# Commodity Prices and City Markets in Tanzania: The Case of Maize Markets

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# ABSTRACT

How competitive are the crop markets in Tanzania? and who gets the rents following four decades of economic reforms that have seen government withdrawal from market interference, encouraged entry by private traders, and fostered competition? Addressing this question is of particular importance to most developing countries whose majority of their citizens are smallholders as farmers in rural areas and informal activities in urban areas; hence the need to enhance rural livelihoods and consumer welfare in urban areas. Even though, the empirical literature remains unclear on the extent of rent extraction in crop markets, as the area is largely unexplored.

Using community-level and field survey data complemented with regional and district monthly commodity prices data across the country, this study takes the first step towards understanding rent extraction in the crop market in Tanzania. The descriptive statistics revealed that, on average, the farmgate prices of 458.28 TZS per kilogramme received by farmers in the rural areas are two times less than the retail prices of 963.4 TZS per kilogramme paid by the consumers in urban areas. The market margins analysis from farmgate to regional wholesale to city retail markets showed that the regional market margins account for seven percent, the wholesale account for 12 percent, and the retail markets contribute to 39 percent to the differences. This result is consistent with the fact that wholesale traders gain from bulk transactions, and retailers gain from high profit margins. Allowing for spatial crop price heterogeneity, the results show that approximately 64 percent of the price spread ranges from 51 percent to 85 percent. Regression results further indicate that a one percent increase in distance to district (regional) markets leads to a 3.6 percent (2.6 percent) decline in farm-gate prices.

The results thus highlight the significance of enhancing transparency in prices, facilitating transactions in the marketing chain, and reducing marketing costs by improving transport infrastructure.

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# 1. INTRODUCTION

The idea that farmers, in particular peasants, in developing countries are irrational, in the sense that they are unresponsive to economic incentives, dominated a large part of post-colonial Africa in the 1960s and 1970s (Johnson, 1978; Lundahl, 1987). This is despite both theoretical developments and empirical investigations in the mid-1960s showed that, although farmers in the third world were poor, they were indeed profit-maximizing and efficient, as they positively respond to economic incentives (Schultz, 1964, 1978).[1] Even though many of the empirical studies during this period displayed a fairly weak supply response, it was argued that in most developing countries, agricultural incentives had been distorted by extensive government interventions (Schultz, 1978).[2]

Significant government interventions in the crop markets in most sub-Saharan Africa (SSA) countries during this period were based on the need to enhance rural livelihoods and consumer welfare in urban areas. Traditional agricultural production was mainly concerned with satisfying basic subsistence requirements, as market incentives were deemed to be inefficient means of stimulating agricultural production. Price incentives were thought to be quite inadequate policy instruments for raising agricultural supply, and instead, extensive price control and regulations were deemed necessary. Thus, governments in SSA actively participated in crop markets in various forms, including establishing grades and standards; setting marketing periods; licensing; taxation; price controls; and direct market control through warehouses or marketing boards. Although in some settings the private sector played a role, government control was the rule (Bates, 1993; Kherallah et al., 2002).[3]

In Tanzania, as was for most other SSA countries during this period, except for a short period of 1961 – 1967, where market forces determined the prices, the prevailing view was that peasant supply of crops was unresponsive to market signals; hence the need for government intervention. Thus, during the first decade and a half after independence and following the Arusha Declaration in 1967, the government relied on a traditional control model in its attempts to promote the agricultural sector. Price

[1]According to Schultz' line of reasoning, peasant do not remain at low-income levels as result of a failure to respond to price incentives neither motivated by traditions; rather it is the incentives to produce, and sell have been poor. Thus, there is a widespread consensus that farmers/peasants in developing countries are responsive to incentives, at least for individual crops.

[2]Incentive distortion was viewed partly as the result of lack of faith in the price mechanism and market forces – what Deepak Lal (1983) has termed as '*dirigisme dogma*'.

[3] One of the argument have been that there have been weak supply response in many instances, and the estimated elasticities of supply response were fairly low or even insignificant in many of the empirical studies in SSA countries (Lundahl and Ndulu, 1897).Supply response was perceived to be constrained by institutional factors such as inadequate infrastructure, poorly developed markets, rudimentary industrial sectors, and severe institutional and managerial weakness (World Bank, 1983).

incentives were thought to be quite inadequate policy instruments for raising agricultural supply (Lundahl, 1987; Lundahl & Ndulu, 2022).

By the early 1970s, the government had control of most aspects of economic activity, where, among other things, the bulk of international trade and private retail trade had been confined to state agencies, administered prices had largely replaced market prices, and a National Price Commission was established to set prices for the vast range of commodities. In a sense, comprehensive price controls in Tanzania began with the establishment of the Regulation of Prices Act of 1973, in the form of domestic consumer pricing regulation by the price commission, and producer price regulation by marketing boards. In early 1973 the government formed the price control task force and charged it with the responsibility of fixing ceiling prices of so-called essential items, where by May 1973, four hundred items had been put on the price control list (Semboja & Rugumisa, 1988).[4] The price control and effective rationing system during this time aimed at protecting consumers against unnecessary price increases (or changes) of the early 1970s, and it was argued by some economists it was necessary (Rice, R. C.,1979; Witworth, A., 1978).[5]

Even though from the mid-1970s to mid-1980s, the economy experienced a series of economic crises, and Tanzanian consumers experienced acute shortages of almost all consumer goods, and so was foreign exchange. Government monopolization of marketing in the early 1970s to early 1980s undercut the rewards to peasant production, while inefficiencies drove down producer prices. Effective price controls under conditions of perpetual shortages of most of the price-controlled goods resulted in a deterioration in economic activity, which could not be realized even when it was complemented with rationing. While rationing measures could effectively complement price controls over short periods, prolonged shortages experienced during this period called for a different outlook on the pricing system and crop markets in Tanzania, even when the basic objective of fostering equity remains valid (Semboja & Rugumisa, 1988).

In responding to the pressure from within and outside the country, post-1985 saw a series of economic reforms that aimed at the transition into the market economy. This included devaluation that removed the downward pressure on farm incomes caused by an overvalued exchange rate. Import liberalization made basic consumer goods available after years of acute shortages. The monopoly of state trading companies and cooperatives unions was broken for both export and staple grains markets, and most agricultural crop markets are now involving significant local and international players, with varying degrees of competition (Cooksey, B., 2003, 2011).

Thus, the liberalization of agricultural input and crop markets during this period ended more than two decades of state control in agricultural crop markets. While export crop

[4]March 1974, 602 groups of domestically produced items and 464 groups of imported items were controlled.
[5]During this period too most of the rural population was forced to resettle in 'Ujamaa Village" as a party of strategy to promote cooperative agriculture; and monopoly government marketing boards had replaced peasant-marketing cooperatives.

market liberalization seems to have failed to take place as expected, the 'deconfinement' of domestic food crop marketing after 1986 saw the successful replacement of national milling corporations by private traders and the end of 'pan-territorial' pricing. Gradually, all crops have been liberalized, and the role of parastatal crop authorities has been reduced. From 1991, fertilizer subsidies were phased out and markets were opened to private traders (Booth *et al*., 1993; Cooksey, B., 2003). The hopes were that private traders would compete away rents and improve the operation of price mechanisms, and in turn allow farmers to respond to price signals from larger markets, leading to better resource allocation, higher productivity, and higher returns (Staatz et.al, 1989; Dillon and Dambro, 2017).

Notwithstanding the efforts and measures taken to pave the way for the participation of cooperatives and private traders in the marketing of crops in a competitive marketing environment that included competitive prices and free entry of marketing actors (producers, traders, processors, exporters and consumers) at all levels, experience has shown that the anticipated gains have not been fully realized. Particularly for food crops, mainly because the reforms did not put in place an orderly marketing system for the crops in place. The producers are not guaranteed markets for their crops in all localities due to, among other reasons, the weaknesses of cooperative societies; lack of farmers' associations, inadequate number of competing buyers, and absence of regulatory institutions to oversee the quality and standard for food crops. Consequently, producers have not received remunerative prices and at times they have remained with unsold produce in cases where buyers do not turn up or offer low prices. In other cases, substantial post-harvest losses have been incurred by farmers which, in turn, have tended to intensify rural poverty and unemployment levels. At the same time, consumers in urban areas have been facing high and persistent increases in basic food crop prices despite many efforts of reforms that have seen significant improvement in distribution infrastructure, logistics, and transport (URT, 2008).

Within this background, the key research questions this study set to address is: who gets the rent? In particular, the study seeks to examine why there has been over time a significant and marked difference between the farm gate prices that producers are receiving in rural areas and the retail prices that consumers are paying in cities and urban areas. Aside from other factors such as income growth, population growth, weather shocks, infrastructure, and production input cost, it is also important to understand whether existing crop market structures in Tanzania matter. In a non-competitive market structure, middlemen with high market power may dominate the pricing of the commodities along the supply chain or across spatially distinct markets. In such circumstances, price increases in some markets may be completely and quickly transmitted to other markets, whereas price reduction might remain sticky, implying that what goes up does not come down, hence leading to price increases (Abdulai, 2000). As such it is important to examine whether farmers have any bargaining power, and what the evidence says about the competitiveness of food crop markets in SSA.

Thus, understanding the degree of competition among traders has been a priority both for researchers and policymakers across the globe. A common belief is that crop markets are not fully competitive, and traders earn rents. This belief is usually based on anecdotes or on a suspicion that farmers are exploited, not on evidence of non-competitive pricing (Sitko and Jayne, 2014). Traders are convenient scapegoats with politicians and others frequently perpetuating the view that traders collude to underpay farmers, resulting in ongoing distrust between the public and private sectors (Ellis & Manda, 2012; Tschirley & Jayne, 2010).

This study utilizes community-level survey data from the National Panel Surveys (NPS), supplemented with monthly commodity price data from regional and district markets across Tanzania, as well as field survey data, to quantify and examine the extent of the price gap between farm-gate and retail prices in the maize market. Understanding this price disparity is crucial for informing evidence-based policymaking aimed at addressing inefficiencies in crop markets and improving the welfare of both producers and consumers.

The structure of the paper is as follows: Section 2 reviews the relevant literature on agricultural markets and price transmission. Section 3 provides contextual background on commodity pricing and crop marketing systems in Tanzania. The methodology and data sources employed in the analysis are detailed in Section 4. Section 5 discusses the key findings of the study, and Section 6 concludes with a summary of the results and implications.

# 2. COMMODITY PRICES AND CITY MARKETS: A REVIEW OF LITERATURE

## 2.1 Theoretical Review

Theory postulates that openness allows the private traders to compete away rents and improve the operation of the price mechanism. This, in turn, allows farmers to respond to price signals from city markets, leading to better resource allocation and higher productivity (Staatz et al., 1989). Thus, understanding the degree of competition among traders has been a priority for both research and policy, with the belief that markets are not fully competitive and traders earn rents. This belief is often based on a suspicion that farmers are exploited, not on evidence of non-competitive pricing, where traders are convenient scapegoats, with politicians and others frequently perpetuating the view that traders collude to underpay farmers, resulting in ongoing distrust between the public and private sectors (Ellis & Manda, 2012; Tschirley & Jayne, 2010). Thus, the proper functioning of markets and marketing channels is vital for the optimal allocation of resources (Abdulai, 2000).

Under the hypothetical (yet common) situation, there are competitive and non-competitive [6]forces that can increase marketing margins above expected trade margins or profit levels. According to the standard price theory trader's gross marketing margin, before subtracting costs, is the difference between the price paid in purchase market $i$ at time $s$, $p_{is}$, and prices received in the sales market $j$ at time $t$, $p_{jt}$. If the trader is engaged in purely intertemporal arbitrage within the same market, then $i = j$. Likewise, a period $t$ may occur very soon after a period $s$ if the crops are stored by the trader only for a matter of hours or days. Let the full cost of transferring goods between markets be $\tau$, including transport costs, compensation for the trader's investments of time, capital, and materials, financing costs, and any costs associated with the processing or transformation of raw goods. If the purchase and sales markets are competitive, the trader takes $p_{is}$ and $p_{jt}$ is given, and the marginal revenue on each unit is equal to the price paid by traders to all sellers (marginal revenue pricing). Traders who offer less than the market price cannot find sellers; those who pay more than the market price earn negative profits and eventually exit the sector. Under these conditions, the trader's profits are zero in expectation $E[\pi] = E\left[(p_{jt} - p_{is}) - \tau\right] = 0$.

We begin by assuming that crop markets are competitive. There are numerous reasons that a trader might earn what appears to be non-competitive rent despite being in a fully competitive market. One is that traders might be absorbing substantial risks, first, risks due to trading within a single season, where short-term price fluctuations introduce significant risks. Another class of risk stems from variation in margins across markets, where traders operate over multiple years, drawing from a distribution of profits across space and time. Also, there is a class of risks that stem from uncertainty

[6]We do not attempt to describe the full set of supply and demand factors that determine the market prices of crops at various points in the value chain.

about possible government intervention in the short or medium term, such as ad hoc policy responses to emerging food crises, such as price controls, often implemented without clear warning and in the absence of pre-determined rules (Jayne, 2012). This, in essence, is a case of misspecification where the observer has not fully understood the problem being solved by agents on the ground.

In addition, traders might have costs that are unobserved by the researcher; for example, they may have fixed costs for purchasing and maintaining trucks, carts, storage facilities, and tools such as scales and bags, most of which are difficult to observe and value appropriately. Matters are complicated further if fixed costs are recoverable. Furthermore, traders may provide services at zero marginal cost that are unobserved by the researcher, where, for example, traders may know which crops are selling well in which markets and know the premiums for particular varietals. If they communicate this during a purchase, the farmer's acceptance of a lower output price may include an information payment. In addition, liquidity-constrained farmers may sell to small traders who arrive immediately at harvest time. The connection between farmers and traders is a form of social capital that some farmers value. All these cases are instances of measurement error concerning the costs incurred by traders or the benefits received by farmers.

For the case of a non-competitive case, we assume that food crop markets are not fully competitive, and traders earn non-competitive rents. This situation can only be sustained if there are barriers to entry. If entry is free, but no one enters to compete away what appears to be rents, it is difficult to argue that the market is not competitive. In such a case, the equilibrium marketing margins reflect the market fundamentals. There may still be a case for intervention in such markets on social welfare or political grounds, but such policies would not be motivated by a lack of competition in output markets.

One type of entry barrier that may underlie a non-competitive market are natural barriers. For example, farmers in SSA are spatially dispersed and served by poor roads, which results in some years farmers having little marketable surplus. Under these circumstances, certain rural markets may only support profitable trading by a few traders, where the traders who serve any one of these markets may enjoy some market power and underpay farmers as a result.

There are barriers due to the activities of current traders, where even if there are no natural barriers to entry, current traders could act to deter entry. One possibility is that established traders lobby village leaders for privileged access to storage facilities or permission to begin purchasing crops before the season opens. Alternatively, large traders may coordinate to divide up the countryside, thereby reducing competition in any given village. Larger traders might also engage in short-term loss pricing to drive out smaller competitors. Also, traders may actively or tacitly collude to fix prices. Another type of entry barrier is due to policy or regulation; examples here include

registration requirements, licensing of vehicles, taxes collected at roadside checkpoints, adherence to standards, or payments for inspections.

However, these regulations only create barriers to entry if one of two other circumstances occurs. The first is whether the regulation creates long delays in authorizing new traders, thereby limiting entry. The second is one in which regulatory costs are so excessive that they create a natural barrier to entry.

### 2.2 Empirical Evidence

The empirical evidence provided in this section aims to answer the question: What does the evidence say about the competitiveness of crop markets in low-income countries like those in SSA? Although there are a few common empirical approaches in establishing the degree of competition in crop markets, a careful measurement of trader profits, descriptive or regression-based approaches using trader or farmer surveys, and impact evaluations, the focus of the review here is only on the analysis of market prices across space or time. The logic underlying this approach is that if markets are connected and competitive, the spread $[p_{jt} - p_{is}]$ cannot be above the transfer cost $\tau$ for an extended period because traders arbitrage away the difference (Barrett, 2001; Fackler & Goodwin, 2001; Ravallion, 1986).

The review of empirical evidence, focused on studies on food crop markets, for the recent papers, was conducted after most structural adjustment reforms were complete or well underway. These are papers that have employed one of two general approaches to estimation. One is based on the parity bounds model of Baulch (1997), which uses observations or extrapolated estimates of transfer costs between markets to identify the probability of the market price spread being equal to, below, or above the transfer cost. The second approaches use cointegration analysis, threshold autoregression, or related time series techniques to examine the degree of integration between two markets.

Badiane and Shively (1998) use early models of cointegration to test for spatial price integration between a major central maize market and two local wholesale markets in Ghana. These authors employ monthly data from 1980–1993 and find clear support for spatial integration. Adjustment is rapid, but not immediate: price shocks typically transmit from the major market to the branch markets within four months.

Also in Ghana, Abdulai (2000) utilizes threshold cointegration analysis to study wholesale maize market integration, comparing price transmission between Accra and two local markets. Abdulai (2000) allows for asymmetric adjustment to price increases and decreases; data are monthly, covering 1980– 1997. Abdulai (2000) finds rapid price transmission; all estimated transmission rates are above 34 percent per month, indicating that deviations from long-run equilibrium have a half-life of less than two months. Price increases are passed on more quickly than price decreases, which Abdulai (2000) interprets as evidence of costs to adjusting prices (menu costs) or

inventory levels, rather than imperfect competition. Given the relatively short adjustment periods in both directions, this interpretation seems warranted.

Van Campenhout (2012) studies price adjustment, central, and southern Mozambique from 1994–2001. Segmentation is possible here, as southern Mozambique is a maize-deficient region with poor road connections to the northern maize-producing areas. In some models, the authors use monthly prices in combination with transport costs to estimate a parity bounds model (Baulch, 1997). In other models, they use weekly prices to estimate vector autoregressions without transport costs. The results of these two approaches are broadly consistent. Within each region, prices move in a manner consistent with competitive arbitrage. Additionally, markets in the southern and central regions are well integrated. The north, however, is effectively isolated from the other two regions because the cost of shipping grain from the north usually exceeds the price spread. As the authors state, "The problem does not seem to be a lack of traders to ship grain from low price areas to high price areas. The problem is that transport costs are so high that it is not profitable to ship the grain."

Van Campenhout (2007) studies price adjustment between six wholesale maize markets in Tanzania using a threshold autoregressive model (TAR); the data are from 1989–2000. The approach allows transaction costs and the speed of adjustment parameters to change over time. Van Campenhout (2007) finds that market performance improved during the 1990s, with price differences decaying by 50 percent in one to five weeks across market pairs. Slower price adjustments are possibly due to bad road conditions or police checkpoints. Overall, the findings are consistent with rapid spatial arbitrage and robust competition.

In Madagascar, Moser et al. (2009) use a modified parity bounds model to study rice market integration at the local, regional, and national levels. The data are unique for this subsection in that the time dimension is short: prices are only available for the four quarters of 2001. However, the data are spatially fine-grained, including rice prices and transport costs for almost all of the country's 1,394 districts. These authors aim to differentiate between three marketing regimes: competitive equilibrium in which the price difference is equal to the transfer cost; a segmented market regime where transfer costs are too high to warrant arbitrage; and a state of disequilibrium, or imperfect competition, in which traders are potentially earning positive rents because the price spread exceeds the transfer cost. When the authors do not allow for unobserved variable transfer costs, they find that small sub-regional markets are usually well integrated (regime 1), long-range national markets are usually segmented by high transfer costs (regime 2), and mid-range regional markets are most often characterized by imperfect competition (regime 3).

However, when the assumption of zero unobserved transfer costs is relaxed, a competitive trading equilibrium (regime 1) is the most common state at all three scales. Thus, while the authors find possible evidence of imperfect competition at the regional level, they show that the findings are also consistent with perfect competition and

unobserved trader costs. The authors argue that if competition is limited at the regional level, it is likely due to the high cost of trucks and storage facilities for medium-distance trade.

Myers (2013) uses weekly data from 2001– 2008 to study price adjustment between 10 maize markets in Malawi. Using a model that allows for different regimes based on the possibility of trade in either direction, Myers (2013) finds rapid rates of adjustment. Half-lives for price spreads lie between 0.6 and 2.2weeks, on par with the United States (Goodwin and Piggott 2001). The conclusion is that maize market integration is reasonably complete throughout the country, consistent with robust competition.

Casaburi et al. (2013) use a road construction program in Sierra Leone to study the effect of lower transport costs on price spreads between markets. These authors use a variety of data, including census data, farmer surveys, trader surveys, market prices, and data on road construction and quality spanning the period 2003–2011. They find that price spreads fall with the improvement of roads between markets, consistent with a model of costly search under competition, but not with various models of imperfect competition.

In Ethiopia, Minten et al. (2014) use cereal market price data to study changes in price spreads between markets from 2001–2011. Data are monthly for 66 markets and five crops: teff, barley, wheat, maize, and sorghum. Using TAR models with empirical estimates of transport costs, these authors find that markets became significantly more integrated over the study period. The average speed of adjustment increased by 25 percent for white teff, 50 percent for mixed teff, 22 percent for red teff, 45 percent for white wheat, 33 percent for maize, 11 percent for white sorghum, and 85 percent for mixed barley. In 2011, the average half-life of adjustment was less than two months for all crops other than white sorghum and was less than one month for maize and white teff. Based on focus groups, the authors identify five factors that led to increased integration between 2001 and 2011: economic growth, urbanization, road construction, mobile phones, and improved extension and technology adoption.

The overall conclusion from this subsection is that crop markets in SSA are well integrated at the local and regional level, indicating the likely presence of robust competition. Two papers showed evidence of market segmentation over long distances when transfer costs exceed price spreads (Moser et al., 2009; Tostão & Brorsen, 2005). There is slightly less clarity at the level of medium-distance trade, where high transaction costs and physical capital requirements may dampen entry and reduce competition.

But the evidence for imperfect competition is far from conclusive and is also consistent with unobserved transfer costs. While this literature remains subject to some important methodological caveats – for example, many papers do not account for possible cointegration between market prices – the evidence shows widespread competitive arbitrage between wholesale crop markets.

# 3. TANZANIA CONTEXT: AGRICULTURAL MARKETING AND PRICING SYSTEM

## 3.1 Agricultural Marketing and Pricing Policy

The development of an appropriate agricultural marketing system has been one of the main concerns of the government of Tanzania since its independence in 1961. This is borne out of the realization that marketing and processing organizations are principal instruments for accelerating the agricultural and rural development process. When the general outlines of agricultural development were laid down in the early 1960s, as in most of the developing world and SSA countries, the prevailing view was that the peasant supply of crops was unresponsive to market signals. Smallholder peasants were believed to have rather low target levels of income. Once these income levels were reached, peasants would not aspire to higher levels of income. Thus, traditional agricultural production was mainly concerned with satisfying basic subsistence requirements, and market incentives were deemed to be an inefficient means of stimulating agricultural production (Amani and Ndulu, 1987; Lundahl and Ndulu, 1987).

As a result, price incentives were thought to be quite inadequate policy instruments for raising agricultural supply. This was one of the fundamental assumptions on which Tanzanian post-colonial agricultural policy, with extensive regulations, came to be based for more than two decades (Lundahl & Ndulu, 1987). During the early years of independence, the Tanzanian government relied, according to Lundahl and Benno Ndulu (1987), on a traditional control model in its attempts to promote the agricultural sector. The control model was based on two central assumptions, the first being the conventional view that peasant smallholders were unresponsive to market signals, such as prices. The second assumption was that commercial production in African agriculture could only be ensured by a 'monopolistic/monopolistic integrated organization', since traditional subsistence agriculture itself was considered unable to provide the stimulus to commercial development (Lundahl & Ndulu, 1987).[7]

Given its dominance in the domestic economy during this period, agriculture was also the sector on which, according to the Arusha Declaration in 1967, the blueprint for Tanzanian socialism – the development of independent Tanzania was to be based (Hedlund and Lundahl, 1987). Thus, during most of the 1970s and the 1980s, the official producer and consumer prices of the main crops were not determined by the market forces of supply and demand. They were instead administratively determined: controlled by the central government and guaranteed by the organizations within the official marketing system. Producer prices were being set annually and announced in advance of the crop season (Amani and Ndulu, 1987; Ellis, 1982).

[7]Modernization of the poorly developed physical infrastructure and production technology could thus only be realized through subsidies, financed by state or parastatal bodies.

Official producer prices were fixed at low levels, the main reason for maintaining low producer prices for food has been the government's ambition to provide the urban population with cheap food, by keeping consumer prices low (Lundahl and Ndulu, 1987). Hence, the importance of the price mechanism in agriculture was long neglected. Most agricultural producer prices were subject to controls, and the use of price incentives to stimulate agricultural production was limited. Instead of market incentives, extensive campaigns largely comprised of political campaigns, moral suasion, exhortation, and even coercion, such as by-laws on minimum acreage, to promote agricultural development (Amani and Ndulu, 1987; Lundahl and Ndulu, 1987).[8]

Comprehensive price controls in Tanzania began with the establishment of the Regulation of Prices Act of 1973, as before that, price controls were applied to a few urban consumer staples. In early 1973 the government formed the price control task force and charged it with the responsibility of fixing ceiling prices of so-called essential items, and by May 1973, four hundred items had been put on the price control list (Semboja & Rugumisa, 1988). The Act of 1973 established the National Price Commission (NPC) and endowed it with statutory powers to fix and review ceiling prices of goods sold in Mainland Tanzania, mainly consumer staples and essential items; and by March 1974, 602 groups of domestically produced items and 464 groups of imported items were controlled. Price controls during this time aimed at protecting consumers against unnecessary price increases of the early 1970s. Grounded on equity grounds, the pricing system adopted by the NPC was based on the assumption that price-controlled goods would be readily available in the market and that, for those in short supply, an effective rationing system would be in operation to ensure that consumers paid the official NPC prices (Semboja & Rugumisa, 1988).

State-controlled economic policies and strategies during this period functioned as significant disincentives to both overall economic performance and agricultural development. These interventions entrenched systematic anti-agriculture and anti-export biases, undermining incentives for production and trade. By the late 1970s and early 1980s, the economy faced acute structural distortions: severe shortages of essential goods—particularly staple foods—alongside critical deficits in agricultural inputs and foreign exchange. These constraints were compounded by a widening parallel exchange market premium, the proliferation of illicit cross-border trade, escalating capital flight, deepening debt crises, and persistently weak performance across productive sectors. Notably, until 1973, the Tanzanian government failed to recognize the pivotal role of producer prices as a mechanism for incentivizing agricultural output (Hedlund and Lundahl, 1987).[9]

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[8] The traditional control model was particularly prejudiced against food production and affected allocation.

[9] Between the mid-1970s and mid-1980s, the Tanzanian consumers experienced acute shortages of almost all consumer goods. Effective price controls under conditions of perpetual shortages of most of the price-controlled goods, resulting deterioration in economic activity, cannot be realized even if it is complemented with a rationing.

Following the evident failure of earlier crop price-control policies, most Sub-Saharan African countries—including Tanzania—embarked on market liberalization through structural adjustment programs beginning in the mid-1980s. This shift marked a decisive move toward opening crop markets to private competition and leveraging producer prices as a key policy instrument for stimulating agricultural output. The reforms emphasized relative price adjustments between food and cash crops, as well as between agricultural and non-agricultural products (Hedlund & Lundahl, 1987).

As part of Tanzania's structural adjustment process, the government implemented a series of major agricultural pricing reforms from the mid-1980s to the early 1990s. These included the decontrol of marketing for non-traditional export crops in 1986, followed by food crops in 1989, and ultimately traditional export crops during the 1993/94 marketing season. The liberalization of agricultural marketing aimed to foster a competitive environment by enabling cooperatives and private traders to participate fully in crop marketing. This competitive framework was characterized by market-determined prices, free entry of actors—including producers, traders, and exporters—at all levels of the marketing chain, and the dismantling of state monopolies (URT, 2008).

As a result of these reforms and measures taken, some major achievements have been attained. Devaluation removed the downward pressure on farm incomes caused by an overvalued exchange rate. Import liberalization made basic consumer goods available after years of acute shortages. The monopoly of state trading companies and co-operative unions was broken for both exports and staple food crops, and most agricultural markets are now involving significant local and international players, with varying degrees of competition. The gradual liberalization of agricultural input and output ended two decades of state control that had seen the successful growth of the internal staple crops markets and a large fall in the production of traditional export crops. The 'deconfinement' of domestic food crop marketing after 1986 saw a successful replacement of the National Milling Corporation monopoly by private firms, and the end of the 'pan-territorial' pricing. Gradually, therefore, all crops were liberalized, and the role of parastatal crop authorities was reduced, followed by a drastic fall in the role of co-operatives in input and output markets. Even though, while internal crop food markets have largely been liberalized, that of export crops has been slow (Cooksey, 2003, 2011).

### 3.2 Agricultural Marketing and Pricing Policy

During the early years of post-colonial Tanzania, the economy was largely agrarian largely carried out by women in rural areas, as indicated by the large shares of agriculture in production and exports. In terms of cultivated area and output, the agricultural sector was dominated by the small-scale farming sector, or the peasant

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While rationing measures can effectively complement price controls over a short time periods, as in war situations, prolonged shortages as experienced during this period, calling for a different outlook to the pricing system, even the basic objective of fostering equity remains valid.

sector. The peasant sector probably accounts for no less than 90 per cent of the cultivated land, and during the 1970s, the sector provided some 70 –75 per cent of the total deliveries to the official markets (Ödegaard, 1985). The average cultivated area per rural household is small. At the Population Census in 1978, the average holding was estimated to be less than 2 hectares, and within the peasant sector alone, the average was about 1.26 hectares, relying predominantly on the use of hand tools for produced output, according to the Agricultural Census of 1971/72 (Skarstein and Wangwe, 1986). At the same time, there was also a large-scale farming sector, consisting of both private and state farms, although farms over 20 hectares account for only 0.1 per cent of all mainland farms (World Bank, 1990).

Despite strong efforts to foster collective production, particularly via the villagization programme, a major part of agricultural production was carried out on private plots. Communal farming never accounted for more than 0.5 per cent of the total land under cultivation. So-called block farms, where the land within the village has been divided into private plots, now dominate agricultural production of both food and cash crops (Skarstein and Wangwe, 1986; Amani *et al.,* 1987; Hedlund and Lundahl, 1987). During these early years, marketing cooperatives were promoted in all parts of the country to eliminate the exploitation of peasants by middlemen. Private trading in the crops handled by the cooperative was banned and by April 1966, there were 33 cooperative unions and 1,500 primary societies handling agricultural produce. Several special commodity marketing boards were established with a view to developing the marketing of agricultural produce both for internal distribution and exports that covered coffee, cotton, sisal, tea, tobacco, cashew, pyrethrum, sugar and livestock, and dairy products. While the National Agricultural Products Board (NAPB) handled major food grains.

Following the Arusha Declaration in 1967, there was a growing concern that the existing crop marketing boards and cooperative marketing societies could turn into capitalist institutions, hence the need for a new orientation. Hence, the creation of new primary co-operative societies based in Ujamaa villages, the formation of regional co-operative unions, and intervention in the election of committee members in the unions were some of the steps taken to bring about the change. This was also recognized that the former colonial system of marketing boards was too limited in its approach to meeting the development needs of the agricultural sector.[10] The establishment of several crop authorities replaced the earlier commodity marketing boards.

The set-up of the institutional structure was closely related to the socialist strategy. The so-called Ujamaa programme was adopted after the Arusha Declaration. The programme aimed at restructuring the rural areas in a socialist direction. To promote collective production principles, the scattered population was to be transferred into

[10]The former NAPB was dissolved in 1973 and many of its functions were absorbed by National Milling Cooperation (NMC). The Cashewnut Authority of Tanzania (CATA) was established in 1973; the Sugar Development Cooperation (SUDECO) assumed the functions of the former National Sugar Board in 1974 and the management of the publicly owned sugar estates from NAFCO.

larger so-called Ujamaa villages. Initially, the villages were to be formed voluntarily. The actual results of the program were, however, limited: few Ujamaa villages were formed. Eventually, after several campaigns of persuasion had been launched, the so-called villagization policy was introduced in 1973. It made the resettlement of all Tanzanians into registered villages by the end of 1986 compulsory and was finally completed by military force. An institutional infrastructure was created in the form of a single-channelled official marketing system for the agricultural sector. The motive for replacing private middlemen in the distribution chain was the removal of one of the sources of exploitation of the peasants (Hedlund and Lundahl, 1987).

Through this system, agricultural supply was to be marketed and processed, and inputs, credit, extension services, and physical infrastructure, principally transportation, were to be provided (Amani *et al.,* 1987; Amani and Ndulu, 1987; Lundahl and Ndulu, 1987). To begin with, a three-level system was adopted, with primary and secondary cooperatives for regions and crop-specific marketing boards at the top. Single crop monopsonies/monopolies were created for export crops, while the marketing of all food crops has been handled, since 1973, by one single authority: the National Milling Corporation. In 1976, the cooperatives were abolished, and a two-level system was created. Registered villages took over the cooperatives' role as primary agents. The functions of the marketing boards, which were reformed into so-called crop authorities, were expanded (Lundahl and Ndulu, 1987; van Cranenburgh, 1990).

However, by the late 1970s and early 1980s, the country found itself in a deep economic crisis; to reduce marketing costs and improve the general efficiency of the distribution system, the government decided, in 1982, to reinstate the cooperatives (van Cranenburgh, 1990). They were eventually reintroduced in 1985/86 (MDB, 1987). With the eventual extension and deepening of the reforms, restrictions on private trade in major food grains were relaxed. In 1986, a three-year structural adjustment programme, supported by the World Bank and the International Monetary Fund was adopted: the Economic Recovery Programme (ERP) (URT, 1986). The ERP gave particular emphasis to the removal of transport bottlenecks, and the monopoly/monopsony of the state-controlled marketing system were gradually weakened. Trade in export crops was not, however, liberalized to the same extent (Eriksson, 1992)

As it was in the early days after independence, so are the recent days following significant agriculture sector reforms; there have never been significant changes in the marketing structure of agricultural staple crops, so are their main players. At lower level there are local village crops market where traders faced a farm gate price at producers'/farmers' farms or a road stand (a meeting place where farmers meet with traders/middlemen) to an organized rural district or regional market where traders or their agents are facing a wholesale prices to city and national crop markets where traders are facing whole prices while consumers are facing retail price in urban areas after being auctioned at a wholesale price (by either the producers or traders/middlemen of rural markets) and thereafter retailed in various ways, including

individuals, shopkeepers, stall owners in city markets, food suppliers/contractors to institutions, to mention some; for the main staple.

# 4 METHODOLOGY AND DATA SOURCES

## 4.1. Methodology

There are several approaches widely employed in empirical literature to explore rent-seeking behaviour (marketing margin) at different stages of marketing (Dillon & Dambro, 2017). In this study, we use a marketing margin analysis or price spread using a spatial analysis of market prices. This involves, first, estimating the marketing margins/markup of traders at different geographically separated markets. The approach aims to explore and compare the marketing margins at different stages of marketing. Given the empirical literature, the mark-up approach estimated at different identifiable markets (farm gate, wholesale at regional and city markets, and retail prices) takes the following form:

$$P_j = (1 + m_j) * P_i \quad (1)$$

where $P_j$ and $m_j$ reflect the price and markups at market $j$ (i.e. price at destination market) and $P_i$ is the price at market $i$ (i.e., price at origin market). The equation can also be expressed as follows:

$$m_j = \frac{P_j}{P_i} - 1 = \frac{P_j - P_i}{P_i} \quad (2)$$

The estimated markups (price spread) using equations (1) or (2) do not, however, reflect the actual markup received by the agent at market *j* as it does not account for the transaction costs (search cost, handling costs, transport cost, and storage cost). Thus, the estimated markup $(m_j)$ might not reflect the actual amount received by agents at market *j* and does not factor in the difference in the market structure and competition.

Given the weakness of the above approach, the study uses a spatial price setting at different identified markets (local, regional, and city markets) that incorporate the transaction costs between identifiable markets (searching, handling, transport, and storage costs). The approach is adopted from that of Cirera and Arndt (2008) with a minor modification.

According to the spatial market approach, traders' net markups (margins) are determined by several factors, including searching, handling, transport, and storage costs. In a perfectly competitive market, the difference between the price at source and the price at destination only reflects search costs, transport costs, storage costs, and processing costs of traders[11] with no possibility of rent extraction.

Let $P_j$ and $P_i$ denote the price at destination and origin locations (markets)[12], then,

$$P_j = P_i + \tau(X_{ij}) + \mu_{ij} \quad (3)$$

[11]For brevity, we assume that there are no costs associated with processing costs of traders and focus on search and transport costs.

[12]The destination denotes the market under analysis (local market, district, or regional agricultural markets).

where the price in a destination location ($P_j$) is the sum of the price at the origin location ($P_i$), transaction costs $\tau(X_{ij})$ , and a mark-up or trader's profit (i.e. rent) ($\mu_{ij}$). The transaction costs $\tau(X_{ij})$ include the cost of collecting, handling, and transporting agricultural products from local markets to the selling points (market). In terms of spatial price differences and following Atkin and Donaldson (2015), we can now rewrite this equation as follows:

$$P_j - P_i = \tau(X_{ij}) + \mu_{ij}(c_{ij}, \phi_{ij}, D_{ij}) \quad (4)$$

Equation (3) shows that the price spread between the two markets equals the sum of transaction costs and the trader's net margin/profits. The trader's net markup or profits ($\mu_{ij}$) is a function of the trader's marginal cost ($c_{ij}$), the competitive environment faced by traders, summarized by the competitiveness index ($\phi_{ij}$, and demand conditions ($D_{ij}$).

Equation (4) indicates that the price spread between the two markets ($P_j - P_i$) are determined by the transaction cost ($\tau(X_{ij})$) which depends on other factors such as the distance between markets and the quality of roads. The estimated rent (or net mark-up) ( $\mu_{ij}(c_{ij}, \phi_{ij}, D_{ij})$) as in equation (4) reflects the amount of rent extracted by the agent at j$^{th}$ market. The magnitude of rent may reflect how imperfect the markets are with slow price transmission, thus rendering an arbitrage opportunity. In addition, after accounting for the transaction costs, the markup provides information on who gains from the market (is it the farmers, small traders, wholesale traders, or retailers) and the possible intervention. Under competitive conditions, $\mu_{ij}$ equal to 0. If the $\mu_{ij}$ is greater than 0, then it is believed that there is an opportunity for traders to obtain more than normal profit. The main challenge of examining rent-seeking behaviour, as in most literature for rural Sub-Saharan Africa, is the absence of robust data on transaction costs $\tau(X_{ij})$).

To understand, why farmers receive low prices (low rent), we estimate the following specification to examine the effects of transfer costs (distance or time travelled to markets) between the farmers/village to the main market centres (e.g, district and region headquarters).

$$\ln(P_{ct}) = \alpha + \beta \ln TC_{ct} + \beta \ln Q_{ct} + \gamma X_{ct} + \gamma_r + \gamma_m + \varepsilon_{ct}$$

where $P_{it}$ is the farm-gae prices received by farmer in community(village) c at time t; $TC$ is the ransfer cost (distance or travel time to markets) between the community and the commercial centres (district and regional headquarter); $Q$ is the quantity for price measurement (amount in KG); $X_{it}$ is a set of other explanatory variables such as existence of cooperatives and saving organization (SACCOS) at community level. $\gamma_r$ and $\gamma_m$ refer to regional fixed effects and year-month fixed effects, and $\varepsilon$ is error term.

## 4.2 Data Sources and Descriptive Statistics

Assessing the marketing margin, assessing the integration and competitiveness of the crop market requires detailed spatial price data from different market segments. The study makes use of several data sources, including primary data from field survey data, community-level survey data (from National Panel Survey-NPS), and monthly price data from the Ministry of Industry and Trade (MIT).

### Field Survey Data

The field survey was conducted to supplement information gathered from the secondary sources, the household surveys, and monthly prices from the regional markets. Due to the absence of transaction costs, the field survey focused mainly on collecting information on the marketing/trader's transaction costs at different stages of the marketing segment, including search costs, assembling costs, packaging costs, transport costs, and storage costs. The data collection was done using a semi-structured questionnaire for the small-scale traders, large-scale traders, and wholesale traders. The semi-structured questionnaire was designed to rigorously explore the structure, conduct, and performance of the market at different marketing stages.

The sampling of traders (small and large) to be interviewed was conducted through a purposive sampling approach. First, major crop-producing regions (regions with surplus) of maize production were identified. From each identified major producing market, the key crop markets were randomly selected for the interviews. Wholesale traders were purposively interviewed by visiting key crop markets[13].

### Community-level Data

The analysis presented in this study also uses data from the third, fourth, and fifth National Panel Survey (NPS). In addition to other information, the NPS collects various information, including prices in the community (street/village). We use this data as a proxy for farmgate prices received by farmers, and the information was matched with regional wholesale and city wholesale and retail prices based on the year and month of the survey.

### Monthly Price Data

Additionally, the study utilizes monthly wholesale from the five regional markets. We focus on maize surplus-producing regions, which are Iringa, Ruvuma, Mbeya, Rukwa, and Dodoma, and the Dar es Salaam deficit city markets. The wholesale price data comes from the Ministry of Industry and Trade (MIT). Table 1 presents descriptive statistics for prices, wholesale and retail prices based on the NPS data that is matched to MIT prices data. On spatial price differences, the farmgate prices in rural producing areas are, on average, half of what consumers are paying in city markets. It is therefore instructive to understand what determines the differences between spatial prices across regions and between rural producing areas and urban consuming areas; there

[13] Fieldwork was conducted in markets in Iringa, Kibaigwa in Dodoma, Mwanjelwa in Mbeya, Njombe, Songea in Ruvuma, and Sumbawanga in Rukwa.

is an influence or dominance of the private traders. Figure 1 shows the distribution of the farm-gate price.

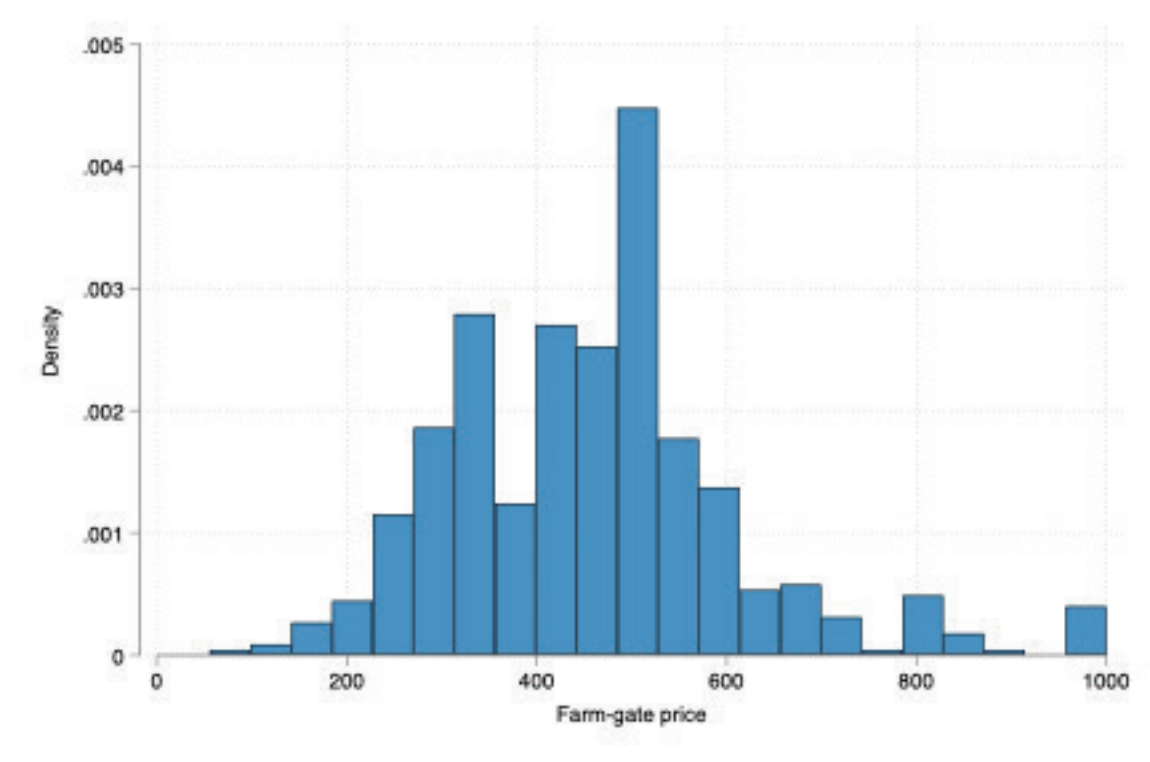
**Table 1: Descriptive Statistics**

| | Obs. | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| Farm-gate price | 526 | 458.28 | 153.26 | 56 | 1000 |
| Wholesale price at regional market | 526 | 533.61 | 137.62 | 202 | 900 |
| Wholesale price at city market | 526 | 581.76 | 140.86 | 354 | 902 |
| Retail/consumer prices | 526 | 963.41 | 148.49 | 767 | 1825 |
| Price - Unit of measurement (KG) | 526 | 13.73 | 79.71 | 0 | 1725 |
| Community has cooperatives | 526 | 0.35 | 0.48 | 0 | 1 |
| Community has SACCOSS | 526 | 0.21 | 0.41 | 0 | 1 |
| Transport cost to district HQ | 526 | 4000.88 | 3880.93 | 65 | 30000 |
| Transport cost to region HQ | 526 | 6752.47 | 5648.35 | 300 | 40000 |
| Distance to district HQ (km) | 522 | 43.38 | 59.72 | 0 | 900 |

**Notes**: The prices are in TZS/ kg. The prices of maize at the village level (enumeration area) are used as a proxy for the farm-gate prices. DSM denotes Dar es Salaam.

**Source**: NPS (community level information) and Ministry of Trade and National Bureau of Statistics (NBS).

**Figure 1: Distribution of Farm-gate Prices**




**Note**: Farm-gate prices are in Tanzanian Shillings (TZS)

# 5. FINDINGS AND DISCUSSION

## 5.1 Marketing Margin Analysis

Table 2 presents the average prices at different markets, from the farm gate to the regional and city markets, by region (surplus-producing regions). The result shows a marked difference across the main maize producing regions in the farmgate and regional wholesale prices; and in the retail prices when the regions are selling to the Dar es Salaam city markets.

Of all seven regions in the country, Dodoma and Iringa had the highest farmgate price on average at 510 and 439 TZS/kg, while Rukwa has the lowest farmgate price at 309 TZS/kg. When looking at the regional wholesale prices, Dodoma and Mbeya had the highest regional wholesale price, while Ruvuma had the lowest regional wholesale price at 417 TZS/kg; and there are slight differences between regional wholesale prices and Dar es Salaam wholesale prices. Overall, the results in Table 2 show a remarkable spatial price difference. However, the spatial price difference does not account for the intertemporal variation in prices between different markets.

**Table 2: Average Prices at Different Market Levels by Region Per kg**

| | Farm-gate price (CP) | Wholesale Price at: | | Consumer/ Retail Price: |
|---|---|---|---|---|
| | | Regional | City (DSM) | City (DSM) |
| Regions: | FP | RP | WP | CP |
| Dodoma | 510 | 570 | 581 | 957 |
| Ruvuma | 399 | 417 | 601 | 998 |
| Iringa | 439 | 487 | 626 | 958 |
| Mbeya | 317 | 497 | 602 | 913 |
| Rukwa | 309 | 473 | 638 | 992 |
| Njombe | 326 | 442 | 542 | 932 |
| **AVERAGE** | **463** | **535** | **581** | **966** |

**Note**: The table reports the average farm gate, wholesale, and retail prices per region for the harvesting seasons of 2020. The prices are quoted in the month of harvest of each respective cluster and averaged by region. This explains the differences in the wholesale and retail prices in the Dar es Salaam market.

Table 3 presents results for the share of marketing margin between the consumer prices and farm-gate prices, wholesale prices, and consumer prices at different market centres. Marketing margin in Table 3 is measured as the difference between the consumer (or retail price) (CP) and the farm-gate price (FP), and between wholesale prices (WP) and the farm-gate price (WP-FP).[14] The marketing margin is further expressed as a share of consumer/retail prices (CP). The relative marketing margin to the consumer prices shows that the spatial price differences between the main

[14] The Marketing Margin (MM) is computed as a difference between the retail price (CP), wholesale price (WP) and the price received by the producer (farm gate price-FP).

producing regions and Dar city markets (column 5) are, on average, about half of the retail price paid by consumers, indicating a higher spread between the two markets. With a couple of regions, such as Rukwa, having the share closer to one third (69 percent), while Dodoma and Iringa have the lowest difference of about 46 percent and 54 percent, respectively.

Column (5) of Table 3 shows the marketing margin as a share of consumer prices. This represents the percentage of the final retail price that is attributed to the costs and profits associated with marketing the product from the farm gate to the consumer.[15] The marketing margin stands at 79 percent of the consumer prices, indicating that 70 to 80 percent of the retail prices in the city market are attributed to transaction costs and profits associated with marketing the product from the farm gate to the consumer. Dodoma has the smallest share of about 46 percent, and the highest is in Rukwa with 69 percent. With Iringa and Dodoma being closer to Dar es Salaam with respect to distance in kilometres, and Rukwa being the furthest market (Table A1), we can attribute part of this high share of marketing margin to the high transportation cost.

The average marketing margin at regional markets (column (3)) is around 7 percent with significant spatial variation. Mbeya and Rukwa have the highest marketing margins, while Ruvuma and Iringa have the lowest. However, the margin at the wholesale market in Dar es Salaam (city market) averages 12 percent of retail prices paid by final consumers. The margin shares relative to retail prices vary between markets, being highest in Rukwa and Mbeya, which are the source regions, compared to Dodoma and Iringa. These variations in margin share can again be explained by the distance and transportation costs of moving maize from the source to the city market.

Overall, the estimate in Table 3 shows that retailers take most of the marketing margin with an average share of (51-12). This result is consistent with the fact that wholesale traders gain from bulk transactions, and retailers gain from high profit margins. Even though, these results contradict those reported in the literature, which found a higher share of estimated margin of wholesale prices than the retail prices, as retailers incur less cost as compared to the wholesale traders. The high marketing margin of maize, in contrast with the expectation from undifferentiated primary products in competitive markets.

**Table 3: Marketing Margin**

| Regions: | Farm-gate Price (FP) | Consumer/ Retail Price (CP) | MM $(\frac{RP-FP}{CP})$ | MM $(\frac{WP-FP}{CP})$ | MM $(\frac{CP-FP}{CP})$ |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |

[15] The share measures how much of the final price paid by the consumer covers the various costs and markups incurred by intermediaries in the supply chain, such as transportation, processing, storage, wholesaling, and retailing.

| | | | | | |
|---|---|---|---|---|---|
| Dodoma | 510 | 957 | 6 | 8 | 46 |
| Ruvuma | 399 | 998 | 2 | 21 | 60 |
| Iringa | 439 | 958 | 4 | 19 | 54 |
| Mbeya | 317 | 913 | 20 | 31 | 65 |
| Rukwa | 309 | 992 | 16 | 33 | 69 |
| Njombe | 326 | 932 | 12 | 23 | 65 |
| **AVERAGE** | **463** | **966** | **7** | **12** | **51** |

**Note**: The table presents the average share of farm gate, wholesale, and retail prices per region to the retail prices in Dar es Salaam for the harvesting season of 2020. The prices are quoted in the month of harvest of each respective cluster and averaged by region. FP, RP, WP, and FP, RP, WP, and CP denote the Farm-gate price, regional (wholesale) price, city (Dar es Salaam) wholesale prices, and retail/consumer price, respectively.

## 5.2 Transaction Costs and Marketing Margin (Spatial Price)

To understand the spatial price differences across maize main producing regions and Dar es Salaam city markets, and their determinants, we estimate the transaction cost associated with maize trading based on a field survey with maize traders. The semi-structured interviews was administered for two types of traders during the survey in four regions of Dodoma, Iringa, Njombe, and Ruvuma: first for the regional small traders who buy directly from farmers or agents, aggregate and sell in the regional market at wholesale prices, and the second type involved those that link the regional traders to Dar es Salaam city markets.

The information and data collected during the survey were the current and during harvest season purchases from farmers (farm gate prices) and selling prices in the wholesale markets. The transaction costs associated with trading maize were also collected during the interview, which included the transport cost, taxes, storage and handling costs (paying agents, loading and offloading, security). The collected price and transaction costs were compiled and calibrated to a single unit (TZS per kg). For example, if the price of one bag of maize that weighs 120 kg costs TZS 70,000/= to purchase from farmers (farm gate price), the farm gate price was computed as 70,000 /120 per kg (equivalent to 583.3 per kg); the same conversion was applied to the transaction costs. To arrive at the total transaction costs (TC), all cost items were added. The significant cost items, according to the trader's response, included transport cost (TRC), taxes, and handling costs (paying agent, storage costs, loading and offloading, packaging, and security – HC).[16]

[16]The survey with traders revealed that traders pay about TZS 1000 to 2000 per bag (that weighs 100-140 kg) as taxes in the source markets (village markets). They also incur significant transport costs from the producer markets to regional markets and the city markets, and other handling costs such as loading and offloading, packaging, storage, and security.

**Table 4: Estimated Transaction Cost**

| | | | Amount of Trading Costs (TZS/per kg) | | | | Share in the Transaction Cost ( % of Total) | | |
|---|---|---|---|---|---|---|---|---|---|
| SN | Region | Obs. | TRC | Tax | HC | TC | TRC | Tax | HC |
| 1 | Dodoma | 7 | 59.81 | 13.50 | 8.61 | 81.92 | 73 | 16 | 11 |
| 2 | Iringa | 4 | 56.25 | 10.00 | 10.00 | 76.25 | 74 | 13 | 13 |
| 3 | Njombe | 9 | 51.44 | 9.20 | 8.64 | 69.28 | 74 | 13 | 12 |
| 4 | Ruvuma | 4 | 62.92 | 11.25 | 11.67 | 85.84 | 73 | 13 | 14 |
| | **Average** | | **57.61** | **10.99** | **9.73** | **78.32** | **74** | **14** | **12** |

**Note**: TRC stands for Transport costs, HC for handling costs, and TC for total transaction costs. The handling cost (HC) is the sum of loading, offloading, storage, security, and other costs.

Table 5 provides the breakdown of the transaction costs per interviewed region. The results show that the average transport cost per kg ranged from TZS 50 to 63, which is equivalent to TZS 5,000 to 6,300 per bag that weighs 100 kg, with the lowest transport cost reported in Njombe and the highest in Ruvuma. The average tax paid per kg is TZS 10.99, equivalent to 1,099 for 1 bag of maize that weighs 100 kg, and the handling costs of TZS 9.73, equivalent to 973. The total transaction cost stands at an average of TZS 78.33 per kg (equivalent to TZS 7,833 per bag of 100 kg). Looking at the cost share, the transport cost constituted about 74 percent of transaction costs, followed by tax with a share of 14 percent, and handling costs with a share of 12 percent of the total transaction cost.

**Table 5: Spatial Prices and Estimated Transaction Costs**

| | Region | Obs. | FP | RP | PS (RP-FP) | TC | TC (% FP) | TC (% PS) |
|---|---|---|---|---|---|---|---|---|
| 1 | Dodoma | 7 | 335.37 | 505.71 | 137.13 | 81.93 | 28 | 85 |
| 2 | Iringa | 4 | 550.00 | 700.00 | 150.00 | 76.25 | 14 | 51 |
| 3 | Njombe | 9 | 420.25 | 538.89 | 118.64 | 69.28 | 17 | 64 |
| 4 | Ruvuma | 4 | 476.67 | 625.00 | 140.00 | 85.83 | 16 | 57 |
| | **Average** | | **445.57** | **592.40** | **136.44** | **78.32** | **19** | **64** |

**Note**: FP and RP denote the farmgate price and regional wholesale prices, respectively. TC is the transaction cost, and PS denotes price spread (regional wholesale prices minus farmgate prices).

**Source**: Author estimation from field survey data.

Table 5 presents the average farm-gate prices, regional wholesale prices, and the spatial price difference between regional wholesale markets and produce markets (village markets) computed from traders' survey data. The average farm gate price during the survey period was on average TZS 445.56, with the highest farm gate price in Iringa and the lowest in Dodoma. The average regional wholesale prices were TZS 592.40 per kg, and the average spatial price difference between the two markets was about TZS 136.44. The transaction costs account (on average) for about 64 per cent of the spatial price difference (Farm-gate and regional markets wholesale prices), suggesting that transaction costs account for more than 50 per cent of the price spread, and 36 per cent is associated with trader profit in the market.

### 5.3 Transport Cost and Farm-gate Prices

Table 6 shows the estimated coefficient for transport costs as determinants of farm-gate prices. Due to the lack of observation of transport costs in the NPS, we use the physical distance and travel costs (for travel time) to the district and region headquarters (HQ) to proxy for transport costs of maize from farmers to the markets. The travel time and the monetary cost are widely used in empirical literature than the straight-line distance (Bęben et al., 2022; Ebata et al., 2015; Martinez-Zarzoso & Nowak-Lehmann, 2007; Persyn et al., 2022). The advantage of using travel cost as compared to physical distance is that the latter doesn't always account for the complexities of travel, such as road conditions, terrain, presence of barriers such as mountains or bodies of water (Persyn et al., 2022). Thus, travel cost (and travel time) provides a more nuanced and realistic proxy to distance, especially when dealing with complex transportation networks, which is the case for most rural areas in Tanzania.

Table 6 shows the estimated results. The dependent variable is the farm-gate price in logarithmic form. All estimates control for spatial (region) fixed effects and intertemporal (year-month) effects. Overall, the estimates explain about 42 percent of the variation in the observed farm-gate prices. As expected, the coefficients on travel costs and physical distance from farmers to district and regional headquarters, our main focus, are negative and statistically significant at the 0.1 percent level, except for the distance to regional markets. In terms of magnitude, the estimate indicates that a one percent increase in travel costs to region and district headquarters is associated with a 4.5 percent and 5.2 percent decrease in farm-gate prices. The descriptive statistics show that the average farm-gate price is 463. The coefficient on physical distance suggests that a one percent increase in distance to district and regional markets correlates with a 3.6 percent and 2.3 percent fall in farm-gate prices. The insignificant effect of distance to regional markets may be due to limited observations, as distance to the regional market was only available for one survey (wave 5).

These results are consistent with other findings showing that physical distance, travel time, and costs to the main market centres strongly determine the farm-gate prices that farmers receive (Ebata et al., 2015)

**Table 6: Effects of Travel Cost and Distance on Farm-gate prices**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Travel Cost to Region HQ (log) | -0.045*** | | | |
| | (0.012) | | | |
| Distance to Region HQ (log) | | -0.023 | | |
| | | (0.023) | | |
| Travel Cost to District HQ (log) | | | -0.052*** | |
| | | | (0.013) | |
| Distance to District HQ (log) | | | | -0.036*** |
| | | | | (0.011) |
| Quantity of Price Measurement (log) | -0.029** | -0.064** | -0.030** | -0.030** |
| | (0.010) | (0.023) | (0.010) | (0.010) |

| | | | | |
|---|---|---|---|---|
| Community has cooperatives (0/1) | 0.040 | 0.068 | 0.042 | 0.037 |
| | (0.029) | (0.071) | (0.029) | (0.030) |
| Community has SACCOSS (0/1) | 0.016 | -0.023 | 0.008 | 0.017 |
| | (0.033) | (0.095) | (0.033) | (0.034) |
| Region Fixed Effects | Yes | Yes | Yes | Yes |
| Year-month Fixed Effects | Yes | Yes | Yes | Yes |
| Mean of Dep. Variable | 458.283 | 458.283 | 458.283 | 458.283 |
| SD of Dep. Variable | 153.263 | 153.263 | 153.263 | 153.263 |
| R-squared | 0.423 | 0.467 | 0.426 | 0.421 |
| P-value | 0.000 | 0.001 | 0.000 | 0.000 |
| Observations | 522 | 163 | 522 | 516 |

**Note**: The Dependent variable is the standardized farm-gate prices.

## 5.4 Transport Costs and Spatial Price Differences

We further estimate the relationship between spatial price differences, the farm gate prices, and the regional wholesale prices, and between farm gate prices and Dar es Salaam city markets, as well as between regional wholesale prices and Dar es Salaam city retail prices (see equation 5), based on National Panel Survey (NPS) data. As shown in Sub-Section 5.2, the transport cost alone accounts for about 64 per cent of the total transaction costs. We are interested in estimating the effects of transport costs on spatial price differences.

The results are shown in Table 7, where Columns (1) and (2) present the results for the spatial price differences between the farmgate prices and regional markets (RP-FP). Columns (3) and (4) present the spatial price differences between farmgate prices and retail prices in Dar es Salaam city markets, while Columns (5) and (6) present the estimates for spatial price differences between regional wholesale prices and retail prices in Dar es Salaam city markets. All estimation controls for region fixed effects (spatial effects) and year-month fixed effects to account for intertemporal differences.

**Table 7: Transaction Costs and Spatial Prices Differences**

| | (RP-FP) | | (WP-FP) | | (CP-FP) | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: Physical Distance and Farm-gate prices** | | | | | | |
| Distance to Region (log) | 0.132** | | 0.135** | | 0.089** | |
| | (0.045) | | (0.043) | | (0.029) | |
| Distance to District (log) | | 0.109*** | | 0.096*** | | 0.077*** |
| | | (0.029) | | (0.027) | | (0.023) |
| **Panel B: Travel Cost and Farm-gate prices** | | | | | | |
| Travel Cost to Region (log) | 0.143*** | | 0.131*** | | 0.109*** | |
| | (0.036) | | (0.033) | | (0.028) | |
| Travel Cost to District (log) | | 0.162*** | | 0.157*** | | 0.135*** |
| | | (0.038) | | (0.035) | | (0.030) |
| Region Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year-month Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |

| | | | | | | |
|---|---|---|---|---|---|---|
| Mean of Dep. Variable | 72.069 | 72.069 | 118.300 | 118.300 | 503.221 | 503.221 |
| SD of Dep. Variable | 178.271 | 178.271 | 203.422 | 203.422 | 212.107 | 212.107 |
| R-squared | 0.362 | 0.360 | 0.468 | 0.465 | 0.615 | 0.610 |
| P-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Observation | 539 | 529 | 539 | 529 | 539 | 529 |

**Note:** Distance between the farmer's location and the regional headquarters (F-R), Distance between the farmer's location and he city (Dar es Salaam) (F-C), and Distance between the regional headquarters and the city (Dar es Salaam) (R-C).

To sum up, the estimated results in Table 7 indicate that the spatial price difference is highly predicted by the distance between markets (as proxied by the travel costs and physical distance) rather than other factors. The coefficient on travel cost and distance between markets is statistically significant for the spatial price difference between farmgate prices and regional wholesale prices, and between farmgate prices and retail prices in city markets (Dar es Salaam). This suggests the significant influence of transport cost on the driving price differences (spread) between vertically spatial markets, reducing the marketing surplus of farmers.

# 6. SUMMARY AND IMPLICATIONS

We begin by documenting the political economy behind the agricultural markets in SSA and Tanzania in particular. We also review several literatures related to crop market prices and city markets, and document in detail the agricultural marketing and pricing system in Tanzania, highlighting the agricultural marketing and pricing policy, institutions, and crop marketing structure. Furthermore, to understand the maize market in Tanzania, we estimate the margin at different vertically separated markets. We further examine the effects of distance from farmers to key market centres as a key explanatory factor for the observed low farmgate prices received by farmers and the high price spread between the two markets.

More specifically, our finding reveals that, on average, the farmers received 463 TZS per kg during the review period, which is less than half of what final consumers in the city market pay at 966 TZS per kg. Margin (price spread) at regional and wholesale markets contributed about seven percent and 12 percent of the final retail price, and retail markets with 32 percent.

A further analysis revealed that, on average, 64 percent of the price spread between farm gate and regional and district markets is accounted for by transaction costs. The share of transport cost varies from 51 percent to about 85 percent. A regression analysis suggests that the distance from farmers to commercial markets significantly influences the price that farmers receive. In particular, estimates show that a 1 percent increase in distance to district and regional market is associated with a 3.6 percent fall in farm-gate prices. While the distance does not show the complexity of the transport network, using transport cost between the two markets also reveals a high association between distance and farm gate prices. These results also hold for price spread, whereby an increase in distance between the respective markets significantly increases the price spread.

# CONCLUSIONS AND POLICY RECOMMENDATIONS

This study addresses a critical gap in the empirical literature on the influence of transaction costs on farm-gate prices and the price spread across wholesale and retail markets in Sub-Saharan Africa (SSA) and other developing economies. Smallholder farmers frequently experience limited market participation and persistently low producer prices—conditions exacerbated by uncompetitive market structures, high transaction costs, and exploitative intermediation. Our findings reveal that farmers typically capture less than half of the final retail price paid by consumers, with the substantial price spread primarily attributable to transportation and trade-related costs.

A salient insight from the analysis is the strong correlation between farmers' geographical remoteness—measured by distance to district and regional markets—and both depressed farm-gate prices and elevated price spreads. These results underscore the centrality of physical market access in shaping smallholder market outcomes. We conclude that strategic investments in rural road infrastructure can significantly reduce transaction costs, compress price spreads, and enhance farm-gate prices. Such interventions hold considerable potential for improving smallholder incomes and mitigating rural poverty.

## Policy Recommendations

Building on the findings of this study, several policy interventions can address the structural constraints imposed by high transaction costs and poor market access:

i. **Invest in Rural Infrastructure**
Prioritize the development and maintenance of rural road networks to reduce transportation costs and improve connectivity between production zones and major markets. This will narrow price spreads and enhance farm-gate prices.

ii. **Promote Competitive Market Structures**
Strengthen regulatory frameworks to prevent monopolistic practices and encourage fair competition among traders and intermediaries. Transparent pricing mechanisms and market information systems should be institutionalized to empower farmers in price negotiations.

iii. **Enhance Market Information Systems**
Deploy digital platforms and mobile-based solutions to provide real-time price and demand information to farmers. Improved information flow reduces asymmetries that often lead to exploitative pricing.

iv. **Support Farmer Cooperatives and Producer Organizations**
Facilitate the formation and capacity-building of farmer groups to improve bargaining power, aggregate produce for better market access, and reduce per-unit transaction costs.

v. **Invest in Storage and Post-Harvest Facilities**
Establish community-level storage and processing facilities to minimize post-harvest losses and allow farmers to time their sales strategically, reducing distress selling at low prices.

vi. **Integrate Rural Transport with Agricultural Value Chains**
Develop integrated transport solutions that link rural production areas to regional trade corridors, thereby reducing logistical bottlenecks and improving efficiency in agricultural marketing.

vii. **Leverage Public-Private Partnerships (PPPs)**
Encourage PPPs in rural infrastructure development, market logistics, and digital solutions to ensure sustainability and scalability of interventions.

.

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# APPENDICES

**Table A1: Distance from the Regional Market to Dar es Salaam**

| SN | Region | Distance in Kilometres |
|---|---|---|
| 1. | ARUSHA | 646 |
| 2. | MANYARA (BABATI) | 814 |
| 3. | BARIADI | 1127 |
| 4. | KAGERA (BUKOBA) | 1433 |
| 5. | DODOMA | 451 |
| 6. | GEITA | 1228 |
| 7. | IRINGA | 492 |
| 8. | COASTAL (KIBAHA) | 35 |
| 9. | KIGOMA | 1258 |
| 10. | LINDI | 452 |
| 11. | MBEYA | 822 |
| 12. | MOROGORO | 192 |
| 13. | KILIMANJARO (MOSHI) | 566 |
| 14. | KATAVI (MPANDA) | 1383 |
| 15. | MTWARA | 556 |
| 16. | MARA (MUSOMA) | 1370 |
| 17. | MWANZA | 1152 |
| 18. | NJOMBE | 710 |
| 19. | SHINYANGA | 989 |
| 20. | SINGIDA | 696 |
| 21. | RUVUMA (SONGE) | 947 |
| 22. | RUKWA (SUMBAWANGA) | 1150 |
| 23. | TABORA | 829 |
| 24. | TANGA | 354 |
| 25. | SONGWE (VWAWA) | 893 |

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