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**Assessing the Impact of National Marketing  
Boards on Consumers and Producers' Welfare**

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## SEPARC

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## **ABSTRACT**

Food production in Swaziland has historically been insufficient, even after the introduction of National Marketing Boards. This is despite their mandate emphasised in the National Development Strategy (NDS) and Agriculture Sector Policy to develop smallholder agriculture through commercialisation, value addition and market access. The low food production coupled with high food prices and dependency on food imports increases the food-insecure population in the country. Hence, the study uses a Partial Equilibrium Model to assess the welfare impact of National Marketing Boards, in particular the National Maize Corporation (NMC) and Swaziland Dairy Board (SDB), on consumers and producers. The results show that over the five-year period, on average, the loss in maize per consumer was E94.22 per year, resulting in an average consumer loss of E116,975,312.30 per year. However, the average producer gains were E35,651,178.21; indicating that highly commercialised maize producers were benefiting from the NMC while consumers were losing through higher maize prices compared to what they would have received in a competitive environment. In the same period, on average, the milk producer gains were E35,545,181.85 while the consumer losses were E243,676,441.51 per year. This implies that commercial farmers are gaining at the expense of consumers. The average individual maize consumer losses amount to E197.90 per year. The study concludes that National Marketing Boards do contribute to low food production, high consumer prices, and economic losses. Therefore, it is recommended that policy makers need to design policies and strategies that comply with the heterogeneous markets in order to benefit consumers and producers.

***Keywords:*** National Marketing Board, Consumer, Producer, Welfare, Partial Equilibrium

## 1. Introduction

Globally, governments are under pressure to come up with sustainable strategies that improve food production and access while taking into consideration consumers and producers' welfare. This has led to the removal of inefficient government systems such as agricultural marketing boards.

However, some developing countries including Swaziland have held on to agricultural marketing boards, which are instruments of self-sufficiency, price-setting and marketing policies. These government policies encourage the provision of market access to farmers, ensure stable commodity prices through price fixing mechanisms, and promote sufficient domestic agricultural production through protecting producer's bargaining power (Jayne and Jones, 1997). In essence, agricultural marketing boards regulate the flow of agricultural commodities from the producer to the final consumer (Charlebois and Tamilia, 2007).

Despite that national marketing boards are an integral part of the agriculture economy, they have many caveats (WFP, 2009); as they fail to meet their intended purposes and cannot keep up with current heterogeneous markets. As a result, marketing boards are constantly considered a waste of government resources (Barret and Mutambatsere, 2008). Lundberg (nd.) posits that "*marketing boards are inefficient, wasteful and fiscally unsustainable, drawing enormous resources that might have been better employed elsewhere*". This is based on the premise that marketing boards impose restrictions with their monopoly powers of setting commodity prices as well as quota restrictions in an attempt to boost prices for producers. Monopolising domestic markets could lead to reduction in marketing efficiency and innovation since there is no competition between traders (Charlebois and Tamilia, 2007). While lack of competition motivates the failure of marketing boards to adjust to the rapidly changing markets (Barret and Mutambatsere, 2008).

As well, price fixing induces losses to producers and discourage production as the boards do not respond immediately to market price changes. In their nature agricultural products have an inelastic demand, which makes agricultural prices highly susceptible to changes when supplies fluctuate (Bank of Nova Scotia, 1977).

Several studies have shown that national marketing boards in Swaziland have failed to achieve the objective of assisting the country in attaining food security (Dlamini, 2016; Mashinini, Obi, & van Schalkwyk, 2007). The SHIES (2010) also clearly states that in 2010 the country was food secure at the national level, while food insecure at the household level in 2010. In fact, there is no document providing evidence for when the country was food secure at household level especially since the inception of national marketing boards. Undoubtedly, this could imply that the local marketing boards have reached an obsolete stage.

Developing countries on the other hand have embarked on restructuring the functions of marketing in order to lessen their influence on markets and food production. For instance, Lesotho's government liberalised the maize market after noting that having the Maize National Marketing Board resulted in considerable losses to consumers, suppressed producer prices, and inhibited development of the agricultural private sector. Similar results are seen in the Swazi maize industry: Mashinini, Obi, & Van Schalkwyk (2006) found that the National Maize Corporation (NMC) is responsible for high consumer prices and benefits only commercial producers. However, the Swazi government has not considered liberalisation of the maize industry. Dlamini and Louw (2016) also confirm that the NMC misallocate resources and is responsible for high consumer prices and imports. The high imports mean that the country is exporting jobs to the country it buys maize from. Therefore, the ultimate question is: could this mean that the other food agricultural marketing boards in Swaziland, especially the Swaziland Dairy Board (SDB), are responsible for the high milk prices and infringing farmers' productivity? This is notwithstanding the Revised Draft National Development Strategy of 2014, stipulating the need to improve the agricultural sector.

Even though literature does state the inefficiencies of the marketing boards, the authors do not quantify most recent welfare effects of the marketing boards on the economy of Swaziland.

Understanding the welfare effects of agricultural marketing boards is desirable in Swaziland for a variety of reasons. First, it is needed as a starting point to discuss the relevancy of marketing boards in Swaziland. Agricultural marketing boards have consistently failed to help farmers get access to markets. This is much against the fact that the government introduced marketing boards so that they can provide reliable marketing services to subsistence farmers and help commercialise their activities. Clearly this fails to support the Agriculture Sector Policy aiming to empower subsistence farmers. Second, understanding the welfare effects of the Boards will help inform policy direction regarding their impact on the vibrancy of the sector. The study determines the producer and consumer welfare (gains or losses) due to the existence of the agricultural marketing boards in Swaziland. It explores the relevance of the NMC and SDB in the country. The aim of the analysis is to contribute towards the development of policies and strategies that will benefit the nation in strengthening the food production system through the empowerment of smallholders and small-scale farmers. Taking a Sustainable Development Goals perspective, the study speaks to SDGs 2, 3, and 8, which respectively focus on ending hunger, maintaining good health and well-being of nations, and providing decent work and economic growth.

## **2. Agricultural Marketing Boards**

Various governments in the region including South Africa, Mozambique, and Lesotho used national marketing boards as part of policy interventions designed to address specific market failures in the supply and demand of

selected agricultural commodities. Lesotho introduced the Maize National Marketing Board with the intention to attain self-sufficiency towards food security (Van Schalkwyk, Van Zyl, Botha & Bayley, 1997). Similar objectives existed in South African Boards, but benefited only white farmers. Ideally, marketing boards promote domestic food production by empowering small-scale producers with marketing services and regulate prices in order to improve food security and alleviate poverty (Dahl, 1972; Murphy, 2012).

As earlier mentioned, marketing boards are subject to a number of government policies such as price setting, marketing, and trade policies, among others. Price setting policies allow the control of commodity prices through the setting of price floors and price ceilings (Jayne *et al.*, 2005). In this context, price floor is a price limit set by a marketing board to protect farmers' income by preventing prices from falling into an economically unacceptable level (Barret and Mutambatsere, 2008). On the other hand, price ceiling is a price limit set by marketing boards to protect consumers. Price ceilings prevent wholesalers and retailers from setting price levels that consumers cannot afford. Hence, price floors and ceilings are necessary to stabilise consumer and producer prices.

Focusing more on the producer side, as per the mandate of marketing boards, price controls are important because they contribute to farmers' income by ensuring that produce per unit earns enough revenue for the farmer (Jayne *et al.*, 2005). They also assist smallholder producers to overcome coordination failures, and mitigate risk (WFP, 2009). However, the down side of the price floors is seen in cases of severe commodity shortages where prices rise significantly, thereby necessitating the boards to use artificial means to adjust (reduce) prices to benefit consumers in terms of affordability. Artificially lowering price transfer gains from producers to consumers and shrinks agricultural development by reducing the adoption of new technologies, and decreasing the use of credit, irrigation, and other necessary inputs that could spur agriculture production (Jayne *et al.*, 2005). This undermines the National Food Security Policy promoting increased food security.

Moreover, marketing boards go beyond the function of price controls. They also provide marketing services for specific commodities within the agriculture sector (Dahl, 1972). Most agricultural marketing boards focus on capacity building of small-scale producer to increase production and productivity within the specific target commodities (Jayne and Jones, 1997). Hence, some marketing boards provide small-scale producers with input supplies and credit, storage infrastructure and transport facilities. Often is the case that marketing boards will focus on providing extension services to smallholders, developing strong agricultural value chains, and securing markets for the produce within the different sectors of the agriculture and food production system (Martin & Warley, 1978; Crawford, 1997).

Despite their benefits, policymakers in the world believe that marketing boards are increasingly becoming irrelevant. Tamilia and Charlebois (2007) observe that marketing boards are most troublesome from a public policy perspective. The authors explain that this is because the boards control the supply of some commodities by assigning border restrictions and sole import licences benefiting themselves, which raises problems in that the monopoly licences prevent competition, innovation, and efficient marketing of commodities (Martin & Warley, 1978; Roberts, 2016). Ultimately, they prevent price signals from reflecting all publicly available demand and supply information. This is much against the Comprehensive Agricultural Sector Policy (CASP) aiming to propel the sustainable development of the agricultural sector in order to enhance poverty reduction and food security at both household and national level.

Similarly, price controls can be responsible for inefficient marketing systems. They fail to consider the balance between demand and supply of commodities in the market – prices are set without considering the price at which farmers are willing to sell, and the price retailers are willing to buy the produce (Dumais, 2012). The board members decide on the prices to be set, assuming all farmers are happy with the price (Tamilia and Charlebois, 2007). Essentially, the price setting mechanisms used by marketing boards render small-scale farmers as price takers, thus violating free market equilibrium- indicating the failure of the market to adhere to the balance between demand and supply forces.

Agricultural markets experience abrupt shifts accompanied by demand fluctuations resulting from weather variations, unpredictable consumers' eating habits, and unstable food prices, which the boards fail to keep in check. It is for these reasons that numerous countries including South Africa, Canada, Zimbabwe, and Netherlands have deregulated their Agricultural Marketing Boards. According to Barret and Mutambatsere (2008) by removing political interference in the marketing process, market forces would lead to efficient resource allocation and price discovery. This decision has largely contributed to increased food production and Gross Domestic Product (GDP) in these countries.

South African marketing boards were dissolved in 1996, after noticing their inefficiencies and benefiting only a certain group of farmers. As a result, South Africa put an emphasis on supply chain management- promotion of value added processing of agricultural commodities and international trade, such that household food security is attained. The country developed new generation cooperatives reinforcing self-help, self-reliance, self-responsibility, democracy, equality and social responsibility among farmers through the augmenting employment and income opportunities, thus contributing to poverty eradication in the country.

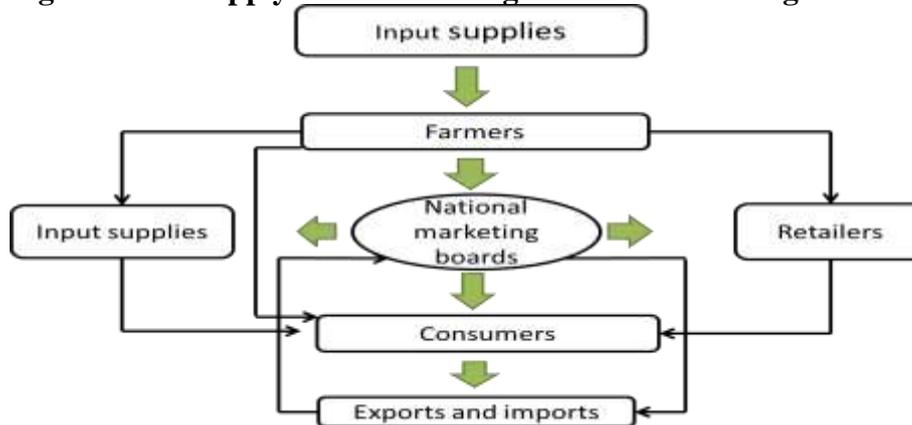
The Canadian wheat board was dissolved in 2011; allowing the free market for the supply (production) and demand (buying) of wheat. The Canadian Wheat Board was the single-desk responsible for selling and marketing prairie wheat and barley for domestic consumption and exports

(Boaitey, 2013). This prevented competition among sellers due to the monopoly that was created by the establishment of the Canadian Wheat Board. Monopolies are a market failure associated with a huge economic deadweight loss, which has serious consequences to producer and consumer welfare. The deregulation of the Canadian Wheat Board facilitated open market trade for wheat and barley growers, resulting in an increase in the number of wheat and barley growers in Canada. The question of interest to Swaziland is whether similar results could be achieved for the maize, dairy, and the fruit and vegetable industries to increase the number of smallholders and small-scale farmers participating in food production.

## 2.1 Agricultural Marketing Boards and Agricultural Production and Productivity in Swaziland

Swaziland has three active food agricultural marketing boards. These are the NMC, NAMBoard, and SDB, all set up by government action and delegated legal powers of compulsion over producers and handlers of primary processed agricultural products. These boards are at the centre of commodity value-chains; they provide commodity supply services to wholesalers, retailers, and consumers, as illustrated in Figure 2.2.1 below. Their main objective is to assist in attaining self-sufficiency and food security.

**Figure 2.2.1: Supply-Chain involving National Marketing Boards**



So

Source: Author's compilation

Notes: National marketing boards transact with farmers through input supplies and market provision. The boards also provide retailers, wholesalers and consumers with commodities bought from farmers. Fruits and vegetables are mostly exported by the boards.

Each of the boards has specific functions aligned to the improvement of food availability in the country. The NMC provides extension and marketing services to maize farmers in order to improve their income, thus expanding food access. Unlike the other boards, the NMC has sole importer rights on commercial maize. Only 50 Kg of maize meal per person is allowed into the country (Swaziland Ministry of Agriculture - MOA, 2016).

This compromises the welfare of consumers as the quantity of maize allowed is limited and based solely on NMC's discretion.

Similarly, the milk industry is regulated by the SDB. The SDB regulates and develops the milk industry, but does not involve itself in the commercial activities of the dairy value chains. The SDB sets milk prices in collaboration with government and Parmalat however, there is no fixed formula used to set the prices (*Pers. Comm.*, 2016). Parmalat is a processing company responsible for the marketing and sale of milk. The board stationed milk coolers in collection centres in various communities across the country to be used by farmers, enabling better access to market and a bargaining platform for producer price negotiation (Gule, 2013). However, only a few producers make use of this service due to the low prices received from transacting with Parmalat (Dlamini, 2013 and Gule, 2013).

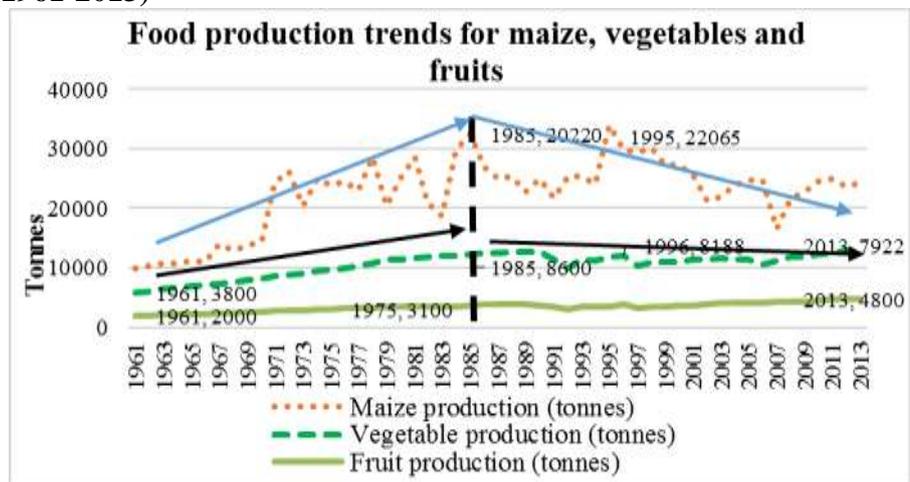
NAMBoard, on the other hand, regulates the importation of scheduled agricultural products. These include maize and maize products, rice, fresh vegetables and fruits, wheat and wheat products, poultry and poultry products (Food, Agriculture, and Natural Resources Policy Analysis Network (FANRPAN), 2003). The board's mandate is to stimulate local production by providing technical support, storage facilities, supply of inputs, and provision of market access (NAMBoard, 2012). Yet, there are only a few storage facilities in the country and are not easily accessible to all the producers in the rural areas. This prevents agriculture producers from selling to the boards and forces them to scout for markets in the informal sector.

The current issue is that the country has timeously failed to achieve the objective of self-sufficiency, particularly in the main agricultural commodities, even after the introduction of the National Marketing Boards. As shown in Figure 2.2.2: fruits, maize, and vegetable production trends were rising steadily before the introduction of the NMC and NAMBOARD in 1985; but after the initiation of the Boards, the production trends started moving downwards. This has brought confusion among policy makers raising questions on whether the Marketing Boards have a contributing factor to the downward spiral of food production trends.

As already noted an important role of marketing boards is to increase food production. However, the trends in Figure 2.2.2 suggest that the Boards are struggling to achieve their mandate in Swaziland. Instead, they make exorbitant profits from the sales of small-scale producers' produce and import levies (Figure 2.2.3). The import levies are applied in fruits, maize products excluding starch, maize excluding seed maize, fresh fruits, banana, fresh vegetables, and poultry, except for maize grains which are only imported by NMC. Clearly, the role of the marketing boards in Swaziland has come under heavy scrutiny, given that the monopolistic rights they hold and given the fact that some of these Boards such as NMC and NAMBoard are actually involved as competitors on top of being regulators of the smallholders they are supposed to develop (Ministry of Agriculture, 2016).

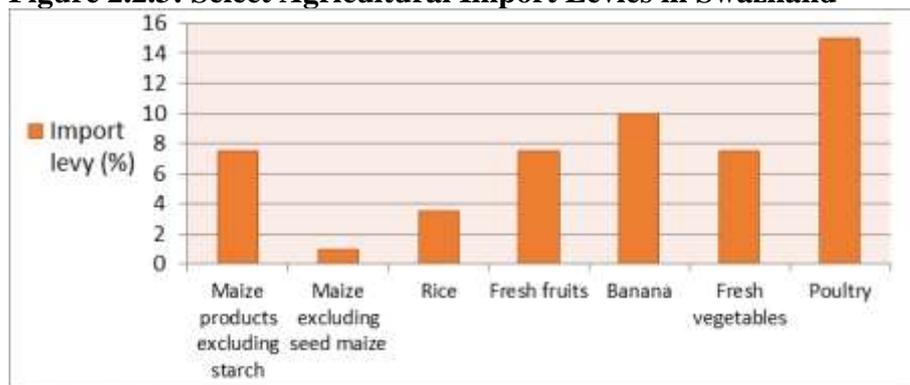
Ideally, the Marketing Boards should maintain their role as regulators to ensure that producers and consumers' welfare is protected at all times in order to maintain the integrity of the agricultural value chains in the country.

**Figure 2.2.2: Fruit, Maize and Vegetable Production in Swaziland (1961-2013)**



Source: NMC and NAMBoard

**Figure 2.2.3: Select Agricultural Import Levies in Swaziland**



Source: NAMBoard's website

### 2.3. Impact of Agricultural Marketing Boards on Consumer and Producer Welfare

There is a plethora of literature including studies by Van Schalkwyk, Van Zyl, Botha & Bayley (1997), Mashinini *et al.* (2006) study on the negative effects of National Marketing Boards on consumers and producers' welfare.

In Lesotho, van Schalkwyk *et al.* (1997) found the same results, which revealed that consumers did not benefit anything from the establishment of the Maize Marketing Board in that country. Lesotho experienced high consumer losses while the benefits accrued to a minority of commercial farmers. The study further indicated that high tariffs set by the Lesotho Marketing Board only benefited the government because the revenue generated did not trickle down to other levels of society. The same sentiments are shared in the Swazi maize industry. Evidenced through a Partial Equilibrium Analysis, a study by Mashinini *et al.* (2006) found that between 2001 and 2006, the NMC triggered significant consumer losses, while benefiting a minority of producers mostly the large-scale commercial farmers. The study further uncovered that due to the high tariffs in those particular years, all the revenue accrued to government, resulting in a high deadweight loss to society.

Likewise, in the milk industry, Ginindza and Kabuya (2014) provide evidence that the tariffs set by the SDB cause high net societal losses resulting in consumers consuming too little milk while paying exceedingly high prices for liquid milk. This reflects the misallocation of resources caused by the SDB tariffs. Though the authors were able to identify losses to society in Swaziland due to the establishment of NMC and SDB, their studies do not attach a monetary value to these economic losses. A monetary value is important to make the argument for or against the continuation of marketing boards in the country because it provides objective and measurable losses and gains that can be compared to the agricultural sector's outputs and to overall GDP in Swaziland. The monetary value can also be apportioned according to the various "losers" and "winners" to determine the impact of the boards on both consumer and producer welfare in Swaziland. This paper provides such evidence by adopting a Partial Equilibrium Model which provides the monetary gains and losses to producers and consumers in Swaziland for the maize and dairy industries.

### 3. Methods

The study fits a partial equilibrium model focusing on Marshallian surplus framework to demonstrate the impact of agricultural marketing on consumer and producer welfare in Swaziland. The model is preferred over the general equilibrium model because of its effectiveness in terms of less time and data requirements as it considers a single market or sector. The model allows the use of maize and milk data from 2010 to 2014 sourced from NMC, SDB, and Statistics South Africa (STATSA). NAMBoard is not included in the study because of lack of data, particularly on the demand for vegetables.

#### 3.2.1. Welfare Analysis -The Partial Equilibrium Model

##### 3.2.1.1. General Information

The study uses a demand and supply model called the standard Partial Equilibrium Model adopted by Monke and Pearson (1989) and Tsakok (1990). The Partial Equilibrium Model estimates an equilibrium of demand and supply of a specific commodity taking into consideration a policy

action or government intervention and assuming independent effect of other market prices and quantities. The model examines the effects of a policy action in creating equilibrium only in a particular market. In this case maize and dairy are each calculated separately, holding effects on other markets constant. In addition, the model distinguishes the welfare effects on consumers and the producers of maize and liquid milk within Swaziland as a result of the NMC and SDB policies.

### 3.2.1.2. Assumptions

The Partial Equilibrium method allows the use of price elasticities quantified through the cobweb model; assuming producers are extremely short-sighted. The cobweb model is an economic model that describes cyclical demand and supply where the amount produced is chosen before prices are observed. The backward-looking forecasting turns out to be crucial for the model's fluctuations. When farmers expect high prices to continue, they produce too much, and leading to low producer prices, and vice versa.

### 3.2.1.3. Model Components (Inputs)

As previously mentioned, the method allows the use of variables such as price elasticities, border price, nominal protection coefficients and domestic prices to estimate losses or gains to consumers and producers, which are computed/calculated separately and imputed into the Partial Equilibrium Model framework, as presented in Table 3.4.3. The computed input variables used in the analysis are listed below:

- i. The import parity prices were calculated using South African commodity farm gate price plus transport cost, import levy and insurance.
- ii. The price elasticities equations are presented below;

#### a) Price elasticity of demand

The demand for particular good is function of price and income, assuming that other factors are not captured, as shown in Eq. (1):

$$Qd_t = f(P_t, I_t)$$

$$\log Qd_t = b_1 + b_2 \log P_t + b_3 \log I_t + u_t \quad \dots (1)$$

Where:

$Qd_t$  = the total quantity of good demanded

$P_t$  = the domestic real price of good

$I_t$  = the real income per capita

$u_t$  = the error term

#### b) Price elasticity of supply

The quantity of good supplied is measured in tonnes and is function of lagged real price, while technology adoption is constant, as shown in Eq. (2):

$$Qs_t = f(P_{t-1})$$

$$\log Qs_t = b_1 + b_2 \log P_{t-1} + u_t \quad \dots (2)$$

Where:

$Qs_t$  = the total quantity of good supplied

$P_{t-1}$  = the lagged real price of good

$u_t$  = the error term

Table 3.4.3 shows that the Model also determines the possible dead weight losses in consumption and production, consumer losses per capita, producer surpluses and revenue lost by commodity traders, possibly accruing to the National Marketing Boards.

**Table 3.4.3. Showing variables and specification for welfare analysis**

Variable	Label	Formulae
$Pd$	Domestic price of maize (selling price)	
$Pb$	Border price of maize (import parity price)	
$es$	Price elasticity of supply	
$nd$	Price elasticity of demand	
$NCP$	Nominal Protection Coefficient	$p_d/p_b$
$t$	Implicit tariff	$NPC - 1$
$t'$		$tp_b/p_d$
$V'$	Value of domestic production at domestic price	$Pd. \text{ domestic production}$
$W'$	Value of domestic consumption at domestic price	$Pd. \text{ total supply/demand}$
$NELp$	Deadweight loss in production	$0.5. es. t'^2. V'$
$NELc$	Deadweight loss in consumption	$0.5. nd. t'^2. W'$
$WGp$	Change in producer surplus	$t'V' - NEL_p$
$WGc$	Change in consumer surplus	$-(t'W' + NEL_c)$
$^GR$	Change in revenue	$t'(W' - V')$
	Total population	
$Loss/cap$	Loss per capita	$WGc/\text{total population}$

Source: Tsakok (1990)

Notes: Border price represents import parity prices

## 4. Results and Discussion

### 4.2. Producer and Consumer Welfare Effects Induced by NMC and SDB

#### 4.2.1. The price elasticities

Price elasticities are a prerequisite for the Partial Equilibrium Model used to determine the welfare gains and losses of consumers and producers. Results show that the maize price elasticity of demand is 0.165 and insignificantly different from zero, as shown in (Eq. 3). This indicates that the demand for maize does not respond to small changes in price. The low

price elasticity is expected because maize remains the dominant crop among local consumers, even though rice is increasingly consumed in the country it has not been comparatively a substitute for the staple crop. This results are similar to a study by Mashinini *et al.* (2006), where the authors report that the price elasticity of demand for maize is very low.

$$Qd_t = 7.06 - 0.165P_t - 0.112I_t + u_t \quad \dots (3)$$

On the other hand, the maize price elasticity of supply is calculated to be 1.97 and significant at 1% level. This indicates that a 1% increase in domestic real price of maize, subject to time constraint, increases the supply of maize by 1.97%, holding all other market variables constant, as shown in (Eq. 4). This in line with *a priori* expectation, maize producers' supply is likely to be influenced by prices of the produce in the previous (past) season because there is no forecasting on future prices.

$$Qs_t = -17.61 + 1.97P_{t-1} + u_t \quad \dots (4)$$

The analysis sourced milk price elasticities from a recent study by Ginindza and Kabuya (2014). As shown in Eq. (5), the price elasticity of demand for milk is 0.02, indicating that a 1% increase in domestic real price of milk, increases the demand of milk by 0.02%, *holding all other market variables constant*. This implies that the demand for milk is sensitive to changes in prices. This is in line with expectations because milk is constantly in demand in the country for its high nutrition content, thus, as price and income changes this has no effect on milk consumption, for now.

$$Qd_t = 10.474 - 0.016P_t + 0.027I_t + u_t \quad \dots (5)$$

The price elasticity of supply is 0.04, indicating that a 1 % increase in domestic real price of milk, subject to time constraint, increases the supply of milk by 0.04%, *all else equal*, as indicated in (Eq. 6). This in line with *a priori* expectation, because farmers supply of produce is likely to be influenced by prices of previous season's output.

$$Qst = 10.525 + 0.038P_{t-1} + u_t \quad \dots (6)$$

The price elasticities estimated from the above equations are imputed in the Partial Equilibrium Model discussed in the next subsection.

## 4.2.2. Welfare Gains and Losses

### 4.2.2.1. Welfare gains or losses of white maize producers and consumers

The results prove that rate of consumer losses per individual per year have increased in the five years (2010-2014), as shown in Figure 4.2. However, in 2011, the annual individual consumer loss was E36.04, this resulted from

the increased domestic maize production and that the price differential between import parity and domestic price was reduced.

**Figure 4.2.1:** Swaziland’s White Maize per-capita Consumer loss



Sources: Author’s compilation

As depicted Table: 4.2.1., individual maize consumers lost more in 2010 and 2014, with an estimated value of E120.20, and E122.86 per year, respectively. Therefore, since 2011 to 2014 the change in annual individual consumer loss was 71.5%. This emanates from the high population and demand for food compared to the low quantity of maize produced; as shown in the Table:4.2.1., the total maize demanded by consumers rose from 173,000 tonnes in 2010 to 190,000 tonnes in 2014, while production increased from 68,000 to 101,040 tonnes. The high per capita consumer loss in 2010 could also be attributed to the fiscal crisis Swaziland experienced in 2010/11 which may have led to low food production.

Over the five-year (2010-2014) period, the average loss per capita was E94.22 per year, resulting into an average consumer loss (the price overpaid by consumers) of E116,282,516.00 per year, almost half the industry’s local production. However, the average producer gains (price received by efficient producers) is E35,651,178.21; indicating that maize producers are benefiting from the NMC while consumers are losing. As stated by Jayne *et al.* (2005), the higher the producer gains the higher the consumer prices; the efficient producers make more profits from higher prices, hence there should be a balance in the system. If consumer gains are too high then producers receive less price, vice versa. This is no surprise, only the few fully-fledged farmers benefit from the prices set through the price setting policy. The domestic maize industry is dominated by smallholder producers that do not benefit from the price set by NMC because it is too low. The low prices received by farmers shrink their returns on investment, as a consequence, farmers are dissuaded to produce for sale at the commercial level as they would much rather produce for their own consumption. In addition, the disparity between producer gains and consumer losses could emanate from the unjustifiably high consumer prices set conveniently to enhance profits of NMC which is supposedly to be a social organisation assisting in the improvement of food production and productivity, to achieve food security. In the five-year period, on average, gains absorbed as inefficiencies – monopoly rents, estimated at E57,842,601.60 per season. This implies that NMC makes profits through the ownership of monopoly

licences; the same profits that could have been shared amongst other maize traders.

The presence of NMC has a negative impact on the economy as the results show that the average loss in consumption (loss to consumers' society), in the five-year period, was E2,405,557.96 per season, while the average economic loss in production (loss to producers' society) amounted to E20,383,178.19 per year. When summed up, the two economic losses result to a total economic loss of E22,788,736.15 per year. The total value spent by the country on maize production and imports amounted to E179,327,710.90, in 2014; indicating that consumers lost 3% on the value spent on maize production and imports in the country. The Agriculture and Forestry sector contributes 6.5% to the GDP, valued at E2,598,000,000.00 in 2014 while the Growing of Crops sector contributes E1,173,000,000.00 to the GDP, with maize production valued at E341,010,000.00. This implies that the maize industry contributes 29% to the Growing of Crops sector and 13% to the Agriculture and Forestry sector. Further, perpetuating the situation, are the tax revenues received by government through levies. This clearly indicates that the presence of government policies triggers the inefficient allocation of resources by NMC. The NMC fails to allow fair competition - participates in the market as a trader other than as a regulator while domestic prices do not obey the demand and supply shifts.



**Table 4.2.1: White Maize Producer and Consumers Gains and Losses to due to NMC**

Variable	Label	Formulae	Year				
			2010	2011	2012	2013	2014
<i>P<sub>d</sub></i>	Domestic price of maize		2177.500	2397.920	3375.000	3375.000	3375.000
<i>P<sub>b</sub></i>	Border price of maize (import parity price)		1373.060	2118.670	2660.170	2569.030	2570.200
<i>es</i>	Price elasticity of supply		1.980	1.980	1.980	1.980	1.980
<i>nd</i>	Price elasticity of demand		0.165	0.165	0.165	0.165	0.165
<i>NCP</i>	Nominal Protection Coefficient	$P_d/P_b$	1.586	1.132	1.269	1.314	1.313
<i>t</i>	Implicit tariff	$NPC - 1$	0.586	0.132	0.269	0.314	0.313
<i>t'</i>		$tp_b/p_d$	0.369	0.116	0.212	0.239	0.238
	total demand		173000.00	155000.000	156000.000	152000.000	190000.000
	domestic production		68000.000	85000.000	76000.000	82000.000	101040.000
<i>V'</i>	Value of domestic production at domestic price	<i>P<sub>d</sub>.domestic production</i>	148070000	203823200	256500000	276750000	341010000
<i>W'</i>	Value of domestic consumption at domestic price	<i>P<sub>d</sub>.total supply/demand</i>	376707500	371677600	526500000	513000000	641250000
<i>NEL<sub>p</sub></i>	deadweight loss in production	$0.5.es.t'^2.V'$	20006598.58	3505488.443	18336199.38	26966353.66	33101250.91
<i>NEL<sub>c</sub></i>	deadweight loss in consumption	$0.5.nd.t'^2.W'$	4241595.041	415850.5884	1948544.422	2413578.968	3008220.786
			4241595.041	415850.5884	1948544.422	2413578.968	3008220.786
<i>WG<sub>p</sub></i>	Change in producer surplus	$t'V' - NEL_p$	34695321.42	20230761.56	35990880.62	39123186.34	48215741.09
<i>WG<sub>c</sub></i>	change in consumer surplus	$-(t'W' + NEL_c)$	-143409715	-43699600.6	113462024.4	-124921019	155920220.8
<i>^GR</i>	change in mill revenue	$t'(W' - V')$	84466200	19547500	57186400	56417900	71595008
	Total population		1193148	1212458	1231694	1250641	1269112
<i>Loss/cap</i>	Loss per capita	$WG_c/total\ population$	-120.194	-36.042	-92.119	-99.886	-122.858

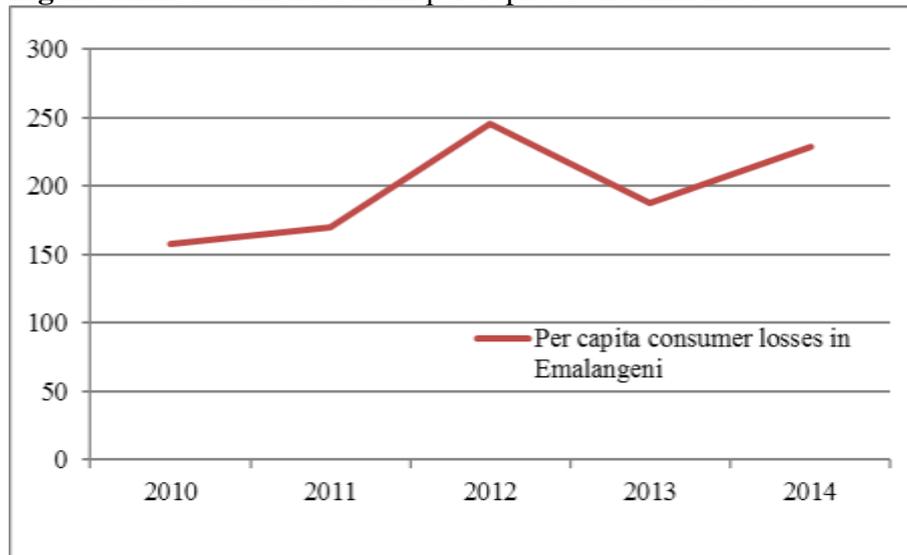
Source: Author's calculation using Partial Equilibrium Model

Notes: The domestic price, import parity price, quantity of maize produced locally, quantity of maize demanded locally, implicit tariff are all inputs used in the partial equilibrium framework to estimate deadweight loss in production, deadweight loss in consumption, consumer surplus, producer surplus and consumer loss per capita. The E stands for Emalangeni currency

#### 4.2.2. Welfare gains or losses of milk producers and consumers

As depicted in Figure 4.2.2, the results prove that the rate of consumer losses per individual per year have increased in the past five years (2010-2014), as shown in Figure 4.2.2. However, in 2011 and 2013 the annual consumer losses per persons were lower, this resulted from the increased domestic maize production and that the price differential between import parity and domestic price are quite lower.

**Figure 4.2.2:** Swaziland's Milk per-capita Consumer Loss



Sources: Author's compilation

The existence of government policies in the dairy industry, on an average five-year period (2010-2014), caused an economic loss to consumers per capita of E197.90 per year. As depicted in Table 4.2.2., the consumer loss per capita increased steadily over the years from E158.07 to E228.45, in 2010 and 2014, respectively. The increase in consumer loss can be explained by the fact that domestic production has failed to keep pace with the demand; implying that consumers are losing - incurring higher prices than expected as a result of the price setting mechanisms of SDB and Parmalat. The economic loss in milk consumption is E1,249,846.08 per year while the economic loss in production is E1,469,298.15 per year, over the five-year period. This results to a total economic loss (cost to society) at E2,719,144.23, implying that consumers spend more than they should on milk. This indicates that the SDB and Parmalat are causing excess burden to consumers.

In the five-year period, on average, the producer gains (price received by producers) were E35,545,181.85 while the consumer losses (price overpaid by consumers) were E243,676,441.51, per year; implying that producers are gaining at the expense of consumers. The total value spent by the country on milk production and imports amounted to E343,600,000.00 in 2014, indicating that consumers lost 7% in the process. The consumer losses are almost 70% of local production (as indicated in Table 4.2.2). The Agriculture and Forestry, and Animal Production sector contributed E2,598,000,000.00 and E1,164,000,000.00, respectively to the GDP in 2014, while the value of domestic milk production amounted to E94,116,600.00. This implies that the milk industry contributes approximately 8% to the Animal Production sector and 3.6 % to the Agriculture and Forestry sector. This is expected because the government regulations protect the few elite medium and large scale dairy farmers who produce efficiently, leaving out the smallholder farmers currently dominating the industry in numbers. As a consequence, there is low supply of milk while the demand is high, therefore resulting to high consumer prices.

**Table:4.2.2. Gains and losses of milk producers and consumers**

Variable	Label	Formulae	Year				
			2010	2011	2012	2013	2014
$p_d$	Domestic price of milk (E per litre)		7.07	6.82	7.95	7.53	7.83
$p_b$	Border price of milk (E per litre)		3.36	3.23	3.35	3.91	4.28
$es$	Price elasticity of supply		0.04	0.04	0.04	0.04	0.04
$nd$	Price elasticity of demand		0.02	0.02	0.02	0.02	0.02
$NPC$	Nominal Protection Coefficient	$p_d/p_b$	2.10	2.11	2.37	1.93	1.83
$t$	Implicit tariff	$NPC - 1$	1.10	1.11	1.37	0.93	0.83
$t'$		$tp_b/p_d$	0.52	0.53	0.58	0.48	0.45
	Total demand (litres)		50,000,000.00	57,310,000.00	65,680,000.00	64,940,000.00	81,670,000.00
	Domestic production (litres)		7,520,000.00	8,660,000.00	9,760,000.00	10,640,000.00	12,020,000.00
$V'$	Value of domestic production at domestic price (E)	$P_d \cdot \text{domestic production}$	53,166,400.00	59,061,200.00	77,592,000.00	80,119,200.00	94,116,600.00
$W'$	Value of domestic consumption at domestic price (E)	$P_d \cdot \text{total supply/demand}$	353,500,000.00	390,854,200.00	522,156,000.00	488,998,200.00	639,476,100.00
$NEL_p$	Deadweight loss in production (E)	$0.5 \cdot es \cdot t'^2 \cdot V'$	292,803.49	1,459,204.35	2,925,991.04	1,373,504.94	1,294,986.95
$NEL_c$	Deadweight loss in consumption (E)	$0.5 \cdot nd \cdot t'^2 \cdot W'$	973,415.84	1,083,016.15	1,748,162.01	1,130,145.73	1,314,490.64
			1.15	1.27	2.03	1.41	1.68
$WG_p$	Change in producer surplus (E)	$t'V' - NEL_p$	27,606,396.51	29,630,195.65	41,970,008.96	37,143,295.06	41,376,013.05
$WG_c$	Change in consumer surplus (E)	$-(t'W' + NEL_c)$	-	-	-	-235,082,801.41	-
			185,500,001.15	205,742,901.27	302,128,002.03		289,928,501.68
$\Delta GR$	Change in manufactures revenue	$t'(W' - V')$	157,600,800.00	174,653,500.00	257,232,000.00	1965,66,000.00	247,257,500.00
	Total population		1,173,529.00	1,212,458.00	1,231,694.00	1,250,641.00	1,269,112.00
$Loss/cap$	Loss per capita	$WG_c/\text{total population}$	-158.07	-169.69	-245.29	-187.97	-228.45

Source: Author's calculation

Notes: E stands for Emalangen currency

## 5. Conclusion and Recommendations

This paper assessed the impact of national maize and milk marketing boards on consumers and producers' welfare in Swaziland. The results show that the agricultural marketing boards have a negative impact on producers and consumers in Swaziland. The consumer losses are higher than producer gains. The results further show that the marketing arrangements of these commodities are highly distorted. In particular, the study found that there is a misallocation of resources characterised by the participation of SDB and NMC as both traders and regulators. Consequently, domestic prices are continually failing to adhere to market forces of demand and supply which draws largely from the failure of the Boards to allow competition among traders.

The study also found that an average consumer loss (the price overpaid by consumers) of E116,282,516.00 per year, almost half the value of maize produced in Swaziland in 2014. The average producer gains (price received by efficient producers) of E35,651,178.21, indicates that maize producers are benefiting from the NMC while consumers are losing. Moreover, over the five-year period (2010-2014), the total average economic loss in maize consumption (losses to society) was E2,405,557.96 per season, almost half the total average economic loss in maize production (society loss) of E20,383,178.19 per year. This finding is in line with *a priori* expectation in that only the few large-scale commercial maize farmers who have economies of scale benefit from the prices set through the price setting mechanism.

Similarly, the study found that in the five-year period, from 2010 - 2015, dairy consumer losses (amount of money lost by milk consumers) were E243,676,441.51 while milk producer gains were E35,545,181.85 (amount of money gained by dairy farmers). This implies that fully-fledged commercial dairy producers are gaining at the expense of dairy and dairy products consumers. The consumer losses are almost 70% of the value of milk produced in Swaziland in 2014. This is in line with *a priori* expectation that only a few commercial dairy farmers producing at economies scale benefit from the SDB prices. On the other hand, the economic losses in milk consumption (losses to society) amount to E1, 249,846.08 per year while the economic losses in production (losses to producers) amount to E1, 469,298.15 per year, over the five-year period. This results to a total economic loss (cost to society) of E2,719,144.23, implying that consumers spend more than they should on milk. This indicates that the SDB is causing an unnecessary burden to dairy consumers in the country.

Therefore, we can conclude that the presence of agricultural marketing boards triggers the inefficient allocation of resources by the Boards. The Boards participate in the market as traders over and above being regulators. Consequently, they contribute to low food production, high consumer prices, and economic losses, much against the National Food Security Policy. Clearly the existence of national agriculture marketing boards is not withstanding the Agricultural Sector Policy aimed at transforming production on SNL from subsistence to commercial farming.

Therefore, in light of the findings of the study, the following recommendations are made:

- Deregulate the maize and dairy industries in Swaziland through the removal of government policies allowing the Boards to control and trade commodities to allow free trade. Domestic prices will be determined by demand and supply forces, and this will encourage competition among traders.
- Establish a council to solely regulate the flow of commodities and provide marketing advisory services to the maize and dairy industries. This will assist in balancing the benefits between farmers producing efficiently (at large scale) and smallholders.
- Strengthen extension services in collaboration with the Ministry of Agriculture to allow the transfer of information and adoption of new technologies, access to credit, and other necessary inputs.
- Create new generation/hybrid cooperatives, and allow them to be monitored by council to avoid the possible benefits of economies of scale accrued to national marketing boards compared to other traders in the market. The cooperatives will reinforce self-help, self-reliance, self-responsibility, democracy, equality and social responsibility through augmenting employment and income opportunities, thus contributing to poverty eradication in the country.
- Develop a model to forecast and report timely future commodity prices, adhering to demand and supply changes.

## 6. References

1. Barrett, C. and Mutambatsere, E. (2008). *Agricultural Markets in Developing Countries*. Final version. Entry in Lawrence E. Blume and Steven N. Durlauf, editors, *The New Palgrave Dictionary of Economics*, 2nd Edition (London: Palgrave Macmillan, forthcoming).
2. Boaitey, A. (2013). Grain market deregulation: a case study of the Canadian and Australian wheat boards. *Journal of Public Affairs*. Volume 13, Issue 3. Pages 282–287.
3. Byerlee, D., Jayne, T. and Myers, R. (2006). Managing food price risks and instability in a liberalizing market environment: Overview and policy options. *Food Policy*. vol. 31, issue 4, 275-287.
4. Crawford, I.M. (1997). *Agricultural and food marketing management*. Food and Agricultural Organisation (FAO). Regional Office for Africa. ISBN 92-851-1003-7.
5. Dlamini, T. (2013). A comparative economic analysis of small scale and medium scale dairy farmers: the case-study of the Manzini Region. Research Project Report Submitted to the Department of Agricultural Economics and Management, Faculty of Agriculture of the University of Swaziland. Luyengo Campus. Swaziland.
6. Dlamini, T and Louw, M. (2016). Measuring the impact of Swaziland's white maize marketing and price-setting policies on price transmission between Swaziland and South Africa. Department of Agricultural Economics, Extension, and Rural Development. Faculty of Natural and Agricultural Sciences. University of Pretoria.
7. Dumais, M. (2012). The negative consequences of agricultural marketing boards. Montreal Economic Institute Research Paper. ISBN 978-2-922687-36-1.
8. Food and Agricultural and Natural Resources Policy Analysis Network (FANRPAN). (2003). *National Marketing Strategy for Swaziland*. Food Agriculture and Natural Resources Policy Analysis Network of Southern Africa.
9. Ginindza, V. and Kabuya, F. (2014). An Analysis of Southern African Development Community (SADC) Free Trade Area (FTA): Implications for the Liquid Milk Consumers and Producers' Potential Welfare in Swaziland. *Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 7 (6), 66-71.
10. Gule, G. (2013). Factors affecting dairy farmers' utilization of dairy board support in the Manzini Region. In Partial Fulfilment of the Requirements for the Degree of Bachelor of Science in Agriculture Economics and agribusiness and Management. Luyengo Campus. Swaziland.
11. Jayne, T and Jones, S. (1997). Food marketing and pricing policy in Eastern and Southern Africa: A survey. *World Development*, vol. 25 (9), 1505-1527.
12. Jayne, T.S. Zulu, B. Mather, D. Mghenyi, E. Chirwa, E. and Tschirley, D. (2005). Maize Marketing and Trade Policy in a Pro-Poor Agricultural Growth Strategy: Insights from Household Surveys in Eastern and Southern Africa. Conference on "Toward Improved Maize Marketing and Trade Policies in the Southern Africa Region," Food, Agriculture, and Natural Resources Policy Analysis Network (FANRPAN). Centurion Park Hotel, Centurion, South Africa.

13. Lundberg, M. (Undated). Agricultural Market Reforms. Poverty and Social Impact Analysis. The World Bank.
14. Masuku, M, B & Sihlongonyane, M. D. (2015). A stochastic frontier approach to technical efficiency analysis of smallholder dairy farmers in Swaziland. *Journal of Economics and Sustainable Development*. ISSN 2222-2855. Vol.6, No.19, 2015.
15. Martin, L. J., and Warley, T. K.(1978). The Role of Marketing Boards in Stabilizing Commodity Markets. *American Journal of Agricultural Economics*. vol. 65, no. 5, 878-884.
16. Mashinini, N.N., Obi, A. and Van Schalkwyk, H. (2006). Deregulation of Maize Marketing System in Swaziland and Implications for Food Security. International Association of Agricultural Economists Conference. Gold Coast. Australia.
17. Ministry of Agriculture. (2016). *Swaziland Market assessment report*. Shiselweni region food security and resilience.
18. Monke, E.A. and Pearson, S.R. (1989). The policy analysis matrix for agricultural development. Cornell University Press. Ithaca and London.
19. Murphy, S. (2012). *Changing Perspectives: Small-scale farmers, markets and globalisation (revised edition)*. Small Producer Agency in the Globalised Market. IIED/Hivos, London/The Hague.
20. National Agricultural Marketing Board (NAMBOARD). (2012). National Agricultural Marketing Board annual report.
21. Reynold, D.P. (1972). State Trading, Agricultural Marketing Boards, and The Role of Government in Marketing. Staff Paper Series. Department of Agricultural and Applied Economics. University of Minnesota.
22. Roberts, S. (2016). Barriers to entry and implications for competition policy. Preliminary draft. Competition Commission and Tribunal 2016 Conference.
23. Swaziland Agricultural Development Programme (SADP). (2011). Office of Evaluation (OED). Mid-Term Evaluation. Final report.
24. Tamilia, R.D and Charlebois, S. (2007). The importance of marketing boards in Canada: a twenty-first century perspective. *British Food Journal*, Vol. 109 Issue: 2, pp.119-144.
25. Tsakok, I. (1990). Agricultural price policy - A practitioner's guide to partial - equilibrium analysis. New York: Cornell University Press.
26. van Schalkwyk, van Zyl, Botha and Bayley. (1997). Deregulation of Lesotho's maize market. *Agrekon*, Vol 36, No 4.
27. World Bank. (2011). Swaziland Rural Sector Review The Livestock and Horticulture Value Chains in Swaziland: Challenges and Opportunities. Agricultural and Rural Development Unit (AFTAR). Country Department AFCS1.Africa Region. Report No. 70201-SZ.  
World Food Programme (WFP). (2009). World Hunger Series: Hunger and Markets. Earthscan in the UK and USA. ISBN: 978-1-884407-83