PEOPLE: International Journal of Social Sciences
ISSN 2454-5899

Nokulunga Mbona, 2019

Volume 5 Issue 2, pp. 433-453

Date of Publication: 19th September 2019

DOI- https://dx.doi.org/10.20319/pijss.2019.52.433453

This paper can be cited as: Mbona, N., (2019). Exchange Rate Pass-Through to Consumer Prices for Clothing, and Pharmaceutical Products in South Africa. PEOPLE: International Journal of Social Sciences, 5(2), 433-453.

EXCHANGE RATE PASS-THROUGH TO CONSUMER PRICES FOR CLOTHING, AND PHARMACEUTICAL PRODUCTS IN SOUTH AFRICA

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Abstract

In this paper, I examine the underlying relationship between exchange rate and prices in South Africa, this phenomenon is termed the Exchange Rate Pass-Through (ERPT). Available empirical literature on aggregate level paints an informative and validating picture of the declining ERPT to consumer price index in South Africa. The literature is still insufficient as there are few studies on disaggregated data. Subsequently, the main objective of the study is to bridge this gap, by investigating ERPT to consumer prices of individual commodities of manufacturing sector namely; i. Clothing, and ii. Pharmaceutical products- for the period of 2010: M01 -2018: M06 in South Africa. Johansen Maximum cointegration and a vector error correction modelling methodology are employed in obtaining the purposes of the study. The obtained results reveal a low long-run pass-through to consumer prices of clothing accounted for 26 percent. While the long run pass through to CPI for pharmaceutical products was as high as 44 percent. The heterogeneous pass through results found among different individual component of the manufacturing sector is useful in formulating the consumer price index forecast, which is an essential role of central banks with inflation targeting framework.

Keywords

Exchange Rate Pass-Through, VEC Model, Disaggregated CPI, Import Prices

1. Introduction

The exchange rate plays a significant role in most open and developing economies, through its influence on inflation dynamics. This is important in South Africa (SA), as the South African rand tends to be highly volatile, for instance on any given day, such as February 21, 2019 one US dollar was equivalent to R13.9085 (SA Rand), while on March 08, 2019 the consumer would have required 14.5496 South African Rand to purchase one US dollar. Exchange rate pass-through (ERPT), is defined as a degree to which international prices respond to changes in exchange rate (McCarthy, 2007). The exchange rate pass-through consists of two stages; the first stage is the impact of exchange rate movement on import prices, and the second stage refers to the exchange rate influence on consumer prices. The latter is more of an indirect channel, as the consumer prices are affected by the changes in prices of imported goods as a result of exchange rate shocks. A negative exchange rate shock (depreciation) leads to more expensive imports. The South African Reserve Bank is independently responsible for the monetary policy, currently targeting inflation rate of 3 to 6 percent. In year 2000 South Africa adopted inflation targeting framework whilst simultaneously, practicing a flexible exchange rate regime. The latter suggests that the price of the domestic currency (rand) is determined by demand and supply factors.

The phenomenal of floating exchange rate, permits exchange rate to act mostly as a macroeconomics adjustment mechanism and thus ERPT helps in determining the contribution of exchange rate volatility on the economy (Rahimov, Jafarova, & Ganbarov, 2017). ERPT can be influenced by the monetary policy, through its interference in the foreign exchange market. Vast studies suggest that ERPT to imports and ERPT to consumer price are considerably low in emerging market and advanced economies with single digit inflation (Ca' Zorzi, Hahn , & Sánchez, 2017). Available literature in South Africa suggests that the ERPT to aggregate import prices is complete or equal to 100 percent, while the ERPT to aggregate consumer price is incomplete (Kabundi & Mbelu, 2016). The decline in ERPT is associated with the adoption of inflation targeting.

There has been extensive research documenting the ERPT, with many of the research focusing on aggregated flows. Analysing the impact of the exchange rate on aggregated trade data can provide a more meaningful and broader overview of this relationship, however, this analysis has its own shortcomings. Aggregated data can produce inconclusive and subjective results due to the nature of how the exchange rate movement impacts sectors and industries differently.

The available literature is still, insufficient as there are limited studies on disaggregated data. The gap highlights the purpose of this research to bridge this gap, by focusing on the ERPT on two out of the thirteen manufacturing import sector components, namely: i. Clothing, and ii. Pharmaceutical products. There are two incentives for concentrating on these individual commodities of the manufacturing sector. First, the manufacturing sector is considered as the central driver of South Africa's trade balance, accounting for roughly 60 percent of the total imports, whilst significantly contributing to the South African economy. Finally, my ideal measure aims to focus on diverse subcategories of manufacturing, i.e., pharmaceutical and clothing. Determining the degree of ERPT on individual components of CPI can be a useful tool for monetary policy inflation forecast. The degree of ERPT to individual CPI commodities for the period of 2010: M01 -2018: M06 in South Africa will be examined using VECM.

The rest of the paper is structured as follows; section 2 commences with an over view of South African economy and further provides a summary on SA's trade balance position, with more emphasis on the significant role played by the manufacturing sector. Section 2 also pay great attention on the nature of the chosen manufacturing commodities for the study. Section 3 provides a brief overview of the theoretical foundation and literature review on ERPT to both import prices and consumer prices. Section 4 describe the methodology used for the study. Empirical results are presented in section 5 and the conclusions is presented in section 6.

2. Background Information on South Africa and Trade Balance

The political environment in South Africa before 1994, ensured stringent foreign exchange controls, whilst also suffering from economic sanctions. This political and economic environment had a strong influence on the South African rand. In the year 2000, South Africa adopted inflation targeting regime-this has resulted in increased accountability and transparency of monetary policy coupled with a more manageable inflation rate within the 3-6 percent band. Historically, South Africa's economy was largely entrenched in the primary sector, as the country greatly profited from the mineral resources and good agricultural conditions (Stats SA, 2019).

In the last decade, South African economy has however, been seen greatly profiting from manufacturing, retail trade, wholesale, financial service, transport, agriculture, mining, tourism and the communication sectors conditions, (Stats SA, 2019) . In 2018, Statistic South Africa reported that South Africa had a negative grow of 2,2 percent and 0,7 percent in the first quarter and second quarter respectively (Stats SA, 2018). In the third quarter of 2018, South

African economy rebounded from a technical recession, recording a positive Gross Domestic Product (GDP) of 2,2 percent (Stats SA, 2018) . The main drivers of the positive growth in the third quarter were manufacturing industry (contributing 0,9 percentage point to GDP), financial sector, transport, and communication sector (each contributing 0,5 percentage point), and the trade, catering and accommodation industry (contributing 0,4 percentage point), (Stats SA, 2018) .

2.1 Trade Balance

Upon assessment of the trade balance, South Africa's trade balanced is divided into three sections; manufacturing, agriculture, and mining sector. South Africa recorded a trade surplus of R10,2 billion and R71,8 billion (as value of merchandise exports exceeded imports) in the third quarter and fourth quarter of 2018 respectively (SARB, 2019).

The value of South Africa's merchandise exports increased significantly by 81,9 percent from R609 billion in 2010 to R1 108 billion in 2017 (SARB, 2018). The drivers of the increase in total merchandise exports and net gold exports between 2010 and third quarter of 2018 were; mining exports averaging a contribution of 49,9 percent and manufacturing exports which averaged a contribution of 41,3 percent (SARB, 2018) . The United States of America (USA) and China gained the larger share of the profits from the increased merchandise exports. The phenomena of the USA and China receiving the larger profits from SA trade highlights the effect of a dominant price, as both countries have an underlying currency that is US dollar or is pegged to the US dollar. South Africa's exposure to the respective countries (USA & China) has however, declined from 21, 2 percent in 2013 to an average of 16, 7 percent in the third quarter of 2018 (SARB, 2018) .

Merchandise import in rand price increased by 3, 2 percent in the fourth quarter of 2018. In volume terms, the merchandise import declined by 4,2 percent over the same period. The phenomenal of this observation of the decline in volume terms, while rand price value of imports increased highlight the importance of analysis volume data vs price data and impact of exchange rate on SA imports/trade balance. Though the picture for merchandise import resembles merchandise exports, the contribution of manufacturing sector to total import is intensified. The average contribution of manufacturing sector to total merchandise import is approximately 60 percent, this is followed by the contribution of agriculture and finally mining sector.

South Africa imports mostly crude petroleum, followed by refined petroleum, and their contribution to total imports averaged 7,8 percent and 6,6 percent respectively in 2017 (SARB,

2019). The contribution of individual commodities to total imports can also be analysed with the individual assigned weights used when calculating total import price index. According to the Statistic SA report on Export and Import Unit Value Indices, weights are assigned to each item in the overall import price index basket, with the total weights equal to 100 and thus represent all imported items (StatsSA, 2018). The two chosen individual commodities from manufacturing sector imports which will be analysed in the paper has a total weight of 8.26 out of 100- i.e; i. Clothing (3,3 per cent), and ii. Pharmaceutical products (4,96 per cent) respectively (StatsSA, 2018).

2.2 Manufacturing Sector and its Subcategories

The manufacturing sector in South Africa is dominated by industry such as automotive, information and communication technology, electronics, chemicals, textiles, clothing, and footwear (StatsSA, 2019). The labour intensive nature of manufacturing sector and its contribution to GDP, has kept automotive industry as one of the most important sectors in the SA economy- accounting for approximately 30,1 percent of total manufacturing in SA. The study focuses on two products from manufacturing sector in SA, and those are discussed in the subsequent subsection.

The textile, and clothing industry in South Africa is highly diverse and matured, however the industry's contribution to GDP is relatively small. The textile, clothing and footwear industry is one of the most labour-intensive sectors in the country, the sector boasts approximately 800 clothing manufacturers with majority of the owners being South Africans. There is a small number of foreign multinational owners (Flanders Investment & Trade, 2016).

Upon assessment of the textile, clothing and footwear industry trade balance, South Africa largely imports; articles of apparel, accessories, knit, or crochet (Flanders Investment & Trade, 2016). Between 2008 and 2013, the industry has been running a trade deficit. This deficit highlights domestic demand, coupled with the crowding out effects of the cheap Chinese imports. The industry has however, due to technological development and production of synthetic fibres become increasingly capital intensive. The industry heavily depends on imported materials - making it more vulnerable to exchange rate movements. The importer distributor relationship is characterised as informal, as the major retailer groups buy both from direct suppliers, specialised importers and third party agents who buy internationally on behalf of retailers.

The nature of pharmaceutical industry is slightly different to the other discussed manufacturing industry. As part of broader healthcare system, the pharmaceutical industry in

SA is responsible for developing and distributing pharmaceutical drugs. Pharmaceutical industry in South Africa is divided between the private sector and public sector (Antonie, et al., 2016). According to Antonie, et al., (2016) , there are 174 manufacturers of pharmaceutical products and most of them are importers and international companies, and out of this 174 about 95 supply their products only to the private sector, while 60 manufacturers supply both private and public sector and only 15 supply exclusively to the public sector. This market segment highlights the presence of oligopoly and monopolistic competition in the industry. As a results the private sector tends to have more diversified products when compared to the public sector.

The public sector healthcare is financed by the national government through taxes (Antonie, et al., 2016). South Africa has a population of about 51 million, and only 16 percent of them can afford private healthcare service (Ratshisusu, 2017). The country has been suffering from the epidemic of HIV and AIDS for the past decades, which has amongst other factors contributed to lower levels of life expectancy and higher rates in child mortality- as the disease can be easy transferred to the unborn child. Subsequently, about one third of the health public sector expenditure is concentrated in one particular category namely: Anti-infectives for systemic use, which consist of antiretroviral medicines for HIV infection, vaccines, and medicines to treat tuberculosis (Antonie, et al., 2016).

On valuation of the trade balance, pharmaceutical imports are the sixth largest classification of imports in SA. Between January and August 2017, pharmaceutical imports accounted for R11,8 billion (Antonie, et al., 2016). This implies that about more than 60 percent of the demand is met through imports, as all generic drugs are imported (Ratshisusu, 2017). Locally based manufacturers import the ingredients (generic drugs) for HIV/AIDS drugs mostly from China and India (Ratshisusu, 2017). The risk of exchange rate is intensified as the two above mentioned country's exchange rates tends to more stable than other emerging market economies (Soreg, 2018). The industry also faces vast number of challenges such as; fragmented market which makes it hard for local producers to take advantages of economies of scale, lack of capital – which in turn makes it hard for the industry to grow and access innovate technology.

The analysis above highlights the importance of exchange rate in the manufacturing sector however, there are several challenges faced by the manufacturing sector in South Africa. The Textile, Clothing, and Footwear industry is drowned by cheap imports from China, which dominate 70 % of the South African market. The industry also faces declining profits as a result of increased volumes of consumer online shopping (Sorebo, 2018).

As an emerging market economy, South Africa is vulnerable and highly exposed to global politics and uncertainty, as its trade depends on trade agreements. This coupled with high employee protection, a country which constitutes the right to strike as a fundamental right. Labour unions will usually call for high wage increases, which can and usually result in industrial action and decreased production. This has a negative effect on the investment, production, and revenue of the producer. Consequently, South Africa is losing a significant amount of manufacturing production to its neighbouring countries i.e. Lesotho, and Swaziland, where wages are considerably low. In the last decade, the South African economy has been unstable as a result of; increased electricity outages (load shedding), droughts which have resulted in water shortage, weakened growth coupled with highly volatile exchange rates.

3. Theoretical and Related Literature

3.1 Theoretical Framework

The phenomena of ERPT to the consumer price index, branch from the Law of One Price (LOP) and Purchasing Power Parity (PPP) principle. According to the LOP, the price of an identical good in two competitive markets are completely equivalent to each other when expressed in terms of one currency (Krugman, Obstfeld, & Melitz, 2012). The assumption is that there is no transportation cost and no barriers to trade. The LOP is a building block of the PPP and the PPP is the foundation of the monetary and Fisher approach. The PPP and LOP theory, with empirical evidence is still flawed. The theories are however, important as they provide the foundation to most economic models of exchange rates. In the real world, there are transportation cost, barriers to entry such as tariffs and tax duties on imports and exports (Krugman et al., 2012). The ERPT is generally explained by both macroeconomics and microeconomic principles (Rahimov et al., 2017).

3.2 Review of Related Literature

The inflation behaviour of advanced and to some degree emerging market economies is different to those observed between 1970s till late 1990s - highlighting the new practice of inflation targeting framework (McCarthy, 2007). Recent events in advanced economies suggest that exchange rate appreciation has on some level deflationary effects and import price deflation. Most of the emerging markets with flexible exchange rates, such as South Africa and Turkey, have over the past years experienced high volatility in their exchange rates especially against advance market economies. This has been posing a risk to the domestic current account deficit, resulting in increased interest in the effects of external influence on domestic inflation.

Over the past decade economic literature has examined the relationship between exchange rates and prices of international goods -with majority focusing on the aggregate trade balance. ERPT is the effects of changes in exchange rate to trade balance and consumer inflation (Goldberg & Knetter, 1996). There is a direct transmission from exchange rate shocks to import prices, while the effect on consumer inflation is indirect. ERPT is said to be complete when its equal to one, and this is more common in countries with high inflation or highly dollarized economies (Hajek, 2014).

Ca' Zorzi, et al., (2017), conducted a study examining the degree of ERPT to prices in 12 emerging markets in Asia, Latin America, Central and Eastern Europe. The study employed alternative vector autoregressive models where; the exchange rate, import prices, consumer prices, short-term interest rate and oil prices were the variable outputs. The study found the ERPT to imports and ERPT to consumer price are considerably low in emerging market economies with single digit inflation. When comparing the direct and inderect effect of the exchange rate, the ERPT to consumer price has significantly declined (Ca' Zorzi, et al., 2017). Using their benchmark models for advanced economies – the industrialized economies - such as the euro area, US and Japan , the general results suggested that ERPT in advanced ecnomies is marginally lower than those of emerging markets with single digit inflation.

McFarlane, (2009) based his study on four emerging market economies namely; Jamaica, Mexico, Brazil, and Trinidad and Tobago using the time-varying estimation of the ERPT. The study is based on monthly collected data over eight year period from year 2000 to 2008. The author measured the ERTP against import price, where import prices at time (t) depended on exchange rates, foreign prices, commodity prices and the output gap, in which were the explanotory variables. McFarlane, (2009) estimated the pass through to consumer prices using the backward-looking Phillip curve, where domestic consumer price depends on commodity prices and the output gap. The study found that both pass through to import prices and consumer prices has declined over time in all the countries in question, and the main drive to this ERPT decline over time in all the countries in question, was the adoption of inflation tagerting framework. Endorsing other literature, the pass through to consumer price was lower in comparison to the pass through to import prices.

In the recent years, research has examined the influence of exchange rate and import price on domestic inflation in South Africa. In their study, Kabundi & Mbelu, (2016) investigated the ERPT to consumer inflation from 1994 to 2014, in South Africa. The study used the rolling-window estimation to examine the likelihood of modification in ERPT over

time. The study extended its investigation by analysing the asymmetric behaviour of ERPT over the phases of a business cycles. Making use of the Error Correction Model, the study found that the first stage of ERPT – exchange rate effect on import prices –is complete in SA, however, the second stage – local currency imports prices to consumer prices – is incomplete at 36 per cent. The decline in the second stage of ERPT is mainly associated with the inflation targeting framework. The study also found that the ERPT is muted during downturn and rise in expansion.

3.3.1 Empirical Literature on Disaggregate Trade Flows and Disaggregate CPI

Rahimov et al., (2017), investigated the ERPT to domestic consumer price and its components in Oil-exporting countries Azerbaijan, Kazakhstan, and Russia from first quarter of 2003 to second quarter of 2016, using Vector Autoregression model and impulse response test. The ERPT is obtained by dividing cummulative changes in price index by cummulative changes in nominal effective exchange rate. Rahimov, et al. (2017), found that the second stage of ERPT is incomplete, but not lower than 28 percent in all countries. They found that for Azerbaijan, the aggregate CPI and non –food CPI was significant for 12 quarters, while CPI for food and service CPI stayed significant for just two and three quarters respectively. These results are backed by the fundamentals that food is mostly produced locally in Azerbaijan.

The literature is still insufficient as there are limited studies on disaggregated data such as individual components of the imports and consumer price index. The gap highlights the purpose of this research to bridge this gap, by focusing on the ERPT on two out of the thirteen manufacturing import sector components, namely: i. Clothing, and ii. Pharmaceutical products.

4. Methodology

The previous subsections presented the reader with a synopsis of the primary topic of the research, leading into the mainstream macroeconomic theoretical framework and empirical literature on exchange rates and price levels, and exchange rates and terms of trade. In effort to close the gap in literature this paper focus on ERPT to consumer prices of individual commodities of manufacturing sector in South Africa. Most empirical studies focus on measuring the ERPT on aggregated consumer price, this consumer price index refers to the prices of a particular basket of goods. This suggest that aggregate pass-through represent the weighted average of individual rate of pass-through (Parsley, 2010). Intuitively, ERPT measured on weighted data (aggregated CPI) will vary not sorely on exchange rate but because of other factors such as changes of goods and services in the overall basket (Parsley, 2010).

The main objective of the paper is to check if estimating pass-through using a set of individual commodity classes would lead to widely different conclusion when compared to previous studies which mainly focused on aggregated data.

4.1 Model Specification

ERPT to CPI of individual commodities is carried out using the vector error correction model (VECM) technique. As a starting point, the paper develops a model to calculate consumer price index from a simple mark-up model. The simple model is consistent with the one employed by Kabundi & Mbelu (2016). The empirical model is thus:

$$CPIit = \beta 0 \ X \ ULC_t^{\beta 1} \ X \ IP_{it}^{\beta 2} \ ...(1)$$

In this equation, CPI represents consumer inflation of individual commodity classes i at time t, ULC represent unit labour cost by manufacturing at time t and serve as one of the explanatory variables for consumer inflation. IP_{it} is the import price index of individual commodity classes i at time t. The CPI and IP data is imported from Statistic South Africa website, ULC data is obtained from the South African Reserve Bank website. The model in logs:

$$cpi_{it} = \alpha + \beta 1 ulc_t + \beta 2 ip_{it} + \mathcal{E}t \ \ldots (2)$$

Where α represent the log of β0, which is the retail mark-up over cost, β1, and β2 are elasticities and Ɛt is an error term. In this study, Equation 2 is expressed as a VECM of the form shown in the equations below.

$$\Delta cpi_{it} = \delta + \sum_{q=1}^{k-1} \beta_q \Delta cpi_{it-q} + \sum_{j=1}^{k-1} \gamma_j \Delta ulc_{t-j} + \sum_{m=1}^{k-1} \varphi_m \Delta ip_{it-m} + \lambda_1 ECT_{it-1} + U_{1t} ..(3)$$

$$\Delta ulc_t = \delta + \sum_{q=1}^{k-1} \beta_q \Delta cpi_{it-q} + \sum_{j=1}^{k-1} \gamma_j \Delta ulc_{t-j} + \sum_{m=1}^{k-1} \varphi_m \Delta ip_{it-m} + \lambda_2 ECT_{it-1} + U_{2t} \ldots . (4)$$

$$\Delta ip_{it-m} = \delta + \sum_{q=1}^{k-1} \beta_q \Delta cpi_{it-q} + \sum_{j=1}^{k-1} \gamma_j \Delta ulc_{t-j} + \sum_{m=1}^{k-1} \varphi_m \Delta ip_{it-m} + \lambda_3 ECT_{it-1} + U_{3t} \ldots . (5)$$

Where β_q, γ_j, φ_m, represent short run dynamic coefficients of the model's adjustment long run equilibrium. Where λ represent speed of adjustment parameter and ECT_{it-1} represents the error correction term, which contains long run information derived from the long run cointegration relationship. Ut is an error term.

4.2 Econometric Procedure

In line with time series data methodology, before model estimation, stationarity tests will be carried out on the variables with the purpose of understanding the nature, behaviour

and necessary order of integration of all the series. The Augmented Dickey Fuller (ADF) test is used to check for stationarity in the series.

Table 1: *Augmented Dickey- Fuller Test*

	Level		First Difference		
Variables	*Intercept*	*Intercept & Trend*	*Intercept*	*Intercept & trend*	*Conclusion*
lcpi_c	-0.0003	-0.03	-0.42***	-0.42***	I(1)
lip_c	-0.01	-0.05	-0.72***	-0.72***	I(1)
lcpi_p	-0.022	-0.018	-0.82***	-0.83***	I(1)
lip_p	-0.001	-0.12	-1.06***	-1.06***	I(1)
lulc	-0.008	-0.16*	-0.85***	-0.89***	I(1)

*, **, *** denotes significance at 10%, 5% and 1%.

Null hypothesis is that there is a unit root in all cases and decision is made at 5% level.

C- denotes clothing c=products / categories

P- represent pharmaceutical products

source: reviews output

The results for the ADF test for all the variables are presented in table 1, and the results suggest that the null hypothesis (which state that the variables are not stationary) is rejected at first difference for all the variables. Accordingly, based on these unit root results, I proceed to test for the possible existence of cointegration among the variables.

5. Empirical Results

5.1 Test for Cointegration

The study employs the Johansen (1995) cointegration test to examine the existence of cointegration among variables. The appropriate lag length was selected based on information criteria. VAR lag selection results are presented in appendix A. The lag length that result to more meaningful results is applied in cointegration test. Table 2 below, presents a summary of the Johansen cointegration test results for both clothing and pharmaceutical industries.

Table 2: *Cointegration Test Results*

Clothing Industry							
Sample (adjusted): 2010M06 2018M06							
Included observations: 97after adjustments							
Trend assumption: Linear deterministic trend(restricted)							
Series: lcpi_c lip_c lulc							
Lags interval (in first difference):1 to 4							
Hypothesized no. f CE(s)	Eigenvalue	Trace statistic	0.05 Critical value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0,254	48,948	42,915	0,011	28,362	25,823	0,023
At most 1	0,149	20,586	25,872	0,198	15,669	19,387	0,160
At most 2	0,049	4,916	12,518	0,608	4,916	12,518	0,608

Pharmaceutical Industry							
Sample (adjusted): 2010M03 2018M06							
Included observations: 100 after adjustments							
Trend assumption: Linear deterministic trend(restricted)							
Series: lcpi_p lip_p lulc							
Lags interval (in first difference):1 to 1							
Hypothesized no. f CE(s)	Eigenvalue	Trace statistic	0.05 Critical value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0,232	38,792	35,011	0,019	26,461	24,252	0.025
At most 1	0,110	12.331	18,397	0,285	11,697	17,148	0,260
At most 2	0,006	0,634	3,841	0,425	0,634	3,841	0,426
*Denotes rejection at 5% level Source: Eviews output							

The cointegration test results show that for both industries (clothing and pharmaceutical), both the trace and maximum eigenvalue test rejects the null hypothesis which

states that there is no cointegration (r=0). The results certify the presence of at least one cointegration relationship amongst the variables. This implies that over the long run consumer prices moves together with import prices and unit labour cost.

Therefore, having discovered that the variables in the estimated VAR model are cointegrated, the next step is to run a VECM. Consequently, in the next subsection, the study proceeds with the discussion of long run and short run analyses results from VECM.

5.2 Long Run Dynamics

Subsequent to verification of a cointegration relationship among the variables, a long run equation when normalised by the coefficient of the respective consumer price index is presented in table 3 and 4 below.

a. Clothing Industry

Table 3: *Long-Run Estimated Equation Results for Clothing Industry*

Results of Vector Error Correction Model				
Variables	lip_c	Lulc	@Trend	Constant
Coefficients	-0,265	0,845	0,005	-7,10
	(0,0463)	(0,233)	(0,001)	
T-Statistic	5,7	3,6	5,28	

Source: Eviews output

Table 3 depicts the long run pass-through to the consumer price index for clothing. The estimated coefficient of import prices of clothing is -0,26 and is significant (a coefficient is said to be significant when the t-ratio is above 2).

Since in the long run the coefficient signs are reversed- this implies that the cumulative long-run pass-through from import prices of clothing to CPI clothing is incomplete at 26 percent. Thus a unit change in import prices of clothing results to an increase in CPI by 26 percent. This is because an increase in import prices translate into increases in the overall prices of the commodity.

The results of low pass-through are intuitive, as South Africa mostly import clothing from China and other emerging market economies, where the cost of production is significantly low compared to SA. The pass-through of 26 percent to CPI clothing is marginally different with the results found by (Kabundi & Mbelu, 2016), which confirmed that the pass-through from aggregated import prices to aggregated consumer prices in SA is incomplete at 36 percent. According to Kabundi & Mbelu, (2016) low pass-through could be explained by the different

markup rates within the supply chain, as there is an indirect channel from imported goods to the final consumer. The market structure of the industry affects how retailors set the prices- as the companies market share could be perceived as more important than price adjustment and current revenue.

The study employed unit labour cost for manufacturing sector as a proxy for other incurred cost in the manufacturing sector. The variable does not necessary represent the cost faced sorely by clothing sector. While, analysis of unit labour cost requires careful consideration; such as weather the index is increases are changes away from equilibrium or equilibrating corrections of distortions in the previous periods- because an increase in unit labour cost that result to disequilibrium profits margins back towards normal level is not necessarily inflationary (Lipschitz & Schadler, 2018). Subsequently, the estimated coefficient of ULC is 0.85 and is statistically significant. The high degree of this pass through highlights high degree of employee protection in SA. Labour unions will usually call for high wage increases, which can and usually result in industrial action and decreased production. This has a negative effect on the investment, production and revenue of the producer.

b. Pharmaceutical Industry

Table 4: *Long-Run Estimate Equation Results for Pharmaceutical Industry*

Results of vector error correction model				
Variables	lip_p	lulc	@Trend	Constant
Coefficients	-0,438	6,378	(-0,028)	-31,50
	(0,198)	(1,211)		
T-Statistic	2,216	5,260		

Source: Eviews output

Table 4 depicts the long run pass-through to consumer price index for pharmaceutical industry obtained from cointegration vector. The estimated coefficient of import prices is 0,44 and is significant. This implies that the cumulative long-run pass-through from import prices of pharmaceutical to CPI pharmaceutical is approximately 44 percent. The high pass through make economic sense and can be explained by the characteristics of the pharmaceutical industry where more than 50 percent of the demand is met through imports, as almost all the generic drugs for anti-infectives are imported (Ratshisusu, 2017). Imports of ingredients tend to have a substantial impact on the final prices. Also, the conclusion that about 80 percent of South African citizen depend on public healthcare, is measured by the assumption that if one does not have private healthcare, then they fall under the public healthcare system but in actual

fact- most of the working class in SA use private doctors and pay consultation fee per visit and subsequently purchase the prescribed medication from privately owned pharmacies.

The relative high pass through to consumer prices of pharmaceutical can also be explained by the previously highlighted imperfect competition in this industry, suggesting that the monopolistic, private sector producers can pass through the cost incurred from imports to the final consumer as they offer exclusive health care product. The coefficient for unit labour cost overshoots, and this is justified because South Africa mostly import generic drug and produces the final product locally where the cost of labour is relatively higher when compared to other emerging market economies.

5.2 Short Run Dynamics

Having investigated the long run determinants of CPI, the next step is to incorporate the short run effects into the long run. In this subsection, the adjustment of cointegrated variables towards their equilibrium is analysed. The individual results for both CPI categories are presented in appendix B and C. Slightly different from the long run analyses, in the short run the sign of the coefficient matters, thus a negative coefficient mean negative impact and so on. The estimated VECM represent the magnitude of the error correction terms which measures the speed of adjustment to long run equilibrium. The short run results are interpreted separately as follows:

a. Clothing Industry

The short run pass-through to the consumer price index for clothing is presented in appendix B. The error correction term has the correct negative signs- this negative sign implies that there is a stable adjustment. The error correction terms lie within the relevant range of 0 and -1 as a theoretical prerequisite. The error correction term of -0,037 means that the previous months' deviations from long-run equilibrium are corrected in the current period as an adjustment speed of 3,7 per cent.

The results confirm the results of cointegration test that the variables have a long run relationship. This means there will be a short run adjustment towards the long run equilibrium consumer price index for clothing. Finally, the short run coefficients for clothing CPI are interpreted as follows: the coefficient of the first lag of CPI clothing is 0.53 and is statistically significant. This implies that a percentage change in clothing CPI from the previous month is associated with a 53 percent increase in CPI in the next period, ceteris paribus. While a percentage change in previous three months in import prices of clothing is associated with a 1,9 percent increase in CPI, ceteris paribus.

b. Pharmaceutical Industry

The short run pass-through to the consumer price index for pharmaceutical is presented in appendix C. The error correction term of -0,000836 has a correct sign but is insignificant. The error correction term represents the speed of correction to restore equilibrium in the model. Thus the model is expected to have a statistically significant negative coefficient. The insignificant error correction term can be justified by the motion that demand for drug prices is typically inelastic and drug prices may be set by long run contracts. The pharmaceutical industry in SA resemble that of an oligopoly market, with the private multinational companies producing more than 60 percent of the output. Also a vast number of the population depends on public health care- hence the national government is also bound to enter into long term contracts.

Finally, to ascertain the adequacy of the model, three diagnostic test were carried out. The null hypothesis to be tested is that there is no serial correlation, no heteroscedasticity and the residual are normally distributed. Table 1-2 in appendix D depicts the model diagnostic results. The results show that both the Clothing and Pharmaceutical sector' model are well specified. The conclusion is draw if the model shows no evidence of autocorrelation, no evidence of heteroscedasticity at 5 percent level. The Normality Jarque Bera test on distribution of residuals suggest that the residuals are not normally distributed. The latter conclusion is not necessary alarming as this conclusion is common in cases of large sample size and nature of time series data, more common in price data.

6. Conclusion

The study examined the ERPT to CPI for two individual commodities from the manufacturing sector in South Africa. The study found a low long-run pass through in clothing CPI, accounting for 26 percent. In other words, clothing producers and retailers have less significant market power and the exchange rate shock is to a small degree translated into domestic prices. The low pass through from import prices suggest that local manufacturers tend to benefit more from cheap imports from China, as they endure a higher pass through from domestic labour cost (indicated by ULC long run results). While the long run pass through to CPI for pharmaceutical products was as high as 44 percent. Put differently, pharmaceutical importers have significant market power and the exchange rate shock are mostly translated into domestic prices at great extent.

The incomplete pass through is firstly associated with the adoption of inflation targeting. The low pass-through is also explained by the different markup rates within the

supply chain through the indirect channel from imported goods to the final consumer. Lastly, the market structure of the industry influences retailers set prices- as the companies market share could be more important. The heterogeneous pass through results among different individual component of the manufacturing sector can be useful in formulating the consumer price index forecast, which is an essential role of central banks with inflation targeting framework.

In terms of further research, it will be interesting to test for the direct response of individual CPI to direct exchange rate movements, while simultaneously studying the degree of the ERPT from different origins of exchange rate shocks- the latter investigation will assist in determining the specific shocks that requires policy makers to intervene in the foreign exchange market.

References

Antonie, F., Simkins, C., van Dalsen, A., Chetty, K., Collocott, C., Toxopeus, M., & Doodnath, A. (2016). The Supply of Pharmaceuticals in South Africa. Johannsesburg: Helen Suzman Foundation.

Ca' Zorzi, M., Hahn, E., & Sánchez, M. (2017). "Exchange Rate Pass-Through in Emerging Markets" Working paper series No 739. Frankfurt: European Central Bank.

Goldberg, P. K., & Knetter, M. M. (1996). Goods prices and exchange rates: what have we learned? Working paper 5862. National Bureau of Economic Research. https://doi.org/10.3386/w5862

Hajek, J. (2014). Exchange Rate Pass-Through to Domestic Prices: The Case of the Czech Republic. M.A Thesis. Charles University in Prague.

Kabundi, A., & Mbelu, A. (2016). Has the Exchange Rate Pass-Through changed in. Economic Research Southern Africa.

Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2012). International Economics: Theory & Policy (Ninth ed.). United States of America: Pearson.

Lipschitz, L., & Schadler, S. (2018). Macroeconomics for Proffessionals. In A guide for analysts and those Who Need to understand them (pp. 63-65). New York: Cambridge University Press. https://doi.org/10.1017/9781108598293

McCarthy, J. (2007). Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies. Eastern Economic Journal, 33(4), 511-537. https://doi.org/10.1057/eej.2007.38

McFarlane, L., 2009. Time-varying exchange rate pass-through: An examination of four emerging market economies. Working paper. Bank of Jamaica

Parsley, D. C. (2010). Exchange Rate Pass-through in South Africa: Panel Evidence from Individual Goods and Services. South African Reserve Bank Working Paper. , 10/03.

Rahimov, V., Jafarova, N., & Ganbarov, F. (2017). The Exchange Rate Pass-Through to CPI and its components in Oil-Exporting CIS Countries. International Economics Section, The Graduate Institute of International and Development Studies, Working Paper.

Ratshisusu, H. (2017). Price Formation in the South African Pharmaceutical Market. Pretoria: Competition Commission South Africa.

SARB. (2018). Quarterly Bulletin. September. Pretoria: South African Reserve Bank.

SARB. (2019). Quartely Bulletin: March. Pretoria: South African Reserve Bank.

Stats SA. (2018). STATISTICAL RELEASE: Gross domestic product. Third quarter. Pretoria: Statistic South Africa.

StatsSA. (2018). Export and Import Unit Value Indices. Pretoria: Statistic South Africa. https://doi.org/10.1016/j.jconrel.2018.01.028

StatsSA. (2019). Manufacturing: winners and losers of 2018. Pretoria: Statistic South Africa.

Sorebo, A. (2018). Non-Monetary Price and Consumers' Intention to Buy. PEOPLE: International Journal of Social Science, 4(1), 45-53 https://doi.org/10.20319/pijss.2018.41.4553

Soreg, K.(2018). Long-Term Growth Dynamics of Emerging Economies In Light Of Jánossy's Trendline Theory. PEOPLE: International Journal of Social Science, 4(1), 571-590. https://doi.org/10.20319/pijss.2018.41.571590

Appendix A: VAR Lag Length Selection Criterion: Clothing

VAR lag order selection criteria						
Endogenous variables: lcpi_c lip_c Luc						
Exogenous variables: C						
Sample: 2010M01 2018M06						
Included observations: 94						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	454.069	NA	1.36e-08	-9.597	-9.516	-9.564
1	1016.728	1077.432	1.04e-13	-21.378	-21.053	-21.246
2	1049.882	61.370	6.25e-14	-21.891	-21.323*	-21.662*
3	1056.038	11.002	6.65e-14	-21.831	-21.019	-21.503
4	1073.587	30.243*	5.56e-14*	-22.012*	-20.957	-21.586
5	1080.127	10.853	5.89e-14	-21.960	-20.661	-21.436
6	1084.287	6.639	6.57e-14	-21.857	-20.315	-21.234
7	1094.249	15.262	6.50e-14	-21.878	-20.092	-21.156
8	1101.999	11.378	6.76e-14	-21.851	-19.822	-21.031

Source: Eviews output

VAR Lag Length Selection Criterion: Pharmaceutical

VAR lag order selection criteria						
Endogenous variables: lcpi_p lip_p Luc						
Exogenous variables: C						
Sample: 2010M01 2018M06						
Included observations: 94						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	420.099	NA	2.81e-08	-8.874	-8.793	-8.842
1	912.281	942.476	9.63e-13	-19.155	-18.830*	-19.024
2	931.697	35.940	7.72e-13*	-19.377*	-18.808	-19.147*
3	935.115	6.108	8.71e-13	-19.258	-18.446	-18.930
4	949.658	25.065	7.76e-13	-19.376	-18.321	-18.949
5	954.339	7.768	8.55e-13	-19.284	-17.985	-18.759
6	961.873	12.022	8.88e-13	-19.253	-17.710	-18.630
7	974.467	19.294*	8.31e-13	-19.329	-17.543	-18.608
8	980.122	8.302	9.04e-13	-19.258	-17.229	-18.438

Source: Eviews output

Appendix B: VECM: Short Run Results

Clothing industry							
Error Correction:	**D(lcpi_c_)**	**D(lip_C)**	**D(lulc)**		**D(lcpi_c)**	**D(lip_c)**	**D(lulc)**
CointEq1	-0.037	0.508	-0.1244	**D(lip_c(-1))**	-0.002	0.268	-0.004
	(0.014)	(0.184)	(0.043)		(0.008)	(0.107)	(0.002)
	[-2.650]	[2.75]	[-2.890]		[-0.247]	[2.508]	[-0.148]
D(lcpi_c(-1))	0.526	0.838	-0.321	**D(lip_c(-2))**	0.013	0.104	-0.017
	(0.107)	(1.419)	(0.331)		(0.008)	(0.110)	(0.026)
	[4.910]	[0.591]	[-0.970]		[1.599]	[0.950]	[-0.659]
D(lcpi_c(-2))	0.009	2.463	-0.282	**D(lip_c(-3))**	-0.019	0.085	-0.026
	(0.118)	(1.562)	(0.365)		(0.008)	(0.110)	(0.026)
	[0.076]	[1.576]	[-0.774]		[-2.226]	[0.766]	[-1.018]
D(lcpi_c(-3))	-0.043	-1.722	0.217	**D(lip_c(-4))**	0.001	0.007	-0.02
	(0.117)	(1.543)	(0.360)		(0.009)	(0.114)	(0.027)
	[-0.371]	[-1.116]	[0.604]		[0.140]	[0.057]	[-0.795]
D(lcpi_c(-4))	-0.023	1.813	0.120	**D(lulc(-1))**	0.056	-0.432	0.174
	(0.103)	(1.361)	(0.318)		(0.034)	(0.455)	(0.103)
	[-0.222]	[-1.332]	[0.378]		[1.671]	[-0.948]	[5.369]
Constant	0.001	0.006	0.005	**D(lulc(-2))**	0.045	-0.890	0.174
	(0.001)	(0.007)	(0.002)		(0.033)	(0.442)	(0.103)
	[1.702]	[0.797]	[2.738]		[1.333]	[-2.104]	[1.688]
@Trend	3.55e-06	-0.000	2.89e-05	**D(lulc(-3))**	-0.021	-0.409	-0.507
	(6.5e-06)	(8.6e-05)	(2.0e-05)		(0.035)	(0.463)	(0.108)
	[0.546]	[-1.364]	[-1.439]		[-0.590]	[-0.887]	[-4.701]
				D(lulc(-4))	0.0641	-0.178	0.2481
R-squared	**0.443**	**0.256**	**0.540**		(0.035)	(0.466)	(0.109)

Source: Eviews output

Appendix C: VECM: Short Run Results Pharmaceutical Industry

Error Correction:	**D(lcpi_p_)**	**D(lip_p)**	**D(lulc)**
CointEq1	-0.001	0.056	-0.033
	(0.008)	(0.027)	(0.043)
	[-0.109]	[2.074]	[5.055]
D(lcpi_p)	-0.071	-0.657	-0.069
	(0.103)	(0.363)	(0.091)
	[-0.691]	[-1.807]	[-0.757]
D(lip_p)	-0.024	-0.474	-0.018
	(0.028)	(0.335)	(0.083)
	[-0.874]	[1.551]	[-0.720]
D(lulc)	0.019	-0.474	0.576
	(0.095)	(0.335)	(0.083)
	[0.195]	[-1.414]	[6.898]
Constant	0.004	0.009	0.003
	(0.001)	(0.005)	(0.001)
	[2.776]	[1.756]	[2.367]
Trend	1.98e-06	-8.19e-05	-2.07e-05
	(2.2e-05)	(7.8e-05)	(1.9e-05)
	[0.089]	[-1.049]	[-1.063]
R-squared	**0.014**	**0.118**	**0.407**
Adj.R-squared	**-0.039**	**0.071**	**0.375**

Source: Eviews output

Appendix D: Diagnostic Results of the Model

Table 1: *Diagnostic Test of the Clothing Industry Model*		
Diagnostic test	P value	Decision
Serial correlation- LM test	0.21	No presents of serial correlation
Heteroskedasticity	0.05	No heteroscedasticity at 10 percent level
Normality-Jarque Bera test	0.0	Residuals not normally distributed

Table 2: *Diagnostic Test of the Pharmaceutical Industry Model*		
Diagnostic test	P value	Decision
Serial correlation- LM test	0.55	No presents of serial correlation
Heteroskedasticity	0.11	No heteroscedasticity
Normality-Jarque Bera test	0.0	Residuals not normally distributed