Economic Reforms and Product Market Integration in Developing Countries: An Empirical Investigation Using Retail Prices in Zambia

By

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Abstract

In spite of extensive trade reforms, markets for goods and services are not fully integrated across countries. Less appreciated also is that product markets within countries are frequently not integrated. Barriers to trade within countries are shown to be as important in preventing product market from integrating as barriers between countries. This evidence of within-country market segmentation is largely based on data from developed countries. Yet market segmentation is likely to be greater between and within developing countries that face large infrastructure, trade facilitation, tariff and other regulatory barriers than between and within developed countries. This thesis uses newly obtained micro-price and tariff data to extend the price-based empirical evidence of product market integration in a developing country, namely Zambia, by examining the influence of trade costs, tariff reform and tradability on internal price dispersion. The main aim of this thesis is to examine how internal trade costs and exposure to external competition affect domestic prices and internal product market integration using Zambia as a case study of a developing country in Sub-Saharan Africa. The empirical analysis is conducted in four inter-related papers. The thesis chapters are organised as follows:

The first chapter provides the general introduction of the thesis. The second Chapter documents the background to the International Monetary Fund and World Bank initiated stabilisation and structural adjustment reforms implemented by Zambia since the late 1980s. The focus of the chapter is on documenting in detail the trade liberalisation programme adopted over the period 1987 to 2011 using a highly disaggregated product-level tariff dataset constructed from primary sources, such as the Government Gazettes. This data is then used to document the extent to which the country opened up to external competition initially through multilateral reform and later through regional trade agreements. This chapter sets the scene and foundation for the later chapters, which unpack the link between tariff reform and domestic prices.

The third chapter empirically investigates the extent of internal market integration in Zambia across districts, products and time using the law of one price as a theoretical benchmark. It draws on a unique product level database of monthly regional prices from 1993 to 2011 that are collected from the Central Statistics Office of Zambia. The chapter presents a descriptive

analysis of this data. In addition, it presents a cursory assessment of how trade reforms are associated with the observed trends in internal price dispersion using simple econometric estimates.

The results show that product prices vary substantially across regions in Zambia, although the mean size of the price gaps is lower for products that are more tradable. Large price gaps are consistent with the presence of high trade costs that prevent internal markets from integrating. The chapter reveals that these deviations from the LOP persist over time despite the dramatic economic reforms undertaken over the period. However, a statistically significant but economically small association between tariff reforms and price convergence is found. This suggests that trade reform may have facilitated some integration of the internal product market.

The fourth chapter of this thesis presents a more rigorous analysis of the sources of intranational price dispersion in Zambia. Following international literature, the mean absolute deviation in prices across regions is regressed on bilateral distances and various product, region and time specific characteristics. The chapter then extends the available literature in a number of ways. Firstly, it addresses concerns regarding the downward bias of the distance coefficient arising from the inclusion regional price pairs where markets are not integrated (Atkin & Donaldson, 2014; Anderson et al., 2013). It does so by testing the sensitivity of the distance coefficient to different distance cut-off points. Secondly, it extends the estimation to include factors unique to Africa, such as ethnic diversity and regional income inequality which may be associated with regional price differences. The role of product tradability in explaining the heterogeneity in market integration across products found in chapter three is also analysed. Finally, in line with the overall objective of the thesis, the chapter examines how exposure to external competition, as measured by the proximity to external borders, affects internal price dispersion and product market integration.

The chapter reveals that distance plays an economically strong and statistically significant role in explaining price level differences across districts in Zambia. The distance effect is larger than found for advanced economies, indicating higher internal trade costs in Zambia. Other factors also influence internal market integration. Price differences are amplified by differences in the price of nontraded inputs and district-level incomes, but are attenuated by ethnic similarities. In addition, exposure to international competition is found to be an important determinant of internal product market integration. The results show that the greater the share of traded goods in total output, the lower the price gaps between regions. Furthermore, price gaps between regions along major trading borders tend to be lower than between regions within the country.

Chapter five interrogates the relationship between external competition and internal product market integration suggested in chapter four. It does so by using the detailed product level data to analyse how product prices within Zambia adjusted to tariff reductions over the period 2001 to 2010. A standard pass-through model is first used to investigate the extent to which domestic prices on average respond to tariff reductions. The model is then adapted to capture the differential product price effect of tariff reductions across regions within the country. Unlike other studies, there is little evidence in this study that show that the tariff pass-through to prices falls the further a region is from the border. Rather, what appears to be more important is distance from the major transport route. The further a region is from a major transport route, the lower the pass-through of tariff reductions to local retail prices. The results also indicate a higher pass-through of tariffs for more tradable products in highway regions compared to regions off highways.

Overall, market integration within Zambia remains low, pointing to the potential large gains in welfare from policies that reduce transactions costs between regions. Tariff liberalisation has been effective in reducing prices. It is, however, less effective in regions not directly accessible by main highways. Improved transport infrastructure will therefore not only increase internal market integration, but also enable the realisation of gains from international trade. In doing so, this thesis adds to this literature by measuring the extent of within country trade costs or price dispersion and investigating their determinants unique to the African context using disaggregated price level data.

Declaration

I, *Dale Siamulandabala Mudenda*, declare that this thesis is my own work that the material included in this dissertation is the result of new research, and other sources have been acknowledged through referencing. I also declare that this thesis has not been submitted for a PhD degree in any another university.

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I also thank conference participants at the African Economic Research Consortium (AERC) biannual (Group D), the Economic Society of South Africa (ESSA), the ERSA international trade and geography workshop-2014, the Private Enterprise Development in Low-Income Countries, Warwick (UK) Workshop-2013 and London-2014 conference for their useful comments and suggestion.

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All errors are my own.

Dedication

To my wife, Mphatso, and our children Chileleko, Mukuzike, and Twapegwa
and
to my parents, Maria and late Zachariah S. Mweetwa

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List of Acronyms

AERC	African Economic Research Consortium
BOP	Balance of Payment
CCCN	Customs Cooperation Council Nomenclature
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
CSO	Central Statistical Office
EAC	East African Community
EIU	Economist Intelligence Unit
ERSA	Economic Research Southern Africa
GRZ	Government of the Republic of Zambia
GDP	Gross domestic Product
HS	Harmonised System
IMF	International Monetary Fund
ISI	Import substitution Industrial
LCMS	Living conditions monitoring survey
ISIC	International Standard Industrial Classification
LOP	Law of One Price
MFN	Most favoured nation
PEDL	Private Enterprise Development in low-income countries
PPP	Purchasing Power Parity
QRs	Quantitative Restrictions
PTA	Preferential Trade Area
RSADC	Rest of Southern Africa Development Community
RSA	Republic of A South Africa
RTA	Regional Trade Arrangement
SACU	Southern Africa Customs Union
SADC	Southern Africa Development Community
SAP	Structural adjustment Programme
SITC	Standard International Trade Classification
SSA	Sub Saharan Africa
SOE	State Owned Enterprise
WB	World Bank

Chapter 1

1. General Introduction:

1.1. Background and Motivation

Since the 1990s, there has been unprecedented surge in economic reforms and regional integration efforts especially in developing countries. The reforms were, in most cases, driven by the structural adjustment and stabilisation programs under the auspices of the World Bank and International Monetary Fund (IMF). The main objectives of the reforms were to promote macroeconomic stability, promote exports, liberalise foreign trade, rationalise public expenditure and encourage the activities of the private sector (Greenaway et al. 1997). Central to the trade reforms was the requirement that economies reduce barriers to trade and government distortions on product markets, including price controls.

The surge in external economic integration schemes has stimulated interest in theoretical and empirical research on various economic outcomes, such as economic growth (Dollar & Kraay, 2002; Frankel & Romer, 1999) and firm responses to resource allocation, including productivity growth, entry and exit (Bas, 2012; Melitz & Ottaviano, 2008; Melitz, 2003; Pavcnik, 2002). Other studies have looked at labour market outcomes like employment, poverty and inequality (Kovak, 2013; Nicita, 2009; Topalova, 2010) and the geographical location of economic activities (Fujita & Mori, 1996; Overman, et al., 2003; Sanguinetti & Martincus, 2009) among other issues.

The key mechanism behind all these dynamics and outcomes is the effect of trade reforms on prices. Prices provide appropriate signals for resource allocation. In addition, in imperfectly competitive markets, economic reforms bring additional benefits by increasing competition and, at the same time, reducing the prices faced by consumers (Tybout, et al., 1991)[1]. In trade theory, particularly the neoclassical model, an intensification of trade should lead to an equalisation of prices across countries that trade with each other. This relationship is often

[1] This effect is consistent with the shrinking ability of firms to price discriminate within and a cross countries in a competitive market.

assumed to hold on aggregate or at national level, thereby treating countries as internally integrated and regions within these countries as homogenous.

However, this implicit assumption in standard trade theory of a uniform effect of trade policy shocks across regions within a country is questioned in the theoretical and empirical literature. Theoretically, the New Economic Geography literature suggests that regions within countries and their interaction with external environment differ, implying that locations matters in how consumers and firms respond to external reforms (Fujita et al., 2001; Fajgelbaum & Redding, 2014). In theory, this suggests that trade liberalisation will have a differential impact across regions within a country. As in international economics, economic outcomes from trade reform of each region will therefore differ and regional specific factors will affect the transmission of trade shocks.

Empirically, established evidence show that product markets remain segmented across and even *within* countries, in spite of the implementation of internal economic and trade reforms to enhance competitiveness and integration (Knetter & Slaughter, 2001). This theoretical and empirical evidence raises the questions, if internal market integration is low, can we expect trade reforms to lead to a transformation of the economy or can it lead the gains from trade to be fully realised? In addition, trade liberalisation may, on one hand, induce greater internal product market integration by exposing domestic firms to international competition that could transcend the internal barriers inhibiting product market integration. This study explores these questions further, thereby contributing towards a deeper understanding of the extent and sources of product market integration in the context of Africa.

While there is some evidence that product market markets are not perfectly integrated, most conclusions are based on a common methodological approach: gauging market integration using observed trade flows in a gravity model. However, this approach is problematic for a number of reasons. First, trade flows are not observable within countries. Second, even across countries, trade flows in most developing countries and particularly SSA are strongly influenced by factors unrelated to openness, such as government expenditure, exchange rates and donor funding (Edwards & Rankin, 2012; Parsley & Wei, 2003).

An alternative is the price-based approach to measuring market integration using the law of one price as a theoretical benchmark. The approach holds that changes in market integration is reflected in prices between markets whether trade occurs or not and the potential for arbitrage dictates how far apart prices can diverge (Parsley & Wei, 2003). Many studies have examined the validity of the law of one price (LOP) and purchasing power parity (PPP) mainly across advanced countries (Engel & Rogers 1996; Bergin & Glick, 2007; Foad, 2010; Gopinath et al., 2011).

More recently, studies have tested the validity of LOP within countries. These studies include Chen and Devereux (2003) and Parsley and Wei (1996) for the U.S., Ceglowski (2003) across Canadian cities, and Fan and Wei (2006) for China. As in international studies, these studies find that LOP does not hold even within countries. Most of the existing price-based analyses of product market integration have so far focused attention on advanced economies. In contrast, very little research on this area has been conducted in developing countries, particularly Africa, mainly because of the scarcity of product-level price data.

1.2. Limitations of Available Literature

There are a number of limitations of the existing empirical research. Firstly, few studies have focused on emerging countries where barriers to market integration are expected to be higher. The exceptions include studies by Aker et al., (2014), Aker and Fafchamps, (2014), Brenton et al., (2014), Balchin et al., (2014); Nchake, (2013) and Versailles, (2012) which examine price integration across borders in Africa. The scarcity of such studies necessitates further insight into product price dispersion within and across borders.

Secondly, virtually all studies focused on Africa look at the border effects, that is, product market integration between countries and not integration within countries. For example, Brenton et al., (2014) examine the border effect across East and Central African countries, while Aker et al., (2014) consider the border effects across the Nigeria and Niger. Large deviations are also found by among others Versailles, (2012) across five Eastern African Community (EAC) member states for the period 2004 to 2008 and Balchin et al., (2014) across SADC member states. Edwards and Rankin, (2012) also find LOP deviations among 12 African cities. In these studies, the price gaps are large between regions within countries. This suggests that internal trade costs are inhibiting product market integration *within* countries as well[2]. However, little is known about market integration across regions within countries in Africa, although, like in the context of international economics, gains from trade based on the comparative advantage are influenced by the extent to which regions are integrated.

The third issue closely related to the above is that there is limited research on the size and determinants of price gaps within emerging economies and Africa in particular. As a unique region with large barriers to internal market integration, the sources of market integration may also be influenced by its uniqueness, such as ethnic linkages (Aker et al., 2014) and income inequality. These issues remain unexplored and unique to the region, thus further research as added dimensions to the existing literature is warranted. If these factors generate internal borders across regions within African economies, then price gaps will also be high.

Finally, few studies have explored the impact of policies aimed at enhancing international integration, such as regional trade arrangements and customs unions on regional integration across selected African countries (Nchake, 2013; Versailles, 2012; Balchin et al., 2015) and others in multi-country studies that include African countries (Parsley & Wei, 2003). In addition, while the theory suggest that policy reforms affect internal prices, the impact of exposure to international competition and trade, particularly tariff reforms on internal market integration, has not been fully explored.

Overall, there are several limitations in the existing literature. These include, among others, little evidence of within country integration, focus on advanced economies, the impact of policies aimed at enhancing regional integration on domestic prices and limited research on the impact of sources of integration unique to Africa. Research on these issues in Africa has been constrained by the lack of the requisite micro price data and long-time series of product-

[2]The key exceptions include Parsley and Wei (1996), Crucini et al. (2008), Ceglowski (2003), Fan and Wei (2006) . In Africa, Atkin and Donaldson (2014) measure the size of trade costs within countries using price gaps.

level tariff information. This thesis resolves these constraints in the case of Zambia by constructing from raw sources a micro-price database that is merged with detailed product-level tariff data. This data is used to analyse product market integration within Zambia and how this relates to tariff reform and exposure to international competition. To the best of our knowledge, this is the first attempt to explore the effect of trade reforms and exposure to international competition on internal product market price integration in the African context.

1.3. The Aim of the Research

This thesis aims to empirically examine how internal trade costs and exposure to external competition affect domestic product prices and internal product market integration within Zambia.

1.4. Objectives of the thesis

To study had four key objectives that form empirical chapters around which this thesis is structured. The first objective is to analyse the extent to which the Zambian economy has been exposed to external competition through internal economic and trade reforms. Given the focus of the thesis on the micro level, such an analysis requires disaggregated tariff data by product and time that is not readily available for Zambia. To overcome this shortcoming, the thesis constructs and analyses the newly constructed annual tariff dataset at 8-digit level of the Harmonized System (HS) from primary sources. We also construct a tariff dataset for the most favoured nation (MFN) and various preferential trade arrangements that the country is signatory to. These comprise the Common Market for Eastern and Southern Africa (COMESA) and Southern African Development Community (SADC). The new dataset contributes towards resolving the problem of limited availability of disaggregated tariff usable in measuring trade reforms. The data are used to measure the extent of the country's exposure to imports and also track and extend the documentation of trade policy changes that have occurred in detail. Lastly, the thesis draws on transactions level import data to measure the degree to which preferential trade agreements have altered trade flows and, consequently, the effectiveness of the preferential tariff reductions in exposing the economy to international competition.

The second objective of this research is to collect and analyse micro price data to measure the extent to which product markets are integrated within Zambia. A unique micro panel dataset of monthly retail prices comprising over 270 products is collected for 28 districts in Zambia over the period January 1993 to December 2011. The database is constructed from unpublished sources obtained from the Central Statistics Office of Zambia. The data are used to present stylised facts about product market integration in Zambia.

This analysis is structured around the objective of determining the extent to which markets are integrated. In particular, three dimensions of price dispersions and market integration are analysed: first, the extent to which prices differ across districts or intranational trade costs; second, product-level heterogeneity in price dispersion; and finally the extent to which prices have converged to the LOP over time. These indicators are then compared with the results of comparable studies in other countries. Next, the price data is used to presents a cursory assessment of how trade reforms are associated with the observed trends in internal price dispersion using simple econometric estimates.

The third objective is to estimate some of the determinants of product market integration in Zambia, taking into account particular characteristics of African economies. The analysis considers the role played by various trade costs as well as exposure to external competition in driving internal market integration.

To achieve this, the study first evaluates the role of transportation costs in driving internal price integration as in standard literature. Secondly, it assesses the sensitive of the estimates of distance to sample selection biases. Thirdly, it establishes the extent to which factors unique to Africa, such as ethnic diversity, remoteness and regional income inequality, influence internal price integration across regions. Finally, in line with the overall objective of the thesis, further examines how exposure to external competition, as measured by product tradability and proximity to external borders and ports, affect internal price dispersion and product market integration.

In achieving this objective, the thesis contributes to the literature in four main ways. First, while the infrastructural and regulatory barriers to trade within and between African economies are well documented (Limao and Venables, 2001), it extends the literature by using the regional variation in produce prices to estimate the size of the trade costs associated with these barriers. This gives insight into the relative role that trade costs play in inhibiting the integration of product markets in Africa.

Secondly, it extends the standard models that focus on distance as the primary indicator of trade costs to incorporate Africa-specific features that influence price differences across locations. These include the influence of ethnic diversity and the dispersion of per capita expenditure on internal price dispersion. Further, in contrast to previous studies, it makes a methodological contribution by addressing concerns regarding downward bias of the distance coefficient arising from the inclusion of regional price pairs where markets are not integrated. We do this by testing the sensitivity of the distance coefficient to different distance cut-off points. This is essential for approximating the true impact of trade costs on market integration, which remain underestimated in standard models (Anderson et al., 2013).

This research further provides the first attempt to explore the empirical link between exposure to international competition, product tradability and the influence of tariff reforms on domestic prices and price differences across regions within a landlocked and developing country in SSA. While these countries continue to pursue trade policy changes, this study provides insight into the effectiveness of tariff reform in driving economic outcomes through the price transmission channel and how this may vary by region using Zambia as a case study

The fourth objective of this research is to investigate the effect of the liberalisation of tariffs on internal product market integration. To achieve this objective, the thesis draws on the preferential import tariffs imposed on South Africa, which is Zambia’s primary source of imported goods under the SADC Trade Protocol to identify the impact of tariffs on domestic prices. The tariffs cuts across products were largely exogenous since their phase-down was in accordance with phase-down schedules offered prior to the onset of tariff reform by each country under the SADC Trade Protocol. Under the agreement, 85% of the tariff lines were to be reduced to zero by 2008, while the other 15% by 2012.

The analysis establishes the relationship between tariffs and product prices in Zambia in three ways. First, a standard pass-through model is used to investigate the extent to which domestic prices on average respond to tariff reductions. This analysis also gives insight into how integrated the Zambian economy is in the international environment. The second analysis extends the standard pass-through model to capture the differential pass-through of tariffs to domestic retail prices across geographic area. The study also tests the sensitivity of these results to different measures of location. Finally, it evaluates how product heterogeneity affects the pass-through of tariffs. To achieve the analyses (i.e., tariff pass-through at various levels) the thesis develops an analytical model using the Cobb-Douglas price determination equation.

As a contribution to empirical evidence, the thesis measures trade costs in the context of developing countries and establishes the linkage among transportation costs, internal borders, exposure to external competition, trade policy reforms and price gaps within a developing country in the context of SSA. This provides insights into how internal factors and external shocks influence internal market integration that, until now, has not been fully explored.

Overall, the thesis identifies and responds to two broad policy concerns. First, the thesis establishes the size of trade costs and how these inhibit price integration is indicative of regulatory, internal borders and/or infrastructural barriers to trade within a country. These results highlight the need for policies to reduce internal trade costs whilst accounting for unique factors such as ethnic linkages. Secondly, governments have actively engaged in regional integration schemes while empirical studies largely look at the border effects as a detriment to gains from trade based on comparative advantages of each country. Yet, internal price barriers may imply that gains from trade may not be fully realised, as lower tariffs are not fully transmitted to domestic prices.

By analysing the transmission of tariffs to domestic prices, this thesis provides policy makers some insights into the effectiveness of tariff reforms and exposure to international competition in driving changes within the economy. Therefore, understanding these linkages is important for policy makers as complementary policies, such as infrastructural policies and regulatory reforms, are required to ensure the effectiveness of the tariff reform programme.

1.5. Organisation of the thesis

The remainder of the thesis is structured as follows. Chapter 2 constructs a detailed product level tariff dataset and documents an in-depth review of the extent to which trade reforms opened up the domestic markets to international competition. Chapter 3 presents the unique product price dataset and measures the extent to which product markets are integrated and how price dispersion may relate to changes in trade policy. Chapter 4 analyses the determinants of product market integration, including distance, ethnic similarity and income inequality, and how exposure to external competition affects internal price behaviour. Chapter 5 examines the differential effect of tariff reforms on internal price integration. Chapter 6 presents the conclusion and policy implications of the thesis.

Chapter 2

2. The Extent and Nature of Trade Liberalisation in Zambia:

2.1. Introduction

The 1980s and 1990s saw many African economies initiating market oriented economic reforms including trade liberalisation. The pressure to reform largely emanated from the multilateral financial institutions, particularly the International Monetary Fund and World Bank under their policy-based lending programs. By the 2000s, most SSA countries that implemented stabilisation and structural adjustment programmes in the 1980s had also significantly opened up their economies to external competition. The effect of the trade reforms was a considerable reduction in tariffs as they fell from 27.1% in 1995 to 13.1% in 2006 (Jones et al., 2011). These trade reforms effectively opened up most of the economies, hence, putting to an end decades of industrial policies anchored on the import substitution strategy.

Zambia liberalised trade during the early 1990s after a hesitant start in the mid-1980s. The reforms reshaped the formally closed command economy into a relatively open one. Quantitative restrictions (QRs) to trade and price controls were removed. At the same time, export promotion activities, aimed at removing the anti-export bias, were introduced. The foreign exchange policy, which anchored government's trade and industrial policy through selective allocation of foreign exchange was liberalised. The simple average most favoured nation tariff rate fell from 28% in 1992 to 13.4% in 1996. This is an average within the Sub Saharan African average. By 1997, the International Monetary Fund noted that Zambia was "one of the most liberal trade regimes in Africa, thereby setting a positive example to other countries"(IMF, 1997).

While unilateral reforms stalled in 1996, the liberalisation agenda continued through regional trade arrangements. In 1993, Zambia signed the Common Market for Eastern and Southern Africa (COMESA) trade protocol, which required member states to completely liberalise trade by 2000[3]. In 1996, Zambia signed the Southern African Development Community (SADC) trade protocol and committed to attain 100% free trade area (FTA) with all member states by 2004[4]. Under the same protocol, the country was to attain an FTA with South Africa by 2008 and completely liberalise all preferential trade by 2012. In addition, Zambia has actively participated in the Economic Partnerships Agreement negotiations aimed at forming an FTA with the European Union. Clearly, trade libealisation has been an ongoing process over the last three decades. This may have led to a significantly lower level of nominal protection across the bulk of Zambia's trade.

Despite the major strides the country has made to reform its trade policy, there is little evidence of the precise extent to which these reforms lowered protection levels at the product level and how this impacted competitive pressures on the economy. Existing studies on the subject, such as Musonda and Adam (1999) and World Bank (1984), only provide general documentation of the trade reform at a broad sectoral level over the period up to 1995. They ignore the effect of the reforms at the product level. The studies also do not measure the effect that the preferential trade agreements have had on protection levels.

This chapter presents a general overview of the economic reforms, with a focus on tariff liberalisation, implemented by Zambian authorities from the early 1990s. It provides a comprehesive documentation of the actual trade reform implemenented over the past two and half decades. The core of the chapter is an in-depth analysis of the nature and degree of protection based on various nominal tariff measures across industries and over time.

The chapter contributes to the the existing literature in serveral ways. Firstly, a new and highly dissagregated MFN tariff database is constructed to enable a clear documentation of Zambia's reform process at the produt level for the period 1986 to 2011. In the past, this has not been feasible due to the lack of electronically available annual tariff schedules that is required to undertake such analyses. This constraint is overcome by using primary official

[3] COMESA has 19 members: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Egypt, Kenya, Madagascar, Libya, Malawi, Mauritius, Rwanda, Seychelles, Sudan, South Sudan, Swaziland, Uganda, Congo DR, Zambia and Zimbabwe.

[4]SADC member states: Angola, Botswana, Congo DR, Madagascar, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Seychelles, Tanzania, Zambia and Zimbabwe.

sources comprising government gazzettes, statutory instruments, and Customs and Excise Acts that report changes in tariff rates and other trade policy measures at HS 8-digit linked to SITC 6-digit level[5]. The dataset is used to assess and document the extent and nature of the various phases of the trade liberalisation that Zambia underwent from 1986-2011.

Secondly, using the same nomencleture, the chapter constructs and incorporates the various preferential trade arrangements into this database. It features product level tariff rates for three preferential trade arrangements that the country participates in (COMESA, SADC and South Africa). The richnesss of the data allows for a more detailed analysis of how unilateral and preferential trade reforms have openned up Zambia to international competition.

Finally, this chapter contributes to the literature by measuring the degree to which the preferential trade arrangements have altered trade flows and, consequently, the effectiveness of the preferential tariff reductions in opening up the economy to regional competition. The chapter uses import transaction data which documents under which tariff programme the imports from regional partners enter into Zambia. This contrast with other literature that often erroneously assumes that all goods from FTA members enter under the preferences. This, however, is frequently not the case as imports from preference partners need to satisfy rules of origin requirements, which are often prohibitively restrictive (Flatters, 2005).

The remainder of the chapter is organised as follows. The next Section 2.2 sets the scene by highlighting the structure and direction of Zambia's trade structure. Section 2.3 describes the data and methods used to analyse trade openness in the chapter and is followed by section 2.5 that provides a historical overview of the unilateral trade reforms in Zambia that commenced in the late 1980s. In Section 2.6, we provide an analysis of preferential tariff reform and explores the extent to which these have opened up the Zambian economy to regional trade. Section 2.7 concludes the chapter.

[5] The SITC –six digit level for 1986 to 1991 and HS-eight digit level for 1992 to 2011.

2.2. Structure of Trade

Zambia's trade policy since 1991 aims at liberalising the economy to higher openness with external trade accounting for an average of 63% of GDP (33% for imports and 29% for exports) between 1995 and 2010. The country's structure of exports organised around the International Standard Industrial Classification (ISIC) is presented in Table 2.1. The exports are very concentrated with basic metals –Zambia's traditional exports (copper and cobalt) accounting for 86% in 1995 and 77.5% in 2010 while mining had its share in total exports increased from 0.68 in 1995 to 6.4% in 2010.

Table 2.1 reveals that the main non-traditional exports over the study period comprised foodstuffs and beverages, agriculture, textiles and fabricated metals (Table 2).

Table 2.1: Commodity Composition of Exports for selected years (1995-2010)

	Share of exports to the world (%)				**Average Annual Growth (%)**	
ISIC Rev 2	**1995**	**2000**	**2005**	**2010**	**1995-2000**	**2005-2010**
Agriculture	0.94	6.90	9.99	3.09	44.0	4.2
Mining	0.68	2.14	5.09	6.31	21.7	37.5
Food, beverages & tobacco	2.15	5.40	7.25	3.44	16.2	13.5
Textiles, apparel, footwear & leather	3.45	5.01	3.44	0.18	4.2	-26.6
Paper and paper products	0.05	0.71	0.99	0.20	63.8	-4.1
Rubber and Plastics	0.18	0.14	0.39	0.31	-8.2	25.4
Wood and wood products	0.13	0.42	1.02	0.20	23.0	-4.7
Chemicals (basic and other)	0.55	0.65	1.24	1.93	-0.1	43.9
Basic Metal	86.26	64.22	58.07	77.73	-8.9	39.6
Fabricated metals and machinery	0.67	8.98	9.31	3.91	62.6	10.7
Transport equipment	0.54	0.39	0.10	0.29	-9.6	62.1
Non metallic	0.78	1.40	0.55	1.11	8.6	51.3
Other	3.62	3.64	2.56	1.31	-3.6	21.2
Total US$	1054882	889963.9	1808876	7175326	-3.3	31.7

Source: Own calculations using raw data from Customs Office (ZRA)

Table 2.2 shows that the geographical concentration of exports has changed since 1995. In 1995 EU[6] (18.1%) Japan (13%) and the SADC (13.2%) and rest of the world (RoW) (51%)

[6] Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, French Guiana, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, St. Helena, Sweden and the United Kingdom

absorbed most of the exports in 1995. By 2010, China[7] and Switzerland (transit of copper destined for China) overtook the EU and Japan as the main destination of Zambia's main export –copper which has rapidly grown since 2001, swamping the share of non-traditional exports in total trade. The SADC region has remained the largest market for non-traditional exports such as processed food (sugar and maize), textiles and tobacco and fabricated metals, which mainly consist of copper wires. The main export destinations in SADC are Zimbabwe, Congo DR, Malawi and Tanzania in processed food, copper wires and maize while South Africa absorbs cotton textiles, Copper and other base metals.

Table 2.2: Destinations for Exports for Selected years (1995-2010)

	Share in total exports (%)				Average Growth (%)	
Country/Region	1995	2000	2005	2010	1995-2000	2005-2010
EU	18.1	51.2	24.1	4.1	28.8	-7.6
SADC	13.2	29.0	39.7	18.3	18.0	12.8
COMESA	2.0	1.3	0.8	1.6	7.7	50.7
Switzerland	0.3	11.7	28.7	51.2	95.9	47.9
China	0.7	0.3	2.2	20.3	-21.8	104.6
Japan	13.0	4.0	1.6	0.1	-71.1	-25.3
Others	51.6	2.4	2.7	4.4	-48.8	44.8
Total (US$000)	1,054	889.9	1,808.0	7175	-3.3	31.7

Source: Own calculations using raw data from Customs Office (ZRA)
Note: COMESA –excludes members that overlap with SADC.

Turning to imports, Table 2.3 shows that Zambia's imports have grown across sectors over the study period. Although imports are concentrated in machinery and fabricated metals chemicals and papers and paper products, they are more diverse across subsectors than exports. The import structure has remained consistent between 1995 and 2010. The intermediate inputs such as chemicals- such as fertilisers and petroleum imports (average of 20%), fabricated metals (average 19%) and machinery and equipment (average of 10%) make up the largest share of the import bill. These are also among the fastest growing imports in the country. This pattern is consistent with Zambia's relative comparative disadvantage in these products, but are critical inputs on the country's expanding mining industry.

[7]We included Hong Kong and Taiwan in China

Table 2.3: Commodity Composition of Imports for selected years (1995-2010)

					Average Annual Growth (%)	
Industry (ISIC rev2)	1995	2000	2005	2010	1995-2000	2001-2010
Primary	**19.9**	**5.7**	**9.4**	**27.1**	**10.7**	**1117.8**
Agriculture	6.3	3.1	2.8	0.8	15.4	30.2
Mining	13.5	2.6	6.6	26.4	6.1	2205.4
Manufacturing	**80.1**	**94.3**	**90.6**	**72.9**	**44.0**	**96.8**
Food beverages	5.3	5.8	4.3	4.2	34.5	77.2
Textiles Apparel	3.0	6.1	3.1	1.9	63.7	49.1
Wood and wood products	1.1	1.8	1.1	0.8	53.0	67.7
Paper and paper products	3.5	10.8	12.5	1.7	96.6	18.7
Rubber and Plastics	3.2	2.1	4.7	2.6	20.4	148.5
Chemicals	15.2	28.0	22.3	19.4	58.2	103.2
Non metallic	1.5	1.9	1.6	1.4	40.8	65.3
Basic Metal	5.1	4.1	4.8	9.1	25.4	246.3
Fabricated metals, machinery	23.0	14.9	19.7	19.4	20.4	121.5
Transport equipment	13.7	10.3	8.8	7.3	23.7	89.5
Other	5.7	8.5	7.7	5.0	47.4	77.5
Total Imports (,000)	688,448	867,153	2,419,314	5,244,108	31.5	124.9

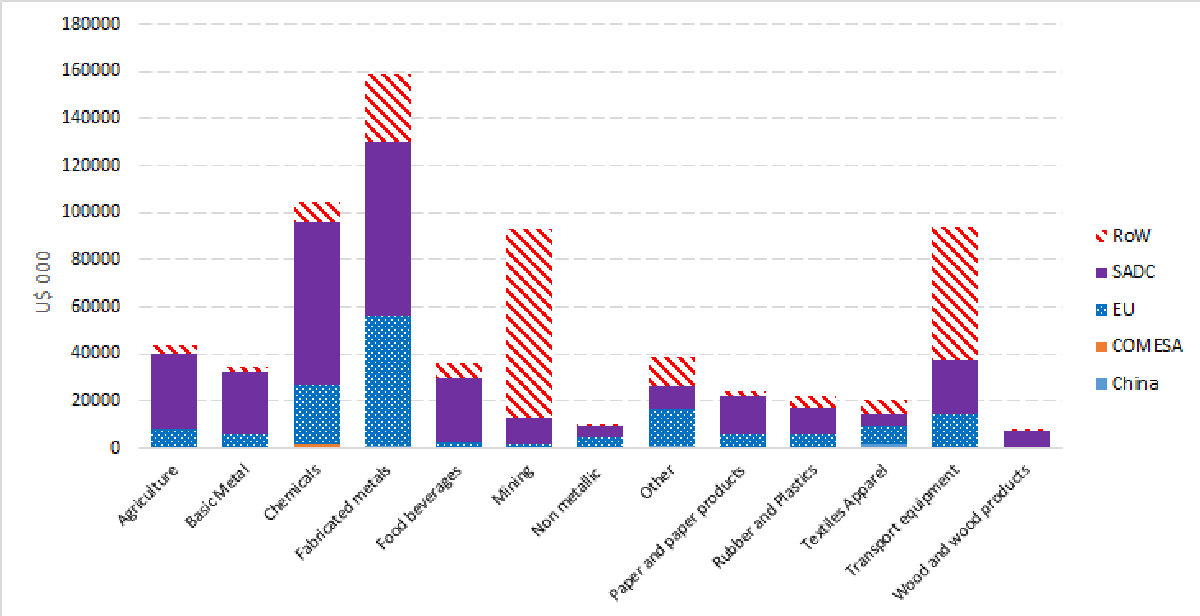
Source: Own calculations using raw data from Customs Office (ZRA)

Looking at the sources of imports, data shows that imports are relatively concentrated with SADC, which supplied an average of 57% (over 87% of this is sourced from South Africa), followed by the EU, accounting for 21 % and the RoW, providing about 18%. The imports from COMESA (non-SADC overlapping members) and China remain below 10%.

Figure 2.1 shows the imports by industry aggregates and by trading partner for 2007. The SADC region is a dominant source of imports accounting for over 50% of the food, beverages and tobacco (57%), agricultural product (87%), paper and paper products (71%), rubber and plastics (60%), wood and wood products (74%), basic and other chemicals (73%) and basic metals, transport equipment (67%). These products are mainly sourced from South Africa, the most industrialised member of the SADC region. The EU, dominated by the United Kingdom, is the second largest supplier of machinery and fabricated metals (24%), other manufactures (32%) of imports to Zambia. For imports of textiles, mining, fabricated metals and transport equipment, not only are the EU and SADC regions the main sources but also RoW remain key sources. The RoW accounted for 38% of mining related imports, 35%

of textiles and apparel, 35% of rubber and plastics and 22% of the transport and equipment subcategories.

Figure 2.1: Imports patterns by commodity group and trading partner group (2007)



Source: Own construction using raw data from Customs Office (ZRA)
Note: COMESA in this figure excludes states that are overlapping with SADC

Despite their small shares in the overall imports, the Chinese share of imports is slightly higher in fabricated metals (14%) and textiles (15%) while COMESA supplied up to 29% of food beverages and tobacco in 2007.

This section has established that Zambia's trade has recently grown with exports rising more than seven fold from US$887 million in 2000 to US$ 7.17 billion in 2010. Similarly, imports have risen from US$867 million in 2000 to US$5.2 billion in 2010. Until after 2007, the trade balance has however been negative because of large imports of capital equipment in the mining sector. The export structure has remained concentrated in copper mainly destined for China (at the expense of Japan) and the SADC sub-region for most non-traditional exports. The bulk of the imports are sourced from the SADC region particularly South Africa. The EU is also a key source of sophisticated and capital goods.

In the next section, we explore the extent to which the country has opened its imports to external competition through liberalisation. Before making this analysis, we first present the data and methods.

2.3. Tariff Data construction and Methods

This section discusses the data construction and analytical methods used to analyse the extent to which Zambia has liberalised its trade.

2.3.1. Data construction

This study applies an intensive data collection process to construct a unique database of actual applied tariffs from primary sources. The data collection process involves reviewing all published annual and supplementary Customs and Excise Acts that document all official tariff changes applied by authorities often as part of the annual budgetary process. It also involves reviewing various Statutory Instruments (SIs) affecting tariffs with respect to exemptions for development purposes and associated activities. These Acts record changes at the most disaggregated level of nomenclatures. These form the basis of the data collection and compilation of this thesis. Since the data is recorded in Customs Acts, it was manually inputted into excel for onward analysis. The process involved reviewing and keying up to a potential average of 3000 tariff lines per year between 1986 and 1991 and about 6000 tariff lines per year between 1992 and 2011 based on the annual tariff revisions as part of the budgetary process. The details of the specific sources of annual tariff changes are given in Appendix A2.1.

The main source of the preferential tariff dataset under the SADC trade arrangement is the official Customs electronic database for the years 2001 to 2007[8]. The data was updated manually to 2011 using official government gazette statutory instrument number 103 of 2007 and the Customs and Excise Amendment Act No 2 which documents the phasedown

[8] These are adjusted for any new rates announced as part of the annual budgetary process.

programme. The COMESA trade liberalisation schedule is constructed based on the phasedown programme that provided for uniform tariff cuts across products every two years. The tariffs are reported at product level under nomenclatures that changed over the study period. Prior to 1992, the tariff rates were recorded under the Customs Cooperation Council Nomenclature (CCCN) and the Standard International Trade Classification (SITC) revision 2 tariff nomenclatures. In 1988, government adopted the Harmonised System (HS) of the tariff nomenclature, which became operational in 1992. Subsequent tariff schedules reported in various Acts are based on the 1996 and 2007 revisions of the HS-8-digit level.

To consolidate the data and make it comparable across years, we first generate a concordance mapping of various revisions of the post 1988/1992 HS codes to HS 1988/1992- 6-digit level for the period 1992-2011. Then we produce new concordance mapping by merging the HS 1988/1992 to international standard industrial classification (ISIC) and SITC- revision 2 with the nomenclatures for the period 1986 to 2011. The concordance is developed using the World Integrated Trade Solution (WITS documentation). The same concordance is used for both unilateral and preferential tariff structures.

The actual tariff structure in the period 1986-1991 comprised of ad valorem, specific, and mixed tariff rates. The presence of mixed and specific tariffs rates pose a constraint on the calculation of average tariffs. To resolve this problem, ad valorem equivalents were computed for each of the tariff lines. For mixed lines bearing alternate tariffs (for example, butter 25% or K85 whichever is greater), use is made of the ad valorem tariff rate in the analysis. In case of specific tariffs, international prices from various sources, including the World Development indicators and World Bank commodity prices, were used to calculate ad valorem equivalent rates[9]. In cases where we could not get international prices to convert specific tariffs into ad valorem equivalent rates, the specific tariffs were excluded from the analysis. Through this process, we excluded an average of 8% of the tariff lines each year between 1986 and 1989. Only ad valorem equivalent tariff rates are used.

[9] The ad valorem equivalent tariff rate is computes as $\tau_{ave} = (\frac{\tau_{specific}}{p}) * 100$ where p is the international price.

In the period 1986-1991, the tariff structure was comprised of ad valorem, specific, compound, and mixed tariff rates. For example, in 1988, the structure was such that 64 food and beverages tariff lines and 167 other manufactures tariff lines had non-ad valorem tariff rates. Importers of agricultural products required special licences. All non ad valorem tariff rates were eliminated in 1992 as part of the simplification of the tariff structure. However, alternate tariffs were re-introduced in 2001/2002 on 80 tariff lines (and 136 tariff lines in 2004) which include, among others, wheat flour, butter, clear beer, sugar and sweets.

One concern with preferential tariffs is that they only apply to products that meet the requirements of the rules of origin. Thus, average tariffs may not provide an accurate measure of the extent to which preferences have opened up the economy. To accurately capture this dimension, we use transactions level import dataset that runs from 2002 to 2011obtained from the Customs Authority, Zambia Revenue Authority. The data covers all transactions and records. These include the product classification, the value and quantity shipped, the date of the shipment, the source country and the trade preference used to import the product into the country. This information is used to capture the exact number of goods that enter the country under each preference.

2.3. 2. Weighting Methods Issues

The use of tariffs as measures of trade protection is well established in literature (Greenaway & Milner, 2003; Kee et al., 2009). The various methods of calculating average rates protection, however, involves choices and trade-offs. The commonly used aggregation procedures to measure nominal protection are: the simple average, the import weighted tariff rates and, most recently, the trade restrictiveness index.

The simple averages are obtained by adding tariffs on all lines and dividing it by the total number of tariff lines. Each tariff line is, therefore, considered to be equally important in calculating the average tariff line, irrespective of its share in imports biasing the weights. For example, low tariffs on economically meangless goods would bias simple averge tariff downwards (Lee et al., 2007). Despite the bias, it has a computational advantage.

An alternative approach is a weighted average tariff that takes the form of equation 2.1:

$$\tau = \sum_{k} w_k t_k \qquad (2.1)$$

where k indexes the imported good, t_k is the tariff rate and w_k is the weight. The weighting corrects for the relative importance of pproducts. However, the problem with this measure of protection is that high protection rates lead to low import volumes and, therefore, will be attributed small weights in an import weighted aggregation. This biases the restriveness of those tariffs (Irwin, 1998; Kee et al., 2009).

Another measure is the *trade restrictiveness index* (TRI) developed by Anderson and Neary (1994) which takes weights as increasing function of import shares and elasticities of import demand at the tariff line level. The aim of the measure is to capture the importance that restrictions on these goods would have on the overall restrictivenes.

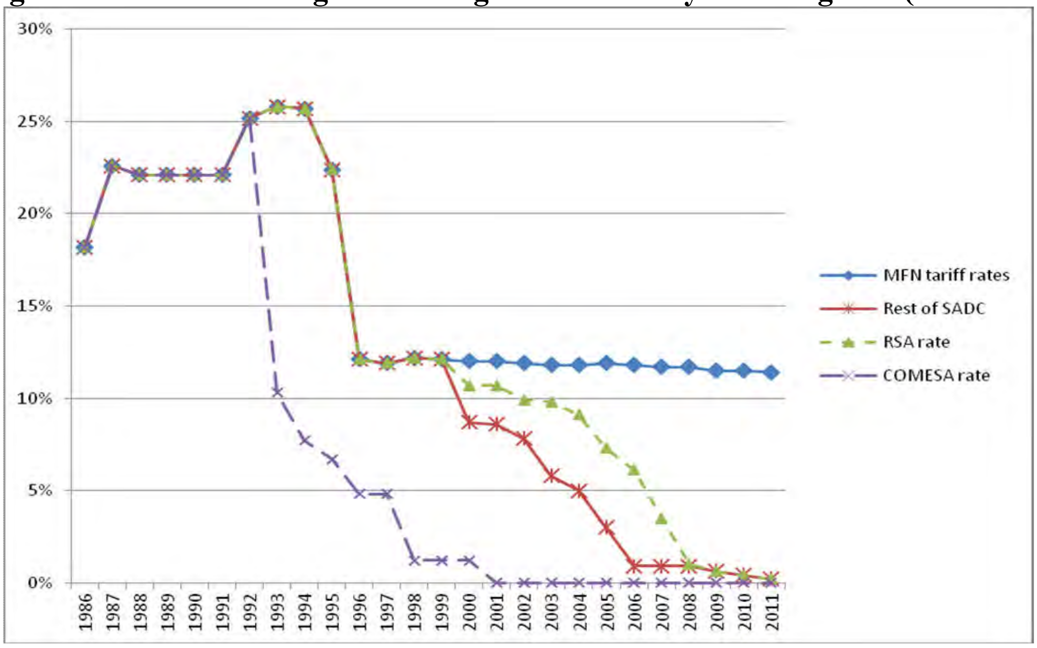
This chapter uses the simple and import weighted average tariff rate to measure the degree of import protection. The import weighted MFN and preferential tariffs rates are weighted using the 2000 imports values the year before the SADC trade protocol was mooted. A similar analysis is extended to the preferential trade arrangments. However, using the total imports from partner countries to weighing the preferential tariffs may lead to a dowmward bias in the calculated tariff rate. To tackle this problem, we use the transaction data to identify the value of imports entering Zambia under the regional trade preferences. The trade values are then used to calculate a simple weighted average tariff applied on imprts from preferential trade arrangements. The weighting scheme uses import for the period 2009-2011, which concides with the attainment of the FTA.

2.4. Trade Reform in Zambia

This section reviews the trade regimes Zambia has pursued since independence. A major emphasis is made on the post 1990s developments in trade liberalisation. The country has made several trade policy reforms under unilateral and preferential trade that reshaped the former closed command economy into a relatively open market based economy. The key trade policy regimes are depicted by the trends in tariff reforms displayed in figure 2.2. The regimes include the unilateral trade policies represented by the MFN regime and the preferential trade policy under the Common Market for Eastern and two asymmetrical reforms under the Southern Africa and the other SADC members.

This section presents a brief description of Zambia's trade policy since independence with emphasis on unilateral trade reforms. For the purposes of this chapter, the post-independence period is divided into two three waves of trade policy reform. The first subsection looks at the trade policies and reforms from 1964 to 1991. This is followed by the period 1992 to 1996 and, finally, the period 1992 to 1996 after which the MFN reforms stalled. The preferential trade policies are presented in section 2.5.

Figure 2.2: Trend in weighted average tariff rates by trade regimes (1985-2011)



Source: Author's construction based on the constructed Tariff database
Note: all tariff rates weighted by the world import values for 2000.

2.4.1. Trade Policy up to 1991: An Historical Overview

This section reviews the trade policy changes up to 1991 based on sub periods above.

2.4.1.1. Imports substitution industrialisation from 1964 -1983

At independence in 1964, the new Zambian government inherited a relatively open mining based economy. The immediate economic objective of the new regime was to diversify the economy away from mining to industrial and agricultural production as alternative sources of economic growth to sustain employment. The import-substitution industrialisation (ISI) strategy was adopted as centrepiece of the development effort. The ISI had to achieve other national goals that included regional development and employment creation.

Following the disruption of trade with Zimbabwe and South Africa, which were relatively more industrialised, self-reliance become an extra key objective of the ISI. The targeted sectors included food and beverages, clothing and textiles, wood and paper industries as well as chemicals. In 1968, the government, through the 'Mulungushi Reforms', introduced a nationalisation policy and a system of industrial licencing that regulated the entry and expansion of existing firms[10]. Mines were also nationalised while Zambianisation was introduced as a means of creating employment opportunities for local people (WB, 1984).

For most of the period between 1968 and 1975, government protected the IS industries using a variety of trade policy instruments that included high tariffs, nontariff barriers, quantitative and exchange controls implemented to varying degrees. The tariff policy modelled around protecting IS industries had nominal tariff rate ranging from 0 to 150%. The products that were deemed essential, the capital and heavy intermediate goods, had zero tariff rates, while intermediate goods attracted an average duty rate of 10%. The tariffs on consumer durable goods ranged from 50% to 100%, while tariff rates for products seemed luxurious, such as vehicles and furniture, were set into the range of 100% to 150% (Musonda & Adam, 1999). According to the World Bank, (1984), calculations effective rate of protection varied between (negative) -20% and 1250% for individual activities.

[10] The 1968 were announced under the 'Mulungushi reforms' which gave government the right to take over private businesses (by acquiring 51% shares or more) and not only nationalise but Zambianise (replace foreign managers and employees with Zambian staff) them as well. The government created an apex of the holding company - the Zambia Industrial and Mining Corporation to oversee the industrialisation process, while the mining development corporation oversaw the mining sector.

Up to 1974, government policies contributed to favourable economic growth averaging at 4.1% boasted by good copper prices and industrial diversification. The state driven manufacturing sector grew at an annual average of 11% between 1968 and 1975, contributing up to 18% of GDP (Faroutan, 1993, 1991; Kydd, 1988). The industrial production became increasingly diversified from the dominance of food and beverages in 1965 to wearing apparel and textiles, wood processing and chemicals, such as fertiliser and mineral products, by 1975 (World Bank, 1984). This period coincided with relatively high copper prices that generated enough resources for government to heavily invest in the nationalised enterprises. The result was a large structure of state owned enterprises, which required a huge amount of foreign exchanges to run.

In the period 1974 and 1983, the country suffered three shocks that eroded the initial gains. The first shock was the fall in the copper output and the collapse of the copper prices on the world market. This shock was exacerbated by the deterioration in the terms-of-trade, which resulted from the sharp rise in import prices of inputs such as oil. These shocks increased the cost of production and triggered a revenue and foreign exchange crisis (World Bank, 1984).

Second, the country's geopolitical stance compounded these external shocks. The military conflicts in Zimbabwe, Angola, and Mozambique together with the hardening attitude towards the apartheid regime in South Africa led to the closure of the shortest trade routes and the disruption of imports and exports to and from the nearest sources (Musonda & Adam, 1999). This subsequently increased transport costs for the country's imports and exports. The final shock came from government's initial response to the deterioration in the terms-of-trade. Deeming the fall in terms-of-trade to be temporal, government reduced its investment and increased its external borrowing while maintain high levels of consumption. This generated a balance of payment (BOP) crisis, which compounded the situation (Musonda & Adam, 1999).

Because of the shocks, the economy could not generate enough foreign exchange to meet the import bill as well as revenue to sustain the SOEs. The industries cut down on their production because they could not import raw materials, spare parts, and equipment due to shortages of foreign exchange. This created some excess capacity in industries and hurt the highly capital-intensity production structure of the economy (World Bank, 1984).

The government responded to the deterioration in the economy that occurred between 1975 and 1983 by extending the controls on the economy. Imports were further restricted using a number of tactics including introducing a complex import licencing system and exchange controls, quantitative restrictions (QRs), complex bureaucracy of import authorisation and firm specific import limits based on strict good-by-good foreign exchange allocations. In addition, retail price controls were gradually introduced throughout the 1970s and 1980s. While these policies were broadly meant to avert the BOP crisis, IS sectors were affected differently according to the country's industrial policy objectives.

These policy instruments, particularly the foreign exchange controls, were influential over decisions made regarding capacity expansion, new investments, production for domestic or foreign market, and the choice of the production technique (Foroutan, 1993; Hawkins, 1991; World Bank, 1984). The Import Licensing Committee that met on a quarterly basis had at their discretion the power to control the level of imports and the condition under which the goods were imported. The government did this by controlling the use, rate, and allocation of foreign exchange to importers on a product-by-product basis in line with government priorities[11]. There were two official exchange rates, a lower one applicable to state owned enterprises, which had the priority, and a higher rate for the private sector. Exporters had to surrender all the foreign exchange to the central bank for re-allocation according to the nation's needs. The state owned import and export corporations imported the bulk of products perceived as necessities and had retailing rights (World Bank, 1984).

The ISI policy could not reduce the import bill. The country depended on foreign trade because almost all sectors needed to import capital and some intermediate inputs. Moreover, overvalued exchange rate encouraged imports and discouraged exports (Musonda & Adam, 1999; World Bank, 1984). This exacerbated the crisis, resulting in huge budget deficits and

[11] The exchange rate was largely overvalued and actually served as the main instrument of import protection. This rendered the tariffs ineffective.

BOP crisis. The economic growth anchored on high copper revenue slumped. Between 1974 and 1978, the per capita income declined by 44%, state revenues declined by more than half, while the foreign debt stood at more than 195% of the GDP (Foroutan, 1993).

2.4.1.2. Unilateral Trade Liberalisation Efforts 1983 -1991

By 1983, the external BOP position and macroeconomic crisis worsened while foreign reserves were depleted. Without additional foreign reserves, the ISI policy became unsustainable. Economic adjustment was inevitable forcing government to turn to the International Monetary fund (IMF) and the World Bank (WB), whose loans attached conditions that required government to undertake some stabilisation and structural adjustment programme. The government embarked on a gradual external liberalisation of foreign exchange controls, the removal of QRs, and tariff reform with a goal of correcting price distortions. The core reforms since 1983 are listed in Table 2.4.

After adopting the adjustment programme, the government's first trade liberalisation strategy focused on dismantling the foreign exchange controls that served as the most binding trade policy instrument. Between 1983 and 1984, the government embarked on foreign exchange liberalisation by devaluing the kwacha. The currency was devalued by 30% in 1983 and 70% in 1984. At the same time, exporters of non-metal products (non-traditional exports) were allowed to retain 50% of the foreign exchange earnings for their use in 1984 (Hawkins, 1991; Musonda & Adam 1999). The objective of this policy was to promote private sector led exports.

In 1985, the foreign exchange market was further liberalised by the introduction of a weekly auction system for all foreign transactions by commercial entities. The scarcity of foreign exchange led to a rapid depreciation of the local currency, which filtered to consumer prices, making them economically and politically unpopular (GRZ, Budget Addresses 1983-1985; IMF, 1997). The reference prices for non-essential products were removed to make the market more competitive.

Table 2.4: Chronology of Trade and Related Policy Reforms (1983- 2011)

Policy Measure	Implementation
A. Exchange Controls	1983: Exchange rate delinked from SDR and pegged to a basket of major trading partners' currencies and the kwacha was devalued by 20% 1984: Exporters were allowed to retain 50% of export earnings 1985: Foreign exchange auction (Dutch Auction system) introduced with allocation being approved by Ministry of Trade and Industry, while manufacturer's rebates were removed 1987: reforms suspended, reintroduced price controls, external debt service limited to 10% of the export earnings 1989: Kwacha devalued by 65% and fixed the rate to US dollar 1990-91: Dual exchange rate system re-introduced. There was an official window one for parastatals allocated by FEMAC at a fixed rate and a second window -managed float, for open general licensing (OGL). Investors allowed retaining 100% of their foreign exchange earnings. 1991-92: All imports subjected to OGL in second window. The two window were unified at market clearing rate. 1992: The exchange rate was fully liberalised and exporters were allowed to retain 100% of their foreign exchange earnings. The OGL list switched from positive to negative. Bureaux legalised for current account transfers (1992). 1993: Exchange control act abolished, OGL eliminated 1994: Capital account completely liberalised
B. Quantitative Trade Restrictions	1983-85: Quantitative restrictions eased 1987: QRs re-introduced to the pre-1986 levels 1991-92: Government removed all quantitative controls with the liberalisation of OGL However, the Import of most agricultural products require licences for sanitary phytosanitary reasons[12]
C. Tariff Reforms	1985: Tariff shifted the previous FOB to CIF maximum and minimum tariffs changed (1985 Budget) 1986-87: Initiated tariff increases on selected capital and intermediate inputs 1987-88: All tariffs reverted to pre-reform levels. 1990-91: Duty levied on all zero rated imports and removes all mixed tariff 1992: Tariff schedule reduced slabs from 12 to 9 and the maximum tariff was reduced from 150% to 100% 1993: The tariff rate reduced from the maximum of 100 to 40% also reduced the tariff categories from 9 to 6 1994: Ratified the COMESA tariff reduction 1995: Introduced a 5% import declaration fee on the value of imports with value exceeding S$500 for fiscal reasons but eliminated the 4% forklift fee. 996: Rationalised the tariff structure from 5 to 4 tariff bands with a minimum of 0% and a maximum of 25%. Inputs continued enjoying their duty free status and duty on capital equipment for agricultural purposes was reduced to 0% from 20%. – Duty on other raw materials and inputs was reduced from 20% to 5% while duty on intermediate goods was reduced from 30% to 5%. – The final goods had the highest tariff rate at 25% having been reduced from 40% 1996: Imports by government and other organisations that were previously duty free were to attract duty – A minimum duty of K500,000 on used cars was to be charged and a specific duty on reconditioned car tyres at a K500 per kg. Threshold for cars increased to K2m in 2001 – Petroleum feedstock attracted a levy of 5% while VAT exemptions on copper were removed

[12] However, authorities tends to arbitrarily ban imports of some products not necessarily for health reasons, for example, wheat and flour (Under statutory 18 of 2009). It also revoked a chicken import licence earlier granted to Shoprite in March 2012.

	1998: Specific duty rates for imported sugar, soft drinks, edible oils, beer, batteries and flour introduced as alternatives to ad valorem rates (based on whichever generated more revenue) 1998: Import declaration fee abolished 1999: Duty on agricultural machinery and equipment, as well as veterinary mendicants Suspended 2006: Reclassified a number of inputs used in food, clothing, shoe, paint making, and reduced duty on them while duty on textiles inputs suspended. At the same time duty on polyester and cotton fibres was increased from 15% to 25% 2008: Export taxes imposed on copper concentrates and cotton seeds, levy increased from 15% to 20% in 2009
D. Regional Trade Arrangements	1981: Founder member of PTA for East and Southern Africa, which metamorphosed into COMESA in 1994. Ratified the FTA protocol in 1993 and implemented it in 2001 1982: Became a contacting party to GATT and founder member of WTO in 1995 1992: Original member of SADC. In 1992, Signed the Trade protocol in 1996 and has since 2000 been implementing the FTA phase down process. Zambia is also a member of the special SADC –MMTZ 1996: Government set the intra-COMESA tariffs at 40% of the MFN rates through SI No 13 1996: Government signed the SADC FTA protocol and initiated implementation in 2000 2000: Granted African Growth and Opportunity Act (AGOA) eligibility giving Zambia quota and duty free market access to the USA for 4600 products until 2015 2000: Signed the Contonou Agreement that replaced the successive Lome Conventions paving way for Economic Partnership Agreement (EPA). Government initialled the EPA agreement in 2007 2000: Became Everything But Arms (EBA) eligible granting Zambia free market access to the EU for all products except for arm 2000: Acceded to the COMESA Free Trade area – Zambia is eligible for generalised System of Preferences for: Canada, Norway, Finland, Switzerland, Sweden and Japan, 2001: Effects the tariff phase down for category A products under SADC and completed the COMESA tariff phase down to 0% by SI no 52 of 2001. 2008: Implemented the SADC FTA (except south Africa)
E. Other Policies Affecting Exports	1986: Export board of Zambia established to promote non-traditional exports 1990 : Duty draw back initiated 1994 : Duty draw back scheme reviewed to simplify it 1995: Introduced export taxes on unprocessed timber and scrap metal 2002: Government passes the export processing zones Act 2005: Investment promotion, privatisation agency and export promotion agencies amalgamated into the Zambia Development agency 2006: Multi-facility economic zones passed (replacing the export processing zones act) and operationalised in 2007

Source: Updated from Musonda and Adams (1997) using various budget addresses and Customs and Excise Amendment Acts.

During the 1984/85 fiscal year, further external liberalisation measures set to make the trade regime more transparent were initiated. The strategy focused on the tariffication of QRs and conversion of specific and mixed tariffs into ad valorem equivalents (GRZ, 1984). Further reforms looked at reducing tariff exemptions and the maximum rates. The minimum tariff was increased to 10% from 0%, while the maximum was reduced from 150% to 100%. With a total of 2860-tariff lines in 1986, the economy-wide simple average tariff stood at 21.7%.

These reforms were short-lived. The newly introduced auction system lacked credibility, was poorly organised and poorly managed (Musonda & Adam, 1999). With a deregulated market, industry could pass price increases to consumers following the devaluation of the kwacha. The product prices rose rapidly and the macroeconomic crisis exacerbated. The cost-of-living index rose by 24.4% in two months after the devaluation, while firms started laying off workers (Hawkins, 1991). This triggered protests against the government, forcing it to terminate the reforms and sever its relationship with the IMF (Kydd, 1988). Previous controls on prices and licensing were largely re-introduced between 1987 and 1988. A two-tier foreign exchange auction system, one for government agencies and the other for the private sector was introduced in mid-1987.

Following the reversal of the IMF led reforms; a new economic recovery programme aimed at growing the economy from its own resources was announced in 1987. This new policy set to discourage the use of imported capital-intensive production methods (especially capital equipment that accounted for 75% of the import bill) in preference to cheaper and labour intensive technologies to avert the foreign exchange shortages (GRZ, 1988). To achieve this objective, authorities increased the tariff rates on selected capital and intermediate inputs. Table 2.5 presents detailed information the MFN import tariff structure. Lack of data on the pre-1986 structure constrains the analysis of the early tariff reforms.

The 1987 changes shown in table 2.5 did not significantly alter the tariff structure from that of 1986. The new policies led to an increase in the number of international tariff spikes (tariffs > 15%) from 43.5% to 51% in 1986 and 1991 respectively. The number of domestic tariff spikes (tariff > three times the simple national average) remained at 4%. The dispersion of tariff rates measured by the coefficient of variation dropped significantly from 1.35 to a modest of 0.96 over the same period, suggesting a reduction in the across sector tariff variations. Some QRs were converted to tariffs. Although this raised the unweighted average tariff rate from 21.3% to 27.9% (equivalent to a change from 18.2% to 22.2% of the import-weighted tariff), the reduction of QRs may have led to the fall in the restrictiveness of import barriers.

Table 2.5: Import (MFN) Tariff Structure selected years (1986 – 2011)

	1986	1987	1991	1992	1995	1996	2000	2005	2010	2011
Total Tariff Lines	2860	2923	2986	5921	5940	6101	6128	6204	5992	6157
Share of Tariff Lines										
Less than or equal to 0% (% all lines)	14.3	13.5	13	2.4	18.5	20.5	20.5	21.7	23.3	23.0
0% < #lines ≤ 5%	0.04	0.04	0.11	0.1	0	14.5	14.7	14.5	13.9	13.7
5% < #lines ≤ 15%	41.9	37.6	38.9	44.3	0	33.7	33.2	32.9	31.6	30.5
15% < #lines ≤ 25%	7.4	4.9	3.6	2.4	31	31.3	31.7	31.0	31.2	32.8
More then or > 25%	36.3	44	43.9	50.8	50.5	0	0	0	0	0
Total	100	100	100	100	100	100	100	100	100	100
Domestic Tariff peaks (% all lines)[A]	4	4	4	1.0	0	0	0	0	0	0
International tar spikes (% all lines)[B]	43.5	49	51	53.2	81	31.3	31.7	31.0	31.2	32.8
Coefficient of variation [C] (%)	1.35	0.96	0.96	0.57	0.56	0.69	0.70	0.71	0.73	0.73
Simple Average tariff rate (%)	21.2	26.5	27.9	28.4	25.1	14.1	14.1	13.9	13.6	13.5
Import weighted average Tariff (%)[D]	18.2	15	22.2	25.2	22.4	12.1	12.0	11.9	11.5	11.4
Tariff Bands	15	15	15	9	4	4	4	4	4	4
Ad valorem (%)	91.5	92	94	100	100	98.7	97.8	97.8	97.8	97.8
Non *ad valorem* (%)	8.5	8	6	0	0	1.3	2.2	2.2	2.2	2.2
Range of tariff rates	0-150	0-150	0-150	0-100	0-40	0-25	0-25	0-25	0-25	0-25

Source: Own construction using raw tariff data described in the data section

Notes: The number of tariff lines from 1986 to 1991 was based on the SITC revision 2 nomenclatures and thereafter under the harmonised system at 8 digit. t-stands for tariff, A- these are tariffs three times more than the overall simple average tariff rate , B- those exceeding 15%, simple average is based on ISIC Nomenclature, C-is the standard deviation divided by the mean of the scheduled MFN tariffs D- total world imports for 2000 were used to weight the tariffs at ISIC revision 2 level .

As Table 2.6 shows, the tariff increases involved both agriculture and manufacturing. The unweighted average tariff rate on agriculture increased 16.4% to 30% representing a 4.8% increase between 1986 and 1991 respectively. The average on manufacturing rose by 2.4% from 21.8% to 28.6%. The heterogeneity in tariff increases is evident in Table 2.6. The food-processing sector experienced the largest increase of up to 22% possibly due the tariffication process. The rest of other sectors had increases of less than 5%.

The industry level data shows that the sectors that had developed during the IS policy, such as food, beverages, textiles and wearing garments, wood products and fabricated metals retained the highest levels of protection with simple and trade weighted tariff rates exceeding 30% in 1991. The least protected industries comprised the mining sector (13.7%), basic metals (12.2%), the rubber and plastics (15.3%) and machinery (17.1%).

Table 2.6: Simple and Weighted MFN Protection by ISIC Sector (1986-1991)

Industry (ISIC)	Unweighted 1986	Unweighted 1991	Unweighted Total change[A]	Weighted tariffs[B] 1986	Weighted tariffs[B] 1991	Weighted tariffs[B] Total change[A]
Agric. Forestry and Fish	***16.4***	***30.0***	***4.8***	***18.4***	***24.2***	***2.1***
Agriculture	14.0	20.3	2.3	18.1	23.1	1.8
Forestry	10.8	27.8	6.2	10.8	28.2	6.3
Fishing	32.5	53.6	6.4	32.5	53.6	6.4
Mining	10.1	13.7	1.4	9.8	10.5	0.3
Manufacturing	**2.8**	**28.6**	**2.4**	**17.6**	**21.6**	**1.5**
Food	27.4	31.8	1.5	22.5	26.1	1.3
Beverages	7.5	79.9	22.4	5.8	69.5	20.5
Tobacco	100.0	89.1	-2.4	100.0	89.1	-2.4
Textiles	25.7	30.2	1.5	20.0	25.4	1.9
Apparel	46.7	58.9	3.5	46.7	58.9	3.5
Leather Prod	25.0	25.0	0.0	39.4	39.4	0.0
Footwear	22.2	27.8	1.9	22.2	27.8	1.9
Wood Prod	36.7	49.5	3.9	58.3	61.0	0.7
Paper products	19.3	20.3	0.4	17.6	19.0	0.5
Print &Publishing	10.2	20.3	3.8	10.2	20.3	3.8
Chemicals	14.1	18.0	1.5	8.6	10.4	0.7
Coke and Petroleum	10.2	21.7	4.3	12.0	21.0	3.4
Rubber and Plastics	11.6	15.3	1.4	14.7	17.9	1.2
Non metallic	15.6	21.5	2.2	15.1	21.2	2.2
Basic metals	11.0	12.2	0.5	11.5	13.0	0.6
Fabricated metals	29.7	32.1	0.8	16.2	19.4	1.2
Machinery	17.8	17.1	-0.3	20.2	18.4	-0.7
Equipment and other	23.3	25.1	0.6	28.4	30.3	0.6
End Use Broad Classification						
Capital goods	23.2	24.1	0.3	25.5	25.6	0.0
Intermediate	17.0	23.5	2.3	14.7	19.2	1.7
Consumption	30.0	39.0	2.9	29.3	35.6	2.1
Other goods	21.4	25.1	1.3	23.6	24.6	0.3

Source: Own calculations from Raw tariff data

Note: A- calculated as: $\log((1+t_1)/(1+t_0))$ *where t_1 and t_0 are period 2 and periods 1 and tariff rates; B –weighted by the global import values for 2000*

Compared to capital goods, tariff increases were higher for consumer and intermediate goods. For example, tariffs increased from 30% to 39% for consumer goods (2.9% increase), 17% to 23.5% for intermediate goods (2.3% increase) and only 23% to 24% for capital goods (0.3% increase). By the early 1990s, the tariffs were as high as they were in the early 1980s, suggesting a rise in the effective protection of the economy after the initial policy reversals compared to what obtained during the SAP implementation period. The effective protection was strongest in consumer goods. Taking the tariffs together with the removal of the trade barriers, the economy between 1987 and 1991 was as closed as it was in the pre-1983 reforms.

Overall, the results on tariffs suggest that by 1991, the economy was as closed as it was in the early 1980s. However, the relaxation of QRs and import and foreign exchange controls remain key policy changes that may have exposed the economy to external shocks.

2.4.2. Crisis Induced Unilateral Trade Reform post 1991

After years of hesitation and sluggish trade reforms, due to lack of political will, a new pro-market government came to power in October 1991, replacing the socialist party in an election. The new leaders undertook to accelerate the implementation of the market-oriented policy reforms within the structural adjustment framework. Trade liberalisation became the cornerstone to resolving the external and internal disequilibria through the acceleration of export growth to overcome the foreign exchange constraint (GRZ, budget address, 1992). The details of these reforms are presented in Table 2.4.

2.4.2.1. Rationalisation of tariff schedule: 1992-1995

In 1992, trade reform measures directed at making the trade regime transparent were implemented. The measures consisted of a credible liberalisation of the exchange rate, removal of QRs on imports, privatisation of SOE, and direct promotion of exports through fiscal and investment incentives like tax holidays to new investors. Quantitative restrictions were immediately removed, which effectively reduced the number of products subject to import licensing. The foreign exchange market was liberalised. The dual auction exchange rates were unified into a market-determined rate. The foreign exchange auction system was abandoned and firms retained the right to keep 100% of their export earnings. By 1994, the capital account was fully liberalised.

A number of adjustments to the tariff structure were also implemented[13]. A detailed Harmonised System (HS) of tariff nomenclature replaced the original CCCN and SITC revision 2 tariff schedule. The immediate effect of this reform was to increase the number of tariff lines from 2986 in 1991 to 5921 in 1992. The number of tariff rates at eight-digit of the harmonised system for 1992 and the subsequent years are presented in Table 2.5. The maximum tariff fell from 150% to 100%, but most of the previously duty free rates increased to 15%. This reduced the number of duty free tariff lines from 13% in 1991 to 2.4% in 1992. The number of the tariff bands fell from 12 to 9, while domestic tariff spikes were eliminated. However, the share of international tariff spikes marginally increased from 51% to 53.4%.

The implementation of the Harmonised System and associated tariff changes raised the level of protection in the economy. The nationwide weighted average tariff rose from 22.2% to 25.2% in 1991 and 1992 respectively. However, the tariff dispersion, as measured by the coefficient of dispersion, remained at 57% due to the increase in the minimum and a reduction of the maximum tariff rates. The weighted average tariff rate for the agricultural sector rose from 24.2% in 1991 to 35.1% in 1992. Weighted average tariffs in manufacturing rose marginally from 21.6% to 24.3%.

There was substantial heterogeneity in the change in tariffs across manufacturing subsectors. For example, the sectors that had the highest protection in 1991, such as wearing apparels, tobacco and beverages, experienced mild declines while the other sector had mild tariff increases (Table A2.2 in the appendix shows these detailed statistics). The weighted average tariff rate on capital goods declined by 2.2%, while those on intermediate goods and consumer goods increased by 1.3% and 1.8%, respectively. This suggests that the economy on average experienced a rise in effective protection in 1992.

In the period, 1993-95, tariff reform continued with the goal of simplifying the tariff system and reducing the dispersion of tariff rates across products. The number of bands, the range, and exemptions narrowed. The highest tariff rate was dropped from 100% to 50% in 1993

[13]The negative list of restricted imports comprised gold, silver, jewelry, weapons and ammunition, alcoholic beverages, tobacco, TVs, radios, video recorders and passenger automobiles.

and was further reduced to 40% in 1995. The number of bands was reduced from 6 in 1992 to 4 comprising 0, 20, 30, and 40% by 1995. Tariffs that previously attracted a 1.5% tariff rate were raised to 20%. This raised the number of international tariff spikes from 53% of all lines to 81% between 1992 and 1995. The Appendix table Industry level changes in tariffs are presented in appendix Table A2.2.

The patterns of tariff protection between 1993 and 1995 reflect a transition between the new and old tariff structure. The structure maintained tariff rates above 30% for sectors like beverages, tobacco, textiles, wearing apparel, wood and leather products which received the highest protection under the ISI policy. The sectors comprising agriculture, fabricated metals, equipment, and forestry experienced tariff rises with rates ranging from 25% to 30%. Intermediate and capital goods sectors (like chemicals, basic metals, and machinery) had the lowest protection (tariffs ≤ 20%).

In the period 1992-1995, the country made substantial progress in simplifying the tariff structure and opening up the economy. While the removal of QRs and the liberalisation of the foreign exchange market increased the openness of the economy compared to the ISI period, the structure of protection that arose under the import substitution policy persisted. This changed in 1996.

2.4.2. Tariff Overhaul: 1996

The year 1996 set the break from the past of tiding up to tariffs structure. Although the reforms implemented between 1991 and 1995 opened up the economy, a number of anomalies remained inherent in the structure. First, a number of new investors, nongovernmental organisations, and religious bodies enjoyed huge duty exemptions on the importation of both final and intermediate inputs. The entire tariff structure became less transparent and open to abuse. Smuggling became rampant. Some capital goods such as machinery and equipment faced high tariff rates ranging from 20% to 30%. The high tariffs on capital goods and evasion of tariffs hurt the competitiveness of import-competing firms that lobbied government (IMF, 1997). In response, a Tax Policy Commission was set up (with the help of IMF/WB) to advise government on rationalising the tariff system so that it maximises government revenue by reducing tax evasion while incentivising investors.

Table 2.7: Simple and Weighted average MFN Protection by Sector: 1992 –1996

	Unweighted				Weighted			
Industry [ISIC]	**1992**	**1995**	**1996**	**Change[A] 1995-96**	**1992**	**1995**	**1996**	**Change[A] 1995-96**
Agric, forestry and Fishing	**37.9**	**32.9**	**18.7**	**-15.0**	**35.1**	**31.2**	**17.3**	**-14.1**
Agriculture	35.1	31.2	17.4	*-11.1*	35.0	31.1	17.2	-11.2
Forestry	31.0	29.3	15.5	*-11.3*	31.5	29.6	15.8	-11.3
Fishing	47.8	38.6	23.6	*-11.5*	47.8	38.6	23.6	-11.5
Mining	16.0	20.2	7.9	*-10.8*	14.8	19.4	5.1	-12.8
Manufacturing	***27.8***	***24.4***	***13.8***	*-11.6*	***24.3***	***21.7***	***11.6***	**-10.8**
Food	38.3	33.4	19.8	*-10.8*	33.0	30.0	17.4	-10.2
Beverages	71.6	36.0	22.8	*-10.2*	56.9	33.3	21.7	-9.1
Tobacco	40.0	35.0	25.0	*-7.7*	40.0	35.0	25.0	-7.7
Textiles	37.1	33.2	17.2	*-12.8*	35.7	32.6	15.6	-13.7
Apparel	48.2	39.0	24.6	*-10.9*	48.2	39.0	24.6	-10.9
Leather Prod	29.5	28.3	19.5	*-7.1*	39.0	33.7	22.3	-8.9
Footwear	33.3	31.3	25.0	*-4.9*	33.3	31.3	25.0	-4.9
Wood Prod	42.3	36.2	24.0	*-9.4*	47.5	38.8	24.8	-10.6
Paper products	19.5	22.9	14.0	*-7.5*	18.7	22.4	12.9	-8.1
Print and Publishing	25.5	26.5	15.8	*-8.8*	25.5	26.5	15.8	-8.8
Chemicals	20.8	12.6	7.1	*-5.0*	18.5	10.6	5.8	-4.4
Coke and Petroleum	19.1	22.5	12.5	*-8.5*	19.8	22.9	12.5	-8.8
Rubber and Plastics	25.4	25.0	20.2	*-3.9*	28.3	27.7	22.2	-4.4
Non metallic	24.9	26.2	15.0	*-9.3*	24.1	25.7	15.1	-8.8
Basic metals	17.8	14.3	7.5	*-6.1*	18.6	10.7	5.2	-5.1
Fabricated metals	26.2	26.8	17.1	*-8.0*	25.5	26.3	16.5	-8.1
Machinery	19.1	22.1	8.0	*-12.3*	20.8	22.9	10.3	-10.8
Equipment and other	28.7	26.5	16.0	*-8.7*	23.7	25.2	15.8	-7.8
Broad Sector Classification-End Use								
Capital goods	19.1	21.8	9.3	*-8.6*	19.5	22.6	11	-7.4
Intermediate goods	23.9	21.4	11.7	*-10.4*	22.9	19.5	10.1	-11.0
Consumption goods	43.9	35.6	22.5	*-16.1*	41.6	34.9	21.9	-15.0
Other goods	29.7	28.7	15.2	*-11.9*	32.9	30.7	17.2	-12.6

Source: Own Calculations from Raw tariff dataset

Note: $^{\Phi}$ -Is weighted by total imports for 2000. Change (A) calculates as $\log((1+t_1)/(1+t_0))$

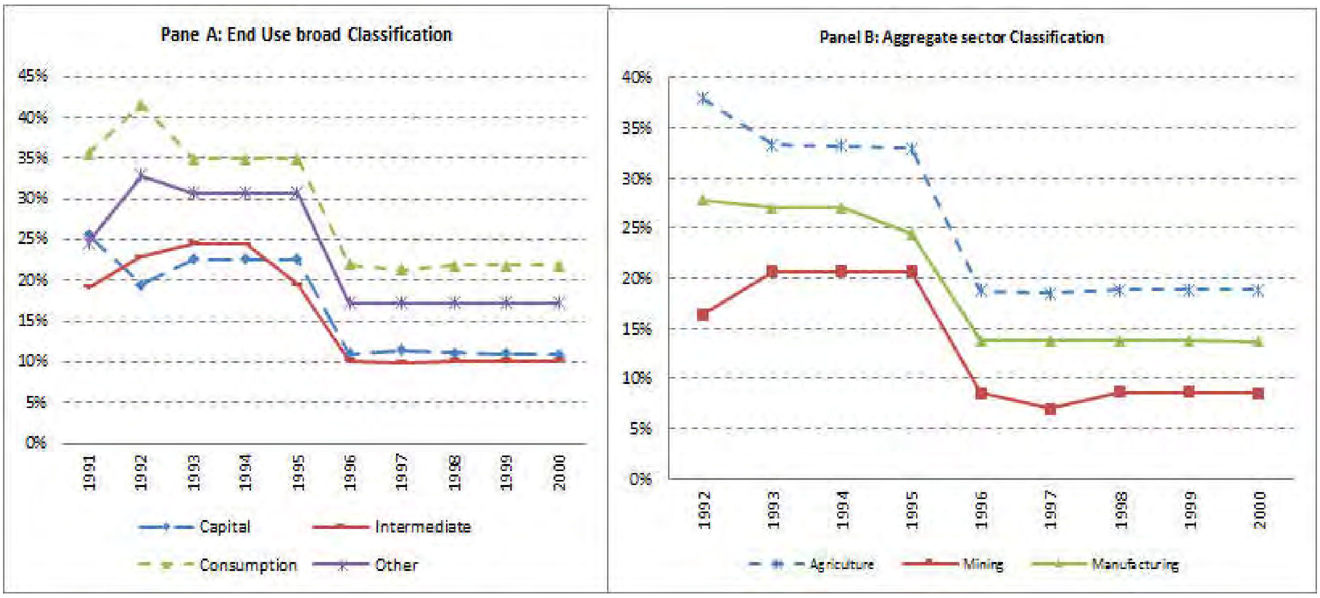
Based on the recommendation of the commission, authorities returned to the liberalisation agenda and implemented significant tariff reductions in January 1996. Measures involved the withdrawal and elimination of import duty exemptions (even to government institutions) and a one-step across-the-board tariff reduction. The structure was further simplified. Four tariff bands of 0%, 5%, 15% and 25% were implemented. The changes reduced the share of international tariff spikes (tariff > 15%) from 81% to 31.3% and eliminated all domestic tariff spikes (tariffs three times the national average).

The 1996 changes reduced the economy-wide protection. The simple (unweighted) average tariff rate fell from 25% to 14%, while the protection rate according to the import weighted average declined from 22.4% to 12.1%. Table 2.7 presents the nominal protection for the ISIC -2-digit groupings and associated industrial sectors between 1995 and1996. The nominal protection fell in all sectors and industries. According to the weighted average tariffs rates displayed in the last three columns, the level of protection declined from 31.2% to 17.3% representing a by 14.1% reduction. The second largest tariff reduction is in the mining sector where tariffs fell from 19.4% to 5.1%. The average import weighted tariff rate on the manufacturing sector fell by almost 10.8% from 21.7% to 11.6%.

There is also heterogeneity in tariff reductions across various agricultural and manufacturing subsectors. Looking at the manufacturing industry, the food processing, textiles and apparel, wood and wood products, and machinery subsectors experienced relatively larger (over 10% sing weighted average tariff rates) declines in nominal protection. Low declines (of less than 7% of the average weighted tariff) were experienced in chemicals, rubber and plastics, and basic metal industries. Although there was an overall reduction in weighted tariffs, the level of protection remains relatively high (above 20%) in wearing apparel, footwear, tobacco, beverages, leather products wood and wood processing, and rubber and plastic subsectors.

Looking at the major commodity categories, the largest proportionate declines were in consumer goods where the average weighted tariff rate fell by almost 15 percentage points from 34.9% to 21.9%. The least decline was in the capital goods where the weighted tariff rate fell from 22.6% to 11%. Figure 2.3 shows the pattern of the tariff structure. It exhibits high levels of escalation. The consumer goods, which experienced the largest tariff reductions in the sector, remained the most protected, while capital goods had the lowest weighted tariff rates.

Figure 2.3: Tariffs by aggregate sectors and broad economic classification (1991-2000)



Source: Own Calculations from Raw data.
Note: Tariffs are weighted by the 2000 import values.

2.4.2.3. MFN Tariff Reform stagnation post 1996

Since 1996, MFN tariff reform has stagnated with no major changes in MFN tariffs in subsequent periods as shown in Figure 2.3. The simple economy wide nominal protection has remained at an average of 13.6%.

Nevertheless, a number of changes have reversed some of the gains made in simplifying the tariff structure. Since 2001, alternate tariffs are increasingly being applied[14]. Initially only 1.3% (80 tariff lines) of the tariff lines comprising butter, wheat flour, maize, cooking oil and margarine, sugar, sweets aerated drinks clear beer, electric accumulators, used tyres, used clothing, and vehicles faced mixed tariffs. This share increased to 2.2% (123 tariff lines) by 2002 when more products, such as cotton, washing and cleaning soap, and woven fabrics of cotton, were included to the list.

In sum, this section has looked the pattern and extent of the MFN tariff protection from the 1970s to 2011. The results show that Zambia's trade policy drastically changed over the study period. The country made considerable progress in reducing quantitative restrictions

[14] For example, in 2007, used pneumatic tyres were bearing alternate tariffs of 25% or K3000 /kg whichever yields greater revenue

while the tariff structure was simplified and rationalised. In addition, the data shows considerable reductions in nominal MFN tariff rates. The average fell from 28% in 1992 to 13.4% in 1996 and has since stalled. Despite the progress made, there is scope for further MFN tariff reforms. The weighted average MFN tariff on consumer goods of 21.9% remains relatively high compared to the 12.8% charged by SACU counterparts in 2000. In addition, the introduction of alternate tariffs obscures the earlier reforms.

2.5. Preferential Trade arrangements

While MFN reform stagnated since 1996, more progress has been made in reducing average tariffs through COMESA and SADC regional free trade agreements (FTAs). Although these bodies have been in existence since the 1980s, the trade reforms through these bodies gained momentum in the mid-1990s for COMESA and 2000s for SADC[15]. Whether the implementation of FTAs and reductions of preference tariffs translate into lower import protection remains a key concern in literature. This concern stems from two observations.

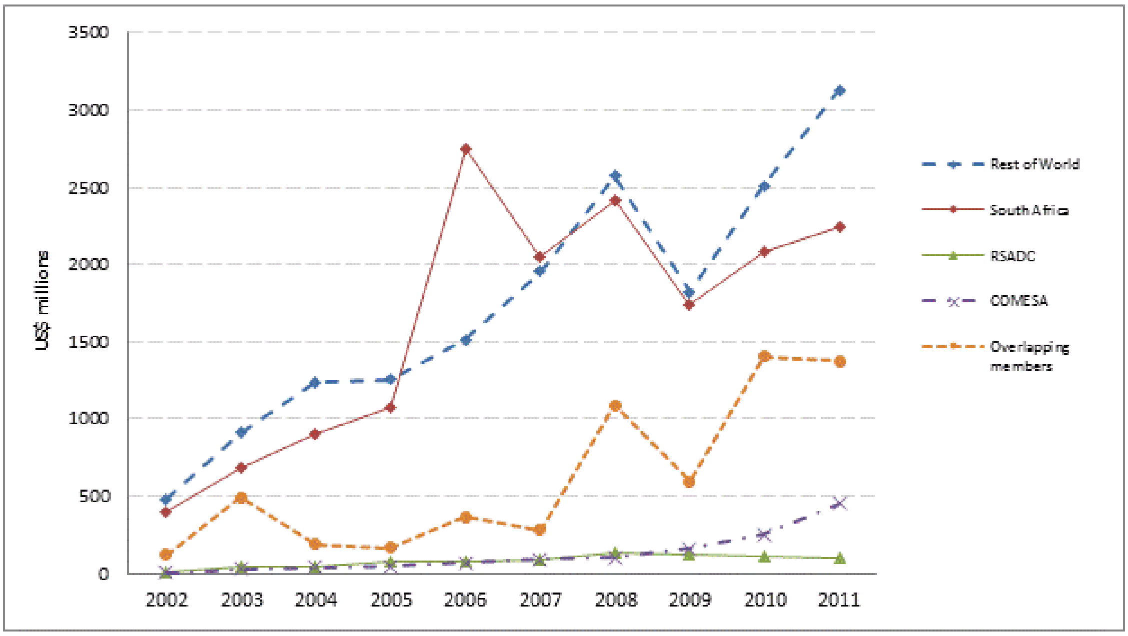
First, while nominal tariffs have fallen, trade across FTAs require that goods satisfy rules of origin. In particular, COMESA offers four alternative criteria for determining the origin. SADC rules are, in many cases, negotiated on a product-by-product basis. This makes them complex. They also tend to be stringent (Flatters, 2002)[16]. In this environment, the tariff rates underestimate the true level of protection.

Second, intra-regional trade remains low, indicating a limited impact of FTAs on overall protection. This is shown in Figure 2.4, which displays the values of Zambian imports by region. With the exception of South Africa, the level of imports from COMESA and the rest of SADC states remain very low at less than 12% of total Zambian imports in 2010.

[15] Several other countries like Zimbabwe, Malawi, Seychelles, and Congo DR have overlapping membership to these two organisations.

[16] For example products like wheat and wheat flour, textiles and sugar have different rules of origin under SADC (See Flatters, 2002).

Figure 2.4: Total Imports by Trade regime (US$ m) (2002-2011)[17]



Source: Own Calculation from the Customs Office (Zambia Revenue Authority) Database.
Notes: Overlapping members refer to states that belong to both SADC and COMESA

This section presents a critical assessment of whether the FTA agreements have effectively led to substantial reductions in the level of import protection. Given the rules of origin, the question that arises is, has the formation of FTAs opened up the economy? We use a transaction dataset to unpack the extent to which preferential partners make use of the FTA rate[18]. The dataset provides all transactions and records, the product classification at the HS-8-digit level, the value and quantity shipped, the date of the shipment the source country and the trade regime used to import the product into the country. This measure is supplemented by changes in tariffs weighted by the 2010 import values as discussed in the data Section 2.3.1. The two trade schemes are discussed in turn.

2.5.1. The Common Market for East and Southern Africa

COMESA was established in 1984 with the objective of liberalising intra-regional trade and creating a free trade area by 3 September 1992. Between 1984 and 1992, the region initiated tariff reforms using a common list of 209 that later increased to 769 product (Chantunya,

[17] The goods do not distinguish between consumer and capital goods imports.
[18] This dataset is described in section 2.1.

2001). This common list approach proved unworkable because several products were excluded while QRs and restrictive rules of origin constrained free trade (Murinde, 2001)[19].

In 1993, the new COMESA trade protocol was signed with the objective of attaining a free trade area by 2000, a customs union by 2004 and a monetary union by 2018. This resulted in a sharp shift from the PTA treaty. The agreement set a generalised linear and automatic, but gradual reduction in tariffs relative to the applied MFN rates across all products (Chantunya, 2001). The programme required members to initiate reductions with a 60% preference in 1993 (Murinde, 2001). Member states were allowed to tailor tariff reductions to their developmental needs, anchoring the scheme on reciprocity on a country by region basis.

In July 2000, 11 of the 20 member states attained an FTA status alongside Zambia. Trade with non-implementing member states is done on a reciprocity basis. In 2012, 13 of the 19 member states were part of the FTA while the rest trade on preferential basis (Ebaidalla & Yahia, 2014).

2.5.1.1. Nominal protection Rate in COMESA

Following the adoption of the COMESA phasedown programme in 1993, Zambia applied a 40% of the applicable MFN rate in 1993 with an additional 10% in 1995. In 1996, the country applied a 60% reduction of the applicable MFN tariff rate on its COMESA imports and continued to implement 10% biennial reductions until 2000 when it attained an FTA status with 8 other member states (Murinde, 2001; WTO, 2002)[20].

However, whether the attainment of the FTA substantially lowered the level of protection and applied rates remains unclear. To address this question, we first examine the transactions dataset from which we calculated the actual shares of products meeting the rules of origin.

[19] The inconsistency in the application of the preferential tariffs, the restrictive nature of the common list and stringent rules of origin makes it difficult to trace the product level tariff reforms since 1984.

[20] The extension of the analysis beyond 1993 is constrained by the lack of a comprehensive tariff phase down schedule. Moreover, tariff reductions prior to 1993 were based on a common list of aggregated products, making it practically difficult to analyse the COMESA tariff reforms before 1993.

Next, we used the same data to weight the tariffs and assess whether aggregate protection has fallen.

Figure 2.4 shows Zambia's imports from COMESA. Even after accounting for overlapping member states, trade remains low at less than 8% of the total imports (if we remove copper re-exported from Congo DR). Since one would expect increased intra-regional trade under the FTA, the low volumes of trade points to lack of supply capacity to utilise the scheme and possibly the inability of COMESA FTA to open up and fostering imports into the country.

Table 2.8 shows the shares of imports that enter the country under the FTA. The table indicates that the preference utilisation rate remains low with high volatility of shares under the COMESA FTA. For example, actual share of imports under the FTA rate over the study period rose from about 30% in 2000 to 88% in 2005 before falling back to 28.2% in 2010. The instability of the shares point to the sporadic nature of the imports meeting the rules of origin from within the region. This is exemplified by the trend in the preference utilisation by Kenya that rose from 38.4% in 2000 to 89.2% in 2005.

The preference utilisation rates for states that belong to both (overlapping) SADC and COMESA averaged at 70% between 2000 and 2005, indicating that a substantial amount of goods enter the country duty free. However, the rate declined in 2010 because of copper imports from Congo DR, which is re-exported after refinery. If this is accounted for, the share remains large as exemplified by the key trading partners Zimbabwe and Malawi whose preference utilisation rates remain above 80%.

The data suggests that Zambia's imports from the COMESA region are dominated by few countries that include Kenya, and other member states that overlap with SADC such as Zimbabwe and Malawi and Mauritius. A number of states remained outside the FTA (as of 2010, over 7 of the 19 members were not part of the FTA) during the period under study.

The question that arises is, did the FTA reforms lower the tariff protection? What is clear from Table 2.8 is that not all goods from COMESA enter the country under FTA since some countries are not implementing the agreement and some goods do not meet the rules of origin. To assess the aggregate protection, we use the transactions data to assess the extent to which actual tariff protection in the region has fallen. To do this, we use the import data from the transactions data to weight the tariffs based on the trade regime utilisation between 2009 and 2011. Firstly, we construct an aggregate COMESA FTA rate. This is calculated as the weighted average tariff rate for all the goods that meet the rules of origin and enter under the FTA. Secondly, we compute the COMESA MFN rate. This is the weighted tariff average for good that are cleared from COMSEA member states but do not meet the rules of origin. Finally, to obtain an aggregate measure of protection, the two rates are averaged using the aggregate import values (2009-2011) as weights[21].

Table 2.8 Preference utilisation rates for selected years (% of imports by trade scheme)

Trade Regime	2000		2005		2010	
	MFN Rate	Preference Rate	MFN Rate	Preference Rate	MFN Rate	Preference Rate
Rest of World	100	-	100	-	100	100
Duty free MFN tariff lines (% all lines)	*20.9*	-	*20*	-	*18.9*	-
South Africa	100	-	84.4	15.6	68.8	31.2
Rest of SADC	99.6	0.4	96	4	63.8	36.2
COMESA	70.3	29.8	11.7	88.3	71.8	28.2
overlapping _members	29	70.5	31.1	68.9	94.3*	5.8
Main Sources of imports and preference utilisation by country						
Kenya	61.6	38.4	10.2	89.2	76.4	23.6
Mauritius	2.9	97.1	97.5	2.4	94.8	5.3
Malawi	50	50	17.6	82.4	18.6	81.4
Tanzania	100	-	98.6	1.4	58.9	41.1
Congo DR	100	-	100	-	100	-
Zimbabwe	23.8	76.2	7.9	92.1	10.5	89.5

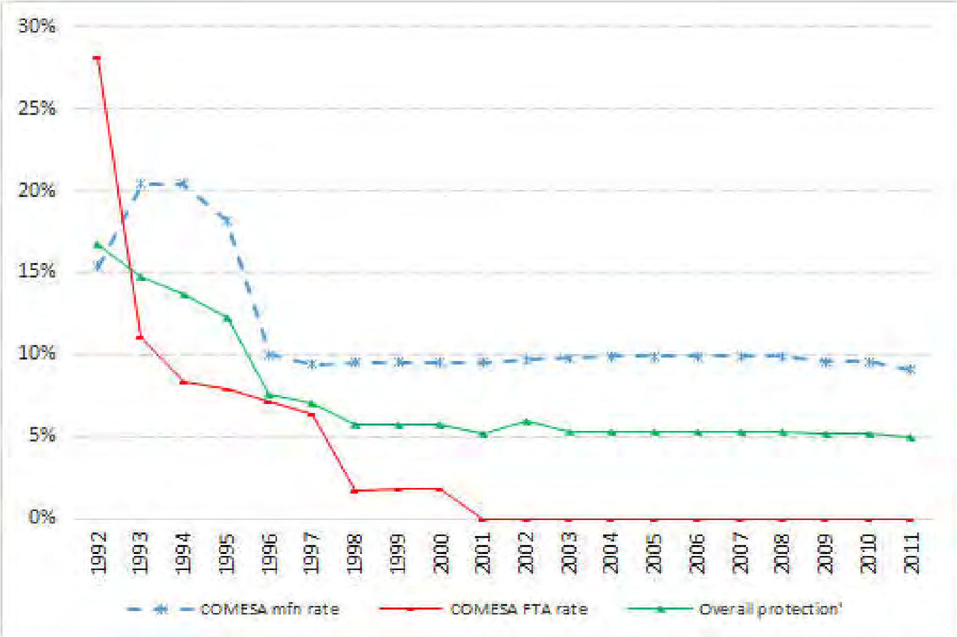
Source: Own Computed from the ZRA ASYCUDA transactions database:
Notes: Apart from South Africa, trade volume from regional countries tend to be very low.
** This is driven mainly by Congo DR copper imports. Netting out copper leaves about 30% under MFN.*

Figure 2.5 presents the import weighted tariff rates. The figure indicates that while the FTA rate fell to zero by 2000, goods entering the country under MFN rates remain relatively protected with an average tariff rate of 10%. However, aggregate protection on imports from COMESA fell considerably from around 16% in 1992 to 7.5% in 1996. It was initially driven lower by preferential rates and then by the sharp fall in MFN rates in 1996. Aggregate protection continued falling after 1996 to around 5% in 1998 because of falling preferential

[21] t = sum(wfta x tfta) + sum(wmfn x tmfn))

tariff rates. Thereafter, aggregate protection did not change at all owing to MFN reform halting and lower preferential rates having little impact.

Figure: 2.5: COMESA: Average tariff rates (1992-2011)



Source: Own Calculation from the constructed raw data
Notes: Weighted weight disaggregates imports according to preference utilisation rate and is weighted by the average of the 2009-2011 import structure weighted tariff

Overall, the data indicates that overlapping member states prefer using COMESA FTA rules of origin. Furthermore, the FTA has also been effective in reducing protection from partners to less than half the MFN rate. The volumes of trade also remain low across the region.

2.5.2. The Southern Africa Development Community

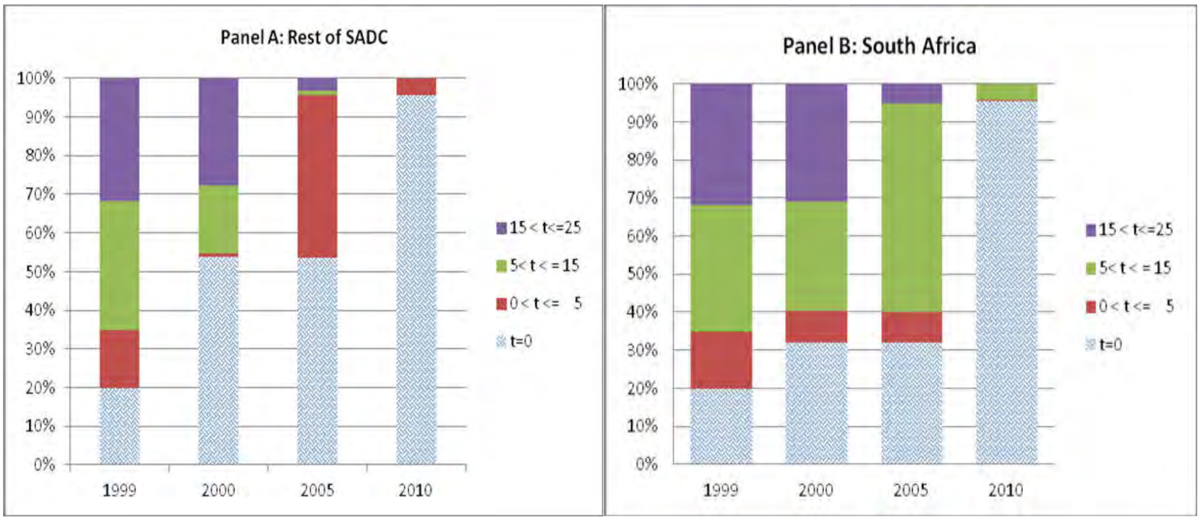
Although SADC has existed since the 1980s, the trade protocol only came into effect in 2001. The protocol committed member states to phase out trade barriers, establish an FTA in 2008 by eliminating non-tariff barriers and reducing tariffs to zero for 85% of the tariff lines, and extend it to a customs union by 2015, a monetary union by 2016, and a single currency by 2018 (Edwards et al., 2009). The tariff phasedown programme grouped products into four categories (A, B, C and E)[22]. Tariffs for type A products were phased to zero in the first year,

[22] Category A are largely capital goods, C comprised goods deemed sensitive by individual member states, and E covered goods ineligible for preferential treatment such as security equipment.

while type B products and the sensitive products classed as C were to be liberalised from 2005 to 2012[23].

The SADC agreement provided for asymmetrical implementation of tariff reductions, with a shorter phasedown period (of 8 years) for less developed non-SACU SADC members and longer period of up to 12 years for South Africa, the most developed member state. Zambia developed two tariff schedules and South Africa developed one. Although the FTA was set to be operational by 2008, some members are yet to join it. Further reforms, such as the customs and monetary unions, have stalled[24]. Zambia, however, has liberalised its trade as scheduled.

Figure 2.6: Distribution of preferential Tariffs: RSADC and South Africa 1999-2011



Source: Author's construction based on Database
Note: SADC mandates that tariffs fall to zero across products by 2012

Zambia's implementation of the SADC FTA required a more rapid liberalisation with other SADC member states compared to South Africa. Figure 2.6 present the distribution of the phasedown tariffs with the rest of SADC (RSADC) and South Africa. The figure confirms the asymmetrical implementation of tariff reductions across the two-phasedown schedules. It also indicates that the phasedown was quicker under the rest of SADC than South Africa.

[23] The protocol envisaged to establish an FTA by 2008 by achieving 0% on 85% of the tariff lines and reduce the other 15% to zero by 2012. While South Africa had to fully liberalise within 8 years, the least developed members had up to 12 years to do so.
[24]Some countries like Congo DR, Angola and Seychelles remain outside the FTA, while other members like Tanzania, Malawi, Mozambique and Zimbabwe have some derogations on some product. The process is expected to be completed in 2015.

Whereas 55% of the tariff lines attained duty free status under RSADC, only 31% of South African imports qualified to enter duty free. The bulk of tariffs on RSA products were reduced after 2006. By 2010, there were no tariff rates above 5% on the RSADC schedule, while almost 5% of the sensitive product tariff lines attracted up to 15% tariff rates on trade with South Africa.

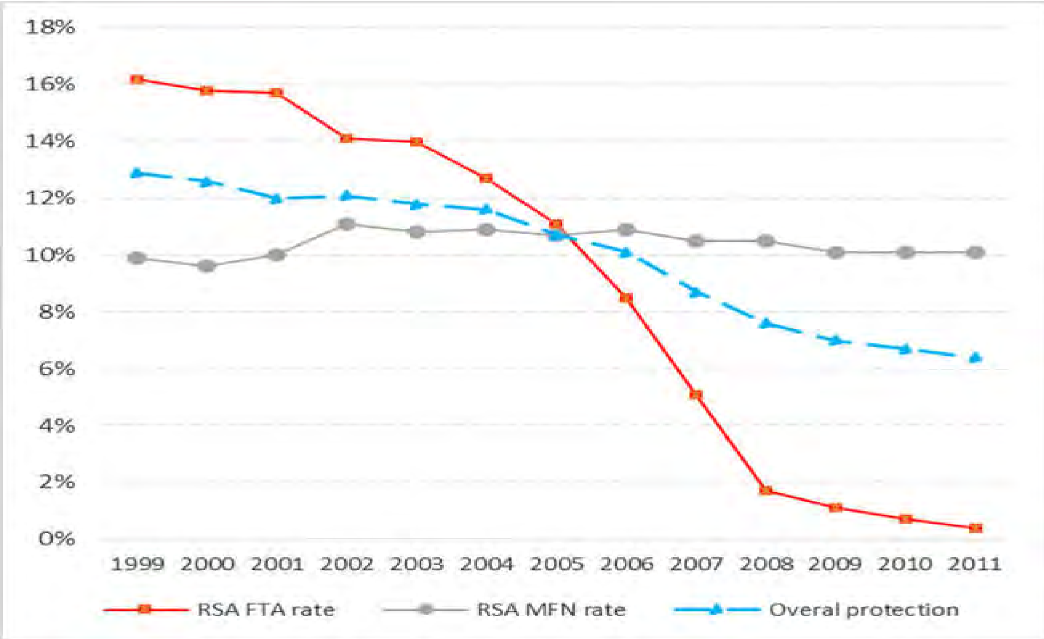
2.5.2.1. Nominal protection and preference utilization

Despite making progress to liberalise tariffs and imports in general the extent of the SADC preference utilisation varies across countries. Table A2.3 in Appendix 2 shows the tariff rates across subsectors for both RSADC and South African reform. Looking at the rest of RSADC and overlapping member states the following observation can be made. RSADC member states account for a very small proportion of the Zambian import bill. As already noted in Figure 2.4, RSADC member states together with overlapping states account for less than 10% of the import bill. Furthermore, Table 2.8 indicates that, even if we accounted for the Congo DR imports, less than two-thirds of the trade flows use preferences. As Flatters (2002) notes, a possible explanation for the low utilisation of preferences is that SADC rules of origin are too stringent to facilitate free trade for all goods.

The stringent rules of origin imply that non-qualify goods flow under MFN rates so that the applied rates differ from the preferential rates. Figure 2.7 displays the trade regime utilisation weighted tariff rates – the MFN, FTA and average protection. As the figure shows, some imports still attract an average tariff rate of 7% while the MFN rate averages at 10%. The overall protection, as measured by the average applied tariff, fell from 8% in 2001 to 4% in 2011. This points to increased openness of the economy to SADC trade.

Next, we unpack the extent to which goods entering Zambia from South Africa make use of the FTA rates. As indicated, South Africa is the single largest source of Zambian imports (see Figure 2.4) and the phase-down of tariffs was delayed compared to the rest of SADC. As Table 2.8 shows, the accelerated tariff reduction between 2005 and 2010 was accompanied by an increase in the uptake of preferential tariff use. The utilisation rate consistently rose from 0% in 2000 to 15.6% in 2005 and 31.2% in 2010 in addition to about 18.9% duty free products that entered under MFN rates in 2010.

Figure 2.7: RSADC Scheme Utilisations Rate import weighted tariffs (1999-2011)



Source: Own Calculation from the constructed raw data

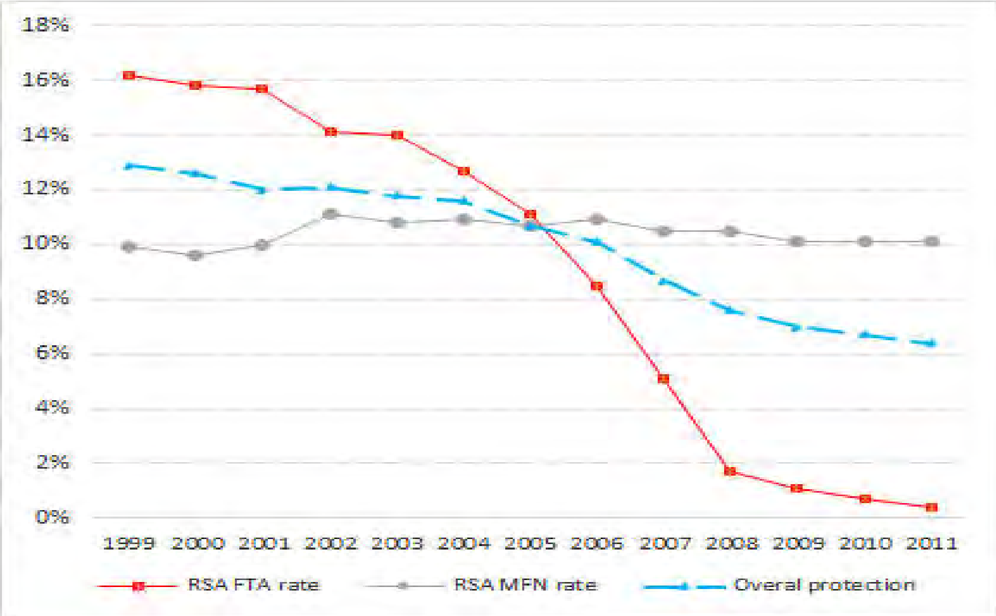
The observed rise in preference utilisation could be explained by the country's position as a major supplier of goods in the country. However, a substantial amount of goods do not appear to meet the rules of origin requirements. This could be explained by the possibility or re-shipment of products (like clothing and footwear) from other countries through South African retail chains.

Figure 2.8 shows the extent to which this agreement reduced the average protection rate. Although the FTA reduced the nominal tariff to 0% on most products, a number of products still attract up to 10% average MFN rate. This average protection rate is driven by two factors. First, some products do not meet the rules of origin and therefore attract MFN tariffs.

Second, the agreement allowed members to maintain tariffs on sensitive products (15% of the tariff lines until 2012). In the case of Zambia, some key imported products, such as carcases, garments, textiles, daily products and motor vehicles, were not fully liberalised by 2010.

Because of these two factors, the overall scheme utilisation protection rate declined from 11% in 2005 to 6% in 2011.

Figure 2.8: RSA Scheme Utilisations Rate import weighted tariffs (1999-2011)

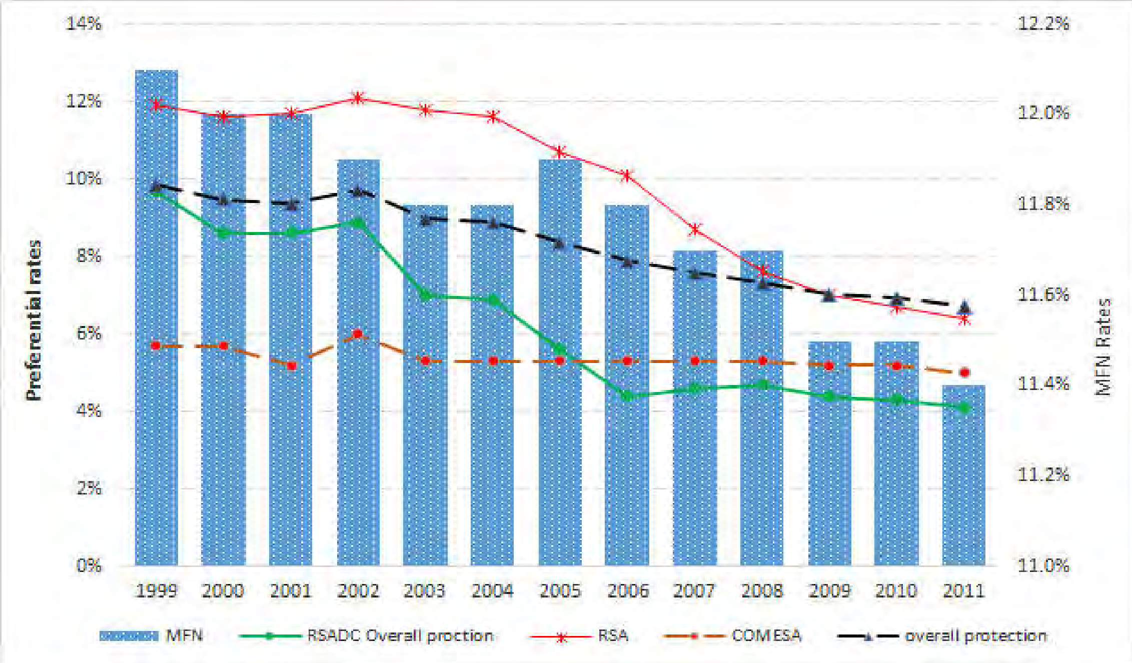


Source: Own construction based on tariff database

Figure 2.9 displays the overall trend in aggregate protection calculated as an average of the trade aggregate protection on preference partners and the MFN rates. The economy-wide aggregated protection fell from around 9.8% in 1999 to 6.5% in 2011. This decline in aggregate protection was driven mainly by the preferential tariff reforms within the SADC FTA, that is, the fall in protection on South African and the other SADC partner imports.

In sum, this section uses transaction data and unpacks the extent to which goods entering Zambia from preferential partners make use of FTA rates. The section shows that the country made substantial reductions in aggregate and nominal protection on imports from regional trade partners. This fall in protection is associated with marginal yet volatile increases in preference utilisation rates among regional trade partners. Despite progress in reducing aggregate protection, the scope remains for further reforms. For example, the SADC trade preference utilisation rates suggest that a high proportion of imports do not meet the rules of origin

Figure 2. 1: Trend in overall protection- across preferences



Source: Own Construction from tariff database
Note: overall weighted is overall protection

2.6. Conclusion

This chapter set out to document the internal economic and trade reforms implemented by the Zambian government since the late 1980s. In line with the overall objective of the thesis, it placed emphasis on trade policy reforms. To conduct the analysis, the chapter constructed a novel and detailed annual tariff dataset at 8-digit level of the Harmonized System covering the most favoured nation (MFN) and various preferential trade arrangements from primary sources, including government gazettes. The data is used to document the evolution of trade policy reforms and the extent of the actual reform using trade weighted and unweighted tariff rates and preference utilisation rates.

Empirical evidence shows that Zambia significantly rationalised and simplified tariff structure. The country made considerable progress in reducing the MFN tariff rates from an average of 28 to 13.4 % between 1992 and 1996. Evidence shows that liberalisation varied across industries and product categories over the reform period. However, the largest reductions in tariffs were in the final consumer goods that were previously most protected. However, since 1996, little further progress has been made in reducing the MFN rates.

In addition to MFN reforms, further reforms continued through RTAs and attaining free trade areas with COMESA and SADC in 2000 and 2008 respectively. The chapter assessed the extent to which these FTAs lowered the applied tariffs rates in Zambia. The data indicates that the implementation of preferential reforms is associated with a fall in the economy-wide aggregate protection.

The preference utilisation rates differed enormously across individual countries and schemes. While they are high for Malawi and Zimbabwe, the rates tend to be volatile and at times as low as 32% for Kenya and South Africa (although this could mask the duty free capital and intermediate imports under MFN rates mainly imported from South Africa). Overall, a substantial proportion of existing trade does not appear to meet the rules of origin. This may also explain why trade flows with some partners remain very low or non-existent. Despite the relatively high preference utilisation rates for some partners, the values of trade flows is low, except for trade with South Africa.

In theory, the effect of trade liberalisation is expected to be reflected in price data within liberalising economies. This is because by opening up to external competition, international competition may induce greater competitiveness in the domestic market, thus gives rise to new supply chains, weaken imperfectly competitive firms, and enhance external as well as internal product market integration. The next chapter explores whether the observed trends in unilateral and preferential trade reforms are associated with increased price integration. We do so by testing if there is any structural break associated with MFN, SADC, and SADC-RSA reforms in the price data.

Chapter 3

3.0. Intra-national Price Dispersion in Retail Markets: Evidence from Zambia

3.1. Introduction

There is a widespread perception that product markets in Africa are not integrated (Brenton & Gözde, 2012; Foroutan & Pritchett, 1993; Naude, 2009). Intra-regional trade flows are low, averaging at 10% in 2010, and price differences (or 'border effects') between countries are large (Naude, 2009). The lack of integration between economies hinders competition and imposes a welfare cost on society through unrealised trade gains and inefficient resource allocation. Substantial research has focused on how trade costs, such as poor infrastructure (Limao & Venables, 2001; Longo & Sekkat, 2004), high transport prices (Teravaninthorn & Raballand, 2009), poor trade facilitation (Njinkeu & Fosso, 2006; Njinkeu et al., 2008), the political borders, regional trade and monetary arrangement (Nchake, 2013; Versailles, 2012), affect product market integration between countries. These and many other market frictions tend to limit the transmission of price signals and inhibit product market integration across countries.

Also important, but less studied, is the integration of product markets within countries. What is striking about the available evidence is the degree to which markets are segmented within countries. Price gaps between regions are frequently large, revealing the presence of large trade costs. This holds for many advanced and emerging economies (Atkin & Donaldson, 2014; Ceglowski, 2003; Parsley & Wei, 1996). For African economies, the segmentation of markets within countries is expected to be particularly problematic given the continent's hard and soft infrastructural constraints that make internal transport costs extra ordinarily high.

Despite the notion of large trade costs within countries, empirical evidence documenting the extent to which trade costs impede market integration within developing countries, particularly Africa, is scarce. While there is some research and data on infrastructural constraints and barriers to trade within and between countries, such as in Limao and Venables, (2001), Teravaninthorn and Raballand, (2009) and World Bank enterprise surveys, the effect of trade costs on product market integration within developing countries is yet to be fully explored[25].

The scarcity of studies measuring the impact of internal trade costs on product market integration in developing countries is made difficult by the lack of appropriate data on firm outcomes such as production, internal trade and prices. This has constrained researchers from understanding the actual extent of trade costs that drive market segmentation in developing countries.

An emerging approach identifies the size of internal trade costs using differences in product prices and detailed product-level price data. As in international studies, the approach considers prices charged by sellers in different markets (Parsley & Wei 1996; Ceglowski, 2003; Knetter & Slaughter, 2001). Following this approach, this chapter uses highly disaggregated monthly retail price data for 270 products and 29 regions over the period 1993 to 2011 collected from the Zambian central statistical office (CSO).

The results of this chapter have high policy relevance. Firstly, high internal barriers tend to trade impede economic activity and the emergence of competitive regional markets by inhibiting specialisation according to comparative advantage. Secondly, barriers act as an indirect 'tax' on consumers by raising prices, thus generating welfare costs for society, particularly for those living in outlying areas. Thirdly, trade costs impede access by rural producers to urban markets, thereby inhibiting participation in the market economy. These are particularly important considerations in emerging economies like Zambia where a relatively high proportion of the population live in rural areas. Furthermore, internal barriers to trade impede the potential gains from external reforms such as the regional trade agreements entered into. In this way, the lack of internal market integration could render the broader regional integration efforts ineffective. A deeper understanding of the extent of product market integration is, hence, essential.

[25] Limao and Venables (2001) show that poor infrastructure accounts for 40% of predicted transport costs for coastal countries and up to 60% for landlocked countries in SSA.

Zambia is an interesting country for this kind of study for two main reasons. First, it typifies a low-medium-income SSA country that has implemented economic reforms, shifting it from a socialist state before 1991 to a more market-oriented economy thereafter. The reforms involved privatisation of state owned enterprises, liberalisation of trade and capital flows, deregulation of exchange rates and the removal of price controls across all sectors. Second, the country engaged into unilateral and region trade reforms under the WTO, COMESA and SADC. These reforms are widely expected to improve market efficiency and lead to substantial reductions in terms of product market segmentation within the country. In this case, these efforts towards greater integration of markets is expected to induce regional prices to converge towards the LOP – where the same good sells for the same price regardless of location.

The chapter is structured around three key questions. 1). How dispersed are product prices across districts in Zambia? 2). Does the degree of product market integration depend on product type? 3). Have product markets become more integrated over time? The chapter also presents a cursory assessment of whether trends in product market integration are associated with various trade policy reforms implemented over the study period. The chapter is largely descriptive in its approach. In addressing these questions, the chapter contributes to the recent empirical literature in using retail prices to assess the extent of internal market integration and trade costs to Africa. This is a region that remains understudied. Unlike previous literature in SSA, our extensive product, time and regional level dataset enables a deeper assessment than available literature of how these trade costs affect products and regions differently, and how these have changed over time.

The rest of this chapter is set out as follows: Section 3.2 formally presents the key theories of market integration. Section 3.3 presents empirical literature. Section 3.4 outlines the methodology of our measures of price dispersion used to describe the data. The data and its sources are discussed in Section 3.5. Section 3.6 contains the empirical analysis of various dimensions of market integration. Section 3.7 concludes the chapter.

3.2. Review of Theoretical and Empirical methods

This section presents an overview of theoretical approaches to modelling product market integration to guide the empirical analysis. In a perfectly competitive market, trade in goods arbitrages away price differentials across markets such that the absolute (LOP) -where the same good sells for the same price regardless of location - holds. In this regard, research mainly uses two approaches to measure market integration. The first approach uses bilateral trade volumes in the form of gravity models. The second infers integration from deviations from the LOP as a theoretical benchmark.

3.2.1. The trade or Gravity Model Approach

This approach gauges market integration using observed trade flows within the gravity framework as pioneered by Tinbergen (1963) and Anderson (1979). In its simplest form, the gravity theory infers costs of trade by analysing how infrastructure and indicators of trade costs impede trade flows. The model shows that bilateral trade flows between countries are proportional to the product of the index of the size of their economies distance and associated costs between them (Anderson & Wincoop, 2003).

The model has been applied to cross trade within and between countries (Bergstrand, 1985; McCallum, 1995; Helliwell, 1996). Cross-border studies typically find that distance and borders constrain trade (Anderson, 2010; Wolf, 2000). Similarly, volume based studies of within and cross-country studies find that the trade inside countries is, controlling for distance, larger than trade with a foreign country – the home bias phenomenon. For example, using trade flows, McCallun (1995) found that Canadian provinces trade 22 more times than with equidistant and equisized U.S. states. This result is supported by Helliwell (1997, 1998).

While the volume approach has been used to infer integration within and across countries, it has limitations in our case. Firstly, there are objections in cross-border studies relating to the traditional model of aggregation biases with respect to sectorally varying trade costs and specification bias because outputs is endogenously related to trade flows (Schwarz, 2012). The second and the most important constraint for our purpose is that it is very difficult to obtain reliable volume data on internal flow of goods between regions as such data is not available. Finally, trade flows are imperfect indicators of market integration because they are not necessary for product markets to be integrated, since the potential to arbitrage rather than actual trade flows affect price deviations across regions. Therefore, even if internal trade data were available, such data could suffer from the problem of selection bias, in that markets may be integrated (as in the LOP holding) despite lack of trade flows between markets.

3.2.2. The price approach

An alternative approach, the price-based approach, deduces market segmentation from deviation from the LOP (Asplund & Friberg, 2001; Crucini et al., 2010; Gopinath et al., 2011). Formally, the absolute LOP and its aggregate purchasing power parity (PPP) states that for the identical good k:

$$P_{kjt} = s_{ijt} P^{*}_{kit} \qquad (3.1)$$

where P_{kjt} is the price of good k in region j at time t and s_{ijt} the nominal exchange rate. P_{ki} is the price of good k in region i. When working with price levels within a country, such that $s_{ijt} = 1$, the LOP deviation (q_{kijt}) in logarithmic form for good *k* between region *j* and region i is written as:

$$q_{ijkt} = \ln(P_{ikt} / P_{jkt}) = p_{ikt} - p_{jkt} \qquad (3.2)$$

According to theory, under perfect competition with no transport costs, differences in relative prices across regions are instantaneously arbitraged away and the absolute LOP holds, i.e. $q_{kijt} = 0$ (Moodley et al., 2000; Parsley and Wei, 2003; Rogers & Jenkins, 1995). Since for any market pair or time period, q_{kijt} can be positive or negative, the analysis focuses the absolute percentage price deviations.

Abstracting from ideal conditions, complete arbitrage could be constrained by the presence of trade costs that place an upper bound on perfect price integration. The log LOP deviations is therefore defined as:

$$\left|q_{ijkt}\right| = \left|\ln(P_{ikt}/P_{jkt})\right| = \mid p_{ikt} - p_{jkt} \mid \ \leq \tau_{ijt} \qquad (3.3)$$

where the absolute value of the price differential $\left|q_{ijkt}\right|$ between region i and j is constrained to be less than or equal to transaction costs, inclusive of transport and other trade costs, between the regions (τ_{ijt}).

This condition suggests that trade will occur if price gaps exceed transactions costs and continues until equality is restored. In this case, markets are considered integrated and consumer in either market is *indifferent* between buying the good in the market where they live or pay τ_{ijt} to buy in the other market. This means that in integrated markets, the equality constraint (i.e. observing price difference) is equivalent to observing total transactions costs. Any price changes in one market will translate to price changes in the other region (Gopinath et al., 2011). Having said this, markets are segmented if transactions costs are large enough between regions (i.e. relative to the price gap) and the inequality condition holds. Consequently, prices will move independent of each other and the price gap is not a function of trade costs. The empirical analysis uses this insight of price gaps to identify the size of trade costs or market segmentation.

3.3. Empirical evidence on the LOP

In recent years, a number of studies have analysed the validity of the purchasing power parity (PPP) and the LOP in the context of international and domestic markets. The literature is organised around two strands based on indexed data testing the relative PPP and retail prices testing the LOP. Regardless of the type of dataset used, evidence rejects the validity of LOP/PPP within and across countries. This section provides a brief overview of both international PPP studies and intranational LOP studies, with a special emphasis on the latter.

3.3.1. Overview of Aggregate of PPP studies

Early empirical studies using CPI indexed datasets to test relative PPP across developed countries include, among others, Frenkel, (1978); Bahmani-Oskooee (1993), Krugman

(1987), Adler and Lehmann (1983), Papell, (1997) and Rogoff, (1996). These PPP studies, based on aggregate price indices, typically compare national level prices to evaluate the evidence for price parity across countries (Edwards & Rankin, 2012; Rogoff, 1996). This done on the assumption that price arbitrage generates parity in prices across products.

The deviations from the PPP are captured by the volatility in the aggregate price indices as measured by the extent to which they revert to the mean. Commonly, these studies find that PPP holds in the long-run, but dramatically fails in the short-run with an average half-lives of 3-5years. Similar evidence is reported in the recent wave of PPP studies, which exploit the potential power of large panel datasets and methodological advances to sharpen estimates of the speed of convergence (Frankel and Rose, 1996; Lothian and Taylor, 1996; Wei and Parsley 1995; Wu 1996).

In Africa, several researchers have examined relative PPP across countries on the continent (Arize et al., 2010; Bahmani-Oskooee & Gelan, 2006; Hoarau, 2010; Holmes, 2000; Kargbo, 2006; Krichene, 1998; Odedokun, 2000). Many approaches are used including cointegration analysis using country pairs, panel cointegration, and unit root tests. The results tend to be mixed and sensitive to estimation techniques, period of analysis as well as the sample of countries. For example, Odedokun (2000) uses quarterly exchange rates and CPI data to examine the nature of deviation from the PPP across 35 African countries over 1980 to 1996. He finds support for the long-run PPP in 17 of the 35 countries included in the sample, while Bahmani-Oskooee and Gelan (2006) find support for PPP using real effective exchange rate for 11 out of 21 African countries.

Further evidence by Kargbo (2006) finds strong support for the long-run PPP in Africa. Holmes (2000) corroborates the validity of the PPP finding by applying panel unit root tests to selected countries. He rejects these results when unit root tests are applied to individual country data. Arize et al., (2010) uses results from long-run cointegration analysis, short-run error correction models and persistence profile analysis to test the validity of the PPP across 14 moderate-to-high inflation African countries.

Nevertheless, relative PPP studies are open to a couple of criticisms associated with aggregate indices. Firstly, research on PPP focuses on relative PPP and pays less attention to the absolute PPP or LOP. Since differences in price indices cannot be used to measure trade costs, it is not possible to measure whether absolute LOP holds. Secondly, price indices are averages of various constituting prices. In this case, the various components have different speeds of convergence. The estimated aggregate speed of convergence masks this compositional effect and can result in larger and longer deviations from PPP (Choi & Matsubara, 2007; Imbs et al., 2005b).

3.3.2. Empirical Literature using disaggregated data

Numerous studies have examined the dynamics of relative good-level prices to avoid the shortcomings associated with price indices. These allow the analysis of the absolute deviations from LOP and hence estimate trade costs as captured by price gaps.

Earlier micro-price based studies based on national data executed in the 1970s to test the LOP showed that commodity arbitrage across countries is never perfect (Isard, 1977; Knetter, 1989; Knetter, 1993; Richardson, 1978; Giovannini, 1988). Further evidence shows large and persistent product-level price deviations from the LOP that appear to be highly volatile when compared to exchange rate movements suggesting that global markets are not perfectly integrated (Bergin & Glick, 2007; Knetter & Slaughter, 200l; Broda & Weinstein, 2008).

The core finding of the failure of LOP is further supported by new evidence primarily coming from city level price data which shows that: firstly, the LOP between countries does not hold; secondly, prices differential are significantly larger for cities across countries relative to equidistant cities in the same country. A partial list of these studies includes Baba (2007), Broda and Weinstein (2008), Burstein and Jaimovich (2009), Gopinath et al., (2011), Gorodnichenko and Tesar (2009), Moon (2013), and Crucini and Yilmazkuday (2013). Weber and Beck (2003) use a mixture of disaggregated and aggregated CPI data from 81 European cities across seven countries over the period 1995 to 2002. They find cross-border price gaps being significantly larger (e.g. 5.53 between Germany and Austria) than the average price-gap of within-country pair (1.93 across German cities). In Asia, Moon (2013) analyse price dispersion based on retail price data for 111 traded goods across ten Asian countries covering the period 1990 to 2011. He finds the cross-country mean price differential of 0.59 and standard deviation of 0.45 in 2008. In North America, Gopinath et al., (2011) uses store level price data collected on 4221 products across Canada and US. They find the median absolute price gap of 3.7% across US stores compared to zero median price gap across Canadian cities.

Recently, a handful of studies have extended the PPP and LOP to intranational analysis, with the bulk of the research focused on the US (O'Connell & Wei, 2002; Parsley & Wei, 1996; Cecchetti et al., 2002). Studies based on indexes find that price convergence among US cities not to be the norm (Culver & Papell, 1999) or extremely slow with half-lives of 9 years (Cecchetti et al., 2002)[26]. Using indexed data for Malaysia, Lee and Habibula (2008) report an average half-life of 6.75 years with a range of 1 to 2 years for tradable goods and 10 years for nontraded goods.

In contrast, Parsley and Wei, (1996) use micro-price data and finds the half-lives ranging from 1 year to 3.5 years across US cities. In Canada, Ceglowski, (2003) finds half-lives for intercity price deviation average of less than 1 year. Carrioni-i-Silvestre et al., (2004) use CPI across 50 Spanish cities for the period 1939 to 1992 and reject the unit root test, despite finding large and persistent short-run deviations from PPP.

Furthermore, a handful of studies have analysed market integration using price gaps across cities within countries. They overwhelmingly reject the validity of the LOP (Ceglowski, 2003; Engel & Rogers, 2001a; Fan & Wei, 2006; Parsley & Wei, 1996). Parsley and Wei (1996) calculate the mean log price differential and standard deviations for 51 products across 48 US-cities. They find services to be more dispersed with the mean absolute log price deviation of 0.156 compared to non-perishable goods at 0.125. Engel et al., (2005) for the US, Ceglowski (2003) for Canadian cities and Fan and Wei (2006) for China record similar results.

[26] This is higher than the 3-5 years found in cross country studies of advanced economies.

3.3.3. Disaggregated price dispersion studies in Africa

There are a few price-based studies analysing market integration in developing countries, particularly Africa. Such work, however, has been impeded by data problems. Notable exceptions focusing on Africa are Aker et al., (2014; 2010), Atkin and Donaldson (2014), Edwards and Rankin (2012), Versailles (2012), Nchake (2013), Balchin et al., (2015) and Brenton et al., (2014). Apart from Atkin and Donaldson (2014), these studies mostly focus on testing the cross-border price integration.

Atkin and Donaldson (2014) use spatial price gaps based on producer-consumer market pairs as a proxy for intranational trade costs across Ethiopian, Nigerian and US cities. They find intranational trade costs to be 4 to 5 times larger in Nigeria and Ethiopia compared to the US. This indicates the existence of large trade costs in developing countries compared to advanced economies.

Given the scarcity of evidence of intranational price dispersion in Africa, we draw further insights from the available ‘border effect’ literature. These studies generally find very large border effects as well as larger price gaps within countries compared to advanced economies. For example, Versailles (2012) looks for convergence to the LOP across and within four East African Community member states using micro-data from 39 cities covering the period 2004 and 2008. His results show relatively lower average price gaps within countries 0.24 mean standard deviations. Furthermore, he reports large heterogeneities in price dispersion among products within countries ranging 0.142 to 0.396 log price differences for other foods, and fruits and vegetables respectively. Edwards and Rankin (2012) have examined international price convergence for 91 products collected from 14 cities across 13 African countries covering the period 1991-2009. They show evidence of increased market integration across the continent with greater progress in Northern Africa especially during the early 1990s.

In another study, Aker et al., (2014) use monthly price data of millet and cowpeas to analyse product market integration within and across Nigeria and Niger. They provide evidence of very large within country price gaps that are systematically related to ethnicity and trade cost.

They estimated price changes of about 20% to 25% across borders with similar ethnic groups and equivalent size across ethnically heterogeneous markets within national borders.

Brenton et al., (2014) investigate the extent and determinants of cross border price integration across 150 cities in 13 Central and Eastern African countries (including Zambia) for three agricultural products: maize, sorghum and rice. They find an average within-country log price differential of 0.20 log points. The extent of the within country dispersion of these price gaps ranged from 0.11 log points for Djibouti to 0.55 log points for the Democratic Republic of Congo. Nchake (2013), who uses monthly retail price data at district level across three Southern Africa Customs Union member countries (South Africa, Lesotho and Botswana), finds qualitatively similar results Balchin et al., (2015) support this evidence.

The studies focused on Africa have some limitation. Firstly, with the exception of Nchake (2013), most of the studies tend to draw on a narrow range of products, often limited to the agricultural or food products. Secondly, the period of analysis covers short time spans often collected from a narrow geographical coverage within countries with a prime focus on cross-border sources of price dispersion. Particularly, missing in the available literature are systematic studies looking at intranational price dispersion within African countries. Except for Atkin and Donaldson (2014), we are not aware of any other studies focused on internal trade costs. We extend the literature using an extensive product prices that allow us to carry out more detailed analysis of within-country price dispersion across products, cities and over time in the context of SSA than has previously been possible.

3.3.4. Methods for testing the LOP/PPP

Price-based studies of market integration depend largely on different modelling approaches that broadly fall into two categories. A sizeable strand on literature explores the time series properties of indexed data or panel price series to test whether the PPP holds (Sarno and Tylor, 2001; Crucini and Shintani, 2008; Broda and Weinsten 2008). This strand of literature focuses on estimating the overtime convergence rates of prices to the PPP/LOP across regions employing several statistical techniques whose sophistication in testing procedures has advanced with developments in econometric techniques[27].

Recent studies in this literature have mostly used either Engel-Granger or Johansen's multivariate cointegration technique to test the PPP. In the approach, markets are integrated if any two series are integrated of the same order and their linear combination (i.e., the panel unit root test) is stationary- establishing the mean-reversion and stable long-run relationship between the series. Cointegrated prices are interpreted as indicating market integration. As already observed, these studies typically find that PPP does hold in the long-run, with a half-life of shocks of years in more disaggregated datasets to 5 years suggesting a slow speed of convergence (Frankel and Rose, 1996; Obstfeld and Rogoff, 2000, Goldberg and Verboven, 2005). The PPP tends to be rejected in small samples and the finding of mean reversion tend to be strong when initially high inflation countries are included. In such cases, results tend to exaggerate the rate of convergence to the PPP.

On the other hand, there is the more cross-section oriented research examining the cross-sectional properties of the price data to determine extent of spatial market integration. This approach is anchored on Engel and Rogers (1996)'s seminal work estimating the economic impact of the US-Canadian border to be equivalent to 75000 km. Several authors among others Gorodnichenko and Tesar, 2009, Crucini et al., 2013, Broda and Weinstein, 2009; Grafe et al., 2008; Aker et al., 2014, Engel et al., 2005, Gopinath et al., (2011) and Atkin and Donaldson, (2014) use aspects of spatial price dispersion in order to identify trade costs. They use measures of central tendency derived from price differences across regions to capture the cross-section variation of market integration. Typically, studies focused on cross-sectional variation using indexed data find implausibly large distance equivalent as Engel and Rogers, (1996). Studies based on micro prices show much smaller deviations from the LOP.

There are clear limitations in each testing method. However, are important and widely used to capture various dimensions of market integration. Studies exploiting time series properties

[27] Sarno and Tylor (2001) puts PPP studies examining time series properties into six groups namely tests of random walk hypothesis, cointegration studies, long-span studies, panel data studies and those using non-linear econometric techniques. An overview of the literature up to the mid-nineties is provided in Roggoff (1996).

such as the panel cointegration and other unit root testing methods focus on the time dimension of market integration and the speed of mean reversion. On the other hand, cross-section oriented ones tend to focus on understanding the spatial aspects of market integration. This thesis focuses on spatial price integration. Thus, we use the later method and focusing cross-section variation of price integration. The next section develops the indicators used to measure price integration in our subsequent analysis.

3.4. Methodology

This section introduces how the price integration across various districts and products is measured. The absolute value of the log price differentials of product k between region *i* and *j* in month *m* is used as the base indicator of price integration.

$$\left|q_{ijkm}\right| = \left|p_{ikm} - p_{jkm}\right| \qquad (3.4)$$

This monthly relative price gap measure is then annualised by taking a simple average over the available data pairs in each year

$$\left|\overline{q}_{ijkt}\right| = \sum_{1}^{M_{ijkt}} \left|q_{ijkm}\right| / M_{ijkt} \qquad (3.5)$$

where t is time in years and M_{ijkt} denotes the number of months $\left|q_{ijkm}\right|$ appears year *t*. Several manipulations of the above framework are made to generate appropriate measures of central tendency.

To calculate the mean absolute deviation in product prices across district pairs, denoted as *mad*$_{ij}$, we take the simple average of $\left|\overline{q}_{ijkt}\right|$ across products k and time (t) for each district pair i and j to obtain:

$$mad_{ij} = \left(\sum_{t} \sum_{k} \left| \overline{q}_{ijkt} \right| / KT \right) \qquad (3.6)$$

where, K is the number of goods and T is the number of periods. Similarly, the mean absolute price difference for product k across all district pairs (N) and time T is calculated as:

$$mad_k = \left(\sum_{ij} \sum_{t} \left| \overline{q}_{ijkt} \right| / NT \right) \qquad (3.7)$$

Finally, the time dimension of price spreads for product k is calculated as the mean (simple average) absolute price deviation across district pairs in each year, t:

$$mad_{kt} = \left(\sum_{ij} \left(\overline{q}_{ijkt} \right) / N \right) \qquad (3.8)$$

Equations (3.6)–(3.8) are core to our analysis. The mean absolute deviations are computed at different levels of product aggregation. If the value of the sum of either equations is zero, then the LOP holds exactly for every good or district pairs in the summation.

Furthermore, the standard deviation of the log price differences ($\overline{q}_{ijkt}$) across districts, products and time is also present as an alternative complimentary indicator of price dispersion. However, the mean absolute deviation forms the bedrock of our descriptive analysis since it is less sensitive to large outliers compared to the standard deviation (Crucini et al., 2005a).

3.5. Description of the Data

This study examines a unique detailed panel dataset of price quotations collected by Zambia's statistical agency as an input into the computation of the consumer price index (CPI). Once every month, the Central Statistical office (CSO) collects prices of goods and services across pre-specified retail outlets dispersed in different regions of the economy. This confidential dataset spans 19 years from January 1993 to December 2011. The data is obtained directly from the agency.

Over the 19 years, the data are split into two periods where products and geographical coverage increased. The first sample period covers seven years beginning from 1993 to the end of 1999. The second period starts at the beginning of 2000 and lasts until the end of 2011, covering a total period of 12 years. The geographical and product coverage of data collection is extensive. Monthly price quotations were collected at product-level for 308 products across 29 districts during the first sample period. The sample was increased to 382 products from 46 districts situated in geographically distinct regions across Zambia (shown in Figure 3.1) in the second period.

The retail prices are collected during the first and second weeks of each month from fixed outlets by enumerators employed by the Central Statistical office. Prices are collected on narrowly defined items in terms of unit, brand and grade. This allows for precise comparisons of prices across regions. For example, there are four brands of cigarettes (Peter Stuyvesant 20 per packet, Consulate Rothmans 20 per packet), two brands of 2.5 kgs of wheat flour and three brands of bathing soap. Once more than one outlet is surveyed in a district, a simple average price of each brand or item in each district is computed and used in this study.

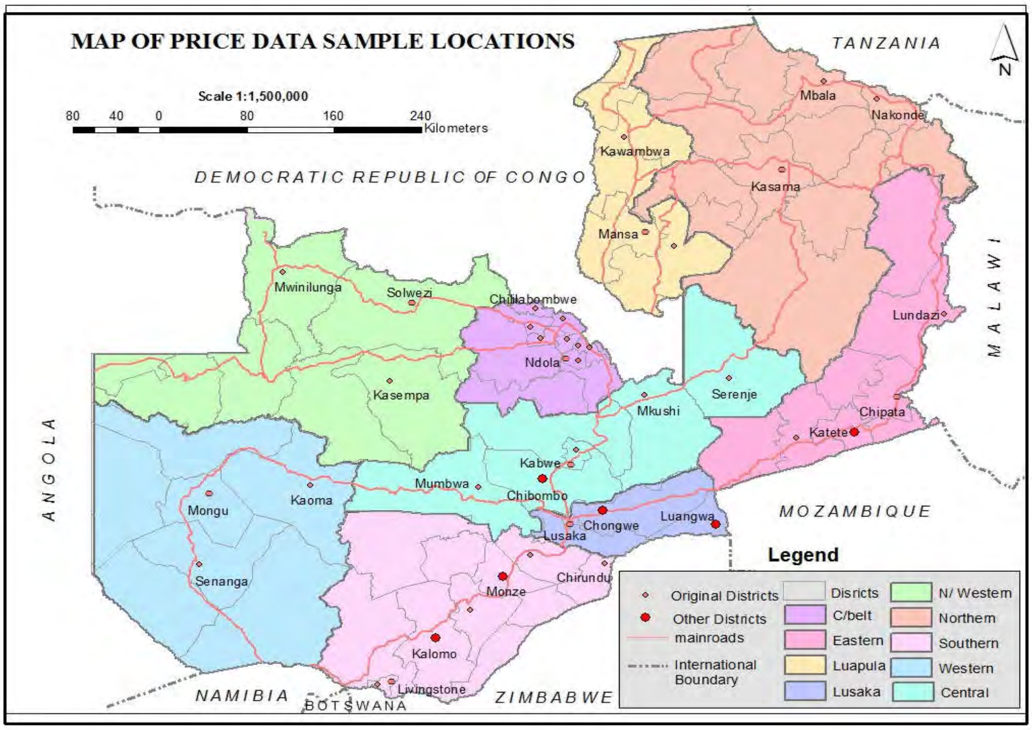
During the data collection week, if collectors find the item to be out of stock, the price from the previous period is carried forward for at most three consecutive months before it is eliminated and subsequently substituted. Thus, our sample is unbalanced, as not every item is available in every district each month[28]. Prices of some products, such as school fees, utilities like electricity and postal services, are collected centrally twice a year. Autonomous state agencies have to approve the price changes for some products procured through statutory bodies – e.g., petrol, electricity and water and sewerage services supply. For others services like local public transport, changes in fares have to be approved by a government agency.

To ensure consistency of the sample included in the analysis, products with insufficient number observations across districts, such as cars, motor cycles, international flights and prices, are set at national level and thus do not have variations across districts were eliminated. As a result of this cleaning process, only 270 products with a total of 378, 250 price records were included in the analysis[29]. Similarly, we removed districts with insufficient observations from the sample in reducing the number of districts in the sample from 46 to 29. Theoretically, the number of districts gives us 29*28/2 =402 bilateral pairs.

[28] In fact, some products like electronics are rarely supplied in rural districts.

[29] This increase in the unit level price records does not reflect a discrete change in the data collection procedure but rather increases the number of surveyed products, district coverage, and period covered.

Figure 3.1: Map of Sample Locations



Source: Constructed by Author

Note: Sample Districts across geographical regions

The final dataset is unique in many ways. First, it comprises district-level average retail prices. Since these are actual prices and not price indices, we can test for the absolute LOP. Second, the data set is collected at narrowly defined consumer products that allows us to compare them across districts while avoiding the aggregation biases associated with CPI indexes. Lastly, the data are collected over a wide geographic area over a longer time. This uniqueness enable us make a detailed analysis internal price integration than it has previously been possible in the African context.

Table 3.1 presents the number of observations and number of products in the final sample according to categories defined by the Classification of Individual Consumption according to Purpose (COICOP). The details of the subsamples by period are presented in appendix 3, Table A3.1. The full list of products used is provided in appendix Table A4.2.

Table 3.1: Shares and Records of Products by COICOP Category (1993-2011)

Product categories	Observations No	Observations %	Product s No	Product s %	CPI Weights[1] (%)
Goods					
Foodstuffs	117,353	31.0	77	28.5	45.6
Non-alcoholic beverages	18,166	4.8	10	3.7	0.3
Alcoholic beverages	10,985	2.9	8	3.0	0.6
Cigarettes & tobacco	7,423	2.0	4	1.5	0.2
Clothing and Footwear	61,876	16.4	49	18.1	10.0
Household maintenance repair	11,065	2.9	12	4.4	1.2
Household equip & furniture	23,972	6.3	24	8.9	2.5
Non-durable Household good	17,411	4.6	8	3.0	2.6
Transport equipment	9,666	2.6	8	3.0	0.8
Medical products	18,569	4.9	14	5.2	0.3
Personal care	33,777	8.9	18	6.7	2.7
Other goods	15,166	4.0	11	4.1	1.5
Services					
Medical services	5,279	1.4	5	1.9	0.5
Culture & recreation	4,384	1.2	6	2.2	2.6
Other services	23158	6.1	16	5.9	4.8
Total	378,250	100	270	100	76.4

Source: Own calculation using the raw price database from CSO

Over the two periods, the largest number of product comprised food products (around 30%), clothing and footwear (18%), household furniture and equipment products (9%) and personal care products (6%). In the services category, medical and other services comprising meals at restaurants and haircuts have the largest services number of products.

In terms of share of CPI weights, food products accounted for the largest share (46%) followed by clothing and footwear (10%). The cigarettes, tobacco, alcoholic beverages and medical products have the lowest CPI weight share of less than 2% each. Services accounted for less than 11% of the CPI expenditure shares.

3.5.1. A Glimpse at the Data

This section characterises the main features of price dispersion across markets and products in Zambia. Table 3.2 provides an illustrative example of district level prices for a 150 ml of

Colgate toothpaste, 2.5 litres of cooking oil and an ordinary men's haircut as measured in April 1995 and April 2005.

Table 3.2: Sample Records of selected district annual average prices (1995)

	1995				2005			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Town	Obs.	*Colgate (price) 150 ml*	*Cooking oil (price) 2.5 litrer*	*Men's Hair cut (price)*	*Obs.*	*Colgate (price) 150 ml*	*Cooking oil (price) 2.5litre*	*Men's Haircut (price)*
Lundazi	1,041	1,485.3	1,274.3	347.7	2,130	5,462.4	7,864.2	2,033.1
Livingstone	2,039	1,434.3	1,219.4	570.8	3,674	6,597.6	8,724.6	3,068.3
Kaoma	736	1,374.3	1,304.6	-	2,287	5,699.6	8,151.8	2,091.3
Mbala	1,205	1,356.1	1,504.2	452.5	2,046	6,421.6	8,520.3	1,500.0
Ndola	1,375	1,336.0	1,403.8	-	1,636	7,343.0	8,546.0	3,350.0
Petauke	1,253	1,327.8	1,228.1	413.6	3,721	6,215.3	8,233.7	2,008.3
Solwezi	1,785	1,300.3	1,278.8	309.8	2,144	6,764.8	8,285.0	2,176.1
Mansa	1,537	1,282.0	1,288.9	290.8	1,960	6,033.5	8,025.0	2,041.7
Kasama	1,638	1,261.6	1,350.0	494.0	3,287	6,208.3	7,945.0	-
Lusaka	2,292	1,259.7	1,313.4	674.6	4,152	6,087.3	8,083.8	4,649.7
Kalulushi	1,220	1,250.8	1,235.1	349.6	1,657	5,810.7	8,293.4	2,134.2
Serenje	1,423	1,235.1	1,332.8	391.1	1,656	5,679.6	8,067.2	1,833.3
Choma	1,953	1,231.3	1,193.4	500.0	3,293	6,238.3	8,454.2	1,505.8
Samfya	985	1,228.3	1,330.6	242.8	2,605	6,360.0	8,104.9	2,021.1
Kabwe	1,894	1,226.5	1,278.1	679.7	3,670	5,937.3	8,282.4	2,020.8
Mongu	1,685	1,222.0	1,335.6	445.6	3116	5,830.8	8,352.0	2,000.0
Mufulira	1,790	1,221.3	1,260.6	340.5	3,153	5,969.8	8,004.7	1,500.0
Isoka	919	1,219.4	1,472.0	372.7	1,844	5,798.6	8,721.2	1,950.5
Kitwe	2,109	1,212.6	1,261.3	646.7	3,791	6,162.9	8,330.3	4,384.9
Chingola	1,799	1,202.8	1,298.4	398.8	3,130	6,747.8	8,085.1	3,375.0
Mazabuka	1,715	1,190.9	1,236.8	433.4	2,991	5,884.2	8,087.6	1,862.6
Chipata	1,867	1,185.0	1,180.0	404.7	3,480	5,602.3	8,132.0	2,300.1
Mumbwa	1,227	1,174.7	1,268.7	417.5	2,592	5,811.9	7,698.5	1,716.5
Luanshya	1,348	1,077.6	1,256.3	498.5	2,528	5,863.4	8,360.0	1,950.0

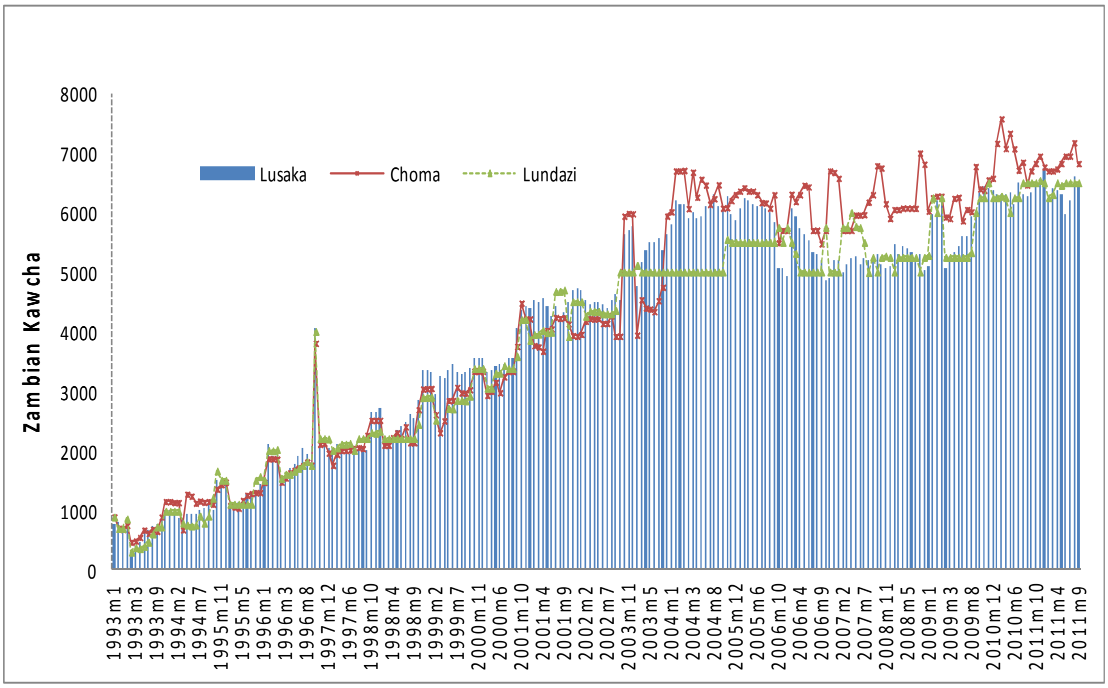
Source: Own construction from price database

These sample records highlight a number of points. First, prices display substantial deviations from the LOP across districts. In column 2, we report the prices of Colgate for April 1995 across a sample of districts. These vary from K1, 077.6 in Luanshya to K1, 485, almost 35% higher in Lundazi. Column 3 displays prices for cooking oil for the same month. It shows a price range of K1, 180 to K1, 504 with the highest price record in Chipata and the lowest in Mbala.

Second, there is divergence in relative prices across products for the same district-pairs. For example, the ranking of relative price differences across districts is not consistent across products. For example, columns 6-8 show that while Colgate was more expensive in Lusaka than in Isoka, cooking oil was more expensive in Isoka than in Lusaka in April 2005. This reverse ranking holds across a number of districts and suggests that product and location specific factors also influence price gaps.

Finally, although prices of the same product show a general tendency of co-movement, they tend to drift apart and, in some cases, reverse ranking over time and across districts. Figure 3.2 plots the monthly price of Colgate for the period 1993 to 2011 for three districts: Lusaka, Choma and Lundazi. The graph illustrates that prices were higher in Lusaka than both Choma and Lundazi in 1999, but this reversed in 2008 for Choma when reported prices rose sharply above those of Lusaka.

Figure 3.2: monthly prices of 150 gm of Colgate in three districts (1993 -2011)



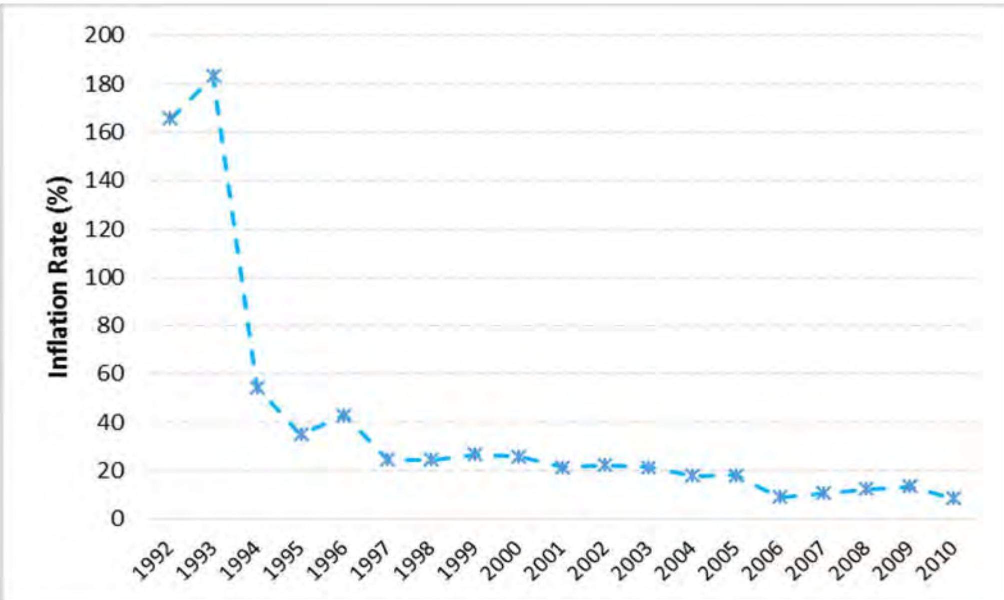
Source: Own construction from the CSO price database

3.5.2. Inflation Developments

The monthly micro- price data described in the previous section is collected as an input into the computation of CPI. As noted in chapter 2. Zambia removed price controls in 1992 when the economy was liberalised. The immediate effect of the removal of price controls was the spiking of price leading to inflation. As figure 3.3 shows, inflation rose from 97% in 1991 reaching a peak of 183.6% in 1993. As part of the major structural adjustment and stabilisation program, government, implemented tight monetary policy and contractionary cash budget system that reduced the expenditure from 23.5% of GDP in 1991 to 11.2% in 1994 (Adams, 1995). This policy action saw a sharp drop in inflation to of 34.9% in 1995.

For most of the period after 1993, inflation took place in an economic structure different from the pre-reform period. Anchored on a relatively tight fiscal and monetary policy stance and favourable weather patterns and growth prospects, the inflation rate remained stable at an average of 23% between 1997 and 2003. It further dropped to 9% in 2006 (Figure 3.3).

Figure 3.3: Trend in Annualised Monthly Inflation (1992-2010)



Source: Own construction based on World Bank database

The drop in inflation during the later years reflects the effect of the external debt cancellation, improved economic growth driven by surging copper exports and the tight fiscal and monetary policies initiated during the 1990s. The period also experienced sustained economic growth averaging at 6% per annum between 2001 and 2010. In theory, improved economic growth and falling inflation should be associated with reductions in price dispersion.

3.6. Empirical Results

This section presents the unweighted good-by-good measures of price dispersion based on the methods above. Only a consistent sample of 28 districts and 270 products are analysed. The expanded district sample and associated estimates is presented in appendix Table A 3.2. The analysis is in two parts. The first subsection provides the descriptive statistics to uncover the key stylised facts about product market integration across space and products. The second part looks at price convergence over time and their association with trade policy, particularly tariff regime changes. We take the good-level dispersions and then aggregated over goods to arrive at the mean absolute deviation and the mean standard deviation.

3.6.1. Price Dispersion across districts

Table 3.3 presents spatial price dispersion for a consistent sample of 270 products for the entire period using Lusaka- as a benchmark district. The mean and median absolute log price differentials based on equation 3.6 are computed to determine the extent of price integration across regions. The standard deviations are also reported as a complementary measure. Under the strict LOP hypothesis, price deviations across districts should be zero. This hypothesis is rejected as the data displays significant deviations of prices from Lusaka.

Column 2 displays the mean absolute price differential for the unweighted data. The average mean absolute price gap from Lusaka is 0.38 log points. This implies that prices in surrounding districts differ on average by 46.2% ($(e^{0.38} - 1 = 0.46.2)$*100) from those in Lusaka. These price gaps are significantly higher than the average of 0.12 reported for Canada by Ceglowski (2003).

Table 3.3: Mean absolute Price differentials –relative to Lusaka (1993-2011)

		Absolute log price deviations			Products (Mean)	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
District	***Distance (km)***	***Mean***	***Median***	***Standard deviation***	***Goods***	***Services***
Mazabuka	125	0.35	0.25	0.43	0.3	0.92
Kabwe	138	0.32	0.23	0.44	0.28	0.74
Mumbwa	151	0.38	0.3	0.4	0.34	0.84
Choma	284	0.37	0.28	0.43	0.32	0.9
Ndola	321	0.30	0.23	0.42	0.28	0.44
Luanshya	331	0.35	0.27	0.43	0.32	0.65
Chingola	354.3	0.32	0.24	0.43	0.3	0.51
Kitwe	358	0.28	0.21	0.44	0.26	0.54
Mufulira	385	0.34	0.25	0.43	0.3	0.72
Kalulushi	402	0.38	0.26	0.41	0.33	0.92
Ndola Rural	411	0.28	0.22	0.45	0.25	0.56
Serenje	423	0.40	0.30	0.41	0.39	0.64
Petauke	432.5	0.42	0.29	0.43	0.37	0.97
Kaoma	439	0.46	0.34	0.45	0.42	0.93
Livingstone	472	0.31	0.23	0.44	0.30	0.47
Chililabombwe	476	0.34	0.24	0.42	0.30	0.85
Samfya	541	0.46	0.26	0.43	0.38	1.31
Mansa	561	0.42	0.28	0.45	0.37	0.97
Chipata	569	0.36	0.26	0.44	0.31	0.84
Mongu	581	0.44	0.32	0.45	0.39	0.92
Solwezi	662	0.41	0.31	0.45	0.36	0.97
Kasempa	710	0.48	0.35	0.43	0.45	0.86
Kawambwa	729	0.46	0.3	0.42	0.40	1.24
Lundazi	754	0.40	0.31	0.40	0.38	0.55
Kasama	850	0.41	0.28	0.44	0.36	0.92
Isoka	950.9	0.48	0.33	0.43	0.44	1.06
Mbala	1016	0.40	0.28	0.40	0.38	0.62
Simple Country Average	***494.15***	***0.38***	***0.27***	***0.43***	***0.34***	***0.79***

Source: Own calculations using raw data price from CSO

Note: All measures are calculated on a good-by-good basis and are time demeaned giving us mean $|q_{ij}|$. Lusaka - j is a numeraire district. The calculation included only 270 products and 28 districts that were in the 1993 (original) basket.

The results in column 2 also reveal large variation in price differences across districts relative to Lusaka. The average deviations in log prices for each city range from 0.28 for Kitwe and Ndola Rural to 0.48 log points for Isoka and Kasempa.[30] About 50% of the district prices

[30] This range is almost similar for both original and expanded sample used in Table 3.

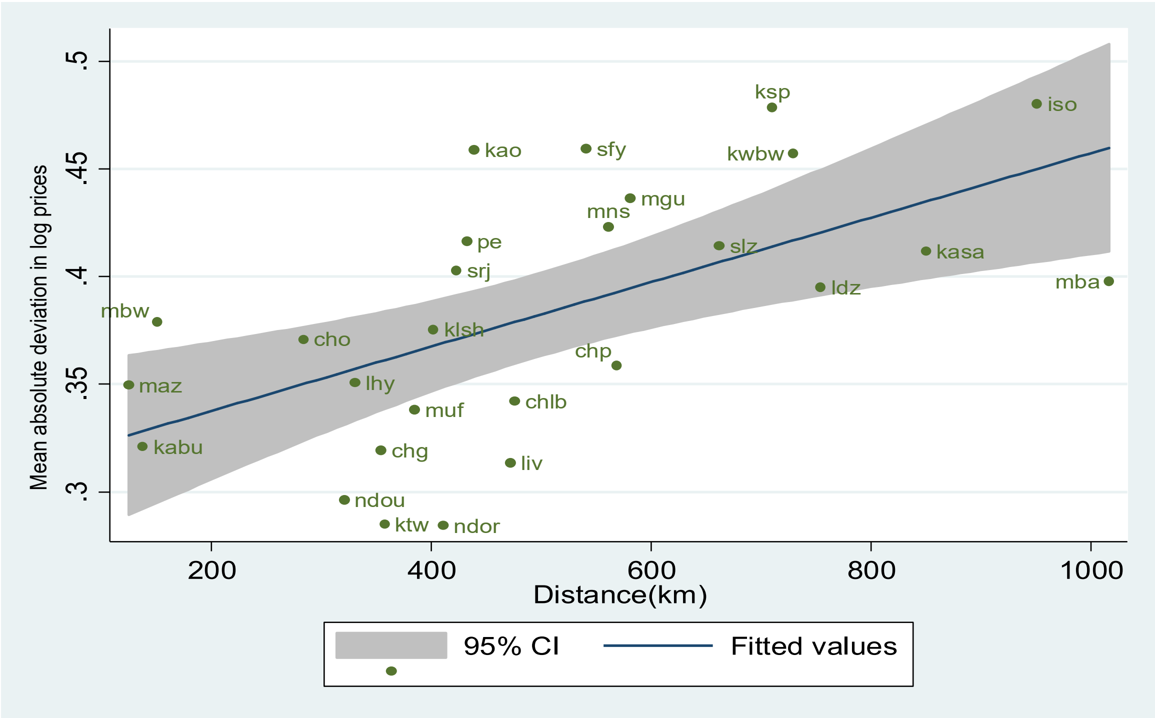
differ from the benchmark district prices by between 0.28 and 0.39 mean absolute log price differences. The price differences are larger across regions ranging from 0.40 and 0.48 log points.

Figure 3.4 displays the correlation between distance and price differences. Three key conclusions are evident. Firstly, consistent with international literature, the mean log price differentials are smaller for districts closer to Lusaka than those further out. This is revealed by the positive correlation between distance and the log price differentials. Secondly, trade costs, approximated by distance only partially explain price differences across districts in the country. For example, although Chipata and Mongu are almost equidistant from Lusaka, they have different degrees of price dispersion. This suggests that some other location-specific factors, such as market structure, income differences and poor logistics influence price dispersion between these regions. The next chapter analyses some of these factors.

The final observation arises from looking at the geographical distribution of the measures of dispersion from Lusaka in figure 3.4. The districts' mean absolute deviation tend to be clustered around their provincial locations. For example, the copperbelt towns such as Ndola rural (ndor) and urban (Ndou), Luanshy (lhy), are clustered just below standard belw the fitted values line whereas the Northern province districts (such as Kasama, Mabla and Isoka) are clustered on the furthest end of the fitted values. This suggests that prices tend to be more integrated across than within provinces.

All measures of price dispersion presented in Table 3.3 reveal large deviations in the LOP across regions. This conclusion remains even when we consider the standard deviations and median absolute price differentials. These results are consistent with the notion that African markets are weakly integrated.

Figure 3.4: Relationship between Distance and Price dispersion (1993-2011)



Source: Own construction from the price and distance database
Notes: The labels are abbreviated district names. The x-axis presents distance of the region from Lusaka

3.6.2. Price Dispersion across Products

Next, we present the measures of the good-by-good average price dispersion across all goods and their sub-categories. Table 3.4 presents the mean and median absolute price gaps for products according to the COICOP classification. A value of zero implies that the LOP holds perfectly. Column (3) presents the standard deviation as an alternative measure.

The results highlight a number of key insights. Firstly, the results in the last row of column 1 show high levels of price dispersion across products. The all product good-by good average mean absolute price differences across products is 0.32 log point. This implies that product prices differ across regions on average by 36.3% - $(\exp(0.31)-1)$. This is consistent with the good-by-good average of 0.32 log points found by Nchake (2013) for Lesotho, who as earlier noted, uses a large dataset like we do.

Secondly, as found in literature, the table indicates that price differentials differ substantially across product categories. Price dispersion across services averages 0.53 log points (about 70%) compared to goods at 0.30 log points (about 35%). These results are similar to those of Crucini et al., (2005a). They suggest that the tradability of a product is closely associated with product market integration, at least at the broad product group level.

Table 3.4: Mean absolute Deviations from the LOP across Products[1] (1993-2011)

	Absolute log price differential		(3)
COICOP Category	*(1) Mean*	*(2) Median*	*Standard deviation*
Panel A: Goods			
All goods average	***0.30***	***0.20***	***0.36***
Food products	0.33	0.23	0.41
Non-alcoholic beverages	0.22	0.15	0.27
Alcoholic beverages	0.20	0.13	0.24
Cigarettes & tobaccos	0.15	0.11	0.18
Clothing and footwear	0.38	0.28	0.46
House maintenance repair	0.34	0.23	0.41
Household equip and furniture	0.36	0.27	0.43
Household supplies	0.14	0.11	0.17
Transport and communication	0.17	0.14	0.21
Health products	0.41	0.31	0.50
Personal care	0.22	0.15	0.27
Other goods	0.20	0.15	0.25
Panel B: Services			
All Services average	***0.53***	***0.38***	***0.64***
Medical services	0.91	0.74	1.09
Culture and recreation goods	0.65	0.35	0.77
Restaurant and other services	0.45	0.35	0.55
Simple average across all products	***0.31***	***0.21***	***0.38***

Source: Own calculation from the price database obtained from CSO
Note: These statistics are calculated from unweighted relative price differences for 270 sample products and all bilateral city pairs ij.

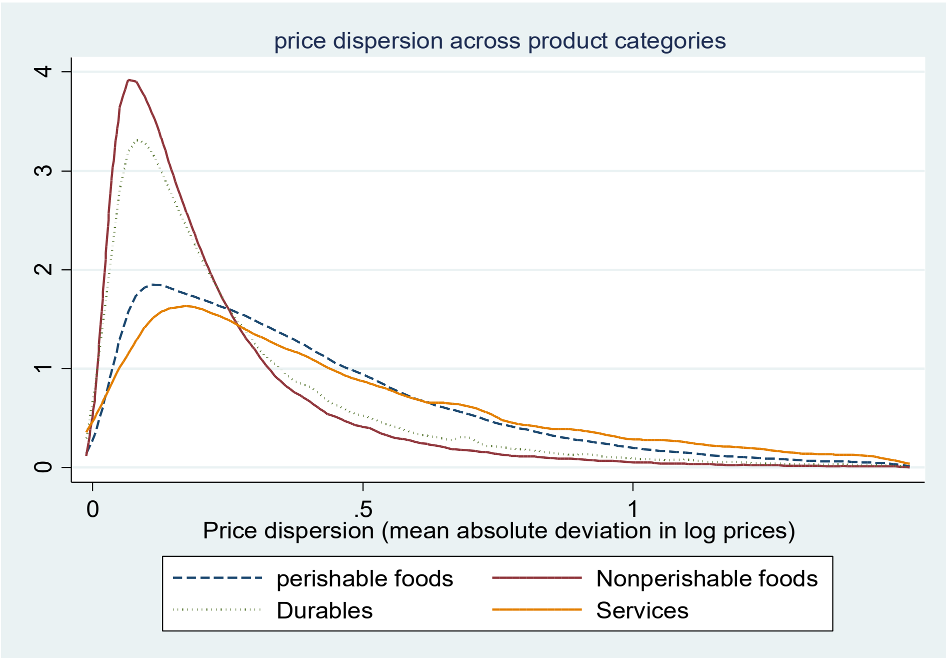
Thirdly, there is substantial heterogeneity in price differences across products within the goods and services categories. Column 1 shows that the log price differentials across goods ranges from 0.14 log points (15%) to 0.41 log points (50.7%). The deviations are larger among non-standardised products, such as medical products (44%) and clothing and footwear

(39%), compared to products comprising beverages, tobacco products and personal care which have lower price differentials (less than 24.6%).

Larger variations are reported across the different services product groups presented in Panel B. Mean absolute price gaps range from 0.45 for restaurant and other services to 0.91 for medical services. Similar evidence of product heterogeneity in price differences emerges when using the standard deviation of relative prices across regions.

Furthermore, following Baba (2008) and Crucini et al., (2005a), we infer product tradability by considering the decomposition of prices into more aggregated product groupings comprising perishable foodstuffs, non-perishable foodstuffs, durable goods and services. The kernel density of these categories is presented in Figure 3.5.

Figure 3.5: Kernel Density estimate of the distributions of LOP Deviations



Note: The distribution are constructed based on the absolute price differentials by product category $|\bar{q}_{ijkt}|$

Each line of the kernel density represents an estimate of the density of the good-by-good deviations from the LOP. Two key results features are evident from the estimate. Firstly, the distribution of the densities are located further to the right, indicating higher price dispersion across regions. Secondly, the spread of the densities reveal large heterogeneity within each product group. They show that absolute price gaps of perishables and services vary more than durables and non-perishables. They indicate more heterogeneity in the former than the latter categories. This result is consistent with Cruicini et al., (2005a) who show that region specific non-traded inputs are less important in determining price gaps in products that have greater share of tradable inputs in their retail price.

3.6.3. Comparison with International Evidence

How do these results compare with other studies? There are few comparable studies to this one. Available literature largely focuses on advanced economies covering different products, product units and times. However, a comparison with the available literature leads to the following observations. Firstly, product markets in emerging economies are more segmented than advanced economies. This is evident from the average log price differential of 0.31 for Zambia, which is substantially higher than 0.142 estimated by Parsley and Wei (1996) for the U.S. and 0.152 found by Fan and Wei (2006) for China.

Secondly, the product-level heterogeneity in price dispersion corroborates international empirical evidence. Across studies, services exhibit larger price dispersion than goods. However, the percentage price differentials are higher across both services and goods in Zambia compared to advanced economies. For example, our average price differentials of 0.33 and 0.66 for goods and services, respectively, are greater than reported in US (0.134 for durable goods to 0.156 for services) by Parsley and Wei (1996), and China (0.11 for goods to 0.46 for services) by Fan and Wei (2006). In Canada, Ceglowski (2003) reports an average of 0.12 log price differentials across goods.

Thirdly, the above pattern is not limited to goods and services but extends to sub-categories of goods and services. For example, within goods, dispersion ranges in the USA from 0.124 (non-perishables) to 0.144 for perishables (Parsley & Wei, 1996); in China 0.066 for industrial materials to 0.16 for perishables (Fan & Wei, 2006); and 0.062 for baby food to 0.219 for cabbages in Canada (Ceglowski, 2003). These estimates are comparatively lower than Zambia's estimates, which range from 0.14 to 0.41.

However, our results corroborate with evidence from other African Countries. In particular, they are consistent with Versailles (2012) who finds a price difference range of 0.149 to 0.396 for non-staple processed foodstuffs to vegetables and fruits respectively. However, there are stark differences in spatial price dispersion with Zambian markets, which exhibits a larger segmentation than their East African counterparts. For example, Versailles estimates the within-country log price differentials of 0.255 (Burundi), 0.246 (Kenya), 0.221 (Uganda) and 0.226 (Rwanda). These are all lower than the 0.39 for Zambia. In fact, the Zambian average compares well with the cross-border deviations for Rwanda-Uganda (0.405), Rwanda and Burundi (0.363), and Kenya-Uganda (0.39). One possible explanation for the substantial differences in spatial dispersion is that intra-national distances within EAC states, which range from 138 km for Burundi to 392 km for Kenya, are shorter compared to the 494 km for Zambia. In fact, the within country distances for Zambia compare well with the average cross-country distances reported for East Africa.

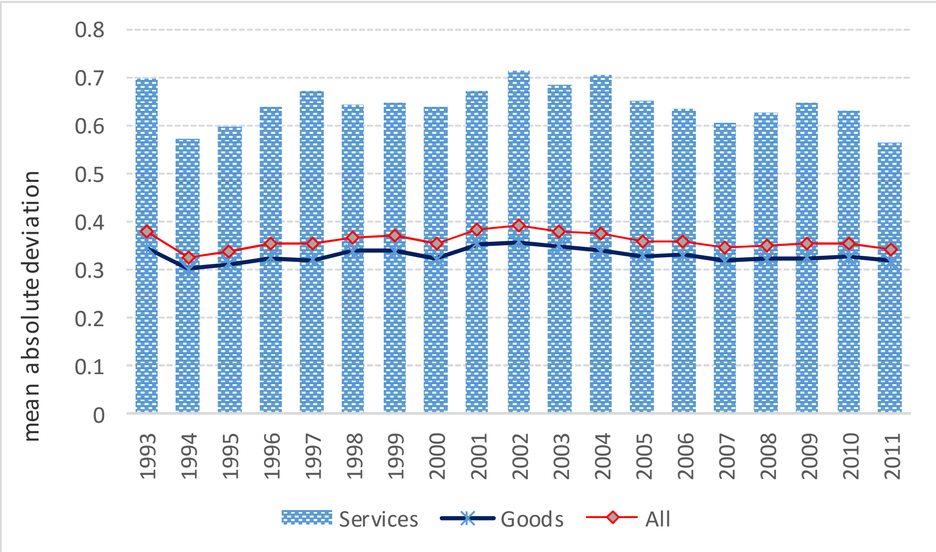
Nchake (2013) provides the average intra-national price dispersion for Lesotho, South Africa and Botswana for before and after initiation of monetary policy reforms. She finds slightly lower mean price differentials with prices averaging at 0.25 for South Africa, 0.16 to 0.22 in Botswana and 0.22 to 0.25 log points for Lesotho.

In sum, our results find that product markets are less integrated in Zambia compared to developed countries. This may be indicative of the relatively large transactions costs prevalent in Africa than in advanced economies. The spatial variation observed in comparison with other African countries could be explained by the smaller distances between districts within these countries.

3.6.4. Mean absolute deviations from LOP across Time

In the preceding section, we find substantial spatial and cross product variation in absolute price differentials. However, given the significant economic and trade reforms that occurred in the early-1990s, complemented by preferential trade reforms, we expect prices to converge to the LOP with deeper economic liberalisation over time. In this section, we explore the deviations from the LOP across time using equation 3.8. The annual product-by-product average deviations from the LOP for goods, services, and their combined average are displayed in Figure 3.6.

Figure 3.6: Mean Absolute Log Price Differentials over-time (1993-2011)



Source: Own calculation and construction from raw CSO database
Note: Calculated as simple averages across goods and services, Services constitute less than 15% of the products baskets hence the downward weighting in overall mean.

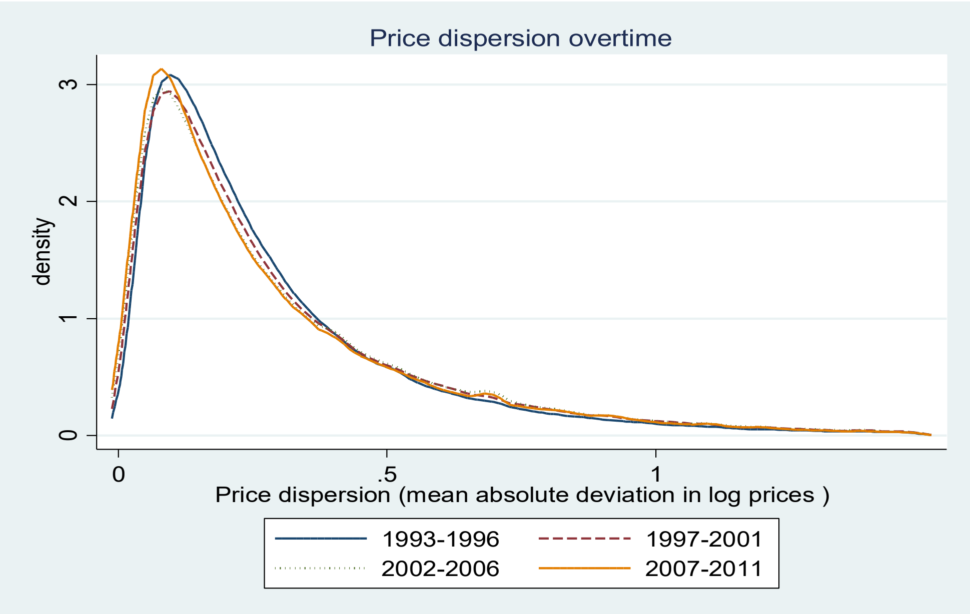
Figure 3.6 reveals the following. Firstly, the product markets are characterised by large and persistent absolute deviations from the LOP. The figure reveals there is little movement in aggregate price differentials between the initial and final sample points. The average price differential stood at 0.34 log points in 1993 and declined only to 0.31 log points in 2011.

Secondly, we observe some evidence of improved integration from 1993 to 1994. The observed spike is consistent with the removal of price controls in 1992. Generally, the price controls artificially reduced price gaps between regions through government subsidies in its shops (Hawkins, 1991). Thus, the reversal of the integration gains over the remainder of the 1990s (after 1994) could be associated with a period of price adjustment to market forces generating wider price dispersion across regions[31].

[31] For example, the first retail chain (Shoprite) established presence in 1995 in the capital and started to spread over the country thereafter.

The final observation is that after an average rise in price dispersion between 1994 and 2005, market became marginally integrated between 2005 and 2011. This is evidenced by the slight leftward shift in kernel density estimate in Figure 3.7 for the 2002/2006 and 2007/2011 periods – which are associated with implementation of the SADC regional trade agreement – and improved macroeconomic performance. Nevertheless, the figures show a remarkable persistence in the level of price dispersion across the sample period. This is despite the various policy initiatives including the removal of price controls and the opening up of the economy to international and regional trade.

Figure 3.7: Distribution of LOP deviations by period (1993-2011



Note: calculated as absolute value of log price differences by period

3.7. Absolute price differentials overtime

In this section, we apply econometric regression analysis of a simple saturated model to test the possibility of price convergence over the sample period (Knetter & Slaughter, 2001). The annual absolute log price gap is regressed on a constant and linear time trend ($time\_trend$) while controlling for the product (k) and location (i) fixed effects (.λ) as in the following static specification:

$$|q_{ijkt}| = \alpha_1 + \alpha_2 time\_trend + \lambda_i + \lambda_k + \xi_{ijkt} \qquad (3.9)$$

The dependent variable $|q_{ijkt}|$ is computed at monthly level and then annualised. In case of price convergence, the regression yields a negative coefficient of the time trend ($\alpha_2 < 0$). The equation is estimated using the pooled sample of all products for the full period and various sub-periods. The results from the specifications are presented in Table 3.5.

With the exception of the 1993/2001 subsample, the trend coefficients are negative and statistically significant, but are economically insignificant, suggesting low convergence. The full period pooled model suggests that average prices converged by 0.006 log points every year. The subsample regressions suggest product markets converged more between 1993/96 and between 2002/11. For the period 1993 to 2001 there is a decrease in price convergence.

Table 3.5: Trend in price absolute price dispersion (1993-2011)

Dependent variable log($\vert q_{ijkt}\vert$ ***)***	***Full Period***	***1993-1996***	***1993-2001***	***2002-2011***
Time trend	-0.0006***	-0.0091***	0.0012***	-0.0025***
	(0.0001)	(0.0006)	(0.0003)	(0.0002)
Constant	1.4055***	18.3111***	-2.1855***	5.2874***
	(0.2806)	(1.1892)	(0.6366)	(0.4766)
Prod FE	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Observations	1,435,106	316,227	676,384	758,722
R-squared	0.3116	0.3485	0.3332	0.3328

Note: The estimates are for 270 products across 28 districts from the original sample.
*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.*

The pooled regression could mask heterogeneity in trends in price convergence across products (Baba, 2008; Crucini et al., 2005a). To analyse this, Table 3.6 presents the mean percentage price deviations from the LOP for various periods between 1993 and 2011. The last column presents the percentage point change in the mean absolute price differentials from 1993/96 to 2007/11. The asterisks show the level of statistical significance for a trend's coefficient based on the regression results in appendix Table A 3.3.

Table 3.6: Overtime mean absolute Deviations in log prices (1993-2011)

	1993 -1996	*1997 -2001*	*2002 -2006*	*2007 -2011*	*% difference 1993/6 -2007/11*	
Food products	43.76	45.64	42.76	38.40	-5.36	***
Non-alcoholic beverages	24.48	24.36	30.73	22.38	-2.10	***
Alcoholic beverages	25.99	30.34	26.62	19.72	-6.26	***
Cigarettes & tobaccos	15.14	21.41	26.36	39.79	24.65	***
Clothing and footwear	44.48	44.92	49.93	50.38	5.90	***
House maintenance repair	41.34	48.29	40.49	36.89	-4.45	***
Household equip and furniture	40.35	43.33	45.35	41.20	0.84	
Household supplies	14.34	15.84	14.45	14.91	0.57	*
Transport	23.61	22.26	19.36	19.48	-4.13	***
Health products	46.08	50.08	53.73	58.41	12.33	***
Personal care	24.36	26.49	32.05	29.95	5.59	***
Other goods	35.93	35.66	39.38	29.82	-6.11	***
Medical services	162.22	155.74	178.15	117.49	-44.72	***
Culture and recreation goods	99.57	123.00	106.27	94.84	-4.73	***
Restaurant and other services	63.07	66.20	73.67	72.12	9.05	

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

Notes: The products are organised around their COICOP category. The values in columns 2 -5 are the mean absolute log price differentials converted to percentage differences by taking the exponents and subtracting 1

The results reveal great heterogeneity in the way trade reforms are associated with price dispersion across products. As already observed, if price dispersion were declining steadily, we expect the regression to yield a negative coefficient. The results show evidence for an increased price convergence in 8 of the 15 product categories. The percentage price changes are negative and statistically significant at 5%. In particular among alcoholic beverages, household maintenance products, foodstuffs and all services are associated with increased integration, while cigarettes, personal care products and clothing are associated with more overtime deviations from the LOP.

3.7.1. Price dispersion and tariff reforms

In this section, we use a static model to test whether the observed trend in the mean absolute price gap is associated with tariff changes implemented during the sample period. The tariff reforms are captured by dummy variables formally presented as:

$$\left|q_{ijkt}\right| = \alpha_1 + \alpha_2 time\_trend + \alpha_3 mfn\_pst95 + \alpha_4 rsadc\_pst00$$
$$+ \alpha_5 rsa\_pst05 + \lambda_i + \lambda_k + \xi_{ijkt} \qquad (3.10)$$

where the dummy variable mfn_pst95 captures the major MFN tariff reform of 1996 (equals 1 from 1996), $rsadc\_pst00$ denotes tariff reforms from 2000 associated with the implementation of the SADC trade protocol with SADC members other than South Africa (equals 1 from 2000), and rsa_post05 (equals 1 from 2005) captures tariff reductions on imports from South Africa from 2005. The model is estimated using the full sample of data between 1993 and 2011.

We expect reductions in tariffs to be associated with lower absolute price differentials so that α_2, α_3 and $\alpha_4 < 0$. The estimated results are presented in Table 3.7. All coefficients on the tariff dummies are statistically significant at 1%, but are very small. The inclusion of the time trend in column 2 does not change the level of significance and the time trend remains insignificant.

Table 3.7: Estimation results of trade shocks (1993-2011)

Dependent variable log($\mid q_{ijkt} \mid$***)***	(1)	(2)
Time trend	-	0.000253
	-	(0.000238)
MFN_post95	-0.00386***	-0.00484***
	(0.00114)	(0.00131)
RSADC_post00	0.0144***	0.0131***
	(0.00129)	(0.00160)
RSA_post05	-0.0211***	-0.0225***
	(0.00154)	(0.00201)
Constant	0.274***	0.273***
	(0.0194)	(0.0194)
Product_FE	Yes	Yes
District_FE	Yes	Yes
Observations	1,424,980	1,424,980
R-squared	0.313	0.313

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

The results suggest that the unilateral liberalisation of the economy in 1996 fostered a 0.38 percentage point reduction in price dispersion. In contrast, the coefficient on the dummy variable for reform with SADC (excluding South Africa) is positive and statistically significant at 1%. This suggests that these reforms are associated with increased absolute price differential of up to 1.31 percentage points.

Finally, the dummy representing the acceleration of tariff reductions with South Africa is negative and significant, implying that lower tariffs on SA imports led to a 2.25 percentage point reduction in price differentials across districts after its implementation. The result suggests that Zambia's accelerated trade reforms with South Africa had the biggest impact on price integration compared to the unilateral and other SADC reforms.

Two caveats to our results are warranted. First, our results do not set to establish the causal relationship between tariff reform and price integration. Rather, we explored the association between the two. The causal relationship is the subject of Chapter 5. Second, the analysis does not analyse the impact of tariff reform on price integration. Rather, it makes a cursory assessment of the association between trade regimes and price integration.

3.8. Conclusion

This chapter investigated the extent of intra-national price integration using the LOP as a theoretical benchmark in Zambia. The study focused on understanding the extent of price differentials across three dimensions namely, across districts, products and overtime. The analysis is made using a highly disaggregated panel data of monthly prices of 270 products collected across 29 districts. This allowed for a more detailed analysis of intra-country price integration than previously done in the African context. The advantage of using micro data from the same country is that it mitigates the roles of exchange rate fluctuations and other *border effect* related barriers to trade. In addition, to exploring the extent of market integration, we made a cursory assessment of the relationship between policy reforms, particularly reductions in tariffs and price integration.

Having converted the mean absolute log price differential to percentage differences by taking the exponents and subtracting one $((\exp|(\ln(P_{kusaka}/P_{ik})|-1))$, we find that prices in regions differed from the Lusaka's benchmark prices by an average of 46.2%. The study finds substantial variations in price dispersion across districts, ranging from 32% to 61%.

Furthermore, the variations in price gaps across districts appear to be positively correlated with distance from Lusaka. This suggests that trade costs affect market integration.

Looking across products, we find some considerable large price differentials averaging at 36% across the 270 sample products. The measure also shows significant variation in price differentials across products. The average price dispersion across goods, which are more traded, is lower at 34% compared to services that are less traded at 69.8%. Even within these broad categories, there is significant heterogeneity in price dispersion across sub categories. As expected, price differentials are greatest for least traded services and perishable products and lowest for branded and durable products. For example, across services, the results find a range of 68% to 156% for medical and restaurant services respectively. We also find relatively high price gaps for clothing and footwear (47.6%), and relatively low gaps for non-durable household goods (15%). These price gaps are substantially larger than found in existing literature. One key insight from our results is that tradability and trade costs play a significant role in influencing price dispersion.

In spite of the extensive internal and external reforms, there is limited evidence of increased price integration over the sample period. Our cursory assessment suggests that trade shocks, particularly tariff reforms, had an economically small, but statistically significant association with the movement in price differences. The results show that the period of tariff reforms with South Africa is associated with greatest reductions in price gaps. This suggest that this reform may have had a most pronounced impact on opening economy to international trade.
These findings are central to the government policy debate on the effect of economic reforms in promoting welfare and market integration across regions within the country. The large price gaps suggest that geographic barriers are large enough to create significant price differentials across markets in the country.

Overall, the chapter sheds light on the degree of product market integration across districts in Zambia. However, the results do not highlight the determinants of internal price dispersion and product market integration. The next chapter extends the analysis by investigating the determinants of intranational market integration in Zambia.

Chapter 4

4.0. Explaining Price Dispersion: The Role of Geography, Ethnicity and Tradability in Zambia

4.1. Introduction

The previous chapter examined the extent to which product markets were segmented across regions in Zambia. It was observed that the country faces the problem of larger price differences across regions. This problem appeared to be larger than in other emerging as well as advanced economies. The chapter also demonstrated the persistence of price dispersion overtime despite the various market reforms, including trade policy reforms.

This chapter extends the analysis from the previous chapter by systematically unpacking some of the factors that contribute towards the intra-national price dispersion. The analysis is centred around three key relationships. Firstly, it estimates the size of transactions costs associated with distance in generating inter-district price dispersion. In doing so, it provides a tighter and more internationally comparable analysis of the role of trade costs in driving product market integration with Zambia.

Secondly, the chapter augments the standard empirical literature in this field by incorporating other factors that may explain intra-national price differences. In particular, the chapter looks for evidence of internal border effects. These are price gaps across regions that persist even after conditioning for distance-related trade costs. Drawing on the insights of Aker et al., (2014), the chapter focuses on ethnic similarity and income differences across regions as a potential explanation for the presence of internal borders.

Lastly, the chapter examines the effect of exposure to international competition and product tradability on price dispersion. In particular, it asks two interrelated questions: firstly, what is the relationship between proximity to external borders and price dispersion? Secondly, does increased tradability of a product increase price integration as broadly found by Crucini et al., (2005a).

The chapter contributes to existing literature in three respects. Firstly, it extends the emerging literature on the determinants of intra-national product market integration and the relative role played by trade costs using micro price data in developing economies. Such studies have been neglected in emerging economies, particularly Africa, given the lack of available micro price data.

Secondly, the chapter augments the standard price integration models that focus on the role of distance with additional and new explanatory variables that are relevant to emerging African countries. This includes how ethnic diversity and income dispersion may give rise to internal border effects within an economy. The chapter also considers how exposure to international competition, as measured by product tradability and proximity to external borders, influences intra-national price dispersion. This is particularly relevant for African economies, many of which are landlocked. The analysis, therefore, accounts for both internal and external factors that are likely to influence product market integration within countries.

Finally, the chapter makes a methodological contribution by assessing the sensitivity of the estimates of transaction costs to the sample selection biases and different empirical model specifications. A key consideration in these sensitivity tests is the selection bias that arises from the inclusion of city-pairs where price gaps are independent of bilateral trade costs. Failure to account for this selection effect results in a downward bias in the estimated distance coefficient (Anderson et al., 2008; Borraz et al., 2015).

The rest of the chapter consists of six sections. The following section presents a brief review of the relevant empirical literature. This is followed by Section 4.3, which discusses the theoretical framework and issues related to the model specification. The empirical framework is presented in Section 4.4. The empirical strategy is presented in Section 4.5 while Section 4.6 describes the data. Section 4.7 reports the regression results for trade costs and internal borders and Section 4.8 examines the effect of tradability on price integration. Section 4.9 presents some robustness tests of the main results. Lastly, Section 4.10 provides concluding remarks.

4.2. Empirical Evidence

There is a large empirical literature on determinants of price dispersion and product market integration. Typically, price-based studies of market integration examine this issue focusing mainly on international markets and to a lesser extent within countries. Evidence across studies suggests that product markets are not perfectly integrated. This section presents an overview of this literature focusing on the sources of price dispersions and product market integration. It makes a distinction between two strands of research, which inform our study.

4.2.1. Evidence from Cross-Border Studies

Several explanations have been offered for the failure of the LOP to hold across regions. Past empirical studies in international trade consistently highlight the role that distance plays in determining price differences within and across national borders (Crucini et al., 2010; Engel & Rogers, 1996; Kano et al., 2013; Parsley & Wei, 2001). Distance between cities is considered the most influential factor because it proxies the direct trade costs associated with transportation, time and information flows in moving goods between markets (Aker & Fafchamps, 2014; Choi & Matsubara, 2007).

Furthermore, price variability has been shown to be sensitive to political borders, that is. *border effect*. For example, using components 14 CPI indices from US and Canada, Engel and Rogers (1996) find that the volatility of changes in price indices for disaggregated product categories are systematically much higher for city-pairs across a border compared to equidistant city-pairs within the USA or within Canada. They concluded that the effect of the US–Canada border on price variability is equivalent to adding 75 000 miles. Parley and Wei (2001) use price level data and estimate the US-Japan border at 43 000 trillion miles wide. Corroborating evidence of border effects is found in a wide range of other studies covering different regions. For example, Grafe et al., (2008) use CPI data collected across central Asian countries comprising Kyrgyz, Kazakhstan, Uzbekistan; Baba (2007) used data from Japan and South Korea;and Morshed (2003) used data from India and Bangladesh. Overall, this strand of literature show a considerable border effect – that is political borders amplify the volatility of relative prices between countries (Obstfeld and Rogoff, 2001).

Empirical literature show that parts of the border effect is explained by various biases and arbitrage costs such as exchange rate volatility (Parsley & Wei 2001; Baba, 2008; Gopinath, 2011; Brenton et al., 2014), dispersion in the prices of nontraded goods, and retailing costs wage variability (Engel & Rogers, 1996; Anderson & Smith, 2008; Morshed, 2003). Others include tariffs and non-tariffs barriers and regional trade agreements, such as free trade areas, customs unions and monetary unions (Bergin et al., 2008; Balchin et al., 2015; Versailles, 2012; Bergin & Glick, 2007; Goldberg & Verboven, 2001; Méjean & Schwellnus, 2009; Nchake, 2013). For example, Allington et al., (2005) find that the introduction of the Euro had a strong integrating effect among member states compared to non-members.

In addition to these, other studies have examined the role played by differences in language and culture (Horvath et al., 2008; Bergin & Glick, 2007) and differences in ethnic networks across regions in explaining product market segmentation (Rauch, 1999; Anderson et al., 2011). Anderson et al., (2011), in particular, find that the Chinese, Indian and Japanese ethnic network density lower price dispersion across countries. They attribute the price integration effect of ethnic networks to their risk-reducing, information-enhancing and contract-enforcing nature. These factors lower and reduce the transaction costs associated with inter-ethnic trade.

4.2.2. Intranational evidence

Few studies have focused exclusively on the determinants of intranational price dispersion. Most of the available research has focused on OECD countries, primarily North America, using city level data at various levels of aggregation.

Typically, tests of integration show large deviations from the LOP that are systematically linked to trade costs. For example, using a panel of 51 prices across 48 US-cities, Parsley and Wei (1996) examined the rate of convergence to the PPP. They find that price convergence occurs faster for larger price differences, but is slower for cities further apart. Consistent with cross-border studies, they find distance be the key underlying factor explaining these outcomes. This result holds in other studies, such as Kano et al., (2013) in Japan, Ceglowski (2003) in Canada, and Parsley and Wei (1996) across US cities.

Some empirical evidence suggests that distance alone is insufficient to explain price gaps or the slow convergence to the PPP across regions (Parsley & Wei 1996). They find prices in proximate regions to be more similar even after accounting for distance. This suggests that internal borders significantly affect intercity price differentials. The internal border effect reflects a whole range of additional factors associated with close regions that explain the failure of complete arbitrage in general and the absolute price parity in particular. These include, among other factors, ethnic linkages, distribution networks, remoteness, differences in incomes, historical ties, similar land productivity in proximate areas, differences in populations, and various regulatory barriers to intra-regional trade (Wolf, 2000; Ceglowski 2003). Overall, demand shocks may be correlated geographically, leading to lower price dispersion among nearby locations compared to cities further apart (Kano et al., 2013).

These factors have been investigated by, among others, Cecchetti et al., (2003) and Choi and Matsubara (2007). Overall, the studies find that internal factors play a significant role in the failure of the LOP. For example, using retail prices across Canadian cities, Ceglowski (2003) finds sizeable inter-provincial border-effect, which she attributes to, among other factors, differences in trade and regulatory barriers, and tax regimes across provinces. Varela et al., (2014) use five intra-country consumer prices for Indonesia to explore the sources of price dispersion. These authors showed that price differences across provinces respond to differences in provincial characteristics, such as remoteness, transport infrastructure, output of the sample products commodity, land productivity and income per capita across Indonesia.

4.2.3. Evidence from Africa

Recently, a few empirical studies have investigated the determinants of product price dispersion between countries in Africa (Brenton et al., 2014; Versailles, 2012; Edwards & Rankin, 2012; Aker et al., 2014; Nchake, 2013; Balchin et al., 2015; Atkin & Donaldson, 2014). The literature has largely focused on the role distance and border effects played in explaining the lack of market integration between countries in the region. For example, Versailles (2012) examines the degree to which distance and border effects explain market integration between 39 cities located in Uganda, Rwanda, Burundi and Kenya. He finds that on average, a 10% increase in distance increased price dispersion across countries by a range of 0.17% to 0.29%. Aker et al., (2014) find that the elasticity of transportation costs range from 0.048 to 0.069. These estimates are by far larger than the ones obtained in advanced countries.

Though not directly comparable, the effects of distance in Africa are larger than advanced economies. For example, Parsley and Wei (2001) estimate the distance elasticity of 0.0049 across the US and Japanese. Atkin and Donaldson (2014) estimate the impact of trade costs on price dispersion within Ethiopia and Nigeria. They find the cost of trading over unit distance to be four to five times larger in these countries than the US. Taken together, these results suggest the prevalence of relatively larger trade costs between locations within and between African countries than in advanced countries.

Furthermore, these studies find prices to be more integrated within countries than across countries due the presence of political border that generate the *border effect* (Brenton et al., 2014; Versailles, 2012; Nchake 2013). These studies tend to show large borders effects ranging from the distance equivalent of 300km-6000km (average of 13% border effect) across East African countries (Versailles, 2012) and 438 km to 15,783 km across South Africa, Botswana and Lesotho (Nchake, 2014). Others, such as Aker et al., (2014) estimate the border effect from 20% to 25% on price differences across Niger and Nigeria. The presence of considerable barriers at the borders prevents regional markets from integrating.

These studies have offered a number of explanations for the border effects across countries. For example, Edwards and Rankin (2012) use annual prices of 91 products across 13 cities in 12 African countries. They find that external tariff reforms and reduced real exchange rate instability enhanced price integration across the sample countries. Nchake (2013) and Versailles (2012) find that monetary unions reduce price dispersion across SACU and EAC member countries respectively. Balchin et al., (2014) reports similar results for trade arrangements across SADC member states.

Aker et al., (2014) explore a different and less studied dimension of the border effect, one that is particularly relevant to the African context, namely the role of differences in ethnic composition. Using the monthly retail prices for millet and cowpeas collected between 1999 and 2007, they find evidence that ethnic diversity does not only magnify the border effects, but also generate internal barriers to trade across markets occupied by different ethnic groups (Hausa and Zarma) within Niger. This is while similar ethnicities enhanced market integration between Niger and Nigeria. Robinson (2013) also finds that ethnic diversity affects the integration of maize market in Malawi.

With the exception of Atkin and Donaldson (2014), there appears to be no detailed studies focusing on the various sources of price dispersion within African countries. A number of studies have examined the extent of price dispersion within and across countries often using a small sample of largely agricultural products covering shorter periods with fewer cities within countries. Yet, African countries exhibit internal variations such as ethnic composition and income inequality within countries. Ignoring this peculiarity of Africa may result in missing some important dimension of price setting behaviour and sources price dispersion in literature. Also, less investigated in empirical literature is the effect of exposure to external competition on intra-country dispersion of prices. This chapter extends the literature by analysing factors associated with internal price differences within Zambia using a wide range of products (308) across a wide range of districts (41) over a period of 144 months (12 years).

4.3. Theoretical Framework, Specification Issues and Empirical methods

This section discusses the theoretical and methodological considerations pertaining to the estimation. Although a variety of theoretical models, such as consumer search theories, rationalise price dispersion as an equilibrium outcome, this chapter focuses on the arbitrage theory and its extensions.

4.3.1. The Law of One Price

Arbitrage is a fundamental building block to the law of one price. In its strict form, the LOP requires that the price of a homogenous good be the same once expressed in the same currency across geographically separated markets. If a disparity in prices between markets occurs, arbitrageurs actively seek profits by purchasing the good in a lower priced market and selling it in a higher priced market. Subject to a transport cost margin, this process continues until prices are equalised in both regions. In this regard, the LOP requires that deviations from perfect equality of prices not exceed the transactions costs between the regions. Formally, the arbitrage condition: for good k is defined as:

$$\left| p_{ik} - p_{jk} \right| \leq tc_{ij} \qquad (4.1)$$

where p_i, p_j are logs of prices in regions i and j respectively, and tc_{ij} represents the proportional trade cost of transferring good k from region i to j. The dispersion can be across borders, regions within-countries, or across stores. In the absence of trade costs, the process of arbitrage ensures that the absolute price difference between i and j equal zero.

The presence of trade cost creates three bands that affect arbitrage (O'Connell & Wei, 2002; Protopapadakis & Stoll, 1986). This first band is the parity condition where the price differences between the two markets exactly equal trade costs i.e., $| p_{ik} - p_{jk} | = tc_{ijk}$ (Gopinath et al., 2011). In this case, markets are integrated and price gaps provide information about the size of transaction cost across markets. The second band occurs where the absolute price difference between regions i and j exceeds trade costs ($| p_{ik} - p_{jk} | > tc_{ijk}$). In this situation, arbitrage is expected to reduce the price gap back towards equality. The gap may nevertheless persist due to other factors, such as market power and regulatory barriers that inhibit market integration. Third, if trade costs exceed the price gap ($| p_{ik} - p_{jk} | < tc_{ijk}$) then markets are segmented and pricing decisions across markets are independent of each other.

4.3.2. Non-binding market-pairs problem

In applying to data, typical price-dispersion models impose the assumption that the equality constraint holds and the relationship can be estimated with the following equation:

$$| p_i - p_j | = \alpha + \beta d_{ij} + \theta X_{ij} + \varepsilon_{ij} \qquad (4.2)$$

where d_{ij} is the log of distance between city i and city j, ε_{ij} is the normally distributed error term, and X_{ij} is a vector of additional controls that affect price arbitrage.

This approach is critiqued by, amongst others, Anderson and Smith (2009), Borraz et al., (2012), Atkin and Donaldson (2014) and Kano et al., (2013) who argue that the specification 4.2 includes market pair combinations in which the equality constraint in equation 4.1 does not hold. This introduces a sample-selection bias leading to a downward bias in the estimate of the distance coefficient. The appropriate specification to estimate is:

$$| p_i - p_j | \leq \alpha + \beta d_{ij} + \theta X_{ij} + \varepsilon_{ij} \tag{4.3}$$

The estimates from standard models such as equation 4.3 are unbiased if the price deviations are exactly equal to the arbitrage cost and equality constraint holds. The next section discusses various approaches studies have followed to deal with the inequality problem.

4.4. Addressing the problem of Non-binding Price pairs

Various approaches have emerged to deal with the inequality constraint imposed in the specification 4.3. These include the quantile repression approach and the Production-Consumption approaches. These are reviewed in this section.

4.4.1. Quantile Regression Approach

The quantile regression approach to addressing the sample-selection bias is proposed by Borraz et al., (2012; 2015). They argue that only price gaps at the borderline of the inequality constraints are likely to generate the equality constraint. Rather than using all price gaps, they develop a quantile regression design that uses the highest price gap between cities to identify the better estimate of the actual trade costs, where the equality constraint is likely to hold. They use barcode-level price data for Uruguay to estimate the city borders using the equation:

$$Q_n\left(\left|p_{ikt} - p_{jkt}\right|_n, \theta\right) = \alpha + \beta D_n + \gamma B_n + \delta \beta_n \times D_n + \gamma Firm + \xi_n \tag{4.4}$$

where Q_n is quantile θ of the absolute price gap of all store pairs that have distances falling within bin n, D_n captures the mean distance between stores belonging to bin n; $Firm_n$ is a binary variable taking 1 if the price difference come from the same supermarket chain and B_n is a dummy variable that equals 1 if supermarkets are in different cities .

In estimating equation (4.4), Borraz et al., (2015) allocate the store price pairs into 500 different bin sizes. In their approach, they first setup distance border-bins defined by range of distance accounting for whether the store pairs are within the same city; secondly, they compute the first and second moments and percentiles ranging from 80th to the 99.9$^{th.}$ and finally the largest price gap in each bin. Then they use the maximum price difference in each bin as a dependent variable to estimate a sequence of quantile regression. They apply the approach to 202 daily scanner-level-prices collected at store level across 47 cities in the US to estimate the city borders. They find larger estimates of the distance coefficient in higher quantile compared to the typical models that pool all the data. For example, a typical model gives a distance estimate of 4.19 compared to the distance estimate of 8.2 in the quantile regression approach at 95.9 percentile. They find a city *border-effect* equivalent to 20 km based on the standard method, which becomes lower and insignificant in the quantile regression approach. These results provide evidence of large sample selection biases that lower the true estimate of trade costs in models that pool all regional price pairs.

4.4.2. Production-consumption pair approach

A different approach to resolving the sample-selection bias problem is the production-consumption pair approach presented by Anderson et al., (2013), Atkin and Donaldson (2014), Inanc and Zachariadis (2012), and Kano et al., (2013). This literature strand resolves the sample selection problem by restricting the sample to city-pairs that are actually trading. Trading pairs are identified by matching goods consumed in particular markets to the sources of production. By matching actual trading regions, the equality constraint is more likely to hold since the actual product is traded between the two regions. By restricting the sample to production-consumption pairs, the sample selection bias is attenuated.

Several researchers including Anderson et al., (2011; 2013), Kano et al., (2013), Atkin and Donaldson (2014) have used the production-consumption centre approach to estimate intranational trade costs, while Ceglowski (2003) uses distance from the hub city to control for the additional role of trade costs. Using data sourced from the Economist Intelligence Unit (EIU) for 15 US cities, Anderson et al., (2010; 2013) compare estimates of a production-consumption based model with the alternative model that includes all price pairs. They estimate distance elasticity of 0.01 in the typical model and substantially higher elasticity of 0.09 in the production-consumption based model.

Anderson et al., (2010), report similar results across US-cities, Kano et al., (2012, 2014) across Japanese cities, and Inac and Zacharias (2012) across EU member states. Within Africa, Atkin and Donaldson (2014) estimate the intranational trade costs for Ethiopia and Nigeria. Virtually all these studies emphasize one key result, which is that trade costs are significantly underestimated in standard models that include region pairs where the equality constraint in equation 4.1 is not binding.

Atkin and Donaldson (2014) further extend the production-consumption pair approach. They point out that trade costs are still not accurately estimated using price gaps between production and consumption centres if traders charge varying mark-ups. They show that price gaps depend on both trade costs and mark-ups (μ) charged by the intermediary in the destination market *i* expressed as:

$$p_{ik} - p_{jk} = tc(X_{ij}) + \mu(c_{ij}, \phi_i, D_i) \qquad (4.5)$$

where $tc(X_{ij})$ represent trade costs or cost-shifters such as distance, (c_{ij}) is the marginal cost of trading, (ϕ_i) denotes the environment's competitiveness, and (D_i) the local demand conditions. The implication is that price gaps exceed the transport costs between regions by the mark-up. Furthermore, these mark-ups vary across locations because of location specific marginal costs, competitive conditions (ϕ_i) and preferences (D_i).

Atkin and Donaldson (2014) empirically demonstrate that the omission of the location-specific leads to a downward bias in the estimated distance coefficient, even in the production-consumption pair models of Inac and Zachariadis (2012) and Anderson et al., (2010)[32]. Using product level data for the US, Nigeria and Ethiopia, they find significantly higher intra-national distance related trade costs in their spatially-varying mark-up corrected model compared to the consumption-production and standard LOP models. For example, in the case of Nigeria, the elasticity of distance rises from 0.021 in the standard model and 0.0254 in the production-consumption model to 0.0558 in the mark-up corrected model. They report a qualitatively similar pattern of results in the Ethiopian data.

4.4.3. Estimation issues: production-consumption model

Nevertheless, there are limitations with the typical production-consumption centre model. The first limitation relates to the narrow focus on the production and consumption pairs. This approach excludes third markets that have the potential to trade with each other despite not being producer pairs. As part of the broad market system, goods can flow through third markets even if none of them produces the good[33]. In addition, regions may be integrated even if no trade occurs between two regions. Rather, the potential for trade conditions the price setting behaviour. The production-consumption approach, even though adjusted for mark-ups, does not take into account the contestability between markets of locally produced goods that may not be traded between regions.

Figure 4.1 illustrates this point using a hypothetical world of four cities. Assuming the price of good k in the production city $O\ (O = 1,.2, 3, 4,)$ is p_o. The other three markets $i, j\ and\ z$ are equidistant from O – the benchmark city in the production-consumption model. The price gap between the source and market i is given by $\ln p_{oik} = \ln(p_{ik} / p_{ok})$. In this sketch, it is possible that trade costs between markets r and z are large enough and completely segmented with no trade between them.

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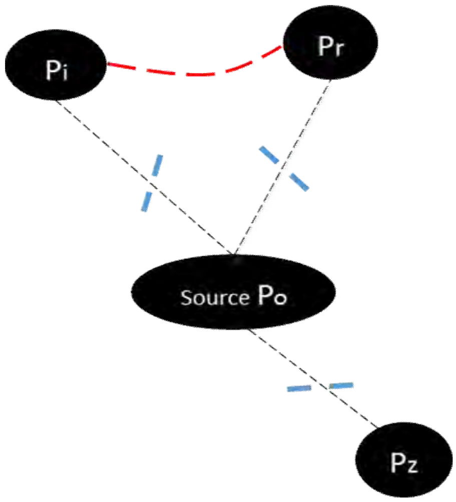
[32] Markups are negatively correlated with distance, but positively correlated with price gaps. Consequently, omitting the location specific markups leads to a downward biased estimate of the distance coefficient.

[33] It is also important to note that products can flow to other markets through third markets. Moreover, with varying mark-ups in imperfectly markets, retailers can source a product from another third market if it is characterised by lower prices.

A few observations can be made. First, the mark-up mark-up in markets i and r is lower than the markup in z (all of which are equidistant from o) because these regions are close to each other and there is the possibility of trade and contestability between them. Thus, the equality constraint between markets *i* and *r* may be binding even if both markets do not produce the good.

Another observation is that, with local production of substitutes, the price of the locally produced good may satisfy the equality condition even without trade taking place. The price of the local good may be pushed up to trade parity so that local market clear without any purchases from the origin O. Finally, even if trade occurred, it is not necessary for the price to be collected on the exact brand in the production and consumption areas. The price of local substitutes could help meet the equality condition even if the area is a net product importer.

Figure 4.1: Hypothetical Model: Market contestability and mark-ups



These observations have several implications for the production consumption model. Firstly, the model excludes market pairs, such as r and j where the price gap equal the arbitrage costs. However, Atkin and Donaldson (2014) address this concern by using a competitiveness indicator controlling for the role of firms within and nearby regions. Secondly, they exclude the *products* where the equality holds. In this way, lastly, it is possible to extend the sample of products to include local substitutes. In short, addressing some of these issues, such as including contestable market pairs, could improve the precision of the estimates.

The other estimation issue of consumption-producer models hinges on identifying the production data by location, the actual destination by traded product, and the trade-pair-from producer data, among others. Meeting this high data demand remains problematic in most empirical models (Anderson et al., 2013). This thesis addresses the inequality constraint by identifying the threshold for which the constraint is likely to hold across all bilateral pairs. Since the constraint is not likely to hold at longer distances, we restrict the sample to distances within which the constraint holds as discussed in the Section 4.5.

4.5. Empirical Strategy

The empirical model of this chapter is an extension of the standard LOP framework in Crucini et al., (2005b), Engel and Rogers (1996), and Parsley and Wei (2001)[34]. In the baseline framework, the regression equation specified for each product is:

$$\left|q_{ijkt}\right| = \alpha + \beta \ln dist_{ij} + \sum_{k=1}^{n} \gamma_k D + \xi_{ijkt} \tag{4.6}$$

where $q_{ijkt} = \ln(P_{ikt} / P_{jkt})$, $dist_{ij}$ denotes distance between cities i and j and D captures dummy variables, such as goods and city dummies. Finally, ξ_{ijkt} is the regression error.

The baseline model regresses measures of dispersion of all bilateral pairs on trade costs while controlling other unobserved variables using fixed effects. We use distance to proxy the unobserved trade costs. Since trade costs are expected to rise with distance, the theory predicts a positive coefficient on distance ($\beta > 0$).

As observed in the previous section, typical baseline specification, which pools all district pairs in the sample, suffers from sample-selection bias. We extend the standard price integration model by controlling for some of these concerns in three ways. Firstly, we restrict the sample to district pairs in which the constraint is likely to hold. The advantage of this approach over the two approaches is in its ability to retain contestable consumption market

[34] These look at price deviations within and across borders. Since we focus on intranational price dispersion, external *border effects* dummy is dropped from the specification.

pairs while correcting for the sample-selection bias problem[35]. Secondly, the baseline model is extended to control for more district specific determinants of price differences, such per-capita incomes, internal borders and ethnic networks. Lastly, to control for the effect of international competition, the specification is extended to incorporate measures of exposure to external competition and product tradability.

Finally, we test the robustness of our results in various ways. First, we use a subsample of more homogenous products to re-estimate the model using distance from the core district or commercial hub-city in line with the production-consumption pairs model. The sample is also tested to price gaps within 600km. Second, we test the entire sample using bootstrap quantile regression using the median, which is less susceptible to outliers as a dependent variable.

4.6. The data

This study utilises five datasets. These comprise retail prices, trade data, market level ethnic composition, per-capita expenditure and tradability of the individual products. The retail price data is as described in Chapter 3. This chapter uses a consistent dataset of 308 products collected in 41 districts of Zambia over the period 2000 -2011.

To capture the extent to which each product is traded in our model, we follow De Gregorio et al., (1994) and Crucini et al., (2005a) by defining tradability as ratio of a product's total trade to its total domestic output. Since total output is not available at product level, the international tradability index is constructed as a ratio of total value of international trade to its domestic output at industry level:

$$PRTD\_index_k = \frac{\sum_{.}^{k}\left(X_k + M_k\right)}{\sum_{.}^{k} Y_k} \tag{4.7}$$

The $PRTD\_index_k$ variable is the product tradability index sector k that is assigned to individual products in that sector, X_k denotes exports in sector s and M stands for imports of

[35] Our estimation does not correct for the mark-ups associated with increasing trade costs. However, we address the varying mark-ups and demand conditions using per-capita expenditure. Similar approaches in cross border studies such as Alessandria and Kaboski (2011) use GDP per capita and wages as a proxy for mark-ups.

good k identified at sector s. Y_k is the total national output for sector k. This index is computed at industry level using imports, exports and national output at the three-digit level of ISIC-revision 3.

The annual import and export data are obtained from the UN Comtrade database for the years 1995 and 1996. The national output data is obtained from the United Nations Industrial Organization for 1994[36]. Service industries such as haircuts, women's hair shampoo and set, meals in restaurants and hotels, are assigned zero tradability indexes.

The district level ethnic composition data are obtained from the Living Conditions Monitoring Survey (LCMS) (1996) conducted by the Central Statistical Agency. To measure the extent of ethnic similarities ($same\_ethnicity$), we construct a Herfindhal index based on the probability that any two randomly selected individual from markets j and i are from the same ethnic group, as is done in Easterly and Levine (1997), Fafchamps (2003) and Posner (2004). The common ethnicity index is calculated using the following formula:

$$com\_ethnic_{ij} = \sum_{g}^{n} (E_{gi} * E_{gj}) \qquad (4.8)$$

where E_{gi} and E_{gi} denotes the share of ethnic group g in markets i and j. n is the total number of ethnic groups. The indicator ranges from 0 to 1 where zero represents complete ethnic differences and 1 complete ethnic similarity.

Typical of African history, Zambia's borders were drawn without taking into account ethnic linkages. The country has seven major tribal or cultural groupings, decomposed into 73 dialects or ethnic groups. The dominant groupings include the Tonga (e.g., Lenjes, Toka leyas, Ila) in the South, Bemba (such as Bisa, Lala, Lamba) in the North and the Lozi (e.g., Luyana, Kwandi, Totela and Nkoya ethnic groups) [37]. While dialects differ at ethnic levels,

[36] We could not get output data at this level of classification for the period beyond 1994 and the import and export data at the same level of classification was not available for the period before 1995. This limited the extension of the tradability index to more than one period.

[37] Others include the Nyanja in the East, the Luvale-Kaonde in the Northwest, the Mambwe group in the north Tumbuka group. In addition to these we have 'the others' category that catering for the minorities such as Asians and Europeans.

they tend to share similar cultural practices within groups. For the purpose of this study, we calculate the Herfindhal index at two levels, at the 73 ethnic group-level and 7 major cultural grouping level.

The 73 ethnic level indicator ranges from 0 to 0.74 with a mean of 0.05, suggesting that on average individuals selected from two different markets are 5% likely to be from the same ethnic group at the lowest level of grouping. However, for markets within the radius of 250 km, the mean index increases to 12%. At the cultural grouping level, the index ranges from 0 to 0.96 with an average of 0.20. However, for markets within the radius of 250 km, the mean index increases 45%, once again indicating that closer market pairs have greater ethnic overlaps than far apart regions.

District level per-capita expenditures are computed from the LCMS of 1998. This is weighted by the district level population weight to make it representative of each sample region. The variable is used to proxy the relative sizes of individual markets the level of development, mark-ups and income inequality across markets.

Finally, bilateral distances are measured as the shortest and most practical driving route in kilometres between any two markets using googlemaps. Distance between districts pairs ranges from 27.7 km for the shortest distance to 1617 km for the longest bilateral distance. The mean bilateral distance is 585.86 km. To ensure the consistency districts and products over the years, the sample used for analysis is restricted to the period 2000 to 2011. This gives a sample of 41 districts and 308 products, leading to 820 bilateral pairs for each year over the period 2000-2011.

4.7. Estimation and Results

This section applies the empirical framework described in the previous sections to examine the proximate sources of spatial price dispersion. Different geographical factors include distance, dispersion of non-tradable inputs prices, internal borders (adjacent, ethnic density), and differences in mark-ups. The second subsection considers tradability issues. The robustness tests finalise the results section. The analysis begins with the baseline model.

4.7.1. Physical Distance

The effect of distance on price dispersion across regions is a key factor in understanding the significance of geographic barriers in price deviations from the LOP (Foad, 2010; Horvath et al., 2008; Kano et al., 2013; Landry, 2013; Parsley & Wei, 2001; Pippenger & Phillips, 2008; Rogoff, 1996). To estimate the importance of distance in Zambia, the cross-district absolute log price differences ($|q_{ijkt}|$) are regressed on the log bilateral distance (dist) between districts i and j.

$$\left|q_{ijkt}\right| = \beta_0 + \beta_1 \ln(dist_{ij}) + \lambda_k + \lambda_t + \varepsilon_{i,j,k,t} \qquad (4.9)$$

The product (λ_k) and time (λ_t) fixed effects control for unobserved quality differences across products and time. Since distance impedes trade we expect $\beta_1 > 0$.

The results for this estimation are presented in Table 4.1. The standard errors are clustered by city-pairs to mitigate potential effects of autocorrelation in the data and to ensure that the remaining price dispersion only captures the intensity of relative price differences by region and product.

Column (1) presents pooled regression of the log price differences for all possible market pairs and products. The coefficient on distance is positive and statistically significant at the 1% level. On average, a 10% increase in bilateral distance increases the price differentials between the regions in Zambia by 0.24%. This effect of distance reflects the impact of trade costs inclusive of transportation costs. This is consistent with theoretical and empirical literature showing that price dispersion increases with transactions costs and barriers to trade between markets (Fan & Wei, 2006; Ceglowski ,2003).

Columns (2) and (3) replicates the results for goods and services, respectively, to test whether the results of our pooled model (Column 1) hold for goods that are mostly traded and services that are less traded. The expectation is that markets for goods are more integrated than services since arbitrage costs are lower for goods than services. The estimated distance estimates in both columns is positive and statistically significant at the 1% level. The estimated coefficient for goods is very close to the one obtained in Column 2. As expected, the effect of distance is larger – about 47% larger in services compared to goods and the pooled model.

Table 4.1: Trade costs and inter-district price differentials (2000-2011)

	(1) All products	(2) Goods	(3) Services
ln(distance)	0.0241***	0.0234***	0.0347***
	(0.00201)	(0.00183)	(0.00736)
Constant	0.170***	0.162***	0.282***
	(0.0127)	(0.0116)	(0.0467)
Prod FE	*Yes*	*Yes*	*Yes*
Time FE	*Yes*	*Yes*	*Yes*
dist_pair cluster	*Yes*	*Yes*	*Yes*
Observations	2,003,212	1,870,982	132,230
R-squared	0.324	0.311	0.276

Notes: the sample includes 308 products collected across 41 districts in Zambia
*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Table 4.2 tests for the presence of nonlinear distance effect by including the square of log of distance. The effect of distance remains positive and significant at the 1% level across all the specification. The coefficient of log distance squared is statistically significant at the 10% level and negative, indicating that the elasticity of distance on prices diminishes as distance increases. This evidence corroborates similar studies (Allington et al., 2005; Baba, 2007; Grafe et al., 2008; Haskel &Wolf, 2001; Parsley & Wei, 2003).

Table 4.2: The nonlinearity of distance and price dispersion (2000-2011)

	(1) **All products**	(2) **Goods**	(3) **Services**
ln(distance)	0.0746***	0.0619***	0.280***
	(0.0225)	(0.0203)	(0.0826)
log(distance) squared	-0.00435**	-0.00332*	-0.0209***
	(0.00190)	(0.00172)	(0.00697)
Constant	0.0265	0.0526	-0.422*
	(0.0659)	(0.0594)	(0.242)
Prod FE	*Yes*	*Yes*	*Yes*
Time FE	*Yes*	*Yes*	*Yes*
District pair cluster	*Yes*	*Yes*	*Yes*
Observations	2,003,212	1,870,982	132,230
R-squared	0.324	0.311	0.277

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

The effect of transactions costs, inclusive of transportation costs diminish relatively faster for services, suggesting that price competition is more localised for services than goods. This is expected as arbitrage for goods can be realised much cheaply through the movement of consumers as well as goods, whereas for services, arbitrage requires movement of consumers. In our subsequent analysis we use only the prices for goods, which are more tradeable as opposed to services.

4.7.2. Dealing with sample- selection bias

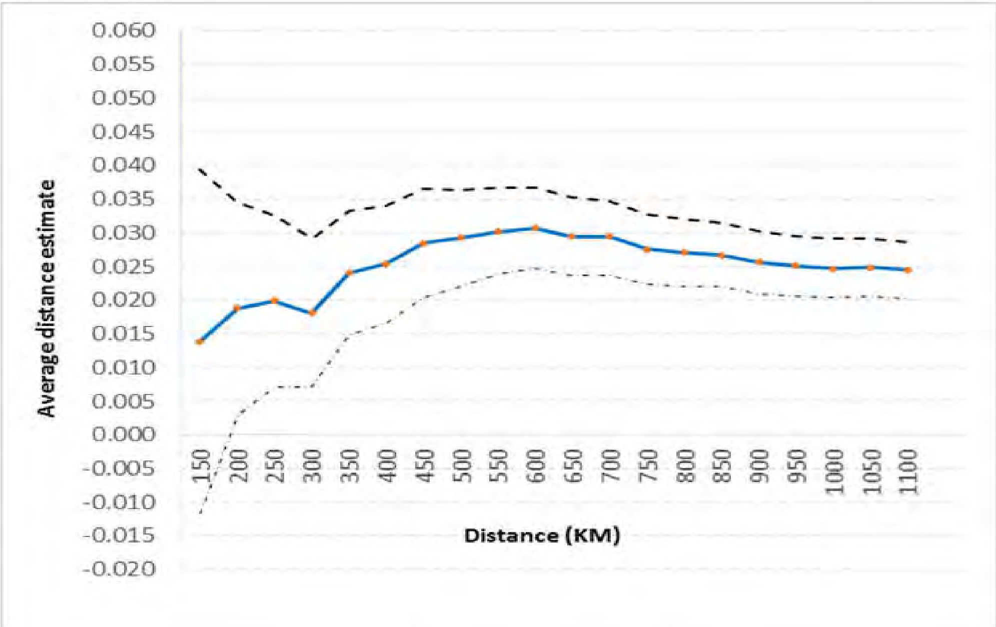
The non-linearity effect observed in Table 4.2 is also consistent with the potential sample selection bias arising from including price pairs where the equality constraint is not binding. This subsection extends the literature by testing our results to this sample selection bias discussed earlier. We test the hypothesis that standard price dispersion models underestimate trade costs.

In contrast to studies using production-consumption pairs such as Anderson et al., (2013), and quantile regression such as Borraz et al., (2015), we exclude market pairs that are further apart where the constraint is likely to be non-binding. As distance increase, it becomes less likely that equality constraint will hold. Following this logic, we perform regression analysis where distance is cumulatively increased by 50km and observe the elasticity of distance.

All the coefficient estimates on the cumulative distance variable correctly signed and statistically significant at 1% across all specifications. These estimates from incrementally increasing distance by 50 km cut-offs are plotted in Figure 4.2. Distance is measured on the horizontal axis, while the estimates are on the vertical axis. The solid lines are the estimated parameters at given distances. Broken lines represent the 95% confidence interval about the means. The estimates are statistically significant at conventional levels.

The results indicate an increase in the point estimates of distance up to 600 km and then a decline. This indicates that the effect of distance increases as the sample is increased to include districts that are up to 600 km apart and decreases thereafter. This pattern is also shown in the supplementary regression results where the distance cut-offs at 250 km, 400 km, 500 km and 600 km and 700 km are estimated in Appendix Table A4.1 (The point estimates range from a low of 0.0199 at 250 km to a high of 0.0307 at 600km before marginally declining at 700 km). This pattern suggests that price-gaps above 600 km bias the distance estimate downwards.

Figure 4.2: Estimation of coefficients of costs of arbitrage by distance



Note: The solid line is for parameter estimates, while the dotted lines give the 95% confidence interval about the means. The vertical axis provides the parameter estimates at given distances. Only goods are included in the pooled products.

This corroborates our earlier non-linear estimates that indicate a decline in the impact of distance on price gaps as districts become more remote from each other. The results are also consistent with Anderson et al., (2013) and Borraz et al., (2014) who find that including observations outside the inequality constraint biases the estimates downwards. Consequently, the remainder of the analysis tests the sensitivity of the results to a sample of market-pairs that fall within a distance of 600km.

In sum, our distance estimates of 0.0234 for goods and 0.0347 for services in the baseline regressions confirm the importance of distance in explaining the intra-national price dispersion. These estimates are within the range of 0.002 for raw materials and 0.032 for perishables found by Fan and Wei, (2006) for China. In contrast, after controlling for trading pairs only, the estimates for Zambia appear to be relatively high compared to Atkin and

Donaldson, (2014)'s estimates, which range from 0.0115 to 0.0248 for Ethiopia, and 0.021 and 0.025 for Nigeria, in the standard and trading pairs controlled model respectively. Similarly, the estimates for Zambia are larger than estimates for advanced economies that range from 0.004–0.018 in the U.S. (Parsley & Wei, 1996) and 0.018 in Canada (Ceglowski, 2003). These results, therefore, suggest that trade costs are higher in Zambia than advanced economies and other emerging economies including those in Africa

4.7.3. Non-tradable input Prices

One compelling source of price dispersion unaccounted for in the above results and other studies is the presence of non-traded input prices in retail prices. Economic theory shows that non-traded price differences matter in driving price differences. As argued by Crucini et al., (2005b), the retail price of good k in location i is represented as a geometric weighted average of traded (T) and nontraded (N) inputs.

$$P_{ik} = (P_i^N)^{\alpha} (P_{ik}^T)^{(1-\alpha} \qquad (4.10)$$

where α is the share attributable to each input type for product k. Taking the log price differences across district j and i yields the equation:

$$q_{i,j,k,t} = \log(P_{i,k,t} / P_{j,k,t}) = \alpha_k \log(P_{i,k,t}^N / P_{j,k,t}^N) + (1-\alpha_k)\log(P_{i,k,t}^T / P_{j,k,t}^T) \qquad (4.11)$$

This equation can also be expressed as:

$$| q_{i,j,k,t} | = | \log(P_{i,k,t} / P_{j,k,t}) | = | \alpha_k q_{i,j,k,t}^N + (1-\alpha_k) q_{i,j,k,t}^T | \qquad (4.12)$$

Equation 4.12 indicates that prices of homogenous products in different locations vary because of differences in the price of tradable inputs and differences in the price of nontraded inputs. In short, absolute price differences are a linear combination of differences in non-traded and traded input prices adjusted for their production shares (Parsley & Popper, 2010; Crucini et al., 2005a). In theory, the price of nontraded inputs may be related to distance so that ignoring it may lead to omitted variable bias in typical models. This requires that we account for the cost of nontraded inputs than what typical models do[38].

A number of measures of nontraded input prices, such as wages and rent (Crucini & Yilmazkuday, 2013) and average price of services (Cecchetti et al., 2002), have been used to proxy immobile factors. In the estimations that follow, we use the difference in the price of local staple food (nshima served in restaurants as a proxy for nontraded input prices[39]. Although maize and other inputs are traded, its retail price is primary driven by the price of restaurant services and local wages which vary across regions. We label the variable as $PNT\_inp_{ij}^{N}$ and extend equation 4.9 to become:

$$\left|q_{i,j,k,t}\right| = \beta_0 + \beta_1 \ln(dist_{ij}) + \beta_2 \ln(PNT\_inp_{i,j,k,t}) + \lambda_k + \lambda_t + \varepsilon_{i,j,k,t} \quad (4.13)$$

The hypothesis we test is that differences in the price of non-traded inputs is positively associated with price dispersion and expect $\beta_2 > 0$.

Table 4.3 shows the estimation results based on the fixed-effects equation 4.11. The standard errors are clustered at district-pairs level. Column 1 reports the estimation results for all possible bilateral price comparisons j and i. Column (2) restricts the sample to district pairs within 600 km of each other. All coefficients are statistically significant at the 1% level and have the theoretically predicted signs.

The estimated coefficient show that differences in nontraded input prices are an important source of retail price differences. The coefficient on nontraded inputs suggests that a 10% increase in the difference in nontraded inputs prices raises the retail price differences by an average of 0.14%. The conclusion that differences in nontraded prices contribute to price dispersion is consistent with the intuition of Cecchetti et al., (2002) and Alessandria (2003)

[38]This is also consistent with Economic Geography theory that treats distance from major markets as a key determinant of non-traded prices.
[39] While rent or wages could have been the best measures, these are not consistently available across districts and time.

who attribute the slow convergence of prices to parity to the inclusion of nontraded goods prices in the price index.

Table 4.3: Role of non-traded inputs in price dispersion (2000-2011)

Variables	**Full sample**	**district pairs within 600 km**
ln(distance)	0.0238***	0.0312***
	(0.00177)	(0.00289)
ln(nontradable inputs)	0.0149***	0.0137***
	(0.00307)	(0.00387)
Constant	0.151***	0.112***
	(0.0115)	(0.0166)
Observations	1,870,982	867,010
R-squared	0.312	0.311
Product FE	Yes	Yes
Year FE	Yes	Yes

Notes: Standard errors are clustered at district level.
*Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

4.7.4. Internal Borders: Role of Adjacency and Ethnicity

The above model assumes that distance adequately accounts for trade costs between regions. However, Ceglowski (2003) in her study of Canada finds evidence of internal border effects or additional constraints between districts that contribute to price differentials, beyond the effect of distance. This subsection investigates this possibility and sources of internal border effect in Zambia.

4.7.4.1. Adjacent / Proximity

Price differentials can be affected by the location of markets or districts relative to each other. In particular, geographically close markets could share similar random shocks and positive price correlations due to the *adjacent effect* associated with similar consumption patterns, the spatial distribution and concentration of economic activities, as well as cultural and historical ties. These similarities are expected to result in lower price gaps between adjacent regions, even after accounting for the effect of distance related trade costs. Consequently, excluding adjacency may bias the elasticity of distance upwards.[40]

To investigate a possible internal border effect, we test the hypothesis that two contiguous districts are more likely to be integrated than non-contiguous regions. An adjacent dummy that takes a value of 1, if two districts are adjacent in geography and 0 otherwise, is added to the specification. The estimated equation is:

$$|q_{i,j,k,t}| = \beta_0 + \beta_1 \ln(dist_{ij}) + \beta_2 \ln(PNT\_inp_{ijkt}) + \beta_3 Adjac_{ij} + \lambda_k + \lambda_t + \varepsilon_{i,j,k,t} \qquad (4.14)$$

where $Adjac_{ij}$ is the adjacent dummy where we expect $\beta_3 < 0$ for contiguous districts.

The results from the empirical test of equation 4.14 are displayed in Table 4.4. Column (1) shows results for the full sample, while column (2) corresponds to district pairs within 600km cut-off estimations. The results of the full sample suggest the following. First, distance remains positive, highly significant and robust to inclusion of other controls in the both sample regressions. Consistent with previous results, the impact of distance is stronger in the sample-restricted model.

Table 4.4: Price dispersion and adjacency (2000-2011)

	Full sample Models	**district-pairs <= 600 km**
Variables	(1)	(2)
ln(distance)	0.0210***	0.0294***
	(0.00207)	(0.00367)
ln(nontradable inputs)	0.0150***	0.0138***
	(0.00306)	(0.00385)
Adjacent	-0.0143**	-0.00527
	(0.00677)	(0.00755)
Constant	0.169***	0.123***
	(0.0137)	(0.0218)
Observations	1,870,982	867,010
R-squared	0.312	0.311
Product FE	Yes	Yes
Year FE	Yes	Yes

Notes: Standard errors are clustered at district level.
*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

[40] Adjacency is negatively related to distance and negatively related to price gaps. The omission of adjacency will thus give rise to an upward bias on the distance coefficient.

Secondly, as expected, the adjacent dummy enters negatively and statistically significant in the full sample specification. The negative coefficient on adjacency indicates that regions closer to each other are more integrated than further apart. The results find that price gaps are on average 1 .4% lower between contiguous districts than between non-adjacent ones in the full sample model. This confirms the presence of internal borders. However, the coefficient on adjacent becomes insignificant once city-pairs are restricted to lie within 600km of each other.

The main insight from these results is that the adjacent variable is picking up some unexplained factors between adjacent districts that lower price differences even after accounting for transactions costs associated with distance. This is consistent with a study on intra-national price dispersion (Ceglowski, 2003) and gravity models (Helliwell, 1998; Wolf, 2000). In case of price dispersion models, Ceglowski (2003) attributes the significant internal borders across Canadian provinces to among other reasons the clustering of economic activities, strong provincial trading networks, and differences in tax and regulatory frameworks. To carry the analysis a step further, we explore some of the potential explanation for the internal border effect including common ethnicity and income similarity across markets.

4.7.4.2. Common Ethnicity

The internal borders associated with the significance of immediate proximity of regions reveal the importance of additional explanatory factors to distance. International price studies indicate that ethnic networks between countries and markets contribute to relative price differentials by generating the border effect over and above distance (Anderson et al., 2011) [41]. They attribute this outcome to the importance of common ethnic networks, which ensure inter-personal trust and tend to play some risk-reducing, information-enhancing and contract-

[41] Rauch (1999) found that ethnic networks play an important role in shaping the structure and volume of international trade. Similarly, Easterly and Levine (1997) attributed lower economic growth rates among SSA countries to ethnic diversity.

enforcing role. These factors all assist in lowering transactions costs across markets, as found in cross-border studies by Aker et al., (2014a) and Anderson et al., (2011).

As noted by Aker et al., (2014), ethnicity also matters for within country outcomes in the African context for two main reasons. First, colonial borders do not correspond to ethnic boundaries and countries tend to be characterised by ethnic fragmentation. Ethnic groups tend to be concentrated within regions with high degree of segregation. For example, in Zambia's Kabwe district, Bembas constitute 39% of the population, followed by the Nyanja and Tonga subgroup at 23.8%, and 13.3% compared to Kaoma, where the Lozi group make up 48.2% of the population, followed by the Luvale-Kaonde subgroup at 43%, and the Tongas at 3%. Secondly, in most SSA, trade largely operates through informal credit markets that cannot be enforced by law. In this setup, the geographic concentration of ethnic groups creates ethnic biased businesses, as trade and credit become limited to interpersonal transactions that carry little risk and ethnicity provides rules for contract enforcement and sanctions for non-cooperation (Robinson, 2013).

Since trust that tend to be risk-reducing, information-enhancement and contract-enforcement is concentrated within ethnic groups in Africa, ethnic networks are likely to be important in reducing trade costs and product market integration within countries. In this case, empirical analyses that fail to account for ethnic similarity may lead to omitted variable bias. Since ethnic similarity is negatively related to price gaps, and is negatively related to bilateral distance, omitting it could bias the distance variable upwards.

To make our price dispersion model more appropriate to the African conditions, we account for ethnicity, which in our case is not defined by national borders, to test the hypothesis that districts that are similar in their ethnic make-up will have lower price dispersion. We estimate the following equation:

$$\begin{aligned} |q_{i,j,k,t}| = {} & \beta_0 + \beta_1 \ln(dist_{ij}) + \beta_2 \ln(PNT\_inp_{ijkt}) + \beta_3 Adjac_{ij} + \beta_4 com\_ethnic_{ij} \\ & + \lambda_k + \lambda_t + \varepsilon_{i,j,k,t} \end{aligned} \tag{4.15}$$

where com_ethnic_{ij} is shared common ethnicity, as calculated in equation 4.8. The expectation is that $\beta_5 < 0$ since common ethnic groups are more likely experience lower trade costs. The common ethnic index shows the probability that a person in district i and j belongs to the same ethnic group. This index is calculated at the level of 73 ethnic groups and at 7 tribal groupings based on ability to understand each other's dialect as described in the data section.

To investigate our hypothesis, the index computed at the 7 tribal grouping-level or major ethnic level which varies from 0 to 0.96 is used. To disentangle the effect of common ethnicity on price dispersion, we create a dummy variable by imposing a continuum where if the index is 0.70 and above, we assign a value of 1, otherwise zero is assigned. In so doing, we assume that regions with a threshold of 70% similar ethnic groups form a completely homogenous market otherwise non-homogenous[42]. This dummy variable tests whether ethnicity is linked to product market integration in equation 4.15.

Table 4.5: The role of common ethnicity in market integration (2000-2011)

	Full sample Models		**district-pairs <= 600 km**	
Variables	(1)	(2)	(3)	(4)
ln(distance)	0.0228***	0.0200***	0.0304***	0.0288***
	(0.00177)	(0.00204)	(0.00284)	(0.00361)
ln(nontradable inputs)	0.0144***	0.0146***	0.0128***	0.0129***
	(0.00308)	(0.00308)	(0.00392)	(0.00390)
Common ethnicity dummy	-0.0190**	-0.0191***	-0.0205***	-0.0205***
	(0.00747)	(0.00730)	(0.00742)	(0.00739)
Adjacent		-0.0145**		-0.00496
		(0.00660)		(0.00737)
Constant	0.159***	0.177***	0.118***	0.128***
	(0.0116)	(0.0135)	(0.0164)	(0.0214)
Observations	1,870,982	1,870,982	867,010	867,010
R-squared	0.312	0.312	0.311	0.311
Product FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Standard errors are clustered at district level.
*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

[42] While ethnic groups are defined at dialect level, tribal grouping combines all dialects within a major language.

Table 4.5 reports results from this estimation. Column (1) reports the results of the baseline regression. Column (2) adds the adjacent variable. Columns (3)-(4) replicate the first two columns for district pairs within 600km from each other.

All the coefficients have correct signs and statistically significant (except for adjacent which remains insignificant in the sample restricted model) and consistent with the need to control for the sample selection biases. The coefficient of interest on common ethnicity is negative and statistically significant as hypothesized in all of the specifications. The results find that common ethnicity improves market integration. The results across specifications indicate that price gaps are about 2% lower between districts that have common ethnic composition even after controlling for distance. This result is robust to the inclusion of other controls. For example, the inclusion of the adjacent variable only affects the distance estimate, which marginally declines.

Since the ethnic composition across districts tends to be sensitive to the classification of ethnicities, we test the robustness of our results to a narrower definition of ethnicity. Instead of using a dummy variable, we use the ethnicity index variable (ranging from 0 to 1) computed at 73 ethnic group level. The results of this test are presented in Table 4.6.

Table 4.6: Disaggregated level ethnicity and Price dispersion (2000-2011)

	Full sample Models		**district-pairs <= 600 km**	
Variables	(1)	(2)	(3)	(4)
ln(distance)	0.0221***	0.0197***	0.0301***	0.0285***
	(0.00211)	(0.00226)	(0.00332)	(0.00382)
ln(nontradable inputs)	0.0147***	0.0148***	0.0133***	0.0135***
	(0.00307)	(0.00307)	(0.00387)	(0.00386)
Ethnic Similarity index	-0.0345*	-0.0313	-0.0181	-0.0172
	(0.0194)	(0.0193)	(0.0202)	(0.0202)
Adjacent		-0.0134*		-0.00492
		(0.00686)		(0.00767)
Constant	0.164***	0.180***	0.120***	0.130***
	(0.0142)	(0.0151)	(0.0198)	(0.0228)
Observations	1,870,982	1,870,982	867,010	867,010
R-squared	0.312	0.312	0.311	0.311
Product FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Standard errors are clustered at district level. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

The coefficients on ethnic density are negative and only significant, as hypothesized, when the full sample in the baseline model is used. The results indicate that price gaps between regions with identical ethnic compositions tend to be between 3.5% more integrated than regions with no ethnic overlap in the baseline model. However, the common ethnicity variable becomes insignificant once adjacent is accounted for and across city pairs that lie within 600km of each other.

One explanation is that population overlaps are likely to be low when accounted when dialect is taken into account of instead of major tribe level. Furthermore, the omission of these outlying pairs in the restricted model reduces the variation in the ethnic similarity index. Distant cities are less likely to have similar ethnic compositions than proximate cities.

Overall, the results confirm our hypothesis that common ethnicity is an important determinant of market integration in ethnically diverse societies. The results are consistent with international evidence that common ethnicity fosters market integration. For example, Aker et al., (2014) estimate a large ethnic border of 20 to 25%. In their study of international ethnic networks, Anderson et al., (2011) find that country-pairs linked to large co-ethnic networks lower price dispersion across countries. They find that a one standard deviation increase in Chinese network reduces price dispersion by 24% in a foreign country, while Japanese and Indian networks have lower effects (of 4 and 11% respectively).

4.7.4. Income differences

An additional factor explaining price gaps may be income differences across district. This result is backed by economic theory based on urban economics that variations in income affect demand and relevant pricing mechanisms by firms. The differences in income may give rise to different mark-ups (Simonovska, 2015; Alessandria & Kaboski, 2011) and affect the quality of products as richer regions may demand higher quality products (Varela, 2014; Handabury, 2013).

Zambia exhibit high inequality in income distribution across regions and individuals. In 2004, the country's Gini coefficient stood at 0.57, indicating large income inequality (LCMS, 1998). Across regions, our data shows that households in more urban areas are associated with higher household expenditure per capita compared to rural household. For example the at K71,713 average per capita expenditure for Lusaka is relatively larger than the average expenditure of K30, 737 and K25, 697 for a remote district of Kawambwa and Senenga respectively. However, the per capita expenditures are relatively similar across larger towns such as K53,396 and K51,178 for Livingstone and Kitwe respectively.

With spatial dependence in incomes, neighbouring districts are likely to have incomes that are more similar than regions that are further apart. For example the per capita expenditure of K47,709 and K51,134 are more similar for neighbouring towns of Ndola and Kitwe than the K25,697 for Senanga which is much further away. Ignoring such income differences could bias the coefficient on distance because differences in income are negatively correlated with distance and positively related to price gaps. Therefore, omitting income differences leads to a downward bias in the distance coefficient. This hypothesis is tested by including the differences in the per-capita expenditure-giving rise to the following equation:

$$\begin{aligned} |q_{i,j,k,t}| = {} & \beta_0 + \beta_1 \ln(dist_{ij}) + \beta_2 \ln(PNT\_inp_{ijkt}) + \beta_3 Adjac_{ij} + \beta_4 com\_ethnic_{ij} + \\ & + \beta_5 \ln(pc\exp\_dif_{ij}) + \lambda_k + \lambda_t + \varepsilon_{i,j,k,t} \end{aligned} \tag{4.16}$$

where $pc\exp\_dif_{ij}$ is per capita expenditure differences across regions as a proxy for district level per-capita income.

Table 4.7 reports the summary results for this specification. Columns (1) – (2) present the coefficients for the full sample, while columns (3) –(4) exclude market pairs that above 600 km apart. The coefficient of interest on differences in per capita expenditure is positive (as expected), statistically significant at the 5% level and is robust to changes in sample and additional controls. The results suggest that a 10% increase in the difference in per-capita expenditure leads to between 0.13% to 0.21% rise in the average price gap between districts. This is consistent with evidence in international literature (Alessandria & Kaboski, 2011).

Interestingly, the adjacent variable remains negative and of similar magnitude while the ethnicity variable remains negative and significant in both regressions. The robustness of the adjacency dummy suggest that these variables are additional factors over and above adjacency.

Table 4.7: Per-capita expenditure and price dispersion (2000-2011)

	Full sample Models		**district-pairs <= 600 km**	
Variables	(1)	(2)	(3)	(4)
ln(distance)	0.0231***	0.0194***	0.0309***	0.0286***
	(0.00173)	(0.00203)	(0.00285)	(0.00362)
ln(nontradable inputs)	0.0147***	0.0146***	0.0138***	0.0131***
	(0.00301)	(0.00301)	(0.00392)	(0.00393)
ln(pcexp_diff)	0.0210***	0.0202***	0.0156**	0.0133**
	(0.00380)	(0.00383)	(0.00659)	(0.00665)
Common ethnicity dummy		-0.0157**		-0.0183**
		(0.00737)		(0.00746)
Adjacent		-0.0149**		-0.00507
		(0.00639)		(0.00725)
Constant	0.147***	0.172***	0.107***	0.124***
	(0.0112)	(0.0134)	(0.0163)	(0.0215)
Observations	1,870,982	1,870,982	867,010	867,010
R-squared	0.312	0.312	0.311	0.311
Product FE	Yes	yes	Yes	Yes
Year FE	Yes	yes	Yes	Yes

Notes: Standard errors are clustered at district level. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

The overall results in this subsection confirm our hypotheses and earlier finding that: firstly, price differentials increase with distance. Secondly, that standard price integration models underestimated the impact of distance on market integration. The results reveal that trade costs in Zambia are larger compared to advanced economies. Thirdly, internal borders exacerbate price dispersion in Zambia. However, the internal borders effect is not explained away by the inclusion of common ethnicity and differences in per capita expenditure. In the next section, we explore the role of tradability in driving price differences.

4.8. Tradability and price dispersion

Trade reforms, by opening up markets to international competition affects product market integration by exposing outlets to greater competition and access to products that are easily traded within and across countries. This section explores whether exposure to external competition through trade also affects internal price dispersion. We address this issue in two ways. Firstly, a region-based indicator is used to analyse whether proximity to borders affects price gaps. Secondly, a product measure of tradability is used to test whether the effect of distance on price gaps differ across products according to their exposure to international trade. The rest of the section is structured around these two objectives.

4.8.1. Effect of exposure to competition: external border effect

Trade liberalisation might affect the integration of regions of a country differently according to their characteristics in terms of location relative to foreign competition. In particular, international competition is likely to affect border regions that are exposed to greater competition and access to traded goods across and within countries. In this case, border regions are likely to experience similar price shocks and price movements that influence price gaps. Hence, we test the hypothesis that border regions are associated with similar shocks that result in increased market integration or price co-movement among them.

To investigate this international exposure effect, equation 4.9 is extended by including the binary variable (R) for the external border. The dummy takes the value of one (1) if both districts are in the border regions or have export and import entry ports and zero for all other pairs.

$$\left|q_{i,j,k,t}\right| = \beta_0 + \beta_1 \ln(dist_{ij}) + \beta_2 \ln(PNT\_inp_{ij}) + \beta_3 Adjac_{ij} + \beta_4 com\_ethnic_{ij} + \beta_6 \ln(pc\exp\_diff)$$
$$\beta_7 R_{ij} + + \lambda_k + \lambda_t + \varepsilon_{i,j,k,t}$$
(4.17)

We expect price gaps to be smaller between regions that have direct access to borders and consequently predict that $\beta_7 < 0$. The results of equation 4.17 are presented in Table 4.8. Columns (1) and (2) reports the results of a typical model, while columns (3) and (4) restricts the sample to market pairs within 600 km radius. As expected, the coefficient on the *external border* dummy is negative and statistically significant at the 1% level across specifications. This result indicates that the effect of international exposure on price differ across regions within the country. The coefficient in the baseline specification (column 1) show that border regions are about 3.4 % more integrated than market pairs in which at least one or both districts are not on the border.

Table 4.8: External borders and absolute log price differentials (2000-2011)

	Full Model		**district-pairs <= 600 km**	
VARIABLES	(1)	(2)	(3)	(4)
ln(distance)	0.0239***	0.0193***	0.0318***	0.0292***
	(0.00178)	(0.00204)	(0.00288)	(0.00361)
ln(nontradable inputs)	0.0140***	0.0137***	0.0126***	0.0119***
	(0.00305)	(0.00299)	(0.00378)	(0.00384)
External border dummy	-0.0343***	-0.0353***	-0.0349***	-0.0374***
	(0.00504)	(0.00507)	(0.00908)	(0.00915)
ln(pcexp_diff)		0.0202***		0.0140**
		(0.00381)		(0.00650)
Common ethnicity dummy		-0.0163**		-0.0189**
		(0.00738)		(0.00747)
Adjacent		-0.0156**		-0.00516
		(0.00641)		(0.00729)
Constant	0.152***	0.174***	0.110***	0.122***
	(0.0116)	(0.0135)	(0.0167)	(0.0216)
Observations	1,870,982	1,870,982	867,010	867,010
R-squared	0.312	0.312	0.311	0.312
Product FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: Standard errors are clustered at district level. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.*

This conclusion remains unaffected by restricting the sample to districts within 600km of each other. On average borders, reduce price gaps by around 10% (=0.03/0.3). The results in both specifications are robust to the inclusion of other controls as indicated in columns (2) (for the baseline model) and column (4) in the restricted model. This suggest that direct exposure to external markets increases price competition in these regions compared to partially isolated regions within the country.

4.8.2. Testing for Product tradability

In the preceding estimates have pooled all bilateral price gaps and imposed an assumption of homogeneity in the coefficient of distance across all types of products so that $(\beta_k = \overline{\beta})$. This may not be correct since products are heterogeneous, and may require different levels of trade costs to trigger arbitrage. As noted in Chapter 3, more traded goods are likely to require lower trade costs, be transported in bulk and reduce the scope for regional monopolies, consequently making them more integrated than less traded goods.

Table 4.9: Tradability indicators by product category[43] (2000-2011)

Product Group	**Absolute Price differential**[1]	*Tradability Indicator* Min	Mean	Max
Food	0.35	0.07	0.25	0.51
Non-alcoholic beverages	0.24	0.19	0.19	0.19
Alcoholic beverages	0.18	0.19	0.19	0.19
Cigarettes and tobacco	0.16	0.01	0.01	0.01
Clothing	0.41	0.45	0.47	0.64
House maintenance repair	0.35	0.12	0.69	0.84
Household equip and furniture	0.38	0.84	1.56	2.14
Non-durable domestic good	0.17	1.03	1.03	1.03
Transport equipment	0.15	0.79	2.92	4.21
Medical products	0.44	1.03	1.03	1.03
Personal care	0.23	1.03	1.03	1.03
Other goods	0.22	0.05	0.73	2.30

Note: 1 –is the mean absolute price differential. The indicator is calculated as total trade to total domestic output using equation 4.7.

To deal with the problems associated with imposing a common coefficient of distance across all products; this section extends the analysis to allow for a differential effect of distance on price gaps as a function of the tradability of the product. In contrast to Crucini et al., (2005b) who use non-traded and traded input shares as a proxy for tradability, we use the ratio of total trade of the product at industry level to total output of the same product at industry level. This is displayed in Table 4.9. This ratio remains a good proxy of the trade shares because trade volumes are closely associated with exposure to external markets and associated trade costs. This tradability index ($PRTD\_index$) is computed using equation 4.7. To isolate the actual effect of this product heterogeneity on price dispersion, we interact the tradability index with distance based as in equation 4.18:

$$\left|q_{i,j,k,t}\right| = \beta_o + \beta_1 \ln(dist_{ij}) + \beta_2 \ln(PNT\_inp_{ijt}) + \beta_4 Adjac_{ij} + \beta_5 com\_ethnic_{ij} + \beta_5 \ln(pc\exp\_dif_{ij} + \beta_6 ext + \beta_7 \ln(dist_{ij}) \times PRTD\_index + \lambda_k + \lambda_k + \varepsilon_{ijkt} \quad (4.18)$$

[43] One limitation of our measure of product tradability is that it is computed using industry level data to explain product specific price dispersion. This reduces the variation in tradability, which can potentially lead to the mismeasuring of the effect of tradability at product level.

We expect that more tradable products will have a lower effect on distance ($\beta_6 < 0$), implying that the effect of distance on price differences diminishes the more a product is traded internationally. The regression results of equation 4.18 are presented in Table 4.10.

Table 4.10: product tradability and absolute price dispersion (2000-2011

	Full Models		**district-pairs <= 600 km**	
Variables	(1)	(2)	(3)	(4)
ln(distance)	0.0263***	0.0217***	0.0348***	0.0326***
	(0.00199)	(0.00218)	(0.00331)	(0.00389)
ln(nontradable inputs)	0.0149***	0.0137***	0.0137***	0.0119***
	(0.00307)	(0.00299)	(0.00386)	(0.00384)
ln(distance)#tradability	-0.00455***	-0.00440***	-0.00661***	-0.00625***
	(0.000978)	(0.000966)	(0.00163)	(0.00165)
External border dummy		-0.0352***		-0.0371***
		(0.00508)		(0.00910)
ln(pcexp_diff)		0.0202***		0.0140**
		(0.00380)		(0.00648)
Common ethnicity dummy		-0.0161**		-0.0188**
		(0.00738)		(0.00747)
Adjacent		-0.0157**		-0.00525
		(0.00640)		(0.00729)
Constant	0.151***	0.173***	0.112***	0.122***
	(0.0115)	(0.0134)	(0.0165)	(0.0215)
Observations	1,870,982	1,870,982	867,010	867,010
R-squared	0.312	0.313	0.311	0.312
Product FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: Standard errors are clustered at district level. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0*

Columns (1) and (2) present the estimates of the full model while columns (3) and (4) provide the estimate of the distance constrained model. The estimated coefficient on the tradability-distance interaction term is negative and statistically significant at the 1% level across all specifications. The coefficients on the other variables remain significant and of expected sign. An increase in tradability leads to a decrease in the effect of distance on absolute price gaps. Specifically, the results of the baseline model in column (1) suggest that if a good has zero tradability, then a 1% increase in distance raises the price difference by 0.026 %. However, if the good's tradability index is one (1), then the elasticity of distance falls to $0.022\% (= 0.0263 - 0.0046)$. This result confirms the hypothesis that markets for most tradable goods are more integrated than less tradable goods. This is consistent with the broad conclusion by Crucini et al., (2005a).

This result is robust to the inclusion of other variables across specification, that is, in the full sample model and the sample-restricted model. The results in table 4.10 confirm our key hypotheses tested in this chapter as follows: Firstly, the results indicate that distance is an important source of price dispersion and the distance effect is stronger when we control for distant market pairs where price gaps are less than the trade costs.

Secondly, internal borders affect inter-district price differentials even after controlling for the effect of distance. The results indicate that common ethnicity reduces price gaps while income inequality raises them. Finally, the results suggest that product tradability, that is exposing markets to greater international competition and access to goods that are easily traded within and across the countries reduce price gaps across regions.

4.9. Robustness Checks

This section presents some robustness and sensitivity test of the results including use of (a) alternative sample to test the robustness of distance (b) alternative approach to addressing the sample selection bias (c) different measure of the left-hand-side variable using quantile regression.

4.9.1: Alternative sample and sample selection bias

The core results of this chapter are subject to several biases and criticisms. The first the inclusion of differentiated products in the sample can bias the estimation of price gaps and therefore the parameter estimates. Secondly, as observed in section 4.4, restricting the sample to market pairs within 600km includes third markets that may bias results of the sensitivity of the coefficient of distance to the sample selection bias.

We address these concerns by re-estimating our model using subsample of 18 more homogenous products with brand names that are directly linked to producers based in Lusaka, the capital, as hub-city and surrounding districts is selected. These products are shown in

Appendix TableA4.2 The sample comprise products like boom detergent paste (400gm), Zamwasha washing powder (400gm), geisha soap (250gm) and NMC wheat flour (2.5kg), Cement (50 kg), Mosi Larger, Chibuku (500ml), Zamanita Cooking oil (750ml)[44].

We do some robustness check of distance by running the benchmark regression using a subsample of more homogeneous products for all bilateral pairs. Next, we test the hypothesis that the coefficient of distance biased downwards relative to true trade costs by using an alternative production-consumption approach, taking Lusaka as a benchmark city and compare the result to model in which price pairs are restricted to districts within 600km apart.

Table 4.11 presents of these robustness tests. Columns (1) presents the results for all bilateral pairs while Column (2) controls for market pairs beyond 600km. Column (3) uses the production-consumption where the dependent variable price gaps are measured using Lusaka as benchmark district. (i.e., $|q_{i,lusaka,k,t}| = |\ln(P_{ikt} / P_{lusaka,k,t})|$). We hypothesise correcting for the sample selection bias by restricting the sample to market pairs within 600km and sing the production consumption pairs yield the same distance effect.

Table 4.11: Robustness test by production –consumption pairs (2000-2011)

	(1)	(2)	(3)
	All Bilateral Pairs		
Variables	*All pairs*	*Districts within <=600km*	*Production – consumption pairs*
ln(distance)	0.0185***	0.0242***	0.0278***
	(0.00141)	(0.00216)	(0.00179)
ln(nontradable inputs)	0.00424*	0.00177	0.0188***
	(0.00243)	(0.00359)	(0.00321)
Constant	0.0335***	0.0122	-0.0283**
	(0.00899)	(0.0122)	(0.0118)
Observations	171,567	79,775	6,810
R-squared	0.264	0.257	0.278
Product FE	*Yes*	*Yes*	*Yes*
Year FE	*Yes*	*Yes*	*yes*

*Notes: The number of observations fall due to reduced sample of products. Robust standard errors in Parentheses. *** p<0.01, ** p<0.05, * p<0.1*

[44] Manufacturers of these products are based in Lusaka or surrounding regions.

Consistent with our earlier finding and expectations, the estimated coefficient of distance is positive and statistically significant at the 1% level in all regressions – indicating that increasing distance between markets raises price dispersion.

The results in Columns (2) and (3) confirm the findings by Atkin and Donaldson, (2014) and Anderson et al., (2013) that the distance estimate is downwards biased in standard models compared to true trade costs. The estimates of distance are larger in the market pair restricted (0.0242) and production-consumption (0.0278) models than in the all pairs model (0.0185).

However, the results do not seem to be significantly different to the two sample selection bias correction methods. The estimated coefficient of distance from the production- consumption approach is very similar to the one obtained by restricting the sample to market pairs within 600 km of each other. This supports the validity our core findings.

Table 4.12: Robustness checks on subsample –All controls (2000-2011)

	(1)	(2)	(3)
	All bilateral Districts		
Variables	*All pairs*	*Within <=600km*	***Production-*** *consumption*
ln(distance)	0.0237***	0.0331***	0.0301***
	(0.00249)	(0.00375)	(0.00312)
ln(nontradable inputs)	0.00375	0.00161	0.0155***
	(0.00241)	(0.00359)	(0.00324)
Adjacent	-0.00627	0.00102	
	(0.00517)	(0.00555)	
Common ethnicity	-0.00820	-0.0403**	-0.183***
	(0.0210)	(0.0181)	(0.0400)
External border dummy	-0.0278***	-0.0356***	-0.00663
	(0.00631)	(0.00783)	(0.00442)
ln(distance)#tradability	-0.0132***	-0.0116***	-0.0133***
	(0.00182)	(0.00262)	(0.00379)
ln(pcexp_diff)	-0.000623	0.00164	0.0180***
	(0.00303)	(0.00481)	(0.00384)
Constant	0.0455***	-0.00785	-0.00348
	(0.0140)	(0.0200)	(0.0130)
Observations	171,567	79,775	6,810
R-squared	0.266	0.259	0.286
Product FE	*Yes*	*Yes*	Yes
Year FE	*Yes*	*Yes*	Yes

*Notes: The standard errors in columns (1) and (2) are clustered by district pairs. The number of observations fall due to reduced sample of products. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

We check the robustness of this finding by including the other controls to the baseline model estimated in Table 4.11. The ensuing results are presented in Table 4.12. The specification in Column (1) uses all bilateral pairs while Columns (2) and (3) control for the sample selection biases by restricting the sample to market-pairs within 600km apart and production-consumption pairs using Lusaka as a production centre.

All the conclusions found in Table 4.11 remain robust, that is, distance segment markets and the coefficient on the production-consumption pair remains relative similar to the restriction of the sample to markets within 600km of each other. Further, in line with our earlier findings, the external borders and distance-tradability interaction variables are associated with lower price gaps while the significance and impact of other explanatory variables is now mixed.

4.9.2. Quantile regression

Next, we test the robustness of our results to an alternative definition of the dependent variable. In particular, we use a quantile regression and estimate the model using the 95th percentile of price differences as the dependent variable. As a semi-parametric in nature, the quantile regressions tends to account for outliers, thus addressing the potential problem of heteroscedasticity associated with price data (Cameroon & Trivedi, 2010; Parsley & Wei, 2001). We estimate the equation:

$$\begin{aligned}\left|q_{i,j,k,t}\right| = {} & \beta_0 + \beta_1 \ln(dist_{ij}) + \beta_2 \ln(PNT\_inp_{ijkt}) + \beta_3 Adjac_{ij} + \beta_4 com\_ethnic_{ij} + \\ & + \beta_5 \ln(pc\exp\_dif_{ij}) + \beta_6 R_{ij} + \beta_7 \ln(dist_{ij}) \times PRTD\_index_k + \lambda_k + \lambda_t + \varepsilon_{i,j,k,t}\end{aligned}$$

where $\left|q_{i,\,j,\,k,\,t}\right|$ estimates the 95th percentile of absolute price gaps between markets.

The ensuing estimation results are presented in Table 4.13. Overall, all coefficients are correctly signed and statistically significant across the four regressions. Consistent with the results in terms of the absolute price dispersion, the evidence indicates that price gaps are strongly and positively associated with transportation costs, although the marginal impact has significantly increased from an average of 0.023 to 0.035 in the baseline equation reported in Columns (1) and (2).

Further, the results confirm the existence of internal borders attenuated by common ethnicity and exacerbated by both the prices of nontraded input prices and the degree of income inequality across districts. In addition, they confirm that exposure to international competition and tradability matters for market integration within countries.

Table 4.13: Measuring price dispersion by 95th percentile

	All bilateral pairs		*district-pairs <= 600 km*	
Variables	(1)	(2)	(3)	(4)
ln(distance)	0.0434***	0.0307***	0.0607***	0.0523***
	(0.00140)	(0.00181)	(0.00231)	(0.00313)
ln(nontradable inputs)	0.0217***	0.0183***	0.000592	-0.00176
	(0.00264)	(0.00272)	(0.00390)	(0.00398)
External border dummy		-0.0442***		-0.0360***
		(0.00755)		(0.0101)
ln(distance)#tradability		-0.00403***		-0.00449***
		(0.000257)		(0.000412)
Adjacent		-0.0518***		-0.0266***
		(0.00545)		(0.00612)
Common ethnicity dummy		-0.0449***		-0.0526***
		(0.00556)		(0.00566)
ln(pcexp_diff)		0.0833***		0.0761***
		(0.00309)		(0.00509)
Constant	0.613***	0.674***	0.529***	0.568***
	(0.00902)	(0.0118)	(0.0135)	(0.0187)
Observations	1,870,982	1,870,982	867,010	867,010

*Notes: This regression uses the observations on the 95th percentile as a measure price dispersion. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.*

4.10. Conclusion and Relevance

This chapter set out to investigate the determinants of product market integration using the price-approach within a single economy using a unique and extensive micro price dataset of 306 products in 41 districts of Zambia, a low-medium income country in an understudied SSA region over the period 2000 to 2011. The chapter set to untangle new sources of internal price dispersion centred on the effect of transaction costs associated with distance, internal borders associated with ethnic diversity, and exposure to international trade. Grounded in these three themes, we draw the following conclusions.

Firstly, the analysis finds that transportation costs, as measured by distance, account for a significant amount of price differences between districts in Zambia. The effect of trade costs on generating price differences is amplified once the sample selection bias is corrected for in the standard models. This suggests that the price effects of distance are not fully captured in standard price models.

Overall, the results suggest that trade costs in Zambia are larger than found in advanced such as Canada and the US. For example, our estimated distance range from 0.023 in the standard model to 0.0312 in controlled pairs model for Zambia. This estimate is larger than the similarly estimated 0.006 and 0.004 by Donaldson and Atkin (2014) across USA- cities. In addition, our all pairs model suggests that distance estimates are larger compared to Ethiopia (0.0115), but compares well once the sample selection biases are eliminated.

Secondly, the analysis provides evidence of internal borders that significantly affect inter-district price differentials in Zambia even after controlling for distance. This result points to the presence of additional constraints to lowering price gaps between districts beyond transportation costs. A further analysis revealed two additional insights into the source of the internal border effect. First, the results show that ethnic linkages are an important determinant of price differences across the districts in Zambia. This finding supports the notion that additional trade costs are lower if trade occurred within a homogenous tribal or ethnic grouping. The results suggest that common ethnicity facilitates trade and market integration by about 2% compared to across diverse ethnic groups. Secondly, the results remain robust to the inclusion of differences in per-capita expenditure across districts that increase price differences across districts.

Finally, differences in price movements between districts differ according to the tradability of each sector. Particularly, districts that are closer to external borders are on average more integrated than districts for which neither one or both form part of the border regions. This points to the co-movement of prices of goods in markets that are directly exposed to greater competition and access to goods that are easily traded across and within countries. In addition, tradability is an important determinant of for market integration in Zambia. Markets for more tradable goods tend to exhibit smaller degrees of segmentation compared to least traded products. This suggests that nontraded inputs play an important role in generating price dispersion.

These results taken together with our findings in the second chapter show that internal trade and transactions costs play a significant role in explaining price differences across regions in Zambia. These trade costs reduce the consumer surplus for people in isolated remote areas. This indirectly calls for policies aimed at addressing internal trade costs, which could generate large welfare gains. This finding calls for the need to provide and upgrade transport infrastructure across the country. Since evidence elsewhere shows that a large number of factors associated with transportation costs, such as inferior technologies, high fuel costs, frequent checkpoints, terrible road conditions, old trucks and bad payload utilisation, potentially contribute to the higher intra-country trade costs, cabotage policy measures could be instituted to address them.

Finally, the presence of internal borders is consistent with the presence of additional barriers (ethnic diversity and income inequality) to internal trade over and above transport costs. This signals the failure of markets to integrate. This has an additional policy implications that, the problem of transactions costs in Africa may not be narrowly focused on addressing transportation infrastructure problems. Rather, they must also consider factors related to differences in internal ethnic divisions and income inequalities.

This chapter has empirically highlighted the key determinants of intra-country market integration in the context of an emerging economy in SSA. However, theory suggests that the internal distribution of prices of tradable products is also driven by external shocks. This notion has not been fully addressed in this chapter. Moreover, empirical evidence of its validity remains scarce in literature. The next chapter, therefore, investigates the extent to which external shocks, particularly tariff reforms, affect the internal distribution of product prices.

Chapter 5

5.0: Tariffs and Intranational Retail Price Dispersion: Evidence from Zambia

5.1. Introduction

Several empirical studies in international trade have examined the impact of external reforms, such as trade liberalisation on economic outcomes within the country. These include studies on the effect of tariff liberalisation on economic growth (Frankel & Romer, 1999), poverty and inequality (Topalova, 2007; Verhoogen, 2008), employment and wages (Revenga, 1997; Goldberg & Pavcnik, 2005), and productivity and growth effects of manufacturing firms (Melitz & Ottaviano, 2008; Melitz, 2003). Firm level studies have looked at the channels through which changes in tariffs affect productivity (Amiti & Konings, 2007; Fernandes, 2007) and the responsiveness of prices, mark-ups and marginal costs within firms (De Loecker et al., 2012).

Surprising though, the impact of trade reforms on domestic prices are largely overlooked in empirical literature (Blonigen & Haynes, 2002). Yet, the effect of trade reform on domestic prices is the central channel that induces changes in firm and individual behaviour to bring about the various economic outcomes observed.

Until recently, much of the established theoretical and empirical literature in this area has focused on the incompleteness of the tariff pass-through into import prices[45]. A bulk of this literature examine this relationship at aggregate level, implicitly treating a country as a single geographical unit with a common pass-through of tariffs to import prices (Feenstra, 1995; Feenstra, 1989; Pompelli & Pick, 1990). However, the implicit assumption that treats a country as a single geographical unit has been questioned in recent theoretical and empirical literature. Particularly, recent theoretical work by Atkin and Donaldson (2014) shows how

[45] Though several theoretical papers examine how changes in tariffs may affect prices, few empirical studies have formally tested the relationship.

the market power of intermediaries in domestic industries affects the mark-ups, and hence results in different rates of tariff pass-through within-countries.

Empirically, price-based studies of product market integration within and cross-countries have documented strikingly large deviations from the law of one price. The results of these studies find large price gaps within countries, revealing the presence of large trade costs, which get amplified by the border effects when crossing political borders. This evidence holds in advanced economies (Ceglowski, 2003; Engel et al., 2003; Fan & Wei, 2006), but is more pronounced in emerging economies where trade frictions within countries lead to segmented markets (Atkin & Donaldson, 2014). In Africa, widespread evidence reveals large market fragmentation because of large infrastructural and transport barriers that significantly impact on the structure and intensity of trade within and across countries (Brenton et al., 2014; Limao & Venables, 2001).

With large imperfect competitive markets and weak production structures, the internal allocative and growth effects of tariff reforms are likely to be greater in emerging countries. However, the impact of tariffs is likely to differ across geographic regions within emerging economies due to large intra-national trade costs. Yet, there is relatively little, if any, systematic analysis of the effects of external integration on internal price dispersion in liberalising economies, especially in Sub Saharan Africa. This scarcity of evidence can, in part, be explained by the lack of the requisite data to conduct such studies.

This chapter bridges this gap using highly disaggregated product-level price data collected from 38 districts of Zambia to analyse the differential pass-through of tariffs to domestic retail prices across geographical regions. The chapter studies three key relationships. Firstly, average pass-through of tariffs to domestic prices in Zambia. Secondly, the differential pass-through of import tariffs to regions, and, thirdly, the differential pass-through of tariffs across heterogeneous products. In doing so, the study tests for the sensitivity of the tariff pass-through to different regions and products within Zambia.

The chapter contributes to the empirical literature on tariff pass-through in several ways. The data used has two unique features that allow us to test the pass-through hypotheses. First, the dataset features a panel of district level prices of 34 narrowly defined products sold in markets across Zambia. In doing this, the analysis avoids differential pass-through that might be based on quality differences across products. This contrasts with other studies (Feenstra, 1989; Mallick & Marques, 2008; Pompelli & Pick, 1990) that use industry level unit values as proxies for import prices. This is because unit values suffer from a number of shortcomings. Firstly, they are quantity weighted average prices. Consequently, changes in quality composition of the sample product can affect the unit values. Secondly, unit values may result in imprecise proxy for prices since volumes of trade may not be accurately reported in the trade dataset.

Second, the price data has a wide geographical coverage of 38 districts. This wide geographical coverage provides us with the requisite spatial variation to identify the differential pass-through across geographic areas within Zambia. The richness of this dataset allows for an analysis of the differential pass-through of trade policy shocks to prices of heterogeneous products.

In line with the literature on *border effects*, this paper gives insights into how integrated regions are in the international environment. This contributes to our understanding of product market integration and the failure of the law of one price to hold. The chapter also speaks to the trade and poverty literature by presenting preliminary evidence of the differential effect of tariffs on domestic retail prices. The district-level pass-through estimates give insight in the role of external reforms in shaping the pattern of internal development and welfare through the price channel as in trade-poverty literature (Nicita, 2009; Porto, 2006).

5.2. Context and Motivation of study

The study uses Zambia's trade policy reforms with South Africa under the SADC trade protocol to identify the effect of trade reform on domestic prices. There are reasons that make Zambia an excellent setting to study effect of trade shocks, particularly reductions in tariffs on internal price variation. First, the country is an import dependent and landlocked country with significant natural and infrastructural barriers to trade. In fact, remote and landlocked countries have higher transportation costs than countries with similar characteristics but are not landlocked. For example, Limao and Venables (2001) estimate that a representative landlocked country has transport costs approximately 50% greater than a representative coastal economy.

Zambia also exemplifies a classic African country that has undergone extensive economic reforms aimed at internal and external integration of the economy. However, the country remains internally segmented, with large and substantial price deviations across regions, as has been shown in Chapter 3 of this thesis. The observed large price deviations across regions point to the potential large gains from policies that increase internal product market integration. Thus, we test whether trade contributes to improved product market integration within the country. The results will contribute to the understanding of the consequence of tariffs on domestic price and the extent to which tariff changes may drive economic responses within Zambia.

Testing the causal link between changes in tariffs and internal price integration requires a measure of traded goods prices, like world prices, that would exist in an open market. As an extension to previous studies, this paper uses a sample of matched products from South Africa. This is ideal for several reasons. First, we test the differential effect of the trade policy shock on intranational price integration using a case study of preferential tariff reductions by Zambia from the SADC trade protocol with South Africa. This tariff reform was exogenously dictated by the SADC trade protocol that aimed at attaining a free trade area. The fact that the final tariff was pre-determined to be zero across products by 2010 reduces concerns about endogeneity in the setting of tariffs.

A second benefit is that South Africa is Zambia's largest trading partner and is a major source of its consumer products. The details of Zambia's trade with South Africa is discussed in chapter 2. In addition, South African supermarket chains are dominant players in the retail market. South Africa also serves as the main transit route for Zambian imports. Consequently, price shocks in South Africa and changes in tariff rates on SA imports are likely to have a substantive effect on Zambian prices.

The remainder of the chapter is structured as follows. Section 5.2 develops the theoretical model that informs our empirical analysis. Section 5.3 reviews the empirical literature, while Section 5.4 presents the empirical framework. The data is discussed in Section 5.5. Section 5.6 presents the estimation results. Section 5.7 concludes the chapter.

5.2. Theoretical Framework of Tariff Pass-through

This section presents a simple theoretical model that informs the estimation of the intranational pass-through of tariffs into retail prices.

5.2.1. The retailer's technology

The theoretical model is derived from Crucini et al., (2005b)'s retail pricing model. The production of good k requires two inputs: a traded and a nontraded input that are combined in a Cobb-Douglas retail production function of the form:

$$Y_{kj} = (N_{kj})^{\alpha_k} (T_{kj})^{(1-\alpha_k)} \qquad (5.1)$$

Y is the output level of product k that is produced using a combination of a nontraded local input (N) and a tradable input (T) that is either produced locally or imported into region j. α is the share of the non-traded and traded intermediate input production.

In the model, the cost function is the solution to the following minimisation problem at each date:

$$\min_{\{N_{kj},T_{kj}\}} C_{kj} = P_j^N N_{kj} + P_{kj}^T T_{kj} + f_x \qquad (5.2)$$

$$\text{s.t. } (N_{kj})^{\alpha_k} (T_{kj})^{(1-\alpha_k)} \geq Y_{kj} \qquad (5.3)$$

where C_{kj} is the cost of producing good k in location indexed j, P^T is the price of the traded intermediate input into the production of the retail good k in location j and P^N is the price of nontraded input common to all goods within the location. f_x is the fixed cost.

5.2.2. Retail price determination

Solving the minimisation problem produces a cost function that takes the form: $Y_{kj}C(\overline{P}_{kj})$ where $C(\overline{P}_{kj})$ is the unit cost of the good and retail price (P_{kj}) of good k. The standard calculation of the price or cost per unit reveals that:

$$P_{jk} = (P_j^N)^{\alpha_k}(P_{kj}^T)^{(1-\alpha_k)} \qquad (5.4)$$

Retail prices are thus a function of traded input prices P^T and non-traded input prices P^N. In the empirical analysis of this chapter, P^T represents the South African price of the traded input. The price of the tradable input T_{kt} depends on the free on board price P_{cik}^* and a two part trade cost that comprise an ad valorem tariff rate (τ_{kt}) charged by domestic authorities and the internal per unit transportation cost (d_k) of moving the good from the border to the final destination j. The price of the tradable input P_{kt}^T is then defined as:

$$P_{kj}^T = P_k^B(1+\tau_k) + d_{kj} \qquad (5.5)$$

where P_k^B is the imported price valued in domestic currency ($P_k^B = eP_k^*$ where e is the exchange rate and P_k^* is the foreign currency denominated price). Substituting (5.5) in (5.4) yields the retail price equation:

$$P_{kj} = (P_j^N)^{\alpha_k}[P_k^B(1+\tau_k) + d_{kj}]^{(1-\alpha)} \qquad (5.6)$$

Taking logarithms of both sides of equation 6 gives us:

$$\ln P_{kjt} = \alpha_k \ln(P_{jt}^N) + (1-\alpha_k)\ln[P_{kt}^B(1+\tau_{kt}) + d_{kj}] \qquad (5.7)$$

Equation (7) demonstrates that that the retailer's price setting behaviour depends on five factors that consist of the fluctuations in the foreign price of the good in local currency, the ad valorem tariff rates charged at the border, the internal trade costs, the tradability of the product and the location specific input costs. To understand how the extent to which tariff rates are passed through into retail prices, we differentiate equation 7 respect to $(1+\tau_{kt})$ to obtain the following:

$$\frac{\partial \ln P_{kjt}}{\partial(1+\tau_{kt})} = V(\tau_{kt}) = (1-\alpha_k)\left(\frac{P^B_{kt}}{[P^B_{kt}(1+\tau_{kt})+d_{kj}]}\right) < 1 \qquad (5.8)$$

The main insight from equation 5. 8 is that the pass-through of import tariffs to consumer prices is less than 1. An *incomplete pass-through* obtains if a 1% fall in trade costs reduces the price of the imported good by less than 1%. The sign of the right hand side of Equation 5.8 is positive, but less than 1.

The incomplete pass-through is driven by two features of the retail price. The pass-through rate depends on the transportation costs of moving the good from the border to local markets. To illustrate this relationship, we differentiate it (equation 8) with respect to distance to obtain[46]:

$$\frac{\partial V(\tau_{kt})}{\partial d_{kj}} = -\frac{(1-\alpha_k)P^B_{kt}}{[P^B_{kt}(1+\tau_{kt})+d_{kj}]^2} < 0 \qquad (5.9)$$

Equation (9) provides a second hypothesis regarding the pass-through rate. The pass-through of tariffs into consumer prices decreases with an increase in transportation costs. The implication is that regions more distant from the source of imports experience lower reductions in consumer prices in response to tariff liberalisation. The pass-through is likely to be much lower for emerging countries with weak infrastructure and natural barriers to trade.

The share of traded intermediate input costs in the supply of good k (tradability) is a second factor that affects the pass-through of ad valorem tariff rates onto retail prices. Differentiating equation 8 with respect to the share of nontraded input costs yields:

[46]Equation 14 can be expressed as $v(\tau_{kt}) = (1-\alpha_k)P^B_{kt}[P^B_{kt}(1+\tau_{kt})+d_{kj}]^{-1}$

$$\frac{\partial V(\tau_{kt})}{\partial(1-\alpha)} = \frac{P_{kt}^{B}}{[P_{kt}^{B}(1+\tau_{kt})+d_{kj}]^{2}} < 1 \qquad (5.10)$$

The sign of the relationship in equation 5.10 is negative. The higher the share of traded intermediate input in the retail price the greater the pass-through of tariffs into the product's retail price. The implication is that the pass-through of tariffs to consumer prices differs across products. Products such as fresh vegetables where non-traded inputs constitute a high share of the retail price, experience a lower pass-through of tariffs than product such as refrigerators where traded inputs make up a high share of the retail price. This yields a third hypothesis that will be investigated later in this chapter, namely that the more tradable a product the higher pass-through of tariffs onto retail prices. The hypothesis points to the existence of heterogeneity in the pass-through of tariffs across products.

5.3. Findings in Empirical Literature

This section presents an overview of previous empirical literature on tariff pass-through studies. In general, there is very little research on retail price behavior and even fewer studies focus on the heterogeneous effect of tariff cuts across products and regions. This review focuses on two strands of literature that informs our empirical and theoretical literature. These comprise the tariff pass-through literature and the poverty and new economic geography literature. Typically, both strands document incomplete pass-through rates. These are discussed in turn.

5.3.1. Tariff pass-through literature

There are a number of studies on the pass-through of trade protection instruments, particularly changes in tariffs, to consumer prices. These include Feenstra, (1989); Mallick and Marques, (2008); Pompelli and Pick, (1990); Rezitis and Brown, (1999). In a typical way, these studies evaluate the hypothesis that changes in ad valorem tariffs lead to changes in import prices. The general finding of this literature is that changes in trade policy are not perfectly reflected in import prices.

In his study, Feenstra (1989) developed a classic theoretical model of how tariff pass-through is determined. His Bertrand duopoly model, in which a foreign exporter competes with domestic producer of an imperfect substitute, shows that import prices inclusive of duties are determined by foreign producer costs, domestic demand and fluctuations in exchange rates. Feenstra (1989) uses this model to estimate the pass-through of tariffs on Japanese trucks, cars and heavy motorcycles compared to U.S. prices. His estimated degree of tariff pass-through coefficient ranges from 0.6 for trucks to around 1 for motorcycles indicating that tariffs are imperfectly passed through to domestic price of trucks and perfectly passed-through in the case of motorcycles.

Using Feenstra's classical model, Pompelli and Pick (1990) and Rezitis and Brown (1999) estimate the pass-through to US prices of tariffs on imports of Tobacco from Brazil and Greece, respectively. Pompelli and Pick (1990) estimate a Brazil-US tariff pass-through elasticity of 0.549. Rezitis and Brown (1999) report qualitatively similar results of tariff pass-through rates for imports of unmanufactured Greek oriental tobacco into the US. Overall, these studies analyse the effects of tariffs on the price of imports sold in the domestic markets and focus on a very narrow range of products. This study extends this literature by looking at the effect of tariffs on domestic retail prices at district level.

Mallick and Marques (2007) study the effects of Indian tariff reforms on import prices (inclusive of tariffs) of a variety of products. Particularly, they use 38 sectors of products obtained at two-digit SITC-level to test the tariff pass-through model for Indian imports. They found incomplete and varying tariff rate pass-through for 36 of the 38 sectors, although only the pass-through coefficients were statistically significant in only six of the sectors. The pass-through of tariffs in the significant sectors varied between 12% and 40% across sectors. Only one of the six sectors displayed perfect pass-through. Furthermore, Mallick and Marques (2007) investigate the effect of factors such as the import penetration rate; share in total imports, nontariff barriers and the effective rate of protection on the pass-through of tariffs to import prices. They show that while the tariff pass-through decreased with import shares, the import penetration rate did not influence the pass-through.

Ludema and Yu (2011) use an extended version of the Melitz and Ottaviano (2008) model to investigate the tariff pass-through at firm level and how it is influenced by firm heterogeneity in productivity and product quality. They find that firms absorb the changes in tariffs by adjusting both the mark-ups for both quality differentiated and quality homogenous products, leading to incomplete pass-through. In general, the evidence suggests incomplete pass-through of tariffs and exchange rates to import prices.

5.3.2. Tariffs and poverty literature

A second strand of literature uses household survey data to explore the effect of trade reforms on household welfare via the price mechanism following Winters (2002), Winters et al., (2004) and Porto (2006). This literature's theoretical prediction is that trade policy reforms affect households differently depending on the geographical characteristics of their localities (Nicita, 2009; Ural Marchand, 2012). The literature identifies two causal links through which these outcomes are realised: (i) the consumption channel through which trade policies affect prices of goods consumed by households, and (ii) the production channel through which trade affects wages and employment of occupants within households. Differences in the pass-through of tariffs to prices across products and regions give rise to differential effects on poverty across locations within a country.

Recently, Porto (2006), Nicita (2009), Marchand (20012) and Han (2014) investigate the effect of trade reforms on households using demographic data focusing on Argentina, Mexico, India and China respectively. This literature emphasise the role of trade costs and market functionality in terms of household location and market competitiveness as sources of variation in the effect of tariffs across regions and households. For example, Nicita (2009) extends the standard model tariff pass-through model to capture heterogeneity across geographic regions. He uses the heterogeneity of trade costs from the nearest border between the US-Mexico borders to estimate the distributive effects of tariff liberalisation across 63 geographic areas of Mexico. He finds the tariff pass-through averages 33% for agricultural products and 27% for manufactured goods. Accounting for regional differences, he estimated an elasticity pass-through of 70% in border regions for manufactured products. This pass-through declined to 40% and 20% for locations 1000km and 2000 km from the border, respectively. However, no variation in tariff pass-through was estimated across regions for agricultural products.

Marchand (2012) uses a model showing that consumer prices are determined by foreign prices, the exchange rates and tariffs. She uses this model to estimate the tariff pass-through elasticities to urban and rural regions of India. She estimated a tariff pass-through range of 33 % to 49% in rural areas and 64 to 68 % in urban regions of India. The results indicate that trade shocks affect urban areas more than rural regions in India.

Finally, Han, et al., (2014)'s study of China assesses the effect of market structure as proxied by the size of the private sector on the tariff pass-through using unit prices of tradable products across 56 cities. They find a 10% increase in the private sector increases to be associated with 2.5% higher pass-through. Due to differences in the degree of privatisation across cities, they find that the tariff pass-through rates varied across cities ranging from 20%, where most firms are state owned, to 39% in cities, with higher privately owned enterprises.

In sum, evidence suggests an incomplete pass-through of tariffs to import prices. However, a major limitation to this research is that they largely use unit values that do not correct for quality change in products. Also, missing from this literature are studies focusing on Sub-Sahara Africa, a region that has undertaken several economic and trade reforms, yet faces several trading frictions that could inhibit the success of these reforms.

We extend the literature by using a sample of goods that are identified by brand and units in the context of SSA. The study evaluates a clear tariff reform program between Zambia and South Africa that is associated with strong trade linkage. This source-destination relation minimises the potential underestimation of the pass-through that could arise from matching non-trading pairs in standard models. In contrast to previous studies that look at import prices, this chapter extends the analysis to examining the effect of tariffs on domestic retail prices, which also influenced nontraded input prices and location. To our knowledge, this study is among the first of its kind in the SSA region and global literature.

5.4. Empirical Framework

This section presents the empirical framework used to quantify the extent of tariff pass-through to retail prices in Zambia. It is split into two parts; one focusing on pass-through rates at the national level and the other focusing on the regional pass-through effects of tariff reform.

5.4.1. Average Tariff pass-through

First, we explore the average pass-through of import tariffs to retail prices. Following our theory, the baseline empirical framework guiding our pass-through analysis is given by the following equation:

$$\ln P_{kjt} = \beta_0 + \beta_1 \ln P_{kjt}^N + \beta_2 \ln P_{kt}^B + \beta_3 \ln(1+\tau_{kt}) + \lambda_t + \lambda_j + \xi_{kjt} \qquad (5.11)$$

where P_{kjt} is the domestic retail price of good kin location j, P_{kjt}^N is the price of nontraded input price in location j, P_{kt}^B is the pre-tariff border price of traded goods in domestic currency, τ_{kt} is the ad valorem tariff, λ represents the fixed effects for products, time and district, and finally ξ_{kjt} is an i.i.d error term.

In this setup, the coefficient β_3 measures the average pass-through of tariff into retail prices across all regions of the country. As shown in 5.8, the pass-through is expected to be positive, but less than one ($dP_{ikt} / d\ln(1+\tau_{kt}) = \beta_3 < 1$), indicating a partial or incomplete pass-through.

5.4.2. Pass-through at Regional level

The standard pass-through framework is then extended to estimate the differential pass-through of tariff reforms across regions. This is captured by including an interaction term between the ad valorem tariff rates and distance from the border or hub district. The specification is:

$$\ln P_{jkt} = \beta_0 + \beta_1 \ln P_{jt}^N + \beta_2 \ln P_{kt}^B + \beta_3 \ln(1+\tau_{kt}) + \beta_4 \ln(1+\tau_{kt}) \times \ln dist_j + \lambda_k + \lambda_j + \lambda_t + \xi_{jkt} \quad (5.12)$$

where $dist_j$ is the distance between the local market j and the border or hub city. The estimated pass-through elasticity is:

$$\frac{\partial \ln P_{ik}}{\partial \ln(1+\tau_{kt})} = \beta_3 + \beta_4 dist_j \quad (5.13)$$

where β_4 is the marginal impact of distance on the pass-through of tariffs to domestic retail prices. It gives the summary measure of the spatial influence of changes in trade policy on internal price behaviour. In the case where tariffs have an identical effect across regions, then $\beta_4 = 0$. If the pass-through rate diminishes with distance from the border as predicted by theory, then we expect it to be negative ($\beta_4 < 0$). The further a product's destination is from the border, the lower the pass-through of tariffs into retail prices.

Furthermore, the effect of tariff liberalisation may be influenced by the individual characteristics of products in particular tradability, which is used as a proxy for the share of nontraded and traded inputs in equation 5.10. To investigate this heterogeneity, we introduce interactions between tariffs rates and product tradability as:

$$\ln P_{jkt} = \beta_0 + \beta_1 \ln P_{jt}^N + \beta_2 \ln P_{kt}^B + \beta_3 \ln(1+\tau_{kt}) + \beta_4 \ln(1+\tau_{kt}) \times trad_k \quad \lambda_k + \lambda_j + \lambda_t + \xi_{jkt} \quad (5.14)$$

where $trad_k$ is the measure of product tradability index. This tests our hypothesis that the more tradable a product the higher pass-through of tariffs onto retail prices.

5.5. Data and description

In this section, we describe our unique micro-price data that allows us to test the effect of trade liberalisation on internal price distributions. The price data comprises 32 products obtained from the Central Statistical Agency of Zambia's of retail prices of individual goods underlying the construction of the consumer price. This data is available at a monthly frequency at product level in 38 districts for the period December 2001- 2010.

The second dataset is made up of retail price data obtained from the South African Statistical agency as a proxy for world prices. This dataset underpins the construction of the South African CPI and is available at city and monthly frequency for the period December 2001 to December 2010[47]. This data is advantageous for the following reasons. First, the products are narrowly defined and closely match the Zambian products. This precision minimises the potential bias associated with unit values. Second, South Africa is the major source of imported retail products into Zambia. In estimating the relationship, the simple average retail price for the Gauteng region is used as the foreign price.

The Gauteng region is the major production and commercial hub from which Zambian imports are sourced. This enables us to estimate a spatially informed model in which the production and consumption centres are linked with actual trade flow. As such, the pass-through is likely to be as accurately estimated as in price integration studies (Anderson et al., 2013; Atkin & Donaldson, 2014; Inanc & Zachariadis, 2012). This minimises the potential underestimation of the tariff pass-through associated with studies using world prices of non-trading partners. The South African prices are converted into kwacha using the monthly exchange rate obtained from the Bank of Zambia.

Figure 5.1 plots the monthly average price series of four selected products – spaghetti, cooking oil, ladies dress and a refrigerator for South Africa and Zambia. Table 5.1 presents the average log prices of the sample products in Zambia and South Africa for June 2002 and 2010. The Zambian prices are available at district level and then aggregated to the national average. The price for South Africa is the average price across cities in the Gauteng province.

The figure suggests the following. Firstly, that there is a co-movement in prices between Zambia and South Africa. This suggests that prices in the two markets are inter-related. The

[47] Note: the South African CPI product were revised in 2006/7. This could introduce some variations in brands and quality across years for which this study does not control.

pattern of the trends suggests a strong association in price movements between the two markets.

Figure 5.1: Trend in the monthly Average retail price of selected products

Source: Own construction from raw data

Secondly, it is also apparent from the figure that the price association between the two markets is not perfect. In some cases, average prices in Zambia are higher than in South African. This is evident, for example, in the spaghetti and cooking oil in Figure 1. The trends suggest that these markets are not perfectly integrated and other factors, such as the price of non-traded input prices, are also important determinants of price levels in each country. The figure shows the existence of log price differences between the two countries, with higher prices in some products in Zambia compared to South Africa and vice versa. This price segmentation is essential for imperfect pass-through of trade shocks into domestic prices.

Table 5.1: Log of December average price and percentage differences 2002 -10 (ZMK)

	Zambia		*South Africa*		lnPz –lnPsa	
	(i)	*(ii)*	*(iii)*	*(iv)*	*(v)*	*(vi)*
Products	**2002**	**2010**	**2002**	**2010**	**2002**	**2010**
Baked beans (420g)	8.08	8.94	7.37	8.28	0.7	0.66
Macaroni (500gm)	8.22	8.84	7.54	8.69	0.68	0.15
Spaghetti (500gm)	8.2	8.84	7.53	8.66	0.67	0.18
pilchards (155)	7.65	8.68	7.57	8.39	0.08	0.29
sugar (1kg)	7.93	8.69	7.64	8.7	0.29	-0.01
Peanut butter (400gm)	8.34	9.08	8	9.31	0.34	-0.23
Cooking oil (750ml)	8.42	9.13	7.98	9.04	0.44	0.09
Orange Squash(2lt)	8.29	9.53	8.33	9.48	-0.04	0.04
Instant coffee (250g)	8.9	9.86	8.44	9.68	0.46	0.18
Tea leaves (250g)	7.79	8.33	8.72	9.47	-0.93	-1.14
Vinegar (750ml)	7.87	8.32	7.28	8.44	0.59	-0.13
Salt (1kg)	7.1	8.32	6.93	9	0.17	-0.68
Toothpaste (100ml)	8.39	8.79	7.81	8.62	0.58	0.17
Carrots (1kg)	7.92	8.44	6.97	8.57	0.95	-0.13
Onion (1kg)	7.85	8.55	7.72	8.63	0.13	-0.08
Oranges (1kg)	7.08	8.4	7.34	8.6	-0.26	-0.2
Tomatoes (1kg)	7.22	8.16	7.89	8.89	-0.68	-0.73
Irish potatoes (1kg)	7.51	8.32	7.53	9.1	-0.02	-0.78
Bread	7.49	8.35	7.47	8.65	0.02	-0.3
Cheddar cheese (1kg)	10.43	11.04	9.8	10.21	0.63	0.83
Brandy (750)	10.08	10.47	9.88	10.94	0.19	-0.47
Cigarettes (packet 20)	8.36	9.14	8.35	9.78	0.01	-0.64
Shoe Polish (50ml)	7.73	8.36	7.39	8.6	0.34	-0.24
Paraffin (1 litre)	7.81	8.51	7.2	9.09	0.6	-0.58
Refrigerator	14.02	14.3	13.8	14.67	0.22	-0.37
Kettle (2.2lt)	11.27	11.32	11.04	11.67	0.23	-0.34
Electric Iron	11.42	11.78	10.77	11.89	0.64	-0.1
Ladies dress	10.86	11.2	9.96	11.19	0.89	0.01
Ladies shoes	10.53	11.36	10.49	11.77	0.04	-0.41
Brassiere	8.59	9.34	10.26	11.08	-1.68	-1.74
Boys shirt	9.6	10.15	9.45	10.97	0.15	-0.82
Body lotion(100ml)	7.86	8.58	8.79	9.13	-0.93	-0.55

Source: Own construction from raw dataset

Notes: lnP_z represents the log Zambian price and lnP_{sa} stands for the log of South African price for each good.

The third observation from Figure 1 is that the association between the South African prices and Zambian prices is closest for more homogenous products that are tradable as opposed to differentiated products that are likely to have many characteristics that vary across retailers, such as ladies dresses and refrigerators. These differentiated products may be affected by differences in quality of varieties sold across the markets. In contrast, the homogenous products tend to be substitutable even though they could have unique characteristics (Balchin et al., 2015).

Finally, the data provides some evidence of convergence in prices from 2006, particularly in the food product markets. This is also apparent from the data in Table 5.1, which compares the extent to which prices in Zambia deviate from the prices in South Africa. Whereas only 7 of the 32 products in the table were higher in Zambia than South Africa, the trend changed in 2010 when about 22 product line converged and, at times, exceeded the prices in South Africa. This trend is consistent with the reduction in tariffs on South African imports.

Overall, the log prices exhibit significant variation across products and the two countries. However, the prices have tended to converge during the later years. The properties are essential not only to test the tariff pass-through hypothesis, but also to test for heterogeneity in tariff pass-through across products.

The second database, described in Chapter 2, constitutes a panel of Zambia's preferential import tariff rates offered to South Africa. The product-level tariff rates were weighted by the 2010 import values from South Africa. Individual products prices were hand matched to corresponding tariff line at HS six digit level. In most cases, several tariff lines were matched with a single price. For example, the price of sugar was matched with the tariff line on sugar and cane sugar. The average South African import weighted tariff rate was used in this study.

Table 5.2 shows the weighted preferential average tariff rates on South African imports from 2001 when the implementation of the reforms started to 2010 after the formation of the free trade area. Zambian tariffs on South African imports fell dramatically with the strongest cuts made between 2005 and 2010. For example, the average weighted tariff fell from 20.7% in 2001 to 15% in 2005 and then sharply to 0.98% in 2010. Although the phasedown across products was at the discretion of policy makers, the reform remained part of the broad external reform process that culminated into the SADC FTA.

Finally, the estimations include a range of other variables including the tradability index, the price on nontraded input prices proxied by the price of restaurant meals and bilateral distances as already discussed in Chapter 4.

Table 5.2: Preferential import tariffs on South African imports (2001-2010)

Year	Trade weighted ($\ln(1+t)$)	$\ln(1+t_2)-\ln(1+t_1)$
2001	20.68	-
2002	17.84	-2.8
2003	17.83	-0.01
2004	14.94	-2.89
2005	14.19	-0.75
2006	10.66	-3.53
2007	6.21	-4.45
2008	2.16	-4.05
2009	1.41	-0.75
2010	0.98	-0.43

Source: Own calculation from tariff database

In contrast to Crucini et al., (2005a) who use the shares of traded and nontraded intermediate inputs prices to tradability, this study uses the ratio of trade to output as described in Chapter 4. This measure remains a good proxy of the input shares for at least two reasons. Firstly, the larger the share of traded goods in consumption, the greater the influence that changes in foreign price is likely to have on the retail prices. This is because products where trade makes up a very low share in consumption are likely to be more isolated from international competition and therefore have a lower pass-through. Secondly, trade volumes are closely associated with trade costs. Therefore, trade volumes relative to total domestic output or consumption serve as an additional proxy for trade costs. In this case, the pass-through of tariff for highly traded products is likely to be higher.

5.6. Estimation Results

This section presents and discusses the main quantitative results regarding the effect of trade policy on internal prices. The section comprises three subsections. The first subsection reports the average effect of trade policy on Zambian retail prices. It also infers the extent to which domestic markets are integrated with international markets. The second part presents the estimates of the impact of tariffs on the internal distribution of retail prices. The last part looks at the effect of product heterogeneity as captured by tradability and import elasticity of demand on the pass-through of tariffs.

5.6.1. Homogenous (average) Pass-through Estimates

This section estimates the magnitude of the tariff pass-through on retail prices using the pooled data. The geographic dimension of price responses to tariff liberalisation is ignored. The pooled regression model is specified as:

$$\ln P_{ikt} = \alpha + \beta_1 \ln P^*_{kt} + \beta_2 \ln(1+\tau_{kt}) + \beta_5 \ln(pr\_ntd_{it}) + \lambda_t + \lambda_k + \xi_{ikt} \qquad (5.15)$$

where P and P^* are domestic and foreign retail price, respectively, valued in Zambian Kwachas. The product λ_k and time λ_t fixed effects are included to control for time-invariant product specific effects and year specific shocks in consumer prices. The standard errors are clustered around the districts in this pooled regression equation.

We begin the analysis by estimating a simple regression to test whether local prices are systematically related to foreign prices. The results give an insight of how integrated Zambian retail prices are integrated in the international environment. To achieve this, a direct logarithmic level regression, only including foreign prices as the dependent variable, is estimated.

The first column of Table 5.3 reports the estimate from the regression of retail prices on foreign (import) prices. The simple average price pass-through is positive and statistically significant at 1%. The estimated elasticity of 0.204 suggests that on average a 10% increase in foreign prices raise domestic retail prices across regions in Zambia by 2.0%. The fact that transmission coefficient is significantly different from both zero and one suggest some level of imperfect transmission of fluctuations in foreign prices into consumer prices in Zambia. This is consistent with our hypothesis based on equation 5.15.

Table 5.3: Transmission of Tariffs and foreign prices into retail prices (2001-2010)

Regressor	(1)	(2)	(3)
ln(foreign price)	0.204***	0.187***	0.187***
	(0.0179)	(0.0182)	(0.0182)
ln(1+tariff)		0.770***	0.770***
		(0.166)	(0.166)
ln(nontraded input prices)			0.0261
			(0.0206)
Constant	6.069***	6.030***	5.801***
	(0.128)	(0.128)	(0.220)
Observations	9,286	9,286	9,286
R-squared	0.947	0.947	0.947
Product FE	yes	Yes	Yes
Year FE	yes	Yes	Yes
District FE	yes	Yes	Yes

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

Comparisons across countries are difficult given different units, products and time periods, but the results suggest a much lower pass-through of foreign prices to domestic prices than is found in the international literature. For example, Marchand (2012) estimates an average price transmission of 0.39 for agricultural products and 0.50 for manufactured products in India. Similarly, Han et al., (2014) uses demographic data for China and find an average transmission of 0.23 that fall within our estimated value of 0.20.

The observed lower pass-through in our sample is consistent with barriers to integration and the high border effects estimated in similar price studies on Africa by Aker et al., (2014), Aker and Fafchamps (2014), Balchin et al., (2015), Brenton et al., (2014), Nchake (2013), and Versailles (2012). These literature attribute the failure of the LOP to the incomplete pass-through of trade policy instruments, such as tariffs, nontariff barriers and exchange rate variability.

The next key hypothesis that we test is that of imperfect pass-through of trade policy shocks proxied by tariffs onto consumer prices as captured by β_2. The results of the estimates including tariffs are presented in Columns (2) – (3) of Table 5.3. The estimated tariff pass-through coefficient is positive and statistically significant at the 1% level. The estimate implies that a 10% reduction in the ad valorem tariff, measured as $\ln(1+\tau)$ leads to an 7.7% reduction in the average consumer prices. While the coefficient estimate is significantly greater than zero, it is insignificantly different from one (as per statistical test)[48]. In Column (3) the robustness of the results to the inclusion of nontraded prices is tested. The variable is positive and insignificant and it has no effect on the other coefficients.

The results in Table 5.3 presents two key insights. First, foreign prices are not perfectly transmitted to domestic prices. A possible explanation for this result could be that the sample products across the two countries are not perfectly matched products. In addition, the average retail price of Gauteng is used as a proxy for the foreign price rather than the wholesale or export price.

Secondly, the pass-through of tariffs onto import prices is insignificantly different from 1, suggesting that Zambian prices are very sensitive to tariff changes. This result indicate that changes in tariffs are an important determinant of price changes within Zambia. This conclusion rejects our hypothesis that imperfect pass-through of tariffs to consumer prices is also consistent with evidence recorded in international literature. For example, using unit values, Feenstra (1989) records an imperfect average pass-through of 0.6 for Japanese trucks onto US market. In contrast, he finds the elasticity of import prices to tariffs to be a unit and above (0.946 to 1.39) for motorcycles, indicating perfect pass-through. Similarly, Mallick and Margue (2012) find a perfect pass-through (100%) of Indian exports to the EU and Japanese markets.

Clearly, the pass-through of tariffs into import prices is high. We offer two possible explanations for this result. First, the trade and account liberalisation programme implemented in the early 1990s was accompanied by entry of South African retail chains into the Zambian market. These retail chain stores source a high proportion of goods from South Africa (Reardon et al., 2003). This process would have raised the pass-through of tariffs into domestic prices in Zambia. Another reason could be that the reform process with other regional partners was faster than with South Africa. The potential supply of cheaper products

[48]We test whether coefficient β_2 is not different from 1 (test _β_2 [ltariff+1]=1). $F(1,36) = 0.81$ and Prob > F = 0.3733. Our estimate fails to reject the null hypothesis.

from countries that liberalised early and existence of local substitutes in the economy may have raised the pass-through of tariffs for average products.

One key concern in the pooled estimation is that results could be masking important compositional effects across products and destination markets. This pooled regression imposes a common pass-through of tariffs and prices to regions and across products. This masks the differential impact of tariffs across products and regions. These dimensions are sequentially addressed in the next sections.

5.6.2. Regional Heterogeneity and Tariff Pass-through

Another key purpose of this chapter is to test whether changes in trade policy affect regions differently according to their characteristics. Chapter 3 showed that prices vary considerably across regions of Zambia and Chapter 4 revealed that exposure to international competition is an important determinant of price differences across districts. This section now tests the role that tariffs play in driving these regional price differences.

As shown in equation 5.12, the differential impact of tariffs on prices across regions is isolated by the interaction term between tariffs and distance. Crucial in the analysis is the choice of distance measure. In what follows, the chapter tests the sensitivity of the results to different measures of distance, including distance from the main port of entry, distance from Lusaka and distance from the main transport route. The hypothesis being tested is that the pass-through of tariffs onto consumer prices decreases with an increase in transportation costs, as proxied by distance.

In testing the model, test the robustness of the results to different combinations of fixed effects that include product-time fixed to control for the unobserved product-time level shocks that common to all products. We also add product-district fixed effects that control for the unobserved heterogeneity that are specific to each district-good pairs, such as differences in demand and incomes for a certain good in each district.

5.6.3. Main port of import entry: Southern Border

The first specification proxies internal trade costs as the distance from the nearest border from the Southern province (Chirundu and Livingstone). These are the main ports of entry for imported goods originating and transiting through South Africa to various destinations in Zambia.[49] This specification is therefore most closely aligned with the production-consumption model being estimated. The regression results are reported in Table 5. 4.

Column (1) reports the baseline results. The coefficient on the foreign price is statistically significant and positive as expected, but not substantially different from the earlier regression results reported in Table 5.4. In line with our earlier results, the coefficient on tariffs and foreign prices remain positive and highly statistically significant at 5% across regressions. However, the coefficient on tariffs has fallen in size by about 37 percentage points from 0.51 to 0.81.

Of key interest to this study is the significance and sign of the interaction term between tariffs and distance from the border. Surprisingly, the estimated coefficient is not only insignificant, but is also of the incorrect sign (i.e., positive instead of negative as hypothesized). This suggests that there are no regional differences in the impact of reductions in tariff rates on domestic prices.

Columns (2) extends the estimation by controlling for the price of nontraded inputs and an interaction variable between foreign prices and distance to test the possibility that the pass-through of foreign prices also diminishes with distance from the border. The coefficient on the interaction between tariffs and distance remains insignificant, suggesting that changes in foreign price do not vary with distance. However, the estimated coefficient on the price of nontraded inputs variable is significant at the 5% level.

[49] It is important to note that Zambia does not have a direct border with South Africa per se but goods have to transit through either Zimbabwe, Botswana or Namibia. However, Chirundu via Zimbabwe is the busiest followed by two borders that have customs clearances within Livingstone –which is much more developed than Chirundu

Table 5.4: Tariff-pass-through from Nearest South Border (2001-2010)

Regressor	(1)	(2)	(3)	(4)
ln(foreign price)	0.187***	0.168***	0.238**	0.247**
	(0.0182)	(0.0528)	(0.109)	(0.117)
ln(1+tariff)×ln(south border_distance)	0.0447	0.00999	0.0265	0.0219
	(0.0301)	(0.0365)	(0.0192)	(0.0295)
ln(1+tariff)	0.510**	0.680**		
	(0.226)	(0.264)		
ln(foreign price)×ln(south border_distance		0.00419		-0.00106
		(0.00857)		(0.00663)
ln(nontraded input prices)		0.0419**		0.0272*
		(0.0166)		(0.0143)
Constant	6.718***	6.242***	6.578***	6.323***
	(0.142)	(0.176)	(0.936)	(0.940)
Observations	9,286	9,286	9,286	9,286
R-squared	0.947	0.972	0.979	0.979
Product FE	Yes	Yes	no	No
Year FE	Yes	Yes	no	No
District FE	Yes	Yes	no	No
Product-Time FE	No	No	yes	Yes
District-product FE	No	No	yes	Yes

Note: distance is measured from nearest southern border district (Chirundu and Livingstone)
*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

In Columns 3 and 4, the regression is estimated using district-time fixed effects to control for any time variant factors at the city level that might affect retail prices and district-product fixed effects to control for any unobserved heterogeneity for each district-product pair. As expected, the tariff variable falls away due to the product-time fixed effects. The estimates however remain robust to this extension, that is, the coefficient of the distance-tariff interaction remains positive and insignificant.

5.6.4. Commercial Hub: Distance from Lusaka

One drawback with our measure of trade costs is that the southern border regions largely serve as transit centres. They do not have logistical infrastructure to provide direct wholesaling and or redistribution of imported products to the rest of the country. Consequently, distance from the southern border may not be the appropriate distance indicator. Rather, distance from Lusaka, the centrally located commercial capital, which serves as a hub-and-spoke for product re-distribution across the local markets, may be a better indicator of distance. As Hillberry and Hummels (2003) note, importers use large trucks to transport products to distribution or wholesale centres, but use smaller trucks when transporting to retailers. Using smaller trucks could lead to the cost of some geographic frictions rising sharply between the core centre and other districts. To address this possibility, we re-estimate the basic specification of Table 5.4 using distance from Lusaka to the rest of the districts across the country as a measure of transportation costs.

The output of this regression is displayed in Table 5.5. Once again, the results show little evidence that distance from the main commercial and hub city affects the pass-through of tariffs. This is evident from the coefficient of interest on the distance-tariff interaction which is only weakly significant with an unexpectedly positive sign once we control for the price of nontraded inputs in Column 2.

Table 5.5: Tariffs and internal price dispersion – distance from Lusaka (2001- 2010)

Variables	(1)	(2)	(3)	(4)
ln(foreign price)	0.187***	0.190***	0.238**	0.283**
	(0.0182)	(0.0209)	(0.109)	(0.113)
ln(1+tariff)×ln(lusaka_distance)	0.0501	0.0525	0.0287	0.00484
	(0.0320)	(0.0323)	(0.0181)	(0.0213)
ln(1+tariff)	0.483**	0.469*		
	(0.244)	(0.245)		
ln(foreign price)×ln(lusaka_distance)		-0.000371		-0.00721
		(0.00188)		(0.00444)
ln(nontraded input prices)		0.0287		0.0294**
		(0.0206)		(0.0144)
Constant	6.719***	6.467***	6.622***	6.366***
	(0.142)	(0.228)	(0.936)	(0.968)
Observations	9,286	9,286	9,286	9,286
R-squared	0.947	0.947	0.979	0.979
Product FE	Yes	yes	No	No
Year FE	Yes	yes	No	No
District FE	Yes	yes	No	No
Product-time FE	No	no	Yes	Yes
District-product FE	No	no	Yes	Yes

Note: distance is measured from Lusaka, the commercial hub.
*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

The coefficients on foreign prices and tariffs remain statistically significant and qualitatively robust to the new measure of trade costs. Furthermore, we explore the effect of adding the product-time fixed effects and the district-product fixed effects in Columns (3) – (4). However, this does not change the underlying results.

5.6.5. Net exposure: distance from Nearest Border

An alternative explanation for the counter-intuitive result obtained above is that the distance from the hub or southern border may not be the appropriate indicator of exposure to external competition. As a landlocked economy, regions across the country are differentially exposed to import competition from different borders. In this case, what may be more important for the effect of tariffs on consumer prices is proximity to closest border[50]. Border regions in Zambia may respond more strongly to reductions in tariffs than areas remote from borders.
To address this limitation, we reconstruct the measure of trade costs as the shortest distance to the nearest border.

Table 5.6 contains the results of the interaction of distance from the nearest border and tariffs in the regression. Once again, the coefficient on foreign prices is significant at 1% and positive and of a similar size to the earlier regression results. The estimate on tariffs is also correctly signed – positive, statistically significant at 1%.

Table 5.6: Internal Trade costs and tariff-pass-through (nearest border) (2001-2010)

Variables	(1)	(2)	(3)	(4)
ln(foreign price)	0.187***	0.200***	0.239**	0.256**
	(0.0182)	(0.0189)	(0.109)	(0.112)
ln(ln(1+tariff))×ln(nearestborder_distance)	0.0263	0.0271	-0.00270	-0.0110
	(0.0217)	(0.0220)	(0.0157)	(0.0202)
ln(1+tariff)	0.640***	0.631***		
	(0.195)	(0.196)		
ln(foreign price)×ln(nearestborder_distance)		-0.00245**		-0.00283
		(0.00120)		(0.00396)
ln(nontraded input prices)		0.0279		0.0259*
		(0.0209)		(0.0145)
Constant	6.719***	6.497***	6.633***	6.345***
	(0.142)	(0.232)	(0.939)	(0.960)
Observations	9,286	9,286	9,286	9,286
R-squared	0.947	0.947	0.979	0.979
Product FE	Yes	yes	No	No
Year FE	Yes	yes	No	No
District FE	Yes	yes	No	No
Product_Time FE	No	no	Yes	Yes
District_product FE	No	no	Yes	Yes

*Note: distance is measured from the nearest border of countries that include border with Malawi, Tanzania, Zimbabwe, Botswana. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

[50] For example, districts in the Northern region are exposed to inflow of goods from East African countries such as Tanzania and Kenya which have a free trade arrangement with Zambia.

However, the coefficient associated with the interaction between distance from the nearest border and tariffs remain insignificantly different from zero, rejecting the hypothesis that the tariff pass-through decrease the further you are from the border regions. This result is robust to the inclusion of other controls (see Column 2).

Once again, we test the robustness of our results by adding good-district fixed effects to control for any unobserved heterogeneity for each good-city pairs and include the product-time fixed effects. With the inclusion of these fixed effects, all variables take on the hypothesized signs, suggesting that trade policy shocks affect border regions more than interior regions. However, the interactions remain insignificant.

5.6.6. Distance from Highways

The results so far find no differential impact of tariff pass-through across geographic regions. A potential reason for this is that we are still using the wrong indicator of trade costs or distance. In particular, the current measures of distance ignore the importance of road quality in driving transportation costs across regions. A good road network lowers the per unit costs transportation of products (Cavailhes, et al., 2007) and affects the pass-through of external shocks to local prices in two ways. Lower transport costs foster competition from domestic and international competitors, leading to a reduction in the price level. Coşar and Fajgelbaum, (2013) and Du,et al., (2013), for example, argue that cities linked to high quality road infrastructure within a country tend to face high competition among retailers and firms in general[51].

Generally, the transportation of goods imported in Zambia is conducted through highways or trunk roads that tend to have good infrastructure but regional road networks that tend to be of poorer quality. In this case, what may matter in terms of trade costs and explain the differential pass-through of tariffs across regions is the distance of a location from the main highways. This association is not adequately captured in the regressions above. To isolate this

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[51] We do not have data on road quality by road segment. Therefore, we limit our road infrastructure quality measure to tarred highways.

association, a dummy variable taking 1 if the district is on a high and 0 otherwise is introduced in the model as follows:

$$\begin{aligned}\ln P_{jkt} &= \beta_0 + \beta_1 \ln P_{jt}^{N} + \beta_2 \ln P_{kt}^{B} + \beta_3 \ln(1+\tau_{kt}) + \beta_4 \ln(1+\tau_{kt}) \times highway_j \\ &\beta_5 \ln P_{kt}^{B} \times highway_j + \lambda_k + \lambda_j + \lambda_t + \xi_{jkt}\end{aligned} \qquad 5.17$$

where $highway_j$ is a binary variable taking 1 if the district (municipality or city) is on the tarred highway and zero otherwise. The coefficient on the interaction term between tariff rates and the road quality dummy β_4 is expected to be positive. The working hypothesis is that the pass-through of tariff liberalisation to domestic prices is higher in districts located along quality road infrastructure compared to largely smaller remote districts. The ensuing estimation results are presented in Table 5.7.

Table 5.7: Highways and tariff pass-through to retail prices (2001-2010)

Variables	(1)	(2)	(3)	(4)
ln(foreign price)	0.186***	0.174***	0.245**	0.227**
	(0.0182)	(0.0185)	(0.109)	(0.108)
ln(1+tariff)	0.640***	0.603***		
	(0.174)	(0.174)		
ln(1+tariff)×*highway*	0.221***	0.268***	0.112**	0.288***
	(0.0767)	(0.0786)	(0.0566)	(0.0773)
ln(foreign price)×*highway*		0.0225***		0.0439***
		(0.00540)		(0.0143)
ln(nontraded input prices)		0.0263		0.0269*
		(0.0205)		(0.0144)
Constant	6.726***	6.399***	6.540***	6.310***
	(0.142)	(0.227)	(0.932)	(0.953)
Observations	9,286	9,286	9,286	9,286
R-squared	0.947	0.947	0.979	0.979
Product FE	Yes	yes	no	No
Year FE	Yes	yes	no	No
District FE	Yes	yes	no	No
Product_Time FE	No	no	yes	Yes
District_time FE	No	no	yes	Yes

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

In Columns (1) and (2), we use district, fixed effects to control for any unobserved district-specific factors affecting retail prices and year specific effects to control for time-varying factors that are common to all districts. The signs of all coefficients in the two columns match our theoretical expectations and are, with the exception of the price of nontraded input prices, significant at the 1% level.

Most importantly, the coefficient on the interaction between the tariff rate and the highway indicator, is positive and statistically significant. The coefficient on this interaction indicates that a 10% reduction in tariffs reduces consumer prices by 2.2% to 2.6% in cities and municipalities cities linked by quality transportation infrastructure compared to districts off the highway. This result is robust to the inclusion of nontraded input prices and the interaction between foreign prices and the highway (see Column 3). The coefficient on this tariff-foreign price interaction variable is also positive and significant, confirming the expectation that the pass-through of foreign prices to domestic prices is greater in areas linked to major highways.

In Columns (3)-(4), we test the robustness of our results to the addition of district-time and product-time interactions. Once again, the coefficients of the interaction terms are positive and significant, confirming that distance from the highways generates the differential pass-through of tariffs across districts in Zambia. Once all controls are included in the model, the differential pass-through increases compared to Column (2). On average, consumers along highways are affected by tariff reduction of between 0.112 to 0.288 more than those living in places distant from the highways. This result confirms our proposed channel of differential pass-through.

These results are in line with the literature that finds heterogeneous effects of trade policy shocks across geographic areas. Studies employing demographic survey data find qualitatively consistent results like ours despite using incomparable datasets. Our findings confirm the existing evidence of considerable variations in the tariff pass-through across geographic areas within a country.

In short, the important insight from these results are that trade costs are an important determinant of internal market integration and impact on the effectiveness of regional integration efforts to foster intra-country market integration. Particularly, internal trade costs captured by the quality of transportation infrastructure of countries engaged in product market integration scheme play an important role in determining the extent to which the country becomes internally integrated and improves welfare across regions. The results are consistent with other studies on the availability and quality of transportation infrastructure in driving internal economic outcomes, such as price integration and welfare distribution (Coşar & Fajgelbaum, 2013; Teravaninthorn & Raballand, 2009).

5.7. Product Heterogeneity and Tariff pass-through

One key fear in the standard estimation of the average and spatial transmission of changes in tariffs to destination prices is that the estimation strategy pools all products together without accounting for differences in product characteristics. With the huge product heterogeneities, the key transmission mechanism of reductions in tariff rates may also depend on their individual characteristics. Therefore, standard tariff pass-through estimates, as above, could be masking the important composition effects that impacts on the average pass-through rate. This section extends the tariff pass-through literature by investigating the effect of product heterogeneity on the pass-through of tariff shocks to local prices. In particular, we consider the role played by product tradability, as an alternative to trade costs in driving the pass-through of tariffs onto retail prices.

5.7.1. Product tradability

Theoretical and empirical evidence from the price integration literature show that the degree of market integration differs according to the tradability of individual products. The extent to which a good is traded depends on whether the cost of arbitrage makes trade profitable or not. At a micro level, the tradedness of a product is an endogenous response to explicit trade costs that vary heterogeneously across goods, with low cost products likely to more traded than the high trade cost products. Since import penetration is inversely related to trade costs, we use trade as a share of output as alternative product specific indicator of tradability. In theory, we expect product with high trade-output ratio to be more exposed to external shocks and experience larger tariff pass-through compared to less traded products. To assess the role tradability as an alternative indicator of trade costs across heterogeneous products, we introduce interactions between import-tariff changes and the tradability index that varies across products. We also control for the effect of fluctuations in foreign price on tradability by including the interaction of the two variables extends the empirical framework to:

$$\begin{aligned}\ln P_{ikt} = \alpha + \beta_1 \ln P_{kt}^B + \beta_2 \ln(1+\tau_{kt}) + \beta_3 trad_k \times \ln(1+\tau_{kt}) + \beta_4 trad_k \times \ln P_{kt}^B \\ + \beta_5 \ln(pr\_ntd_{it}) + \lambda_i + \lambda_k + \xi_{ikt}\end{aligned} \qquad (5.16)$$

The effect of tradability on the tariff pass-through is measured by the coefficient β_3 . Since tradability, which varies by product only, is multiplied by tariffs, this coefficient measures the tariff pass-through that varies by across products. The estimate on the tariff rate β_2 captures the tariff pass-through unrelated to product characteristics. If product tradability systematically increases the pass-through rates, the coefficient β_3 should be positive. The total pass-through for product k is thus given as $\beta_3 trad + \beta_2$. Since tradability only varies over products and not overtime with product fixed effects, its level estimate drops out of the regression. The estimation results of the estimated coefficient of interest for equation 5.14 are presented in Table 5.8.

The coefficient on the tariff-tradability interaction is positive and significant at 1% level across the three regressions. The result suggests that a product whose tradability is 1 has a pass-through of 0.85, which is statistically not different from 1, whereas a product with a tradability of zero has a pass-through of 20% and is insignificantly different from zero. This result confirms our hypothesis of greater pass-through of tariffs onto more traded products than less traded goods markets.

Next, we compute the average estimated effects of tariffs and tradability across the three columns in Table A5 and construct the net pass-through elasticity ($\beta_3 trad + \beta_2$) for the most traded and least traded products in our sample. The computed net pass-through elasticity shows imperfect pass-through of tariffs across the selected products. With the exception of electronic products like fridges, the net pass-through is smaller than 1, ranging from 0.23 for cigarettes to 0.95 for products such as insecticides and body lotion. However, the constructed net pass-through of tariffs for household electronics stood at 1.72, which is substantially greater than the 100% pass-through.

In Columns (2)–(3), we test the sensitivity of our results to fluctuation in foreign prices by adding an interaction between tradability and foreign prices in Columns (2)–(3). The coefficient of interest, β_4, is statistically significant and negatively signed rather than positive as expected. Although the magnitude of the tariff-tradability coefficient declines, the inclusion of additional controls does not affect its sign and level of significance.

Table 5.8: Product tradability and tariff pass-through (2001-2010)

Regressor	(1)	(2)	(3)
ln(foreign price)	0.159***	0.203***	0.204***
	(0.0214)	(0.0269)	(0.0272)
ln(1+tariff)	0.208	0.304	0.319
	(0.215)	(0.217)	(0.215)
ln(1+tariff)× tradability	0.845***	0.641***	0.611***
	(0.103)	(0.115)	(0.119)
ln(foreign price)×tradability		-0.0839***	-0.0840***
		(0.0229)	(0.0236)
ln(nontraded input prices)			0.0710***
			(0.0200)
Constant	6.905***	6.892***	6.273***
	(0.177)	(0.181)	(0.281)
Observations	9,286	9,286	9,286
R-squared	0.945	0.945	0.945
Product FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Notes: Standard errors are clustered at district level. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0*

In Table 5.9, we test whether the pass-through of tariffs decline in the geographic areas are more remote from highways regions. We introduce a variable interacting among tariffs, highway and measure of tradability, to evaluate whether more remote regions have lower tariff pass-through than regions along highways. The sign of the coefficient on this interaction is positive and statistically significant as expected. This indicates that more tradable products and regions along highway are more exposed to international trade shocks than geographic areas further from the highways.

Columns (1) carries out the baseline test while Column (2) test the robustness of the result to the inclusion of other controls. The interacting among tariffs, highway and tradability is significant and robust to the inclusion of the controls. The coefficient on this interaction indicate that the pass-through of tariffs is higher in location closer to highways and more so for more traded goods. However, the interaction between the highway and tariffs becomes insignificant but also of the incorrect sign (negative).

Table 5.9: Highways, tradability and Tariff pass-through (2001-2010)

Variables	(1)	(2)	(3)	(4)
ln(foreign price)	0.170***	0.155***	0.365***	0.361***
	(0.0183)	(0.0189)	(0.130)	(0.130)
ln(1+tariff)× tradability× highway	0.708***	0.423***	0.479***	0.439***
	(0.0643)	(0.0997)	(0.0821)	(0.0926)
ln(1+tariff)	0.399**	0.247		
	(0.171)	(0.185)		
ln(1+tariff)× tradability		0.414***		
		(0.0936)		
ln(1+tariff)×highway		-0.000940		-0.184
		(0.0973)		(0.156)
ln(foreign price)×highway		0.0141**		0.0157**
		(0.00566)		(0.00645)
ln(nontraded input prices)		0.0237		
		(0.0203)		
Constant	6.881***	6.683***	7.552***	7.511***
	(0.143)	(0.228)	(1.537)	(1.534)
Observations	9,286	9,286	9,286	9,286
R-squared	0.948	0.948	0.956	0.956
Product FE	Yes	Yes	no	No
Year FE	Yes	Yes	no	No
District FE	Yes	Yes	no	No
Product-Time FE	No	No	yes	Yes
District-time FE	No	No	yes	Yes

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

Columns (3)–(4) add the product-time and district-time fixed effects to control for any unobserved heterogeneity in each time-district pairs. The variable of interest remains robust and statistically significant, although the size of the estimated pass-through rates are within the range found in Column 2. This confirms the validity of the chosen channels of differential pass-through effects and that consumers along highways benefit more from trade policy changes.

Overall, the result suggests that changes in tariffs are not perfectly transmitted to retail prices and its impact differs across individual products and districts. The pass-through of tariffs is higher in location closer to highways and more so for more traded goods. In general, more tradable products are more likely to be influenced by changes in trade policy changes, while markets for less traded products respond slowly to trade reforms.

5.8. Conclusion

This chapter uses highly disaggregated product level retail price data in 38 regions of Zambia to analyse the differential pass-through of tariffs to domestic retail prices across local markets. This differential analysis of tariffs is preceded by the evaluation of how integrated these regions are to the international environment. The last part tests the sensitivity of tariff pass-through to product heterogeneity as measured by tradability.

The conclusions of the study are summarised as follows. Firstly, Zambian retail markets are not perfectly integrated in the international environment. This is in line with international literature suggesting that the LOP does not hold across countries. Secondly, tariffs play an important role in driving price differences across destination market within countries. In particular, the results reveal that regions that are more exposed to external shocks, such as border regions and districts linked to highways, experience greater effects of trade policy changes than interior districts. Finally, product heterogeneity in the form of tradability has implications for the degree of tariff pass-through across products and across destination markets. In particular, the results find that more traded goods experience higher pass-through of tariffs compared to less traded products.

These results have the following policy implications. First, despite implementing market integration initiatives, product markets across countries remain segmented. The liberalisation of tariffs has not fully fostered greater price integration across the countries. As such, it suggests the existence of technical and nontariff barriers to trade. This is consistent with the findings by Cadot and Gourdon (2014), and Edwards and Rankin (2012).

Second, and most importantly, much of the policy efforts have placed emphasis on the negotiations and implementation of policies that enhance cross border integration. Our results find that international integration efforts are susceptible to lead to segmentation of domestic markets if they are not complemented by the provision of quality transportation infrastructure within countries. This points to the need for countries to coordinate trade policy reforms with domestic and regional infrastructure development. This is especially the case for developing and landlocked countries like Zambia.

Chapter 6:

6.0. General Conclusions and Policy Relevance

6.1. Key Insights

This thesis set out to explore the interplay of domestic trade costs and exposure to external trade shocks on influencing internal price dispersion. Using the price-based approach, it investigated the extent and determinants of internal price dispersion and product market integration using Zambia a landlocked country in SSA region as a case study. In doing so, the thesis contributes to the emerging literature on the price-approach to estimate trade costs and internal market integration. The thesis emphasises the role played by international competition, particularly from lower tariffs, product tradability and proximity to borders in influencing domestic prices and the distribution of these prices across locations within Zambia. The analysis is conducted over four inter-related empirical chapters.

The first empirical chapter (Chapter 2) drew on product-level tariff data to unpack the effect of Zambia's various import liberalisation programmes on overall protection levels. The data and chapter provided an important input into subsequent chapters of the thesis. The data showed that Zambia made considerable progress in reducing the MFN tariff rates in the early 1990s, which drastically opened up its economy to external competition. This process, however, stagnated from 1996 with almost no changes made to the MFN rates in the past 20 years. Average protection, nevertheless, fell as Zambia implemented tariff reductions in accordance with its participation in the COMESA and SADC FTA.

The chapter highlighted two important features of regional trade that have limited the impact of the FTA on aggregate tariff levels. Firstly, very little trade is conducted with COMESA members. Secondly, a substantial proportion of trade with regional partners still enters under MFN rates and not the preferential rate. This suggests that rules of origin may continue to constrain import trade within the region, as has been suggested by Flatters (2005). It also possibly reflects the prevalence of South African supermarket chains, which are using their supply linkages as a conduit through which to bring in products sourced from outside of Africa. Further research is required on how to enhance trade flows under the FTAs.

The second empirical chapter (Chapter 3) presented a detailed analysis of intranational price integration in Zambia across districts, products and overtime. The chapter also conducted a cursory test of the association between the various trade reform periods and trends in product market integration. To do this, the chapter drew on a unique product level database of monthly regional prices from 1993 to 2011, which were collected from the Central Statistics Office for the construction of CPI in Zambia. The consistency in the collection of this data plus the narrow product definitions allowed for a precise analysis of how prices of similar products vary across regions in Zambia.

Chapter 3 found the following stylised facts about product market integration in Zambia. First, domestic product markets remain segmented across districts, despite the absence of exchange rates and country border effects that commonly explain price gaps between regions/countries. On average regional prices differ from Lusaka by 46%. The pattern of dispersion displays a positive correlation with distance from the benchmark district, suggesting that transport related trade costs are an important part of the explanation. The level of geographical dispersion is greater than obtaining in developed countries, suggesting the presence of large trade and infrastructural barriers to the transport of goods within Zambia.

Second, there is substantial heterogeneity in the dispersion of prices across products in Zambia. Goods prices differ on average by 35% across regions. Price gaps of services are higher at 70%. There is also a wide variation in prices within the goods and services categories. For example, among the goods category, price differences range from 15% for household supplies to 44% for medical supplies. Similarly, price differentials within services range from 56.8 % to 148%. Overall, goods, which are more tradable have lower price gaps compared services, which are less tradable. This is consistent with the findings of Crucini et al., (2005a).

Looking over time, the thesis finds no tendency for prices to converge towards the LOP. The average price gap in the early 1990s (0.38 log points) is very similar to the average price gap at the end of the 2011 (0.34 log point). Nevertheless, there is a statistically significant, although economically small, association between the various trade reforms and trends in price dispersion. MFN tariff reforms of 1995 and the preferential reforms with South Africa contributed to increased integration. The reforms with other SADC members have a positive association with price gaps across regions.

The third empirical chapter (Chapter 4) looked at various determinants of intra-national price dispersion in Zambia. It also tested for the sensitivity of transport-associated trade costs to changes in sample of regional price pairs. As hypothesized, the econometric estimates indicated that barriers to trade arising from transportation costs inhibit market integration. Distance is a significant factor explaining absolute price differences across districts in Zambia. The further districts are apart, the larger is the price differences. The size of the distance coefficient, however, is sensitive to the sample of regional pairs in the data. Rolling estimates with increasing distance cut-off points reveal that the maximum distance coefficient is realised at around 600km.

Chapter 4 also found the presence of internal borders even after controlling for distance. Unexplained factors associated with the immediate proximity of regions are revealed to be important additional explanatory factors to distance. This motivates a deeper analysis of the role that ethnic similarity and regional income inequality play in explaining price gaps across regions. Ethnic fragmentation and regional income inequality characterise many African economies, including Zambia. The empirical estimates showed that ethnic linkages, as captured by ethnic similarity of regions and similarities in income, significantly reduce price gaps between regions.

Furthermore, Chapter 4 investigated the effect of exposure to international competition and product tradability on price dispersion. In particular, it examined how proximity to external borders affects price dispersion and tests whether tradability of products increase price integration. The results indicated that differences in price between districts differ according to the tradability of each sector. Markets for more tradable goods exhibit lower price gaps across regions than less traded products. The results further indicated that exposure significantly affects market integration. For example, district pairs that are closer to external borders are on average 3.5% more integrated than districts for which neither one of them or both form part of the border regions. This points to the similarity of prices of goods in markets that are directly exposed to greater competition and access to goods that are easily traded across and within countries.

The final chapter (Chapter 5) analysed the differential pass-through of external trade shocks, particularly changes in tariffs to domestic retail prices across regions. The chapter first estimated the average transmission of foreign prices into domestic consumer prices. The results revealed an imperfect transmission of foreign price shocks to domestic prices in the country. This is consistent with a model of retail prices that combine traded inputs with non-traded inputs. Second, the chapter examined the extent to which changes in tariffs are passed-through to consumer prices. The result showed a very high tariff pass-through, which is insignificantly different from 1. This indicates that Zambian prices are very sensitive to changes in tariffs. The results suggest that tariffs are an important determinant of local prices.

The second part of the analysis in Chapter 5 investigated the role that tariffs play in driving regional price differences. Unlike other studies, we found little evidence that the tariff pass-through to prices decreases the further a region is from the border. Rather, the evidence indicated that distance from the major transport route is the most significant source of the differences in tariff pass-through across regions. The further a region is from a major transport route, the lower is the pass-through of tariff reductions to local retail prices. The results also indicated that products that are more tradable have higher tariff pass-through rates, especially in highways areas.

In sum, the findings of this thesis provide insights into the measurement and extent of internal trade costs in developing countries. It also establishes the linkage among transportation costs, internal borders, exposure to external competition, trade policy reforms, and price gaps within a developing country in the context of SSA. In doing this, the thesis extends the price-based evidence of within country trade costs to an understudied region while highlighting new determinants of internal market integration, which, until now, have not been fully explored.

6.2. Policy Relevance

Although this thesis set to investigate how trade costs and exposure, to external competition affect internal markets integration the results have some policy relevance. The results of this thesis have a number of implications for policy. Firstly, the thesis establishes that price gaps are large even relative to other emerging economies. This implies that government must prioritise investment in opening up new and upgrading transport infrastructure across the country to lower the trade costs. These polices could be complemented by policies that focus on transport regulation, such as cabotage laws which promote competitiveness in transport services industry.

Secondly, the problem of transactions costs in Africa may not be narrowly focused on addressing transportation infrastructure problems. Rather, in the African context, they must also consider factors related to differences in internal ethnic divisions and income inequalities

Finally, the transmission of tariffs to domestic prices differs across districts, indicating that some regions have remained insulated from trade reforms particularly lower tariffs. The full gains from international trade may not be realised within these regions. Therefore, policy makers need to complement tariff reforms with domestic policies to allow for the effect of the external reforms to permeate throughout the economy. Such policies could include upgrading internal infrastructure as opposed to solely focusing on cross-border constraints.

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Appendix For Chapter 2:

Table A2.1: List of Sources of MFN and Preferential Tariffs

Years	Source	Comments
1986	Correspondence Listing 1986	External trade statistics CCCN Listing 382/86
1987	Act No 4 of 1987	Customs and Excise Act (April 1987)
1988	Act No 10 of 1988	Customs and Excise Act (April 1987)
1989	Act No 25 of 1989	Customs and Excise Act (26th December 1989)
1992	Act 20 1992	Customs and Excise Act (Harmonised System)
1993	Act No 42 of 1993; Act No 17	Customs and Excise (Amendment)1993
1994	Act No 15 of 1994	Customs and Excise Act (April 1994)
1995	Act No 3 of 1995	Customs and Excise (Amendment) 1995
1996		Customs and Excise Act of 1996
1997	Act No: 9 of 1997	Customs and Excise (Amendment)1997
1998	Act No 1: 1998	Customs and Excise (Amendment) 1998
1999	Act No 4 of 1999	Customs and Excise (Amendment)1999
2000	Act No 3 of 2000; SI 14 of 2002	Customs and Excise (Amendment)2000
2001	Act No 2 and 9 of 2001; SI 127	Customs and Excise (Amendment) 2001
2002	Act no 1 of 2002; Act No 21 of 2002	Customs and Excise (Amendment) 2002
2003	Act No 1 of 2003; SI No: 13, 14 & 27	Customs and Excise (Amendment) 2003
2004	Act No 3 of 2004; SI No 69	Customs and Excise (Amendment) 2004
2005	Act No 4 of 2005	Customs and Excise (Amendment) 2004
2006	Act No 3 of 2006	Customs and Excise (Amendment) 2006
2007	Act No 5 of 2007;	Customs and Excise (Amendment) 2007
2008	Act No: 2; 4 of 2008; SI No 124, 2008	Customs and Excise (Amendment) 2008
2009	Act No:2 of 2009	Customs and Excise (Amendment) 2009
2010	Act No:47 of 2010	Customs and Excise (Amendment) 2010
2011	Act No:31 of 2011	Customs and Excise (Amendment) 2011

Appendix for Chapter 2

Table A2.2: Simple and Import Weighted MFN Protection by ISIC Sector 1991-1992

	Unweighted			Weighted		
Industry [ISIC]	**1991**	**1992**	**Total change**	**1991**	**1992**	**Total change**
Agriculture, forestry and Fish	**30.0**	**37.9**	**2.6**	**24.2**	**35.1**	**3.7**
Agriculture	20.3	35.1	5.0	23.1	35.0	4.0
Forestry	27.8	31.0	1.1	28.2	31.5	1.1
Fishing	53.6	47.8	-1.7	53.6	47.8	-1.7
Mining	13.7	16.0	0.9	10.5	14.8	1.7
Manufacturing	***28.6***	***27.8***	***-0.3***	***21.6***	***24.3***	***1.0***
Food	31.8	38.3	2.1	26.1	33.0	2.3
Beverages	79.9	71.6	-2.1	69.5	56.9	-3.4
Tobacco	89.1	40.0	-13.1	89.1	40.0	-13.1
Textiles	30.2	37.1	2.2	25.4	35.7	3.4
Apparel	58.9	48.2	-3.0	58.9	48.2	-3.0
Leather Prod	25.0	29.5	1.5	39.4	39.0	-0.1
Footwear	27.8	33.3	1.8	27.8	33.3	1.8
Wood Prod	49.5	42.3	-2.1	61.0	47.5	-3.8
Paper products	20.3	19.5	-0.3	19.0	18.7	-0.1
Print & Publishing	20.3	25.5	1.8	20.3	25.5	1.8
Chemicals	18.0	20.8	1.0	10.4	18.5	3.1
Coke & Petroleum	21.7	19.1	-0.9	21.0	19.8	-0.4
Rubber & Plastics	15.3	25.4	3.6	17.9	28.3	3.7
Non metallic	21.5	24.9	1.2	21.2	24.1	1.0
Basic metals	12.2	17.8	2.1	13.0	18.6	2.1
Fabricated metals	32.1	26.2	-2.0	19.4	25.5	2.2
Machinery	17.1	19.1	0.7	18.4	20.8	0.9
Equipment & other	25.1	28.7	1.2	30.3	23.7	-2.3
End Use Broad Classification						
Capital goods	24.1	19.1	-1.8	25.6	19.5	-2.2
Intermediate	23.5	23.9	0.1	19.2	22.9	1.3
Consumption	39.0	43.9	1.5	35.6	41.6	1.9
Other goods	25.1	29.7	1.6	24.6	32.9	2.8

Table A2.3: The Weighted SADC Preferential tariff rates 1999-2011

Industry [ISIC rev 2]	RSADC 1999	RSADC 2000	RSADC 2005	RSADC 2011	South Africa 2000	South Africa 2005	South Africa 2011	Overall 2000	Overall 2005	Overall 2011	Change overall
Agric. Forestry & Fishing	**17.3**	**12.3**	**2.9**	**0.1**	**13.7**	**8.6**	**0.1**	**12.8**	**4.6**	**0.1**	**-11.9**
Agriculture	17.2	12.5	3.0	0.1	13.6	8.6	0.1	17.2	6.5	0.2	-15.7
Forestry	15.9	4.1	0.8	0.0	12.2	7.3	0.0	19.7	5.7	0.0	-18.0
Fishing	23.6	0.8	0.2	0.0	23.6	14.3	0.0	23.6	6.2	0.0	-21.2
Mining	5.3	0.6	0.3	0.1	5.1	4.9	0.1	5.3	1.9	0.1	-5.1
Manufacturing	**11.7**	**8.3**	**3.0**	**0.2**	**10.4**	**7.2**	**0.2**	**9.8**	**6.5**	**0.2**	**-9.1**
Food	18.6	15.2	3.9	0.1	16.9	11.2	0.1	18.8	11.0	0.2	-17.0
Beverages	21.7	18.7	3.7	0.0	18.7	11.2	0.0	21.7	8.7	0.0	-19.6
Tobacco	25.0	25.0	5.0	0.0	25.0	15.0	0.0	25.0	14.6	0.0	-22.3
Textiles	15.1	8.1	2.5	0.1	9.7	6.4	0.1	16.3	7.7	0.3	-14.8
Apparel	24.6	24.3	14.1	2.3	24.3	19.2	2.3	24.6	19.1	4.5	-17.6
Leather Prod	22.8	22.3	7.0	0.8	22.8	14.7	0.8	22.8	13.5	2.1	-18.5
Footwear	25.0	25.0	25.0	5.0	25.0	25.0	5.0	25.0	25.0	10.0	-12.8
Wood Prod	24.2	19.1	3.7	0.0	24.2	14.7	0.0	24.4	13.5	0.0	-21.8
Paper products	11.7	4.4	1.0	0.1	9.3	6.3	0.1	11.7	6.6	0.1	-11.0
Print & Publishing	15.1	12.8	3.6	0.0	14.0	9.0	0.0	15.1	9.8	0.0	-14.1
Chemicals	6.0	2.6	0.7	0.0	5.1	3.3	0.0	6.0	4.3	0.0	-5.8
Coke & Petroleum	13.4	13.7	4.6	0.2	13.5	9.3	0.2	13.4	12.1	0.3	-12.3
Rubber & Plastics	22.2	21.3	7.4	0.6	21.8	14.7	0.6	22.4	14.7	1.4	-18.8
Non metallic	15.3	9.6	2.8	0.0	15.2	10.3	0.0	15.2	10.7	0.0	-14.1
Basic metals	5.8	1.7	0.6	0.0	4.9	3.4	0.0	5.8	4.0	0.1	-5.5
Fabricated metals	16.6	10.7	2.6	0.0	16.2	10.5	0.0	16.6	12.1	0.0	-15.4
Machinery	10.3	7.6	2.3	0.0	10.1	7.1	0.0	10.6	9.8	0.0	-10.1
Equipment & other	15.7	15.1	6.0	0.7	15.5	11.0	0.7	15.5	13.5	1.6	-12.8
Broad Economic Categorisation											
Capital goods	11.0	8.6	3.9	0.5	10.8	8.0	0.5	10.1	7.4	0.4	-9.2
Intermediate goods	10.2	6.0	1.8	0.0	8.3	5.5	0.0	7.2	4.5	0.0	-7.0
Consumption goods	21.8	20.4	7.0	0.7	21.1	14.4	0.7	21.9	12.2	0.7	-19.1
Other goods	17.2	16.4	4.2	0.0	16.4	8.4	0.0	16.4	8.3	0.0	-15.2

Note: $Overall\ SADC\ rate = (imp_{rsa} * tar\_rsa + imp_{rsad} * tar\_rsadc) / imp_{sadc}$ Where Imp_{resa} imports from South Africa, Imp_{rsdc} –is imports from the rest of sad and Imp_{sadc} is the total SADC imports i.e., combines South Africa and rest of SADC based on imports for 2000.

Appendix for Chapter 3

Table A3.1: Shares and Records of Products by Consumption Purpose

	Period 1: 1993-1999					Period 2: 2000-2011				
	Observations		*Product s*		*CPI[1]*	*Observations*		*Products*		*CPI[1]*
Product categories	*No*	*%*	*No*	*%*	*(%)*	*No*	*%*	*No*	*%*	*(%)*
Goods										
Foodstuffs	117353	31.0	77	28.5	45.6	547936	35.07	103	31.1	58.2
Non-alcoholic beverages	18166	4.8	10	3.7	0.3	66317	4.24	11	3.3	0.3
Alcoholic beverages	10985	2.9	8	3.0	0.6	47931	3.07	9	2.7	0.8
Cigarettes & tobacco	7423	2.0	4	1.5	0.2	22696	1.45	4	1.2	0.2
Clothing and Footwear	61876	16.4	49	18.1	10.0	233039	14.91	58	17.5	11.4
HH maintenance repair	11065	2.9	12	4.4	1.2	43411	2.78	12	3.6	1.2
HH equip & furniture	23972	6.3	24	8.9	2.5	92379	5.91	30	9.1	2.9
Non-durable HH good	17411	4.6	8	3.0	2.6	71739	4.59	10	3.0	2.8
Transport equipment	9666	2.6	8	3.0	0.8	36483	2.51	9	2.7	1.3
Medical products	18569	4.9	14	5.2	0.3	79250	5.07	17	5.1	0.4
Personal care	33777	8.9	18	6.7	2.7	121972	7.81	20	6.0	2.9
Other goods	15166	4.0	11	4.1	1.5	74091	4.74	16	4.8	4.0
Services										
Transport & comm.	0	0.0		0.0	0	1864	0.12	1	0.3	0.4
Medical services	5279	1.4	5	1.9	0.5	19735	1.26	7	2.1	0.5
Culture & recreation	4384	1.2	6	2.2	2.6	19719	1.26	8	2.4	3.6
Other services	23158	6.1	16	5.9	4.8	81205	5.20	16	4.8	4.8
Total	378250	100	270	100	76.4	1559767	100	**331**	100	**95.8**

Note: Constructed by author based on price database. 1- Based on the CPI weights for 2009

Table A3.2: Cross-district price differences Expanded Sample (1993-2011)

District	Distance	Mean	Std dev	Mean	Std dev
Chongwe*	40	0.32	0.40	0.3	0.4
Mazabuka	125	0.36	0.45	0.36	0.45
Kabwe	138	0.33	0.46	0.33	0.45
Mumbwa	151	0.39	0.42	0.39	0.41
Chibombo*	200	0.4	0.43	0.4	0.43
Monze*	225	0.39	0.44	0.39	0.44
Choma	284	0.39	0.45	0.38	0.45
Mkushi	313	0.39	0.40	0.39	0.41
Ndola	321	0.31	0.43	0.31	0.43
Luangwa*	323	0.37	0.39	0.35	0.38
Luanshya	331	0.35	0.43	0.35	0.44
Chingola	354	0.32	0.44	0.33	0.44
Kitwe	358	0.3	0.45	0.29	0.46
Mufulira	385	0.36	0.45	0.35	0.44
Kalulushi	402	0.38	0.42	0.38	0.43
Ndola Rural	411	0.3	0.46	0.29	0.46
Kalomo*	411	0.42	0.45	0.42	0.46
Serenje	423	0.43	0.43	0.43	0.44
Petauke	432	0.43	0.43	0.41	0.42
Kaoma	439	0.47	0.45	0.47	0.46
Katete*	467	0.4	0.37	0.4	0.37
Livingstone	472	0.32	0.45	0.31	0.45
Chililabombwe	476	0.35	0.42	0.35	0.42
Samfya	541	0.46	0.44	0.46	0.44
Mansa	561	0.41	0.45	0.42	0.45
Chipata	569	0.37	0.45	0.35	0.45
Chadza*	575	0.39	0.41	0.41	0.42
Mongu	581	0.44	0.45	0.44	0.46
Solwezi	662	0.42	0.46	0.42	0.46
Senanga*	689	0.54	0.47	0.52	0.47
Kasempa	710	0.47	0.42	0.47	0.43
Kawambwa	729	0.46	0.43	0.46	0.43
Luwingu*	745	0.54	0.43	0.52	0.44
Lundazi	754	0.4	0.41	0.38	0.41
Kasama	850	0.42	0.45	0.41	0.45
Mwinilunga*	859	0.49	0.45	0.49	0.45
Mwense	881	0.49	0.41	0.49	0.42
Isoka	951	0.49	0.44	0.48	0.45
Nchelenge*	1010	0.44	0.42	0.46	0.42
Mbala	1016	0.41	0.41	0.4	0.42
Total	***504***	0.39	0.44	***0.39***	***0.44***

Table A3.3: Trend in price dispersion across products

	Year	SE	Observations	R-squared
Food products	-0.00296***	(0.000174)	483,448	0.335
Non-alcoholic beverages	-0.00131***	(0.000216)	74,778	0.171
Alcoholic Beverages	-0.00519***	(0.000294)	47,002	0.139
Cigarettes & tobacco	0.00290***	(0.000330)	26,465	0.185
Clothing and footwear	0.00479***	(0.000560)	209,670	0.177
HH maintenance	-0.00549***	(0.000654)	43,677	0.234
HH equip & furniture	7.53e-06	(0.000485)	67,771	0.177
Household supplies	-0.000254*	(0.000133)	77,318	0.163
Transport equip	-0.00223***	(0.000247)	31,293	0.186
Health products	0.00391***	(0.000645)	75,694	0.196
Personal care	0.00394***	(0.000236)	132,991	0.242
other goods	-0.00433***	(0.000280)	61,255	0.126
Medical services	-0.00867***	(0.00275)	14,300	0.101
Recreation & culture	-0.00966***	(0.00193)	8,570	0.516
Other services	-0.000815	(0.000570)	80,874	0.197

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

Appendix for Chapter 4

Table A4.1: Price dispersion and different lengths of distance (2000-2011)

	(1) 250 km	(2) 400 km	(3) 500 km	(4) 600 km	(5) 700 km
ln(distance)	0.0199***	0.0254***	0.0293***	0.0307***	0.0292***
	(0.00641)	(0.00444)	(0.00363)	(0.00304)	(0.00279)
Constant	0.170***	0.146***	0.129***	0.123***	0.132***
	(0.0324)	(0.0238)	(0.0202)	(0.0175)	(0.0164)
Prod FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
District pair cluster	Yes	Yes	Yes	Yes	Yes
Observations	230,725	482,570	668,457	867,010	1,027,136
R-squared	0.300	0.308	0.312	0.310	0.310

*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*
Note: Only tradable goods are included in the estimation

Table A4.2: In sample products by category

1. Perishable foodsL28F3:F3:L29	*2. Non-perishable foodstuffs*	*3. Non alcoholic Beverages*	*6. Textiles & Clothing*
Cabbage (1k)**	Table salt (1kg)**	Instant coffee (prima 250gm)**	Men's Skipper**
Carrots (1kg)**	Tomato ketchup (375)**	Instant coffee (ricoffy (250)**i	Men's Sweater**
Green pepper (1kg)**	Baby cerelac(200gm)***	Cocoa (250g)***	Men's Tracksuit**
Irish potatoes (1kg)**	Wheat Flour (2.5kg)**^	Orange squash (2lt)**	Men's Underpants (cotton)
Apple(1)***	Baking powder(100gm)***	Milo (250gm)**	Men's Jacket***
Onion (1kg)**	White Maize (20kg)**^	White vinegar (750gm)**^	Gents'Two Piece Suit**
Oranges (1kg)**	White Roller (25kg)**+	Golden syrup (500gm)**	Pair of Trousers**i
Pawpaw (1kg)**	Shelled groundnut(1kg)***	Coffee Classic (200gm)**	Pair of Trousers **l
Pineapples (1kg)	Wheat Flour(2.5kg)***^	Coke (300ml)**^	Men's socks**
Rape (1kg)**	White breakfast (25kg)**	Ginger Ale **	Men's sports shoes**
Bun each***	Sorghum***	Schweppes (2tl)**	Zip Plastic **
Mutton***	White sugar (2kg)**	Tea bags (20bags)**	Mens Leather Shoes**i
Spring onion (1kg)**	Cassava meal (1kg)***	Tea leaves (250gms)**	Satin**
Chinese cabbage (kg)***	Sugar(1kg)***^	***4. Alcoholic Beverages***	Tights**
Sweet potatoes (1kg)**	Dressed chicken (1kg)**	Brandy(Chateau(750)**	Tropicals**
Tomatoes (1kg)**	Chewingum (each)***	Consulate (pck of 20)**	Boys School Sweater***
Banana (1kg)**	Baked beans (Heinz) (420)***	Rhino Lager***^	Boys Trousers***
Dried fish bream***	Corned beef (fray bentos 320gm)**	Wines (autumn (750ml)	Boys shirt***
Fresh bream fish (1kg)**	Custard powder (340g)**	Mosi lager (750ml)**^	Boy Tracksuit**
Brisket (1kg)**	Soup (Knorr)***	Vodka (nikolai(750ml)**	Boys School Shoes**
Beef Sausages (1kg)**	Powdered milk (400gm)**	Whisky (Johnnie wal(750ml)**	Boys School Socks **
Fillet Steak (1kg)**	Soda bicarbonate***	Whisky local (750ml)**	Boys Underpants**
Mince Meat(1kg)**	Pilchards Lucky Star (155gm)**	Shake shake bear (1 ltr)**^	Boys school uniform**
Mixed Cut 91kg)**	Cooking oil (750g)**i	Castle Lager (375mls)**	Boys shorts**
Offals (1kg)**	Cooking oil Local(2.5lt)**^	***5. Cigarretes & Tobacco***	Boys' jeans**
Ox-liver (1kg)**	Rice (1kg)**i	Rothmans (pkt of 20)**	Brassiere**
Pork Sausages 91kg)**	Rice Local (1kg)**	Peter Stuyvesant(pkt of 20)**	Chitenge material(2m)**i
Pork chops (1kg)**	Millet***	Pipe tobacco (50gm)**	Chitenge material(2m**l
Rump Steak (1kg)**	Yeast (125ml)	***6. Textiles & Clothing***	Dress Material(1m)**
Cucumber (1kg)**	Curry powder (50gm)**	Face towel**	Men Leather Shoes **
Eggs (unit)**	Cornflakes (300gm)***	Girls Dress**	Cotton Thread**
Fresh milk (local)(500gm)**^	Dried beans (1kg)**	Girls Panties***	Baby suit (coat)***
Green beans (1kg)**	Eet-Sum-mor(200gm)**	Girls School Shoes**	Knitting Wool**
Lemons (1kg)**	Raisins (250gm)**	Girls School Uniform**	Suiting material(1m)**
Pumpkin leaves (1kg)**	Samp(1kg)**	Girls school socks**	Terry Nappy(1)**
Raw cassava (1kg)**	Kapenta (chisense (1kg)**d	Half slip**	***7. Transport and Communi***
Watermelon (1kg)**	Kapenta (mpulungu(1kg)**d	Imported Dress **	Bicycle Tube (28*1.5)**
Fresh Kapenta (Sardines)	Kapenta (siavonga(1kg)**d	Ladies Leather shoes**	Bicycle Tyre ()28*1.5)**
Ice cream (115gm)**	Macaroni (500gm)**	Ladies leather shoes (bata)**	Car battery (12volts)**
Yorghart (125ml)**^	Marmalade (500gm)**	Ladies pants**	Engine oil (0.5lt)**
Bacon(1kg)**	Spaghetti (500gm)***	Ladies skirt **i	Gents' bicycle **
Bread (800gm)**	Pineapple jam (500gm)**	Ladies suit local**	Spark plugs (set of 4)**
Chedder cheese (1kg)**	Pineapple chunks (410gm)**	Ladies sweater**	Tyre radial**
Butter stork (250gm)**	Peanut butter (400gm)**^	Long Sleeved Shirt**i	Petrol (1lt)**
Fresh super milk(500ml)***	Salted peanuts(100gm)**	Long Sleeved Shirt **l	Car Battery Charging ***
Margarine (250gm)**			

Table A 4.2: In sample products by category

8. Personal Care products	***10. Medical products services***	***11. Household durables***	***12. Housing maintance & Service***
Shoe Polish (50ml)**	Andrews Liver salt**	Cooking pot**	Plasters (box of 10)**
Skin Lotion (350ml)**^	Anti Diarrhoea (normet(10 tab)**	Ceramic plate **	Cement (50kg)***^
Soap geisha(250gms)**^	Anti diarrhoea (immod. (10 tab)**	Metal plate **	Clear glass (3mm)**
Soap lifebouy(250GM)**	Aspirin (20 tab)**	Concrete Block**	Corrugated Asbestos(12ft)**^
butone toilet Soap***	Asthma Cure (salb.(20 tab)**	Matches (pack of 10)**	Corrugated Iron (10ft)**
Toilet Tissue (sofex)**	Cafenol (2 tabs)**	Paraffin (1 ltr)**	Floor tiles (vinyl 30*30 cm)**
Baby Lotion (100ml)**	Fansidar (10 tab)**	Electric Iron dry **	Foam mattress**
Baby Powder (100ml)**	Magnesium Trisil. (20 tab)**	Electric Kettle (2lt)**	Mortise lock (union)**
Baby Shampoo (200ml)**	Medix cough sy (100ml)**	Electric Plug**	Roofing nails (10 cm)**
Dettol (125ml)**	Muiltivitamin (syrup(100ml)**	Electric bulb pin**	Steel Door **
Wardrobe***	Paracetamol(20tabs)**	Electrical cooker**	Steel Window Frame**
Lip Stick (magic)**	Tetracycline(20 caps)**	Video Recorder***	Water paint (PVA)**
Lip ice (100gm)**	Eye Ointment***	Heater 92 bar)**	Carpenters Hammer**
Moon lite(100ml)**	Throat Lozenges (strip 2)**	Pans (medium)***	***13. Other products***
Razor Blade (pck 5)**	Registration fee govt.hospital (LC)**	Hoe blade**	Cinema Charges**
Sanitary (stayfree(pck 12)**	Condoms***	Non electric Kettle (2lt)**	Colour Film 100 ASA**
Shampoo (B&S 100ml)**	Dental fees (GVT)**	Mug**	Football**
Sanitary Towels (always)***	Bandages***	Carpet (9x12ft)***	Pen **
Shampoo (vitafro(100ml)**	Dental fees (PVT)**	Dry cells***	Pencil with Rubber**
Vaseline P Jelly (50gm)**	Doctor's consultation (pvt)**	Charcoal (50kg)***	Exercise Book (small)**
Vaseline P Jelly (50mg)**w	Chest X-ray (PVT)***	Charcoal Brazier (each)***	School Fees (pvt primary)**
Tooth paste (100ml)**	Dr consultation fee (pvt)**	Plastic mat (floor)***	School Fees (pvt sec)**
9. Household nondurables	Other Services	Plastic bucket	Photocoping***
Dry Clean (two piece suit)**	Developing & printing (24 colour)**	Cassette Recorder (sharp)**	
Laundry (trousers)**	Hammer Mill charge**	Refrigerator (210lt)**	
Bleach jik(500ml)**	Hire of DVD (2 nights)**	Shoe brush***	
Cobra (400ml)**	House rent (low cost)**	Single Blanket**	
Detergent (boom(400gm)**^	House rent (medium cost)**	Bed Sheets(3/4)***	
Detergent Powder (zamwasha 400gm)**^	Ladies Full Perm**	Colour TV philips(14inch)**	
Sanpic (500mls)**	Ladies Shampoo & Set**	Unrecorded Tape Cassette (tdk)**	
Target double action(150gm)***	Mens Hair Cut**	Wooden bed frame**	
Scouring powder (500gm)**	Nshima with Beef (2star)**	Wooden door **	
Candles (pck of 6)**	Nshima with Beef (restaurants)**	Lounge suit high price**	
Chik bar soap**^	Takeaway chicken & chips**	Coffee table ***	
	Bed & Breakfast (2star down)**	Lounge suit low price**	
	Bed & Breakfast (3star up)**	Bath towel **	
		Display cabinet***	

*Note: ** Products that were in the basket from 1993-2011 *** Products added to the CPI basket in 2000 ****Products used in robustness tests, ^ -products used in robustness tests (Chapter 4)*

Appendix for Chapter 5

Table A 5.1: Product heterogeneity and tariff pass-through

Product	Total Pass-through	Tradability Index
Baked beans (420g)	0.36	0.19
Body lotion(100ml)	0.95	1.03
Boys shirt	0.54	0.45
Brandy (750)	0.35	0.17
Brassiere	0.54	0.45
Bread	0.36	0.19
Carrots	0.58	0.51
Cheddar cheese (1kg)	0.36	0.19
Cigarettes (pct. 20)	0.23	0.008
Cooking oil (750ml)	0.36	0.19
Electric Iron	1.72	2.14
Instant coffee (250g)	0.36	0.19
Irish potatoes	0.36	0.19
Kettle (2.2lt)	1.72	2.14
Ladies dress	0.54	0.45
Ladies shoes	0.54	0.45
Macaroni (500gm)	0.36	0.19
Onion	0.58	0.51
Orange Squash(2lt)	0.36	0.19
Oranges	0.58	0.51
Paraffin	0.78	0.79
Peanut butter (400gm)	0.36	0.19
Refrigerator	1.72	2.14
Salt (1kg)	0.36	0.19
Shoe Polish (50ml)	0.95	1.03
Spaghetti (500gm)	0.36	0.19
Target	0.95	1.03
Tea leaves (250g)	0.36	0.19
Tomatoes	0.58	0.51
Toothpaste (100ml)	0.95	1.03
Vinegar (750ml)	0.36	0.19
Pilchards	0.28	0.07
Sugar (1kg)	0.36	0.19
Average of all products	**0.61**	**0.55**