Analysis of the Farm-to-Retail Maize Marketing Margins in Zambia

By

Olipa N Zulu

Submitted in partial fulfillment of the requirements for the degree of MSc Agric (Agricultural Economics)

Department of Agricultural Economics, Extension and Rural Development
Faculty of Natural and Agricultural Sciences

University of Pretoria
South Africa

April 2015

DECLARATION

I Olipa N Zulu declare that this thesis, which I submit for the degree of MSc Agric (Agricultural Economics) at the University of Pretoria, is my own work and has not been previously submitted by me for a degree at this or any other institution.

Signature: _____

Date: _____

DEDICATION

To my Mother,
Regina Nachilongo Zulu.

ACKNOWLEDGEMENTS

I would like to thank the almighty God for his goodness in my life. I would also like to express my heartfelt gratitude to my supervisors Professor Johann F. Kirsten and Professor Thomas S. Jayne for their assistance and guidance towards the completion of this study.

I would also like to thank the African Economic Research Consortium's Collaborative Masters in Agricultural and Applied Economics (CMAAE) Program for providing the funding for the entire period of my studies as well as for the research. To the Indaba Agricultural Policy Research Institute (IAPRI), thank you for providing the data used in the study.

My sincere gratitude goes to my mother Regina Zulu, my sister Tisuleko Zulu, my brother James Zulu and to Alfred Mbata for being supportive and understanding throughout the period of my study. I also want to thank my friends Paul C. Samboko and Mitelo Subakanya for the support and encouragement offered when I needed them the most, as well as for making my stay in Pretoria memorable.

Analysis of the Farm-to-Retail Maize Marketing Margins in Zambia

By

Olipa N Zulu

Degree: MSc Agric (Agricultural Economics)
Department: Agricultural Economics, Extension and Rural Development
Supervisor: Professor Johann F. Kirsten
Co-Supervisor: Professor Thomas S. Jayne

ABSTRACT

The Zambian government like most African governments continue to intervene in food markets. One such intervention mechanism used in Zambia is the Food Reserve Agency which provides marketing opportunities to farmers but at the same time protects farmers against the exploitative behaviour of private traders. These private traders are believed to extract monopoly rents from their position between scattered and ill-informed producers, on one hand, and captive consumers, on the other hand. Marketing margin analysis has usually been used to examine the behaviour and competitiveness of markets and the share of a retail commodity price accruing to farmers. Most studies that have used marketing margins analysis have typically considered margins to vary either spatially or temporally. There has been little attempt to understand how or why marketing margins may vary across households holding both space and time constant, even though inter-household variability has been observed in most rural maize marketing areas. This study, therefore, determines the relative importance of spatial factors, temporal factors, and household-specific factors in the maize prices received by farmers in Zambia and in the associated farm-to-retail marketing margin under the assembly trader channel. Understanding where most of the variation in marketing margins and farm prices comes from is an important question that has great policy implications.

The study findings reveal that the mean farm-to-retail marketing margin was ZMK195.70 per kg of maize, compared to a mean retail price of ZMK1018.44 per kg. On average, the farm-gate price was 80 percent of the price obtaining at the retail centres. However, there are wide

variations in the prices received by farmers even within the same localized areas and time of sales.

Spatial factors were found to account for the largest source of explained variation (72%) in the maize marketing margin and farm-gate prices obtained by farmers. There is wide inter-district variability in marketing margins. Temporal factors account for the second largest explained variation (16.7%) in the marketing margin and the price obtained by farmers. Household-specific factors account for the smallest source of explained variation (11.3%) in the marketing margin; factors that were found to significantly affect the size of the marketing margin were marital status, kinship ties to either the chief or village elders and access to price information. The wide inter-household variation in farm-gate prices within the same locality and month suggest the importance of unobserved household-specific factors. These results indicate that the prices that maize farmers in Zambia obtain are not exogenous to farmer characteristics and attributes. In order to raise maize prices that farmers obtain, policies should be aimed at providing timely price information to farmers. Given the importance of spatial factors in explaining variations in farm-gate prices and marketing margins, the results suggest that improved road infrastructure in areas where marketing margins are high could significantly improve farm-gate prices.

Lastly, the study reveals that roughly 75% of the farmers did not travel to sell their produce, because the assembly traders travelled to their homesteads to buy maize. For those farmers who did travel off their farms to market their grain, the average distance travelled from the farm to the point of maize sale was 4.5km. These findings suggest that private traders are relieving most Zambian maize farmers of the need to organize transport for them to sell their grain. Nevertheless, the study's findings indicate great potential for specific public sector investments to narrow the wedge between maize prices received by farmers, and those paid by consumers.

Key words: Marketing Margin, Maize, Zambia

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AMIC	Agricultural Market Information Centre
CSO	Central Statistical Office
FAO	Food and Agriculture Organization of the United Nations
FRA	Food Reserve Agency
IAPRI	Indaba Agricultural Policy Research Institute
IFAD	International Fund for Agricultural Development
MAL	Ministry of Agriculture and Livestock
OLS	Ordinary Least Squares
RALS	Rural Agricultural Livelihoods Survey
ZMK	Zambian Kwacha

CHAPTER ONE
INTRODUCTION

1.1 Background

Governments have intervened in agriculture markets for centuries. The reasons for government intervention in agricultural markets include stabilizing or reducing consumer food prices, maintaining uninterrupted food supplies, stabilizing or maintaining producer prices to guarantee incentives for production, reaching food self-sufficiency, and providing government revenue (Lundberg, 2005; Ellis, 1996). After the market liberalization policy reforms that took place in most of Africa in the 1980s, governments reduced their direct role in food markets. However, even with the liberalisation of markets, most African governments have continued to operate in food markets, with the aim of providing markets in areas where there were none and to incentivize producers to grow more produce by providing a market and a steady flow of income. Smallholder farmers occupy around 70-80% of the world's farmland, and they produce about 80 percent of the world's food (FAO, 2014). In Africa, these smallholder farmers are usually located in deep rural areas and tend to lack access to markets due to thin markets and poor infrastructure (Fafchamps, 2004).

In Zambia, the staple food (maize) accounts for about 50% to 65% of the total area under cultivation and the rural smallholder farmers produce about 65% of the nation's production (Central Statistics Office, Agricultural Analytical Report for the 2000 Census of Population and Housing, 2002). Therefore, access to markets by these smallholder farmers plays a vital role in their livelihoods and the economy as a whole. However, there has been widespread agreement that smallholder farmers find it difficult to participate in markets due to poor or lack of market access in Zambia (Bwalya, Mugisha, & Hyuha, 2013; Chapoto & Jayne, 2011). It is believed that private traders take advantage of these poor market conditions, and therefore, governments have continued to participate in markets in an effort to protect smallholder farmers from potential exploitation by the private traders (Ellis, 1996; Tschirley & Jayne, 2010; Sitko & Jayne, 2014a; Jayne, Zulu, & Nijhoff, 2006).

One such government intervention in the maize markets in Zambia is through the Food Reserve Agency (FRA). The FRA's mandate has been to significantly contribute to the stabilization of National Food Security and market prices of designated crops through the establishment and sustenance of a sizable and diverse National Strategic Food Reserve in Zambia. The FRA sets a pan-territorial indicative price at which it buys maize from individual farmers and cooperatives even in remote areas. The active role of a buyer that FRA plays has been seen to undermine the role of other private traders (Mason, Jayne, & Myers, 2012). However, even with the FRA intervening in the market to ease market access for the smallholder farmers, it has been observed that most of the farmers sell their maize produce to private traders, with assembly traders accounting for the largest maize channel used by farmer's in remote areas (Chapoto & Jayne, 2011; Sitko & Jayne, 2014b). Assembly traders are traders who purchase grain from the smallholder farmers' usually in small quantities from multiple farmers and tend to assemble these transactions into quantities with sufficient economies of scale for onward sale. This makes assembly traders of particular importance to the smallholders in the rural areas, who generally lack the sales volumes to interest large private buyers.

However, even with the various services that assembly traders provide to farmers, the view that they exploit farmers and consumers by the exercise of monopoly/oligopoly power is still widely held (Ellis, 1996; Pokhrel & Thapa, 2007; Sitko & Jayne, 2014a). The perception of monopoly/oligopoly power is attributed to underdeveloped and uncompetitive markets. Traders are believed to extract monopoly rents from their position between scattered and ill-informed producers, on one hand, and captive consumers, on the other hand. The monopoly/oligopoly power held by these traders due to poor market access and conditions, increases the marketing margin (the price difference between what they offer to farmers at the farm-gate and what farmers would obtain if they sold in retail centres) observed under private traders than it would be if markets where competitive or in some cases state–run (Ellis, 1996). Marketing margins have been used as a measure of how much farmers and indeed consumers are gaining or losing due to trader marketing activities. Thus marketing margins give an indication of the market efficiency, performance and structure.

This view of rural grain markets essentially regards marketing margins as exogenous to the farmer margins and farm-gate prices within a given village and at a given month are simply determined by the retail price in the nearest market centre, traders' costs and the degree of non-competitive behaviour in these markets. I find that this characterization of marketing margins and farm-gate prices is inconsistent with anecdotal evidence in survey data suggesting the existence of wide variability in farm-gate prices among farmers in the same villages and time of sale. I therefore, posit that household-specific factors (e.g., those correlated with negotiation ability or an understanding of how markets operate) may be important in explaining variations in prices received by farmers and hence the farm/retail price spreads commonly analysed in agricultural economics.

1.2 Problem Statement

Most government policies have been conceived with the notion that markets fail due to weak institutions such as poor access to markets and information asymmetry, especially with smallholder rural farmers. Market access is an important and multi-dimensional feature influencing the livelihoods of small-scale farmers (IFAD, 2003). Poor market access conditions, manifested for example by poor roads and long distances to the nearest retail center, affects the price farmers fetch for their produce (Minten & Kyle, 1999). Improved access to markets is thus important for raising rural farmers' incomes, farm productivity and living standards. Among the measures of market access, marketing margins are an important measure – in fact, it could be argued that farmers' market access conditions could be summarized in terms of the difference between two terms: the difference between the price that farmers receive relative to the price in the nearest retail center (i.e., the marketing margin) vs. the marketing margin under perfectly competitive market conditions where price information is known to all and there is transparency in the transactions.

While many maize marketing studies have been carried out in Zambia (e.g., Chapoto & Jayne, 2011; Tembo & Jayne, 2010; Bwalya et al., 2013), few studies have examined how or why marketing margins of staple grains vary across farm households. Most have confined their focus to simply measuring the margin between the various stages in the maize value chain (e.g., Kirimi et al 2011; Sitko & Jayne, 2014a) or examining the factors influencing marketing

margins over time (e.g., Traub & Jayne, 2008). Most studies that have looked at marketing margins have typically considered margins varying spatially and temporally, but having no variation among transactions carried out in a particular time and location. Consequently, relatively little attention has been devoted to understanding how or why marketing margins may vary across households holding both space and time constant, even though inter-household variability, has been observed in most rural maize marketing areas (Sitko & Jayne, 2014a; Yamano & Arai, 2010; Jayne, Sitko, Ricker-Gilbert, & Mangisoni, 2010). There is however a need to understand the reasons why marketing margins may vary across households in the same locality and time frame. Understanding where most of the variations in marketing margins come from is an important question that has great policy implications. If most of the variation in marketing margins is household-specific, it would mean the variation in marketing margins and thus the idea of farmer exploitation has little to do with trader competitiveness or lack thereof as commonly thought, but has more to do with the household-specific factors. Different sources of variation in marketing margins would call for different policy actions to improve market access and efficiency for farmers. A review of literature shows that, no study has tried to decompose the marketing margin into temporal, spatial and household-specific factors. In addition, none has looked at what the magnitude of inter-household variability in marketing margins versus spatial and temporal differences is. This study thus investigated these issues.

1.3 Hypothesis

It is against this backdrop and context that this study tested the standard microeconomic hypothesis that farmers are strictly price takers and do not influence the price that they receive in rural markets. The associated hypothesis in econometric models of farm-gate prices and marketing margins would be that exogenous household-specific factors do not affect the farm-gate price and that all variations in price received by farmers and associated farm/retail price spreads are due to the time and location of sale, the type of buyer, and other factors that are exogenous to the farm household.

1.4 Objectives

1.4.1 General objective

The main objective of this study was to determine the relative importance of spatial factors, temporal factors, and household-specific factors in the maize prices received by farmers in Zambia and in the associated farm-to-retail marketing margins. Based on the findings, the study hopes to shed more light on the scope and appropriate entry points for raising the maize prices received by farmers and reducing maize marketing costs in Zambia.

1.4.2 Specific objectives

1. To determine the difference between the retail price and the farm-gate price offered to small-scale farmers in their villages, and to decompose this farm-to-retail marketing margin into spatial, temporal, and household-specific factors.
2. To determine the underlying sources of variation in the size of the household-specific marketing margins and the degree to which each factor affects the size of the marketing margin.
3. To identify the implications of these findings for policy actions to promote farmers' incomes from participation in maize markets.

1.5 Rationale

Maize marketing has been at the centre of most policies in the country with emphasis on improving market access to reach the rural farmers. African governments participate in markets with the mandate of reaching rural farmers who cannot access markets. However, evidence shows that most rural farmers tend to sell their produce to traders who follow them to their villages. These traders may relieve farmers of having to organize transport services and may therefore provide a much-needed service to the farmers if it is performed under reasonably competitive conditions. Grain traders in much of the world are however perceived to exploit poor farmers due to the latter's' lack of resources and knowledge as observed through the varying prices they offer farmers and the different marketing margins they obtain. Thus, an understanding of the extent to which marketing margins are driven by spatial, temporal or household-specific factors could provide useful guidance for policy makers and development organizations. Furthermore, the investigation of which factors account for the greatest variation

in the margins, and an understanding of whether marketing margins are indeed exogenous to the household will provide new insight on whether farmers are indeed price takers. The study will also help in identifying potential household characteristics that affect the farmers' ability to obtain better prices for their produce and can therefore be used to push for better prices for farmers.

1.6 Organization of the Thesis

This thesis comprises six chapters. Chapter Two presents a review of the literature on traders and marketing margins in staple markets in Africa, the methods used in marketing margin analysis are also reviewed, and the conceptual framework is presented. Chapter Three discusses the data, methods and procedures used in this study. The findings on household and farm characteristic are discussed and presented in Chapter Four, while Chapter Five decomposes the farm-to-retail maize marketing margin into temporal, spatial and household-specific components. The thesis ends with conclusions and policy implications in Chapter Six.

CHAPTER TWO

TRADERS AND MARKETING MARGINS IN STAPLE MARKETS IN AFRICA: A LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of studies on traders and market access in staple markets; marketing margin analysis in Africa and developing countries, indicating the reasons for marketing margin analysis, the factors that affect the margins and the insights that tend to emerge from marketing margin analysis. The methods used in marketing margin analysis and some of their shortcomings are also highlighted. The chapter ends with a summary of the literature reviewed and points out the knowledge gaps that exist in the current literature.

2.2 Traders and Market Access

The liberalizations of food markets in most African countries brought about a reduction in government participation in the marketing and pricing of commodities and saw the entry of the private sector (Akiyama, Baffes, Larson, & Varangis, 2003; Barrett, 1997). Both formal and informal private traders entered agricultural marketing channels in rural as well as urban markets. The entry of private traders was expected to improve market conditions and market access for farmers in Africa. However, market access conditions are widely perceived to remain very weak even in the post-liberalization period, with most rural farmers being unable to effectively participate in markets and in turn fetch low prices for their produce in most African countries (IFAD, 2003). Poor access to markets is usually a result of high transaction cost and thus makes it a challenge for smallholder farmers to engage in market operations (Bwalya, Mugisha, & Hyuha, 2013; Barrett, 1997). This view largely explains African governments' efforts to improve farmers' market access and participation. However, recent studies have shown that this view might be somewhat out-dated. Chapoto and Jayne (2011) show that about 60% of the smallholder farmers in Zambia actually sell their maize produce directly on their farm or travel distances of less than 3km. Sitko and Jayne (2014), also found that across the region (Kenya, Zambia, Malawi and Mozambique) 70% of the transactions in maize occurred within 5km of the farmers' home. Another study by Jayne et al., (2010) shows that most smallholder farmers were not as isolated from markets as commonly thought, as the

median distance travelled by farmers to sell their maize in the three countries (Malawi, Zambia, and Kenya) studied was zero. Therefore, it can be noted that market access might not be as worrisome as mostly thought in terms of grain marketing due to the fact that farmers do not travel long distances to sell their produce. African staple markets are characterized by a myriad of market intermediaries due to the fact that most market transactions are very small and most market participants are either individuals or very small firms. In rural areas, assembly traders are the most widely used market channel (Chapoto & Jayne, 2011; Jayne, Sitko, Ricker-Gilbert, & Mangisoni, 2010; Sitko & Jayne, 2014b).

These assembly traders usually have no or little storage facilities and little working capital (Fafchamps, 2004). They use rural assembly points to assemble these transactions into quantities with sufficient economies of scale for onward sale; they follow the farmers to their farm gates. By following farmers to their farm-gates in the villages, these traders help to cut down on the transportation and searching costs the farmers might incur (Sitko & Jayne, 2014a; Chapoto & Jayne, 2011). However even though the assembly traders provide a much-needed service, by improving market access for the farmers, they are usually perceived and often referred to as exploitative businessmen and parasites who take advantage of smallholder farmers (see Sitko & Jayne, 2014; Ellis, 1996; Pokhrel & Thapa, 2007). Therefore, with this in mind, few studies have been carried out in developing countries to try to determine whether the assembly traders are in fact exploiting farmers. Sitko and Jayne (2014a) examined the validity of perceptions that grain traders are exploitative in east and southern Africa. They found that the reliance on traders by farmers is a marketing strategy on the farmer's part due to ease of payment and market access, even though assembly traders tend to offer lower prices as compared to other market channels and the further the distance from the district market the lower the price offered. These findings are in line to those found by Pokhrel and Thapa (2007) in Nepal in their study on mandarin marketing, where they also found that most farmers use intermediaries (assembly traders) as a marketing strategy choice to reduce price and payment risks. In both studies, it is found that complaints about farmers being cheated persist. This is attributed to unstandardized weighing instruments used by the assembly traders and the significant intra-village farm-gate price variations observed. In trying to examine whether traders are indeed soliciting abnormal profits, the price spread/marketing margin is often used.

The marketing costs are deducted from the price spread and what remains are the profits that go to the traders. However, most studies use marketing margin analysis as a measure of market access conditions and as an indicator of farmer exploitation (Kalule & Kyanjo, 2013; Yamano & Arai, 2010; Pokhrel & Thapa, 2007; Sitko & Jayne, 2014a). The size of the marketing margin compared to an estimate of traders' costs for transferring grain between two locations gives an indication of the market conditions and whether farmers are getting a fair share of the crop benefit.

2.3 Marketing Margins

The marketing margin (or price spread) is the price difference between the different levels of the marketing chain for a particular product (Myers, Sexton, & Tomek, 2010; Vavra & Goodwin, 2005). Marketing margins analysis is based on analysing price differences of products from a lower level and thus lower price to a higher level and higher price. There are several types of marketing margins based on the market level examined in the marketing chain, e.g., the farm-to-wholesale margin, the farm-to-retail margin, and the wholesale-to-retail margin. The farm-to-retail margin is defined as the difference between the producer and consumer price. It represents payments for all assembling, transporting, processing, and retailing charges added to farm products. The farm-to-wholesale margin is the difference between the producer price and the wholesale price, and hence does not account for the functions associated with processing and retailing. The wholesale-to-retail margin on the other hand is the difference between the consumer price and the wholesale price. Marketing margin analysis is based on examining the mark-up costs between two levels in the supply chain. Therefore, the lower market level prices are lower than the upper market level prices, due to the costs that are incurred from moving products from one level to another.

Marketing margin analysis has been of interest to researchers and policy makers as well as the public for a long time. The retail-to-farm marketing margin is the most studied and of particular interest in the African context. This is because marketing margins give an indication of the markets' structure, performance and efficiency as well as an indication of whether consumers or producers are getting a fair share of the marketing bill (Myers, Sexton, & Tomek, 2010). Wider margins mean that farmers obtain a smaller share of the retail price. Margins are

influenced by a number of factors; primarily shifts in retail demand, farm supply, and marketing input prices. Other factors include the cost of transacting, temporal and spatial considerations, and the quality of products and risk associated with the transactions (Wohlgenant M. K., 2001).

A number of past studies have analysed marketing margins (retail-price spreads) in developing countries. These studies typically analysed marketing margins in order to try to understand the size of the margin, the variation in different margins as well as understanding the effects of certain policy changes. One such study is by Traub and Jayne, (2008) which looks at how price decontrol has affected marketing margins for maize meal in South Africa. The study used time-series data, which showed that maize meal retail margins had increased by 2% each year since price deregulation and the margins showed a monthly upward trend. A similar study by Vigne and Darroch (2010) tried to determine the maize miller margins in South Africa. The study also used time-series data and found that margins of the maize miller had been rising along the years. Other studies have used marketing margin analysis to explain and understand market performance. The study by Kalule and Kyanjo (2013) for instance, used margin analysis to examine market efficiency and performance of banana retail trade in Kampala Uganda. The study used primary data to determine the marketing efficiency using marketing margin analysis. This study found that marketing margins vary depending on the size of the bananas and the rental and handling cost significantly increased margins. Ojogho et al., (2012), in their study on beef in Benin used marketing margin and price transmission analysis to determine market efficiency. They found that in beef marketing in Benin, price transmission was incomplete and imperfect and thus changes in the producer price were not completely and instantaneously transmitted to the retail prices. This meant that the margin between producer and retail prices was also not maintained and tended to vary in the short run.

Marketing margins are affected by numerous other factors. Most studies on marketing margins consider that the size of the marketing margin is affected by the marketing cost (Ojogho, Erhabor, Emokaro, & Ahmadu, 2012; Emokaro & Egbodion, 2014; Toure & Wang, 2013; Wohlgenant & Mullen, 1987). The marketing costs consist of packaging, handling, and processing and transportation costs. The degree of risk through prices or yield uncertainty was

also shown to affect the marketing margin (Brorsen, 1985). The marketing margin is also affected by temporal and spatial factors (Carambas, 2005; Wohlgenant M. K., 2001). Minten and Kyle, (1999) in their study in the former Zaire, examined how the producer-wholesale price margin of various foods was affected by distance and road quality. This study found that distance and bad roads increased the size of the marketing margins. They also found substantial regional price variation and also relative price variations. This price variation and variation in margins across regions and villages has also been observed in other areas. Apart from regional and seasonal variations in prices, inter-household variations have also been found in the maize margins in Malawi, Kenya and Zambia (Sitko & Jayne, 2014; Yamano & Arai, 2010; Jayne et al., 2010). This then raises an interesting question of whether marketing margins are affected by the household factors. Some recent studies have looked at characteristics of the market participants and how they affect the size of the marketing margin; these factors include age, level of education, marital status, gender and the family size (Toure & Wang, 2013; Yamano & Arai, 2010).

Other studies have looked at the differences in the marketing margins across different marketing channels. They have found that marketing margins vary across the different market channels (Hussain, Aslam, & Rasool, 2013; Mojtaba, Karim, Malihe, & Hossein, 2012; Tesfew & Alemu, 2013). Numerous studies found that the trader (assembly trader) or market intermediary channel offers the lowest farm-gate prices, hence having the highest margin as compared to other market channels. (Sitko & Jayne, 2014a; Hussain, Aslam, & Rasool, 2013; Mojtaba, Karim, Malihe, & Hossein, 2012; Pokhrel & Thapa, 2007; Sitko & Jayne, 2014b). Therefore, the type of channel the farmer chooses to utilize affects the size of the marketing margin and in fact, the price the farmer obtains for their produce. Since the liberalization of grain markets in Africa, there have been a number of new entrants from the private sector into various parts of the grain marketing chain (Kähkönen & Leathers, 1999). These entrants in the grain marketing chain have given farmers a wide variety of marketing channels to choose from. In the case of the Zambian maize market, the market channels include; the Food Reserve Agency (FRA) which is partly government run, large milling companies, small scale mills (hammer mills), brewery/feed makers, large private buyers (wholesalers), small private buyers (assembly traders), local markets/retailer and other farmers. Most of the transactions in these

markets are "spot" or cash transactions (Kähkönen & Leathers, 1999). These channels interact in a number of ways as farmers have options to sell to different channels.

A farmer's choice of marketing channel depends on various factors. A major factor is the cost related to carrying out the exchange of commodities. These costs are referred to as transaction costs (Nkosi & Kirsten, 1993). It is argued that the level of transaction costs imposed on the seller influences his/her choice of the marketing channel. These transaction costs include but are not limited to:

- Searching costs: these are the costs associated with finding and contracting the potential buyers;
- Bargaining Costs: these are costs of obtaining information on prices so as to come up with an acceptable agreement with the other party to the transaction;
- Transfer costs: these are costs of transportation and storage, they also include costs of commodity loses in storage and transport.

The extent to which these transaction costs affect farmers differs from area to area and from farmer to farmer within each area. Farmers sell their maize produce to different channels based on the cost they have to incur and other factors such as availability. Recent studies in Zambia have shown that assembly traders are the most important market channel as most farmers sell to them (Sitko & Jayne, 2014a; Chapoto & Jayne, 2011). This is mainly because they help reduce transaction costs as they follow the farmers in their villages even in inaccessible areas, they pay the farmers cash at the time of sale unlike parastatal marketing boards and less often processing firms that pay using cheques (Sitko & Jayne, 2014b).

2.4 Methods Used in Marketing Margin Analysis

From the review of literature, it can be noted that various methods and model specifications have been used in estimating the relationship between marketing margins and the factors that affect it. Generally, there are two ways to estimate the impact of the shifts in consumer demand, farm product supply, and marketing costs on marketing margins. One is through a rigorous analysis of the structural model, which is based on the econometric estimation of demand, supply and market equilibrium models; and the other, through estimation of reduced-

form equations. Wohlgenant and Mullen (1987), however note that, since output and retail price changes are caused by shifts in both demand and supply, "a complete analysis of price spread or marketing margin is only possible through an analysis of the complete set of market-behavior equations". However, this is rarely possible due to constraints on data availability and time, thus most marketing margin analysis use reduced form models that are specific to the data and question being investigated. Reduced form models also allows there to be no explicit link of the margin model to a particular market structure.

These reduced form models have been developed along the years and there are four distinct models:

Mark-up Model	$MM = f(RP, X)$
Relative Price Spread Model	$MM = f(RP, RP * Q, X)$
Marketing Cost Model	$MM = f(Q, X)$
Rational Expectations Model	$MM = f(FP, E_t[FP_{t+1}], X)$

where

MM= marketing margin, equal to Retail Price (RP) minus Farm Price (FP);

X= a vector of all other marketing variables;

Q= quantity of farm product, and;

$E_t[FP_{t+1}]$ = farm price expected to obtain after harvest

The Mark-up Model suggested by Waugh (1964), expresses the marketing margin as an absolute value or percentage. The marketing margin under this model is a function of the retail price and the marketing cost and the consumer price determines the difference between the two. Wohlgenant and Mullen (1987), on the other hand suggested the Relative Price Spread Model which accounts for both farm supply and retail demand. The marketing margin under this model is expressed as a function of the quantity of goods, retail price, and the marketing agent costs. The Marketing Cost Model was also suggested by Wohlgenant & Mullen (1987), is more or less a complement to the Relative Price Model. Under this model the marketing margins is expressed as a function of the marketing costs and farm product quantity. All these

models are static in nature. The Rational Expectation model by Wohlgenant on the other hand introduces a dynamic component by incorporating an expected value of the future farm price.

Each of these models enjoys special characteristics that are applied in different situations and studies. The choice of the model to use depends on the theoretical grounds upon which they are rooted, the type, and availability of data and the market level being examined. Most studies that have been done on marketing margins have used the different reduced form equations for the analysis Carambas, 2005, for instance uses the marketing cost model to explain the marketing margins in the eco-labeled products market in Thailand and the Philippines, while Vigne & Darroch, 2010, used the mark-up model in estimating the determinants of the Maize Board - Miller (MBM) marketmg margin for the period 1977-1993. However, there are econometric challenges associated with estimating these models, due to the appearance of endogenous variables like retail and farm price on the right-hand side of the equation. From literature, this econometric aspect has not really been questioned and one can say it has been ignored. Thus, in this study, a variation of the marketing cost model, which determines the marketing margin as a function of the marketing variables, will be adopted. This is because it fits into the data available and the question at hand; and at the same time is the only model that does not include a price variable on the right hand side, which as earlier noted introduces endogeneity in the other models and by construction makes the dependent variable a linear function of the price variable. Also the reduced form model used in the study excluded the quantity of grain traded as its inclusion also raises the issue of endogeneity since the marketing margin affects the retail and farm-gate price, which also affect the quantity traded over time. On this basis, this study finds the model to be superior when compared to the other models.

2.5 Conceptual framework

The marketing margin represents the mark-up of the marketing system and the various marketing costs, such as transport and storage costs (Ellis, 1996). The setup of the marketing system and the marketing costs affect the size of the marketing margin. Various market systems and the factors under them are expected to affect the size of the marketing margin. From the reviewed literature, it is noted that the marketing margin is affected by numerous factors. A conceptualization of the factors that affect the marketing margin has been developed

based on the literature reviewed and depicted in Figure 2.1 below; these include the market structure, market access conditions, physical transfer costs, transaction costs, market information access and household characteristics of the producers.

The market structure is the organizational and structural characteristics of a market. Major structural characteristics of a market are the degree of concentration, which is the number of market participants and the size of distribution; and the relative ease or difficulty for the market participants to secure entry into the market (Dessalegn, Jayne, & Shaffer, 1998). The staple grain markets in Africa and indeed the maize markets in Zambia has been characterised as being a perfect competition market structure, as they are numerous buyers and sellers, sellers are believed to be price takers and there is free entry and exit into the industry. The structure of a market affects the size of the marketing margin in that under perfect competition they are numerous buyers, thus this increases the competition among the buyers and in turn farmers obtain competitive prices. The larger the number of buyers, the better the price obtained by the producers. In the Zambian maize market case, it is expected that the larger the number of traders operating in the same area the better the farm-gate price obtained by the farmers. Therefore, whether a market is a perfect competitive, oligopoly or a monopoly market will affect the size of the margin.

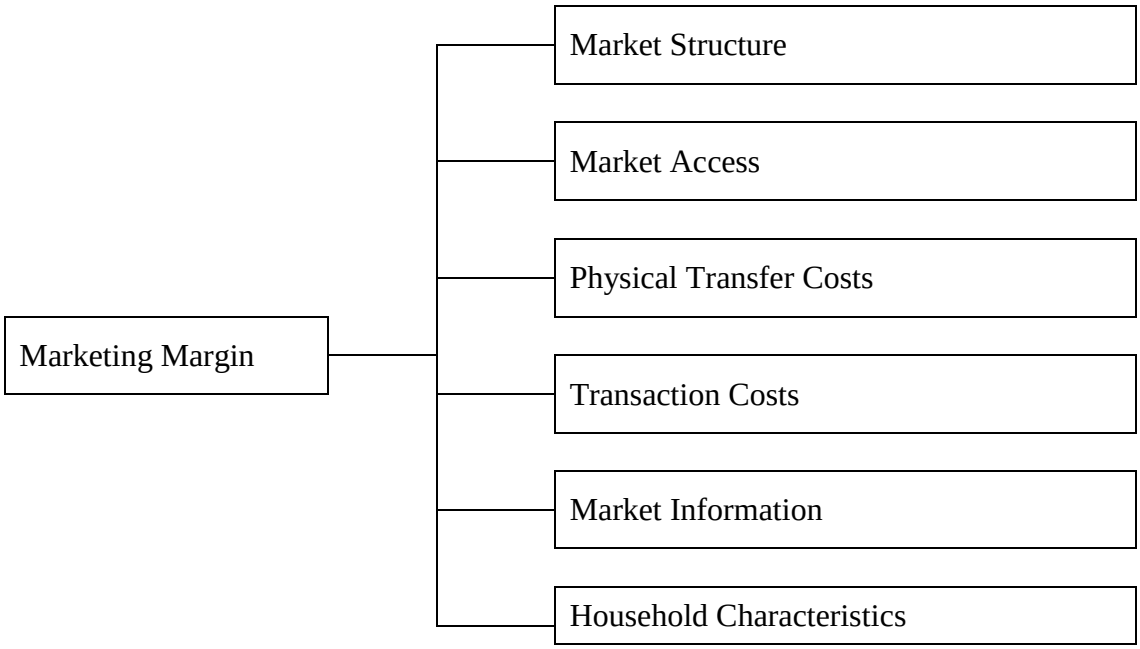


Figure 2.1: Dimensions of Marketing Margin Analysis
Source: Compiled by the author

Market access is the ease with which farmers are able to gain entry and participate in markets (Chamberlin & Jayne, 2013). Market access, is characterized by the transaction costs that sellers incur, such as the cost of transporting the produce to the nearest market point and also geographical attributes, such as distance travelled to markets. Poor market access increases the operating costs and in turn reduces the price of farm products and thus, discourages farmers from participating in markets (de Janvry, Fafchamps, & Sadoulet, 1991). Market access conditions affect the size of the marketing margin in that, the further away the distance is to the market, the bigger the marketing margin is expected to be as traders have to incur more costs.

Physical transfer costs represent all the costs that are incurred between the farm gate and the retail market. These include the costs for all assembling, storage, processing, transporting, wholesaling, and retailing added to the farm products, i.e. the cost of providing a bundle of marketing services as well as valuations for risk and expectations on how markets will evolve (Ellis, 1996). The higher the physical transfer costs the larger the marketing margin is expected to be. Transaction costs on the other hand are the costs that are incurred in securing a market for a product, by both the buyer and the seller. These costs include searching costs, which are the cost associated with finding a potential buyer or seller; bargaining costs; the costs of negotiating to come up with an agreeable price by both parties. These transaction costs affect the price obtained by the seller and the buyer and in turn affect the size of the marketing margin. It is expected that the higher the transaction costs, the bigger the marketing margin.

Market information, is having access to relevant market information in terms of product price, information on available buyers and sellers and their behaviours and reputation. Having access to market information equips one with the knowledge to negotiate a better price and choose a buyer or seller that offers a better price (Fafchamps, 2004), and thus affects the size of the marketing margin. Farmers with information about the prices tend to obtain better farm-gate prices and thus have a lower marketing margin than those without. Information about the market helps to also curb trader exploitative behaviour.

Marketing margins analysis has traditionally been based on the assumption of price taking behaviour in both the output and the input markets for the different agricultural products

(Gardner, 1975; Myers, Sexton, & Tomek, 2010; Wohlgenant M. K., 2001). In the farm-gate to retail price this entails that farmers are price takers and as such their household specific characteristics do not affect the size of the marketing margin. However, marketing margins have been seen to vary across households holding both space and time constant (Sitko & Jayne, 2014a; Yamano & Arai, 2010; Jayne, Sitko, Ricker-Gilbert, & Mangisoni, 2010), and as such an examination of whether the variation in marketing margins are affected by household-specific characteristics is will shed more light on the notion of price taking behaviour. These household specific characteristics include age, gender, marital status, education level and household size. The age of the head of the household is important since it determines whether the household benefits from the experience of an older person, or has to base its decisions on the risk-taking attitude of a younger farmer. It is expected that older and thus more experienced household heads, other factors held constant, have greater contacts allowing trading opportunities to be discovered at lower cost. The level of education of the farmer is expected to affect the size of the marketing margin in that, the more educated the farmer is, the more likely they are to make informed decisions and obtain better farm-gate prices. Also a large household size indicates a household's ability to have several information sources thus being able to obtain a low marketing margin. Male headed households are expected to report lower marketing margins, as males are thought to have better access to information and better negotiation skills than females.

2.6 Conclusion

Marketing margins have long been used as means of understanding market performance and efficiency; as well as the effect certain policy changes have on the market, and in indeed on the welfare of producers and consumers. It has been shown that the factors that affect market margins are many, but from the reviewed literature most of the marketing margin analysis has mainly focused on the spatial and temporal factors. This stems from the notion that market participants are price takers, hence their characteristics have nothing or little to do with price determination and indeed margin size. However, variations in the size of the marketing margins have been seen at the household level, holding time and space constant, thus an enquiry of this variation may produce useful insights. From the review of the literature, it is seen that few studies have examined whether household-specific factors affect the size of the

farm-gate price and marketing margin, and none have tried to decompose the size of marketing margins into spatial, temporal vs. household-level components. It is from this void in the literature that this study will look at the magnitude of inter-household variability in marketing margins versus spatial and temporal differences. The literature shows that various methods are employed when estimating most marketing margins. Reduced form models, as opposed to structural models are commonly used to explain the relationship between marketing margins and the various factors that might affect the size of the marketing margin. Different reduced form models have been used and the choice of model depends on the question at hand and the data availability.

CHAPTER THREE
METHODS AND PROCEDURES

3.1 Introduction

This chapter presents a description of the methods and procedures used in achieving the stated objectives, and the data used in the analysis as well as the actual empirical models used. The study employed a variation of the Marketing Cost Model. The model was estimated using Ordinary Least Squares (OLS) to determine the factors having the highest influence on the size of the marketing margin as well as on the farm-gate price obtained.

3.2 Data

The study used data collected in the 2012 Rural Agricultural Livelihoods Survey (RALS12) by Zambia's Central Statistical office (CSO) and the Indaba Agricultural Policy Research Institute (IAPRI). This is cross sectional data which is nationally representative, and covers a 12 month time period, from May 2011 to April 2012. The survey elicited information on various maize marketing activities, for instance, it provides information about who the farmers sold their maize to, which month the maize was sold in and the amount it was sold for at the farm-gate price. It also provides information about the individual farm and farmer characteristics. For the purpose of this study, only households that used the assembly trader channel were considered. The study sample was also restricted to areas where maize trade flowed from the farm to the retail centre (surplus areas). This restriction is important as marketing margin analysis should be based on observations where the flow of grain is from the farm to the retail and hence where the retail prices are higher than the farm-gate price. Areas where trade flows from the retail centre to the farm (deficit areas) are excluded in the analysis as they downwardly bias the measurement of the marketing margin. Marketing margin analysis is valid if it only includes observations where the flow of grain is from the farm to the retail centre (lower price to higher price), thereby bringing the sample size of the study to 579 households. In order to determine the marketing margins, monthly retail price data at district level was collected from CSO for the same period. The monthly retail maize prices are collected and publicized in all districts in the nation by the Central Statistics Office (CSO).

3.3 Empirical Model Specification

In estimating the empirical model, the marketing margin was used as the dependent variable. The marketing margin was calculated as the farm to retail level of maize grain at household level. The retail price in this case means, the price of dry maize grain in the nearest retail centre. The monthly maize Marketing Margin (MM) was calculated as the difference between the Retail Price (RP) and Farm-gate Price (FP) in each Month (t) for the all the households that sold to assembly traders in the sample:

$$MM_t = RP_t - FP_t$$

A variation of Marketing Cost Model was used and taking the general form of:

$$MM_t = X_t\beta_i + \varepsilon_t$$

where the dependent variable is the marketing margin (MM_t); X_t is a set of explanatory variables that were hypothesized to influence the size of the marketing margin and ε_t the error term. The model was estimated using Ordinary Least Squares (OLS) regression. Multiple OLS regression analysis allows us to carry out ceteris paribus analysis because it explicitly controls for many other factors, which simultaneously affect the dependent variable (Wooldridge, 2004). Another model with the farm-gate price being the dependent variable and the same explanatory variable but including the retail price as well was also run to determine how the various factors affect the size of the price obtained by the farmers.

Several factors as discussed in literature above have been documented as affecting the marketing margin (Brorsen, 1985; Carambas, 2005; Emokaro & Egbodion, 2014; Minten & Kyle, 1999; Ojogho, Erhabor, Emokaro, & Ahmadu, 2012; Toure & Wang, 2013; Wohlgenant & Mullen, 1987; Yamano & Arai, 2010). The choice of the variables that were hypothesized to affect the marketing margins was based on economic theory and from the literature. The variables were categorized based on the spatial, temporal and household characteristics. Using this benchmark, the variables described in Table 3.1 were included in the regression model.

Table 3.1: Description of Variables used in the Regression Models

Variable Name	Description of Variable	Expected Effect on Marketing Margin	Expected Effect on Farm-gate Price
Dependent variables			
Market Margin	Farm gate to retail price margin (ZMK)		
Farm-gate Price	Farm-gate Price (ZMK)		
Explanatory variables			
Age	Age of Household head (years)	+/-	+/-
Sex	Sex of household head (=1 if male, 2 female)	+/-	+/-
Education level of household head[1]			
dedulev1	Primary Education Dummy(Yes=1)	+/-	+/-
dedulev2	Secondary Education Dummy(Yes=1)	+/-	+/-
dedulev3	Tertiary Education Dummy(Yes=1)	-	+
dedulev4	No Education Dummy	+	-
Household Head Marital Status			
dmarital_status1	Never Married Dummy (1= yes)	-	+
dmarital_status2	Married Dummy (1= yes)	+/-	+/-
dmarital_status3	Divorced Dummy (1=yes)	+/-	+/-
dmarital_status4	Widowed Dummy (1=Yes)	+/-	+/-
dmarital_status5	Separated Dummy (1=Yes)	+/-	+/-
Household size	Number of household members	+	-
Dkinties	Household Kinship ties dummy (1=yes)	-	+
Farm size	Farm size (Ha)	+/-	+/-
Distance boma	Distance to nearest boma (Km)	+	-
Distance road	Distance to nearest road (Km)	+	-
Transport cost	Cost of transporting a kg of maize(ZMK)	+	-
Traders	Number of Traders Entering a Village	-	+
Price information	Access to price information(1=yes, 2=no)	-	+
Prodasst	All household Assets (ZMK)	-	+
Retail Price	Retail Price (ZMK)	NA	+
Month	Month of sale dummy variable to account for potential seasonality	+/-	+/-
District	District dummies to account to control for differences in geographical location	+/-	+/-

[1] Primary education means having attended at least 7 years of schooling, secondary at least 12 years and tertiary education having attended more than 12 years of formal education.

3.4 Summary

This chapter presented the data and methods used in the study. The study used nationally representative cross sectional data collected in the 2012 Rural Agricultural Livelihoods Survey (RALS12) by Zambia's Central Statistical office (CSO) and the Indaba Agricultural Policy Research Institute (IAPRI). For the purpose of this study, only households that used the assembly trader channel were considered. The study sample was restricted to areas where maize trade flowed from the farm to the retail centre (surplus areas) to avoid downwardly biasing the results. A variation of the marketing cost model was estimated using OLS in order to determine the factors that affect the marketing margin. The marketing margin was used as the dependent variable, with the explanatory variables being those that were hypothesized to affect the marketing margins was based on economic theory and from the literature. The variables were categorized based on the spatial, temporal and household characteristics. The variables included age, sex, education level of the household head; month and district dummies, etc.

CHAPTER FOUR
HOUSEHOLD CHARACTERISTICS IN RELATION TO MAIZE MARKETING MARGINS IN ZAMBIA

4.1 Introduction

This Chapter presents a discussion on the study findings. It provides descriptive statistics of the variables used in the analysis. It further examines how the farm-gate price and marketing margins vary by specific household characteristics and it also presents the effect of grain quantity on price received by farmers.

4.2 Descriptive Statistics

The variables used in this study are described in Table 4.1. The descriptive statistics of the variables are given by the mean as well as the distribution of each variable at five different percentiles. The mean marketing margins observed for the farmers that used the assembly trader channel was found to be ZMK[2]195.703 (USD0.04) per kg of maize sold, which entails that in general farmers obtained a lower price at the farm-gate than they would have if they had sold at the nearest retail centre. However on the other hand, about 10% of the farmers had negative marketing margins, these farmers managed to obtain a higher price at the farm-gate compared to the price they would have obtained had they sold at the retail market. The mean farm-gate price was found to be ZMK 822.74 (USD 0.16) per kg of maize sold and the mean retail price was ZMK 1018.44 (USD 0.20) per kg of maize sold. The farm-gate price as a percentage of the retail price is 80.78%. Access to price information is important in helping farmers, especially those in remote areas to obtain better prices for their produce and in turn reduce the gap between the retail price and farm-gate price. More than 80% of the farmers in this study had access to price information**.** This shows that price information is readily available to farmers, even in remote areas. The average age of the farmers was found to be 44 years, with the majority of these farmers being male (82%).

[2] The marketing margin and the farm-gate and retail prices are reported in the old Zambian kwacha (ZMK) before the currency was rebased by 1000 in January 2013 to the new Zambia Kwacha (ZMW)

Table 4.1: Descriptive Statistics

Variable Name	Description of Variable	Mean	Distribution of Variables				
			p10	p25	p50	p75	p90
Dependent variables	***Dependent variables***						
Market Margin	Market Margin (ZMK)	195.703	-102.30	39.22	181.45	360.09	480.82
Farm-gate Price	Farm-gate Price (ZMK)	822.735	545.455	626.087	800.00	995.025	1111.111
Explanatory variables	***Explanatory variables***						
Age	Age of Household head (years)	44.833	28	34	41	55	65
Sex	Sex of household head (=1 if male, 2 female)	1.187	-	-	-	-	-
Education level of household head	Education level of household head						
dedulev1	Primary Education Dummy(attended=1, 0 otherwise)	0.549	-	-	-	-	-
dedulev2	Secondary Education Dummy(attended=1,0 otherwise	0.273	-	-	-	-	-
dedulev3	Tertiary Education Dummy(attended=1, 0 otherwise)	0.050	-	-	-	-	-
dedulev4	No Education Dummy	0.128	-	-	-	-	-
Household size	Number of household members	5.907	3	4	6	8	9
Dkinties	Household Kinship ties dummy,1=yes 0=no	0.484	-	-	-	-	-
Farm size	Farm size (Ha)	4.042	1	1.715	2.835	5.188	8.91
Prodasst	All household Assets (ZMK)	2.49e+07	500000	1020000	2920000	1.04e+07	2.75e+07
Traders	Number of Traders Entering a Village	6.877	0	2	5	9	15
Distance boma	Distance to nearest boma (Km)	46.019	10	20	35	62	98
Distance road	Distance to nearest tarred road (Km)	26.602	1	5	20	40	65
Transport cost	Cost of transporting a kg of maize (ZMK)	17.611	0	0	0	0	86.96
Price information	Access to price information-agric commodity(1=yes)	1.128	-	-	-	-	-
Month	Month of Maize Sale	7.699	-	-	-	-	-
Retail Price	Retail Price Per Kg (ZMK)	1018.438	717.647	941.1765	1038.647	1176.471	1176.471

Source: Authors computations from RALS 2012

The education level of the household head was categorised into four levels; no education, primary, secondary and tertiary education. More than half of the sampled household heads had attained at least primary education (55%), with about 28% having completed secondary education and very few had a tertiary education level (5%). Those with no formal education accounted for about 12% of the sample. Households headed by farmers who are married were the majority (84%). The average household size was found to be 6 members per household, and majority of the households had no kinship ties to the local headmen or chiefs (52%). Each household on average had farm sizes of about 4 hectares, which they used for agricultural purposes. The mean value of productive assets for the sample was found to be ZMK24, 900,000. These productive assets include livestock assets, ploughs, harrows, oxcarts, and other productive farm assets including machinery that are owned by the farmers.

The distance and time travelled to the nearest retail centre variables give an indication of the ease of accessing markets. The mean distance to the nearest retail town (boma) was found to be about 46 kilometres and the average distance from the villages to the nearest tarred road was 26 kilometres. Even with these distances, it was however found that the most of the farmers did not travel long distances to sell their produce. About 75% of the farmers travelled zero distances, meaning they sold their maize produce at the farm gate. For those that did travel to sell to assembly traders, their average distance was 4.5km per maize sale transaction thus the farmers in this case might not have problems with regard to market access as is normally believed to be the case with rural smallholder farmers in Africa. These findings are similar to those found by Chamberlin and Jayne (2013), who found that the distance travelled from the farm to the point of sale, was zero for over 70% of the farmers selling maize to private traders. Hence it can be noted that traders offer a much needed service by obviating the need to organize transport services that the farmers would otherwise need to pay for themselves if they have to travel to the nearest retail town to sale their maize. Thus, for 75% of the farmers the transport costs are borne directly by the trader and which the trader recovers in the price that they offer to farmers and only about 25% of the farmers incurred transport costs. The average transport cost for the farmers that transported the maize grain for sale was found to be ZMK863.35 per 50kg bag of maize grain.

Recent studies have however called for a holistic approach to looking at market access, apart from the use of conventional market access measures such as distance or time travelled to nearest market (Chamberlin & Jayne, 2013; Chapoto & Jayne, 2011). Such simplifications do not take into account other factors such as degree of competitiveness. The numbers of traders that operate in a village give an indication of the degree of competitiveness. In this study it was found that the average number of traders that entered the different villages to purchase maize grain directly from the farmers was 7. This indicates a reasonable level of competitiveness in the village grain market. The findings are also in line with those by Chapoto & Jayne, (2011) and Sitko & Jayne, (2014a) in which they found that the mean number of traders in each village during the marketing season was 9 and 10 respectively. A further look at how the farm-gate price and the marketing margin vary based on farmer characteristics i.e. gender; age and education level (Table 4.2).

The results show that male farmers obtain a higher farm-gate price, but they also have a higher marketing margin than female farmers. The higher farm-gate price confirms with most studies, as males are believed to be better negotiators and tend to have more price information than females. The higher marketing margin however, shows that in relation to the prevailing retail price, females were able obtain a better price than the males. The farm-gate price female farmer's obtained was found to be less than the median farm-gate price obtained by all the farmers at ward level. Farmers who were less than 30 years obtained higher farm-gate prices followed by those farmers that were between the ages of 50-70 years. The farmers above 70 years fetched the lowest farm-gate price. Younger farmers are believed to be able to take more risks and in turn are able to look and negotiate for better prices than older farmers who are said to be more risk averse.

Table 4.2: Maize Farm-Gate Price and Marketing Margin by Sex, Age and Education Level.

Variable	Observations	Farm-Gate Price (ZMK)	Farm-gate price minus median farm-gate price at ward level	Marketing Margin (ZMK)
Gender				
Male	471	823.0344	4.949725	196.7986
		(224.0458)	(147.8669)	(244.9745)
Female	108	821.429	-0.135	190.9266
		(190.222)	(160.4777)	(217.683)
Age in years				
18-30	107	847.5947	5.379481	157.7357
		(226.6872)	(157.3263)	(242.4587)
30-50	286	828.1581	2.865701	196.5614
		(213.3127)	(144.877)	(240.8981)
50-70	154	817.0863	10.79176	220.4303
		(216.4133)	(158.3024)	(233.3024)
>70	32	718.3255	-23.13538	195.99
		(216.6552)	(134.7915)	(249.6687)
Education Level				
Primary	318	801.2496	5.02304	204.9598
		(227.5121)	(161.8895)	(247.6589)
Secondary	158	855.8821	3.819165	168.0713
		(216.6463)	(133.6595)	(237.3386)
Tertiary	29	878.9605	37.06803	228.527
		(182.424)	(93.34712)	(247.1497)
No Education	74	822.2565	-12.95857	202.0602
		(179.1557)	(149.1584)	(206.0668)

Standard Deviations in Parentheses

Source: Authors computations from RALS 2012

The level of education of the farmer is expected to affect the size of the farm-gate price and the marketing margin in that, the more educated the farmer is, the more likely they are to make informed decisions and obtain better farm-gate prices. This was shown to be the case, as the farmers with tertiary education obtained higher farm-gate prices (ZMK878.96) than the farmers with lower levels of education. The farmers with no education on the other hand fetched a lower farm-gate price than the prevailing median farm-gate price at ward level.

4.3 Correlation Coefficient Matrix

The correlation matrix in Table 4.3 shows how the variables used in this study are related to each other. Negative correlation coefficient between the marketing margin and the farm-gate price suggest that as the farm-gate price increases, the marketing margin decreases. The retail price on the other hand is positively related to both the farm-gate price and the marketing margin. A higher retail price means higher farm gate price. Also as the retail price increases, *ceteris paribus*, the marketing margin also increases. Having attended secondary school education was found to be negatively correlated to the marketing margin (p=0.1). This relationship is expected as it is believed that farmers that are more educated are able to negotiate better farm-gate prices due to more price information and thus have a lower margin than those that are less educated. Results also indicate that kinship ties is positively correlated to the marketing margin and negatively correlated to the farm-gate price. Farmers with kinship ties obtain lower farm-gate price and higher marketing margins in turn.

..

Table 4.3: Correlation Coefficient Matrix

	Marketing Margin	**Farm-gate Price**	**Retail Price**	**Age**	**Sex**	**Primary**	**Secondary**	**Tertiary**	**No Education**	**Never Married**
Marketing Margin	1									
Farm-gate Price	-0.691**	1								
Retail Price	0.4932**	0.2881**	1							
Age	0.0541	-0.0913**	-0.0382	1						
Sex	-0.0095	-0.0029	-0.0161	0.1332**	1					
Primary	0.0426	-0.1089**	-0.0746*	0.0194	-0.0206	1				
Secondary	-0.0706*	0.0932**	0.0187	-0.1467**	-0.0644	-0.676**	1			
Tertiary	0.0314	0.0593	0.113**	0.1232**	-0.0896**	-0.254**	-0.1407**	1		
No Education	0.0101	-0.0008	0.0124	0.0863**	0.1753**	-0.423**	-0.2345**	-0.088**	1	
Never Married	-0.0468	0.0861**	0.0416	-0.112**	0.0474	-0.111**	-0.0143	0.2912**	-0.0063	1
Divorced	-0.0574	0.0319	-0.0377	0.0751*	0.4573**	0.0613	-0.0768*	-0.0546	0.0468	-0.0299
Widowed	-0.0246	-0.0401	-0.0808*	0.1895**	0.5565**	-0.113**	0.0249	-0.0371	0.1594**	-0.0365
Separated	0.0185	0.0346	0.0661	-0.025	0.2727**	0.083**	-0.0619	-0.0334	-0.0194	-0.0183
Household Size	0.0183	-0.0656	-0.0547	0.0916**	-0.2362**	0.093**	0.0232	-0.032	-0.148**	-0.211**
Farm size	-0.0167	0.0135	-0.006	0.0211	-0.1521**	0.0636	-0.0048	0.0537	-0.1248*	0.0213
Productive Assets	0.0095	0.05	0.0727*	-0.0663	0.0321	-0.168**	0.0368	0.3969**	-0.0576	0.6294*
Kinship Ties	0.1188**	-0.1156**	0.0182	-0.0122	-0.0553	0.168**	-0.0808*	-0.191**	-0.0185	-0.0657
Traders	-0.0096	0.0147	0.005	0.0121	-0.0255	0.0553	-0.0704*	-0.0809*	0.0643	-0.089**
Distance to Boma	-0.1722**	-0.0004	-0.2286**	-0.1439**	-0.0571	0.1285**	-0.0422	-0.117**	-0.0587	-0.0466
Distance to Road	-0.0939**	-0.006	-0.1315**	-0.0941**	-0.0243	0.1682**	-0.1038**	-0.0779*	-0.0612	-0.0023
Transport Cost	-0.0741*	-0.0202	-0.1225**	-0.0392	-0.1326**	0.0983**	-0.0313	-0.0521	-0.0707*	-0.0126
Price Information	0.0602	-0.0653	0.0011	0.0782*	0.0292	0.0765*	-0.0487	-0.088**	0.0084	0.0355

	Divorced	Widowed	Separated	Household size	Farm size	Productive Assets	Kinship Ties	Traders	Distance to Boma	Distance to Road	Transport Cost	Price Information
Table 4.3 cont...												
Divorced	1											
Widowed	-0.069*	1										
Separated	-0.0346	-0.0422	1									
Household Size	-0.135**	-0.168**	-0.0732*	1								
Farm size	-0.084**	-0.114**	-0.0797*	0.249**	1							
Productive Assets	-0.0059	0.0796*	-0.0269	-0.10**	-0.0579	1						
Kinship Ties	0.0001	-0.0744*	-0.0437	0.0434	-0.0146	-0.145**	1					
Traders	0.0287	-0.0514	0.0235	-0.0067	-0.0066	-0.093**	-0.085**	1				
Distance to Boma	-0.0378	-0.024	-0.0024	0.063	0.1234*	-0.119**	0.139**	0.073*	1			
Distance to Road	-0.0324	-0.036	-0.038	0.0755*	0.242**	-0.118**	0.096**	0.0527	0.499**	1		
Transport Cost	-0.087**	-0.0347	-0.0553	0.0228	0.0157	-0.0565	0.0264	-0.075*	0.0413	0.11**	1	
Price Information	0.0239	0.0048	0.0169	-0.0501	-0.0316	-0.0592	0.0643	0.0163	0.0298	0.0199	0.069*	1

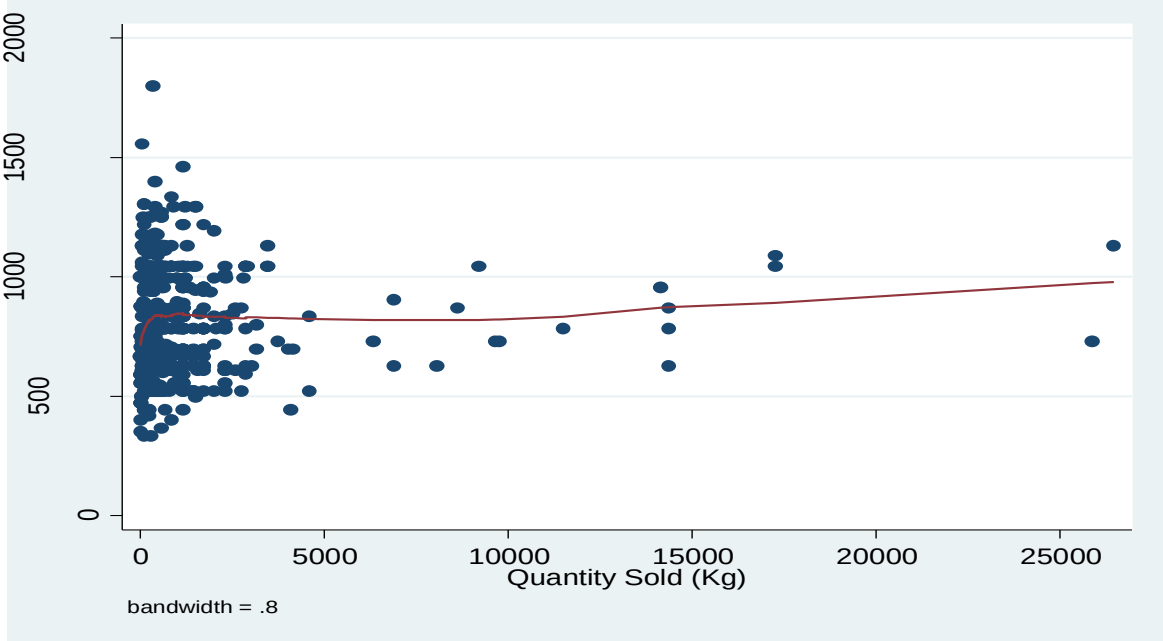
** p<0.05, * p<0.1

Source: Authors computations from RALS 2012

This finding is contrary to the belief that farmers with kinship ties tend to obtain better prices, as they are believed to have better access to price information through these ties. The results also show that there is a negative correlation between the market margin and the distance to the district town and to the main road (p=0.05), which is contrary to what has been thought to be the case. This implies that for this study farmers that are in remote areas have a lower marketing margin than those in less remote areas.

4.4 Quantity Traded and the Farm-gate Price

A large body of literature has shown that there is a positive relationship between the price of maize obtained and the quantity traded. The relationship between the maize farm-gate price and the maize quantity sold for this study is shown in figure 4.1 below. From the Lowess[3] regression curve, it can be seen that the relationship between farm-gate price and quantity traded is a positive linear relationship beyond roughly 10,000 kgs sold (10 metric tonnes).

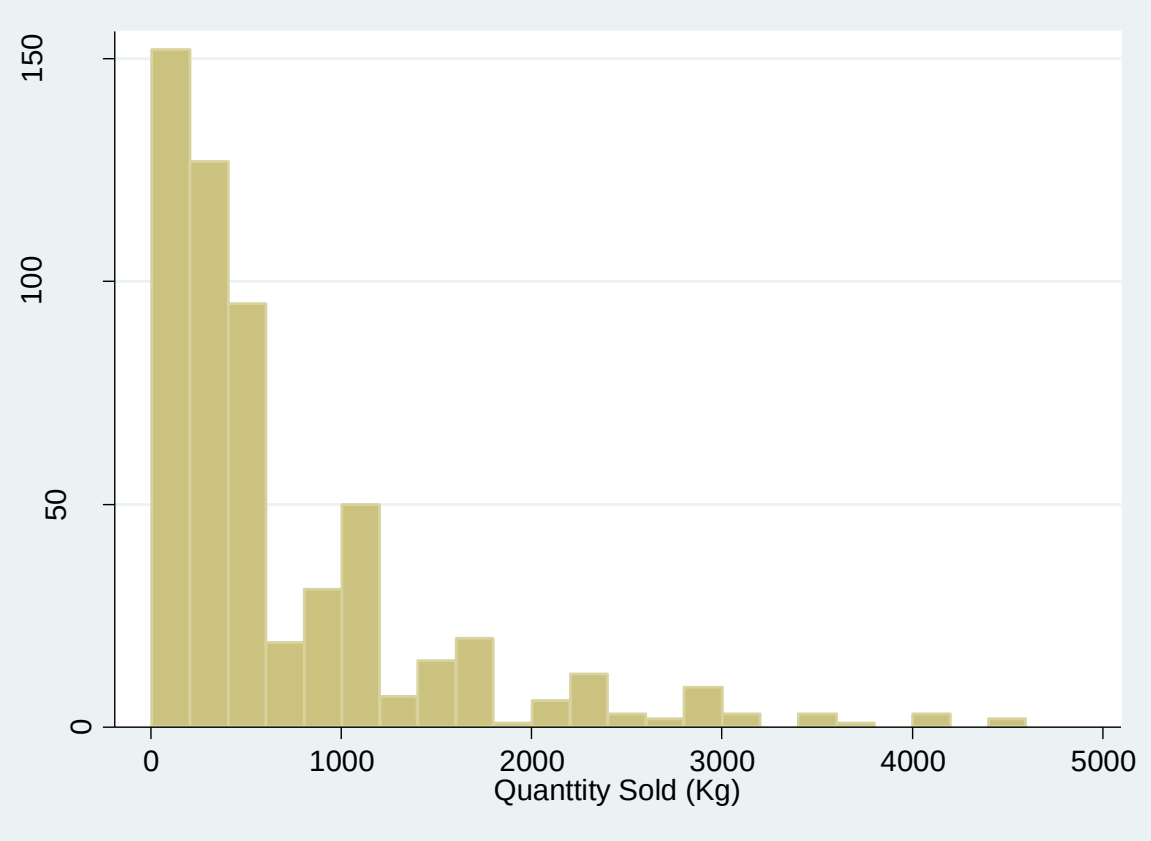


Source: Authors computations from RALS 2012

Figure 4.1: Bivariate Lowess Regression Curve of Farm-gate Price on Quantity of Maize Grain Sold

[3] Lowess stands for locally weighted scatter plot smoothing. It is a local average non-parametric estimator usually employed to check for relationships between variables. It is robust to outliers unlike other non-parametric estimators such as the super smoother and the kernel regressions (Cameron & Trivedi, 2005: 297-321)

This relationship shows that the larger the quantity sold beyond 10,000 kgs, the higher the price obtained. These results thus conform to the view that economies of scale play an important role in helping farmers obtain better prices. However, most of the farmers produce much smaller quantities than this, with 97% selling less than 5000kg (5 metric tonnes) of grain (figure 4.1 above). Further, unpacking the distribution for those that sold less than 5000kg of grain shows that 73% of the farmers sell under a 1000kg (1 metric tonnes) of maize grain in a farming season (Figure 4.2 below). The reason these small amounts of grain are traded, is that most of these rural farmers tend to have little to sell after they have accounted for household consumption, which in most cases, is the main reason for production. However, having these small quantities of maize grain to sell makes it a challenge for the farmers to take advantage of the economies of scale.



Source: Authors computations from RALS 2012

Figure 4.2: Distribution of Quantity of Maize Grain Sold for those selling under 5,000kg per year.

4.4 Summary

This chapter presented a description of the study variables and the household characteristics. The findings show that the mean marketing margin obtained under the assembly trader channel was ZMK195.703 (USD0.04) per kg of maize sold, which entails that in general farmers obtained a lower price at the farm-gate than they would have if they had sold at the nearest retail centre. A few farmers were however found to obtain higher prices at the farm-gate than at the retail centre. The farm-gate price as a percentage of the retail price is 80.78%. The study also showed that majority (80%) of the farmers had access to price information and about 75% of the farmer travelled zero distances to their selling point. The results from this study also revealed that most farmers sold below 1000kgs of maize, and thus were unable to take advantage of economies of scale, as the farmers that sold above 5000kgs obtained better farm-gate price.

CHAPTER FIVE
DECOMPOSING THE FARM-TO-RETAIL MAIZE MARKETING MARGIN

5.1 Introduction

This chapter decomposes the farm-to-retail price margin into spatial, temporal and household specific factors. The underlying sources of variation in the size of the household-specific marketing margins are examined and the factors that affect the size of the marketing margins and the farm-gate price farmers obtain are also identified.

5.2 Spatial and Temporal Price Variation

Maize is the most important food crop amongst the smallholder farmer in Zambia and having its prices fluctuate widely over time and space affects their wellbeing. Prices that farmers receive at the farm-gate, as well as the retail price, normally vary from one region to another (spatial variation). After decomposing the data into temporal and spatial aspects, table 5.1 shows how the marketing margins vary by province and district, with Southern Province having the lowest marketing margin. Farmers in this province obtained a farm-gate price that is closer to the retail price in the nearest town/retail centre. Chiengi district in Luapula Province had the lowest marketing margin of ZMK0.00, which meant that the farm-gate price obtained by farmers in this district was the same as the retail price reported in the nearest retail centre.

In general some farmers in the provinces and districts showing positive marketing margins were obtaining lower farm-gate prices, compared to the retail prices in the nearest retail centres. Eastern province had the highest margin, with Nakonde district in Muchinga Province having the highest marketing margin of ZMK513.37. These differences in marketing margins per province and district indicate the spatial price differences that are observed due to differences in marketing access conditions as well as other factors, such price information that farmer’s in the different provinces and districts have access to and also the road conditions.

.

Table 5.1: Maize Marketing Margin by Province and District

Province	Observations	Marketing Margin (ZMK)	District	Marketing Margin(ZMK)
Central	109	189.2935	Chibombo	307.5063
			Kapiri-Mposhi	201.9904
			Mkushi	52.71044
			Mumbwa	316.3916
			Serenje	1.48999
Copperbelt	47	192.8855	Chingola	15.39261
			Kitwe	413.2993
			Luanshya	153.3089
			Lufwanyama	205.5982
			Masaiti	205.9829
			Mpongwe	211.499
			Mufulira	393.8619
			Ndola	240.1818
Eastern	165	268.9533	Chadiza	503.7787
			Chipata	107.4338
			Katete	229.2108
			Lundazi	350.8407
			Mambwe	155.743
			Nyimba	258.4654
			Petauke	273.7234
Luapula	34	264.9688	Chiengi	0.00
			Mansa	210.9772
			Mwense	360.0894
			Nchelenge	291.1892
			Samfya	273.9642
Lusaka	19	225.3199	Chongwe	350.3836
			Kafue	260.2731
			Lusaka	154.7315
Muchinga	13	151.7661	Isoka	251.6794
			Mpika	28.74191
			Nakonde	513.369

Province		Marketing Margin (ZMK)	District	Marketing Margin(ZMK)
Table 3 cont.				
Northern	74	208.8209	Kasama	345.2685
			Luwingu	301.2788
			Mbala	199.5841
			Mporokoso	323.1978
			Mpulungu	230.502
			Mungwi	44.07025
North Western	48	73.64006	Mwinilunga	69.65948
			Solwezi	75.82296
Southern	63	66.02136	Choma	36.94811
			Itezhi-tezhi	401.9608
			Kalomo	7.875391
			Kazungula	13.96188
			Livingstone	190.6413
			Mazabuka	316.7945
			Monze	276.2148
Western	7	118.0733	Lukulu	48.31626
			Senanga	211.0827

Source: Authors computations from RALS 2012

Minten and Kyle (1999) for example, state that "the presence or absence of road infrastructure is perceived to be one of the main determinants of spatial price variation observed in African grain markets". However, apart from the spatial price variation, prices tend to also vary over time. Food grains and other types of food products are likely to exhibit seasonal price variations, due to variations in food availability and supply. For instance, the maize marketing season in Zambia is during the months of June to August each year, which is the period after harvesting. During this period large quantities of maize grain are offloaded onto the market and a decline in retail prices is observed (Table 5.2 below). Retail prices are lowest in the months of June and July, with June having the largest quantity of maize sold in the season.

Table 5.2: Monthly Maize Prices, Quantity Sold and Marketing Margin, 2011/2012 Marketing season

Month[4]	Observations	Mean Number of Sales Transactions per Household	Farm-gate Price (ZMK)	Retail Price (ZMK)	Quantity Sold for all transactions (Kg)	Marketing Margin (ZMK)
2011						
May	19	1.16	696.93	1052.10	549.76	355.18
June	66	1.18	709.99	908.56	1671.68	198.58
July	93	1.24	772.86	929.46	995.36	156.59
August	174	1.34	837.68	1004.45	1329.05	166.77
September	61	1.46	869.56	992.93	749.11	123.37
October	69	1.42	868.70	1119.81	901.32	251.10
November	30	1.93	845.21	1164.22	522.18	319.01
December	24	1.58	908.43	1091.9	522.94	183.49
2012						
January	24	1.71	930.52	1185.46	734.13	254.94
February	15	2.40	868.34	1100.00	889.33	231.66
March	3	2.67	811.59	1176.47	345.00	364.88
April	1	2.00	695.65	1058.82	287.50	363.17

Source: Authors computations from RALS 2012

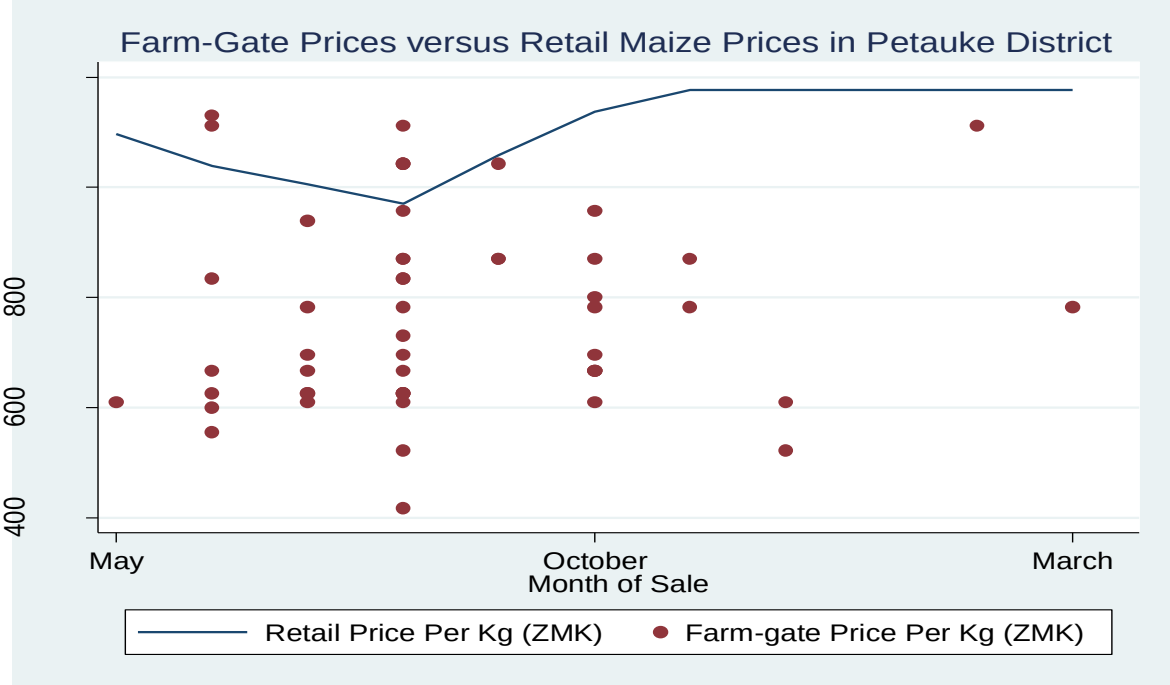
The prices and quantity sold vary from one month to another or from one season to another. The marketing margin also varies from month to month, with March having the lowest marketing margin and April having the highest marketing margin.

5.3 Inter-Household Price Variation

Price variations are evident in terms of spatial and temporal variations. Theses price variations are expected as geographical differences bring about differences in market infrastructure and facilities, such as access to roads which in turn affect the cost of transportation and thus affecting the prices differently depending on the area. Seasonal differences affect the grain availability and in turn affect the price. However, even within the same time period and in the same areas, maize farm-gate prices have been seen to vary among households (see Sitko & Jayne, 2014a:64). Households in the same area and same month tend to fetch varying prices for the same produce. Figure 5.1 below examines the inter-household price variation in the

[4] The data was collected from May 2011 to April 2012, therefore the months in this table are reported in this order

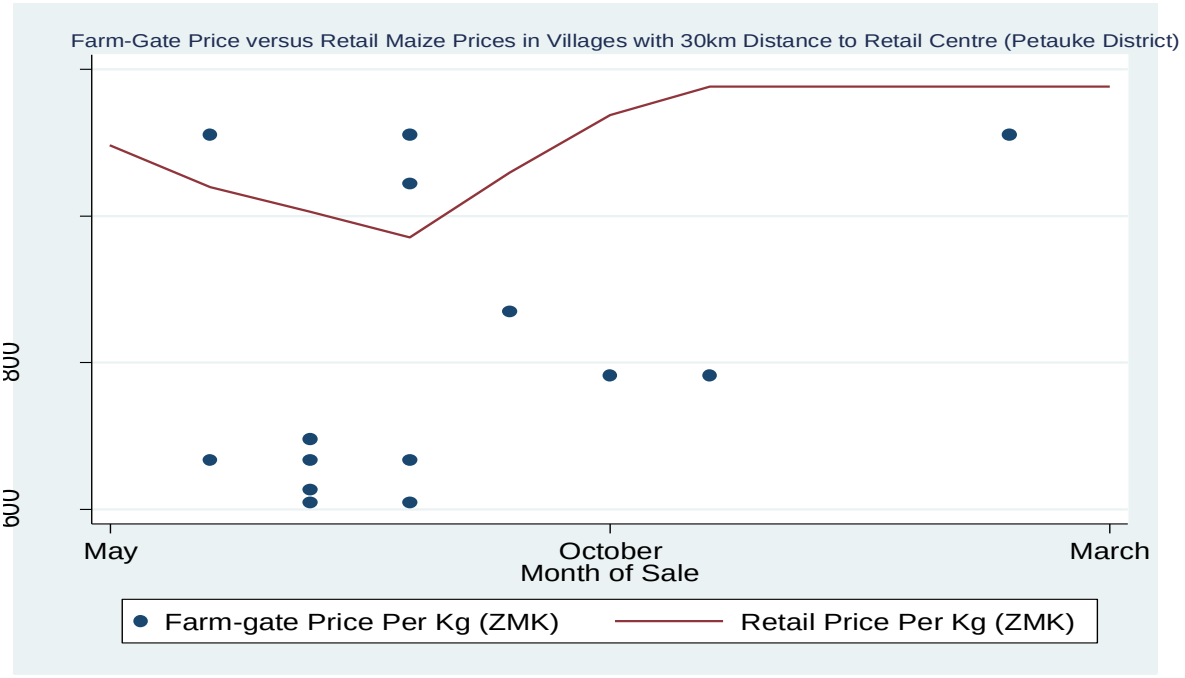
same district and the same months, where the farm-gate price is plotted alongside the retail price for Petauke district. The results show that within the same district and the same month farmers fetch varying prices, with some farmers being able to obtain prices above the retail price while others receive very low prices, even less than 50% of the retail price.



Source: Authors computations from RALS 2012

Figure 5.1: Farm-Gate Price Relative to Retail Maize Prices in Petauke District

The range between the highest and lowest farm-gate prices that farmers in the same month and area obtain are large in some cases. For instance in the month of August, the price range between the lowest farm-gate price and highest farm-gate price obtained was as large as ZMK693 per kg of maize grain. This large inter-household variation in prices raises a number of questions as to why farmers in the same area would obtain such varying prices. Other districts in the other provinces also showed similar trends (see Appendix 1). A closer examination of this price variation, holding distance to the retail centre within the same district constant at 30km (Figure 5.2 below), still showed variations in the prices obtained by farmers in Petauke District. Some farmers were able to fetch prices above the retail price while others fetched prices below the retail price.



Source: Authors computations from RALS 2012

Figure 5.2: Farm-Gate Price Relative to Retail Maize Prices in Villages with Distance of 30km to Retail Centre in Petauke District

The variations in farm-gate prices holding both time and space are further examined. The villages in the entire sample are grouped into categories based on the distance to the district retail centre and for the various months. Category 1 shows all the villages in all districts that have a distance of less than 30km to the nearest district retail centre. Category 2 consists of villages with distance to the retail centre of between 30km to 50km and the last category has villages that are more than 50km to the district retail centres. The mean farm-gate prices for each category are shown in Table 5.3 below. The results generally show that farmers whose homesteads are less than 30km from the retail centre obtained a higher price than those that are further away. This is expected as they are fewer costs involved for the trader to reach the farmers. However in some cases, the mean farm-gate price for villages that are more than 50km from the retail centre obtained a higher price than in the villages that are 30km to 50km from the retail centres and even in those that are less than 30km to the retail centre. This result suggests that the price obtained by farmers in some cases has very little to do with access to the market/retail centre as commonly thought. The results also reinforce the fact that market access is not a problem when it comes to rural farmers in Zambia.

Table 5.3: Monthly Mean Farm-gate Price by Distance to Retail Centre

Monthly Mean Farm-gate Price per Kg				
		Distance to retail center (Km)		
	Observations	<30	30-50	>50
2011				
May	19	769.777	608.696	647.468
		(105.228)	.	(221.928)
June	66	710.165	716.550	706.115
		(290.932)	(166.023)	(202.338)
July	93	832.644	727.119	747.981
		(190.446)	(180.818)	(280.444)
August	174	853.597	818.494	830.054
		(196.954)	(179.756)	(204.402)
September	61	875.372	814.153	904.109
		(192.715)	(194.782)	(218.488)
October	69	865.939	875.424	866.811
		(186.318)	(196.987)	(253.471)
November	30	807.500	872.359	848.654
		(166.281)	(115.196)	(197.424)
December	24	920.929	965.217	864.348
		(274.128)	(212.644)	(256.524)
2012				
January	24	935.715	802.813	976.411
		(297.839)	(263.655)	(174.564)
February	15	875.362	972.947	832.436
		(214.884)	(195.394)	(257.289)
March	3	826.087	782.609	-
		(61.488)	.	

Standard Deviations in Parentheses

Source: Authors computations from RALS 2012

The significant inter-household variation in prices holding time and space constant suggests that other factors apart from the spatial and temporal factors might have an influence on the farm-gate price obtained by farmers and indeed the size of the marketing margin in Zambia. For instance, household specific factors e.g. access to price information, the farmer's market knowledge, negotiating skills, age, gender or relationships with the assembly traders; might have an influence on the price a farmer obtains. Therefore, an examination of the contribution of the spatial, temporal and household specific factors to the size of the farm-gate price and the marketing margins is carried out in the next section.

5.4 Factors Affecting the Household-Specific Marketing Margins and the Farm-gate Price

In order to establish how much variation in marketing margins is due to spatial, temporal and household specific factors, three regressions were run. The dependent variable is the same for all regression, which is the marketing margin. The first regression is a regression of just the spatial factors, which are the district dummies, the second regression is a combination of the spatial factors and temporal factors (monthly dummies), and the third regression includes the spatial factors, temporal factors and all the household specific factors. The results of all three regressions are presented in Table 5.4. From the results, it can be seen that spatial factors account for the largest variation in marketing margins given by an adjusted R-squared of 21.1%. Adding the temporal factors increases the adjusted R-squared by 4.9 percentage points and including the household specific factors increases the adjusted R-squared by 3.3 percentage points. Therefore, of the explained variation in marketing margins 72% is due to spatial factors, 16.7% is from temporal factors and household-specific factors account for 11.3% of the variation.

These results show that apart from the usual expected spatial and temporal factors, marketing margins are also affected by household-specific factors, even though the contribution of the observed household factors presented in this study relative to the other factors is minimal. The household specific factors that were found to be statistically significant in affecting the size of the marketing margin are marital status, kinship ties, cost of transporting grain and access to price information.

Table 5.4: Maize Marketing Margin Regression Results

Variables	Regression 1	Regression 2	Regression 3
Spatial Factors (District Dummies)			
Kapiri-Mposhi	-73.75	-54.82	-28.74
	(67.15)	(59.09)	(52.66)
Mkushi	-280.5***	-289.1***	-254.1***
	(80.08)	(73.90)	(68.69)
Mumbwa	81.13	52.35	57.53
	(93.65)	(85.92)	(85.94)
Serenje	-288.6***	-260.7***	-247.9**
	(92.15)	(93.31)	(106.9)
Chingola	-288.4***	-285.0***	-251.5***
	(65.80)	(60.85)	(64.33)
Kitwe	92.82	150.9**	222.7***
	(69.22)	(60.50)	(64.98)
Luanshya	-109.9*	-82.79	-76.89
	(58.50)	(53.71)	(62.51)
Lufwanyama	-34.00	-23.58	8.826
	(149.3)	(129.5)	(131.2)
Masaiti	11.39	-44.56	-61.13
	(64.68)	(60.07)	(72.13)
Mpongwe	-78.97	-40.91	-64.04
	(93.52)	(94.83)	(115.3)
Mufulira	114.5**	178.7***	199.6***
	(55.16)	(49.60)	(52.68)
Ndola	-19.94	-49.79	-85.26
	(66.04)	(84.48)	(79.14)
Chadiza	197.7**	207.1**	160.1*
	(96.12)	(89.39)	(91.88)
Chipata	-156.9***	-153.8***	-164.1***
	(60.61)	(54.41)	(61.67)
Katete	-116.9	-134.3**	-161.7***
	(73.75)	(62.09)	(56.24)
Lundazi	91.49	78.33	14.03
	(64.47)	(56.92)	(59.67)
Mambwe	-42.17	-69.77	-110.2
	(97.56)	(89.97)	(104.7)
Nyimba	32.65	67.06	33.08
	(85.76)	(90.09)	(116.5)
Petauke	11.61	23.37	-11.17
	(62.59)	(55.75)	(56.92)
Chiengi	-279.4***	-351.8***	-338.2***
	(55.16)	(102.2)	(113.9)
Mansa	-49.10	-53.54	-48.13
	(111.7)	(87.15)	(81.81)

Variables	Regression 1	Regression 2	Regression 3
Table 5.4 cont.			
Mwense	149.9	88.55	76.47
	(133.2)	(106.0)	(105.1)
Nchelenge	-75.92	-22.10	-64.08
	(120.4)	(123.8)	(108.0)
Samfya	160.8	61.93	40.38
	(220.9)	(178.4)	(176.0)
Chongwe	41.14	15.33	-95.50
	(57.70)	(67.04)	(97.39)
Kafue	-58.22	-32.34	-59.96
	(75.27)	(85.64)	(85.11)
Lusaka	-118.8*	-146.5**	-330.2
	(61.05)	(56.74)	(288.2)
Isoka	-24.66	-34.30	-90.77
	(68.82)	(75.41)	(84.29)
Mpika	-215.8	-204.5	-266.1*
	(136.4)	(132.4)	(141.3)
Nakonde	234.0***	272.3***	299.5***
	(55.16)	(58.91)	(79.81)
Kasama	35.30	12.33	-68.75
	(197.3)	(172.9)	(181.8)
Luwingu	66.05	21.65	35.38
	(219.0)	(223.5)	(204.7)
Mbala	-80.92	-39.43	-72.99
	(58.97)	(52.63)	(48.19)
Mporokoso	65.90	-34.65	-66.72
	(58.47)	(87.69)	(85.24)
Mpulungu	-49.57	-25.80	-55.76
	(91.55)	(89.53)	(91.69)
Mungwi	-327.2***	-336.5**	-359.4***
	(110.5)	(142.3)	(135.8)
Mwinilunga	-250.8**	-218.7**	-257.9***
	(97.29)	(91.82)	(74.98)
Solwezi	-219.8**	-218.1**	-268.4***
	(93.11)	(88.84)	(84.96)
Choma	-203.3***	-222.9***	-285.3***
	(62.50)	(61.88)	(62.66)
Itezhi-Tezhi	122.6**	186.8***	216.1***
	(55.16)	(49.60)	(53.12)
Kalomo	-242.9***	-224.2***	-210.5***
	(64.26)	(61.71)	(56.89)
Kazungula	-300.3**	-286.7*	-241.2
	(140.1)	(153.3)	(164.6)
Livingstone	-124.5	-106.5	-122.5
	(114.7)	(100.7)	(111.2)

Variables	Regression 1	Regression 2	Regression 3
Table 5.4 cont.			
Mazabuka	8.162	72.36	33.72
	(82.44)	(79.33)	(92.23)
Monze	-3.146	-14.48	-63.29
	(55.16)	(60.31)	(68.11)
Lukulu	-253.9***	-228.1***	-275.3***
	(58.02)	(58.84)	(86.08)
Senanga	7.355	-106.7	-124.8
	(100.1)	(76.95)	(85.92)
Temporal Factors (Month Dummies)			
February		-33.59	-36.90
		(101.8)	(97.06)
March		-20.18	27.47
		(89.55)	(88.26)
April		32.36	-52.39
		(93.75)	(83.74)
May		81.12	79.48
		(122.0)	(111.9)
June		-94.94	-109.9
		(92.08)	(79.27)
July		-151.6*	-151.2*
		(90.77)	(78.63)
August		-170.5*	-173.6**
		(88.36)	(75.80)
September		-144.6	-134.2*
		(92.40)	(80.78)
October		-68.59	-71.93
		(93.14)	(81.12)
November		-12.36	-24.09
		(89.46)	(88.55)
December		-33.86	-63.91
		(125.8)	(114.7)
Farmer and farm household characteristics			
Age Of Household Head In Years			-0.174
			(0.781)
Sex (1= Male, 2= Female)			-21.06
			(44.52)
Primary Education (1= attended, 0= otherwise)			-15.35
			(33.15)
Secondary Education (1= attended, 0=otherwise)			-34.64
			(36.98)
Tertiary Education (1=attended, 0=otherwise)			-0.653
			(74.43)
Never Married (1= Yes, 0=No)			-262.8**

Variables	Regression 1	Regression 2	Regression 3
Table 5.4 cont.			
			(108.7)
Divorced (1= Yes, 0=No)			-78.05
			(64.91)
Widowed (1= Yes, 0=No)			-30.56
			(50.31)
Separated (1= Yes, 0=No)			-9.907
			(73.99)
Number Of Household Members			-1.296
			(4.549)
Farm size			0.349
			(3.509)
Productive Assets (ZWK)			4.19e-07
			(3.10e-07)
Kinship Ties Dummy, 1=Yes 0=No			88.26***
			(27.36)
Number Of Traders Entering A Village			0.252
			(1.875)
Distance To Nearest Boma (Km)			-0.0158
			(0.585)
Distance To Nearest Road (Km)			-0.561
			(0.674)
Transport Cost Of Transporting A Kg Of Grain To District Salepoint			-0.578*
			(0.323)
Price Information (1=Yes, 0=No)			-74.76**
			(35.51)
Constant	279.4***	385.6***	509.5***
	(55.16)	(98.49)	(116.6)
Mean Marketing Margin	195.703	195.703	195.703
Observations	579	579	579
R-squared	0.275	0.334	0.386
Adj.R-squared	0.211	0.260	0.293

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results indicate that households that are headed by never married farmers obtained a lower marketing margin by ZMK262.8 than households headed by married farmers. The results also show that households with kinship ties, that is ties to either the chief or village elders have a margin that is higher by ZMK88.26 than those without kinship ties, holding other things constant. It has always been believed that households with kinship ties obtain higher farm-gate price and in turn lower marketing margins, however these results show the opposite. Thus is the notion of kinship ties being positively related to price a myth and not a fact? Household's access to price information also affects the size of the marketing margin. The results show that households with access to price information obtain a lower marketing margin by ZMK74.76 *ceteris paribus. A priori*, it had been hypothesized that access to price information equips one with the information and thus are able to negotiate a better price and choose a buyer or seller that offers a better price, therefore obtaining a higher farm-gate price and reducing the market margin.

A similar analysis was carried out with the dependent variable being the farm-gate price to shed more light on how much variation in farm-gate prices are due to spatial, temporal and household specific factors, with the same independent variables. The results of all three regressions are presented in Table 5.5 and they show that spatial factors account for the largest variation of 18.8% as reported by the adjusted R-squared. Adding the temporal factors increases the adjusted R-squared by 3 percentage points and including the retail price does not change the adjusted R-squared. Addition of the household specific factors increases the adjusted R-squared by 3.2 percentage points. As was the case with the marketing margin, spatial factors contribute the most to size of farm-gate price (75.2%), temporal factors and the household specific factors have very minimal contribution to the farm gate price obtained by farmers with 12% and 12.8% respectively. The household specific factors that are found to influence the size of the farm-gate price are education level, access to price information and kinship ties. Farmers who have attained secondary education have a higher farm-gate price by ZMK61.79 than those with no formal education. The farmers with access to price information receive a higher farm-gate price by ZMK68.05 and the households with kinship ties receive a lower farm-gate price by ZMK70.94.

Table 5.5: Maize Farm-Gate Price Regression Results

Variables	Regression 1	Regression 2	Regression 3	Regression 4
Spatial Factors (District Dummies)				
Kapiri-Mposhi	-110.0**	-121.8**	-103.9*	-116.6**
	(51.81)	(52.23)	(53.94)	(53.14)
Mkushi	-55.76	-27.73	4.432	-21.68
	(60.34)	(62.89)	(68.66)	(64.16)
Mumbwa	-20.10	-33.64	-35.54	-32.16
	(77.74)	(86.96)	(86.46)	(86.89)
Serenje	23.03	32.14	55.33	43.52
	(85.40)	(85.46)	(86.97)	(93.93)
Chingola	195.3***	240.8***	245.3***	210.9***
	(53.13)	(81.71)	(77.66)	(65.96)
Kitwe	-60.45	-86.86	-93.35	-154.9**
	(58.73)	(62.18)	(62.52)	(72.04)
Luanshya	-61.79	-31.42	-19.82	-38.34
	(64.05)	(51.96)	(52.34)	(63.43)
Lufwanyama	41.64	15.15	16.01	-9.277
	(109.7)	(112.5)	(114.2)	(115.2)
Masaiti	46.17	17.91	20.62	9.174
	(53.22)	(54.39)	(54.86)	(66.47)
Mpongwe	-24.86	35.28	35.85	60.54
	(84.34)	(90.00)	(90.40)	(110.5)
Mufulira	-23.31	-47.61	-60.91	-97.38*
	(41.23)	(43.62)	(47.20)	(50.68)
Ndola	100.5*	78.08	75.21	91.26
	(53.00)	(57.40)	(58.96)	(56.77)
Chadiza	-188.1**	-114.5	-123.9	-57.68
	(88.79)	(88.48)	(88.85)	(86.14)
Chipata	75.18	46.34	57.26	71.52
	(50.95)	(52.35)	(53.00)	(60.99)
Katete	-22.33	56.17	64.09	101.1**
	(46.43)	(54.43)	(54.74)	(48.57)
Lundazi	-83.05*	-71.66	-72.34	-16.15
	(47.89)	(51.74)	(52.05)	(57.44)
Mambwe	95.44	103.9	100.4	116.4
	(85.46)	(87.39)	(87.26)	(101.9)
Nyimba	-107.3	-133.4*	-126.7	-96.64
	(80.34)	(80.31)	(81.29)	(110.9)
Petauke	-49.17	-43.66	-41.60	-6.136
	(49.95)	(51.45)	(51.62)	(53.69)
Chiengi	370.5***	314.8***	318.6***	310.3***
	(41.23)	(88.30)	(89.42)	(103.5)
Mansa	91.81	98.41	93.85	79.98

Variables	Regression 1	Regression 2	Regression 3	Regression 4
Table 5.5 cont.				
	(68.26)	(65.13)	(66.70)	(66.51)
Mwense	107.5	170.5**	144.2*	161.0**
	(77.65)	(68.39)	(76.65)	(77.64)
Nchelenge	198.6**	217.4*	197.5	217.6**
	(99.53)	(125.0)	(127.2)	(99.13)
Samfya	62.20	130.4	110.9	118.4
	(104.4)	(90.09)	(100.1)	(104.1)
Chongwe	50.05	23.74	19.77	105.4
	(44.57)	(56.76)	(57.82)	(85.56)
Kafue	19.29	0.971	4.155	29.02
	(82.84)	(80.88)	(81.08)	(83.59)
Lusaka	210.0***	181.6***	178.0***	378.3
	(48.83)	(51.07)	(51.04)	(259.2)
Isoka	9.716	11.47	13.79	56.94
	(64.05)	(76.18)	(75.72)	(82.47)
Mpika	160.5	129.1	136.7	164.7
	(114.1)	(118.9)	(119.9)	(130.6)
Nakonde	-260.5***	-293.6***	-291.5***	-327.2***
	(41.23)	(52.83)	(53.12)	(74.89)
Kasama	35.27	8.196	6.113	80.08
	(135.8)	(138.4)	(141.2)	(143.0)
Luwingu	-70.36	-69.97	-65.06	-53.83
	(195.3)	(193.9)	(197.4)	(185.5)
Mbala	162.2***	159.6***	147.4***	176.2***
	(46.06)	(46.46)	(49.39)	(46.45)
Mporokoso	260.6***	232.7***	212.6***	203.9***
	(45.57)	(69.20)	(69.90)	(68.62)
Mpulungu	183.9**	157.8*	144.4*	160.0**
	(79.63)	(82.66)	(84.15)	(79.73)
Mungwi	359.1**	327.8**	328.7**	359.9**
	(142.1)	(145.1)	(144.8)	(142.5)
Mwinilunga	-3.658	10.25	31.41	64.03
	(88.31)	(88.60)	(91.92)	(81.06)
Solwezi	34.94	61.88	77.73	104.9
	(84.52)	(83.09)	(83.88)	(79.20)
Choma	-215.6***	-185.1***	-143.7**	-85.36
	(50.29)	(50.43)	(66.34)	(68.82)
Itezhi-Tezhi	-217.7***	-242.0***	-236.4***	-282.5***
	(41.23)	(43.62)	(43.93)	(48.47)
Kalomo	-70.23	-37.39	-10.83	-16.09
	(59.65)	(56.33)	(62.28)	(62.92)
Kazungula	260.6*	234.5	239.8	192.1
	(148.0)	(150.3)	(150.6)	(152.0)

Variables	Regression 1	Regression 2	Regression 3	Regression 4
Table 5.5 cont.				
Livingstone	99.45	79.41	82.16	83.12
	(82.36)	(81.15)	(82.91)	(93.13)
Mazabuka	-34.62	-58.92	-60.28	-53.49
	(73.85)	(75.73)	(76.09)	(80.89)
Monze	-23.31	78.62	72.11	124.0*
	(41.23)	(55.35)	(56.15)	(64.37)
Lukulu	244.7***	213.7***	215.1***	276.8***
	(48.08)	(56.13)	(56.08)	(80.41)
Senanga	37.86	99.08**	99.85**	130.9**
	(63.02)	(48.37)	(49.39)	(62.70)
February		-14.20	-9.346	4.560
		(103.0)	(101.7)	(94.01)
March		-12.85	-9.495	-48.59
		(80.29)	(80.55)	(81.59)
April		-18.72	-20.10	59.46
		(82.75)	(82.10)	(78.19)
May		-149.4*	-142.5*	-130.9*
		(83.37)	(85.26)	(75.67)
June		-132.2	-109.1	-82.66
		(82.63)	(88.99)	(76.87)
July		-84.25	-60.31	-50.79
		(82.66)	(89.72)	(75.73)
August		-5.955	11.95	23.81
		(77.68)	(82.80)	(72.16)
September		2.927	17.30	19.79
		(83.90)	(86.91)	(75.68)
October		-5.210	2.280	13.34
		(83.04)	(84.33)	(73.85)
November		2.667	3.651	8.091
		(77.18)	(77.24)	(75.31)
December		25.46	26.32	58.06
		(109.7)	(109.7)	(100.5)
Retail Price Per Kg (ZMK)			0.101	0.118
			(0.105)	(0.106)
Age Of Household Head In Years				-0.233
				(0.714)
Sex (1= Male, 2= Female)				-0.118
				(43.71)
Primary (1= attended, 0=otherwise)				19.27
				(31.96)
Secondary(1=attended,0=otherwise)				61.79*
				(35.34)
Tertiary(1= attended, 0=otherwise)				70.87

Variables	Regression 1	Regression 2	Regression 3	Regression 4
Table 5.5 cont.				
				(70.27)
Never Married (1= Yes, 0=No)				181.7
				(117.7)
Divorced (1= Yes, 0=No)				54.20
				(62.22)
Widowed (1= Yes, 0=No)				14.87
				(47.21)
Separated (1= Yes, 0=No)				32.46
				(64.20)
Number Of Household Members				-0.438
				(4.288)
Farm size				-1.699
				(3.308)
Productive Assets (ZMK)				-4.31e-07
				(2.76e-07)
Kinship Ties Dummy,1=Yes 0=No				-70.94***
				(26.88)
Number Of Traders Entering A Village				0.0714
				(1.837)
Distance To Nearest Boma (Km)				0.311
				(0.537)
Distance To Nearest Road (Km)				0.244
				(0.594)
Transport Cost Of Transporting A Kg Of Grain To District Salepoint				0.453
				(0.306)
Price Information(1=Yes, 0=No)				68.05**
				(33.70)
Constant	805.9***	836.2***	712.2***	599.5***
	(41.23)	(75.67)	(158.3)	(166.4)
Mean Farm-gate Price	822.735	822.735	822.735	822.735
Observations	579	579	579	579
R-squared	0.254	0.296	0.298	0.350
Adj.R-squared	0.188	0.218	0.218	0.250

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This study focuses on the marketing margin of the household that sold to assembly traders. However, a further look at the marketing margin of the entire household that sold to private traders in general shows that the mean marketing margin was ZMK 150.14 (USD 0.03), which was ZMK45.56 less than the mean marketing margin observed under the assembly trader only. The mean farm-gate price was found to be ZMK868.58 (USD 0.17) per kg of maize and the mean retail price was ZMK1018.72 (USD 0.20) per kg of maize sold. The farm-gate price as a percentage of the retail price was found to be 85.26%, which is higher than that found under the assembly trader channel only. The households that sold using the assembly trader channel have the highest marketing margin as compared to the other market channels (Table 5.6, below). This is expected as the assembly traders incur a large cost by following the farmers to their farm-gates, thus the mark-up price is larger so that they are able to break even. Households that used the cooperative market channel had the lowest marketing margin, as the farm-gate price they obtained was higher than the retail price in the nearest market.

Table 5.6: Farm-gate Price, Retail Price and Marketing Margin by Private Trader Market Channel

Market Channel	Observation	Farm-gate Price (ZMK)	Retail Price (ZMK)	Marketing Margin (ZMK)
Assembly Trader	579	822.74	1018.44	195.70
Large scale trader	88	905.91	983.78	77.87
Retailer / Marketeer	189	948.65	1054.89	106.24
Cooperative (not destined for FRA)	9	1156.02	1000.00	-156.02
Directly to miller/processor	45	879.90	996.06	116.16
To miller/processor through an agent	38	1000.92	955.27	-45.66

Source: Authors computations from RALS 2012

The regression results of the marketing margin run on the sample of all the households that sold to private traders (Table 5.7), show that the type of private trader one chooses affects the size of the marketing margin. The households that sold to an assembly trader and to a retailer/marketer had a significantly higher marketing margin of ZMK199.5 and ZMK108.80 respectively than household that sold to millers/ processors through an agent or designed buying point, ceteris paribus. Hence the type of market channel a farmer chooses will influence whether they get a lower or larger share of their farm produce.

Table 5.7: Private Trader Marketing Margin Regression Results

Variables	**Regression**
Age Of Household Head In Years	-0.104
	(0.677)
Sex (1= Male, 2= Female)	-20.48
	(37.83)
Primary (1= attended, 0=otherwise)	8.386
	(28.75)
Secondary (1= attended, 0=otherwise)	-3.430
	(33.83)
Tertiary (1= attended, 0=otherwise)	-46.65
	(57.01)
Never Married (1= Yes, 0=No)	25.11
	(160.1)
Divorced (1= Yes, 0=No)	-33.99
	(46.96)
Widowed (1= Yes, 0=No)	-19.80
	(46.36)
Separated (1= Yes, 0=No)	3.966
	(51.11)
Market Channel==Small Scale Trader	199.5***
	(56.57)
Market Channel==Large Scale Trader / Wholesaler	82.06
	(63.34)
Market Channel==Retailer / Marketeer	108.8*
	(59.99)
Market Channel==Cooperative (Not Destined For Fra)	-101.8
	(85.00)
Market Channel==Directly To Miller/Processor (Delivered To Mill/Processor	142.2*
	(73.75)
Number Of Household Members	-0.331
	(4.050)
Farm size	1.098
	(3.446)
Productive Assets (ZMK)	1.26e-07*
	(7.59e-08)
Kinship Ties Dummy,1=Yes 0=No	37.03
	(23.83)
Number Of Traders Entering A Village	1.195
	(1.404)
Distance To Nearest Boma (Km)	0.520
	(0.546)
Distance To Nearest Road (Km)	-0.767

Variables	Regression
Table 5.7 cont.	
	(0.568)
Transport Cost Of Transporting A Kg Of Grain To District Salepoint	-0.816***
	(0.275)
Price Information, 1=Yes 0=No	-73.24**
	(30.33)
Kapiri-Mposhi	-100.6*
	(52.90)
Mkushi	-208.6***
	(56.86)
Mumbwa	120.7**
	(56.54)
Serenje	-306.5***
	(105.2)
Chingola	-353.2***
	(58.82)
Kalulushi	-154.3***
	(55.12)
Kitwe	123.1**
	(60.91)
Luanshya	-114.3
	(71.53)
Lufwanyama	117.1
	(110.2)
Masaiti	-131.2**
	(51.26)
Mpongwe	-110.2
	(76.04)
Mufulira	190.5*
	(109.8)
Ndola	15.88
	(68.71)
Chadiza	10.63
	(81.75)
Chipata	-191.2***
	(47.62)
Katete	-222.6***
	(54.02)
Lundazi	37.08
	(49.91)
Mambwe	-122.6
	(101.3)
Nyimba	-28.29
	(95.50)
Petauke	-30.41

Variables	Regression
Table 5.7 cont.	
	(47.09)
Chiengi	-242.5**
	(115.8)
Mansa	-71.91
	(66.56)
Mwense	-24.38
	(86.26)
Nchelenge	48.47
	(116.3)
Samfya	-179.8
	(155.7)
Chongwe	-7.209
	(72.42)
Kafue	-91.47
	(64.63)
Lusaka	-64.34
	(121.1)
Isoka	-69.25
	(77.39)
Mpika	-287.1**
	(115.2)
Nakonde	307.4***
	(62.63)
Kasama	-85.05
	(161.3)
Luwingu	18.93
	(223.7)
Mbala	-102.8**
	(45.11)
Mporokoso	-47.73
	(71.90)
Mpulungu	-85.10
	(80.10)
Mungwi	-358.7***
	(103.4)
Mwinilunga	-301.5***
	(78.36)
Solwezi	-386.3***
	(74.89)
Choma	-352.3***
	(59.48)
Itezhi-Tezhi	168.5***
	(47.01)
Kalomo	-249.4***

Variables	Regression
Table 5.7 cont.	
	(51.14)
Kazungula	-176.7
	(107.4)
Livingstone	-121.8
	(93.92)
Mazabuka	-37.22
	(72.32)
Monze	78.36
	(68.14)
Lukulu	-213.3***
	(76.16)
Senanga	-233.5***
	(58.77)
February	-51.87
	(102.9)
March	-459.7**
	(204.5)
April	51.69
	(120.5)
May	158.3*
	(92.76)
June	-28.70
	(76.49)
July	-70.12
	(73.66)
August	-120.2*
	(70.18)
September	-98.54
	(73.73)
October	-19.38
	(74.74)
November	31.67
	(79.77)
December	-32.48
	(103.4)
Constant	252.2**
	(122.2)
Observations	948
R-squared	0.395
Adj.R-squared	0.338

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.

5.5 Summary

The factors that affect the farm-to-retail marketing margins are decomposed in this chapter. The study found that spatial and temporal differences affect the size of both the farm-gate price and the marketing margin. Variation in prices holding both spatial and temporal factors constant were also observed. Empirical analysis of the marketing margin and farm-gate price revealed that spatial factors account for the highest variation in both cases, with temporal and household factors contributing minimally. The choice of market channel was also found to affect the price a farmer would fetch. The assembly trader channel offered the lowest farm-gate price as compared to other private trader channels and in turn household that used this channel had the highest marketing margin.

CHAPTER SIX
CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Conclusion

Marketing margins have typically been considered to vary spatially and temporally. There has been little empirical evidence to understand why margins may vary holding the spatial and temporal factors constant even though this has been seen to be the case. This study thus looks at the relative importance of the spatial, temporal and household-specific factors in the marketing margin and the farm-gate prices received by maize farmers in Zambia. The study used nationally representative data collected in the 2012 Rural Agricultural Livelihoods Survey (RALS12) by Zambia's Central Statistical Office (CSO) and the Indaba Agricultural Policy Research Institute (IAPRI). The data covers a 12 month time period, from May 2011 to April 2012. Only households that used the assembly trader channel were considered, and the monthly retail maize prices by AMIC were used to determine the monthly marketing margins.

The findings show that there are wide variations in prices received by farmers as well as in the retail prices in various districts. The mean farm-to-retail marketing margin was found to be ZMK195.703 (USD0.04) per kg of maize sold, thus generally farmers were obtaining lower prices at the farm-gate as compared to the prices at the retail centres. The mean farm-gate price was found to be ZMK 822.74 (USD 0.16) per kg of maize sold and the mean retail price was ZMK 1018.44 (USD 0.20) per kg of maize sold. A few of the farmers (10%) however managed to obtain a higher price at the farm-gate as compared to the retail price, this shows that other attributes could be at play in influencing the prices that farmers obtain. The study also found that more than 80% of the farmers had access to price information**.** This entails that price information is readily available to farmers, thus even farmers in remote areas have adequate knowledge about the prices prevailing at the retail centre.

Market access conditions are said to give an indication of the efficiency and performance of the market. The study indicates that market access is not an issue as has been commonly thought with smallholder farmers. About 75% of the farmers did not travel to sell their

produce, as the assembly traders followed them to their homesteads and the average distance for those that travelled to sell to assembly traders was 4.5km. The number of traders that entered a village to purchase grain was found to be 7 and this shows a reasonable amount of competitiveness in the village grain market. Results also show that that most farmers (73%) sell less than 1000kg of maize grain, and this is mainly because these farmers are small scale farmers owning on average 4ha of land and thus they mainly grow maize for home consumption and only sell the surplus. These small quantities of maize grain however, make it a challenge for the farmers to take advantage of economies of scale so as to obtain better prices in retail centres.

The econometric results show that the observed variables were not good at explaining the variation in the marketing margin and the farm-gate price as seen from the Adjusted R-squared of 29.3% and 25% respectively. The empirical results show that spatial factors account for the largest source of variation in the marketing margin and farm-gate prices obtained by farmers. The wide variation in marketing margins observed in different districts show that the price farmers obtain differs from one area to another, and this is mostly based on the distance to the retail centre. Temporal factors account for a minimal variation in the marketing margin and the price obtained by farmers. During months of grain availability, which is from June to August, the farm-gate prices are lower and in times of low grain availability the farm-gate prices are higher. Thus seasonality plays a role in the farm-gate price and the marketing margins obtained by farmers. These variations in farm-gate prices are also evident in the same villages and holding time constant as shown by the study. An examination of the household characteristics showed that household-specific factors have an effect on the farm-gate price and the size of the marketing margin, account for very little variation when compared to the spatial factors. The household factors that were found to affect the size of the marketing margin were marital status, kinship ties, which are ties to either the chief or village elders and access to price information. From this, it can be seen that we cannot explain much of the variation with the variables we have in our model, there is still household level variation but most of these variables are unobserved in our model and remain unexplained.

Therefore, these results indicate that the prices that maize farmers in Zambia obtain might not be exogenous of the farmer characteristics and attributes. The individual farmer attributes influence the price they obtain at the farm-gate and hence it can be said that maize farmers in Zambia are not necessarily price takers. Hence, it can be noted that the large marketing margins observed do not necessarily mean farmer exploitation and the small marketing margins do not mean market competiveness, but these might mean that farmers have different attributes and these attributes affect the prices that they are able to obtain.

6.2 Policy Implications and Recommendations

Spatial factors have been found to account for the largest source of price variation, and that the farmers in villages further away from the central retail centres tend to fetch lower prices than those near the retail centres. Therefore, in order to help reduce price variation among farmers and raise maize prices received by the farmers in Zambia, policies aimed at improving infrastructure to better link rural villages to urban markets ought to be implemented. Rather than trying to engage in markets in an effort to overcome perceived private trader exploitation, the government and donors need to help farmers better engage in the existing market channels. As it has been seen that the type of channel a farmer uses, will influence the price they obtain. Helping farmers have access to both these existing channels should be a priority and also equipping farmers with timely price information. Having access to price information has been found to be a significant factor in determining the price a farmer will obtain. Farmers that have access to reliable and timely price information are in a better position to engage in the market and are able to negotiate better prices than those farmers without access to price information.

Seasonality and time of sale play a big role in the maize price obtained by farmers as temporal factors account for the second largest source of variation in maize grain prices. To help reduce maize price variation and improve the prices received by farmers, the Zambian government and other private sector participants, need to assist smallholder farmers in ensuring they are able to market grain at the times when it is most profitable and this can be achieved by investing in storage facilities that farmers can use. Farmers are unable to take advantage of higher prices in off-season times due to lack of storage facilities.

REFERENCES

Akiyama, T., Baffes, J., Larson, D., & Varangis, P. (2003). *Commodity Market Reform in Africa:Some Recent Experience* . Working Paper 2995, World Bank Policy Research.

Barrett, C. B. (1997). Food Marketing Liberalization and Trader Entry: Evidence from Madagascar. *World Development, 25*(5), 763-777.

Brorsen, B. (1985). Marketing Margin in Rice Uncertainity. *American Journal of Agricultural Economics, 67*, 521-28.

Bwalya, R., Mugisha, J., & Hyuha, T. (2013). Transaction costs and smallholder household access to maize markets in Zambia. *Journal of Development and Agricultural Economics, 8(9)*, 328-336.

Cameron, C. A., & Trivedi, P. K. (2005). *Microeconometrics: Methods and Applications.* New York: Cambridge University Press.

Carambas, M. (2005). *Analysis of Marketing Margins in Eco-Labeled Products.* Conference paper, Center for Development Research, University of Bonn, Bonn.

Central Statistics Office. (2002). *Agricultural Analytical Report for the 2000 Census of Population and Housing.* Lusaka Zambia.

Central Statistics Office. (2011). *Crop Forecast Survey Report.* Ministry of Agriculture and Livestock, Lusaka.

Chamberlin, J., & Jayne, T. S. (2013). Unpacking the Meaning of 'Market Access': Evidence from Rural Kenya. *World Development, 41*, 245-264.

Chapoto, A., & Jayne, T. (2011). *Zambian Farmers' Access to Maize Markets.* Working Paper 57, Food Security Research Project, Lusaka, Zambia.

de Janvry, A., Fafchamps, M., & Sadoulet, E. (1991). Peasant Households Behaviour with Missing Markets: Some Paradoxes Explained. *The Economic Journal, 101*(409), 1400-1417.

Dessalegn, G., Jayne, T. S., & Shaffer, J. D. (1998). *Market Structure, Conduct and Perfomance: Constraints on Perfomance of Ethopian Grain Markets.* Working Paper 8, Ministry of Economic Development and Cooperation, Addis Ababa.

Ellis, F. (1996). *Agricultutral Policies in Developing Countries.* Cambridge: Cambridge University Press.

Emokaro, C., & Egbodion, J. (2014). Effect of Marketing Cost on Marketing Margin Realizable from Beef Sales in Benin City, Nigeria. *American Journal of Experimental Agriculture, 4*(2), 215-224.

Fafchamps, M. (2004). *Market Institutions in Sub-Saharan Africa: Theory and Evidence.* London: The MIT Press.

FAO. (2014). *The State of Food and Agriculture: Innovation in Family Farming.* Food and Agriculture Organization of the United Nations, Rome.

Gardner, B. L. (1975). The Farm-Retail Price Spread in a Competitive Food Industry. *American Journal of Agricultural Economics, 75*(3), 399-409.

Gujarati, D. N. (2003). *Basic Econometrics* (Fourth ed.). New York, U.S.A: Mc Graw-Hill.

Hussain, M., Aslam, M., & Rasool, S. (2013). An Estimation of Marketing Margins in the Supply Chain of Tobacco in District Faisalabad, Pakistan. *Academic Research International, 4*(6), 402-408.

IFAD. (2003). *Promoting Market Access for the Rural Poor In Order To Achieve the Millennium Development Goals.* Discussion Paper, Twenty-Fifth Anniversary Session of IFAD's Governing Council.

Jayne, T., Sitko, N., Ricker-Gilbert, J., & Mangisoni, J. (2010). *Malawi's Maize Marketing System.* Evaluation of the 2008/9 Agricultural Input Subsidy, Malawi.

Jayne, T., Zulu, B., & Nijhoff, J. (2006). Stabilizing food markets in eastern and southern Africa. *Food Policy, 31*, 328-341.

Kähkönen, S., & Leathers, H. (1999). *Transaction Costs Analysis of Maize and Cotton Marketing in Zambia and Tanzania.* IRIS Center, University of Maryland. AMEX International, Inc.

Kalule, S., & Kyanjo, J. (2013). Marketing Margins and Efficiency of Cooking Banana Retail Trade In Kampala City, Uganda. *International Journal of Sales & Marketing, 3*(4), 9-18.

Kirimi, L., Sitko, N., Jayne, T., Karin, F., Muyanga, M., Sheahan, M., et al. (2011). *A Farm Gate-To-Consumer Value Chain Analysis of Kenya's Maize Marketing System.* Michigan State University. MSU International Development.

Lundberg, M. (2005). Agricultural Market Reforms. In A. Coudouel, & S. Paternostro (Eds.), *Analyzing the Distributional Impact of Selected Reforms* (Vol. 1 ed., pp. 145-212). Washingston DC: World Bank.

Mason, N., Jayne, T., & Myers, R. (2012). Smallholder Behavioral Responses to Marketing Board Activities in a Dual Channel Marketing System: The Case of Maize in Zambia. *International Association of Agricultural Economists.* Foz do Iguaçu.

Minten, B., & Kyle, S. (1999). The effect of distance and road quality on food collection, marketing margins, and traders' wages: evidence from the former Zaire. *Journal of Development Economics, 60*, 467-495.

Mojtaba, A., Karim, M., Malihe, E., & Hossein, E. (2012). The economic analysis of marketing margins of Mazafati Date: A case study of Sistan and Blouchestan-Iran. *International Journal of Agriculture and Crop Sciences, 4*(7), 390-397.

Myers, R. J., Sexton, R. J., & Tomek, W. G. (2010). A Century of Research on Agricultural Markets. *American Journal of Agricultural Econmics, 92*(2), 376-402.

Nkosi, A., & Kirsten, J. (1993). The marketing of livestock in South Africa's developing areas; A case study of the role of speculators, auctioneers, butchers and private buyers in Lebowa . *Agrekon, 32*(4), 230-237.

Ojogho, O., Erhabor, P., Emokaro, C., & Ahmadu, J. (2012). Market Margin and Price Transmission Analysis for Beef in Benin Metropolis. *International Lournal of Agricultural Economics and Rural Development, 5*(1), 63-73.

Pokhrel, D. M., & Thapa, G. B. (2007). Are marketing intermediaries exploiting mountan farmers in Napal? A study on market price, marketing margin and income distribution analysis. *Agricultural Systems, 94*, 151-164.

Siegel, P. (2008). *Profile of Zambia's Smallholders: Where and who are the Potential Beneficiaries of Agricultural Commercialization?* . The African Working Paper Series. Washington D.C: World Bank.

Sitko, N., & Jayne, T. (2014b). *Demystifying the Role og Grain Assemblers in the Rural Maize Markets in Eastern and Southern Africa.* Working Paper No.84, Indaba Agricultural Policy Research Institute, Lusaka, Zambia.

Sitko, N., & Jayne, T. S. (2014a). Exploitative Briefcase Businessmen, Parasites, and Other Myths and Legends: Assembly Traders and the Performance of Maize Markets in Eastern and Southern Africa. *World Development, 54*, 56-67.

Tesfew, A., & Alemu, D. (2013). Marketing channel and margin analysis: A case study of red papper marketing at Habitehinan District in Northwestern Ethiopia. *International Journal of Agricultural Economics and Extension, 1*(6), 31-40.

Toure, M., & Wang, J. (2013). Marketing margin analysis of tomato in the district of Bamako, Republic of Mali. *Journal of Agricultural Economics and Development, 2*(3), 84-89.

Traub, L., & Jayne, T. (2006). The Effects of Market Reform on Maize Marketing Margins in South Africa: An Empirical Study. *International Association of Agricultural Economists Conference.* Gold Coast, Australia.

Truab, L., & Jayne, T. (2008). The effects of price deregulation on maize marketing margins in South Africa. *Food Policy, 33*, 224-236.

Tschirley, D. L., & Jayne, T. S. (2010). Exploring the Logic Behind Southern Africa's Food Crises. *World Development, 38*(1), 76-87.

Vavra, P., & Goodwin, B. (2005). *Analysis of Price Transmission Along the Food Chain.* OECD Food, Agriculture and Fisheries. OECD Publishing.

Vigne, W., & Darroch, M. (2010). Determinants of the Maize Board-Miller Marketing Margn in South Africa: 1977-1993. *Agrekon: Agricultural Economics Research, Policy abd Practice in South Africa, 35*(4), 295-300.

Waugh, F. (1964). Demand and Analysis: Some example for Agriculture. *Technology Bulletin, 13*(6), 267-284.

Wohlgenant, M. K. (2001). Marketing Margins: Empirical Analysis. *Handbook of Agricultural Economics, 1*, 933-970.

Wohlgenant, M., & Mullen, J. (1987). Modelling the Farm-Retail Price Spread for Beef. *Western Journal of Agricutural Economics, 12*, 119-125.

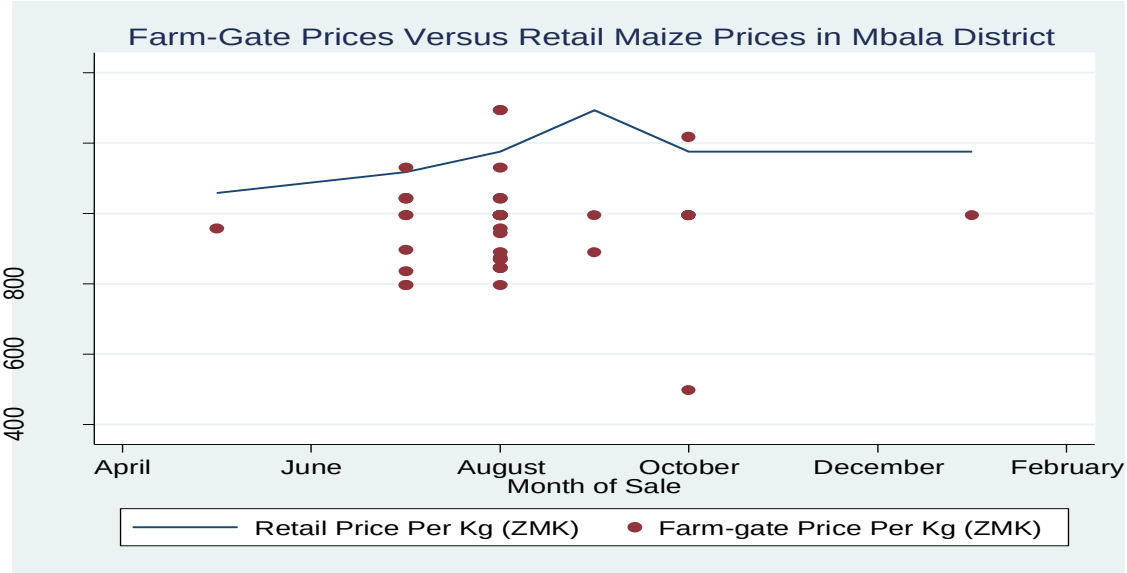
Wooldridge, J. M. (2004). *Introductory Econometrics: A Modern Approach* (Second ed.). Michigan State, U.S.A: South-Western College Publishing.

Yamano, T., & Arai, A. (2010). *The Maize Farm-Market Price Spread in Kenya and Uganda.* Discussion Paper 10-25, National Graduate Institute for Policy Studies, Tokyo.

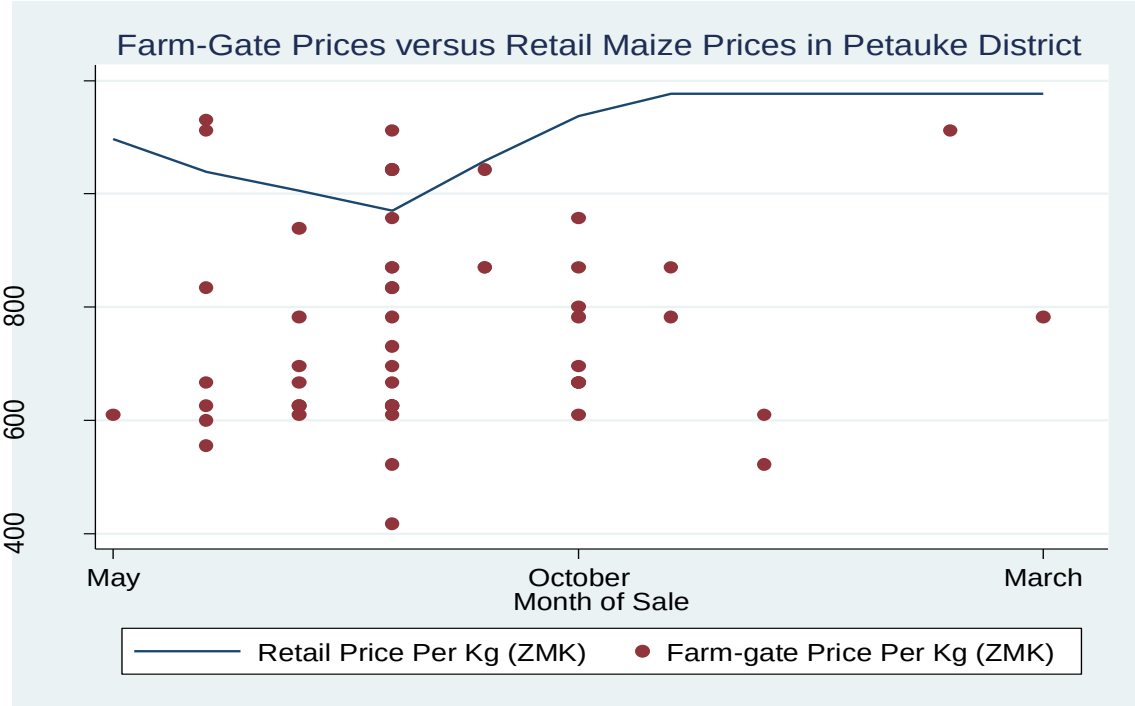
APPENDICES

Appendix 1:
Farm-gate price versus Retail prices per Province and District

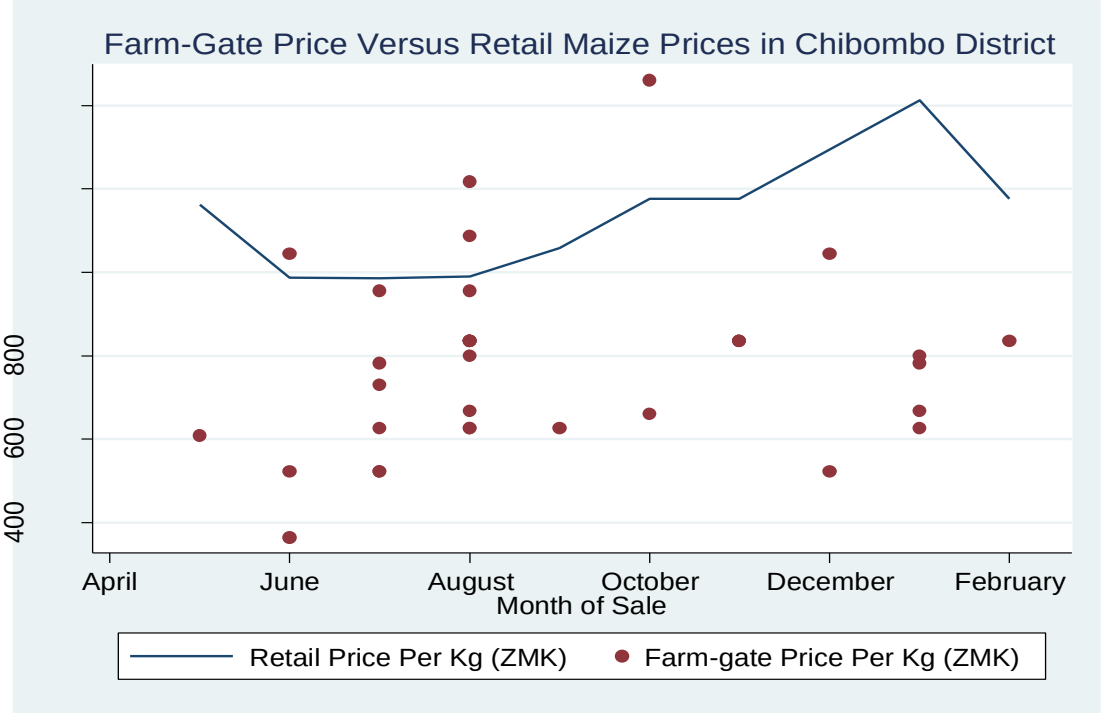
Northern Province



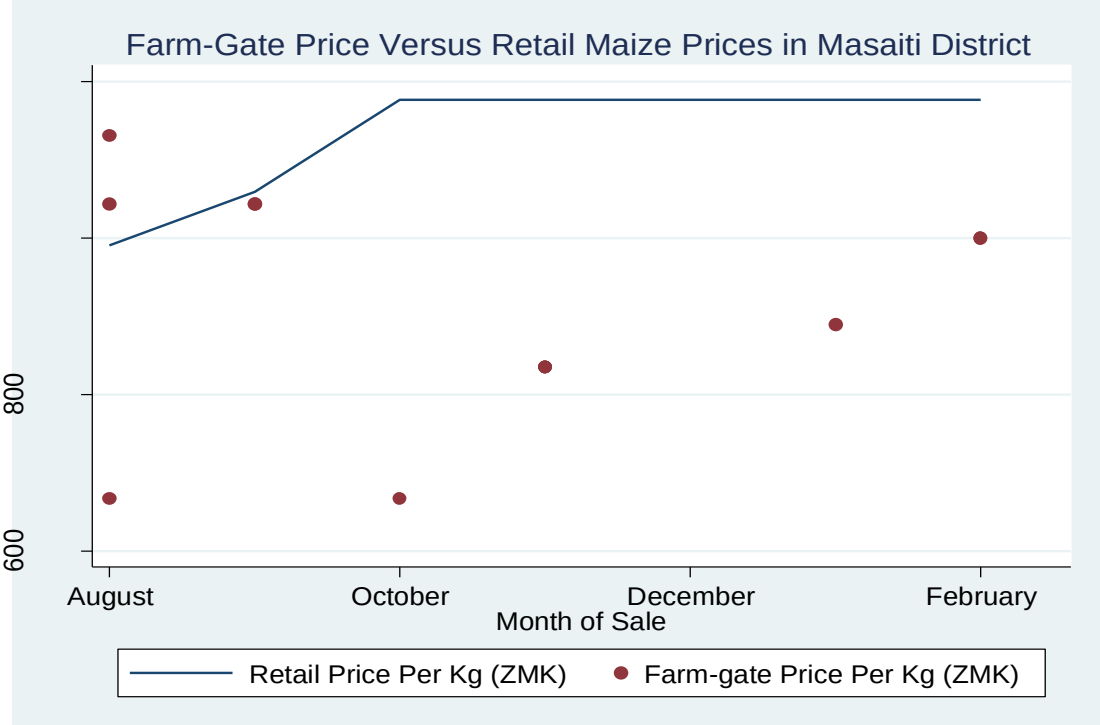
Eastern Province



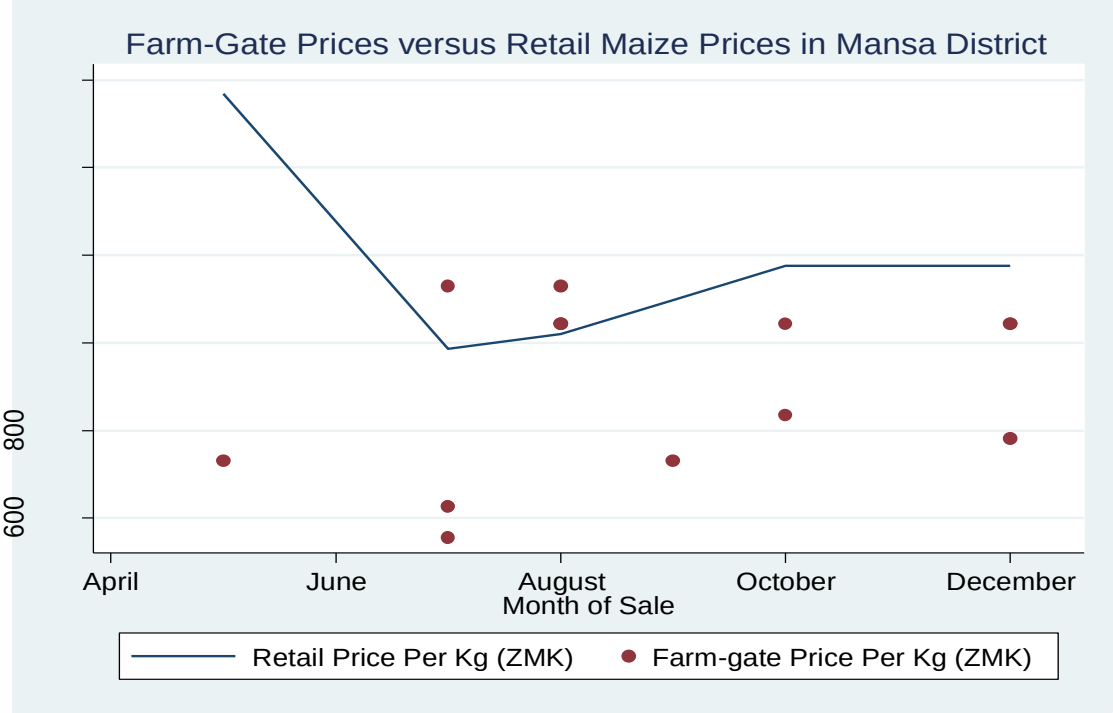
Central Province



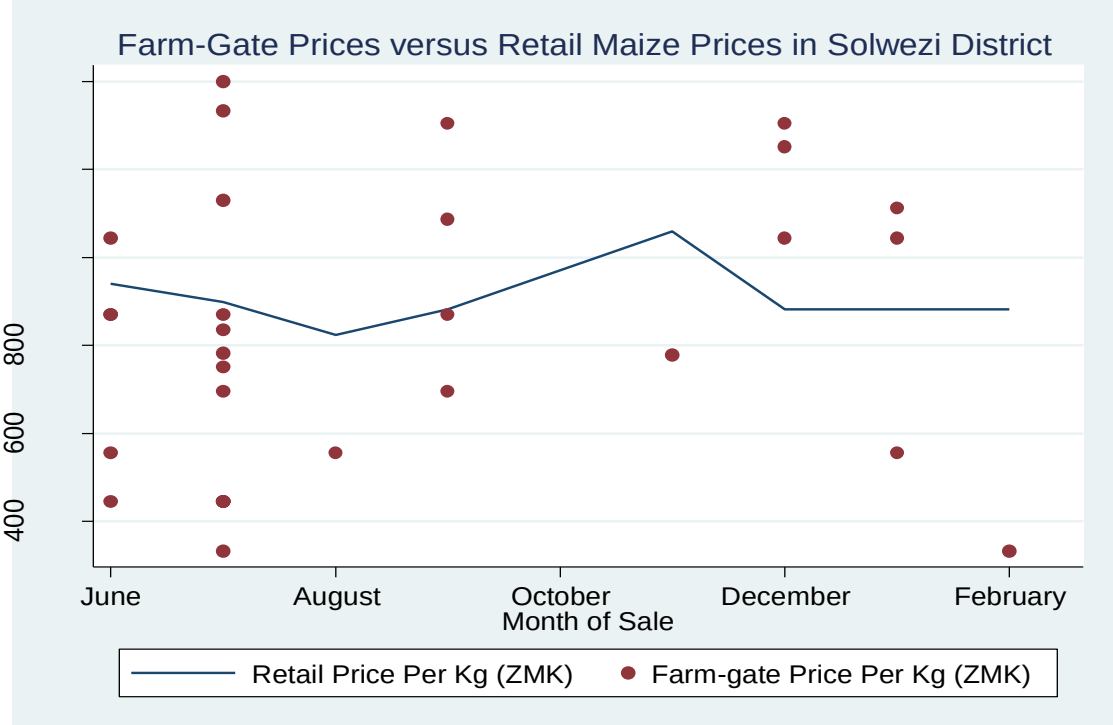
Copperbelt Province



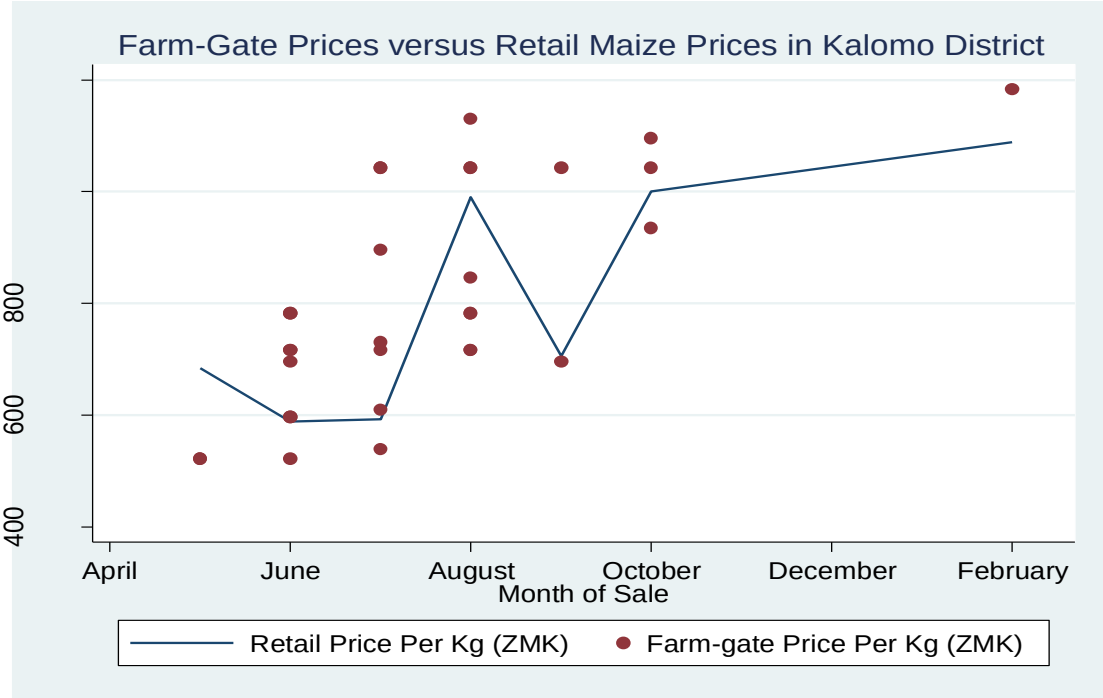
Luapula Province



North Western Province



Southern Province



Western Province