

**Economic feasibility of hybridizing forward
contracts and warehouse receipt system in Malawi**

by

Marvin Mbaso

B.S., University of Malawi, 2012

A THESIS

Submitted in partial fulfillment of the requirements

for the degree of

MASTER OF AGRIBUSINESS

Department of Agricultural Economics

College of Agriculture

KANSAS STATE UNIVERSITY

Manhattan, Kansas

2018

Approved by:

Major Professor
Dr. Vincent Amanor-Boadu

ABSTRACT

Generally, commodity prices immediately after harvest tend to be low because of supply glut and rise over time away from harvest as supply shrinks and demand remains virtually unchanged. Unfortunately, because many Malawian farmers do not have effective storage, they do not have any commodity for sale when prices are high. To help improve the income Malawian farmers may generate from their activities, this thesis explored the feasibility of hybridizing the two forms of price risk management systems in Malawi to minimize their individual weaknesses and enhance their collective benefits. The two risk management systems are forward contracts and warehouse receipt systems.

Forward contracts allow farmers and their buyers to agree on a future delivery date and commodity price. On the agreed date, the farmer delivers the commodity and receives the agreed price. It allows farmers to pass downward price risk to buyers and guarantees a fixed price. As private transactions, forward contracts are not regulated by the Government, and present opportunism and enforcement challenges. Warehouse Receipt System (WRS) enables farmers to deposit their crop in the care of a warehouse operator and sell the crop when and where they choose. Farmers, therefore, incur both upside and downside price movement but avoid some of the opportunism and enforcement challenges presented by forward contracts.

The thesis explored the net benefits of developing a hybrid system that allow forward contracts with warehouse receipt enforcement mechanisms. Thus, farmers are guaranteed a minimum price at some future date and the deposited commodity is used as the security supporting the guaranteed minimum price. The buyer also deposits a performance bond as

commitment to purchase the commodity. The costs associated with these transactions are real and could affect participation. The thesis provides a process for assessing these transaction costs and incorporating them into the effectiveness of forward contracts, warehouse receipt systems and the hybrid program. The mathematical model example has proved that the hybrid system guarantees a fixed margin to the farmer over and above the harvest price and WRS cost as opposed to fluctuating margins under WRS alone.

The thesis has identified three factors that can lead to the successful implementation of this hybrid system in Malawi and they include: the availability of the warehouse receipt bill, reliable warehouse certification which is done by AHCX and ACE on third party warehouse operators; and the availability of performance guarantee assuring that the quantities and quality of goods match those specified by the warehouse receipt. The thesis has also identified two factors that could hinder a successful implementation of this hybrid program and they include: first, low scale of warehousing operations under WRS which could deny most farmers a chance to access and benefit from this hybrid system and the commodity exchanges may not benefit from the economies of scale provided by large volumes of commodities produced in rural areas. Second, the absence of a harmonized national grading standard which possess a challenge when engaging in international trade.

Finally, the thesis has made three recommendations for the successful implementation of the hybrid program as follows: Taking the system close to the producers to mitigate potentially high transportation costs; educating and selling the system to the stakeholders to increase adoption rate; and push for the implementation of national standardized grading regulations.

TABLE OF CONTENTS

List of Figures.....	vi
List of Tables	vii
Acknowledgments.....	viii
Chapter I: Introduction	1
1.1 Background and Problem Statement.....	1
1.2 Research Question	3
1.3 Research Objectives	3
Chapter II: Literature Review.....	5
2.1 Commodity Price Risk	5
2.2 Forward Contracts	6
2.3 Transaction costs in contracts	9
2.3.1 Theoretical overview.....	9
2.3.2 Search and switching cost and the default option	12
2.4 Market-supporting institutions.....	13
2.5 Warehouse Receipt System.....	16
2.5.1 Overview of Warehouse Receipt System.....	16
2.5.2 Meaning of WRS	17
2.5.3 Key players of WRS and their roles	18
2.5.4 Benefits of WRS	19
2.5.5 Key requirements to ensure a successful WRS.....	20
2.6 Warehouse Receipt System in Malawi	22
2.6.1 Auction Holdings Commodities Exchange.....	23
2.6.2 Agriculture Commodity exchange for Africa (ACE)	24
2.6.2.1 ACE Progress report	25
2.6.3 Summarized extract of the process for issuing and redeeming a WR	28
2.6.4 Warehouse Receipts Bill.....	29
2.7 Empirical Studies	31
Chapter III: Research Methods	34
3.1 Governance Mechanism of Forward Contracts and WRS in Malawi	34

3.2	Transaction Costs and decisions in Forward Contracts	34
3.2.1	Approach, techniques, and tools for data analysis	34
3.2.2	Data.....	35
3.3	Cost-benefit analysis of Warehouse Receipt System.....	36
3.3.1	Data.....	36
3.3.2	Approach, techniques, and tools for data analysis	36
3.4	Hybridizing forward contracts and WRS	37
3.4.1	Approach and techniques.....	37
Chapter IV: Results and Discussions		38
4.1	Governance Mechanism of Forward Contracts in Malawi	38
4.2	Transaction Costs and decisions in Forward Contracts.....	39
4.3	Governance and Operational Mechanism of WRS in Malawi.....	42
4.4	Cost-Benefit analysis of WRS	44
4.4.1	Cost of WRS.....	44
4.4.2	Price Movement of Soybeans	46
4.4.3	Cost-Return structure of Warehouse Receipt System.....	47
4.4.4	Sensitivity analysis on cost-return structure of WRS	48
4.5	Hybridizing forward contracts and WRS	51
4.5.1	Mathematical Example of the Hybrid Risk Management Tool.....	55
Chapter V: Conclusion and Recommendation		58
5.1	Conclusion	58
5.2	Recommendations	60

LIST OF FIGURES

Figure 2.1: How warehouse receipt system works.....	20
Figure 4.1: Decision Making in Forward Contracts.....	42
Figure 4.2 Percent Change in Harvest Price by Month of Sale (2007-2017).....	51
Figure 4.3: Net Grain Revenue per Tonne for Farmers Using the Warehouse Receipt System Compared to Those Selling at Harvest.....	51
Figure 4.4: The proposed hybrid model of Forward Contracts and WRS.....	54

LIST OF TABLES

Table 4.1: Charges for WRS for the Commodity Exchanges in Malawi	46
Table 4.2: Charges for WRF in Malawi.....	45
Table 4.3: Price trend of soybeans in Malawian Kwacha per kilogram.....	46
Table 4.4: Cost-Return Structure of WRS.....	47
Table 4.5: Mathematical hybrid model of forward contract and WRS.....	56

ACKNOWLEDGMENTS

The writing of this thesis was one of the most challenging goals. This would not have been possible without the constant support, guidance and prayers of several individuals who in one way or another assisted me in the preparation and completion of this study. It is a great privilege to extend my sincere appreciation to the following people:

To my supervisory committee: Dr. Vincent Amanor-Boadu (Major Professor), Dr Kara Ross and Dr. Lawrence Mapemba. Thank you for all your guidance throughout this study, for keeping me motivated and sharing your knowledge.

To MAB staff and faculty who took turns in drilling me for the Master of Agribusiness. Thank you for imparting some of your knowledge to me. Your contribution in my life will always be cherished.

To members of my cohort: You have always been so helpful and reliable on and off campus. I owe gratitude to each and everyone of you. I wouldn't exchange any of for anything.

To my family and friends: Thank you for all the love, motivation and prayers. I am privileged to have you in my life.

Above all, I thank God for answering my prayers and giving me the opportunity that so few people have, along with the ability and strength to complete this goal in life.

CHAPTER I: INTRODUCTION

1.1 Background and Problem Statement

Maybe because of weather or in spite of it, Malawian farmers have to content with significant vicissitudes in commodity prices. Generally, commodity prices immediately after harvest tend to be low because of supply glut. These prices rise over time away from harvest as supply shrinks and demand remains unchanged. Unfortunately, because many Malawian farmers do not have effective storage, they do not have any commodity for sale when prices are high. This status ensures the perpetual income deficits facing many Malawian farmers.

Although price risk management may be undertaken through several strategies, Malawian farmers have used forward contracts as well as warehouse receipt system as price risk management strategies. Forward contracts as a risk management strategy allows a farmer and a buyer to agree on a future price for a commodity. On the agreed date, the farmer delivers the commodity at the agreed price. It allows a farmer to pass the price risk to the buyer who is, technically, under contract to purchase the product at the contracted price. Because forward contracts are private transactions and are not regulated by the Government, they exhibit significant contract enforcement risks. For example, when prices increase above the contracted price, farmers may sell to others instead of fulfilling their contractual obligations. On the contrary, when prices fall, buyers' incentive to renege on the contract increases. Thus, as currently operated in Malawi, forward

contracts are ineffective price risk management strategies for both farmers and their buyers.

In an environment where formal contract enforcement mechanisms are a challenge, Warehouse Receipt System (WRS) may offer a solution. First, WRS enables farmers to bulk their crop for deposit, ensuring compliance with quality and minimum quantity standards. The quality and quantity of the tradeable stored commodity assured, implying sellers can sell to any number of buyers at a time of their choosing. Furthermore, the guarantee of delivery by warehouse operators reduces counterparty risk, that is, the risk of non-performance of trade contracts. Apart from contractual issues, WRS allows farmers to delay sales of recently-harvested crops by providing them with credit, storage space and market information until the market has stabilized and prices have increased (G. Onumah 2010). However, WRS incurs storage cost, quality certification and trading commission; but it doesn't guarantee the exact forward price considering that future prices may vary depending on forces of demand and supply.

The foregoing indicates that forwards contracts and warehouse receipt system complement each other in addressing the uncertainty peculiar to each risk management tool. WRS provides a guarantee on the availability of the commodity with quality and quantity assured which is a challenge under forward contract. On the other hand, WRS does not guarantee the exact forward price which forward contracts provide. Understanding the effect of costs on the WRS performance vis-à-vis the uncertainty associated with forward contracts could provide some insights into the economic viability in Malawi as a hybrid risk management tool.

Effective price risk management tools for Malawian farmers remain a critical problem adversely affecting their incomes. Identifying effective tools for specific conditions could help alleviate some of the financial challenges farmers face. This is the problem tackled by this research.

1.2 Research Question

The question this research seeks to answer is this: What are the economic costs and benefits of hybridizing forward contracts and WRS in Malawi and does this hybrid risk management tool offer a superior net benefit than either price risk management tools on their own for Malawian farmers?

1.3 Research Objectives

The overall objective of this research is to assess the economics of WRS and forward contracts in the agricultural commodity sector of Malawi and develop a hybrid price risk management system utilizing both alternatives. The specific objectives are as follows:

1. Describe the conceptual frameworks supporting warehouse receipt system and forward contracting and identify the governance mechanisms that influence their effective operations in a marketplace.
2. Place the conceptual frameworks and the related governance mechanisms described above within the context and institutional realities of the Malawian agricultural economy with the view to understanding the effect of institutions to the effective operations of these risk management tools

3. Simulate the outcomes of the two alternative risk management tools under known Malawian governance and institutional conditions to determine their transaction costs and benefits for farmers and buyers under alternative conditions.
4. Determine the effectiveness of hybridizing the two risk management tools by changing specific governance and institutional conditions.

CHAPTER II: LITERATURE REVIEW

2.1 Commodity Price Risk

Over the last two decades, commodity prices in Malawi have been more volatile than those of manufactured goods. Commodity price uncertainty, whether caused by government policy, foreign exchange rates, climatic disasters, or political/civil instability, is inherent in commodity markets.

Price volatility leaves farmers uncertain about the price they could receive at the time of sale. The problem is, however, not limited to how much cash farmers receive for their commodities at harvest. Every investment decision made during the crop cycle is a difficult one because of the price uncertainty. For example, it is difficult to determine how much to borrow and the cost of the loan since ability to repay is determined by commodity prices, assuming yields are not compromised. Uncertain prices pressure borrowers' ability to repay and thus make agriculture financing a risky proposition for lenders. On the other hand, financial institutions and potential creditors are reluctant to lend to farmers and commodity traders knowing the price uncertainties confronting them. Often, they will raise interest rates to cover these price risks, but they mostly refuse to provide credit. As a result, it is not surprising that a lack of price risk management is one of the major reasons that poor farmers stay poor (World Business Council for Sustainable Development 2004).

This section reviews some of the literature on market based agricultural risk management tools which includes forward contracts and warehouse receipt system. The chapter is divided into six parts. The first part discusses the literature on forward contracts, looking at their nature, effectiveness and weaknesses. The second part discusses transaction costs in contracts and how they affect decision making. The third part discusses Market Supporting Institutions (MSI) and how they help in reducing transactions costs and enforce contracts. The fourth part discusses Warehouse Receipt system, looking at the benefits, key players and key requirements for a successful WRS. The fifth part discusses Warehouse Receipt System in Malawi, looking at the key players, the WRS process and the legal framework supporting WRS. The sixth part discusses empirical studies on the role of transaction costs in small scale farmers marketing and impacts of Commodity Exchanges as MSIs.

2.2 Forward Contracts

According to Kang and Manajan (2006), forward contract is an agreement between the seller and the buyer to deliver a specified quantity of a commodity to the buyer in the future for a specified price or in accordance with a specific pricing formula. The terms and conditions of the forward contract are therefore usually specific to each transaction. They categorize forward contracts into the following types:

(i) Fixed price contract: A fixed price (or flat price) contract is one of the most common types of forward contracts. In a fixed-price forward contract, the farmer commits

himself to delivering at an agreed time a certain quantity of commodities of a specified quality. Normally, the farmer is only paid on delivery, although this type of contract can also be used to obtain pre-harvest financing. Premiums and discounts may be established for the produce that does not meet specified quality standards. The farmer carries the opportunity risk of losing potential gains when market prices rise.

(ii) Price-to-be-fixed contract: Price-to-be-fixed (PTBF) contracts, also called executable orders (in sugar trade) or on call contracts (in cotton trade), are the most common form of export contracts for commodities from Latin America. They are also very common in Asia, and although still common in Africa, are relatively less used. Unlike other forward contracts where the used reference prices are commonly futures market prices, in this case the seller (or the buyer, in case of processors, importers or end-users) has the active ability to fix the prices at the moment deemed most opportune.

(iii) Deferred pricing contract: A deferred pricing (or delayed pricing, price later, no price established) contract provides that the farmer delivers the commodity and transfers ownership on the contract date but maintains control over when it is priced. This contract allows the seller to separate the pricing decision from the delivery decision. The risks of storage are passed to the buyer at the time of delivery and the contract may also be used as a substitute for storage when unavailable. The price may equal the elevator's bid price or an adjusted futures price at a time selected by the farmer. While this gives the farmer the opportunity to benefit from price rises, he also

retains the risk that prices will fall between the time the contract is entered and the date on which the sales price is determined. This is one of the most widely used instruments for small scale farmers, especially where there is an established level of confidence in the buyer.

(iv) Deferred payment contract: A deferred (or delayed) payment contract specifies the price to be paid and transfers ownership upon delivery while postponing payment. This contract may also offer farmers tax advantages by deferring income from the sale of a commodity to the next tax year as a tax-saving strategy for the current year.

(v) Minimum price contract: This forward contract is similar to a fixed-price forward contract, except that it guarantees a minimum price with an opportunity to participate in future price gains. From the farmer's side, this eliminates an important risk factor, and the incentive to default on the contract is less than that with fixed-price contracts. On the other hand, the buyer (elevator or packer) can also hedge the assumed risks by taking opposite positions. The farmer can be required to pay a certain price to take advantage of this benefit. In practice, the vast majority of farmers in developing countries have no access to forward contracts that contain this kind of price risk management component.

(vi) Reference price forward contract: This form of forward contract uses reference prices, at times futures prices, but more often average export prices of a country, to price forward contracts. On delivery, farmers are automatically paid the price of the

day or period when they make their delivery. This type of arrangement is quite common in contract farming and out grower/nucleus estate systems. It is also the basis for the standard pricing formula for most developing country sugar producers, who receive a fixed percentage of the sales prices of their sugar.

There are three essential concepts in using forward contracts. First, given that no cash transfer occurs when the contract is signed, the seller of the commodity is obliged to deliver the commodity at maturity; however, the buyer does not have to pay money up front (except for transaction fees). Second, since the sole guarantee that a forward contract will be honored is the reputation of the two parties entering the agreement, there is an inherent credit or default risk: the counterpart of the forward transaction may fail either to deliver the commodity or to pay the agreed price at maturity. Third, forward contracts are primarily merchandising vehicles, whereby both parties expect to make or take delivery of the commodity on the agreed upon date (UNCTAD 1998).

2.3 Transaction costs in contracts

2.3.1 Theoretical overview

The general hypothesis of the Transaction Cost Economics paradigm is that institutions are transaction cost-minimizing arrangements, which may change and evolve with changes in the nature and sources of transaction costs. This work was pioneered by Coase. In his seminal article “The Nature of the Firm” (Course 1937) he argued that market exchange is not without costs. He recognized the role of transaction costs in the

organization of firms and other contracts. Transaction costs include the costs of information, negotiation, monitoring, co-ordination and enforcement of contracts. He explains that firms emerge to economize on the transaction costs of market exchange and that the “boundary” of a firm or the extent of vertical integration will depend on the magnitude of the transaction costs.

The work of Williamson (1979, 1993, 1996) on the economics of organization and contracts follows on from Coase’s line of thinking. According to Williamson, transaction cost theory is based on three behavioral assumptions: bounded rationality, opportunism, and risk neutrality. This implies that a transaction is associated with contractual risks, for example the opportunistic behavior of one of the contracting parties, or the so called hold-up problem that comes up if one contracting party tries to exploit the other party’s vulnerability connected to his asset specific investments” (Royer 1999). Asset specificity is important in transaction cost theory (Williamson, The Economic Institutions of Capitalism 1985) because rising asymmetric specific asset investments make markets less competitive by reducing the number of potential trading partners, locking one partner to the other and offering increasing incentives for renegotiation.

As economic incentives to behave opportunistically rise, the preferences of the contracting parties diverge: while the exchanging firms have an incentive to jointly maximize long-term profits, each also wishes to maximize its return in the short term by appropriating as much of the gains as possible whenever contractual changes are required (Williamson, The Governance of contractual Relations 1979). The condition of diverging preferences is known as goal incongruence, or a lack of overlapping goals (Ouchi 1980).

Cooperation is difficult to achieve in conditions of goal incongruence because the individuals involved each follow their own differing objectives (Mahoney and McNally 2004). The conceptualization of transaction costs theory assumes goal incongruence is given, although some transaction costs theorists acknowledge that incentive alignment or loyalty may reduce goal incongruence (Alchian and Demsetz 1972). Organization theorists, on the other hand, place particular emphasis on the ability to reduce goal incongruence through means other than incentives because doing so may increase exchange efficiency (Ouchi 1980). Organization theory adds cultural control as a mechanism to reduce goal incongruence. Cultural control focuses on aligning the views of governance structure members through organization culture, which is a fairly stable set of assumptions, beliefs, meanings, and values that individuals use to orient their thinking and to guide their actions (Scott 1998).

Transaction costs are classified into observable and unobservable or inhibitive transaction costs (Staal, Delgado and Nicholson 1997). The observable transaction costs include marketing costs such as transport, handling, packaging, storage, spoilage etc. (Delgado 1995) and are observable when a transaction takes place. The unobservable transaction costs include cost of information search, bargaining, screening, monitoring, co-ordination, enforcement and product differentiation (Bardhan 1984). The latter are inhibitive and often cannot be observed.

Transaction costs theory shows that transaction cost problems can be dealt with using the different forms of governance structures. Organizational theory forms the basis for the

concepts underlying the different governance structures. In trying to deal with transaction costs we cannot run away from organizational theories. In Williamson's framework, a trade-off has to be made between the costs of coordination and hierarchy within an organization, and the costs of transacting and forming contracts in the market (Williamson, *The Economic Institutions of Capitalism* 1985). This trade-off will depend on the magnitude of the transaction costs

2.3.2 Search and switching cost and the default option

This section explores the literature that explains factors that drives parties in the forward contracts to renege. The literature is adopted from the search and switching cost in a consumer-seller relationship and can be related to contracted parties.

Consumers' ability to change suppliers is often restricted by both the costs of collecting information about alternative options and the costs of organizing or adjusting to an actual changeover (Wilson 2012).

Farrel and Kemperer (2007) suggest "a consumer faces a switching cost between sellers when an investment specific to his current seller must be duplicated for a new seller". Unlike switching costs, search costs cannot be incurred by a fully informed consumer (Distinction 1), search costs may be incurred more than once by searching across multiple

firms (Distinction 2), and search costs may be incurred without then necessarily choosing to switch suppliers (Distinction 3).

Switching costs may deter initial search activity but they do not affect the extensiveness of any search because they cannot be incurred across multiple firms (Distinction 2).

However, because switching costs can still be incurred by fully informed consumers, (Distinction 1), they also enhance the loyalty of consumers that have searched the entire market. (Wilson 2012) suggests that search costs have more powerful effect on market power. This follows from Distinction 3 which ensures that search costs have the stronger effect in deterring initial search activity. When evaluating whether to start searching, consumers place less weight on switching costs because, unlike search costs, they are incurred only with the probability of finding an attractive alternative.

Within this context, this thesis looks at transaction costs (including search costs) for farmers entering into a forward contract under alternative scenarios; and transaction cost for contracted parties in forward contract to renege on a contract.

2.4 Market-supporting institutions

Markets only function in the presence of an adequate institutional environment. The Institutional environment involves formal and informal rules that private trading partners have to comply with and that constrain but also facilitate exchange relationships. Market-supporting institutions ensure that contracts are enforced, property rights are respected, opportunistic behavior by trading partners is diminished, the adverse effects of externalities are reduced, information flows improve, transaction costs are reduced, and

tools for risk management are provided ((Grief 2008); (McMillan, Market Institutions 2008); (World Bank 2012)).

Without such market-supporting institutions, coordination of exchange in the market will incur substantial transaction costs as exchange partners have to safeguard themselves against opportunistic behavior and spend time and effort in finding suitable trading partners, negotiating the terms of exchange, overcoming information asymmetries, monitoring and enforcing agreements. Several studies have shown the importance of personal networks in coordinating exchange relationships in the absence of market-supporting institutions, such as an inadequate legal framework to enforce contractual agreements; or the role of trade credit to overcome the absence of formal financial market institutions ((Fafchamps and Minten 2002); (McMillan and Woodruff 1999)). As a result, the absence of proper market-supporting institutions leads to limited opportunities for growth: insecure property rights reduce incentives to invest and at the same time reduce opportunities for investment as property cannot be leveraged as collateral; the dependence of exchange relations on close, personal networks limits opportunities to benefit from innovations outside the network and limits the opportunities for growth in sales volume.

Grief (2018) discusses the establishment of market-supporting institutions (MSI) for contract enforcement. He claims that although contract- enforcing institutions exist in many forms, their effectiveness depends largely on the extent to which they succeed in making the threat of sanctions (or rewards) credible. If no credible threat is established

that a breach of the agreement will be punished, then contracting parties will not credibly commit to adhere to their contractual obligations. He distinguishes between ‘organically’ (spontaneously) formed MSI and purposefully ‘designed’ MSI. This holds similarity to (Aoki 2007) who distinguishes between the exogenous view on institutions (designed MSI) and the endogenous view (organic MSI). Exogenous economic institutions such as contracts are regarded as “rational transaction-cost-saving responses” that are established within the constraints of the institutional environment that is formed by regulatory rules and social norms. Endogenous economic institutions are “shaped and sustained in the repeated operational plays of the game itself” (Aoki 2007).

In organic MSI, the credible threat by the economic agents to impose sanctions deters breach of contract. Such organic market-supporting contract enforcement institutions are most likely to occur in cases where agents value the prospect of continued exchange. The enforcement device in such situations is often based on reputation effects. The potentially negative effect on an agent’s reputation deters contract breach. Such reputation-based deterrence for contract breach is stronger in multilateral reputation mechanisms than in bilateral relationships as behavior can be monitored more easily, more information can be shared, and sanctions are generally higher. Organic MSI for contract enforcement are most likely to emerge in situations where “parties are locked into their relationships, markets are thin, and it is costly to find a new exchange partner” (Grief 2008).

Designed MSI for contract enforcement are intentionally created organizations that are based on more formalized rules. These rules and organizations “increase the disciplinary

impact of economic sanctions by changing the information structure, providing coordination and by altering the strategic interaction among economic agents” (Grief 2008). For example, the creation of an organization for interaction among actors, changes infrequent interactions of one actor with any other actor into frequent interactions between actors and the organization. Membership of the organization holds certain value to its members e.g., because of the possibilities to attract more trade, or by lowering transaction costs as the organization credibly disciplines members to adhere to their obligations. This value of membership, on the other hand, also means that the sanctioning device that the organization can employ is the threat of exclusion in the case that the organizational rules are broken.

The initial set-up costs of the organization in case of the designed MSI for contract enforcement are high: acquisition of organizational capital, making common rules, generating awareness about the existence and credibility of the organization. However, “once established, designed MSI exhibit low marginal costs of expanding the number of members / individuals / transactions covered by the institution” (Grief 2008).

2.5 Warehouse Receipt System

2.5.1 Overview of Warehouse Receipt System

Most smallholder farmers need cash immediately after harvest to prepare for the next crop. This necessitates immediate sale of the new crop since the situation of nearly every farmer is the same. The new crop floods the local market shortly after harvest dropping

the price. As the result, most smallholder farmers have no choice but to sell into the poorest market (WIC Project 2005).

The use of a warehouse receipt allows a farmer to deposit his crop in a warehouse and to meet his short term need for cash by borrowing from a bank or other lending institution. This allows the farmer to avoid selling his crop immediately at harvest when the supply of the commodity is usually highest and therefore prices lowest (WIC Project 2005).

2.5.2 Meaning of WRS

Warehouse receipts (WR) are documents issued by warehouse operators as evidence that depositors have deposited specified commodities of stated quantity and quality, at particular location by named depositor (Coulter and Onumah 2002).

The receipt is issued to the owner as evidence of location and ownership. A significant characteristic of a WR is the security it provides a buyer. When a WR is offered for sale, the buyer knows that the underlying commodity is in secure storage, being managed professionally. The buyer knows that he will get the quantity and quality stated on the WR and that it is guaranteed by the storage facility operator. The storage operator is liable in case of a default and the WRS requires that the storage facilities are comprehensively insured: the WR owner has to take out on-site insurance, not only for the infrastructure but also for stock on-site.

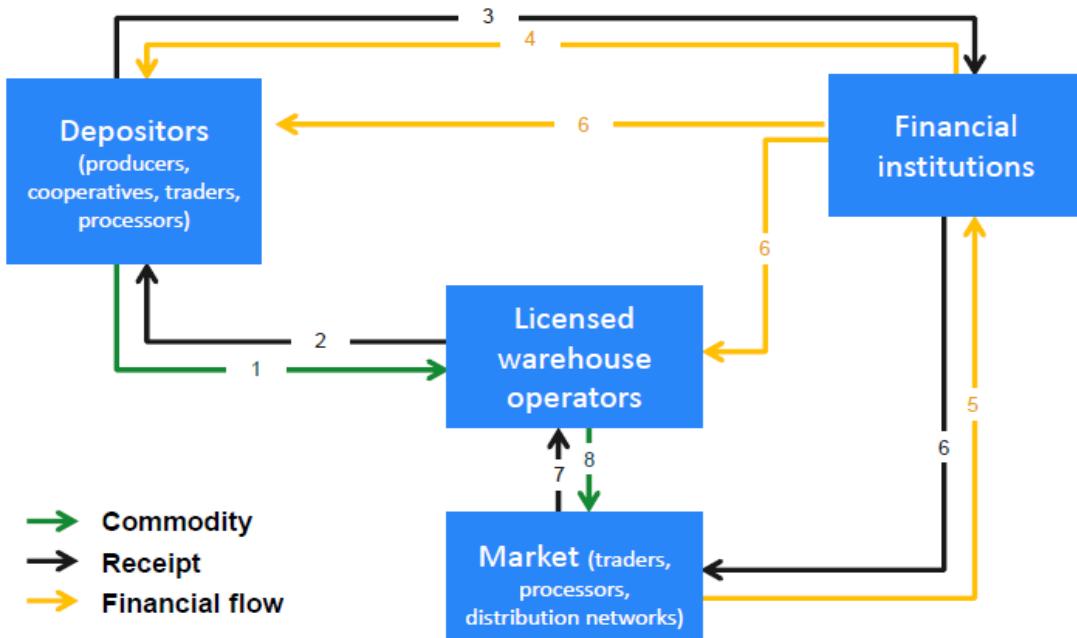
The receipt is also a negotiable instrument that can be sold or used as collateral for a loan, backed by the claim to the commodity held in the warehouse” (World Bank 2012). This is also beneficial to the banks as they are able to reach a new set of customers for financial services and products.

2.5.3 Key players of WRS and their roles

The WRS has three main players, which are the depositor, warehouse operator and the finance institution (Kwadjo 2000). In order for these players to work properly, the Government must make sure that the working environment is of good quality by preparing good policies and other regulations. The depositor may be a producer, farmer group, trader, exporter, processor or indeed any individual or body corporate. The warehouse operator holds the stored commodity by way of safe custody; implying he is legally liable to make good any value lost through theft or damage by fire and other catastrophes but has no legal or beneficial interest in it (G. Onumah 2002). The receipts may be transferable, allowing transfer to a new holder - a lender (where the stored commodity is pledged as security for a loan) or trade counter-party - which entitles the holder to take delivery of the commodity upon presentation of the WR at the warehouse.

Figure 2.1 below shows how warehouse Receipt System works.

Figure 2.1: How warehouse receipt system works



Source: (Saint-Geours 2012)

2.5.4 Benefits of WRS

According to Bass and Henderson (2000) and Onumah (2002), the benefits from WRS can be explained into two sides, for the Financial Institutions (FIs) and for depositors (Farmers and traders).

For the FIs, the benefits are:

- Decreased risk;
- Reduced seasonal price variability and
- Higher level of liquidity

For the depositors the benefits include:

- Improved farm income and smooth domestic prices
- Can create cash and forward markets and hence price discovery and competition

- It offers stable prices and linking the small farm sector to guaranteed and profitable markets for produce.
- WRS forces industry to improve on the storage opportunities and thereby reduces postharvest losses.
- It offers small farmers the opportunity to bulk their crops, grade and store them which in turn means they could be offered to a wider geographical area and trade “unseen” based on the WR.
- A WRS guarantees delivery thereby reducing counterparty risk.
- A WRS goes hand in hand with the supply of market information.
- It greatly improves the integrity of the system since all products are now inspected and graded.

2.5.5 Key requirements to ensure a successful WRS

According to Bass and Henderson (2000), implementing a successful warehouse receipt program can be done easily if a few key factors are in place. These are lessons learned from the experience in Ghana, South Africa, Zimbabwe and other African countries and can be grouped into two:

a) Appropriate regulation and supervision of the sector:

In order for a WRS to be viable, the economy within which it operates must meet certain conditions: The legal system must support pledge instruments, such as warehouse receipts, as secure collateral. The pertinent legislation must meet several conditions:

- i. Warehouse receipts must be functionally equivalent to stored commodities;

- ii. The rights, liabilities, and duties of each party to a warehouse receipt (for example a farmer, a bank, or a warehouseman) must be clearly defined;
- iii. Warehouse receipts must be freely transferable by delivery and endorsement;
- iv. The holder of a warehouse receipt must be first in line to receive the stored goods or their fungible equivalent on liquidation or default of the warehouse;
- v. The prospective recipient of a warehouse receipt should be able to determine, before acceptance, if there is a competing claim on the collateral underlying the receipt. The lack of an appropriate legal environment is probably the single most important constraint on the creation and acceptance of warehouse receipts in many developing countries and in most countries in transition.

b) *Operational conditions*

The operational conditions must be conducive to the creation of a warehouse receipt system and include the following:

- i. Reliable warehouse certification, guaranteeing basic physical and financial standards;
- ii. Operate on a large scale: The cost of warehouse receipt administration and oversight decreases with scale. The more warehouses available, the lower the cost of monitoring the system.
- iii. The existence of independent determination and verification of the quantity and the quality of stored commodities, based on a national grading system (with inspection of warehouses and stored commodities performed, in most cases, by

- the private sector under license from a government body-for agricultural goods, usually the ministry of agriculture); and
- iv. The availability of property and casualty insurance: The integrity of the system must be assured through performance guarantees. A key prerequisite for the acceptability of warehouse receipts by the trade and by banks is the existence of a performance guarantees for warehouses, assuring that the quantities of goods stored match those specified by the warehouse receipt and that their quality is the same as, or better than, that stated on the receipt. Without this guarantee, farmers and traders will be reluctant to store their crops, and banks will be hesitant to accept warehouse receipts as secure collateral for financing agricultural inventories.

2.6 Warehouse Receipt System in Malawi

Warehouse Receipt System is mainly operated by the two Commodity Exchanges in Malawi, namely, the Agriculture Commodity Exchange for Africa (ACE) and AHL Commodities Exchange (AHCX).

ACE, was established in 2005 and started operating an online trading platform in October 2006. The National Small Farmers“ Association of Malawi (NASFAM) took the initiative to establish ACE as an attempt to ease the marketing effort for small farmers with the financial support from the USAID. The aim was to link national marketing institutions to create free information flows and facilitate regional trade growth. Shortly after launching, it had attracted the interest of 11 companies in Malawi, 6 companies in

Zimbabwe and a growing number of members from South Africa, who are also members of the SAFEX (AMPRIP Trade Forum 2007).

2.6.1 Auction Holdings Commodities Exchange

AHCX is an initiative by Auction Holding Limited (AHL), Malawi's largest tobacco company, which is partly owned by the government. The roll out of AHCX began in 2013 with the first trading session conducted on 16th May 2013. A total of 30 tons were transacted on the first three separate trades. The initial days saw major trading in groundnuts, soybeans and pigeon peas (AHCX 2014).

AHCX has broader than usual scope of operations which include:

- i. Quality assessment and certification
- ii. Electronic Warehouse Receipting (Collateral Management)
- iii. Trading floor operations
- iv. Clearing and settlement
- v. Market information dissemination

In 2015/2016 season AHCX rolled out forward contracts targeting soybeans and pigeon peas. AHCX entered into an agreement with processors to procure the commodities through the exchange on forward contracts basis. The buyers were required to successfully commit to the contract including its condition of price mode, payment mode and performance bond (AHCX 2015).

Members of the exchange and the public at large were invited to express their interest to supply on the forward contracts. The interested suppliers were required to provide a 5% performance bond to AHCX before the forward contract is signed. At maturity date, the suppliers were required to deliver on the contract and payment was being made 24 hours after the delivery time (AHCX 2015).

However, the forward contracts were not successful because it didn't attract many suppliers due to the required performance bond of 5%. Since AHCX entered into agreement with buyers, it was deemed as a default on the contract; and AHCX was dragged to court and was ordered to pay MK 2 billion which is equivalent to USD 2.7 million (The Nation 2016)

2.6.2 Agriculture Commodity exchange for Africa (ACE)

ACE commenced operations as a virtual commodity exchange in 2006 with the National Small Farmers Association of Malawi as a founding member and shareholder. ACE has a system whereby bids and offers are advertised on a screen. When a deal is struck between two parties it is supposed to be a valid forward contract. However, when the market price moves away from the transaction price, a culture has unfortunately established itself where the party losing out because she/he can now obtain a higher/lower price, walks away from the transaction. Apparently this is no different from any other transaction struck outside the exchange, but nonetheless it greatly tarnishes the image of the exchange. ACE does not guarantee the transaction but only advertises it (Dentoni and Dries 2015).

(Kennedy 2011) confirms this view in his analysis stating two criteria that hampered growth: A reputation was difficult to achieve due to contractual defaults (usually on the side of the seller) and the provision of realistic market information based upon trades agreed through use of the exchange was hampered by a lack of exchange trade volume.

Since 2011, registered warehouse operators have been able to take grain deposits from third parties and issue a WR as proof of grain stored in the name of the owner. The WR could then be offered on the ACE trading platform.

ACE has advocated for a WRS as an integral part of agricultural trade and financing since its incorporation in 2006. The system was aimed at reducing the risk of contract/performance defaults in agricultural trade and also facilitate competitive financing with agricultural commodities as collateral. Before the enactment of the Warehouse Receipt Bill, the system was built on a contractual relationship between depositors, storage operators, financial institutions and ACE. The initial success of the WRS was very much dependent on the active involvement of all participants and this is why it took 6 years before the first WR was issued, financed and traded in Malawi (ACE, 2012).

2.6.2.1 ACE Progress report

In 2011, ACE registered the GSL silos in Kanengo, Lilongwe as the first WRS storage facility (ACE 2012). The GSL facility has a capacity of 12,000 MT and it was open to

deposits from any interested third party. In 2011, three small rural warehouses of 500 tons each were registered. A fourth warehouse with a capacity of 2000 tons was under consideration in an arrangement with the UNDP Millennium Villages Project. It would have operated under the banner of NASFAM, assisted and supervised by ACE, for the balance of the 2011 season (ACE 2011).

Storage fees were set by GSL and advertised by ACE. The fees cover all costs and the depositor will have no additional costs. This includes bagging in new bags and printing these bags where WFP is the buyer (ACE 2012).

The National Food Reserve Agency (NFRA) plays a very important part when it comes to maize storage and marketing in Malawi. The NFRA came about in 1998 when the government, under pressure of the IMF and World Bank programs, agreed to eliminate price support operations for maize by ADMARC and prepare it to operate on a strictly commercial basis. It agreed to establish an agency to handle disaster relief involving the management of the strategic grain reserve in the place of ADMARC, with a clear delineation of responsibilities between the two agencies.

The NFRA had for some years taken deposits from selected large traders, and occasionally the banks called the NFRA to obtain confirmation of physical stock before approving finance (ACE, 2012). This was, in effect, an unstructured warehouse receipt. The NFRA was quick to confirm that they would participate in the WRS and issue WRs from their Kanengo (Lilongwe) silos. NFRA has storage sites in other locations and also

confirmed that they will apply the procedures that have been implemented and tested in Kanengo.

Other than the NFRA warehouses, ACE has targeted a total 16 facilities with a combined storage capacity of 53,200 tons (ACE, 2012). During May 2012, ACE sent its inspectors to the warehouse owners (listed below), responding to their application based on the new proposed requirements:

- I. Rab Processors Lilongwe
- II. Rab Processors Blantyre
- III. Farmers World Lilongwe
- IV. Agora Blantyre
- V. KU Distributors Blantyre
- VI. Transglobe Blantyre
- VII. Rice Milling Blantyre

Individual feedback is still confidential, but it could be reported that four sites were unconditionally approved, one conditionally and two declined (ACE 2012). It is considered a good mix, proving the point that inspections are thorough and that in some instances grain has been stored in facilities that are not up to standard. ACE certification will most definitely improve the industry standard. Informed market participants will not be confident if they know that they store product at a facility that is substandard according to the ACE requirements.

2.6.3 Summarized extract of the process for issuing and redeeming a WR

The process of depositing the product, issuing the warehouse certificate, financing and redeeming the certificate, can be summarized as follows (ACE 2012):

- A commodity is deposited in an ACE registered warehouse facility, certified to store that commodity.
- The warehouse owner issues a WR, through ACE, and thereby guarantees the quantity and quality.
- The WR owner could request financing from a preferred bank and immediately receive the funds.
- The WR owner follows the market prices and may offer the WR for sale through ACE's trading platform.
- A buyer accepts the offer and ACE generates a contract.
- The buyer deposits funds into the ACE settlement account.
- ACE settles the finance and storage costs and transfers ownership of the WR
- ACE transfers the balance to the seller
- The new owner can either collect the commodity or request new financing from a preferred bank.
- The WR is cancelled in the Registry if the commodity is collected. If not, the sequence starts again.

2.6.4 Warehouse Receipts Bill

The warehouse receipt bill in Malawi was drafted in 2016 and gazetted in 2017. The Bill defines and clarifies the legal status of warehouse receipts as documents of title and to clarifies the rights and obligations of warehouse operators and holders of warehouse receipts in accordance with international best practices in order to facilitate trade and financing of goods in storage in Malawi. The Bill is divided into the following six Parts (Jere and Nyirongo 2016):

Part I: Contains preliminary provisions including interpretation of terms used throughout the Bill. A warehouse receipt is defined as a document of title issued by a warehouse operator for goods in storage.

Part II: Makes provision for the issuance and form of warehouse receipts. A warehouse receipt may be issued by any warehouse operator and need not be in any particular format. The Part makes provision for, at a minimum, the information to be indicated in a warehouse receipt. A warehouse receipt may be issued in either an electronic or paper form. A warehouse receipt may either be negotiable or non-negotiable. The Part also makes provision for the control of warehouse receipts. A warehouse receipt may be reissued in an alternative medium on request.

Part III: Makes provision for the rights and obligations of warehouse operators. Generally, warehouse operators are to exercise due care in the storage and handling of goods in storage and to redeliver the goods on demand or upon termination of an

underlying storage agreement. Goods covered by warehouse receipt shall be kept separate and identifiable or may be comingled if fungible. A warehouse operator may terminate storage prior to the termination of a storage agreement in some circumstances after giving notice to a person with interest in the stored goods. A warehouse operator shall have lien on goods covered by a warehouse receipt including charges for storage, transportation, insurance etc. A warehouse operator may enforce his lien in accordance with the procedures set forth in the Bill.

Part IV: Describes the formal requirements for and legal effect of negotiation and transfer of warehouse receipts. Upon due negotiation, a purchaser or pledgee of goods covered by a negotiable warehouse receipt shall acquire title to the document and the goods covered by the document that is superior to all other claimants, with the sole practical exception of goods placed in the warehouse by a thief. Upon negotiation other than due negotiation or transfer of a warehouse receipt, a purchaser or pledgee shall acquire all rights that a seller or pledger had the legal capacity to transfer. Upon delivery of goods, a warehouse operator is required to cancel a negotiable warehouse receipt or, if the warehouse receipt is lost or stolen, to remain liable to any holder who in good faith obtains the lost or stolen document for value.

Part V: Clarifies the relation of rights and priorities as between secured parties under the Personal Property Security Act, 2013 and the holders of warehouse receipts.

Part VI: Makes provision for miscellaneous matters including procedures to be followed for the protection of warehouse operators in the case of lost or stolen documents, resolution of conflicting claims to the goods in storage, and the power of courts to compel delivery of goods covered by outstanding negotiable warehouse receipts.

2.7 Empirical Studies

Nyirenda (2010) conducted a study on the role transaction costs and marketing cooperatives play in small scale farmers marketing of rice in the Bwanje valley area in Malawi. In order to achieve this, the study researched if small scale farmers consider transaction costs when making the decision to participate in a cooperative. The study was also aimed at finding out if there is any association between cooperative membership and some dimensions of a transaction that affect the cost of transacting as well as the role cooperative membership has on the incomes the farmers earn from rice. A number of areas were discovered to be the major sources of transaction costs for the farmers in the study area. These sources include limited access to market information (about prices, markets and buyers) which hindered the farmers' capability to make informed sales decisions, poor road infrastructure which limits the farmers access to markets as well as buyers' access to the farmers, and availability of few buyers in the area which increased the cost of negotiation for the farmers since they were negotiating in less competitive marketing environments. These factors affected the cost of transaction for the farmers through search costs and negotiation costs. The results found that three of the transaction cost variables had a significant influence on the choice decision to participate in the cooperative. The significant variables were type of buyer, information on prices and membership status of the farmer.

Studies have also been conducted on the impacts of Commodity Exchanges as MSI. One of them is the study on the South African exchange (SAFEX) by Moholwa and Phukubje (2016) which used a nine-years dataset to test price discovery for wheat and sunflower seeds on the SAFEX. The study presented two sets of results. First, it showed that there is a significant relationship between spot and future prices, implying improved price discovery due to the exchange. Given that SAFEX has profitably existed for more than a quarter of a century without any support, this result is to be expected. Traders and farmers voluntarily traded their commodities through SAFEX because it benefitted them by reducing their transactions costs, which in turn improved market performance. However, the study also reported that brokerage fees can make trade unprofitable.

Rashid (2015) added that Improved price discovery itself implies that the problems of incomplete information, high transactions costs, and other market failures are being addressed. On the other hand, Warehouse Receipts Systems, as an integral part of most commodity exchanges, have contributed to increased liquidity in the markets, which is reflected by the trade volumes in successful exchanges.

However, very limited success is observed in developing countries, where agricultural markets are plagued by market failures. Clearly, one explanation is the absence of key viability conditions. In order to have Western-style exchanges, all viability conditions need to be improved. However, for most developing countries, addressing those viability conditions would take time. Therefore, an alternative strategy would be to try out new

institutional and operational designs instead of replicating the designs of industrialized countries (Rashid 2015).

This thesis therefore proposes an operational design of hybridizing forward contracts and warehouse receipt system in a commodity exchange set up in a quest to address the agricultural commodities' market failures.

CHAPTER III: RESEARCH METHODS

3.1 Governance Mechanism of Forward Contracts and WRS in Malawi

The research used descriptive-qualitative data in an attempt to describe the ideal conceptual frameworks supporting warehouse receipt system and contracts and compare them with the case of Malawi. The description focused on institutional arrangement and legal and regulatory framework governing forward contracts and warehouse receipt system.

3.2 Transaction Costs and decisions in Forward Contracts

3.2.1 Approach, techniques, and tools for data analysis

This research simulated a decision tree indicating the decision to enter into a forward contracts or not based on transaction costs under different scenarios i.e. with and without the Marketing Supporting Institutions (MSI) e.g. the commodity exchange.

The research also simulated the likelihood of default or no default on forward contracts based on transaction costs (switching costs) under the two different scenarios (with and without MSI). The main transaction costs and their proxies are as follows:

a. Information search

- Knowledge of prices in the other markets

- Knowledge of available buyers/sellers

b. Contract enforcement

- Monitoring
- Quality and quantity uncertainty

The above mentioned proxies of transaction costs are difficult to measure quantitatively. With this in mind, the goal of the test was to qualitatively rank the magnitude of each proxy as high or low and associate it to the probability of entering a forward contract and default under alternative options. The basis of association is as follows: 1) Where the transaction cost to participate in forward contract is high, people will avoid to participate in it, 2) Where the switching costs for a reneging decision is low, the probability of default for forward contract is high.

3.2.2 Data

The research used descriptive-qualitative data sourced from both published and unpublished literature and the general understanding of the reality on the ground regarding access to price information, information on buyers, quality and quantity issues and buyer-seller relationships under two different scenarios i.e. with and without MSIs.

3.3 Cost-benefit analysis of Warehouse Receipt System

3.3.1 Data

The following data were used to conduct the cost benefit analysis:

- a) Average monthly prices of soybeans for 10 years starting from 2007 to 2017.

Soybeans has been chosen because it is the second most volatile commodity traded on commodity exchanges in Malawi. The first most volatile is maize but it is as a result of government interventions through subsidies and price support mechanism which to a large extent are inefficient. Average monthly prices of soybeans will be obtained from FAO website and commodity exchanges.

- b) Costs associated with warehouse receipt system was collected from the commodity exchanges. The costs include storage cost, handling, quality certification and trading commission.

3.3.2 Approach, techniques, and tools for data analysis

- a) Time taken (in months) to reach maximum price within six months of the trading season for each year was determined. Average percentage price increase to reach maximum price and average time taken (in months) to reach maximum price across the period under study were calculated and used as standard percentage price increase and the storage period.

- b) WRS costs on a per ton basis were calculated for the period taken to reach the maximum price.
- c) Economic benefits of WRS were calculated by simulating the price gain and subtracting WRS costs for the assumed period.
- d) Sensitivity analysis was conducted using Monte Carlo Simulation to assess the effect of change in future prices on the economic benefits of WRS.

3.4 Hybridizing forward contracts and WRS

3.4.1 Approach and techniques

- a) The research designed a model that accommodates both forward contracts and WRS as a hybrid risk management tool by changing specific operational conditions. An illustrative diagrams were used to show the flow of commodity, documents and funds among the parties involved.
- b) The research also simulated a mathematical example of the hybrid risk management tool and show how it addresses the challenges faced by WRS and forward contracts as separate risk management tools.

CHAPTER IV: RESULTS AND DISCUSSIONS

4.1 Governance Mechanism of Forward Contracts in Malawi

Forward contracts in Malawi are usually private transaction and they are not regulated. In light of this, it is very difficult to follow and document forward contract transactions.

ACE introduced a system in 2016 to make forward contract transactions transparent. The system allowed buyers and sellers to bid through ACE and deals could be struck as valid forward contracts. However, the system lacked contract enforcement mechanism because when the market price moves away from the transaction price, a culture was unfortunately established where the party losing out because she/he is getting a higher/lower price walk away from the transaction. Apparently this was no different from any other transaction struck outside the exchange. However, the Malawi penal code reprimands breach of contract but in many circumstances such cases are taken to court if parties involved are high profile and not ordinary farmers.

AHCX also tried to introduce forward contract transaction in 2015. AHCX's approach was aimed at enhancing contract enforcement by way of demanding performance bond of 5% of the value of the contract from both the supplier and buyer. This was not successful because many suppliers/farmers could not afford to pay the performance bond upfront.

Both Exchanges are no longer coordinating forward contract transactions and currently forward contracts continue to be transacted out of the exchange albeit with challenges.

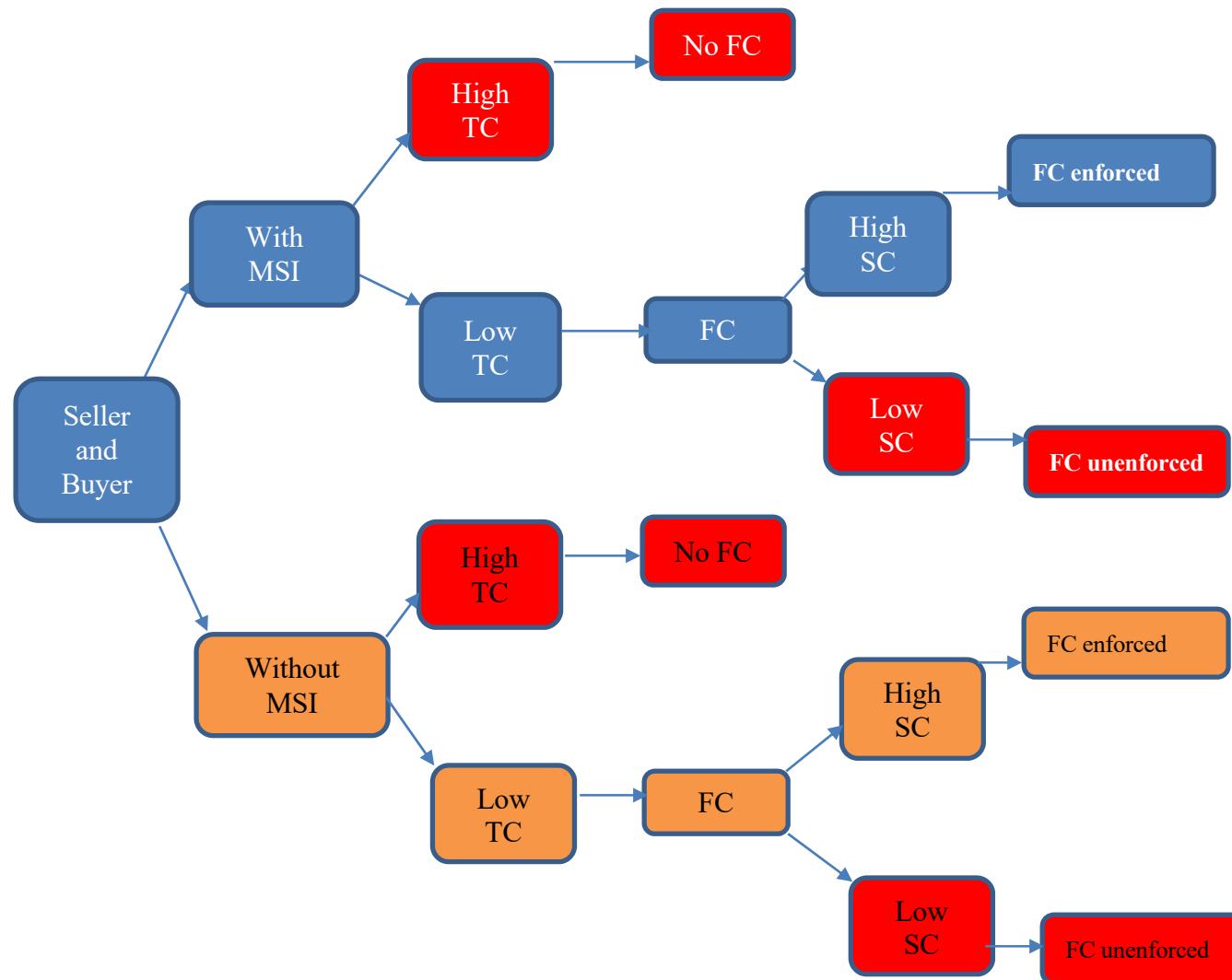
4.2 Transaction Costs and decisions in Forward Contracts

All transactions have embedded costs (Coase, 1937) and called these costs transaction costs (TC). They are present whenever there is uncertainty or incomplete information. TC include the costs of information collection and asymmetry, negotiation, monitoring, co-ordination and enforcement of contracts. He explains that firms emerge to economize on the transaction costs of market exchanges and that the extent of vertical integration will depend on the magnitude of the transaction costs.

Grief (2008) argues that markets only function in the presence of an adequate institutional environment. The Institutional environment involves formal and informal rules that private trading partners have to comply with and that constrain but also facilitate exchange relationships. Market-supporting institutions ensure that contracts are enforced, property rights are respected, opportunistic behavior by trading partners is diminished, the adverse effects of externalities are reduced, information flows improve, transaction costs are reduced, and tools for risk management are provided.

Based on the literature review and the case of ACE and AHCX, the TCs and the decisions in forward contracts can be summarized in the decision tree below (Figure 4.1).

Figure 4.1: Decision Making in Forward Contracts



Grief (2018) discusses establishing market-supporting institutions (MSI) for contract enforcement. Designed MSI for contract enforcement are intentionally created organizations that are based on more formalized rules like ACE and AHCX. These rules and their enforcement organizations increase the disciplinary impact of economic sanctions by changing the information structure, providing coordination and by altering the strategic interaction among economic agents. With such market-supporting institutions, coordination of exchange in the market incur lower TC in terms of information search, negotiation, monitoring, co-ordination and enforcement of contracts.

In the case of ACE, the system was aimed at reducing the TC for price information and contract negotiation, hence, Forward Contract (FC) deals were easily struck. However, the system did not emphasize on contract enforcement and it provided a leeway for opportunistic behavior. As a result, the switching cost was low for the contracted parties and the forward contracts were not enforced.

In the case AHCX, the system was aimed at reducing the TCs for price information and contract negotiation. The system also emphasized on contract enforcement by way of demanding a 5 percent performance bond from both parties. This proved to be a high transaction cost for enforcing contracts as only few suppliers managed to pay the performance bond and a majority did not qualify for the contracts. Due to low subscription, the system also flopped.

Without MSI, coordination of exchange in the market incurs substantial transaction costs as exchange partners have to safeguard themselves against opportunistic behavior and spend time and effort in finding suitable trading partners, negotiating the terms of exchange, overcoming information asymmetries, monitoring and enforcing agreements. However, contract enforcement is most likely to occur in cases where agents value the prospect of continued exchange and the enforcement device in such situations is often based on reputation effects. The potentially negative effect on an agent's reputation deters contract breach and such reputation-based deterrence for contract breach is stronger in multilateral reputation mechanisms than in bilateral relationships. In Malawian setting, this is applicable where farmers operate as an organization e.g. club, cooperative or association. As it stands, Malawi lacks a designed model that offers an efficient forward contracting mechanism with both low transaction costs and enhanced contract enforcement.

4.3 Governance and Operational Mechanism of WRS in Malawi

According to Bass and Henderson (2000), lessons learned from the experience in Ghana, South Africa, Zimbabwe and other African countries in implementing a successful warehouse receipt program can be grouped into two:

i. Appropriate regulation and supervision of operations:

The legal system must support pledge instruments, such as warehouse receipts, as secure collateral. The warehouse receipt bill in Malawi was drafted in 2016 and

gazetted in 2017. The Bill defines and clarifies the legal status of warehouse receipts as documents of title and clarifies the rights and obligations of warehouse operators and holders of warehouse receipts in accordance with international best practices in order to facilitate trade and financing of goods in storage in Malawi.

ii. Operational conditions

The operational conditions must be conducive to the creation of a warehouse receipt system and include the following:

- a. ***Reliable warehouse certification:*** ACE certifies third party warehouse operators who intend to operate the WRS under ACE. Apart from third party warehouses, ACE also operates its own rural warehouses. AHCX also operates its own leased warehouses, hence, guaranteeing basic physical and financial standards.

- a. ***Operate on a large scale:*** ACE operates 19 warehouses representing 88,574 tons of storage space available for deposits. From this, ACE operates 11 rural warehouses owned by partner farmer associations or private sector partners; cumulatively offer depositors access to 6,500 tons. AHCX operates 13 warehouses only across Malawi with total storage capacity of 22,350 tons. With this information, it is clear that warehouses are most commonly located in commercial areas and are relatively scarce in up-country locations where most producers are located. The status quo would increase transportation costs because most warehouses operating under WRS are not close to producers. Very few users

would be willing to have their crop inventory stored too far away from their production site.

- b. *The existence of independent determination and verification of the quantity and the quality of stored commodities:* Currently Malawi doesn't have a harmonized National grading standard. ACE and AHCX have fragmented grading standards in grain and oilseeds. This possess a challenge when engaging in international trade. However, a proposal for the development of national grading standard is at an advance stage with the support of USAID's Trade Hub. Quantity verification is usually done by the commodity exchanges.

- c. *The availability of performance guarantees:* A key prerequisite for the acceptability of warehouse receipts by the trader and by banks is the existence of a performance guarantees for warehouses, assuring that the quantities of goods stored match those specified by the warehouse receipt and that their quality is the same as, or better than, that stated on the receipt. Warehouses under ACE and AHCX operations are always insured and warehouse operators take responsibility for any significant deviation in quantity and quality.

4.4 Cost-Benefit analysis of WRS

4.4.1 Cost of WRS

WRS comes at a cost and Table 4.1 below shows the charges of WRS incurred by the depositors from commodity deposit to commodity trade.

Table 4.1 : Charges for WRS for the Commodity Exchanges in Malawi

Cost item	Cost per ton (MWK)
Handling	5,000 per ton
Storage cost	30/ton/day
Trading Commission	2% of sales

Commodity handling involves loading, unloading and quality check. Storage cost is charged on a per day basis and trading commission is charged on sales.

The WR can also be used as a financial instrument i.e. it gives an opportunity to the commodity depositor to access financing from banks and the cost of WRF are summarized in Table 4.2 below.

Table 4.1 :Charges for WRF in Malawi

Cost item	Percent
Hair cut	70%
Arrangement fee	1%
Interest rate per annum	21%

When providing warehouse receipt financing, banks usually discount the value of the warehouse receipt (hair cut) to 70 percent to cushion themselves against price shocks. Banks charge an arrangement fee of 1 percent on the loan amount and interest charge is

currently at 21 percent per annum.

4.4.2 Price Movement of Soybeans

WRS allows the farmers to avoid selling their crop immediately after harvest when the supply of the commodity is usually highest and therefore prices lowest. The expectation is that with time the supply goes down, prices increase and market information becomes clear.

Table 4.3 below provides the price trend of soybeans from harvest period in April up to the sixth month of the trading season within a time period of 10 years starting from 2007 to 2017. Prices are quoted in Malawi kwacha per kilogram.

Table 4.2: Price trend of soybeans in Malawian Kwacha per kilogram

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg.
APR	72.88	85.42	120.00	128.07	127.42	200.70	200.65	150.00	161.75	316.00	190.00	
MAY	71.04	96.23	132.69	108.98	126.87	192.34	215.46	157.00	166.16	326.00	130.00	
JUN	73.38	109.95	133.76	133.76	133.76	135.70	224.68	226.00	191.40	339.00	145.00	
JULY	64.48	113.49	124.49	121.60	133.30	213.05	242.27	240.00	201.59	349.00	165.00	
AUG	72.44	126.38	131.12	119.02	137.69	141.99	233.03	246.00	205.18	358.00	190.00	
SEPT	66.82	122.69	125.46	132.83	136.96	223.82	241.22	249.00	210.82	360.00	195.00	
Time taken to reach maximum price(Months)	3	5	3	6	5	6	4	6	6	6	6	5
Price increase to reach Maximum(%)	1%	48%	11%	4%	8%	12%	21%	0.66	0.30	0.14	0.03	20%
Price increase after 5 months(%)	-1%	48%	9%	-7%	8%	-29%	16%	64%	27%	13%	0%	

From the table above, it takes five months on average for prices of soybeans to reach their maximum, ceteris paribus; and on average prices increase by 20 percent from the start of the trading season to fifth month, ceteris paribus.

4.4.3 Cost-Return structure of Warehouse Receipt System

Based on the cost of WRS and the price trend of soybeans provided above, the cost-return structure of WRS for soybeans for a period of 5 months is simulated in the Table 4.3 below.

Table 4.3: Cost-Return Structure of WRS

	Description	MWK
Price at deposit	MWK per ton	200,000.00
Selling price after 5 months	20% Increase	240,000.00
Price gain per ton		40,000.00
Costs of WRS		
Handling	5000 per ton	5,000.00
Storage cost	30/ton/day	4,500.00
Trade Commission	2% of sales	4,800.00
Total WRS cost	MWK per ton for 5 months	14,300.00
Net Benefit to the farmer	MWK per ton	25,700.00
Net Benefit to the farmer(%)	% of price gain	64.25%
Return on WRS		179.7%

Assuming a farmer deposits 1 ton of soybeans in April and the spot market price is MWK 200,000 per ton. If the commodity is stored for five months and price in Month 5 is up 20% from the harvest price of MWK 200,000, then the take price at sale is MWK 240,000. If the farmer decides to sell at this price, then the farmer incurs MWK 14,300 as WRS cost. From the price gain of MWK 40,000 within five months, the farmer nets MWK 25,700, equivalent to 64.25% of the price gain. The base benefit from the farmers having access to the WRS is equivalent to 12.85%. That is, the contribution of the WRS to farm

income as a result of not selling at harvest price. The return on using the WRS is 179.7% [$\text{Net Price Gain} \div \text{WRS Cost}$].

Let us assume the farmer self stores the grain to avoid paying the external cost. We also assume, for simplicity, that there is not pecuniary cost to the farmer for self storage. The farmer who uses the WRS has a secondary benefit over the one using self storage because the former can use WR as a collateral to procure funding prior to sale of commodity.

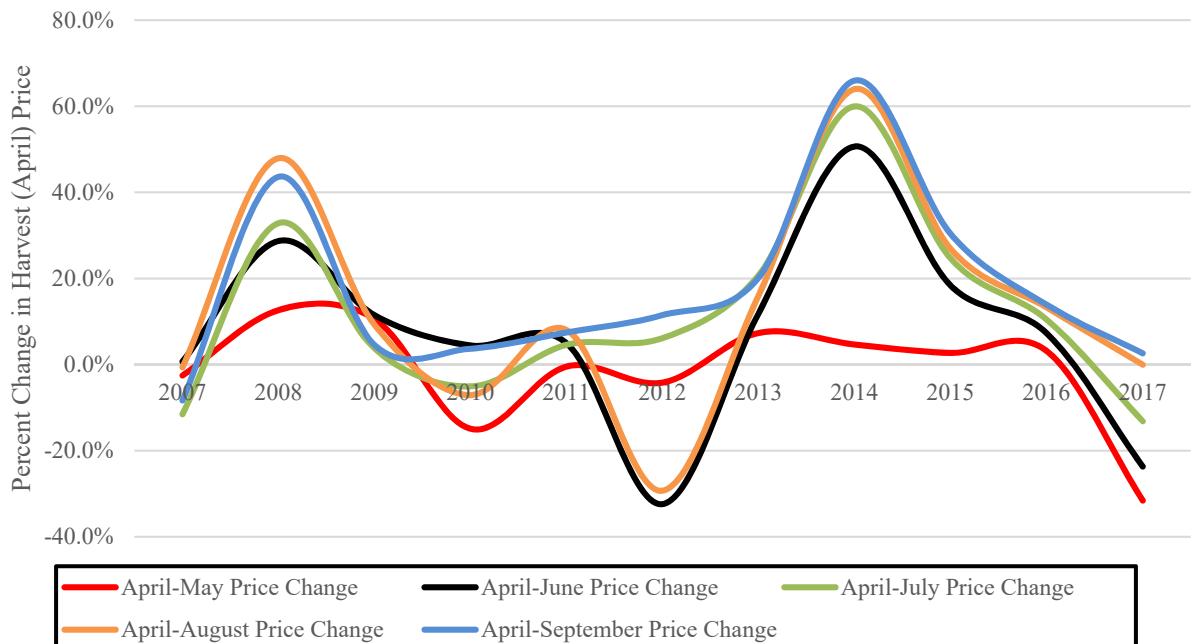
Suppose the maximum amount that may be borrowed using a WR as collateral is 70% of the commodity value at harvest. Also, assume that the financial institution charges a 1% facilitation fee and a 21% per annum interest rate on borrowed funds. Finally, assume the comparative borrowing cost without a the WR collateral is 1.5% facilitation fee and 28% interest rate. The foregoing implies that borrowing cost with the WR collateral is MWK 13,650 [MWK 140,000 * $(1\% + (21\% * 5/12))$] compared to MWK 18,433.33 [MWK 140,000 * $(1.5\% + (28\% * 5/12))$] for an uncollateralized facility of the same amount over the same period. The net benefit from the WRS from the loan facility opportunity is MWK 4,783.33 [MWK 18,433.33 – MWK 13,650]. This brings the total benefit from the WRS (when the farmer exercises the option to borrow using the WR as a collateral) to MWK 30,483.33. The equivalent return on the WRS is, thus, 213.17% [$(\text{Net Gain from WRF} + \text{Net Price Gain}) \div \text{WRS Cost}$].

4.4.4 Sensitivity analysis on cost-return structure of WRS

WRS does not hedge against price volatility. The expectation of the commodity depositor is that the price will go up. However, there is a possibility that prices may go down or

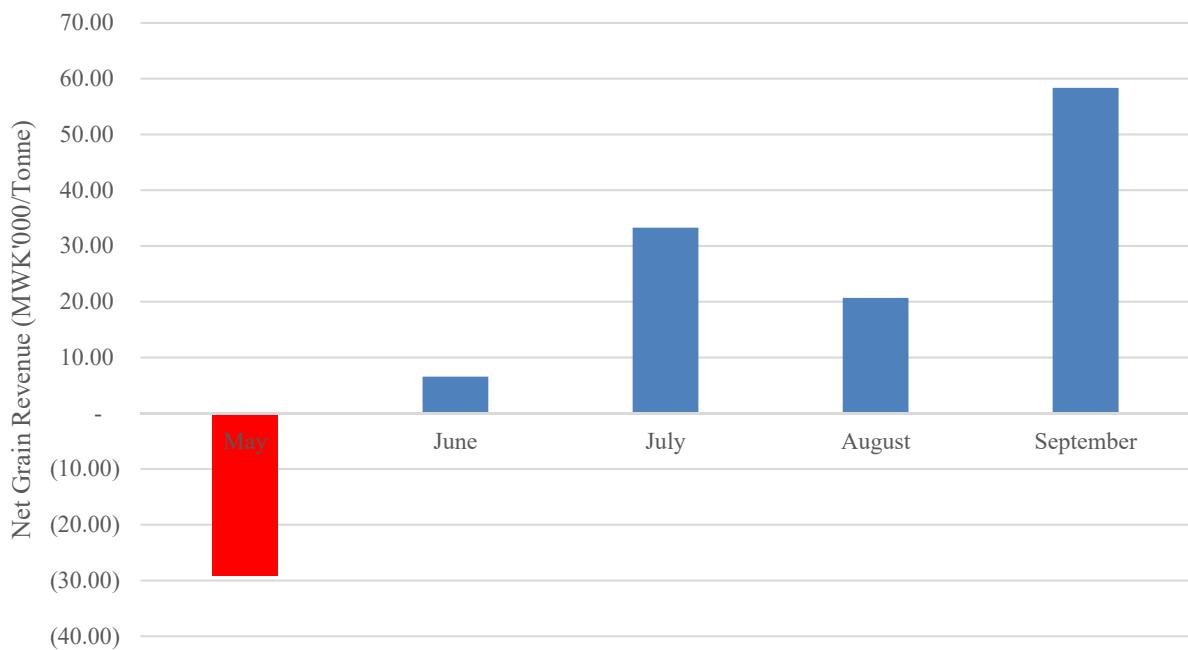
may not increase as expected depending on forces of demand and supply. Figure 4.2 below shows the change in the price of soybeans after one through five months from the start the trading season between 2007 and 2017. The figure shows significant variability in price changes between harvest and sellinig price by month of sale and year. For example, selling in May, i.e., after a month of storage, shows about 45.5% probability over the 11 years of getting a negative price movement, averaging -10.7%. The average positive price movement for selling in May was estimated at 6.9% over the 11 years. The probability of a negative price change selling in June is 18.2% compared to 27.3% for selling in July or August. The average negative price movement between harvest and June is -28.0% compared to positive price movement of 15.4%. For July and August, the average negative price movements are respectively -9.9% and -12.3% and average positive price movements are 20.4% and 26.5%. The probability of a negative price movement when sold in September was estimated at 9.1%, with negative average price movement of -8.3% and positive average price movement of 20.4% over the 11 years.

Figure 4.2: Percent Change in Harvest Price by Month of Sale (2007-2017)



We used a Monte Carlo simulation to analyze the potential net price for farmers using the WRS compared to those who are not and, therefore, selling at harvest. We used the range of price changes for each of the sale months estimated above to randomly generate 1,000 price changes and then simulated them 25 times for each sale month – i.e., May through September. We kept harvest price at MWK 200,000 throughout the simulations. Figure 4.3 shows the average results from the 25 simulated outcomes. The figure shows that selling in the second month produces an average loss of MWK 29,166/tonne over the 11 years. On the other hand, selling in September produces an average gain of MWK 58,367/tonne for farmers using the WRS compared to those who are selling at harvest. The simulated results suggest that given the conditions seen over the past 11 years, selling in September produces the highest net gain, followed by selling in July.

Figure 4.3: Net Grain Revenue per Tonne for Farmers Using the Warehouse Receipt System Compared to Those Selling at Harvest



From the analysis above, it is clear that the benefits of WRS to farmer depends on how well the price moves from the time of deposit to the time the commodity is sold; such that it should be able to cover the cost of warehouse receipt system and provide a margin to the farmer.

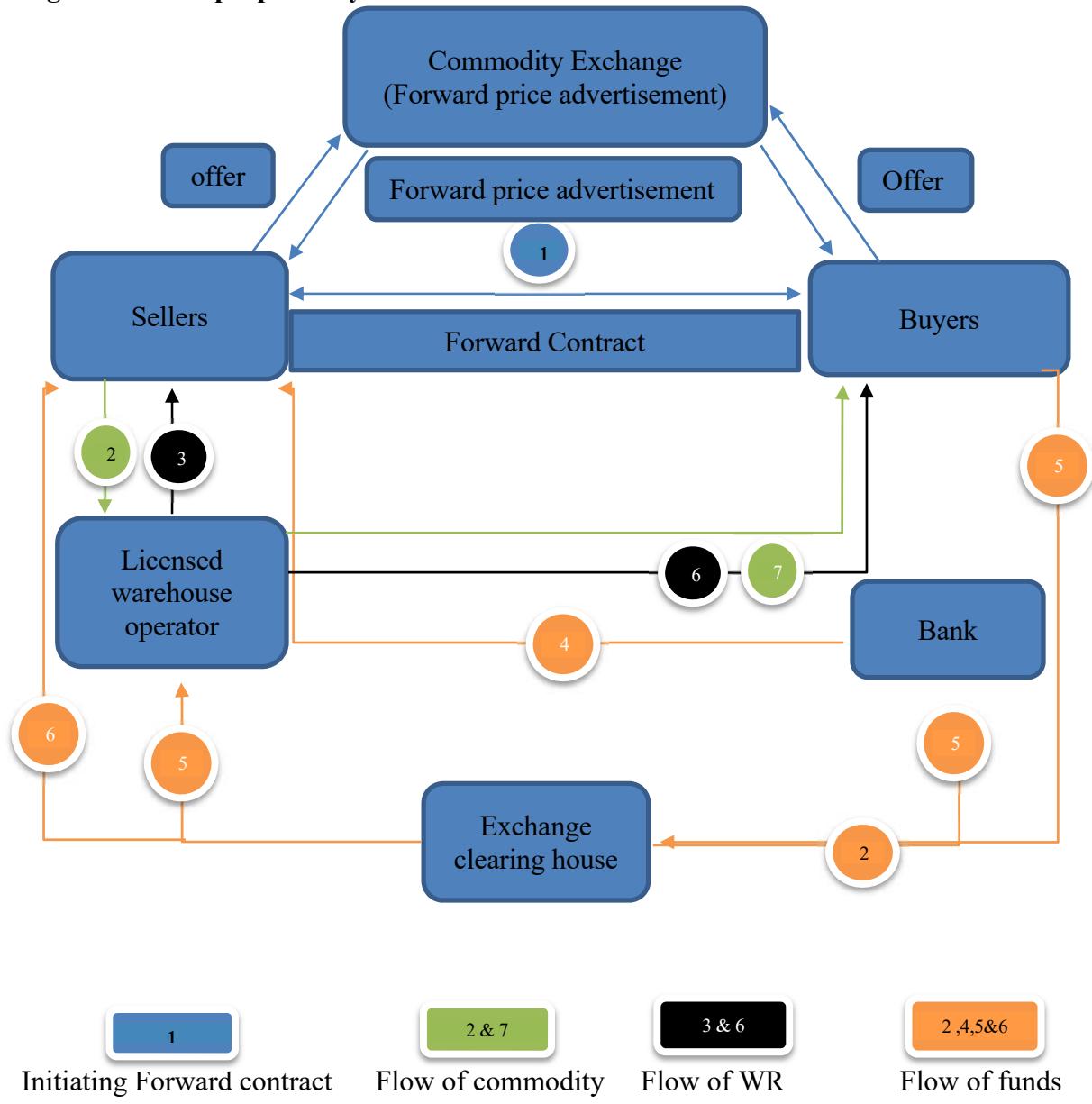
4.5 Hybridizing forward contracts and WRS

The analysis done on both forward contracts and warehouse receipt system shows that these risk management tools complement each other in addressing the uncertainty peculiar to each risk management tool. WRS provides a guarantee on the availability of the commodity with quality and quantity assured which is a challenge under forward contract.

On the other hand, WRS does not guarantee the exact forward price which forward contracts provide.

Figure 4.4 below shows the proposed model of hybridizing forward contracts and WRS in an attempt to provide an effective price risk management tool to both farmers and buyers.

Figure 4.4: The proposed hybrid model of Forward Contracts and WRS



1. Initiating forward contracts

Commodity Exchange Advertises forward prices in various media outlets. Forward prices to be based on the current price plus cost of warehouse receipt system plus a margin. The negotiating variable will be the margin because the current price and the cost of WRS are always given. Sellers and buyers will be required to make offers to sell and buy

respectively. When a deal is struck between two parties, it is presented as a forward contract and the Commodity Exchange becomes the caretaker of the contract.

2. Depositing the commodity and performance bond

For the forward contract to be valid, the farmer or supplier will be required to deposit the commodity under warehouse receipt system and the buyer will be required to deposit a performance bond committing to buy the commodity. The depositor will not be required to pay WRS charges upfront up until the commodity is sold. Ideally, the performance bond should be designed to cover the handling and storage cost and should be expressed as a percentage of the forward price. In a situation where the buyer for some other reasons decided not to honor the contract, the deposited performance bond would go towards paying for the storage and handling cost. But if the buyer honors the contract at maturity, the performance bond will go towards payment for the forward price and the buyer will only be required to pay the difference. The deposited performance bond can be invested in the money market and the net interest received would also go towards the forward price payment.

3. Warehouse Receipting

The warehouse owner issues a WR, through the Exchange, and thereby guarantees the quantity and quality. The WR will be required to indicate the forward contract position.

4. Warehouse Receipt Financing

The WR owner could request financing from a preferred bank and receive the funds to meet immediate needs.

5. Maturity of the forward contract

At maturity of the contract, the buyer deposits funds into the Exchange settlement account. The deposited funds plus the performance bond deposited at the start of the contract settles the forward contract price. Subsequently, the funds settle the finance owed to the bank (if used), storage costs and handling cost, and trading commission less any money market returns.

6. *Take home for the depositor and buyer*

The exchange transfers ownership of the WR to the buyer and transfers cash balance to the seller.

7. *Release of the commodity*

The buyer collects the commodity from the warehouse Operator

4.5.1 Mathematical Example of the Hybrid Risk Management Tool

Table 4.5 below shows a mathematical simulation of the hybrid of forward contract and WRS. The scenario assumes the current price of MK 200,000 per tonne and the buyer and seller agree through the exchange to buy and sell after 3 months at predetermined price.

Table 4.4: Mathematical hybrid model of forward contract and WRS

	Description	Month 1	Month 2	Month 3
Spot Market Price (A)	MWK per ton	200,000.00		
Costs of WRS				
Handling (B)	MWK 5000 per ton	5,000.00		
Storage cost (C.)	MWK30/ton/day	900.00	900.00	900.00
Total WRS cost (B+C)	MWK per ton	5,900.00	6,800.00	7,700.00
Price before Margin(A+B+C)		205,900.00	206,800.00	207,700.00
Margin(D)	%	10%	10%	10%
Margin(D*(A+B+C))	MWK per ton	20,590	20,680	20,770
Price before Commission (D*(A+B+C))+(A+B+C)		226,490.00	227,480.00	228,470.00
Trading Commission (E.)	2%	4,529.80	4,549.60	4,569.40
Forward Price at the end of the month F=((D*(A+B+C))+(A+B+C)+E)		231,019.80	232,029.60	233,039.40
Price gain to the farmer after WRS cost(F-E-C-B-A)				20,770
Buyer's Payment				
Performance bond deposit	WRS cost as % of forward price			3%
Performance bond deposit	MWK per ton	-	-	7,700.00
Interest from performance bond deposit	18% p.a. (money market rate)	115.50	231.00	346.50
VAT on interest	16.50%	19.06	38.12	57.17
Net Interest from performance bond deposit		96.44	192.89	289.33
Buyer's Payment at maturity				225,050.07

The model above simulates a case where the seller negotiates a forward price that gives a margin of 10% of the current price and the cost of WRS excluding the trading commission. The forward price is then determined by adding the current price with the WRS cost for three months, the agreed margin and the trading commission. In this case, at a current price of MK 200,000 per ton, the forward price after 3 months is MK 233,039.40. From this price the farmer gains MK 20,562.30 per ton after deducting the cost of WRS.

When initiating the contract, the buyer will be required to deposit a performance bond of 3% of the forward price which is derived by dividing the cost of commodity handling and storage with the forward price which translated to MK 7,700 per ton. If this performance bond is invested in the money market at an interest rate of 18% per annum, within a period of 3 months the investment will attract interest of MK346.50. Net interest after tax of 16.5% is MK289.33. At the end of 3 months the deposited performance bond will increase to MK 7,989.33. At maturity of the contract, the buyer will only be required to pay MK 225,050.07 as a balance for the forward price of MK 233,039.40.

CHAPTER V: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The research has revealed that Malawi lacks a designed model that offers an efficient forward contracting mechanism with both low transaction costs and enhanced contract enforcement. ACE introduced a system in 2016 to make forward contract transactions transparent and reduce transaction costs for information search and contract negotiations. However, the system lacked contract enforcement mechanism, hence, it wasn't successful. AHCX also tried to introduce forward contract transaction in 2015. AHCX's approach was aimed at enhancing contract enforcement by way of demanding performance bond of 5% of the value of the contract from both the supplier and buyer. This was not successful because many suppliers/farmers could not afford to pay the performance bond upfront. Both Exchanges are no longer coordinating forward contract transactions and currently forward contracts continue to be transacted out of the exchange albeit with challenges.

The research has also indicated that Warehouse Receipt System (WRS) avoids some of the opportunism and enforcement challenges presented by forward contracts because it enables farmers to deposit their crop in the care of a warehouse operator and sell the crop when and where they choose. However, the study has also shown that WRS incurs both upside and downside price movement which provides fluctuating net benefits to farmers depending on the price movement.

The thesis explored the net benefits of developing a hybrid system that allow forward contracts with warehouse receipt enforcement mechanisms. Thus, farmers are guaranteed a minimum price at some future date and the deposited commodity is used as the security supporting the guaranteed minimum price. The buyer also deposits a performance bond as commitment to purchase the commodity. The mathematical model example has proved that the hybrid system guarantees a fixed margin to the farmer over and above the harvest price and WRS cost as opposed to fluctuating margins under WRS alone.

The research has identified three factors that can lead to the successful implementation of this hybrid system in Malawi and they include: the availability of the warehouse receipt bill which supports pledge instruments such as warehouse receipts as secure collateral; reliable warehouse certification which is done by AHCX and ACE on third party warehouse operators; and the availability of performance guarantee assuring that the quantities of goods stored match those specified by the warehouse receipt and that their quality is the same as, or better than, that stated on the receipt.

The research has also identified two factors that can hinder a successful implementation of the hybrid system and they include the following: First, low scale of warehousing operations under WRS. ACE operates 19 warehouses representing 88,574 tons of storage space available for deposits and only 11 of them representing 6,500 tons are rural warehouses. AHCX operates 13 warehouses across Malawi with total storage capacity of 22,350 tons. With this small scale of operations in rural areas, most farmers may not have a chance to benefit from this hybrid system; and the commodity exchanges may not benefit from the economies of scale

provided by large volumes of commodities produced in rural areas. Second, the absence of a harmonized national grading standard. ACE and AHCX have fragmented grading standards in grain and oilseeds. This possess a challenge when engaging in international trade because international off-takers may not have confidence in fragmented grading standards.

5.2 Recommendations

Take the system close to the producers

In a well-developed WRS, warehouses are spread throughout the producing areas in reasonable proximity to producers. This proximity helps mitigate potentially high transportation costs; also, very few users would willing to have their crop inventory stored too far away from their production site. Currently in Malawi, warehouses are most commonly located in commercial areas and are relatively scarce in up-country locations. The scale of warehousing operations under this system can be increased in the rural areas through privately owned third party warehouses or development partners.

Educating and selling the system to the stakeholders

The concept of WRS is new to many farmers and traders in Malawi as evidenced by low scale of operations which are also patchy across the country. It will be most beneficial to Commodity Exchanges to increase awareness campaign of the existence and benefits of this system so as to increase adoption rate. This would be a follow up activity after taking the system close to the producers.

National standardized grading regulations

The commodity exchanges should push for the implementation of national standardized grading regulations. This would give confidence to international traders to take part in the system because they will be assured of an internationally recognised grade of the commodity.

6.0 WORKS CITED

- ACE. 2012. <http://www.aceafrica.org/about-ace/funded-projects.aspx>.
- . 2011. *Summary of Implementation status. The Agricultural Commodity Exchange for Africa.* <http://www.aceafrica.org/media/2224/AGRA%20REPORT%202012%20Final%20DCH2.pdf>.
- AHCX. 2015. "A Supplier's Guide to AHCX Forwards."
- AHCX. 2014. "AHCX Business Plan."
- Alchian, A.A., and H. Demsetz. 1972. "Production, Information Costs and Economic Organization." *American Economic Review* 62(5), 777s795.
- AMPRIP Trade Forum. 2007. "Agricultural Marketing Promotion and Regional Intergration Project."
- Aoki, M. 2007. "Endogenizing Institutions and Institutional Changes." *Journal of Institutional Economics*, 3, 1-31.
- Bardhan, P.K. 1984. *Land, Labor and Rural Poverty: Essay in Development Economics.* Delhi: Oxford University Press.
- Coulter, J., and G. Onumah. 2002. "The Role of Warehouse Receipt System in enhanced commodity marketing and rural livelihood in Africa." *Science Direct* 319-337.
- Course, R.H. 1937. "The Nature of the Firm." *Economica* 386-405.
- Delgado, C. 1995. "Types of transaction Costs Affecting Agriculture in Developing Countries."
- Denton, Domenico, and Liesbeth Dries. 2015. "Private sector investments to create market-supporting institutions: The case of Malawian Agricultural Commodity Exchange." San Francisco, CA.
- Fafchamps, M., and B. Minten. 2002. "Returns to Social Network Capital among Traders." *Oxford Economic Papers* 173-206.
- Grief, A. 2008. "Commitmant, Coercion and Markets: The Nature and Dynamics of Institutional Support Exchange." In *Handbook of New Institutional Economics* , by C Menard and M.M. Shirley, 727-786.

- Jere, Kahaki, and Chizaso Nyirongo. 2016. *Warehouse Receipts Bill, 2016*. Lilongwe: Ministry of Justice.
- Kennedy, J.A. 2011. "Report for ACE Malawi concerning business development model and strategy." Lilongwe.
- Kwadjo, G.T.M. 2000. "Inventory Credit: a financial product in Ghana." *Proceedings of advancing microfinance in rural west africa conference*, 02 25: 54-73.
- Mahoney, J.T, and R.C. McNally. 2004. "Explaining and Predicting the Choice of Organizational Form: Interpreting Performance Ambiguity and Asset Specificity Effect." *Working Paper 04-0109*.
- McMillan, J. 2008. "Market Institutions." In *The New Palgrave Dictionary of Economics*, by L. Blume and S. Durlauf.
- McMillan, J., and C. Woodruff. 1999. "Interfirm relationships and formal credit in Vietnam." *Quarterly Journal of economics*.
- Onumah, G.E. 2002. "Improving Access to rural finance through regulated warehouse receipt system in Africa." *Proceedings of paving the way forward for rural fiance on best practices in international conference*, 133-148.
- Onumah, Gideon. 2010. "Implementing Warehouse Receipt Systems in Africa: Potential and Challenges." United Kingdom.
- Ouchi, W.G. 1980. "Markets Bureaucracies and Claus." *Administrative Science Quarterly*, Vol 25, 125-141.
- Rashid, Shahidur. 2015. "Commodity Exchanges and Market Development: What Have we Learned?" Milan, Italy.
- Royer, J.S. 1999. "Cooperative Organisational Strategies: A neo-institutional digest." *Journal of Cooperatives* 44-67.
- Saint-Geours, Jean. 2012. "Warehouse Receipt System Reform Initiatives in Africa." *World Bank Webnar Presentation*.
- Scott, W.R. 1998. *Organizations: Rational, Natural and Open Systems*. Upper Saddle River,NJ: Prentice Hall, Inc.
- Staal, S., C. Delgado, and C. Nicholson. 1997. "Smallholder Dairy under Transaction Costs in East Africa." *World Development Vol. 25, No.5*.
- The Nation. 2016. *Commodity exchange sealed over K2bn debt*. Lilongwe: Nation Publication.

UNCTAD. 1998. "A survey of commodity risk management instruments." Geneva, Switzerland.

WIC Project. 2005. <http://www.wrstz.org/WRS/>.

Williamson, Oliver E. 1979. "The Governance of contractual Relations." *Journal of Law and Economics* Vol.22, October: 233-261.

Williamson, Oliver E. 1985. *The Economic Institutions of Capitalism*. New York: The Free Press.

Wilson, C.M. 2012. "Market Frictions: A Unified Model of Search Costs and Switching Costs." *European Economic review*. 56, 1070-1086.

World Bank. 2012. "Africa Can Help Feed Africa. Removing barriers to regional trade in food staples." *World Bank Group* 53-66.

World Business Council for Sustainable Development. 2004. "Insuring fair prices for farmers in developing Countries." Geneva, Switzerland.