# EFFECT OF COMMON MARKET FOR EAST AND SOUTHERN AFRICA FREE TRADE AGREEMENT ON DAIRY TRADE PERFORMANCE AND THE MALAWIAN ECONOMY

**MSc. (AGRICULTURAL AND APPLIED ECONOMICS) THESIS**

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**LILONGWE UNIVERSITY OF AGRICULTURE AND NATURAL RESOURCES**

**BUNDA COLLEGE**

**SEPTEMBER, 2023**

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**BSc. (Mathematical Sciences), Malawi**

**A THESIS SUBMITTED TO THE FACULTY OF DEVELOPMENT STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR AWARD OF THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL AND APPLIED ECONOMICS**

**LILONGWE UNIVERSITY OF AGRICULTURE AND NATURAL RESOURCES**

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**SEPTEMBER, 2023**

## DECLARATION

I, **Blignaut Joshua Kadam'manja**, hereby assert that this thesis is a result of my own effort and work, and that, to the best of my knowledge, the findings have never been previously presented to the Lilongwe University of Agriculture and Natural Resources or elsewhere for the award of any academic qualification. Where assistance was sought and all referenced materials contained herein, they have been accordingly acknowledged.

**Blignaut Joshua Kadam'manja**

**Signature: ________________________**

**Date: ______________________________** (day, month, year)

## CERTIFICATE OF APPROVAL

We, the undersigned, certify that this thesis is a result of the author's own work, and that, to the best of our knowledge, it has not been submitted for any other academic qualification within the Lilongwe University of Agriculture and Natural Resources or elsewhere. The thesis is acceptable in form and content, and that satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate through an oral examination held on ______________________________ .

**Major Supervisor:** Professor Charles B.L. Jumbe

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**Date:** _______________________________ (day, month, year)

**Co-supervisor:** Dr. Horace Phiri

**Signature:** __________________________

**Date:** _______________________________ (day, month, year)

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May the Good Lord bless you all abundantly!

## ABSTRACT

This study analysed the factors influencing dairy imports by estimating the effect of the Common Market for East and Southern Africa Free Trade Agreement (COMESA FTA) on dairy trade performance and Malawian economy. The data were obtained from the COMESA and World Bank databases (1990-2029). The empirical analysis from autoregressive distributed lag (ARDL) bounds test and error correction model (ECM) provide evidence of the long-run (cointegration) and short-run relationships between dairy product imports and Comesa free trade agreement, exchange rate and relative prices. The Granger causality (GC) test results suggest a one-way causality running from Comesa free trade agreement and exchange rate to dairy product imports, respectively, and bi-directional causality between dairy product imports and relative price. The results also show that real income has a high and negative elasticity with respect to dairy imports in the short run. The Verdoorn approach was applied to analyse the COMESA FTA effect on dairy trade performance and Malawian economy by computing trade creation and diversion. The results show that free trade has potential to generate welfare gains of about US$0.29 million, and positive net trade effect of US$1.0 million and US$1.02 million in short and long runs, respectively. This suggests that Malawi has benefited from COMESA FTA. Trade complementary index (TCI) was estimated to assess the effectiveness and favourability of free trade. The large estimated TCI (0.944) suggests effective and favourable trade agreement. The policy recommendations drawn include: first, to invest in large- and small-scale dairy enterprises in all the regions of the country to increase milk production for domestic consumption, exports and incomes. Second, to negotiate with COMESA member countries to remove all non-tariff barriers to harness potential regional market opportunities to maintain gains from free trade.

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| | |
|---|---|
| ADF | Augmented Dickey-Fuller |
| AERC | African Economic Research Consortium |
| AfCFTA | African Continental Free Trade Area |
| AIC | Akaike Information Criterion |
| ARDEP | Agricultural Research and Development Programme |
| ARDL | Autoregressive Distributed Lag model |
| ASEAN | Association of South Eastern Asian Nations |
| BoP | Balance of Payments |
| CDSP | Central Dairy Scale-Up Project |
| CISANET | Civil Society Agriculture Network |
| CMAAE | Collaborative Masters in Agricultural and Applied Economics |
| COMESA | Common Market for East and Southern Africa |
| CPI | Consumer Price Index |
| CUSUM | Cumulative Sum of Recursive Residuals |
| DFID | Department for International Development |
| DRC | Democratic Republic of Congo |
| EAC | East Africa Community |

| | |
|---|---|
| ECM | Error Correction Model |
| ECOWAS | Economic Community for West African States |
| EU | European Union |
| FAO | Food and Agriculture Organization of the United Nations |
| FEWS NET | Famine Early Warning Systems Network |
| FINCA | Flemish International Cooperation Agency |
| FTA | Free Trade Agreement |
| FTA | Free Trade Area |
| FUM | Farmers Union of Malawi |
| GC | Granger Causality |
| GDP | Gross Domestic Product |
| GoM | Government of Malawi |
| HIM | Heifer International Malawi |
| HO | Heckscher-Ohlin |
| HQIC | Hannan-Quinn Information Criterion |
| HS | Harmonized System |
| IMF | International Monetary Fund |
| ITC | International Trade Centre |

| | |
|---|---|
| JICA | Japan International Cooperation Agency |
| KPSS | Kwiatikowsky-Phillips-Schmidt-Shin test |
| LM | Lagrange Multiplier |
| LUANAR | Lilongwe University of Agriculture and Natural Resources |
| MBG | Milk Bulking Group |
| MDBDP | Malawi Dairy Business Development Programme |
| MDI | Malawi Dairy Industries |
| MFN | Most Favoured Nations |
| MMM | Malawi Milk Marketing |
| NAFTA | North American Free Trade Area |
| NLDP | National Livestock Development Project |
| NTB | Non-Trade Barriers |
| OLS | Ordinary Least Square |
| PP | Phillips-Perron |
| PTA | Preferential Trade Area |
| RCA | Revealed Comparative Advantage |
| RESET | Ramsey Regression Error Specification Test |
| RoW | Rest of the World |

| | |
|---|---|
| SADC | Southern Africa Development Community |
| SAP | Structural Adjustment Programme |
| SBC | Schwartz Bayesian Criterion |
| SDG | Sustainable Development Goal |
| SSA | Sub-Saharan Africa |
| SSLDP | Small-Scale Livestock Development Partnership |
| TC | Trade Creation |
| TCI | Trade Complementarity Index |
| TD | Trade Diversion |
| TE | Trade Effect |
| TII | Trade Intensity Index |
| UECM | Unrestricted Error Correction Model |
| UNCTAD | United Nations Conference on Trade and Development |
| USAID | United States Agency for International Development |
| VAR | Variable |
| VECM | Vector Error Correction Model |
| WE | Welfare Effect |
| WITS | World Integrated Trade Solution |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background information

Imports of dairy product are an important component of the market supply of dairy and dairy products in Malawi. They have a direct connection with the domestic dairy production as some of the locally processed products are made from imported milk powder, and therefore, directly compete with the domestically produced dairy products (Toma et al., 2014). These imported dairy products have been dominant and have surpassed domestic supply on the Malawian market with a considerable margin of 75 percent, despite being more expensive than domestically processed (Revoredo-Giha & Renwick, 2016).

### 1.1.1 Domestic consumption and distribution of dairy and dairy products

Compared with several countries in Sub-Saharan Africa, per capita consumption of dairy and dairy product in Malawi is low, estimated at about 4-6kg/person/year, (Revoredo-Giha & Renwick, 2016). This consumption per capita is lower than 15kg/person/year, the average for African continent and much lower than 200kg/person/year, the Food and Agriculture Organisation of the United Nations and World Health Organization's international recommendation on milk consumption per person per year (Revoredo-Giha & Renwick, 2016). In less developed country, for instance in Kenya, per capita dairy consumption is estimated at 95kg (i.e. 93.17 litres[2])/person/year (Revoredo-Giha & Renwick, 2016). Malawi's low per-capita milk consumption is triggered, in part, by limited market supply, low purchasing power of

2,1kg of milk is equivalent to 0.9807 litres sourced from International System of Units (SI Units): FAO.org/3/t0713e/T0713E0d htm the population and poor or inadequate distribution channels outside urban and main trading centres (Revoredo-Giha & Renwick, 2016; CYE Consult, 2009).

Over the decades, most Malawians have consumed more powdered milk than other dairy products such as fresh milk. In cases where fresh milk is not available or inaccessible due to long distances from the production sites; powdered milk has therefore been the major dairy product for consumption (Revoredo-Giha & Renwick, 2016).

Traditionally, sterilized fresh milk is sold in the supermarkets to the high and middle-income classes of people who have high purchasing power, whereas unprocessed and usually diluted milk is hawked by the vendors straight to customers (Revoredo-Giha & Renwick, 2016). Furthermore, dairy farmers do not sell all their milk to milk-producers' associations or milk bulking groups as some milk is locally sold in their local areas or consumed in their households (Revoredo-Giha & Renwick, 2016).

In Malawi, dairy and dairy product sales and distribution have largely concentrated in major cities and towns in urban and peri-urban areas where large supermarkets such as Metro, Peoples, Spar, Shoprite, Sana, Chipiku Plus, and other outlets control the retail markets. In addition to the large supermarkets, dairy and dairy products are also sold in medium and small accessible retail outlets, filling stations, informal small outlets in low-income residential areas and rural areas, dairy farms, vending areas outside of the main cities of Lilongwe, Blantyre and Mzuzu (Revoredo-Giha & Renwick, 2016).

Sources of milk product imports in Malawi are highly dependent on world milk prices and areas or regions that produce surplus milk in the world (Revoredo-Giha et al., 2013; Revoredo-Giha & Renwick, 2016). For instance, powdered milk is mainly imported from New Zealand, while yoghurts and cheese are imported from South Africa and butter is imported from Zimbabwe (CYE Consult, 2009).

### 1.1.2 Domestic production of dairy products

In Malawi, domestic milk production is undertaken on both large- and small-scale (smallholder) farms. However, main distinguishing characteristics between large-scale farms/estates (public or private) and small-scale farms are cattle size held, cattle genotype raised, and management level and skills applied (Revoredo-Giha & Renwick, 2016; Nyekanyeka, 2011). Small-scale dairy farmers are in two categories: improved or modern and local or traditional farmers. Improved or modern farmers normally own improved or exotic (high milk-yielding) breeds of dairy cows such as Holstein Friesian and Jersey, practice artificial insemination, provide improved animal housing facilities, and feed their cows with dairy meals and mineral supplements, on the other hand, local or traditional farmers own zebu cow, do open grazing without conserving fodder, do not provide improved animal housing facilities and do not practice artificial insemination (Arakelyan, 2017; Revoredo-Giha & Renwick, 2016).

In general, milk production is dominated by the small-scale dairy farms. In 2008, for instance, smallholder milk production accounted for about 80 percent (about 4.83 million litres) of the total milk production (Revoredo-Giha & Renwick, 2016). In 2012, about 13.5 million litres (91% from southern region) of milk was produced by smallholder dairy farmers, which was marketed through formal channels where milk is processed/treated and then sold to consumers through retail outlets. Additionally, about 16.5 million litres of milk was produced by small-scale (informal) dairy farmers, who are the leading market channel in Malawi (Imani Development Consultants, 2004).

According to 2014 Malawi livestock census, the total milk production was estimated at about 63.5 million litres of which, 25 percent was produced by the local zebu and the remaining 75 percent was produced by improved breeds such as Friesian cows (Revoredo-Giha & Toma, 2016). Most of the milk produced in Malawi is produced from Southern region (about 58 percent), while Central and Northern regions produce approximately 27 percent and 15 percent, respectively (Revoredo-Giha & Toma 2016).

### 1.1.3 Efforts made to meet the gap between demand and supply of milk

To increase domestic milk production to meet domestic demand, intensive smallholder dairy production was first established in 1969, following the establishment and growth of Blantyre and Zomba townships (Arakelyan, 2017). This led to installation of milk processing plants in the cities of Blantyre, Lilongwe and Mzuzu in 1969, 1973 and 1974, respectively. These processing plants were organized under Malawi Milk Marketing (MMM) project (Nyekanyeka, 2011). Following the Structural Adjustment Programme (SAP) by the World Bank, MMM project was, in 1985, reorganized into Malawi Dairy Industries (MDI), as a statutory cooperation mandated by the government to operate on commercial lines (Imani Development Consultants, 2004). The main aim for establishing MDI was to multiply and improve livestock for the production, processing, manufacturing, and distribution of dairy products in Malawi (Arakelyan, 2017; Revoredo-Giha & Renwick, 2016; Chindime et al., 2016).

During this time, smallholder dairy farmers were encouraged to join milk bulking/buying groups (MBGs) or farmers' associations that work as milk collection, checking, bulking, or cooling centres, a development that made dairy farmers to own high-yielding dairy cattle imported from Zimbabwe and South Africa to boost milk production (Revoredo-Giha et al., 2013).However, between 1998 and 2000, MDI was privatized and subsequently split into three separate companies as follows: Northern Dairies Limited in Mzuzu, New Capital Dairy Limited in Lilongwe and Dairiboard Malawi Limited in Blantyre (Nyekanyeka, 2011).

Over the past decades, through its development partners (donors) such as Japan (through JICA-Japan International Cooperation Agency), USA (through USAID-the United States Agency for International Development), and Belgium (through FICA-Flemish International Cooperation Agency), the Government of Malawi implemented various projects to develop the dairy sector to increase milk production (Phiri, 2007). One of such projects was the National Livestock Development Project (NLDP) in 1990 whose objective was to promote dairy production, attain self-sufficiency in dairy products and enhance household incomes (Imani Development Consultants, 2004). Through this project, several hundreds of imported exotic breeds were disseminated to small-scale dairy farmers on heifer-loan scheme. The projects also helped to build the capacity of dairy farmers and Milk Bulking Groups (MBGs), enforce the capacity of farmers' associations, and to educate dairy farmers in marketing, management, quality control and hygiene, among others, especially in central and northern regions so that in the end high quality milk would be produced (Revoredo-Giha & Renwick, 2016). Around this time, dairy farmers benefited from the provisions of extension services on zero-grazing promotion for dairy cattle, homemade dairy mash and supplementary feed, pasture establishment and fodder conservation, artificial insemination and improved veterinary services, and construction of appropriate housing for dairy cows (Arakelyan, 2017; Nyekanyeka, 2011).

Around 2000, several development partners including Small-Scale Livestock Development Partnership (SSLDP), Land O' Lakes, Agricultural Research and Development Programme (ARDEP) and Clinton Foundation also played a major role in the development of dairy sector by introducing improved breeds of cows and promoting better-quality management practices (Nyekanyeka, 2011; Chindime et al., 2016). For instance, between 1999 and 2006, Land O'Lakes implemented Malawi Dairy Business Development Programme (MDBDP), a major dairy development programme, with the main aim to increase the number and availability of high-yielding dairy cows, increase the number of supplemental feed stations, and increase the availability of vitamin supplements and veterinary medicines (Phiri, 2007). This project consequently increased the number of high-yielding dairy cattle and milk production in the country (Revoredo-Giha et al., 2013).

Most recently, some development partners including Heifer International Malawi (HIM), Farmers Union of Malawi (FUM), and the Civil Society Agriculture Network (CISANET) also played a major role in the dairy sector development in the country. For instance, in 2015, HIM in partnership with FUM and CISANET implemented Central Dairy Scale-Up Project (CDSP) with financial support from the Government of the United Kingdom of Great Britain and Northern Ireland through the Department for International Development (DFID). The project targeted about 6,000 small-scale dairy farmers, who had local cattle breeds to be provided with artificial insemination services to improve cattle genotypes in three districts of Lilongwe, Dowa and Mchinji (FUM et al., 2021). The project also provided business support services such as extension, veterinary and feed formulation services to the farmers. The aim of the project was to improve productivity, efficiency, and sustainability of the dairy sector, and enhance quality and quantity of milk yields. Consequently, the project increased income and employment benefits for small-scale dairy producers and increased access to safe nutritional dairy products for low-income consumers (FUM et al., 2021)

### 1.1.4 Milk production constraints

Despite the efforts by the Government of Malawi and its development partners in developing the dairy sector over the decades to increase milk production, domestic production could not meet the high milk demand because of several factors. First, fast population growth and increase in incomes, urbanization, or rural growth centres and expansions of cities and towns, and changes in diets have recently resulted to increased milk demand (Arakelyan, 2017). Milk consumption has increased by 140 percent between 2000 and 2018, and 49 percent between 2010 and 2018 (FAO, 2021). As the population of Malawi is projected to reach 37 million by 2050, the demand for milk is expected to increase even more (GoM, 2015). Therefore, this calls for strategies to deal with all the barriers to the growth of the dairy subsector.

Second, the dairy production system is generally based on low stocking levels ranging between 1 and 5 dairy cows on average. The large part of dairy production (about 80%) is performed by the small-scale dairy farmers, which has led to limited returns from milk sales and slow growth in the number of dairy cows (CYE Consult, 2009). In addition, milk output per animal (i.e., productivity) is very low, and even for the improved breeds in Malawi. According to Nakagawa et al., (2009), the estimated average diary production ranges between 5.7 and 9 litres per day per cow for local Malawian Zebu. Most dairy farmers are not technically skilled in milk production.

This is basically due to poor husbandry and management practices that include insufficient animal feeds and lack of feeding technologies, poor animal health and high dairy cattle mortality rates (Sindani, 2012), insufficient or irregular use of artificial insemination because of inadequate transport for the technicians, veterinary extension services and/or long intervals for calving (CISANET, 2013). It should be noted that achieving higher milk production efficiency requires the availability of exotic breeds such as Friesians (i.e., high-milk yielding cows), larger-scale of dairying, quality control, among others (Revoredo-Giha, 2016).

Third, it should be noted that sometimes during peak crop growing season, dairy cows are left underfed, and cattle kraals are ignored as human, material, and financial resources are normally channeled towards crop production. The fertilizer that could have been used for growing pasture to feed dairy animals is channeled towards growing crops. Poor feeding practices lead to animal deaths or availability of unhealthy cows and high calf mortality (40%) (CYE Consult, 2009).

Fourth, sometimes low milk price paid by dairy processors to the small dairy farmers limits the growth of the dairy industry in Malawi. Dairy farmers get discouraged to invest or grow their dairy production due to low milk prices. As such, some dairy farmers drop out of dairying and opt for other economic activities such as crop farming (Revoredo-Giha et al., 2016).

Fifth, milk buying centres regularly experience electrical blackouts, and a great number (more than a half) of them do not have back-up generators for cooling milk when power is not available and therefore milk gets spoiled. The milk spoilage is further worsened by the failure or delay of milk-ferrying bowsers from milk processing or treatment plants on planned times to collect milk, hence resulting to low milk production (Arakelyan, 2017).

Finally, low milk productivity in the small-scale (smallholder) dairy subsector in Malawi is mostly affected by unorganized market structure, small land-size holdings for growing pasture, fragile system of agricultural credits, unfavorable weather conditions influenced by climate change and variability, and inadequate technological development (CYE Consult, 2009).

#### 1.1.5 Imports of dairy products

In order to fill the domestic milk supply gap, Malawi imports its dairy products mostly from South Africa, the Netherlands, New Zealand, Zambia, and Zimbabwe. For instance, in 2014 and 2019, South Africa exported dairy products worth US$2.98 million and US$4.73 million to Malawi, respectively. New Zealand exported dairy products of about US$0.2 million and US$0.59 million to Malawi, respectively. The Netherlands exported dairy products of about US$1.06 million and US$0.32 million to Malawi, respectively. While Zambia and Zimbabwe, in 2014, exported dairy products valued about US$0.71 million and US$0.01 million to Malawi, respectively (Akaichi & Revoredo-Giha, 2014; COMESA, 2021; FAO, 2021).

**Table 1.1** Origin of dairy imports and trade balance (US$ '000') 2014-2019

| Partner name | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| New Zealand | 198.4 | 420.9 | 411.5 | 91.4 | 251.5 | 594.5 |
| The Netherlands | 1,055.5 | 342.8 | 456.4 | 331.4 | 255.6 | 321.8 |
| South Africa | 2,983.1 | 3,331.3 | 3,558.0 | 4,644.6 | 5,844.8 | 4,729.6 |
| Zambia | 706.8 | 110.0 | 76.1 | 76.1 | 42.4 | 33.9 |
| Zimbabwe | 5.0 | 27.4 | 270.6 | 115.5 | 53.2 | 75.0 |
| Other COMESA | 30.9 | 10.4 | 0.4 | 344.9 | 452.2 | 155.9 |
| Total COMESA | 742.6 | 147.9 | 347.1 | 536.6 | 547.8 | 264.9 |
| Non-COMESA | 9,472.4 | 11,576.1 | 9,620.9 | 12,487.4 | 10,223.2 | 9,043.1 |
| Dairy imports from the world | 10,215.0 | 11,724.0 | 9,968.0 | 13,024.0 | 10,771.0 | 9,308.0 |
| Dairy exports to the world | 750.0 | 740.0 | 164.0 | 43.0 | 16.0 | 4.0 |
| Trade balance | (9,465.0) | (10,984.0) | (9,804.0) | (12,981.0) | (10,755.0) | (9,304.0) |
| Dairy imports from the World as a share of Malawi GDP (%) | 0.1236 | 0.1379 | 0.1144 | 0.1438 | 0.1149 | 0.0993 |
| Malawi dairy imports from COMESA as a share of Malawi GDP (%) | 0.0090 | 0.0017 | 0.0040 | 0.0059 | 0.0058 | 0.0028 |

Data sources: COMESA, 2021; FAO, 2021

Furthermore, Malawi imports its dairy products from other trading blocs such as East African Community (EAS), Southern Africa Development Community (SADC), European Union (EU), Economic Community of West African States (ECOWAS) and Association of South-East Asian Nations (ASEAN) community, among others (COMESA, 2021).

### 1.1.6 Tariff and non-tariff barriers in milk trade

The dairy sector in Malawi experiences high costs of animal feeds, inflated by import tariffs, besides the identified problems such as shortage of improved (high milk-yielding) breeds and low productivity, shortage of and expensive manufactured animal feeds and poor feeding practices (GoM, 2015). Over the years, Malawi has faced tariff barriers including taxation on import or export of manufactured or raw agricultural products. Malawi has also faced non-tariff barriers (NTBs) such as export and import controls (export quotas, import quotas, restrictions on some exports inclusive), restrictive rules of origin, custom delays in trade procedures as they are widely documented (GoM, 2015).

Nevertheless, trade liberalization in the COMESA region has generally increased intra-regional trade. Malawi as one of the members of COMESA has benefited from this trade arrangement, although the intra-regional trade has remained low for some product imports such as dairy products (Mbithi et al., 2016). Under COMESA, some progress has been made regarding financial integration, especially in financial institutions, which include Africa Trade Insurance Agency, COMESA Trade and Development Bank and COMESA reinsurance company (AUC, 2019). COMESA has also worked on tariff and non-tariff liberalization, although trade restrictiveness generally still exists (Mbithi et al., 2016). Trade restrictions differ across different countries and different products. For instance, intra-regional trade is constrained when quantitative restriction measures for import and export are applied together with other non-tariff measures. This consequently diminishes the gains from regional trade arrangement (Mbithi et al., 2016).

When price of dairy import drops because of the reduced or removed tariffs following FTA, product import from more efficient member of FTA replaces the product produced by the domestic industry in less efficient country. Meaning that imports originate from more efficient FTA member country or region becomes cheaper than locally manufactured product. This makes people in the domestic economy import more due to the lower price, which consequently increases consumer surplus and leads to improved national economic wellbeing (Pasara & Diko, 2020).

### 1.1.7 Overview of COMESA Free Trade Agreement

The Common Market for Eastern and Southern Africa (COMESA[3]) is the largest trading bloc among other trading blocs existing in Africa. COMESA was established in 1994 as a transformation of the Preferential Trade Area for Eastern and Southern Africa (PTA) of 1981 (COMESA, 2009). The purpose of establishing COMESA was to enhance the sustainable social and economic development among COMESA member countries. This was achieved through creation of cooperation arrangement that has a potential to stimulate regional economic integration particularly in areas of trade, infrastructure development (transport networks i.e., roads, rail, air and sea, and telecommunications), customs, natural resources, agriculture, science, and technology. The main purpose of COMESA especially in trade was to create free trade area (FTA). FTA started in 2000 to basically eliminate non-tariff barriers including removal of foreign exchange taxes and restrictions, removal of roadblocks for goods in transit and import/export quotas and establish customs union and common currency on intra-regional trade (COMESA, 2018; AUC, 2019).

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3 COMESA trading bloc comprises of the following 21 countries: Burundi, Comoros, Djibouti, DRC, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Somalia, Sudan, Swaziland, Tunisia, Uganda, Zambia, and Zimbabwe.

## 1.2 Problem Statement

The benefits of dairy and dairy products are commonly recognized globally and particularly in Sub-Saharan Africa as trade in dairy products enhances economic growth and development and reduces poverty among the poor population (Akaichi & Revoredo-Giha, 2014). Dairy and dairy products have the potential to contribute to poverty reduction (SDG 1) by increasing household incomes through trade expansion or job maximization. However, in Malawi, the contribution of the dairy sector has been very minimal, contributing less than 0.06 percent to GDP (Revoredo-Giha & Renwick, 2016; FAO, 2021).

Despite that the Government of Malawi and its development partners have put up significant investments in the dairy sector over decades to boost milk production, the domestic dairy production has not met the high domestic demand of milk in the country. This has made Malawi to be dependent on dairy imports from other countries across the world to meet domestic milk demand. Nonetheless, these imported dairy products have been dominant and surpassed domestic supply on Malawian markets, despite being more expensive than domestically processed milk products due to tariff and non-tariff trade barriers imposed by its trading partners.

Malawi, like many Eastern and Southern African countries, joined COMESA, which was established to enhance economic development among member countries through creation of free trade agreement (FTA) to improve trade (COMESA, 2018). However, there is little evidence of the effect of FTA on Malawi's trade performance in dairy products as a result of its membership to COMESA and SADC free trading blocs in the short or long run. Therefore, this study analyzed factors that affect dairy product imports and estimate effect of COMESA FTA on trade performance in dairy product imports in Malawi by applying Cointegration analysis and error correction techniques with regime switching (pre- and post-COMESA FTA).

## 1.3 Study objectives

### 1.3.1 General objective

The general objective of the study was to analyze the factors that affect dairy and dairy product import flows from COMESA region and potential effect of COMESA FTA on trade performance in dairy and dairy product in Malawi.

### 1.3.2 Specific objectives

The specific objectives for the study were as follows:

i. To identify factors that affect dairy and dairy product imports from COMESA into Malawi in the short and long run.

ii. To analyse the effect of COMESA FTA on trade performance in dairy and diary product imports in Malawi in the short and long run.

iii. To analyse the economic welfare effect of COMESA FTA in dairy and dairy product trade on Malawian economy.

iv. To measure trade complementarities due to FTA between COMESA and Malawi in dairy and dairy product trade.

## 1.4 Study hypothesis

This study tested the null hypothesis as follows:

i. Economic factors such as real domestic income, relative prices, exchange rate, domestic dairy consumption and domestic dairy production affect the flow of dairy product imports from COMESA trading bloc into Malawi in the short and long run.

ii. COMESA FTA has a positive effect on the trade performance in dairy products in the short and long run and on economic welfare in Malawi.

iii. There are trade complementarities such that free trade agreement in dairy trade is favourable between Malawi and COMESA.

### 1.5 Research questions

The study investigated the following research questions:

i. Are there any short and long run relationships between dairy and dairy product imports to Malawi and factors such as real domestic income, relative prices, exchange rate, domestic dairy consumption, and domestic dairy production?

ii. To what extent does the COMESA FTA affect trade performance in dairy and dairy products in short and long run, and the welfare on Malawian economy?

iii. Are there any trade complementarities due to FTA between Malawi and COMESA trading bloc?

### 1.6 Study justification

Free trade agreement (FTA) is significant because of its perceived role of enhancing intra-trade performance among member countries of the same economic bloc as reported in Malawi-SADC general trade study (Karemera & Phiri, 2016). Although

FTA gives hope for the improved country's economic welfare, however, this hope may be dashed out due to some negative impacts it brings about to the country. Moreover, there is little information on effect of COMESA FTA on performance of trade in dairy product imports to Malawi.

A thorough understanding of factors that affect dairy product imports to Malawi from COMESA region as well as effect of COMESA FTA on trade performance in dairy trade in Malawi is essential. Firstly, this study has generated information on factors that affect imports of dairy and products to Malawi from COMESA FTA. Secondly, the study has analysed how Malawi's membership to COMESA FTA has affected trade performance in dairy and dairy products. Finally, the study has generated information on the potential benefits or costs of free trade agreement on dairy products between Malawi and other COMESA member countries. This information may help policy makers to recognize factors to be considered when formulating Malawi's trade policies in dairy trade and potential economic benefits for entering into free trade agreement on trade in dairy and dairy products with COMESA countries and beyond. One of the trade policy instruments that affects consumer goods and certain foodstuffs is tariff, and the most favoured nations (MFN) rate on such products averaged 13.7 percent in 2000-01 (GoM, 2015) and 16 percent in 2009 (WTO et al., 2021). For instance, an escalating tariff structure, with a tariff up to 25 percent on foodstuffs including dairy products may encourage domestic production by providing comparatively high effective protection (GoM, 2015). Extensive tariff concessions on imported inputs such as animal feeds and veterinary medicines may also make tariff structure to practically escalate, thus providing additional production incentives in the dairy sector (GoM, 2015). This information may also, therefore, help to infer trade policy implications in dairy sector in Malawi.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter presents a review of relevant literature on the factors that affect dairy and dairy product imports to Malawi from COMESA member countries and other non-COMESA countries. It also presents literature on COMESA FTA effect on dairy and other goods trade performance in Malawi and globally. It also presents a review of literature on trade complementarity. The section considers several international trade studies previously conducted applying different models such as cointegration and error correction, gravity, pooled Ordinary Least Squares (OLS), World Integrated Trade Solution (WITS) Simulation, Seemingly Unrelated Regression (SURE) framework, fixed effects, and random effects, among others. It shows that some studies covered trade flows as total trade i.e., imports plus exports, while others covered trade flows as imports and exports separately (Susanto et al., 2008; Balassa, 1974; Karemera & Phiri, 2016; Karemera & Koo, 1994; Sawyer & Sprinkle, 1989; Karamuriro, 2015; Toma et al., 2014; Safoulanitou & Ndinga, 2010; Essen, 2017). The literature review then considers studies conducted on total trade, imports and exports in Malawi and, lastly, draws some lessons learnt from the information gathered.

## 2.2 Overview of dairy sector in Malawi

For decades, Malawi has been a net importer of dairy and dairy products from different parts of the world (FAO, 2021). For instance, in 1999, Malawi generated revenue amounting to US$36,000 from dairy exports to the world but spent about

US$4.15 million on dairy imports (Figure 2.1). In 2005, Malawi generated over US$14,000 from dairy exports and spent about US$14.15 million on dairy imports. In 2010, over US$3.2 million of revenue was generated from dairy exports, while more than US$19.1 million was spent on dairy imports. In 2018, about US$16,000 was generated from dairy exports, while more than US$10.77 million was spent on dairy imports. This implies that Malawi heavily depends on dairy imports to meet its domestic milk demand.

In the period under review, Malawi imported more dairy and dairy products such as pasteurized milk and milk cream, yoghurt, milk powder, whey, butter and dairy spread and cheese from other countries. For instance, Malawi imported dairy products worth US$19.1 million in 2010 and US$9.3 million in 2019 from across the world, with a trade balance of about -US$15.8 million and -US$9.3 million, respectively (Figure 2.1).

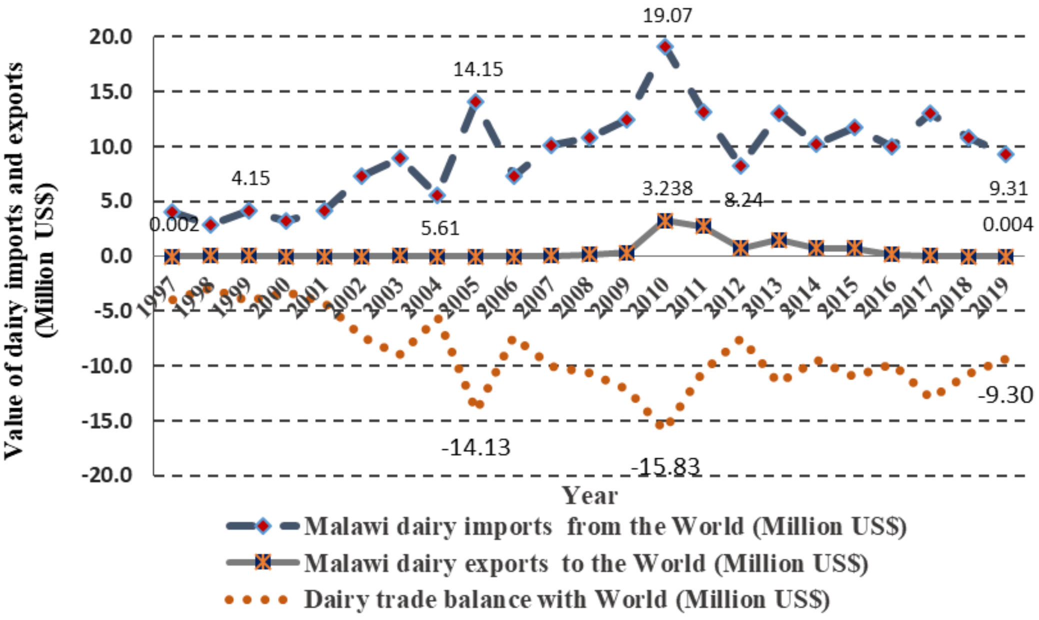


**Figure 2.1** Malawi-World dairy exports and imports (US$) 1997-2019

Data source: FAO, 2021

Based on the FAO data, over the period under review (1990-2019), the per capita milk consumption in Malawi has been fluctuating between 2.85kg/person/year and 7.98kg/person/year and depicting a declining trend from 5.16kg/person/year recorded in 1990 to 3.44kg/person/year in 2017, which is far much below the average per capita intake of 43.8kg/person/year and 57.46kg/person/year for African continent and Southern African region, respectively (FAO, 2021; Arakelyan, 2017) (see Figure 2.2).

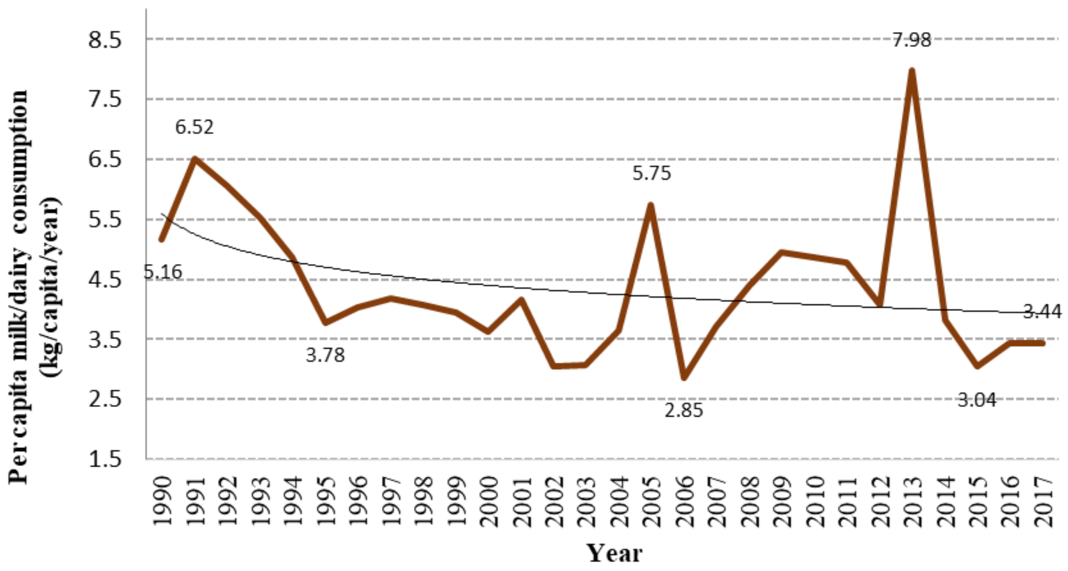


**Figure 2.2** Per capita milk/dairy consumption (in kg/year) in Malawi 1990-2017

Data source: FAO, 2021

Over the years, domestic milk production has been steadily increasing in Malawi (FAO, 2021). For instance, 36,800 tons, 79, 239 tons, 92,134 tons, 124,924 tons and 188,985 tons of milk were produced in 1990, 2000, 2005, 2010 and 2018, respectively (Figure 2.3). This could be attributed to successful national development efforts, high increase in the number of high-yielding dairy cattle breeds (about 56% from 2004 to 2010), and smallholder dairy farmers' desire to diversify the standard practices to earn steady income (GoM, 2015; Revoredo-Giha & Renwick, 2016).

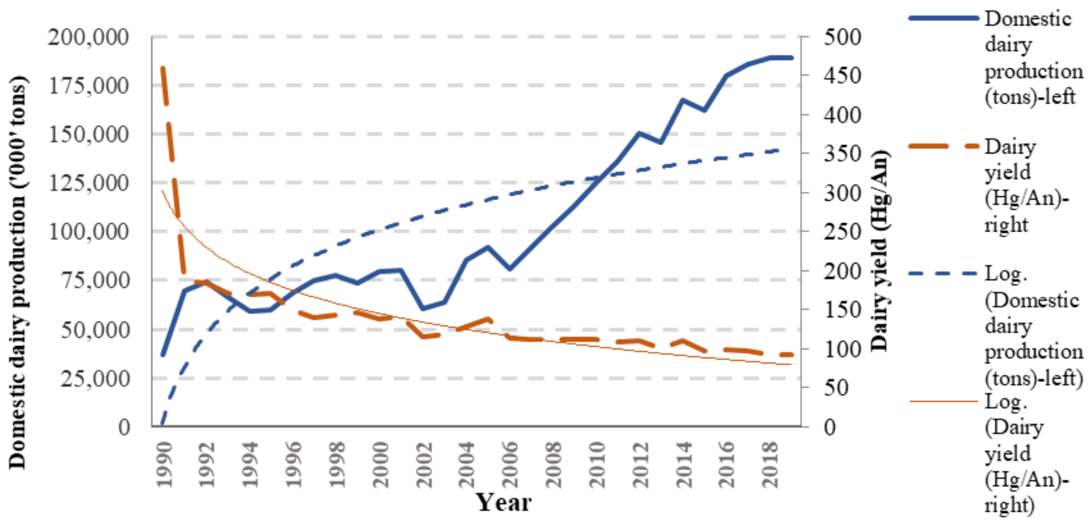


**Figure 2.3** Domestic dairy production (tons) in Malawi 1990-2017

Data source: University of Oxford, 2021

In general, since 1990s, consumption of dairy products has progressively increased due to the imports of value-added dairy products, such as yoghurt, butter and cheese to meet domestic milk demand that has been recurrent as a result of low domestic milk supply (Revoredo-Giha & Renwick, 2016). Figure 2.4 shows the increasing total dairy consumption (in tons) in Malawi from 77.03 tons in 1992 to 193.3 tons in 2018 mainly due to the increase both in imports of value-added dairy products and local milk production (Akaichi & Revoredo-Giha, 2014).

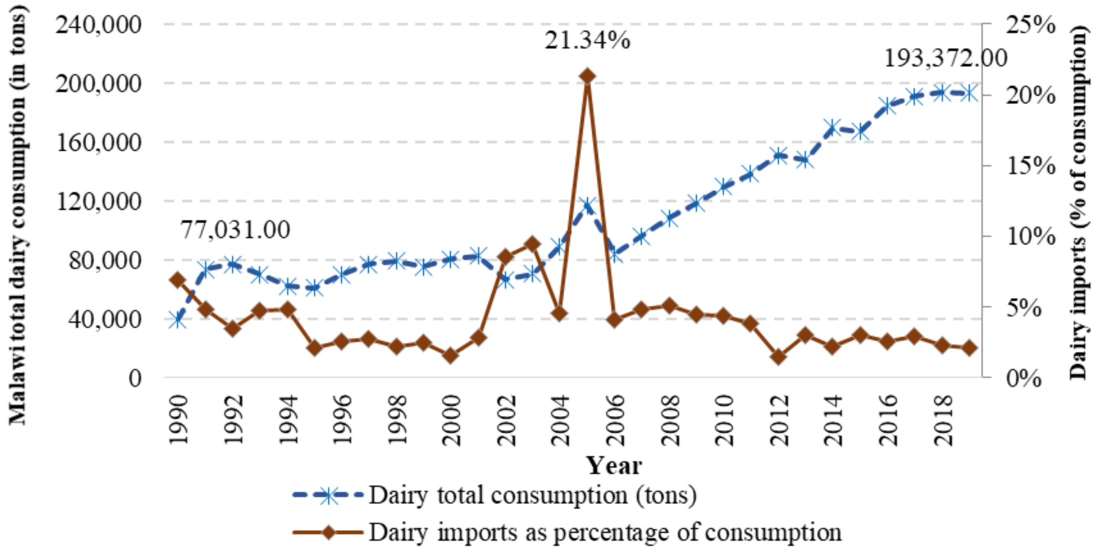


**Figure 2.4** Total dairy consumption (in tons) in Malawi 1990-2019

Data source: FAO, 2021

The share of Malawi's dairy product imports to the GDP has remained very small and has constantly shown a declining trend in the period under review. According to Figure 2.5, for 2005, the shares of dairy imports from the world and COMESA region to Malawi's GDP are estimated at 0.29 percent and 0.03 percent, respectively. For 2010, the shares of dairy imports from the world and COMESA region to Malawi's GDP are estimated at 0.27 percent and 0.03 percent, respectively. For 2018, the shares to GDP of dairy imports from the world and COMESA are estimated at 0.115 percent and 0.006 percent, respectively.

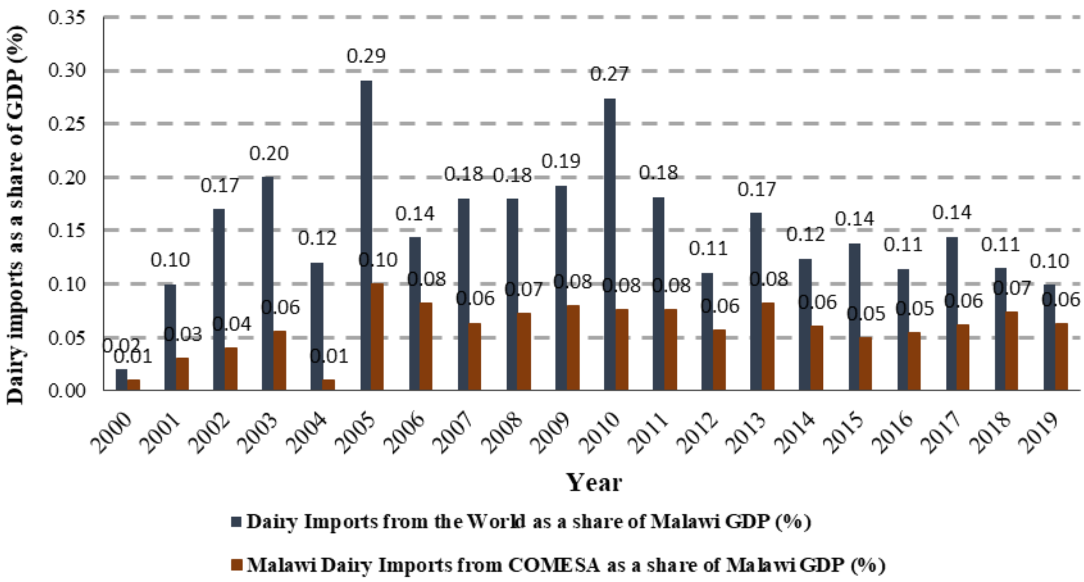


**Figure 2.5** Dairy imports as a share of Malawi's GDP 2000-2019

Estimated using data from COMESA, 2021; NSO, 2020

## 2.3 Overview of COMESA dairy trade with other trading blocs

The COMESA trading bloc, like many other trading blocs across the world, has been dealing dairy trade with other blocs over the years. The main trading partner of COMESA for dairy imports is the European Union (EU). The dairy imports of COMESA from the EU over the years have generally been increasing from over US$110 million in 2001 to over US$544 million in 2019 with very minimal total dairy exports to the EU. Other trade partners such as SADC and EAC have shown very minor trade activities in both total exports and imports (see Figure 2.6).

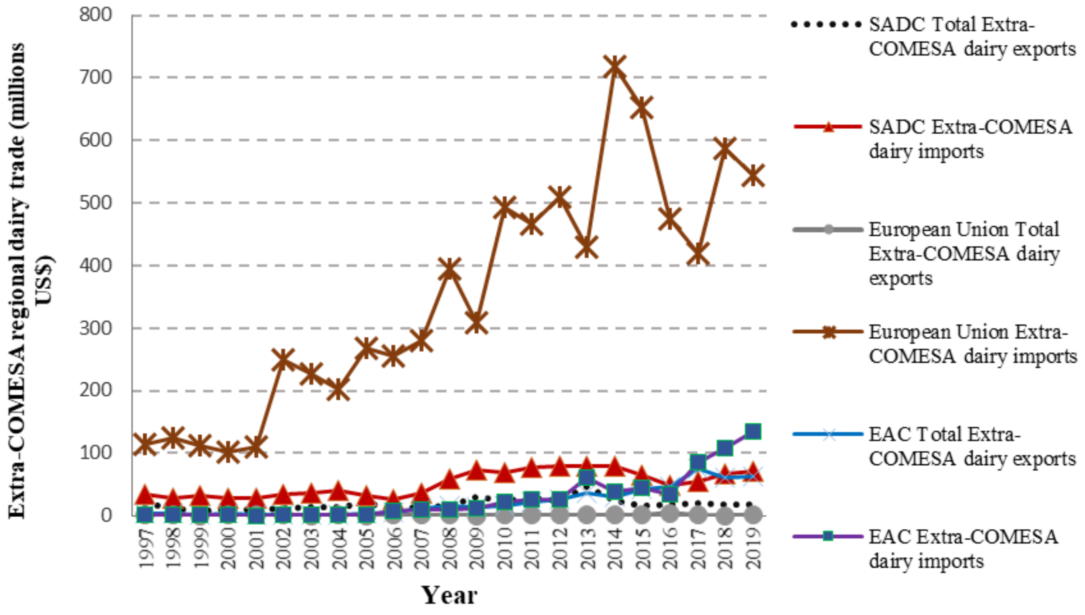


**Figure 2.6** Extra-COMESA dairy exports and imports 1997-2019

Data source: COMESA, 2021

## 2.4 Dairy trade before and after COMESA FTA

The COMESA trading bloc, with 560 million people from 21 member countries by 2019, has a huge market for trade in both dairy product exports and imports (COMESA, 2018). Most intra-regional trade transactions among COMESA member states started after implementing FTA in 2001, which could be attributed to FTA. Since 2001, both intra-regional dairy imports and exports have shown upward trend as compared with pre-COMESA FTA period. For instance, in 2001, the COMESA trading bloc generated over US$2.78 million from intra-regional dairy exports and incurred over US$6.63 million as import bills. In 2019, the trading bloc generated over US$137.69 million from intra-regional dairy exports against dairy imports of over US$218.05 million as import bills. However, during the pre-COMESA FTA period, both intra-regional imports and exports were much lower. For instance, in 1999, respective import and export values were estimated at US$4.17 million and US$4.21 million (see Figure 2.7).

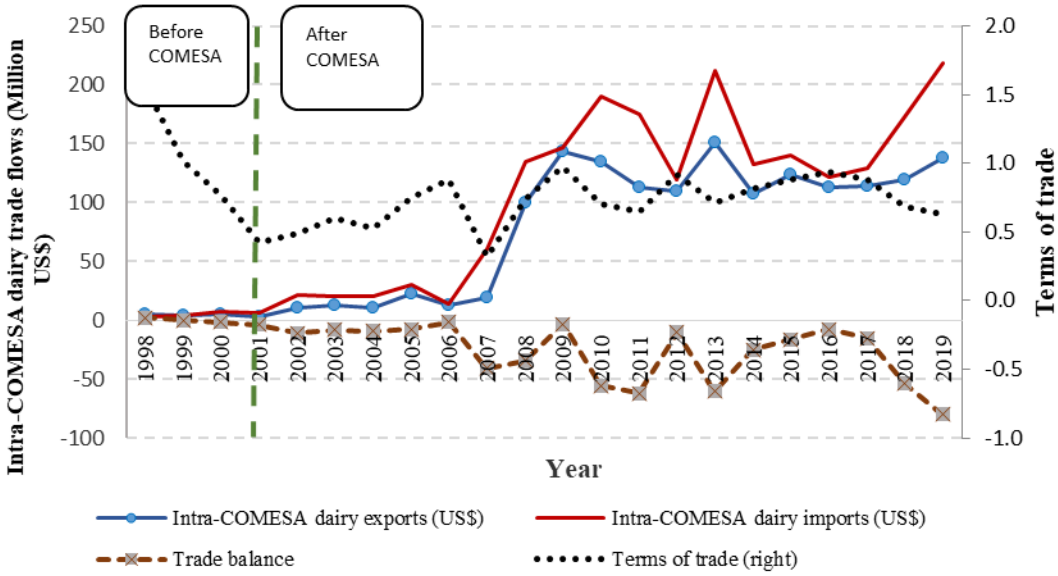


**Figure 2.7** Intra-COMESA dairy exports and imports 1997-2019

Data source: COMESA, 2021

Furthermore, COMESA member countries have had a weak export base for dairy products over the years under review with exception from 1998 to 1999 when the value of exports surpassed the value of imports. Since 2001, they have been dependent on dairy imports from other COMESA members as evidenced by the small terms of trade (i.e. total exports divided by imports) that have been less than one (refer to Figure 2.7).

Similarly, Malawi as a member of COMESA trading bloc engages in intra-regional trade on dairy products such as milk powder, milk cream, yoghurt, whey, butter and dairy spread and cheese. Malawi's main trading partners are Zimbabwe, Zambia, and Kenya. Over the years, Malawi has been dependent on dairy product imports from COMESA member states. The dairy product imports to Malawi have generally trended upwards, despite some fluctuations during the post-COMESA FTA period from 2001 to 2019 with a positive trade balance in some years. However, the dairy product imports have shown constant and lower trend during the pre-COMESA FTA period (refer to Figure 2.8)

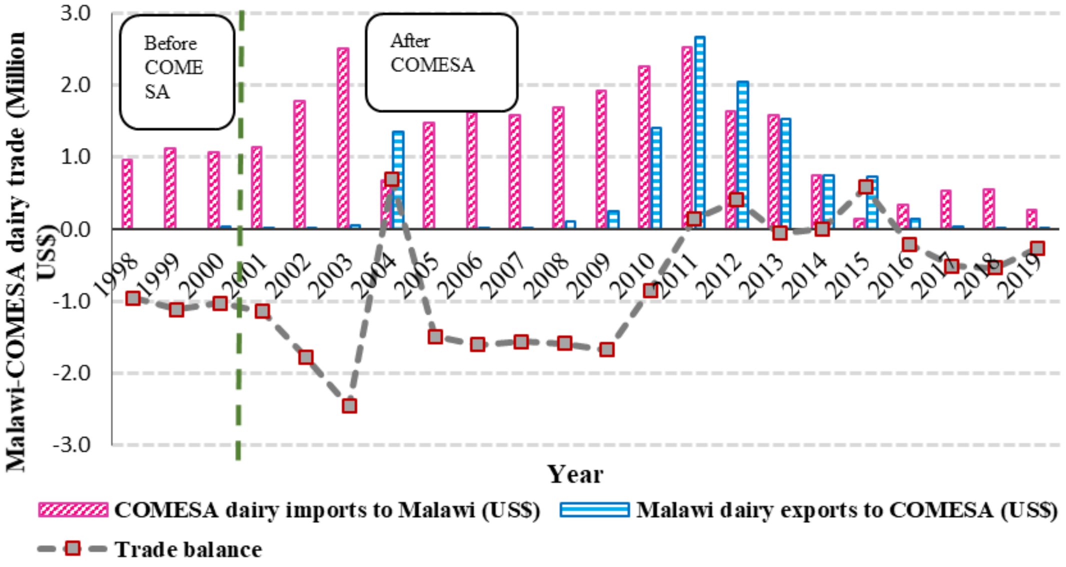


**Figure 2.8** Malawi-COMESA dairy trade 1998-2019

Data source: COMESA, 2021

## 2.5 Empirical studies on factors that affect trade in imports

Essen (2017) investigated the determinants of agricultural imports for China from Sub-Saharan Africa (SSA) using imports data covering 1995 – 2014 period. This study applied the gravity model to estimate the unknown coefficients of variables causing impact on China's agricultural imports from SSA. The empirical results showed that GDP of Sub-Saharan African countries and China, infrastructure, quality of institutions, trade agreements and endowments of natural resources in Sub-Saharan Africa were significant and positively impacted agricultural imports for China from Sub-Saharan Africa. However, the study found that transportation cost was a weakening determinant. In this regard, the study suggested that SSA countries should improve their infrastructure and institutional quality to attract more agricultural product importers from China.

Wani et al., (2016) analyzed the determinants of imports to India using imports data covering 1995-2015 period for 35 countries to understand imports trade between India and its partners. The study applied the gravity model to assess impact of factors such as inflation rate, per capita income, trade openness of countries involved, and common borders, among others on imports. The results showed that inflation rate, per capita income differentials and overall openness of the countries involved in trade had an impact on India's imports. Study results further showed that the common borders between India, China and Bangladesh had great impact on India's imports. However, the study found that exchange rate had a minimal influence on India's imports. As policy implications, the study suggested that India must undertake tight monetary and fiscal policies to reduce inflation as it affects imports. The study also suggested that India should be more open especially for the imports of capital goods that would, in the end, expand manufacturing to increase export capacity.

Egwaikhide (1999) analysed factors that influence aggregate imports in Nigeria using a time-series data (1953-1989). The study employed the Error Correction and Cointegration modeling techniques to estimate impact of foreign exchange, relative prices, and real income as independent variables on the total imports. The results showed that foreign exchange, relative prices, and real income had influence on total imports' behaviour. The study also found that fluctuations in foreign exchange, which is tied to the long-run effects by means of feedbacks, determined the import decisions in the short run. The study results also showed that foreign exchange had effects on the dynamics of disaggregated imports. In this regard, the study concluded that it was vital to implement economic policies that would increase the availability of foreign exchange earnings in Nigeria.

Martinez-Zarzoso (2003) measured the determinants of annual flows for bilateral trade for 47 member countries, especially preferential agreement effects between many trading blocs such as ), European Union (EU), North American Free Trade Area (NAFTA among others using time-series data (1980-1999). The gravity model was applied to estimate the effects of importer's incomes, population, and distance, among others. The results showed that importer's incomes negatively impacted annual bilateral trade flows, which suggested the increased inelasticity in bilateral trade flows with respect to income of the importer. The study also found that population of the exporting country negatively impacted the imports, which suggested that bigger countries were endowed with more resources to trade more self-sufficiently than smaller countries. The results also showed that the distance negatively impacted annual flows in bilateral trade, as expected, over the years under review (1980-1999). The study suggested that the higher income elasticity of the exporting meant that the production capacity of the country was essential to boost exports.

Khiyavi et al. (2013) investigated factors that affect international agricultural trade in developing countries including Brazil, Chile, Kenya, Tunisia, Thailand, Pakistan, Indonesia, India, Iran, Malaysia, Turkey, Venezuela, Romania, and Mexico using panel data covering 1991-2009 period. The study applied gravity model to measure effects of per capita income, real GDP (1985 US dollars), distance, exchange rate volatility, common border, relative distance weighted by income and regional trade agreements such as ASEAN community on international agricultural trade. The results showed that the market size for both importing and exporting countries had an impact on international trade, i.e. trade in agricultural products increased with the increase in market size for both developing and developed countries. The results also showed that per capita income had positive and significant impact on international agricultural trade on the side of developed importing countries, while on the side of developing exporting countries, per capita income had significant and negative impact on international agricultural trade. The study also found that exchange rate volatility had negatively and significantly affected international agricultural trade, which meant that agricultural trade was more sensitive to the exchange rate instability.

Ayotodun and Farayibi (2016) assessed determinants of imports in Sub-Saharan Africa (SSA), and specifically in 31 countries as follows: Benin, Burundi, Burkina Faso, Botswana, Congo Republic, Central African Republic, Cameroon, Ivory Coast, Gabon, Ethiopia, Lesotho, Kenya, The Gambia, Malawi, Madagascar, Mali, Mozambique, Mauritius, Nigeria, Namibia, Rwanda, Seychelles, Senegal, Swaziland, Sudan, Tanzania, South Africa, Togo, Zambia and Uganda using imports data (1995-2012). The study also assessed the short and long run elasiticities of agregate imports demand. The study applied pooled OLS, Fixed and Random effects modelling techniques to estimate impact of foreign exchange reserve, real income, real imports, trade liberalization, relative import price and total trade (openness) on aggregate imports. The study showed that all independent variables were highly and positively significant in influencing aggregate imports from pooled OLS, fixed effect and random effect estimations. The study results showed that real income, foreign exchange reserves and trade liberalization play important role in the short run as well as long run import demand levels within SSA. Therefore, the study suggested that policy makers should concentrate on trade policies that would reduce purchasing power and increase domestic supply to correct balance of payments disparities in the long run in SSA.

Hibbert et al. (2012) investigated the aggregate import demand for Jamaica with the United Kingdom and the United States using monthly time-series data (January 1996 - September 2010). The study applied cointegration and error correction models to estimate the impact of real GDP, real foreign reserves, exchange rate volatility and relative import prices as independent variables. The study results showed that there was cointegrating relationship (i.e. long run relationship) between aggregate import as dependent variable and independent variables for both the UK and the US. The study also estimated long-run and short-run elasticities. The study found that income had a negative and lower elasticity for Jamaica's trade with the US in the short run as compared to the long run. Exchange rate volatility was positive (more elastic) in the short run, but negative (less elastic) in the long run. The study also estimated Jamaica's trade with the UK. The study results showed that exchange rate volatility and real GDP were more elastic in the long run than in the short run. The study suggests a tight monetary policy would have the substantial effects on imports in the short run for Jamaica with UK only.

### 2.6 Empirical studies on effect of FTA on trade

Lusenge and Mugano (2017) analyzed the effect of COMESA FTA on trade in DRC using the data that were extracted from the World Integrated Trade Solutions (WITS) database of the World Bank. The data contained statistical information at 6-digit level of Harmonized System (HS) in variables such as export and import values to/from each trade partner, export supply, import demand and substitution elasticities and tariffs up to 2010. The study used the partial equilibrium modeling approach to assess trade diversion, trade creation revenue, net trade and welfare effect due to COMESA FTA on Democratic Republic of Congo (DRC) economy. The results showed that

COMESA FTA is beneficial in terms of increased exports, increased consumer welfare and trade creation. However, DRC experienced loss of government revenues because of zero tariff on imported goods. Therefore, to ease the revenue losses in DRC, the study suggested that the implementation of the free trade agreement in COMESA should be accompanied by fiscal reforms such as diversification of valued-added rates to improve the tax collection system from value-added taxes. The government could also broaden its tax base by including the inform sector that generates about 94 percent of labour income in DRC.

Karamuriro (2015) analyzed the impact of COMESA region on exports flows. The study employed the augmented gravity model, fixed and random effects regression models using panel data (1980-2012) to estimate the effects of COMESA. The results showed that COMESA trading bloc had enhanced intra-regional exports with a growth of about 35 percent from the period before COMESA (i.e. between 1980 and 1993) to the period after COMESA had started (i.e. between 1994 and 2012). The study suggested that as a way of boosting exports, there is need to intensify the economic integration and increase road infrastructure in the COMESA region.

Toma et al. (2014) assessed the effects of increasing tariffs on dairy imports from the Common Market for Eastern and Southern Africa (COMESA), European Union, Southern Africa Development Community (SADC), Oceania, South Africa, and the rest of the world during 1999-2011 to protect farmers against cheap milk powder in Malawi. The study employed the constant market shares analysis to analyze policy measure (tariff increase) effects on trade in dairy between the European Union and Malawi. The Study results showed that high tariffs and dairy price fluctuations on the international markets did not have a significant impact on imports from other trading partners outside the EU, although the volumes of imports were still large.

Ogbonna and Chimobi (2008) estimated the aggregate import demand in Nigeria, using time-series data covering 1980-2005 period. The study applied Error Correction and Cointegration modelling techniques to analyse the effect of import liberalization focusing on real quantity of imports, relative imports price, GDP, nominal exchange rate and era of quantitative import restrictions as variables. The results showed that import demand volume cointegrated with the relative import price and real income. Using error correction model, the results showed that real GDP, real import price, nominal exchange rate jointly influenced the import demand function for Nigeria. The results further showed that the import demand dynamics are mostly explained by the real GDP rather than the prices, thus suggesting ineffectiveness to use exchange rate policy to adjust import quantum.

## 2.7 Empirical studies on trade complementarities

Masunda (2020) employed trade complementarity index (TCI) and structured model to measure effects of African Continental Free Trade Area (AfCFTA) in COMESA. The study used trade data for imports and exports sourced from UN Comtrade database (2000-2018). Using TCI, the results showed that AfCFTA has trade diversion effects as COMESA region is already liberalized. Likewise, using the gravity model, the results showed trade creation effects in COMESA region. In this regard, the study suggested that the signing of the AfCFTA would lead to pure trade creating effects for exports and trade diverting effects for imports in COMESA. The study also suggested that the implementation of the free trade agreement would generally generate trade creating effect for the COMESA regional trade agreement.

Ibrahim and Shafii (2018) analyzed trade complementarity and similarity for Nigeria with West African sub-region (ECOWAS) using 2000-2014 imports and exports data. The study applied revealed comparative advantage (RCA) index and trade intensity index (TII). The results of the study showed high trade intensities for Nigeria with other West African countries such as Benin, Ghana, Togo, and Senegal. The results also showed that Nigeria could export cocoa and mineral fuels, rubber and hides to other ECOWAS countries with low RCA in these products. The results further showed that Nigeria and other ECOWAS countries had to import iron and steel, electrical machinery, nuclear reactors, and furniture from other countries outside ECOWAS region because of their limited industrial base. The study suggested that countries within ECOWAS region should develop sound policies that would change production structure to boost more trade among them.

Hoang (2018) computed trade complementarity index (TCI) to examine the association of Southeast Asian Nations (ASEAN). By analyzing agricultural trade data (1997-2015) extracted from UN Comtrade database and International Trade Centre, the study found that the patterns of intra-regional agricultural exports were not strongly matching with the intra-regional agricultural imports. However, the results showed that the patterns of agricultural product exports to the international markets were moderately matching, i.e. Southeast Asian Nations were benefiting from import trade flows of agricultural products from other countries outside the ASEAN region (i.e., relative complementarity). The study suggested that the ASEAN countries should cooperate and exploit the internal agricultural market opportunities to improve competitiveness and primarily focus on external markets. Yabu (2014) analysed SADC intra-regional trade by calculating trade complementarity and similarity among countries in SADC including Malawi. Trade intensity index (TII) was computed to estimate trade complementarity and similarity in terms of share of imports and exports to determine whether the trade value is greater or smaller than expected among SADC member states. The study results showed that the value of trade intensity index was greater, a sign of trade improvement among SADC countries. On the contrary, the study results showed a small share of imports and exports in SADC region, suggesting a slow trade improvement among countries. The study also reported that most of SADC countries seemed to trade more with other non-SADC countries, which led to successes in export performance. Therefore, the study concluded that the national trade policies would be implemented to simultaneously address intra-regional and foreign market issues that arise from trade.

## 2.8 Lessons learnt from literature

Free trade agreement (FTA) can have positive as well as negative effects on trade performance between two trading partners. These effects can include trade creation (increase-enhancing), trade diversion (decrease-enhancing) and government revenue losses, among others. However, FTA can, in general, have the positive effects on the economy. For example, FTA can enhance the free movement of goods and capital across countries. Besides FTA, there are other factors that affect trade flows (both imports and exports) globally including rapid population growth, distance between trading partners, national income, inflation rate, exchange rate, foreign reserves, per capita income, institutional quality, and communication network. The gap identified from the literature reviews is information about the effect of COMESA FTA on dairy trade performance by applying cointegration and error correction models.

In Malawi, few studies have been conducted focusing on general imports and exports to analyze trade creation and trade diversion as effects of FTA (Phiri & Karemera,

2016) and estimate trade complementarities (Masunda, 2020). But no study has previously focused on the analysis of effect of COMESA FTA on trade performance in dairy and dairy product imports by applying cointegration and error correction modeling techniques with regime switching from pre-COMESA to post-COMESA both in the long and short runs. Hence, it is against this background that this study analysed factors affecting dairy imports, estimated the effect of COMESA FTA on trade performance by applying cointegration and error correction models with regime switching both in long and short runs and to measure complementarities in dairy trade due to FTA between COMESA and Malawi using dairy imports.

# CHAPTER THREE

# METHODOLOGY

## 3.1 Introduction

This chapter describes the methodologies that were used in the study. Firstly, the chapter starts with the conceptual and theoretical frameworks of trade. Secondly, the chapter illustrates the empirical models for analyzing determinants of dairy import demand both in the long run and short run and for measuring effect of free trade agreements on trade performance in dairy products (such as milk powder, milk and milk cream, yoghurt, whey, butter and dairy spread and cheese) and assessing trade complementarities. Lastly, the chapter explains the study design, methods of data collection and data management.

## 3.2 Conceptual framework of free trade agreement

It is imperative now to understand the free trade agreement (FTA) concept. COMESA FTA is regarded as a common market for goods and services, which is aided by free movements of labour and capital to foster economic integration (Balassa, 1974) and thereafter to boost trade with the aim of ending poverty and hunger in the COMESA region.

### 3.2.1 Effect of free trade agreement -Trade creation

Free trade agreements (FTA) may bring about positive (increase-enhancing) effects between two trading countries. This happens when the cheap substitute imports from FTA beneficiary trade partner replaces local production in the importing country. The imports of the beneficiary country displace higher-cost locally produced products - *a* *trade creation* (Karemera & Phiri, 2016; Sawyer & Sprinkle, 1989)). Low-cost imports from a trade partner, an efficient producer replace high-cost domestic production of the importing member country. For instance, consumers of the imported products in Malawi gain from FTA that COMESA creates, thus raising consumer surplus in the economy because of the reduced prices of imported goods (Karemera & Phiri, 2016).

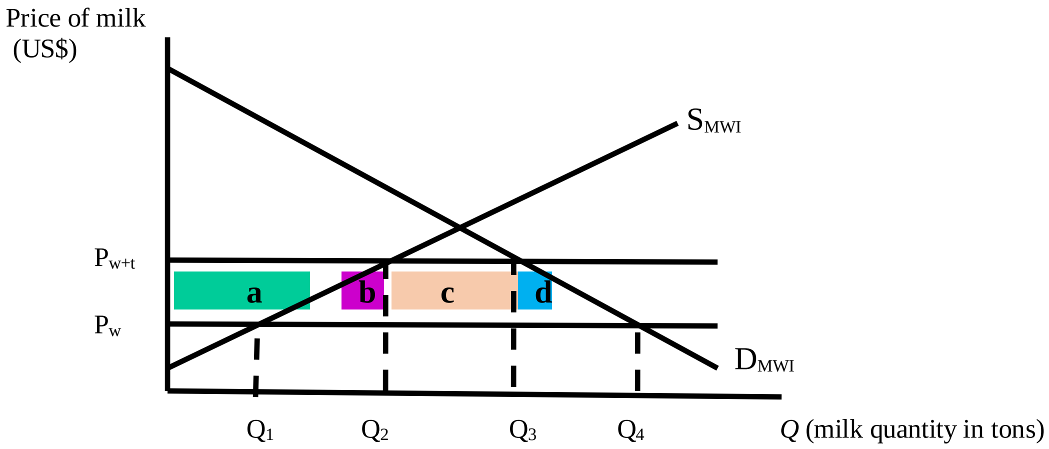


**Figure 3.1** Effect of free trade agreement - Trade creation

The graphical representation in Figure 3.1 illustrates producers in importing country (for instance, Malawi) supplying $Q_2$ at $P_{w+t}$, the world price with tariff. The imported quantity increases from $Q_2$ to $Q_3$ to meet the domestic demand. The removal of tariffs reduces import price from $P_{w+t}$ to $P_w$. Thereafter, the imported quantity increases from $Q_1$ to $Q_4$ to meet the domestic demand, which results in the consumer surplus increase as represented in the area: ***b+c+d.*** As shown in Figure 3.1, trade creation is associated with the loss of domestic producer surplus displayed by area ***a.*** The domestic producer will sell less of domestic product as the consumer buys cheaper imports. As a result, the government will lose tax revenues from removed or reduced import tariffs, displayed by the area ***c***. Figure 3.1 also shows a net gain from removing or reducing tariff barrier presented in area ***b+d,*** *"trade creation (TC) effects"*. The amount of trade creation is dependent on the price elasticities of both supply and demand curves and size of cuts or reduction in tariffs.

### 3.2.2 Effect of free trade agreement - Trade diversion

Free trade agreements (FTA), besides creating trade, may also bring about negative (decrease-enhancing) effects. This happens after imports from beneficiary countries displace restricted imports from non-beneficiary countries. The non-beneficiary is the trading partner and non-member of FTA whose products still faces tariffs (Karemera & Phiri, 2016). The imports from relatively less efficient FTA beneficiary countries replace imports from more efficient non-beneficiary countries (Karemera & Phiri, 2016). For instance, the COMESA trading bloc moves imports to the less-efficient suppliers from the more-efficient suppliers, which leads to losses *"trade diversion (TD) effects"*.

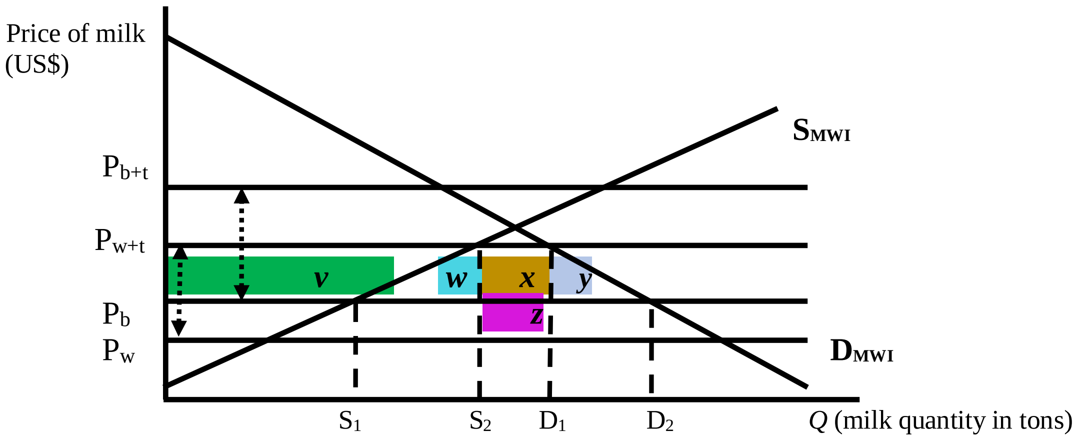


**Figure 3.2** Effect of free trade agreement - Trade diversion

The graphical representation in Figure 3.2 illustrates trade diversion (TD) effect using domestic dairy demand ($D_{MWI}$) and domestic dairy supply ($S_{MWI}$). The pre-COMESA import price that includes tariff is $P_{b+t}$ and the prevailing world price with tariff is $P_{w+t}$, which is lower than $P_{b+t}$. This reflects efficiency of production in the non-beneficiary countries from the rest of world (Karemera & Phiri, 2016). The FTA between Malawi and other COMESA member states reduces price of imports from $P_{b+t}$ to $P_b$ when tariff barrier is removed for the beneficiary COMESA member countries (Karemera & Phiri, 2016). Trade diversion, therefore, arises as the consumption changes to the higher-cost beneficiary of products from the low-cost producers. Hence, the high cost imported goods from within COMESA trading bloc replaces low-cost imports from non-COMESA countries (Karemera & Phiri, 2016). For instance, prices of Malawi's dairy and dairy products imports from COMESA get reduced price from $P_{b,}$ to lower than $P_{w+t}$. Thus, increasing consumer surplus as shown in area: ***v+w+x+y.*** The government revenues reduce as represented in area: ***x+z.*** The net gain is represented by area: ***w+y*** while the net loss of government tariff revenues by area ***z.*** If the area: ***w+y*** is greater than area ***z,*** then, the COMESA FTA is trade creating, otherwise, it is trade diverting (Karemera & Phiri, 2016). Therefore, trade benefits arise from the increased trade due to FTA among member countries through trade creation or substitution.

### 3.3 Theoretical framework for trade

#### 3.3.1 Theoretical framework for international trade

There are various theories explaining the reasons why and how trade started. The two most well-known of these theories are the Ricardian and Heckscher-Ohlin (HO) models (Koo & Kennedy, 2005). The Ricardian model, proposed by David Ricardo in the early 1800s, depends on the differences in productivity and is hypothetically based on two countries, two products (that are homogeneous or identical in both countries), and one factor of production (input). For instance, labour, whereas the settling element is comparative advantage between two countries (Koo & Kennedy, 2005).

Therefore, the Ricardian model states that the major factor of trade is the relative labour input for producing a product.

Second theory talks about the Heckscher-Ohlin (HO) model, which was built on the Ricardian model and its simple form depends on two countries, two products (which are homogeneous or identical in both countries), and two inputs, for instance, labour and capital (Koo & Kennedy, 2005). Theoretically, the country with capital abundance has comparative advantage to produce capital-intensive product, whereas on other hand, the country with labour abundance has comparative advantage in producing the labour-intensive product. Therefore, the HO model states that comparative advantage is described by the difference in the resource endowment such as natural resources, technology, and capital among others (Koo & Kennedy, 2005). Both Ricardian and HO models state that countries will specialize producing and exporting the product in which they have higher comparative advantage and importing other products in which they have less comparative advantage (Koo & Kennedy, 2005). This specialisation leads to the production efficiencies, which consequently triggers competition, greater supply, lower prices, and in the end economic growth. In other words, both countries will benefit from trade (Koo & Kennedy, 2005).

Both Ricardian and HO models demonstrate the fundamental reasons for trade such as advantages or benefits from specialization (Sarker & Surry, 2006). They also play an important role in providing an imperative and intuitive understanding and explanation of the advantages of trade (Sarker & Surry, 2006).

### 3.3.2 Empirical framework for trade analysis

#### 3.3.2.1 The classical imports demand model specifications

Since Malawi markets are integrated with neighboring countries such as Zambia, Mozambique, and Tanzania, therefore, the prices (market signals) heavily influence trade (FEWSNET, 2018). These market signals display the direction and volume of trade. Therefore, this study applied the classical imports demand model (a single equation approach) with quantity of dairy imports, real national income (GDP), domestic price index, multilateral or bilateral price index, and the value of dairy product imports, exchange rate volatility, domestic milk production, and the total domestic milk consumption as the most important variables.

The classical imports demand model estimates of a country are customarily calculated under two assumptions as follows: imports are directly related to national income of an importer and inversely related to prices of imports. Therefore, the specification of classical imports demand model at time *t* gives the foundation for the study (Karemera & Phiri, 2016). The effects of regime switching, i.e. from pre-COMESA period to post-COMESA FTA period, was assessed. COM dummy variable was included in the classical model, Eq. (2) to reflect the effect of COMESA FTA on dairy product imports in the long run and short run, respectively.

The long run (cointegration) classical imports demand model is presented in Eq. (1) as follows:

$$Q_t = e^{\beta_0} Y_t^{\beta_1} \left( \frac{mP_t}{domP_t} \right)^{\beta_2} ExR_t^{\beta_3} dom\mathrm{Pr}od_t^{\beta_4} domC_t^{\beta_5} + \eta_t \qquad (1)$$

Therefore, in natural log form, Eq. (1) could be written as a linear function with the inclusion of the COMESA dummy variable as in Eq. (2) below:

$$\ln Q_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln RP_t + \beta_3 \ln ExR_t + \beta_4 \ln dom\Pr od_t + \beta_5 \ln domC_t + \beta_6 COMESA + \eta_t \quad (2)$$

Where: $Q_t$ is the quantity of Malawi's dairy and dairy product imports from COMESA FTA at time *t* (t=1990, 1991, …, 2019). Use of quantity is justified by the theory of demand, which suggests that it is an appropriate dependent variable rather than value of imports (Ogbonna & Chimobi, 2008).

$Y_t$ is real national income of Malawi, represented by the country's GDP at time *t*.

$\frac{mP_t}{domP_t}$ is relative price (RP) indicating price volatility between Malawi and its trading partner; where $domP_t$ is the domestic consumer price index (CPI or GDP deflator depending on the data availability) of Malawi at time *t* and $mP_t$ is import unit price from Malawi's trading partner at time *t*.

$ExR_t$ is the exchange rate volatility (the capacity of the country to import) at time *t*.

$dom\Pr od_t$ is the domestic milk production (output of dairy sector) at time *t*.

$domC_t$ is the total domestic milk consumption at time *t*.

*COMESA* dummy variable is coded with the value '0' for 1990-2000, the period without FTA and '1' for 2001-2019, the period of FTA in COMESA to reflect the FTA effect on dairy trade in Malawi.

The subscript *t* denotes the period of interest under study (t = 1990, 1991, …, 2019)

$ln$ describes natural logarithm.

$\beta'$s and $\eta$ denote the unknown parameters and a random error term at time *t*, respectively.

Eq. (2) assumes $ExR_t$ and $dom\Pr od_t$ are negatively associated with dairy and dairy product import demand, $Q_t$ and that $Y_t$ and $domC_t$ are positively associated with import demand for dairy products $Q_t$ .

## 3.4 Empirical models for analysing determinants of imports and FTA effect

### 3.4.1 The cointegration and error correction models and causality test

The first study objective was to analyse the factors that affect dairy product imports into Malawi from COMESA FTA**.** The cointegration and error correction models were applied to estimate the impact of domestic and foreign prices, national income (GDP), exchange rate volatility, domestic dairy production, and total domestic dairy consumption on the quantity of dairy product imports using time-series data (1990-2019). The cointegration and error correction models were applied to estimate factors that affect dairy product imports in the long run and short run, respectively. To estimate effects of regime switching/change, i.e. from pre-COMESA FTA to post-COMESA FTA, on dairy trade in imports, COMESA dummy variable was included to reflect the FTA effect with the value '0' for 1990-2000, to indicate the period without FTA and value '1' for 2001-2019, to indicate the period of FTA in COMESA. The estimates of FTA effect were calculated for both long run and short run.

To separate effect of short run from the long run trend through testing of bounds, the error correction model (ECM) representation has been used in many studies (Hibbert et al., 2012) to correct disequilibrium or deviation in the short run (Gujarati & Porter, 2009). ECM I(0) and I(1) can be developed from ARDL model through a simple linear modification or when there one cointegrating vector among the variables of interest. It adds the short-run dynamics with the long-run equilibrium without necessarily losing its long-run information and problems of spurious or nonsensical relationship from non-stationary time series data (Gujarati & Porter, 2009). In the same manner, vector error correction model (VECM) comprises of multiple equations for multivariate dependent variables. It is applicable when there are more than one cointegrating vectors to evaluate the short-run dynamics from the long-run relationships or cointegrating variables. The short-run (error correction term) dairy imports demand model is specified in Eq. (3) (Zhou & Dube, 2011) as follows:

$$\begin{aligned} \Delta \ln Q_t &= \alpha_0 + \sum_{i=1}^{n} \eta_i \Delta \ln Q_{t-i} + \sum_{i=0}^{n} \lambda_i \Delta \ln Y_{t-i} + \sum_{i=0}^{n} \phi_i \Delta \ln RP_{t-i} \\ &+ \sum_{i=0}^{n} \psi_i \Delta \ln ExR_{t-i} + \sum_{i=0}^{n} \vartheta_i \Delta \ln domProd_{t-i} + \sum_{i=0}^{n} \omega_i \Delta \ln domC_{t-i} \\ &+ \gamma_1 ECM_{t-1} + \gamma_2 \Delta COMESA_t + \gamma_3 \Delta Int_t + \tau_t \end{aligned} \quad (3)$$

Where: $\ln Q_t$ is a natural logarithm of the quantity ($Q_t$) of Malawi's dairy product imports from Comesa trading bloc at time *t* (t=1990, 1991, …, 2019). The symbol Δ represents the first difference, i.e. $\Delta \ln Q_t = \ln Q_t - \ln Q_{t-1}$, where $\ln Q_{t-1}$ is the vector of variables endogenous with the first lag and $\eta_i$ is the coefficient endogenous with $i^{th}$ variable $\ln Q_{t-i}$. $Y_{t-i}$ is the real national income (Malawi's real GDP), $RP_{t-i}$ is the relative price ($\frac{mP_{t-i}}{domP_{t-i}}$), i.e. price volatility between Malawi and its trading partners in Comesa region; where $domP_{t-i}$ is the domestic consumer price index (CPI or GDP deflator) and $mP_{t-i}$ is import unit price from trading partner, $ExR_{t-i}$ is the exchange rate (the country's capacity to import), $dom\Pr od_{t-i}$ is the domestic milk production (output of Malawi's dairy sector) and $domC_{t-i}$ is the total domestic milk consumption (vector variables with $i^{th}$ lag, respectively). *Comesa* is the dummy variable coded with the value '0' for 1990-2000, the period without free trade agreement and '1' for 2001-2019, the period with free trade agreement, to reflect the effect of free trade agreement on dairy trade in Malawi. $\alpha_0$, $Int_t$ and $\tau_t$ are vector constants, intercepts and residuals, respectively, $\lambda_i$, $\phi_i$, $\psi_i$, $\vartheta_i$ and $\omega_i$ are the estimated coefficients of the short-run model.

$$\begin{aligned} ECM_{t-1} &= \ln Q_{t-1} - \varphi_1 \ln Y_{t-1} - \varphi_2 \ln RP_{t-1} - \varphi_3 \ln ExR_{t-1} \\ &- \varphi_4 \ln dom\Pr od_{t-1} - \varphi_5 \ln domC_{t-1} - \varphi_6 COMESA_{t-1} - \varphi_7 Int_{t-1} \end{aligned} \tag{4}$$

the extracted residuals, presented in Eq. (4), are from the regression of the long-run dairy product import demand function and the coefficient of $EC_{t-1}$, $\gamma_1 = (1 - \sum_{i=1}^{n} \delta_i)$ is the parameter with a negative sign that measures the speed of adjustment of the short-run dynamics or disequilibrium towards long-run equilibrium, that is, $\Delta \ln Q_t$ will be negative to restore the equilibrium. Consequently, if $\ln Q_t$ is beyond its equilibrium value, it starts declining in the next period to correct the equilibrium error (Zhou & Dube, 2011, Gujarati & Porter, 2009). This means that there would be a long-run convergence among the variables and the previous errors are corrected at the current period in the model, $\varphi_s$ are estimates of coefficients of the long-run model and *n*= 0,1,2, …, k, where k is the maximum lag. All variables have already been described in Eq. (2), excluding the first difference symbol (Δ), intercept, *Int* and white noise error term, $\tau_t$.

The testing method for the bounds has two steps (Hibbert et al., 2012). The first step uses F or Wald tests for the null hypothesis testing of no cointegration between the dependent variable and independent variables (with joint significance irrespective whether the independent variables are I(0) or I(1)); $H_0 : \gamma_1 = \gamma_2 = \gamma_3 = 0$, versus the alternative hypothesis of cointegration, $H_1 : \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq 0$ (at least one of the coefficients of the lagged variables is non-zero in the unrestricted error correction model (UECM) and there is cointegrating relationship), at levels of significance of 10 percent, 5 percent, and 1 percent (Zhou & Dube, 2011). These tests are conducted using Eq. (3).

There are two sets of critical values for each level of significance either with time trend or without (Hibbert et al., 2012). F is compared with the non-standard critical bounds. If the calculated F value is greater than the upper critical value of bounds, then the null hypothesis of no cointegration ($H_0$) is rejected, which indicates the presence of cointegration among the variables. If the F value is less than the lower critical value of bounds, the null hypothesis of no cointegration is not rejected. However, if F value falls within the critical values of bounds, then no inference or no conclusion can be made about cointegration without clear knowledge of integrating variables. If cointegration exists, the second step is to estimate the short run and the long run coefficients of the cointegrated variables in the model (Hibbert et al., 2012).

The bounds test is performed to test the validity of cointegration, or stationarity restriction (i.e. joint cointegration represented in the dairy product import demand function). The bounds test is adopted generally for two reasons. First, this test is applicable regardless of whether the explanatory variables are non-stationary or stationary (Zhou & Dube, 2011) and addresses the problem of unit root pre-testing.

Second, the small sample bias of cointegration process is dealt with by applying unrestricted error correction model (UECM) and bounds test. The bounds test produces the more reliable and accurate estimates as compared with VAR-based Johansen and Engle-Granger tests (Zhou & Dube, 2011). Bounds test for cointegration using Autoregressive Distributed Lag (ARDL) model is applied to estimate the cointegrating vectors. ARDL is an ordinary least square (OLS) model applicable for both time series with unit root (non-stationary) and times series of mixed order of integration (I(0) and I(1)) (Gujarati & Porter, 2009). The use of bounds test approach for cointegration has three justifications, namely: first, the level relationship can be estimated using OLS if the order of ARDL has been recognized model. Second, bounds test permits a mixture of variables as explanatory variables of different order I(1) and I(0). Third, the ARDL technique is suitable small sample sizes (Pesaran & Shin, 1999). The suitable structure of lags for variables in ARDL model is determined using Schwartz Bayesian Criterion (SBC) (Zhou & Dube, 2011).

In addition to the estimation of cointegrating factors, Granger causality (GC) technique was applied to examine the direction of causality between dairy product imports and the factors such as Comesa free trade agreement, real income, domestic milk production, domestic milk consumption, and exchange rate and relative price, respectively. This was to deduce the influence of individual factor on dairy product import flows into Malawi from Comesa trading bloc or vice versa.

### 3.4.2 Diagnostic tests on the model

The diagnostic tests were run on the short-run model. These tests included Breusch-Godfrey (BG) also known as Lagrange Multiplier (LM) test for serial correlation of residuals, Durbin-Watson (DW) test for serial correlation (autocorrelation) of disturbance terms (correct model specification), Breusch-Pagan test for Heteroskedasticity, Ramsey Regression Error Specification Test (Functional RESET) and, Jarque Berra (JB) test for normality of the error term, Cumulative Sum of Recursive Residuals (CUSUM) stability test for parameter stability and Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) for unit root tests (stationarity).

### 3.4.3 Empirical models for measuring COMESA FTA effect

To address the second study objective of measuring effect of COMESA FTA of lowering or removing tariffs such as import and export taxes and non-tariffs barriers such as export or import quotas and export restrictions among trading countries, trade creation effects, trade diversion effects and consumer/produces surplus effects due to COMESA FTA were estimated using dairy and dairy products imports data for individual COMESA member countries (Karemera & Phiri, 2016; Pasara, 2019). The empirical models that were used to calculate trade creation, trade diversion, net trade, and welfare (consumer surplus and/or producer surplus) as FTA effects are described below.

Following Verdoorn's method (Verdoorn & Bochove, 1972) the trade creation (TC) effect is estimated using the Equation (5) as follows:

$$TC = M_{COMESA} * \lambda * \left( \frac{\rho t}{1+t} \right) \tag{5}$$

Where: $TC$ is the trade creation effects for dairy and dairy products in Malawi due to free trade agreement with COMESA member states, $M_{COMESA}$ is the initial level of dairy and products imports by Malawi from another COMESA member countries, $\lambda$ is price elasticity of demand for dairy and dairy product imports from COMESA member states into Malawi, $\rho$ is the level of tariff cut in dairy and dairy product import in COMESA, $t$ is the initial tariff level on dairy or dairy product in COMESA member countries.

Following Verdoorn's method (Verdoorn & Bochove, 1972), trade diversion (TD) is estimated using the Equation (6) as follows:

$$TD = \frac{TC * M_{COMESA}}{(M_{COMESA} + M_{NON-COMESA})} \qquad (6)$$

Where: $TD$ is the trade diversion effects in Malawi due to free trade agreement with COMESA trading bloc, $M_{COMESA}$ is dairy and dairy products imports by Malawi from COMESA member countries, $M_{NON-COMESA}$ is the dairy and dairy products imports by Malawi from non-COMESA countries, i.e. the rest of the world (RoW).

The net trade effects (TE), which is the overall FTA effects on trade, is now calculated by summing up trade diversion (TD) effects and trade creation (TC) effects. The trade diversion (decrease-enhancing) effect is subtracted from trade creation (increase-enhancing) effect as presented in Eq. (7) as follows:

$$TE = TC + TD \qquad (7)$$

Following Pasara (2019), the economic welfare effect (WE) is the sum of the consumer surplus and producer surplus in the economy due to COMESA FTA because of tariff reduction or change. The welfare effect is computed using Eq. (8) as follows:

$$WE = \left( \frac{\Delta M_{COMESA} * \Delta t}{2} \right) \qquad (8)$$

Where: $\Delta t$ is the change in tariff due to COMESA FTA and $\Delta M_{COMESA}$ is the change in dairy and dairy product imports to Malawi due to COMESA FTA.

### 3.4.4 Empirical model for measuring trade complementarity index

The third study objective was to measure the trade complementarity index between with Malawi and COMESA trading bloc on trade dairy and dairy products. Trade complementarity index (TCI) assesses the extent to which the patterns of imports and exports match in the region or a country (Masunda, 2020). TCI is measured as 1 less the sum of absolute values of the variance between imports of commodity (in this case, dairy and dairy products) in the region as a share of total imports of the region and exports of commodity (i.e. dairy) in the country as a share of total exports of the country divided by two (Masunda, 2020). The TCI value ranges between 0 and 1, where ‘0’ suggests no overlap and ‘1’ suggests the perfect match in the patterns of exports and imports. The large value of TCI might give indications for effective and favorable trade agreements on dairy and dairy products. The index is calculated using Eq. (9) as follows:

$$TCI = 1 - \left( \frac{\sum_{\vartheta} \left| \left( \frac{M_{rd}}{M_r} \right) - \left( \frac{X_{cd}}{X_c} \right) \right|}{2} \right) \tag{9}$$

Where; $M_{rd}$ is the imports of dairy and dairy products (d) by COMESA region (r), $M_r$ is the total imports of COMESA region (r), $X_{cd}$ is the exports of dairy and dairy products (d) by Malawi as a country (c) and $X_c$ is the total exports of Malawi as a country (c).

### 3.5 Data sources

The study used secondary time-series imports data for dairy and dairy products into Malawi from COMESA and non-COMESA regions, covering a period of between 1990 and 2019. The study covered the period from 1990 to 2019 as there was no data for the previous years, especially on NSO-Trade Map and COMSTAT databases. The quantities and dollar value of traded dairy products were obtained from WITS and COMSTAT. The dairy import and export unit values, national consumer price indices and Gross Domestic Product (GDP) were sourced from National Statistics Office (NSO)-Trade Map, Food and Agriculture Organization of the United Nations (FAO), and the World Bank. Domestic milk production was obtained from NSO, FAO and University of Oxford websites, among others. COMESA member countries showing highest dairy trade volumes with Malawi were selected and small countries with discontinuous/missing trade figures were merged or excluded during the assessment of the determinants of dairy imports and estimating COMESA FTA effects on trade performance as well as trade complementarities.

The data from these different sources were collected in a common currency (US$), except where quantities (in tons) were required, as in a case of the dependent variable. These data were integrated into Excel format, which were later exported to STATA software for analysis

# CHAPTER FOUR

# EMPIRICAL RESULTS AND DISCUSSION

## 4.1 Introduction

This chapter presents the results of the study. The chapter starts with the presentation of diagnostic test results on the model. The chapter also presents the results from analysis of structural break or structural change in the dairy product imports from COMESA to Malawi. The chapter also presents the results of stability test for residuals. The chapter also presents the results on variable and data characteristics stemming from model estimation through unit root tests (stationarity test), cointegration tests as well as error correction model estimates. The chapter also presents statistics on the factors that affect dairy and dairy imports to Malawi from COMESA region in the short and long run. The chapter also presents study results of the analysis of the effect COMESA FTA on dairy and dairy product trade performance in Malawi in short and long runs as well as welfare effect on Malawian economy. The chapter also presents study results on trade complementarities between Malawi and COMESA trading bloc. Finally, the discussion, conclusions, policy implication and recommendations are also presented.

## 4.2 Diagnostic test results for the short-run ARDL model

Before model estimation was carried out, the diagnostic tests were run on the short-run model. These tests included Durbin-Watson (DW) test for serial correlation of disturbance terms (correct model specification), Breusch-Godfrey (BG) test for *high-order* serial correlation of residuals, Breusch-Pagan test for heteroskedasticity, Ramsey Regression Error Specification Test (Functional RESET) and, Jarque Berra

(JB) test for normality of the error terms, Cumulative Sum of Recursive Residuals (CUSUM) stability test for parameter stability (at 5% level of significance) and Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) for unit root tests (stationarity).

### 4.2.1 Serial correlation test

Serial correlation refers to regression errors that are correlated over time. If a regression model does not contain lagged dependent variables as regressors, the OLS estimates are consistent in the presence of mild serial correlation, but the covariance matrix is incorrect. When the model includes lagged dependent variables and the residuals are serially correlated, the OLS estimates are biased and inconsistent. To test serial correlation in the model (correct model specification), Durbin-Watson test was performed with the null hypothesis: serial correlation and therefore, the model was correctly specified. The test results show that test statistic=2.018 was greater than the critical decision value=2. The null hypothesis was rejected, hence, concluding that there was no serial correlation in the model. Breusch-Godfrey test was also performed with the null hypothesis: no serial correlation. The test results show that the test statistic, Chi2=0.282, was less than the p-value=0.595. The null hypothesis was not rejected and hence we concluded that there was no serial correlation in the model at 5 percent level of significance (refer to Appendix 1).

### 4.2.2 Functional model specification test

To test functional model specification, the study used Ramsey's RESET test with the null hypothesis: model has no omitted variables. The results show that the null hypothesis was not rejected, and therefore, concluded that there were no omitted variables in the model, which indicates the correct model specification at 5 percent level of significance (refer to Appendix 1).

### 4.2.3 Normality test

To test the normality of error terms in the model, Jarque-Bera test was used with the null hypothesis: error terms are normally distributed for all the variables at 5 percent level of significance. The Jarque–Bera results present test statistics for each equation and for all equations jointly against the null hypothesis of normality. The results show that the null hypothesis was not rejected and hence, concluded that the error terms were normally distributed (refer to Appendix 1)

### 4.2.4 Heteroskedasticity test

Heteroskedasticity (absence of homoskedasticity) occurs when there is a non-constant variance for independent or explanatory variables. If this situation exists, it leads to inconsistent parameter estimates and wider confidence intervals (STATA Manual, Version 13.0). To measure heteroskedasticity in time-series, Breusch-Pagan test/Cook-Weisberg test was used to test the null hypothesis for constant variance. The results show that the test statistic Chi2=0.08 was less than p-value=0.7808 and the null hypothesis was not rejected at 5 percent level of significance and hence, we concluded that the there was a constant variance in the model (refer to Appendix 1). Additionally, using the White test for unrestricted heteroskedasticity with the null hypothesis of homoskedasticity. The results show that the null hypothesis was not rejected, and hence, was concluded that there was homoskedasticity in the model at 5 percent level of significance (refer to Appendix 1)

## 4.3 Structural breaks in Malawi's dairy import data from COMESA

The macroeconomic data (dairy imports, prices, exchange rates, national income, etc.) are for the period 1990-2019, a period of 30 years. During this period (in 2000), Malawi signed for free trade agreement with other COMESA member countries. This led to a sharp increase in dairy and dairy product imports from COMESA region in the subsequent years (refer to Appendix 4). Therefore, we tested for stationarity in these aforementioned economic variables in order to estimate the ARDL and ECM models for dairy and dairy product imports. However, before testing for the stationarity properties (unit root) in the dairy product imports from COMESA to Malawi, the data were examined to assess the existence of structural breaks or structural changes. The results show that there was a structural break or structural change (i.e. sudden increase or jump) in the dairy imports trend between 2000 and 2002. This corresponds to the regime switching from pre-COMESA FTA period to post-COMESA FTA period, the time when free trade agreement or free trade policy was being implemented by COMESA member states, which resulted to enormously increased trade in dairy imports to Malawi at the time (refer to Appendix 4).

## 4.4 Stability of dairy product trade flows

Stability can be defined when the plotted residuals consistently fall within 5 percent boundary overtime. The stability for the model is determined by performing the Cumulative Sum of Recursive Residuals (CUSUM) stability test for residuals. The test, in Figure 4.1, shows that the CUSUM graph lies between the 5 percent boundary, suggesting that the parameters have been stable during the entire period under review including pre- and post-COMESA FTA for the dairy and dairy product imports into Malawi from COMESA trading bloc. These results are essential for this study together with the results that COMESA FTA is significant in the dairy import model. This implies that FTA in COMESA has significant influence to determine the extent of dairy and products imports to Malawi.

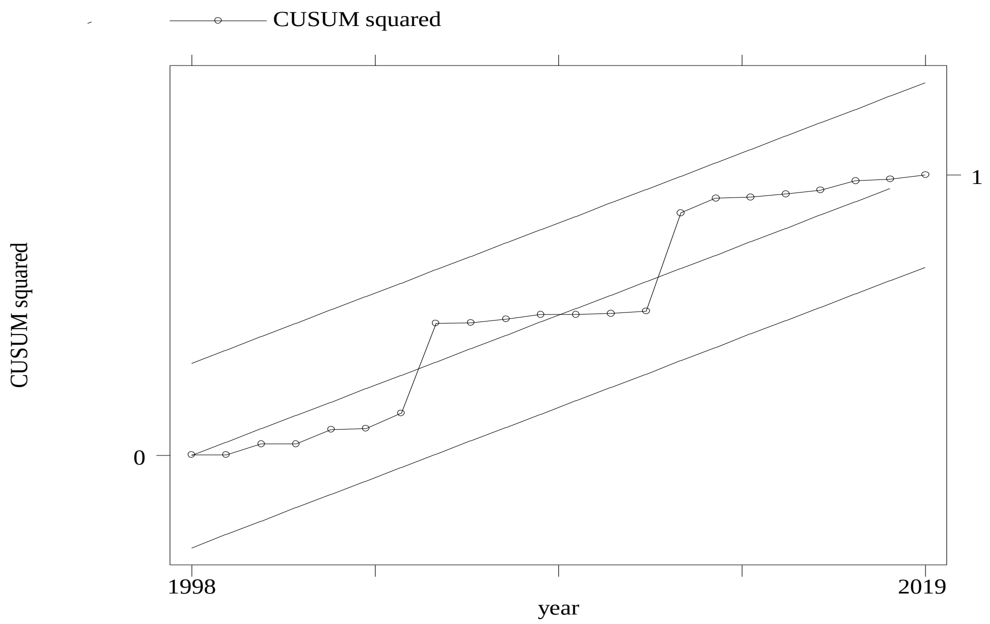


**Figure 4.1** Stability of dairy product trade flows

Source: Own computation based on secondary data obtained from COMESA, the World Bank and National Statistical Office of Malawi.

### 4.5 Model estimation procedure

This section discusses the unit root test results and analysis of the factors that affect dairy and dairy product imports. First, the order of integration of each variable is determined by applying Augmented Dickey-Fuller and Philips-Perron unit root tests, because the time series theoretically requires that the variables should be stationary (i.e. integrated of order I(0)) if model estimates are to be non-spurious (Ogbonna & Chimobi, 2008; Shrestha & Bhatta, 2018). Second, if the same order of integration of non-stationary variables is found, Johansen method of cointegration is applied to obtain the number of cointegrating vectors. Alternatively, if the mixed or same order of integration of non-stationary variables is found, Autoregressive Distributed Lag

(ARDL) model is applied to assess the existence of cointegration among the variables (i.e. cointegrating vectors) (Shrestha & Bhatta, 2018). Finally, as variables are found to be cointegrated, error correction model can be estimated to ensure that both long-run and short-run information are used in modeling dairy and dairy product import demand.

The presence of lags on dairy product imports in the model brings in endogeneity problem especially when the error terms are serially correlated, which causes OLS estimator to be biased and inconsistent. However, if the error terms are not serially correlated, the lagged dependent variable (dairy and dairy product import) will not be correlated with the current error term, as such the OLS estimator will be consistent (Shrestha & Bhatta, 2018). Durbin-Watson test is applied for serial correlation of error terms to ensure the correct estimation method for long-run dairy product import demand function. If OLS estimator is found to be consistent, and that t-test and F-test are valid, then t-test is used to determine the significance of individual coefficients and F-test for overall significance of correct model specification (Shrestha & Bhatta, 2018).

**4.6 Unit root test results**

Before performing cointegration analysis, the study looked at the stationarity properties (unit root) of the data variables using Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests. Consistent with Shrestha and Bhatta (2018), Table 4.1 shows the level of the variables and their respective first differences for these tests and the order of integration. The criteria for selecting lag order for ADF test was based on Schwarz-Bayesian Information Criteria, the default information criteria, and lag order for PP test was based on Newey-West.

**Table 4.1** Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test results

| | **Level: Augmented -Dickey Fuller (ADF) Test Statistic** | | **First Difference: ADF Test Statistic** | | | **Level: Phillips – Perron (PP) Test Statistic** | | **First Difference: PP Test Statistic** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Intercept | Intercept and time trend | Intercept | Intercept and time trend | Order of integration | Intercept | Intercept and time trend | Intercept | Intercept and time trend | Order of integration |
| lnQ | -1.933 (ns) | -2.365 (ns) | -5.414 (***) | -5.296 (***) | I(1) | -3.383 (**) | -3.891 (**) | -9.629 (***) | -9.430 (***) | I(0) |
| lnY | 0.505 (ns) | -2.308 (ns) | -3.134 (**) | -2.993 (ns) | I(1) | 0.039 (ns) | -2.387 (ns) | -6.958 (***) | -6.980 (***) | I(1) |
| lndomProd | -0.040(ns) | -3.107 (ns) | -5.908 (***) | -5.941 (***) | I(1) | -1.712 (ns) | -3.647 (**) | -8.019 (***) | -8.455 (***) | I(1) |
| lnPR | -1.643 (ns) | -1.747 (ns) | -4.236 (***) | -4.475 (***) | I(1) | -1.451 (ns) | -1.940 (ns) | -6.673 (***) | -6.842 (***) | I(1) |
| lnExR | -2.638 (*) | -2.599 (ns) | -2.593 (*) | -3.190 (*) | I(1) | -2.105 (ns) | -1.440 (ns) | -3.112 (**) | -3.667 (**) | I(1) |
| lndomC | -0.202 (ns) | -3.390 (*) | -5.853 (***) | -5.892 (***) | I(1) | -1.721 (ns) | -4.112 (***) | -9.107 (***) | -9.646 (***) | I(1) |
| Comesa | -1.322 (ns) | -1.607 (ns) | -3.674 (***) | -3.683 (**) | I(1) | -1.279 (ns) | -1.771 (ns) | -5.295 (***) | -5.255 (***) | I(1) |

**Note:** i) ns indicates no significance (i.e. existence of non-stationarity), ***, **, * indicate 1%, 5% and 10% levels of significance, respectively. ii) Unit root tests are performed using STATA version 13 and p-values for Z(t), test statistic, are MacKinnon (1996) one-sided p-values. Source: Own computation based on secondary data obtained from COMESA, FAO, University of Oxford, the World Bank and National Statistical Office of Malawi.

Both ADF and PP tests give the same unit root test results for all the stationarised variables, which are consistent with the study by Ogbonna and Chimobi (2008), who used the same unit root tests for stationarity, although other tests such as Kwiatikowsky-Phillips-Schmidt-Shin (KPSS) could be used. Results show that all the variables are non-stationary at level and become stationary after first differencing under both ADF and PP tests, except dairy product import flows, and income with intercept and time using ADF, meaning that all the variables are I(1). The stationarity of the variables after first differencing gave a room to suggest the use of either Johansen test or Autoregressive Distributed Lag (ARDL) model to analyse the cointegrating vectors (or long run relationships) among the variables. However, as opposed to Johansen, ARDL model was opted since it has the capability to capture both the short run and the long run relationships among the cointegrating variables, following the study by Shrestha and Bhatta (2018). Therefore, in this case, the ARDL model was applied to Equation (3) not only to analyse the cointegrating vectors but also to separate the short run effects from the long run trend among the cointegrating variables for the period under review.

### 4.7 Short-run ARDL model estimation of dairy and dairy product imports

To derive the estimated short-run ARDL model after making all the data series stationary using first differences, the lag structure was determined using the maximum lag given by SBIC. The SBIC was used in this case since it is a default information criterion that is used to select the optimal lag in STATA. The determined lag structure or lag matrix was $r_1$ = (1 0 0 1 0 0 0), and AIC was also specified in the model derivation. Therefore, the estimated short-run ARDL model for dairy and dairy product imports is presented in Table 4.2.

The estimated results of unrestricted short-run ARDL model using F-statistic (Wald test) are presented in Table 4.2. The null hypothesis results show F-statistic of 46.11, which is statistically significant at 1 percent (Prob>F=0.000<0.01) in the short-run. This asserts the necessity to reject the joint null hypothesis of no cointegration or no causal relationship from domestic milk consumption, first lag of dairy and dairy product imports, national income, and first lag of national income, exchange rate, relative prices, domestic milk production and free trade agreement (explanatory variables) to the dairy and dairy product imports (dependent variable) in the short run in Malawi. This can potentially suggest that the domestic milk consumption, national income, first lag of real income, exchange rate, relative prices, domestic milk production, free trade agreement, first lag of dairy and dairy product imports (i.e., independent variables) explain the dairy and dairy product import flows (i.e., dependent variable) better than that could be likely occurred by chance. Additionally, consistent with Ogbonna and Chimobi (2008), the adjusted $R^2$ (goodness of fit) is 0.9280, which suggests that the independent variables and their first lag of real income including the first lag of dependent variable (dairy and dairy product imports) explain 92.8 percent of the total variation in the dependent variable (dairy and dairy product imports) whereas the remaining 7.2 percent is explained by other unknown factors.

**Table 4.2** Estimated short-run ARDL model of dairy import: lnQ (dependent VAR)

| Variable | Coefficient | Std. Error | t-statistic | Prob>\|t\| |
|---|---|---|---|---|
| ln*Q* (-1) | 0.0189 | 0.6310 | 0.30 | 0.767 |
| ln*domC* | 9.5725 | 1.5415 | 6.21 | 0.000 |
| ln*domProd* | -10.4441 | 1.6188 | -6.45 | 0.000 |
| ln*Y* | 1.3558 | 0.6604 | 2.05 | 0.053 |
| ln*Y* (-1) | 1.7137 | 0.8376 | 2.05 | 0.054 |
| ln*ExR* | -0.6327 | 0.2040 | -3.10 | 0.006 |
| ln*RP* | -0.2387 | 0.2037 | -1.17 | 0.255 |
| Comesa | 0.5432 | 0.1460 | 3.72 | 0.001 |
| Intercept | -34.8882 | 10.1572 | -3.43 | 0.003 |
| F (8, 20) | 46.11 | | | |
| Prob > F | 0.0000 | | | |
| R-squared | 0.9486 | | | |
| Adj R-squared | 0.9280 | | | |
| Root MSE | 0.1602 | | | |
| Log likelihood | 17.3455 | | | |

Source: Own computation based on secondary data obtained from COMESA, FAO, University of Oxford, the World Bank and National Statistical Office of Malawi.

The estimated model results show that elasticities for domestic milk consumption, real income and first lag of real income in Table 4.2 are more than 1 and statistically significant at 1 percent (p=0.000 <0.01) and 10 percent (p=0.053<0.1, and p=0.054<0.1) with respect to dairy and dairy product imports in the short-run ARDL model, respectively. Consistent with Zhou and Dube (2011), these results suggest that Malawi's dairy and dairy product imports have been positively responsive to proportionate change in domestic milk consumption, real income and first lag of real income, i.e., 1 percentage increase in domestic milk consumption, real income and first lag of real income would significantly cause an increase in the dairy and dairy product import flows into Malawi by 9.57 percent (p=0.000 <0.01), 1.36 percent (p=0.053 <0.1) and 1.71 percent (p=0.054 <0.1) in the short run. The statistically significant coefficients indicate that the domestic milk consumption, real income and first lag of real income would increase in dairy and dairy product import flows in the short run. The results also show the one-way causal relationship from domestic milk consumption and real income to dairy and dairy product import in the short run. This indicates that Malawi can become one of the potential buyers of dairy and dairy products in the COMESA region if it sustains its economic growth.

Furthermore, the study results show that the dairy and dairy product import flow is marginally responsive to its first lag, i.e. 1 percent change in its first lag would slightly cause an increase in the dairy imports by about 0.02 percent, though not statistically significant. Consistent with Zhou and Dube (2011), these results suggest that Malawi's dairy and dairy product imports have not been very responsive to changes in its first lag in the short run. The clarification of this situation may be found in Malawi's trade policies during the period under review.

However, the study results also show that dairy and dairy product imports were very negatively elastic as the rate of domestic milk production increases, and statistically significant at 1 percent ($p=0.000<0.01$). For instance, 1 percent increase in domestic milk production would significantly cause a decline of about 10.4 percent in the dairy and dairy product imports from COMESA. This suggests that Malawi's dairy and dairy product imports are inversely responsive to the increase in domestic milk production in the short run (i.e., negative unidirectional causal relationship from domestic milk production to dairy and dairy product imports). The results also show that exchange rate was negatively inelastic and statistically significant at 1 percent ($p=0.006<0.01$). These results suggest that the depreciation of the Malawi Kwacha against the world major trading currencies such as United States Dollar, British Sterling Pound and Euro would make dairy and dairy products from other countries relatively more expensive, and Malawi has decreasingly imported the dairy products in the short run.

The results also seem to show a decline in the dairy and dairy product import flow as the relative price increases (i.e., negative and inelastic price elasticity), though statistically insignificant in the short-run ARDL model. These results suggest that dairy product imports are not responsive to relative prices in the short run. In other words, dairy and dairy product import flows do not depend on the relative prices. Conversely, Table 1.1 (p 14) shows that Malawi has largely imported dairy and dairy products from COMESA in the short run before switching to the relatively cheaper or better-quality dairy products from other countries outside COMESA such as South Africa, New Zealand, and the Netherlands.

Moreover, the study results show that free trade agreement (COMESA dummy variable=1 for 2001-2019) seems to have positive and unidirectional causal effects on dairy trade in the short run. For instance, dairy and dairy product import flows significantly increased by about 54.3 percent ($p=0.001<0.01$) due to the existence of COMESA free trade agreement in the short run. This suggests that COMESA free trade agreement had positive effects on dairy trade, i.e., dairy and dairy product import flow responded positively to COMESA free trade agreement in Malawi during the period under review. In 2000, Malawi entered into free trade agreement with COMESA member countries on foodstuffs including dairy products (Dimaranan & Mevel, 2008). However, for imports including dairy products, Malawi regularly recognizes the certificates issued by exporting countries and conducts physical inspection at the border to check for the availability or signs of pests in the foodstuffs by the Veterinary Department (Mangelsdorf et al., 2015). This policy might distort import flows and contribute to the positive price elasticity in the dairy and dairy product import demand estimation despite making some positive contributions in dairy trade.

**4.8 Cointegration test using ARDL bounds test approach.**

Since the variables are non-stationary at level or stationary after first differencing, the next step is to perform cointegration test to determine whether a one-way causal long-run relationship exists from the dependent variable to all the explanatory variables in the model (Zhou & Dube, 2011). The cointegration analysis is carried out in the Autoregressive Distributed Lag (ARDL) framework to estimate the cointegrating vectors and calculate long-run and short-run elasticities of dairy product import demand function. The estimation of cointegrating vector is carried out in a two-step procedure; ARDL model specification by Schwarz Bayesian Information Criteria (SBIC)[4] and then it is estimated by ordinary least squares (OLS). First, the optimal lag order must be selected to ensure that the sensitivity of cointegration test on lag length is incorporated in the results. This selection of lag order is based on Akaike Information Criteria (AIC), Schwarz Bayesian Information Criteria (SBIC) and Hannan-Quinn Information Criterion (HQIC).

To test cointegration or long-run relationships, the bounds test in ARDL framework was performed under the null hypothesis of no cointegration (i.e. no levels of relationship with joint significance) versus the alternative hypothesis of cointegration (i.e. at least one of the coefficients of the lagged variables is non-zero in the error correction model. ARDL framework included the variables as follows: dairy and dairy product imports (as a dependent variable) and domestic milk production, domestic

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4 If ARDL model is instead chosen by AIC, the estimates lack the required small sample properties (Pesaran and Shin, 1999).

milk consumption, real income, relative prices, exchange rate and COMESA FTA (as independent variables). The computed F-statistic (Wald test) of 60.123 in error correction model (ECM) shown in Table 4.3 below lies far above 10 percent or 5 percent or 1 percent upper bounds of 3.23, 3.61 or 4.43, respectively. Furthermore, the t-statistic of -15.548 in ECM lies far below 10 percent or 5 percent or 1 percent upper bounds of -4.04, -4.38 or -4.99, respectively. Therefore, the null hypothesis of no cointegration is rejected at these joint significance levels. We, therefore, conclude that there is cointegration (i.e., long-run causal relationships) between the dependent variable (i.e., dairy product imports) and some of the independent variables (i.e., domestic dairy consumption, domestic dairy production, real income, and COMESA free trade agreement), which is consistent with the study results by Ogbonna and Chimobi (2008). Moreover, the results in Table 4.2, show that an increase in domestic dairy consumption significantly causes a rise in dairy product import flows to Malawi in the short run (positive one-way causal effect), which is an indicator of increasing dependency problem on dairy and dairy product imports. The results also show that an increase in domestic milk production significantly decreases the dairy product import flows in the short run (negative one-way causal effect). The results also reveal that the existence of free trade agreement in COMESA region has a great potential to increase dairy import flows by more than a half into Malawi in the short run. The results also show that an increase in real income also has the potential to increase dairy and dairy product imports in the short run, which can enhance the "Buy Malawi" policy.

As the independent variables, i.e., domestic milk production, domestic milk consumption, real income, exchange rate and COMESA FTA, first lag of dairy and dairy product imports and first lag if real income are cointegrated with the dependent variable (dairy and dairy product imports) as reported in Table 4.3, the next step is to develop the error correction model to estimate the long-run and short-run elasticities of dairy import demand function (i.e., factors that affect the dairy product import flows in the long-run and short-run periods in Malawi).

**Table 4.3** Pesaran/Shin/Smith (2001) bounds test for cointegration

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $H_0$: no levels relationship | F = 60.123 | | | | | | | |
| | t = -15.548 | | | | | | | |
| Critical Values (0.1-0.01), F-statistic & t-statistic, Case 3 | | | | | | | | |
| | [I_0] | [I_1] | [I_0] | [I_1] | [I_0] | [I_1] | I_0] | [I_1] |
| | L_1 | L_1 | L_05 | L_05 | L_025 | L_025 | L_01 | L_01 |
| F (k_6) | 2.12 | 3.23 | 2.45 | 3.61 | 2.75 | 3.99 | 3.15 | 4.43 |
| t (k_6) | -2.57 | -4.04 | -2.86 | -4.38 | -3.13 | -4.66 | -3.43 | -4.99 |

Accept $H_0$ if F < critical value for I(0) regressors

Reject $H_0$ if F > critical value for I(1) regressors

Accept $H_0$ if t > critical value for I(0) regressors

Reject $H_0$ if t < critical value for I(1) regressors

Note: k: # of non-deterministic regressors in long-run relationship. Critical values from Pesaran/Shin/Smith (2001). Source: Own computation based on secondary data obtained from COMESA, FAO, University of Oxford, World Bank and National Statistical Office of Malawi.

### 4.9 The long- and short-run elasticities for the factors that affect dairy imports

Table 4.4 presents the estimated long-run ARDL model cointegration and causality results between the dairy and dairy product imports (dependent variable) and domestics milk consumption, national income, exchange rate, relative prices, domestic milk production and free trade agreement (explanatory variables) in the long run. The results show that F-statistic is statistically significant at 1 percent

(Prob>F=0.000<0.001). This affirms the need to reject the overall null hypothesis of no causal relationship or no cointegration between the dairy and dairy product imports (dependent variable) and domestics milk consumption, national income, exchange rate, relative prices, domestic milk production and free trade agreement (independent variables). This suggests that the independent variables explain the dependent variable better than that could be likely occurred by chance. Thus, we conclude that there is a steady-state long-run positive causal relationship (or cointegration) between the dependent variable and independent variables. Consistent with the literature, the adjusted $R^2$ (goodness of fit) is 0.9369, which suggests that the domestics milk consumption, real income, exchange rate, relative prices, domestic milk production and free trade agreement (independent variables) explain about 93.7 percent of the total variation in the dependent variable (dairy product imports), while 6.3 percent of the total variation is explained by other unknown factors.

The estimated unrestricted long-run ARDL model results also present the speed of adjustment (-0.981) of dairy and dairy product import towards the long-run equilibrium. This speed of adjustment is a coefficient of error correction model (ECM), which measures how quickly the dairy and dairy product imports respond to the distortions from equilibrium relationship in one period (Kripfganz & Schneider, 2018). The existence of quick speed of adjustment of 98.1 percent of the short-run dynamics or disequilibrium towards the long-run equilibrium in the dairy product import demand is significant at 1 percent level of significance (p=0.000<0.01) and negative as expected. This suggests that the independent variables, i.e., the domestic milk consumption, national income, exchange rate, relative prices, domestic milk production and free trade agreement and dependent variable, i.e., the dairy and dairy product imports are cointegrated or converged, and that the previous error terms could quickly be corrected at the current period, which is consistent with Zhou and Dube (2011). This gives an indication that dairy and dairy product imports from COMESA region to Malawi greatly depend on domestic milk consumption, national income, exchange rate, domestic milk production and free trade agreement in the long run.

The estimated long-run ARDL model coefficients, in Table 4.4, present the effects of equilibrium (long-run relationship) between the domestic milk consumption, national income, exchange rate, relative prices, domestic milk production and free trade agreement (as explanatory variables) and dairy and dairy product imports (as dependent variable) in the long run in Malawi.

In terms of direction of causality from each of the independent variables to the dependent variable, the long-run ARDL model coefficients show that the coefficient of COMESA free trade agreement is positive (0.5537) and statistically significant at 1 percent ($p=0.000<0.01$). Meaning that dairy and dairy product imports and COMESA free trade agreement are cointegrated in the long run and that free trade agreement would boost dairy imports by about 55.4 percent in the long run. This suggests a significant and bidirectional causality from free trade agreement to dairy product imports to Malawi from COMESA region. This is consistent with the purpose of free trade agreement launched in early 2000s, when it was agreed upon to remove tariffs and non-tariff barriers in COMESA region (i.e. from pre-COMESA FTA to post-COMESA FTA).

**Table 4.4** ARDL cointegration and ECM estimates for ΔlnQ

| Variable | Coefficient | Std. Error | t-statistic | Prob>\|t\| |
|---|---|---|---|---|
| **Long-run cointegration estimates (estimated elasticities for factors)** | | | | |
| ln*domC* | 9.7573 | 1.6244 | 6.01 | 0.000 |
| ln*domProd* | -10.6457 | 1.7003 | -6.26 | 0.000 |
| ln*Y* | 3.1288 | 0.8717 | 3.59 | 0.002 |
| ln*ExR* | -0.6449 | 0.2126 | -3.03 | 0.007 |
| ln*RP* | -0.2433 | 0.2100 | -1.16 | 0.260 |
| Comesa | 0.5537 | 0.1391 | 3.98 | 0.001 |
| **Short-run ECM estimates (error correction representation)** | | | | |
| ECM (-1) | -0.9811 | 0.0631 | -15.55 | 0.000 |
| Δln*Y* | -1.7137 | 0.8376 | -2.05 | 0.054 |
| Intercept | -34.8882 | 10.1572 | -3.43 | 0.003 |
| Prob > F | 0.0000 | | | |
| R-squared | 0.9549 | | | |
| Adj R-squared | 0.9369 | | | |
| Root MSE | 0.1602 | | | |
| Log Likelihood | 17.3455 | | | |

ARDL (1 0 0 1 0 0 0), (number of observations: 29), [maximum lags: 1], {income measure: Y = real GDP at 2010 prices}, where COMESA = 0 for 1990-2000 and COMESA=1 for 2001-2019

Source: Own computation based on secondary data obtained from COMESA, FAO, University of Oxford, the World Bank and National Statistical Office of Malawi.

Similarly, the study results show that the coefficient (9.75) of domestic milk consumption is statistically significant at 1 percent (p=0.000<0.01) in the long run. Meaning that domestic milk consumption and dairy and dairy product imports are cointegrated, suggesting the existence of bidirectional causality between the two variables. The coefficient of 9.75 indicates that 1 percent increase in domestic milk consumption can lift up the dairy and dairy product import flow to its equilibrium point by about 9.75 percent. This shows a high dairy import elasticity or responsiveness, that is, 1 percentage change in domestic milk consumption increases dairy and dairy product import flow by 9.75 percent in the long run.

Furthermore, the study results in the estimated long-run ARDL model show that the coefficient (3.13) of real income is statistically significant (p=0.002<0.01). This suggests that real income and dairy and dairy product imports are cointegrated and that there is a bidirectional causal relationship from real income to dairy and dairy product imports in the long run. The coefficient of 3.13 also suggests that as a real income increases by 1 percent, the diary and dairy product import flow to Malawi from COMESA region also increases by more than threefold (3.13 percent), thus pushing up the diary and dairy product imports to the equilibrium point in the long-run. Again, consistent with Zhou and Dube (2011), these results suggest, i.e., 1 percentage change in income against 3.13 percentage increase in dairy imports in the long run. Meaning that Malawi can become one of the potential buyers of dairy and dairy products in the COMESA region if it sustains its economic growth in the long run.

The coefficient for price volatility appears to be negative and statistically insignificant. Meaning that price volatility doesn’t have any effect or potential to drive the dairy and dairy product import flow to its equilibrium point in the long-run. Consistent with Zhou and Dube (2011), these results suggest that, despite negative relationship, Malawi’s dairy and dairy product imports have not been responsive to price changes (i.e. 1 percentage change in price volatility) in the long run.

On the contrary, the study results show that exchange rate seemingly has a marginally negative effect on the dairy and dairy product flow at 1 percent statistical level of significance (p=0.007<0.01) in the long run. Evidently, the high dairy and dairy product import flow from COMESA region to Malawi could slightly fall down by 0.64 percent to its equilibrium point when exchange rate goes up by 1 percent in the long run. These results show that Malawi dairy product imports have been negatively responsive to exchange rate despite becoming relatively expensive in the long run.

Similarly, the coefficient (-10.65) of domestic milk production is negative and statistically significant at 1 percent level of significance ($p=0.000<0.01$), suggesting that domestic milk production and dairy and dairy product flow are cointegrated. Evidently, the high dairy and dairy product import flow from COMESA region to Malawi could fall by about 10.6 percent to its equilibrium point when domestic milk production rises by 1 percent in the long run. This suggests that if the Malawi sustains the economic growth and greatly develop the dairy sector, Malawi can experience a high dairy import substitution and become one of the potential suppliers of milk and milk products in the COMESA region and beyond.

Estimated ECM or error correction model results in Table 4.4 show that the short-run elasticity for real income with respect to the dairy and dairy product imports is negative (-1.71) and statistically significant at 10 percent ($p=0.054<0.1$). This accounts for short-run fluctuations not due to the long-run equilibrium for dairy and dairy product import flow. For instance, 1 percentage change in first difference of real income negatively accounts for 1.7 percent short-run fluctuations not due to deviations or disequilibrium from the long-run equilibrium for dairy and dairy product import flow. This suggests that, on policy implication, ECM may be used as a method of adjusting trade policy instrument to maintain dairy and dairy product imports close their desired level or value.

**4.10 Granger causality test results**

The empirical results in Appendix II-A show that p-values are not statistically significant for all the equations. This provides the evidence to conclude that there is no autocorrelation based on the Breusch-Godfrey LM test for serial correlation for residuals. The coefficient (0.9288) of the lagged variable, comesa ($comesa_{-1}$) from Eq.1a is statistically significant (i.e. is not zero), while the coefficient (-0.10448) of the lagged variable, dairy product imports ($lnQ_{-1}$) from Eq.1b is not statistically significant. This suggests a one-way Granger causality running from Comesa free trade agreement to dairy product imports.

The results in Appendix II-B also show that coefficient (0.11559) of the lagged variable, exchange rate ($lnExR_{-1}$) from Eq. 6a is statistically significant (i.e. is not zero), while the coefficient (-0.03511) of the lagged variable, dairy product imports ($lnQ_{-1}$) from Eq. 6b is not statistically significant. This suggests a one-way Granger causality running from foreign exchange rate to dairy product imports, suggesting that foreign exchange rate has influence on dairy product imports into Malawi. The results further show that the coefficients of the lagged variables relative price and dairy product imports ($lnRP_{-1}$ and $lnQ_{-1}$) from Eq. 5a and Eq. 5b, respectively, are statistically significant (i.e. they are not zero). These results provide the evidence to suggest a bi-directional causality between dairy products imports and relative prices. This implies that dairy product imports and relative price are reciprocally determined, meaning that they have influence on each other.

### 4.11 Empirical results of FTA effect on dairy trade performance and economy

The analyses of trade creation and trade diversion are not done simultaneously because factors that influence trade creation are not essentially the same as the factors that influence trade diversion. For example, trade creation is largely influenced by the change in trade, which is directly associated with the proportion in tariff reduction through free trade agreement between countries (Pasara, 2019). Nonetheless, trade diversion is when a country has switched from more efficient producer of a good, which is a non-member of free trade area such as COMESA to the less efficient producer, which is a member of free trade area. The trade diversion or switch will be triggered basically because the good from the member country becomes cheaper because of the tariff reduction or removal and not necessarily that the good was efficiently produced (Pasara, 2019).

To analyse the COMESA FTA effect on dairy trade performance, the Verdoorn approach is used to calculate trade creation and trader diversion (Sawyer & Sprinkle, 1989). Trade creation (TC) and trade diversion (TD) as effects of COMESA FTA are calculated using the short-run and long-run estimates of dairy import demand price elasticities adopted from estimated short-run and long-run ARDL model. Then, customs tariff rate of zero percent is included in the calculation to reflect the reduced or removed tariff and non-tariff barriers from 17 percent tariff rate reported in Trade Policy Review for 2000/2001. The trade creation and trade diversion are estimated using the selected 2001-2003 dairy import values (US$) from COMESA member states after removing the COMESA dummy variable as shown in Table 4.4. Trade creation and trade diversion as effects of COMESA FTA on dairy trade are calculated by applying the Verdoorn model in equations, Eq. (4) and Eq. (5) using dairy imports data for selected years and the results are in Table 4.5 and Table 4.6, respectively.

**Table 4.5** Malawi dairy imports (US$ 'million') in selected years

| Dairy import origin | 2001 | 2002 | 2003 | 2004 | 2005 | 2001-2019 Average | Ratio |
|---|---|---|---|---|---|---|---|
| Zambia | 0.0189 | 0.0229 | 0.0317 | 0.0148 | 0.1254 | 0.2629 | 0.025 |
| Zimbabwe | 1.1052 | 1.7559 | 2.4735 | 0.6551 | 1.0270 | 0.5303 | 0.051 |
| Other states | 0.0134 | 0.0004 | 0.0014 | 0.0001 | 0.3325 | 0.5209 | 0.050 |
| Total COMESA | 1.1375 | 1.7791 | 2.5067 | 0.6700 | 1.4848 | 1.3142 | 0.125 |
| Non-COMESA | 3.0135 | 5.5449 | 6.4984 | 4.9370 | 12.6612 | 9.1825 | 0.875 |
| The world | 4.1510 | 7.3240 | 9.0050 | 5.6070 | 14.1460 | 10.4967 | 1.000 |
| Initial import customs tariff rate | | | 17.0 | | | | |
| Short-run dairy import price elasticity | | | 0.2387 (absolute) | | | | |
| Long-run dairy import price elasticity | | | 0.2433 (absolute) | | | | |

*Note*: i) The initial import customs tariff rate (17 percent average) for dairy imports used to estimate COMESA FTA effects was adopted from the Malawi Trade Policy Review of 2000-2001, Malawi Government -WT/TPR/S/96, page 75, which is close to 2009 MFN applied tariff of 16 percent (average) for Malawi dairy imports, in World Tariff Profile, page 110. In computation, the rate was compared with tariff of 0 percent that represents free trade with COMESA region. Source: Own computation based on secondary data obtained from COMESA, the World Bank and WTO.

### 4.11.1 Short-run trade creation, trade diversion and net trade effects

Table 4.6 shows trade creation, trade diversion and net trade computed as the short-run COMESA FTA effects using Verdoorn method of estimation.

**Table 4.6** Short-run COMESA FTA effects on dairy import trade (US$ 'million')

| Short-run FTA effect | 2001 | | | 2003 | | |
|---|---|---|---|---|---|---|
| | Trade creation | Trade diversion | Net trade effect | Trade creation | Trade diversion | Net trade effect |
| Zambia | 0.0725 | 0.0005 | 0.0720 | 0.1215 | 0.0006 | 0.1209 |
| Zimbabwe | 4.2356 | 1.1366 | 3.0990 | 9.4797 | 2.6135 | 6.8662 |
| Other COMESA | 0.0514 | 0.0002 | 0.0512 | 0.0054 | 0.0000 | 0.0054 |
| Total | 4.3595 | 1.1373 | 3.2222 | 9.6066 | 2.6141 | 6.9925 |
| **Short-run FTA effect** | **2017** | | | **2019** | | |
| | **Trade creation** | **Trade diversion** | **Net trade effect** | **Trade creation** | **Trade diversion** | **Net trade effect** |
| Zambia | 0.2918 | 0.0018 | 0.2901 | 0.1299 | 0.0005 | 0.1294 |
| Zimbabwe | 0.4427 | 0.0041 | 0.4387 | 0.2876 | 0.0024 | 0.2852 |
| Other COMESA | 1.3218 | 0.0355 | 1.2863 | 0.5977 | 0.0101 | 0.5875 |
| Total | 2.0564 | 0.0414 | 2.0150 | 1.0152 | 0.0130 | 1.0022 |

Source: Own computation based on data obtained from COMESA, 2021; GoM, 2015

Consistent with literature, the study results show that completely removing the customs tariff rate of 17 percent to zero on dairy and dairy product imports following the COMESA free trade agreement, in 2001, the dairy and dairy product imports generally increased by about 6.7 percent (about US$4.36 million) under trade creation and by 30.3 percent (about US$1.14 million) under trade diversion from 2000 in the short run. The trade diversion suggests about 25.9 percent of intra-regional trade between Malawi and COMESA trading bloc was redirected from more efficient non-COMESA dairy suppliers to more costly COMESA dairy exporters in the short run in 2001.

In 2003, the Malawi dairy and dairy product imports also registered an increase of about 40.9 percent (about US$9.61 million) under trade creation and 61.5 percent (about US$2.61million) under trade diversion from 2001 in the short run, which is exclusively attributable to customs tariff removal. These amounts represent the constant increase in dairy trade performance in Malawi over the years, which stems from the total removal of tariff barriers to dairy trade in COMESA region. This is partly due to the low market supply of locally produced milk and rapid population growth, which in turn put pressure on the locally available dairy products. For instance, the reduction or removal of customs tariff barriers would increase dairy and dairy product imports in the short run mainly from Zimbabwe, the major dairy trade partner of Malawi by about 40.9 percent (US$9.48 million) under trade creation and by about 61.5 percent (US$2.61 million) under trade diversion (27.5% of trade created) from 2002 to 2003 in the short run.

In 2017, the Malawi dairy and dairy product imports also registered an increase of about 54.6 percent (about US$2.06 million) under trade creation and 34.9 percent (about US$0.041 million) under trade diversion in the short run from 2016, with a net trade of 55.03 percent (US$2.02 million). However, in terms of value, dairy and dairy product import flows have been gradually declining over the years from 2000 to 2019. This is partly due to the increase of local milk production and partly due to constant increase of dairy imports from other countries such as South Africa, New Zealand, and Denmark (refer to Table 1.1). In terms of share of dairy and dairy imports to Malawi, other countries, excluding Zambia, recorded the highest share of 64.28 percent (US$1.32 million) of dairy and dairy product exports to Malawi as compared with the dairy imports recorded in 2001 and 2003 under trade creation and by about 61.5 percent (US$2.61 million) under trade diversion from 2002 to 2003 in the short run in the short run.

In 2019, Malawi dairy and dairy product imports registered a decline of 51.64 percent (about US$1.02 million) under trade creation and a decline of 82.72 percent (about US$0.013 million) under trade diversion (about 1.27% of trade created). Similarly, the net trade of declined in the short run from 2017. Evidently, the trade creation is bigger than trade diversion in Malawi due to COMESA FTA for all the years, meaning that there is a constant increase of competitive pressure on domestic dairy market in Malawi. The trade diversion is small, which suggests that, despite the free trade agreement on trade in diary with COMESA member states, Malawi has sill preferred to trade with more efficient countries outside COMESA over the years such as South Africa, the Netherlands, and New Zealand than some inefficient countries in COMESA region (refer to Table 1.1 in Chapter 1).

In terms of net trade effects, the study results show that, overall, in 2001, tariff reduction of 17 percent has brought in a positive overall net trade of about US$3.22

million from dairy trade with COMESA trading bloc, and Zimbabwe alone contributed a share of about 96.2 percent (US$3.1 million) to the overall net gains, while the remaining share of 3.8 percent was collectively contributed by other COMESA member states in the short run. Similarly, in 2003, the overall net gain was about US$6.99 million from dairy trade with COMESA, and Zimbabwe also contributed a share of about 98.2 percent (US$6.87 million) of the overall net gains, while the remaining share of 1.8 percent of the overall gains was collectively contributed by other COMESA member states in the short run (refer to Appendix 2).

### 4.11.2 Long-run trade creation, trade diversion and net trade effects

Similarly, Table 4.7 shows trade creation, trade diversion and net trade computed as the long-run COMESA FTA effects using Verdoorn model estimation with similar percentage increases as reported for short run.

**Table 4.7** Long-run COMESA FTA effects on dairy import trade (US$ 'million')

| Long-run FTA effect | 2001 | | | 2003 | | |
|---|---|---|---|---|---|---|
| | **Trade creation** | **Trade diversion** | **Net trade effect** | **Trade creation** | **Trade diversion** | **Net trade effect** |
| Zambia | 0.0739 | 0.0005 | 0.0734 | 0.1239 | 0.0006 | 0.1233 |
| Zimbabwe | 4.3173 | 1.1585 | 3.1588 | 9.6624 | 2.6639 | 6.9985 |
| Other COMESA | 0.0524 | 0.0002 | 0.0522 | 0.0055 | 0.0000 | 0.0055 |
| Total | 4.4435 | 1.1592 | 3.2843 | 9.7918 | 2.6645 | 7.1273 |
| **Long-run FTA effect** | **2017** | | | **2019** | | |
| | **Trade creation** | **Trade diversion** | **Net trade effect** | **Trade creation** | **Trade diversion** | **Net trade effect** |
| Zambia | 0.2975 | 0.0018 | 0.2957 | 0.1324 | 0.0005 | 0.1319 |
| Zimbabwe | 0.4513 | 0.0041 | 0.4471 | 0.2931 | 0.0024 | 0.2907 |
| Other COMESA | 1.3473 | 0.0362 | 1.3110 | 0.6092 | 0.0103 | 0.5989 |
| Total | 2.0960 | 0.0421 | 2.0538 | 1.0348 | 0.0132 | 1.0215 |

Source: Own computation based on data obtained from COMESA, 2021; GoM, 2015

The study results show that removing the customs tariff rate of 17 percent to zero rate on dairy and dairy product imports following the COMESA free trade agreement, would increase dairy and dairy product imports by 6.7 percent (about US$4.44 million) in trade creation and by 30.3 percent (about US$1.16 million) in trade diversion (about 26.13% of trade created in 2001 from 2000.

Similarly, in 2003, the study results show an increase in dairy and dairy product imports of about 40.9 percent (US$9.79 million) under trade creation and about 61.5 percent (US$2.66 million) under trade diversion from 2002 in the long run. These amounts represent yearly increase in dairy trade performance in Malawi, which exclusively emanates from the reduction or total removal of tariff barriers to dairy trade in COMESA region. This is partly due to the low market supply of domestically produced milk alongside the high population growth, which put pressure on the locally available dairy and dairy products in the long run. For instance, the reduction or removal of customs tariff barriers would increase the importation of dairy and dairy product in the long run from Zimbabwe, the major dairy product trade partner of Malawi, by about 97.2 percent (about US$4.32 million) under trade creation and by about 99.9 percent (US$0.61 million) under trade diversion (about 14.12% of trade created) in 2001 from 2000.

Similarly, in 2017, the study results show an increase in dairy and dairy product imports of about 54.6 percent (US$1.35 million) under trade creation and about 34.8 percent (US$0.04 million) under trade diversion (about 1.26% of trade created) from 2016 in the long run. In 2019 there was a decline of 51.6 percent (US$1.03 million) of dairy imports from COMESA under trade creation and a decline of 82.7 percent (US$0.013 million). Evidently, the trade creation is bigger than trade diversion in

COMESA region for all the years, despite showing a constant decline in the volumes. The trade diversion suggests about 1.26 percent of intra-regional trade between Malawi and COMESA trading bloc was redirected from more efficient non-COMESA dairy suppliers to more costly COMESA dairy exporters in the short run in 2001.

### 4.12 Welfare effect of COMESA FTA on Malawian economy

The study also analysed the welfare effects of COMESA FTA on Malawian economy. The results show the improved welfare effect (WE), i.e. the sum of consumer surplus and producer surplus in Malawian economy due to COMESA FTA because of tariff reduction or removal (refer to Table 4.8).

The study results show that by removing the customs tariff rate of 17 percent to zero rate on dairy and dairy product imports following the COMESA free trade agreement, the Malawi economy or welfare would improve by about US$285,370 over the. On year basis, the economy improved by 113.4 percent (US$54,537), 42.9 percent (US$94,634) and 25.3 percent (US$118,335) in 2002, 2010 and 2011 with a reference to 2001 as a base year respectively. Nevertheless, from 2012 onwards, the Malawi economy shrunk by 64.3 percent (US$42,332), 189.8 percent (US$340 000), 24.0 percent (US$51,000 million) and 1.9 percent (US$50, 0000) in 2010, 2014, 2017 and 2019 respectively due to the decline in the dairy and dairy product imports especially from Zimbabwe, the major trade partner in 2004, which is consistent with Figures 1.1 and 1.8 in Chapter 1.

These estimates also establish that this (zero tariff) policy would generate a positive welfare effect of about US$0.29 million over the period under study. This comes in due to the welfare gains, emanating from COMESA free trade agreement, through the changes in producer and consumer surpluses in the Malawian economy (refer to Table 4.8).

**Table 4.8** Welfare effect of COMESA FTA on dairy import trade

| Year | Total Malawi dairy imports | Import change | Initial tariff rate | Zero tariff rate | Reduced tariff | M_change *t_change | WE = M_change* t_change)/2 |
|---|---|---|---|---|---|---|---|
| 2001 | 1,137,518.0 | - | - | - | - | - | - |
| 2002 | 1,779,136.0 | 641,618.0 | 0.17 | - | 0.17 | 109,075.1 | 54,537.5 |
| 2003 | 2,506,649.0 | 1,369,131.0 | 0.17 | - | 0.17 | 232,752.3 | 116,376.1 |
| 2004 | 670,042.0 | (467,476.0) | 0.17 | - | 0.17 | (79,470.9) | (39,735.5) |
| 2005 | 1,484,796.4 | 347,278.4 | 0.17 | - | 0.17 | 59,037.3 | 29,518.7 |
| 2006 | 1,620,194.0 | 482,676.0 | 0.17 | - | 0.17 | 82,054.9 | 41,027.5 |
| 2007 | 1,578,849.0 | 441,331.0 | 0.17 | - | 0.17 | 75,026.3 | 37,513.1 |
| 2008 | 1,693,682.9 | 556,164.9 | 0.17 | - | 0.17 | 94,548.0 | 47,274.0 |
| 2009 | 1,916,701.2 | 779,183.2 | 0.17 | - | 0.17 | 132,461.1 | 66,230.6 |
| 2010 | 2,250,862.4 | 1,113,344.4 | 0.17 | - | 0.17 | 189,268.5 | 94,634.3 |
| 2011 | 2,532,281.1 | 1,394,763.1 | 0.17 | - | 0.17 | 237,109.7 | 118,554.9 |
| 2012 | 1,635,437.1 | 497,919.1 | 0.17 | - | 0.17 | 84,646.2 | 42,323.1 |
| 2013 | 1,577,092.6 | 439,574.6 | 0.17 | - | 0.17 | 74,727.7 | 37,363.8 |
| 2014 | 742,647.0 | (394,871.0) | 0.17 | - | 0.17 | (67,128.1) | (33,564.0) |
| 2015 | 147,880.2 | (989,637.8) | 0.17 | - | 0.17 | (168,238.4) | (84,119.2) |
| 2016 | 347,148.2 | (790,369.8) | 0.17 | - | 0.17 | (134,362.9) | (67,181.4) |
| 2017 | 536,562.3 | (600,955.7) | 0.17 | - | 0.17 | (102,162.5) | (51,081.2) |
| 2018 | 547,764.2 | (589,753.8) | 0.17 | - | 0.17 | (100,258.1) | (50,129.1) |
| 2019 | 264,894.3 | (872,623.7) | 0.17 | - | 0.17 | (148,346.0) | (74,173.0) |
| Total | 24,970,137.9 | | | | | | 285,370.1 |

Source: Own computation based on data obtained from COMESA, 2021; GoM, 2015

## 4.13 Trade Complementarity Index of Malawi with COMESA trading bloc

The study also measured the trade complementarity index (TCI), to ascertain whether free trade agreement in dairy and dairy products is favourable and effective between Malawi and COMESA. The study results show that trade complementary index of Malawi with COMESA region is 0.944, which is close to 1. TCI assesses the extent to which the patterns of imports and exports match between Malawi and the COMESA trading bloc, whereby the index of 0 suggests no overlap and 1 suggests the perfect match in the patterns of imports and exports. In this regard, 0.944 shows a strong overall complementarity in trade on dairy and dairy products between Malawi with COMESA countries such as Zimbabwe, Zambia, and Kenya, which export large volumes of dairy and dairy products to Malawi. This large value of TCI suggests an effective and favourable trade agreement between Malawi and COMESA trading bloc. Therefore, COMESA FTA is expected to have a significant effect with the proven evidence (TCI=0.9441) on the existing trade relations between Malawi and Zimbabwe, Zambia, and Kenya, among other COMESA member states (refer to Appendix 2).

**4.14 Study limitations**

Despite the fact that the study analysed factors affecting dairy product import flows to Malawi and the effect of COMESA free trade agreement on dairy trade performance and Malawian economy, however, there were a number of limitations encountered during analysis. Firstly, data were not available for some years in the period under review or for the previous years for many COMESA member countries such as Burundi, Comoros, Djibouti, DRC, Egypt, Eritrea, Ethiopia, Libya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Sudan, Swaziland, Tunisia, and Uganda. As a result, much of the dairy imports data used in the analysis were predominantly imports from Zimbabwe and Zambia, and for some years from Kenya. Secondly, the study recognizes that it is equivalent to oversimplification in assuming that the ARDL model applied in this study captured all the distinctive country factors, which might have an influence on dairy product import flows under COMESA FTA, considering structural, cultural, and socioeconomic differences existing across COMESA member countries. Therefore, this study recommends that further research is required to analyse all the COMESA member country factors that affect dairy product import flows as well as the effects of bilateral trade agreements on dairy trade performance and Malawian economy.

# CHAPTER FIVE

# CONCLUSION AND RECOMMENDATIONS

## 5.1 Summary

This study has analysed the factors of market demand in dairy and dairy product imports for Malawi from COMESA trading bloc. The study has applied the bounds test for stationarity or cointegration restrictions in (ARDL) model specifications. The applied model has a two-step procedure, which is suitable for the small-sample study and has examined the long-run and short-run price and income elasticities including effects of COMESA FTA, among other factors using the data covering 1990-2019 period. The evidence suggests the existence of long-run relationship (cointegration) between dairy product imports and Comesa free trade agreement, relative price, foreign exchange rate, domestic milk production and domestic milk domestic milk consumption. The results also suggest a one-way causality running from Comesa free trade agreement and exchange rate to dairy product imports, respectively, and bi-directional causality between dairy product imports and relative price to dairy and dairy product imports. Furthermore, the evidence suggests that model is well fitted at 1 percent (Prob>F=0.000<0.01) and that the explanatory variables explain the model well as shown by the adjusted $R^2$ values of 92.8 percent in Table 4.2 and 93.69 percent in Table 4.4.

On the other factors that affect dairy product imports in Malawi either in the short run or in long run or in both, the study has established that national income (real GDP) affects dairy and dairy product imports positively in the long run but negatively in the short run. Dairy and dairy product imports are less responsive to foreign exchange and relative price changes in the long run than in the short run. Domestic milk consumption affects dairy product imports positively both in the long run and short runs, but it affects dairy product imports greater in the long run than in the short run. Moreover, COMESA FTA positively and significantly impacts the Malawi's dairy product imports both in the long and short runs, but more impacts are experienced in the long run than in the short run. Consistent with the existing literature, the study has shown that long-run income and price elasticities are higher than the short-run income and price elasticities. This suggests that, over time, the dairy and dairy product imports from COMESA trading bloc to Malawi become more responsive to changes in national income and prices in the long run. This typically explains the existence of trade-off between Malawi's economic growth and the Balance of Payments (BoP) in the long run. The price elasticities are either not statistically significant or positive for Malawi, contrasting with the traditional perception or understanding that the imports are negatively correlated with the relative prices.

The study has also brought in an insight to suggest that the free trade arrangement or negotiations with the aim to reduce or remove the tariffs and non-tariff barriers in the COMESA region will not basically result to the increased flow of dairy and dairy imports to Malawi. Even if the regional price becomes relatively lower to Malawi's domestic prices, Malawi will still import fewer dairy products from COMESA region than from outside the region. This is evidently shown by declining dairy import trend in the recent years from COMESA countries and increasing dairy import trend from non-COMESA countries such as South Africa and New Zealand.

The study has also estimated the effects of COMESA Free Trade Agreement (FTA) on trade performance in dairy and dairy product imports in Malawi between 1990 and

2019 through computation of trade creation (TC), trade diversion (TD), net trade effects (TE) and economic welfare effects (WE).

These estimates have established that (zero tariff) policy would generate a positive welfare effect over the period review. This would be due to the welfare gains from COMESA free trade agreement through the changes in producer and consumer surpluses in the Malawi economy.

Further, the study also estimated viability on Malawi for joining the FTA with other COMESA member states with a focus on dairy product imports through calculation of trade complementarity index (TCI). This generally suggests that the removal or reduction of tariffs and nontariff barriers in COMESA trading bloc would create Malawi's dairy import trade to an estimated value of about US$4.36 million in 2001, about US$6.82 million in 2002, US$9.61 million in 2003, about US$2.06 million in 2017 and US$1.02 million in 2019 in the short run. The estimated price elasticities (-0.24) and income elasticities (1.36) suggest that Malawi will benefit from dairy import trade increases emanating from COMESA FTA in the short run. Similarly, COMESA trading bloc would create dairy imports trade to Malawi to about US$4.44 million in 2001, US$6.95 million in 2003, US$2.10 million in 2017 and US$1.03 million in 2019 in the long run. In the contrary, Malawi's dairy product imports will decrease due to the increase in regional prices relative to the domestic prices in both the short and long runs.

The study has also found that Malawi's net dairy import trade with Zimbabwe was the biggest in COMESA region seconded by Zambia, especially in the 2000s. However, in the recent years, the net import trade has declined, while net dairy import trade with other COMESA member states has increased in the recent years. Besides, the study results show that COMESA FTA has more trade creating effects than diverting effects to Malawi from dairy product imports, which consequently generate the net gains from dairy and dairy product trade in both short and long runs. The study results also show that exchange rate volatility has a significantly negative impact on dairy imports to Malawi in the short run and no significantly negative effect in long run.

On trade complementarity index (TCI), the results show the effects of COMESA FTA on trade between Malawi and COMESA specifically dairy and dairy products are very high. TCI is 0.944, which shows strong overall complementarity in trade. This large value of TCI suggests effective and favourable trade agreements on dairy and dairy products and that Malawi benefits by trading with COMESA member countries.

## 5.2 Recommendations and policy implications

The study has generated essential information that can be used for drafting policy recommendations and implementation.

### 5.2.1 Policy recommendations deriving from the analysis.

The study recommends that Malawi should invest in national agricultural development projects especially in high-yielding dairy cattle farming to increase or multiply domestic dairy production to meet domestic milk demand. This recommendation is derived from the Autoregressive Distributed Lag (ARDL) model estimates, which show that domestic milk consumption, real national income, domestic milk production and free trade agreement are major factors, which significantly affect the flow of dairy product imports from COMESA region into Malawi in the long run. For instance, the dairy and dairy product imports increase as the domestic milk consumption and real national income increase.

The results also show that the dairy and dairy product imports decrease as the domestic milk production increases. Therefore, there is need for Malawi Government and its development partners to establish large-scale dairy farms and small-scale dairy famers' cooperatives in all the regions or districts of the country to increase local milk production and incomes to offset negative effects of the determinants and meet the domestic milk demand and reduce poverty. There is also a need to provide dairy cattle on credit and free training in good animal husbandry practices to small-scale famers to manage dairy cattle to increase milk production to meet domestic milk demand.

The study also recommends that Malawi should continue negotiating with other COMESA member countries to intensify economic integration by further removing non-tariff barriers such as import or export quotas, rules, restrictions and regulations and custom delays in trade procedures especially in dairy trade in the region. Therefore, there is need to work on tariff and non-tariff liberalisation by removing all trade restrictions on dairy product exports and imports, which can reduce the gains from regional trade arrangement in Malawi. This is derived from the literature as well as the ARDL model estimates, which show that COMESA FTA, i.e. regime switching from pre-COMESA FTA to post-COMESA FTA, has positive and significant effects on the flow of dairy and dairy products imports from COMESA to Malawi in the long run.

### 5.2.2 Policy recommendations on FTA on trade performance and economy

The study recommends that the Malawi Government should develop and implement programmes and policies, which can promote trade creation in the country. This can be achieved not only through further reducing or removing tariffs and non-tariff barriers on dairy trade but also through developing dairy sector through increased investment on modern dairy processing, storage and marketing techniques and training of dairy farmers on technical business skills and management, among others, in all the regions or districts.

The study results show that trade in dairy and dairy products has a great potential of trade creation, which consequently has positive net trade effects in the country if Malawi signs for free trade agreement with other COMESA member countries. Despite that free trade agreement in dairy and dairy products with COMESA trading bloc has created trade and enhanced economic welfare through positive net trade, there is need to do more to boost dairy sector and improve welfare. Therefore, development of dairy sector can increase the value of milk output, which in turn adds value to the dairy and dairy products on the market, thereby increasing incomes (welfare increase) among the people. Furthermore, development of the dairy sector can also increase the availability of dairy products and reduce dependency on dairy and dairy product imports from COMESA, SADC, New Zealand, European Union, and rest of the world (RoW). In other words, there will be a multiplier effect to developing the dairy sector in the country.

### 5.2.3 Policy recommendations related to the trade complementarity

The study also recommends that the Malawi Government and its development partners should train both large- and small-scale dairy farmers to equip them with technical skills on dairying to increase or multiply the dairy output not only for domestic consumption but also for exports. This recommendation is derived from the empirical results of trade complementarity index (TCI) computation, which shows a high trade complementarity. The high TCI suggests the existence of an effective and favourable trade agreement in dairy and dairy product between Malawi and COMESA trading bloc. This shows that Malawi can also benefit more from exporting dairy and dairy products to the COMESA trading bloc than depending on dairy imports in the long run. Therefore, there is need to harness potential market opportunities available in the region for dairy and dairy product exports.

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## APPENDICES

### **Appendix 1** Estimated ECM model and diagnostics tests

ECM=ln*Q* + 9.757lndom*C*-10.646lndom*Prod*+3.129ln*Y*-0.645ln*ExR*-0.243ln*RP*+0.554comesa-34.89
Std. errors: (1.624) (1.700) (0.817) (0.213) (0.210) (0.139) (10.157)

| **Test** | **Test name** | **Hypothesis testing and level of significance** | **Test statistic** | **Prob (p-value) and decision** |
|---|---|---|---|---|
| Serial Correlation of error terms | Durbin-Watson test | Null Hypothesis: Presence of serial correlation<br>Reject $H_0$ if d-statistic >2 | Durbin-Watson d-statistic (9, 29) = 2.1542 | Since if d-statistic >2 (d=2.1542), we reject $H_0$<br>and conclude that there is no serial correlation |
| Functional model specification | Ramsey's RESET test | Null Hypothesis: Model is correctly specified,<br>α = 0.01 (sig. level)<br>Reject $H_0$ if calculated p-value <0.01 (sig. level) | F (3, 20) =4.35<br>Prob> F= 0.0163 | Since the calculated p-value = 0.0163 is more than 0.01 (sig. level), we fail to reject $H_0$ and strongly conclude that the model was correctly specified |
| Normality | Jarque-Bera test | Null Hypothesis: Error terms are normally distributed for all the variables, α = 0.05 (sig. level). | Chi2(12) =14.825<br>Prob>Chi2=0.2514 | Since the calculated p-value = 0.2514 is greater than 0.05 (sig. level), we fail to reject $H_0$ and conclude that error terms are normally distributed |
| Heteroskedasticity | Breusch-Pagan test/ Cook-Weisberg test | Null Hypothesis: Constant variance,<br>α = 0.05 (sig. level)<br>Reject $H_0$ if calculated p-value <0.05 (sig. level) | Chi2(1) =0.53<br>Pro>Chi2 =0.4671 | Since the calculated p-value = 0.4671 is greater than 0.05 (sig. level), we fail to reject $H_0$ and conclude that there has been a constant variance |
| Unrestricted heteroskedasticity | White test | Null Hypothesis: Homoskedasticity,<br>α = 0.05 (sig. level)<br>Reject $H_0$ if calculated p-value <0.05 (sig. level) | Chi2(28) =29.52<br>Pro>Chi2 =0.2882 | Since the calculated p-value = 0.2882 is greater than 0.05 (sig. level), we fail to reject $H_0$ and assert the presence of homoskedasticity |

Source: Own computation based on data obtained from COMESA, 2021; GoM, 2015

**Appendix 2A** Granger causality between dairy product imports and their factors

| Granger causality equation | Coefficient | Std. Err | Adj. R-squared | p-value (autocorrelation test) |
|---|---|---|---|---|
| **(Eq. 1a)** | | | 0.5094 | 0.0425 |
| Dep. Var: lnQ | | | | |
| Constant | 15.82114*** | 2.56005 | | |
| $comesa_{-1}$ | 0.92881*** | 0.21249 | | |
| $lnQ_{-1}$ | $-0.08486^{ns}$ | 0.17519 | | |
| **(Eq. 1b)** | | | 0.8704 | 0.9985 |
| Dep. Var: comesa | | | | |
| Constant | $1.6159^{ns}$ | 1.06607 | | |
| $lnQ_{-1}$ | $-0.10448^{ns}$ | 0.07296 | | |
| $comesa_{-1}$ | 0.99432*** | 0.08849 | | |
| **(Eq. 2a)** | | | 0.2162 | 0.1458 |
| Dep. Var: lnQ | | | | |
| Constant | $4.73912^{ns}$ | 4.43766 | | |
| $lndomProd_{-1}$ | $0.26269^{ns}$ | 0.24927 | | |
| $lnQ_{-1}$ | 0.36789** | 0.17421 | | |
| **(Eq. 2b)** | | | 0.8642 | 0.4255 |
| Dep. Var: lndomProd | | | | |
| Constant | 2.01912* | 1.22913 | | |
| $lnQ_{-1}$ | $0.02630^{ns}$ | 0.04825 | | |
| $lndomProd_{-1}$ | 0.87142*** | 0.06904 | | |

**Note:** ns indicates no significance, ***, **, * indicate 1%, 5% and 10% levels of significance, respectively.

**Appendix 2B** Granger causality test – *continued*

| Granger causality equation | Coefficient | Std. Err | Adj. R-squared | p-value (autocorrelation test) |
|---|---|---|---|---|
| **(Eq. 3a)** | | | 0.2385 | 0.1669 |
| Dep. Var: lnQ | | | | |
| Constant | 0.84816ns | 6.02749 | | |
| $lnY_{\_1}$ | 0.41431ns | 0.29380 | | |
| $lnQ_{\_1}$ | 0.33119* | 0.17613 | | |
| **(Eq. 3b)** | | | 0.9805 | 0.0694 |
| Dep. Var: lnY | | | | |
| Constant | 0.08097ns | 0.58504 | | |
| $lnQ_{\_1}$ | 0.01302ns | 0.01710 | | |
| $lnY_{\_1}$ | 0.98928*** | 0.02852 | | |
| **(Eq. 4a)** | | | 0.2122 | 0.4512 |
| Dep. Var: lnQ | | | | |
| Constant | 4.97415ns | 4.48271 | | |
| $lndomCons_{\_1}$ | 0.25970ns | 0.26588 | | |
| $lnQ_{\_1}$ | 0.35520** | 0.18135 | | |
| **(Eq. 4b)** | | | 0.8430 | - |
| Dep. Var: lndomCons | | | | |
| Constant | 2.43085* | 1.30337 | | |
| $lnQ_{\_1}$ | -0.01464ns | 0.05273 | | |
| $lndomCons_{\_1}$ | 0.88285*** | 0.07730 | | |
| **(Eq. 5a)** | | | 0.280 | 0.6738 |
| Dep. Var: lnQ | | | | |
| Constant | 12.32324*** | 3.04070 | | |
| $lnRP_{\_1}$ | -0.14673* | 0.07532 | | |
| $lnQ_{\_1}$ | 0.22294 | 0.18966 | | |
| **(Eq. 5b)** | | | 0.9646 | 0.8414 |
| Dep. Var: lnRP | | | | |
| Constant | -7.26699*** | 1.64542 | | |
| $lnQ_{\_1}$ | 0.45940*** | 0.10263 | | |
| $lnRP_{\_1}$ | 1.03905*** | 0.40756 | | |
| **(Eq. 6a)** | | | 0.2737 | 0.1077 |
| Dep. Var: lnQ | | | | |
| Constant | 10.16329*** | 2.52309 | | |
| $lnExR_{\_1}$ | 0.11559* | 0.06183 | | |
| $lnQ_{\_1}$ | 0.29544* | 0.17343 | | |
| **(Eq. 6b)** | | | 0.9902 | 0.1816 |
| Dep. Var: lnExR | | | | |
| Constant | 0.88752ns | 0.79228 | | |
| $lnQ_{\_1}$ | -0.03511ns | 0.05446 | | |
| $lnExR_{\_1}$ | 0.96136*** | 0.01942 | | |

**Note:** ns indicates no significance, ***, **, * indicate 1%, 5% and 10% levels of significance, respectively.

**Appendix 3** Trade creation, trade diversion and net trade effects shares (%)

| COMESA member state | 2001 | | | 2003 | | |
|---|---|---|---|---|---|---|
| | **Trade creation** | **Trade diversion** | **Net trade effect** | **Trade creation** | **Trade diversion** | **Net trade effect** |
| **Short and long run shares (%)** | | | | | | |
| Zambia | 1.66 | 0.04 | 2.23 | 1.27 | 0.02 | 1.73 |
| Zimbabwe | 97.16 | 99.94 | 96.18 | 98.68 | 99.98 | 98.19 |
| Other states | 1.18 | 0.02 | 1.59 | 0.06 | 0.00 | 0.08 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| **Year-on-year trade growth (%)** | | | | | | |
| Zambia | -75.27 | -95.36 | -74.58 | 38.56 | 63.69 | 38.46 |
| Zimbabwe | 39..00 | 41.55 | 38.09 | 40.87 | 61.48 | 34.34 |
| Other states | -93.12 | -99.62 | -99.62 | 280.00 | 1131.94 | 279.94 |
| Total | 6.65 | 30.28 | 0.24 | 40.89 | 61.48 | 34.48 |

Data source: Author's calculations using COMESA trade data.

Note: Computation of TCI starts from 2001 since COMESA FTA was launched in that year.

**Appendix 4** Malawi Trade Complementarity Index with COMESA

| Year | COMESA total imports (US$ 'million') | COMESA dairy imports (US$ 'million') | Malawi total dairy exports to COMESA (US$ 'million') | Malawi total exports to COMESA (US$ 'million') | COMESA dairy imp_total imp ratio (A) | Malawi dairy exports_total exports ratio (B) | Abs(A-B) |
|---|---|---|---|---|---|---|---|
| 2001 | 42,650.50 | 269.47 | 0.00 | 79.21 | 0.0063 | 0.0000 | 0.0063 |
| 2002 | 50,040.98 | 512.69 | 0.00 | 48.60 | 0.0102 | 0.0001 | 0.0102 |
| 2003 | 46,959.87 | 443.74 | 0.05 | 70.98 | 0.0094 | 0.0007 | 0.0088 |
| 2004 | 55,709.63 | 399.75 | 1.36 | 104.57 | 0.0072 | 0.0130 | 0.0058 |
| 2005 | 73,147.95 | 520.50 | 0.01 | 45.02 | 0.0071 | 0.0003 | 0.0068 |
| 2006 | 83,500.80 | 519.70 | 0.01 | 77.02 | 0.0062 | 0.0002 | 0.0060 |
| 2007 | 101,291.92 | 674.83 | 0.02 | 183.91 | 0.0067 | 0.0001 | 0.0066 |
| 2008 | 159,579.00 | 1,162.08 | 0.11 | 85.55 | 0.0073 | 0.0013 | 0.0060 |
| 2009 | 137,560.56 | 945.15 | 0.24 | 167.33 | 0.0069 | 0.0014 | 0.0054 |
| 2010 | 164,059.31 | 1,303.44 | 1.41 | 215.56 | 0.0079 | 0.0065 | 0.0014 |
| 2011 | 168,262.05 | 1,336.61 | 2.67 | 312.94 | 0.0079 | 0.0085 | 0.0006 |
| 2012 | 195,429.71 | 1,340.44 | 2.04 | 170.70 | 0.0069 | 0.0120 | 0.0051 |
| 2013 | 199,543.68 | 1,526.93 | 1.52 | 143.78 | 0.0077 | 0.0106 | 0.0029 |
| 2014 | 208,788.17 | 1,769.77 | 0.75 | 603.81 | 0.0085 | 0.0012 | 0.0072 |
| 2015 | 201,907.67 | 1,676.77 | 0.73 | 211.06 | 0.0083 | 0.0035 | 0.0048 |
| 2016 | 186,002.71 | 1,410.86 | 0.14 | 156.29 | 0.0076 | 0.0009 | 0.0067 |
| 2017 | 180,636.58 | 1,080.55 | 0.03 | 132.53 | 0.0060 | 0.0002 | 0.0058 |
| 2018 | 210,895.09 | 1,800.52 | 0.01 | 155.44 | 0.0085 | 0.0001 | 0.0084 |
| 2019 | 211,974.23 | 1,447.00 | 0.00 | 205.81 | 0.0068 | 0.0000 | 0.0068 |
| | | | | | [Sum of absolute variances]/2 | = | 0.0559 |
| | | | | | TCI | = | 0.9441 |

Data source: Author's calculations using COMESA trade data.
Note: Computation of TCI starts from 2001 since COMESA FTA was launched in that year.

**Appendix 5** Structural break in Malawi's dairy imports trend

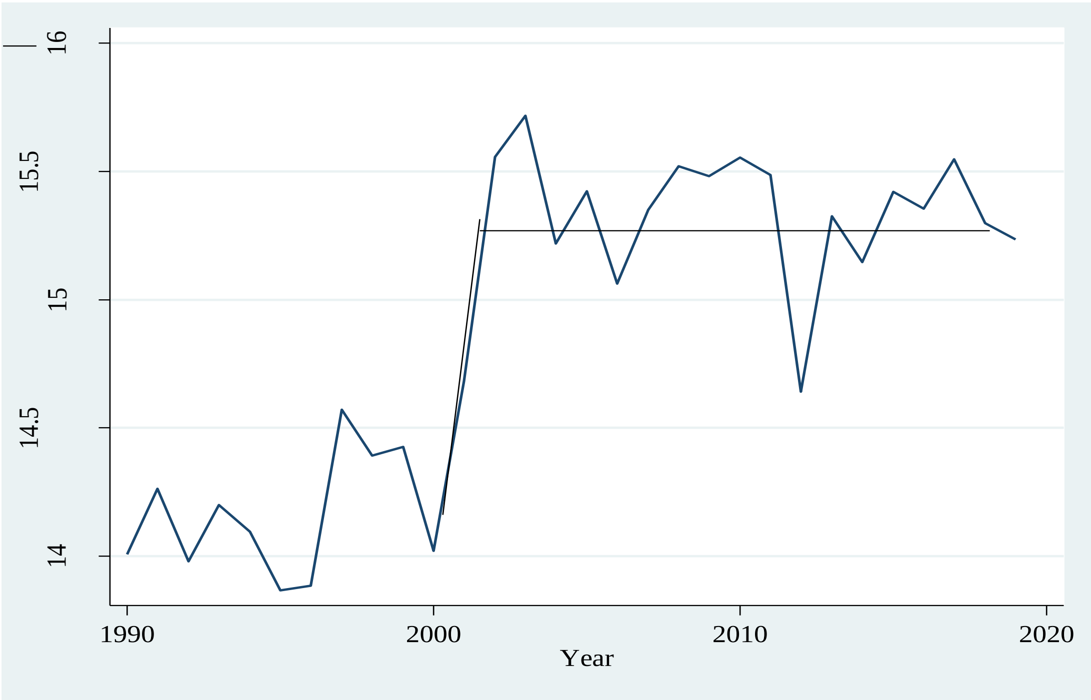


**Figure 4.1** Structural break in Malawi's dairy imports trend

Source: Own computation based on data obtained from COMESA, 2021; GoM, 2015