducted following established empirical industrial organization guidelines (Koetter et al., 2012; Carbó-Valverde et al., 2009).

### 3.6. Model Specification

The analysis began with a simple linear model, consistent with the conventional approach in studies linking the Lerner Index to firm profitability. In this framework, profitability is expressed as a linear function of market power alongside relevant control variables, following earlier applications in the literature (Maudos & Fernández de Guevara, 2004; Shair et al., 2019; Yuanita, 2019). The baseline specification is given as:

$$\pi_i = \beta_0 + \beta_1 LI_i + \beta_2 Size_i + \beta_3 Cost\ Eff_i + \beta_4 Share_i + \beta_5 Diff_i + \beta_6 HHI_i + \varepsilon_i \dots Eq\ 1$$

Where:

$\pi_i$  = profitability of trader i, measured by gross profit margin

$LI_i$  = Lerner index for trader i, capturing firm level market power

$Size_i$  = Total sales

$Cost\ Eff_i$  = Cost per unit of output

$Share_i$  = Trader's market share within the relevant market

$Diff_i$  = Product differentiation strategies proxied by dummy

$HHI_i$  = Herfindal – Hirshman index of market concentration in a given market

$\varepsilon_i$  = stochastic term

The key parameter of interest in this model is  $\beta_1$ . According to the SCP framework, firms with greater market power are expected to earn higher profits, holding other factors constant (Bain, 1951; Mason, 1939). This leads to the a priori expectation that  $\beta_1$  should be positive. In this baseline specification, the model therefore examines whether traders who exercise stronger pricing power as reflected by higher Lerner Index values achieve higher profit margins after accounting for differences in costs, scale of operation, market share, product differentiation, and overall market structure.

#### Non-Linear Model

Recent studies in the banking sector indicate that the link between market power and firm performance may not always be linear. Moderate market power can enhance profitability, but excessively high market power may eventually lower it when firms become less efficient due to reduced competitive pressure or face regulatory and reputational constraints (Hicks, 1935; Beck et al., 2011; Kariuki, 2024). To account for this potential pattern in the sweet potato market, the analysis extends the baseline model by adding a squared term of the Lerner Index, allowing for an inverted U-shaped relationship. The resulting non-linear specification is expressed as:

$$\pi_i = \beta_0 + \beta_1 LI_i + \beta_2 LI_i^2 + \beta_3 Size_i + \beta_4 Cost\ Eff_i + \beta_5 Share_i + \beta_6 Diff_i + \beta_7 HHI_i + \varepsilon_i \dots Eq2$$

Where:

$\beta_1$  captures the initial (marginal) impact of market power on profitability

$\beta_2$  captures the curvature (non – linear) effect of market power

The following signs are expected:  $\beta_1 > 0$  and  $\beta_2 < 0$

A positive  $\beta_1$  paired with a negative  $\beta_2$  would indicate the presence of an inverted U-shaped relationship between profitability and the Lerner Index. In such a case, profitability rises as market power increases, but only up to a certain point. Beyond that threshold, the negative effects of excessive dominance such as x-inefficiency and reduced managerial effort begin to outweigh the gains from market power, leading to declining profitability (Hicks, 1935; Beck et al., 2011). The turning point, representing the Lerner Index value at which profitability reaches its maximum, is calculated as:

$$LI^* = -\frac{\beta_1}{2\beta_2} \dots \dots \dots \text{Eq 3}$$

This threshold is particularly important from a policy perspective, as it helps determine whether the level of market power held by sweet potato traders especially wholesalers falls within the beneficial range of the curve or has surpassed the point where further increases in market power start to erode profitability and potentially undermine broader market welfare.

## 4. Results and Discussions

### 4.1. Results

The correlation matrix in Table 1 summarizes the strength and direction of the relationships among the study variables. Profitability shows a strong, positive, and statistically significant association with cost efficiency ( $r = .784, p < .01$ ), indicating that wholesalers who control their operating costs more effectively tend to realize higher gross profit margins. Profitability is also strongly associated with firm size ( $r = .692, p < .01$ ), suggesting that larger firms benefit from economies of scale, stronger bargaining positions, or better access to wider markets.

A similarly strong and significant correlation is observed between profitability and the Lerner Index ( $r = .685, p < .01$ ), which aligns with the Structure–Conduct–Performance (SCP) hypothesis that firms with greater pricing power earn higher profits. By contrast, the correlations between profitability and market share ( $r = .223$ ) as well as market concentration ( $r = .135$ ) are weak and statistically insignificant. This pattern implies that firm performance in this value chain is shaped more by internal efficiency and pricing power than by the overall structure of the market.

Other relationships in the matrix also stand out. Cost efficiency is positively and significantly related to firm size ( $r = .553, p < .01$ ) and to the Lerner Index ( $r = .572, p < .01$ ), suggesting that larger and more cost-efficient firms are better positioned to exercise market power. Product differentiation shows a positive correlation with both profitability ( $r = .530, p < .01$ ) and market power ( $r = .500, p < .01$ ), implying that traders who distinguish their products through quality, presentation, or customer service—may command better prices or attract broader demand. Meanwhile, the Herfindal–Hirschman Index does not show significant associations with any of the firm-level variables, reinforcing the view that market structure alone does not drive profitability in this chain.

Taken together, the results in Table 1 suggest that firm-level capabilities and pricing behaviour play a more central role in determining profitability than aggregate concentration measures, a pattern consistent with insights from the New Empirical Industrial Organization (NEIO) literature.

**Table 1. Correlation between Profitability, learner index and other market characteristics for sweet potato Wholesalers**

Correlations		profitability	cost efficiency	Firm size	Learner index	Product differentiation	Market share	HHI
profitability	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	47						
cost efficiency	Pearson Correlation	.784**	1					
	Sig. (2-tailed)	.000						
	N	47	47					
Firm size	Pearson Correlation	.692**	.553**	1				
	Sig. (2-tailed)	.000	.000					
	N	47	47	47				
Learner index	Pearson Correlation	.685**	.572**	.492**	1			
	Sig. (2-tailed)	.000	.000	.000				
	N	47	47	47	47			
Product differentiation	Pearson Correlation	.530**	.376**	.449**	.500**	1		
	Sig. (2-tailed)	.000	.009	.002	.000			
	N	47	47	47	47	47		
Market share	Pearson Correlation	.223	.132	.010	.267	.353*	1	
	Sig. (2-tailed)	.133	.377	.949	.070	.015		
	N	47	47	47	47	47	47	
HHI	Pearson Correlation	.135	.077	.043	.052	.130	-.009	1
	Sig. (2-tailed)	.367	.606	.774	.731	.386	.952	
	N	47	47	47	47	47	47	47

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

The linear regression model summarized in Table 2 evaluates how firm size, cost efficiency, market power, market concentration, and product differentiation jointly influence wholesalers' profitability. The results show a strong model fit, with an R-value of 0.878 and an R Square of 0.771, indicating that about 77.1 percent of the variation in profitability is accounted for by the five predictors. The Adjusted R Square of 0.743 confirms that the model remains reliable after controlling for the number of explanatory variables. The F-statistic of 27.628 ( $p < .001$ ) demonstrates that the overall model is statistically significant. In addition, the Durbin–Watson statistic of 1.533 suggests that autocorrelation is not a concern in the residuals.

The ANOVA results in Table 3 support these findings. The regression sum of squares (27.597) is considerably larger than the residual sum of squares (8.191), indicating that the predictors collectively explain a substantial proportion of variation in profitability. The significance level ( $p < .001$ ) confirms that the model provides a significantly better fit than a model with no predictors.

**Table 2. Model Summary on the relationship between Lerner index and other Wholesalers' profitability determinants**

Model Summary											
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics						
					R Square Change	F Change	df1	df2	Sig. Change	F	Durbin-Watson
1	.878	.771	.743	.446958915	.771	27.628	5	41	.000		1.533

a. Predictors: (Constant), Product differentiation, Herfindal\_Hirschman index , cost efficiency, Firm size, Learner index

b. Dependent Variable: profitability

**Table 3. ANOVA Results**

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.597	5	5.519	27.628	.000
	Residual	8.191	41	.200		
	Total	35.787	46			

a. Dependent Variable: profitability

b. Predictors: (Constant), Product differentiation, Herfindal\_Hirschman index, cost efficiency, Firm size, Learner index

The coefficient estimates in Table 4 shed light on the individual contribution of each predictor to wholesalers' profitability. The constant term is positive and highly significant ( $\beta = 3.672, p < .001$ ), indicating a strong baseline profitability level when all predictors are held constant. Firm size shows a positive and statistically significant effect ( $\beta = 0.547, p = .006$ ), supporting the view that larger wholesalers benefit from economies of scale, lower per-unit costs, and stronger bargaining power.

Cost efficiency also has a sizable and highly significant effect on profitability ( $\beta = 0.211, p < .001$ ), and it carries the largest standardized coefficient in the model ( $\beta = .452$ ). This underscores cost management as the single most influential driver of profitability among wholesalers: those who minimize wastage, transport expenses, and handling costs tend to secure higher margins.

Market power, measured by the Lerner Index, is likewise a significant predictor ( $\beta = 2.358, p = .025$ ). This finding indicates that wholesalers who can price above marginal cost earn substantially higher profits, consistent with evidence from other industries linking market power to financial performance. In contrast, both the Herfindal-Hirschman Index ( $p = .420$ ) and product differentiation ( $p = .220$ ) are not statistically significant. Once firm size, efficiency, and pricing behaviour are accounted for, neither market structure nor differentiation appears to exert an independent effect on profitability.

Collinearity diagnostics in Table 4 further confirm that multicollinearity is not a concern, as all Variance Inflation Factors (VIFs) fall below 2. Overall, the linear regression findings point to firm size, cost efficiency, and market power as the primary determinants of wholesalers' profitability, while market concentration and product differentiation show limited direct influence in this context.

**Table 4. Estimated profitability with determinants such as Lerner index and other firm specific characteristics**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.672	.747		4.918	.000		
	Firm size	.547	.190	.276	2.886	.006	.610	1.639
	cost efficiency	.211	.046	.452	4.580	.000	.573	1.744
	HHI	10.778	13.224	.062	.815	.420	.980	1.020
	Lerner index	2.358	1.016	.231	2.320	.025	.563	1.775
	Product differentiation	.118	.094	.112	1.245	.220	.685	1.459

a. Dependent Variable: Wholesalers profitability

### Nonlinear Regression Results

To examine whether the link between market power and profitability follows a nonlinear pattern, a quadratic model was estimated by adding the squared Lerner Index to the specification. The model summary in Table 5 indicates a stronger fit than the linear version, with an R-value of 0.897 and an R Square of 0.804. This implies that approximately 80.4 percent of the variation in profitability is accounted for by the six predictors in the extended model. The Adjusted R Square of 0.775, together with the F-statistic of 27.407 ( $p < .001$ ) reported in Table 6, confirms that the model is statistically significant and that incorporating the squared term meaningfully improves its explanatory power.

**Table 5. Model Summary for testing complacency in the wholesale market**

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. Change	
1	.897	.804	.775	.418387767	.804	27.407	6	40	.000	1.640

a. Predictors: (Constant), Squared LI, Herfindal\_Hirschman index, Wholesaler Firm size, Product differentiation, cost efficiency, Lerner index

b. Dependent Variable: profitability

**Table 6. ANOVA Results**

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.785	6	4.798	27.407	.000 <sup>b</sup>
	Residual	7.002	40	.175		
	Total	35.787	46			

a. Dependent Variable: Wholesalers profitability

b. Predictors: (Constant), Squared LI, Herfindal\_Hirschman index, Firm size, Product differentiation, cost efficiency, Lerner index

The coefficient estimates in Table 7 reveal a clear pattern: the Lerner Index has a positive and statistically significant effect on profitability ( $\beta = 29.914$ ,  $p = .007$ ), while its squared term carries a negative and significant coefficient ( $\beta = -16.350$ ,  $p = .013$ ). Taken together, these signs confirm an

inverted U-shaped relationship between market power and profitability. In practical terms, profitability rises as market power increases, but only up to a certain level. Beyond that threshold, further gains in market power reduce profitability, likely reflecting complacency, diminished managerial effort, or inefficiencies that tend to emerge when firms hold excessive market dominance. Based on the estimated coefficients, the turning point representing the level of the Lerner Index at which profitability reaches its maximum can be computed as:

$$LI^* = -\frac{\beta_{LI}}{2\beta_{LI^2}} = -\frac{29.914}{2(-16.350)} \approx 0.915$$

This result suggests that wholesalers attain peak profitability at a Lerner Index value of roughly 0.915. Considering that earlier studies such as Odondo (2014) document Lerner Index values for wholesalers reaching up to 0.80 or higher, it is likely that some of the traders in the sample operate close to, or even exceed, this profitability threshold. Those operating beyond it may experience declining returns to market power, consistent with Hicks’ (1935) “quiet-life” hypothesis, which proposes that firms with excessive market power may become complacent and less efficient.

In the nonlinear model, firm size and cost efficiency remain significant predictors, reinforcing their importance in shaping profitability. Meanwhile, market concentration and product differentiation continue to show no significant effects, mirroring the results from the linear specification. Although the VIF values for the Lerner Index and its squared term are high, this is expected due to the inherent correlation between a variable and its polynomial transformation. This does not weaken the evidence of a nonlinear relationship; it simply means that LI and LI<sup>2</sup> should be interpreted together rather than in isolation.

**Table 7. Estimated nonlinear wholesale profitability model**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-7.241	4.246		-1.705	.096		
	Firm size	.511	.178	.257	2.866	.007	.606	1.649
	cost efficiency	.178	.045	.382	3.967	.000	.528	1.892
	HHI	9.774	12.385	.056	.789	.435	.979	1.021
	Lerner index	29.914	10.617	2.930	2.818	.007	.005	221.108
	Product differentiation	.106	.089	.101	1.194	.240	.683	1.463
	Squared LI	-16.350	6.274	-2.651	-2.606	.013	.005	211.579

a. Dependent Variable: profitability

#### 4.2. Discussions

The findings of this study are broadly consistent with both international and regional research on market power and firm profitability, while also contributing new insights to the literature.

First, the positive association between the Lerner Index and profitability observed in the correlation results and the linear model mirrors the conclusions of Shair et al. (2019), Maudos and Fernández de Guevara (2004), and Yuanita (2019), who report similar relationships in banking markets. These

scholars contend that firms with stronger pricing power are better able to extract higher margins, a pattern also documented in agricultural markets by Nzuma (2006) and Bergquist and Dinerstein (2020). The results reported in Tables 1, 2, and 4 therefore reinforce the view that behavioural market power is a key determinant of profitability among sweet potato wholesalers.

Second, the inverted U-shaped relationship found in Table 7 differentiates this study from much of the earlier agricultural literature, which often assumes a simple, monotonic link between pricing power and profits. Instead, the current findings parallel the nonlinear patterns described by Kariuki (2024) in the Kenyan banking industry, demonstrating that profitability may actually fall beyond a certain level of market power. This suggests that agricultural intermediaries, much like financial institutions, may become less efficient or less motivated when competitive pressure weakens excessively, consistent with the “quiet-life” hypothesis.

Third, the strong and significant roles of cost efficiency and firm size reported in Tables 4 and 7 align with evidence from both agricultural and financial studies. Research by Odondo et al. (2013), Nabay et al. (2020), and Koetter et al. (2012) highlights the importance of operational efficiency and scale in shaping firm performance. The present study confirms that competitive advantage in the sweet potato value chain is heavily influenced by internal capabilities rather than external structural conditions.

Finally, the lack of significance of the Herfindal Hirschman Index in both the linear and nonlinear models contrasts with traditional SCP expectations (Bain, 1951), but aligns with contemporary NEIO perspectives. Recent studies including Yuanita (2019) and IMF (2019) argue that structural concentration measures often provide limited insight into actual market power unless firm-level behaviour is incorporated. The results here support that view, showing that concentration ratios alone do not reliably predict profitability.

## **5. Conclusion and Recommendations**

### **5.1. Conclusion**

Across all modelling approaches, the evidence shows that profitability in the sweet potato wholesale market is shaped primarily by firm-level characteristics market power, cost efficiency, and firm size rather than by industry-level concentration or product differentiation. The identification of an inverted U-shaped relationship between the Lerner Index and profitability adds both theoretical and empirical value by demonstrating that excessive pricing power may ultimately erode profitability. These results underscore the importance of policies that promote operational efficiency and maintain healthy competitive pressure, while still allowing firms to benefit from economies of scale.

### **5.2. Recommendations**

The study therefore recommends that regulatory authorities foster a market environment that supports fair competition while still granting wholesalers reasonable flexibility in pricing. Striking this balance is essential because moderate levels of market power can boost profitability, but excessive dominance tends to reduce efficiency and erode returns. In addition, the findings underscore the importance of enhancing cost efficiency among wholesalers. Interventions such as improving logistics systems,

expanding access to modern storage technologies, providing training in cost management, and ensuring affordable transportation options can substantially strengthen operational efficiency and, in turn, improve profitability.

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