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Policy Research Working Paper 8942

Why South Africa Is Cheap for the Rich and Expensive for the Poor

Reconsidering the Balassa-Samuelson Effect

Vincent Dadam
Marek Hanusch
Nicola Viegi

WORLD BANK GROUP
Macroeconomics, Trade and Investment Global Practice
July 2019

Policy Research Working Paper 8942

Abstract

This paper investigates cross-sectoral productivity differentials in South African industry and their distributional consequences. The analysis shows that typically, traded sectors have experienced low productivity growth over the past decade, while skill intensive service sectors have had significant productivity growth. This is the inverse of the traditional Balassa-Samuelson sectoral transformation hypothesis, where high wages in high-productivity traded sectors increase wages throughout the economy, thus increasing prices on non-traded goods and revaluing the country's real exchange rate. Instead, the higher productivity of non-traded sectors experienced in South Africa induces a devaluation of the real exchange rate and a contraction of the traded sectors. The results of the estimation show evidence of this "inverse" Balassa-Samuelson effect for agriculture and manufacturing and in particular mining. This "inverse" Balassa-Samuelson effect has important distributional consequences: the high-productivity sectors are associated with cheaper goods and services for wealthy households. This in turn burdens poor households, which are more dependent on traded goods, with higher prices, which are a consequence of low productivity and high markups.

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Why South Africa Is Cheap for the Rich and Expensive for the Poor: Reconsidering the Balassa-Samuelson Effect *

Vincent Dadam†, Marek Hanusch‡, Nicola Viegi§

*The authors would like to thank Sebastien Dessus, Ha Nguyen, and Max Rudibert Steinbach for valuable comments.

†University of Pretoria email:dadamvince@yahoo.fr

‡World Bank, email:mhanusch@worldbank.org

§University of Pretoria and ERSA, email: nicola.viegi@up.ac.za

Key Points

- **South Africa's real exchange rate depreciation is large and persistent.** The persistent deviation from the law of one price is only partly explained by a traditional Balassa-Samuelson effect. Nevertheless, the Balassa-Samuelson analysis directs attention toward differentials in sectoral productivity.

- **Productivity in the traded sector is inversely related to the degree of openness of the economy**. The intuition of modern trade theory is that countries with high barriers to entry in international markets and low competitiveness in the domestic economy will have larger deviations from the law of one price. South Africa shows all the characteristics of a relatively closed economy, with high barriers to entry in international markets, and quite protected internal sectors.

- **Low productivity growth in the manufacturing and mining sectors is coupled with growing productivity in some service sectors, especially the ones with high skill intensity**. The picture of traded goods stagnation is matched by dynamism in some service sectors. The increase in productivity in some service sectors makes the services relatively cheaper than goods in less productive sectors. This is reflected by sectoral differences in inflation rates.

- **The Balassa-Samuelson logic is reversed.** The increase in productivity in the service sector has a spillover effect into the goods sector in the form of an increase in wages: this logic is reflected in the increase in the unit labor cost in the manufacturing sector being largely decoupled from productivity increases.

- **Firms in the traded sectors reduce employment or require protection from external competition.**Firms in the manufacturing sector will respond to the increase in labor costs either by reducing their labor force or by demanding higher levels of protection against competition from more productive external competitors. The negative spiral of low productivity and low competitiveness is thus self-reinforcing, with the increasingly monopolistic nature

of the traded goods sector reducing productivity, thus limiting access to international markets.

- **The process is reinforced when considering sectoral skill intensity.** The service sectors that have experienced greater productivity growth are also the most skill-intensive. Skills are therefore rewarded by increasing productivity and increasing the skill premium. Low-skilled workers in the high-productivity service sectors benefit as well with an increase in wages. The manufacturing sector will instead shrink and become more inward oriented.

- **Intersectoral productivity differences have distributional consequences.**Inflation will be lower in the sectors that have a larger weight in higher income groups while the poor will be burdened by the price of low productivity and high mark-ups in the inward-looking production sectors.

- **Increasing productivity in the traded sector is a necessary condition for a rebalancing of the economy.** To achieve inclusive growth the South African economy requires significant growth in traded sector productivity. This can be achieved by reducing the barriers to entry of South African firms in the international value chain (by promoting integration in international value chains, supporting exports to reduce the "gravity" effect on trade costs, and by reducing barriers to entry in the domestic market).

- **Reducing the skill constraint would drive a reduction of the skill premium and rebalance intersectoral distribution of skills.** This is a priority not only to improve the productivity dynamic in the country, but also to deal with long-term distributional issues. Skills are the most important commodity to import and in which to invest.

1 Introduction

It is well known that the difference in price levels across countries correlates with the difference in income levels. The main explanation for this observation, illustrated in Figure (1), is generally found in the Balassa-Samuelson effect (Balassa (1964), Samuelson (1964)) that links the differences in income levels with differences in productivity in the traded sector.

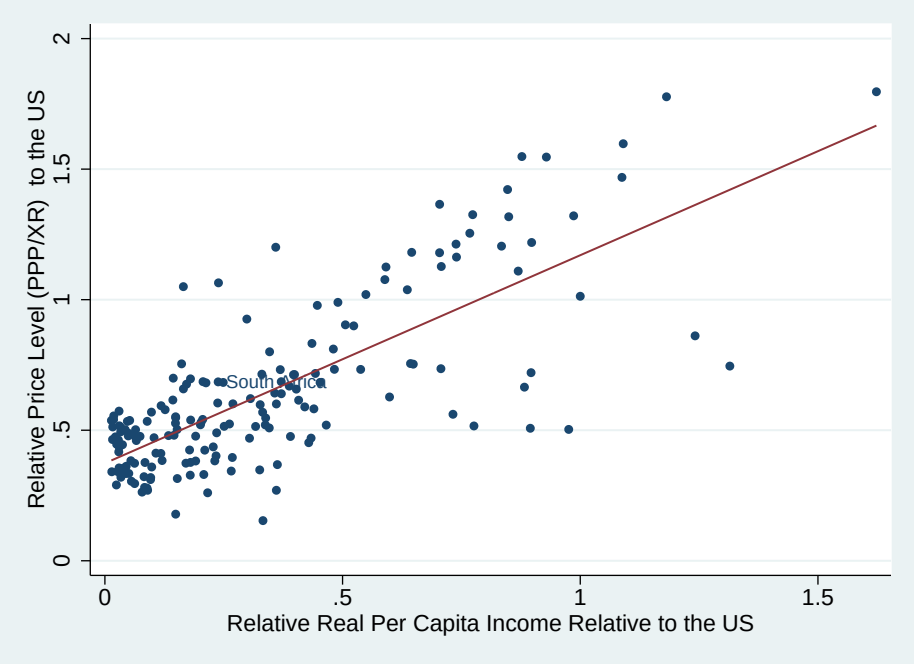

Figure 1: Price Level and Income Level (source; Penn World Tables)

In its original formulation, it states that a country will experience an appreciation of the equilibrium real exchange rate (i.e. an increase of home prices relative to foreign prices) when an increase in productivity in the *traded* sector leads to an increase in local wages in *any* (i.e. traded and non-traded) sector. The generalized increase in wages induces an increase in prices in non-traded sectors and thus an increase in the general level of prices.

The Balassa-Samuelson analysis then offers a guidance to understanding the process of sectoral changes during episodes of growth convergence in a small open economy, that is benefiting from productivity spillovers from global trade integration (Cravino and Haltenhof, 2017).

South Africa's price level does not show any consistent pace of convergence towards the law of one price, especially in the last 10 years (Nguyen, 2018). Figure 2 shows the evolution of South African prices of household consumption and per capita income relative to the United States from 1990 to 2017. South African prices have declined from 55 % of United States prices in 1990 to 45% in 2017. This pattern of decline is matched by a similar pattern of relative per capita income, indicated by the blue line in figure 2. The close correlation between relative price and income movement suggests that the Balassa-Samuelson intuition of a link between the level of prices and productivity growth can be applied to understand the real exchange rate dynamics in South Africa.

Figure 2 illustrates the main proposition that South Africa has not seen any significant convergence with international prices, which is possibly a direct effect of sluggish growth performances in South Africa.

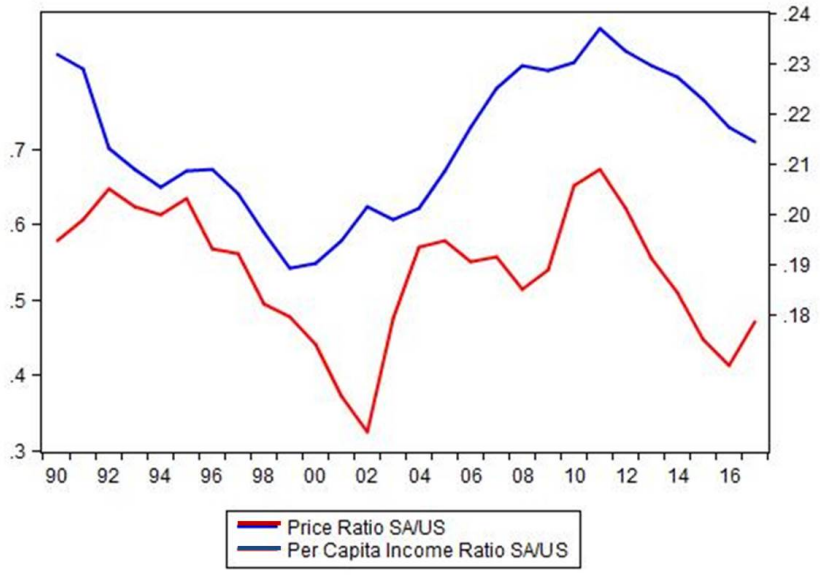

Figure 2: Purchasing Power Parity and Per Capita Income Convergence to United States Levels 1990-2017 (Source: Authors' Calculations on Penn World Table Data)

In this paper we discuss how to use the Balassa-Samuelson framework to understand some of the structural transformations in South Africa. The persistent deviation from the law of one price

is a reflection of complex inter-sectoral dynamics. High transport costs and other barriers to entry reduce the productivity dynamics in the traded sectors. Domestic firms operate for the domestic market with low productivity and high mark-ups, affecting the distribution of rents between capital and labor (Fedderke et al., 2018). Few sectors, especially the service sectors, finance and insurance, have seen positive productivity dynamics, driven by technological innovation and liberalization after the 1990's.

The biggest effect of this increase in productivity of the service sectors is reflected in a change of the relative prices and an increase of the relative size, with resources moving from the low-productivity to the high-productivity sectors. This reinforced the relative weakness of low-productivity sectors, which find it even more difficult to enter international markets.

The logic of the Balassa-Samuelson effect is reversed: technical and efficiency innovations in non-traded sectors increase their productivity, thus putting upward pressure on economy-wide wages. This increase in wages has spillover effects in the traded sector, which is a price taker on the world market. The increase in labor costs induces a contraction of the use of labor in the traded sector and possibly an overall contraction of the sector. The real exchange rate remains depreciated; more resources are invested in the non-traded sectors; and non-traded goods become relatively less expensive than the internationally determined prices of tradeable goods. This dynamic has sectoral and distributional effects that are the focus of this paper.

Th relative price changes have important distributional effects in a very unequal society. The main productivity gains are made in the sectors servicing mainly the top end of the income distribution, making the economy relatively cheaper for them and more expensive for the poor. A rebalancing of productivity dynamics is important not only for growth but also from the perspective of equity.

The paper is organized as follows: in the next section we review the sectoral productivity dynamic in South Africa and link it to recent literature on the endogeneity of the Balassa-Samuelson effect when considering trade costs and barriers to entry in the traded sectors (Ghironi and Melitz, 2005). Section 3 presents a simple empirical analysis to show the relationship between relative sectoral productivity dynamics and the relative size of the sectors. Finally in section 4 we assess

the distributional consequences of the observed productivity dynamics. In particular, we look at the relationship between the real exchange rate and inequality in the country and how productivity growth in the traded sector might also require social rebalancing.

2 Balassa-Samuelson in South Africa: Some preliminary observations

The traditional Balassa-Samuelson analysis is based on an exogenous definition of the traded and non-traded sectors often identified as goods and services. The problem is that a strict definition of traded and non-traded sectors conflicts with a simple observation: in all sectors, the proportion of firms that do not trade internationally represents the vast majority of the firms, with maybe the exception of the mining sector. Consider, for example, the following table from (Edwards et al., 2018)

The table shows that almost 70% of all manufacturing firms in South Africa do not trade. This is possible if we consider a world with heterogeneous firms, with different levels of productivity, producing heterogeneous products which do not have perfect substitutes. Less productive firms can survive because they are partly protected from external competition. This observation is not specific to South Africa: the literature shows that in the United States only 21% of manufacturing plants export and there is a lot of switching from traded to non-traded goods in the same plants.

Moreover, in principle all sectors have traded components. The following graph shows the proportion of sectoral product exported for primary, secondary, and tertiary sectors in South Africa in

	2009	2010	2011	2012	2013	Average
Exporter only	6.2	7.2	7.1	7.1	7.2	7.0
Exporter and importer	16.3	17.7	17.2	17.9	15.9	17.0
Importer only	9.2	8.4	8.2	7.7	7.7	8.2
Non-trader	68.4	66.6	67.5	67.2	69.2	67.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 1: Manufacturing Firm Engagement in International Trade, (Share of firms, %)(source (Edwards et al., 2018))

2016. Clearly there is a difference in export intensity across sectors, with, as expected, manufacturing, mining and agriculture having a much higher proportion of exported product. Nevertheless, all sectors export.

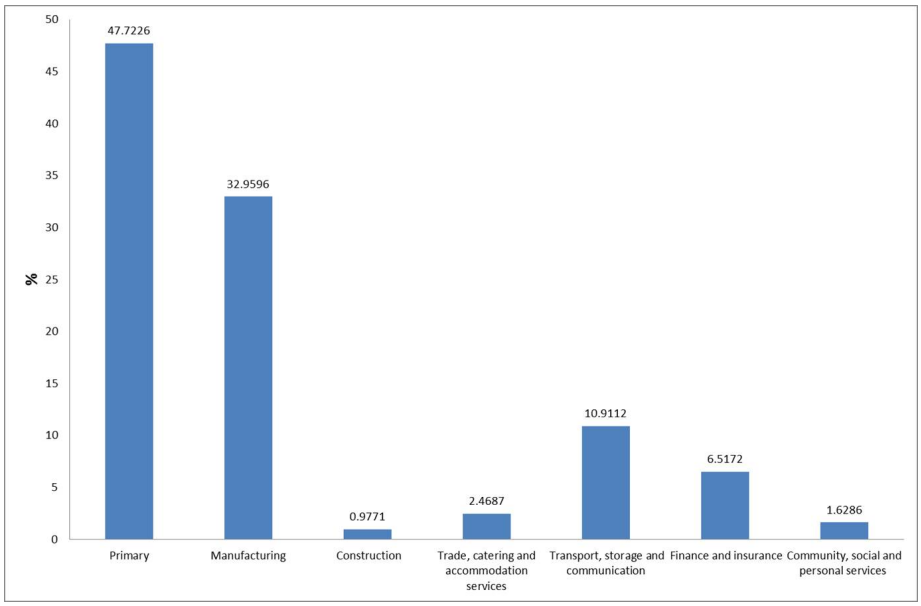

Figure 3: Export-output ratio by sectors 2016 (source; Quantec Industrial Dataset)

The simple perfect competitive, homogeneous goods framework of Balassa-Samuelson cannot capture this complexity. But the logic of the Balassa-Samuelson effect can be extended to a world of heterogeneous firms that are engaged in monopolistic competition in local and international markets (Ghironi and Melitz, 2005). Firms enter international markets when they can overcome both fixed entry costs and higher variable costs. Similar costs are incurred by foreign firms wanting to enter the national market. Thus, firms engaged in international trade need to be more productive, while the least productive firms opt instead to serve the local markets, especially if they are protected by barriers to entry against international competition, or they exit the market altogether.

How does this structure link with the Balassa-Samuelson effect? Let's consider a relative reduction in productivity in South Africa or an increase in entry costs, which are often associated with lower income per capita and higher prices. In the logic of (Melitz, 2003) and (Ghironi and Melitz, 2005), South Africa becomes less attractive for prospective entrants, and thus the cost of labor in

the country should decrease relative to the rest of the world in order to keep labor employed. This will cause the relative prices of non-traded goods in any sector to reduce, thus depreciating the real exchange rate.

In normal circumstances, the lower relative labor cost should increase the export profitability of home firms, thus reducing the profit cut-off point that makes entering the export market convenient for home firms (only the most productive firms export). This is constrained by what determines the fixed cost of entry in the export market: the higher the cost of entry (both of national firms in the export market and foreign firms in the domestic), intended as physical, regulatory and economic (volatility and market structure), the larger the distance between national and international prices, as the economy will have a much larger proportion of less productive non-trading firms.

The logic of Balassa-Samuelson is maintained at the level of each individual sector: assume that labor has the same price across sectors, but the productivity of firms is differentiated: trading firms are more productive as a necessary condition to access the international market as they have to pay the cost of entry in the international market; non-trading firms are less productive but survive because they do not have to pay the fixed cost of entry in the international market. Wages will be higher the larger is the number of high productive firms in the market. The least productive firms will cover the increase in wages, due to the high productive firms, by increasing prices, thus replicating the Balassa-Samuelson inflation effect of productivity catch up.

The most important implication of the Balassa-Samuelson effect in the South African context is that the difference in prices across countries reflects differences in productivity levels, as they are reflected in differences in wage levels. The first observation is therefore that the South African real exchange rate is depreciated because of dismal productivity performances that have characterized this economy over the past 20 years.

In practice, the Balassa-Samuelson reasoning focuses our attention on the role of productivity in the export sectors as the source of productivity growth and wage increases. Either in the traditional perfect competitive framework or in the most recent models of monopolistic competition we need to first consider the sectoral composition of South Africa's traded sector. As far as trading in goods is concerned, the following graph from the Atlas of Economic Complexity shows the composition

of South African exports.

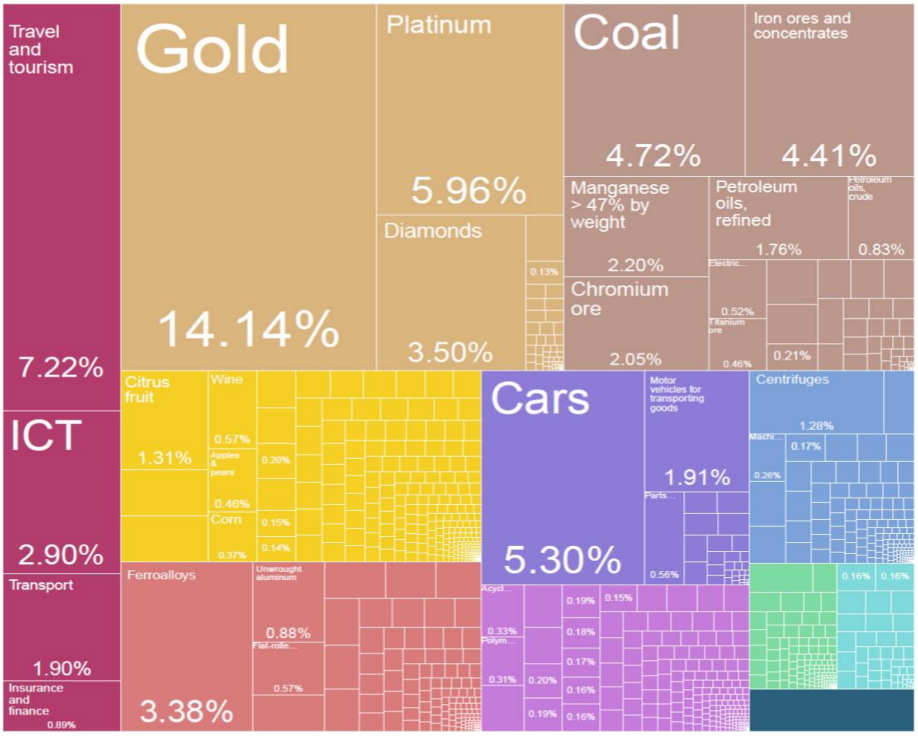

Figure 4: Composition of South African exports in 2017 (source: Atlas of Economic Complexity

More than 50% of South African exports are in sectors where South Africa is a price taker, *i.e.* minerals and stones (the dark and light brown area in figure 4), metals (lower pink area in the figure) and agricultural products (the yellow area). In these sectors the traditional Balassa-Samuelson logic follows.

What has the productivity development in these sectors been? The grey line in Figure 5 indicates that these sectors have been characterized by slowing productivity growth from the 1990's with a sharp decline in productivity after 2006.

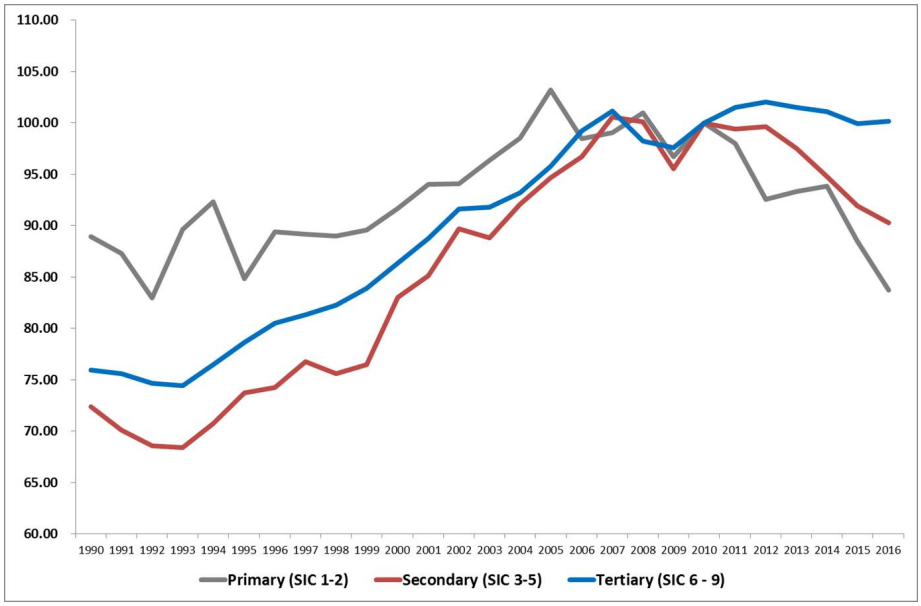

Figure 5: Multifactor productivity by sector - Index 2010=100 (Source: Quantec industry database.

What about manufacturing, the second sector with the highest proportion of exported production? The red line in Figure 7 shows that the manufacturing sector contributed to the productivity growth of the economy from 1994 to 2006. The growth in productivity stops after that and starts to decline after 2010.

The only sectors that show any productivity dynamics, especially in the last 10 years, are sectors traditionally considered non-traded, *i.e.* construction and more importantly, finance and insurance. These are also the sectors where the difference in productivity with the rest of the world is lower (Inklaar and Timmer, 2014).

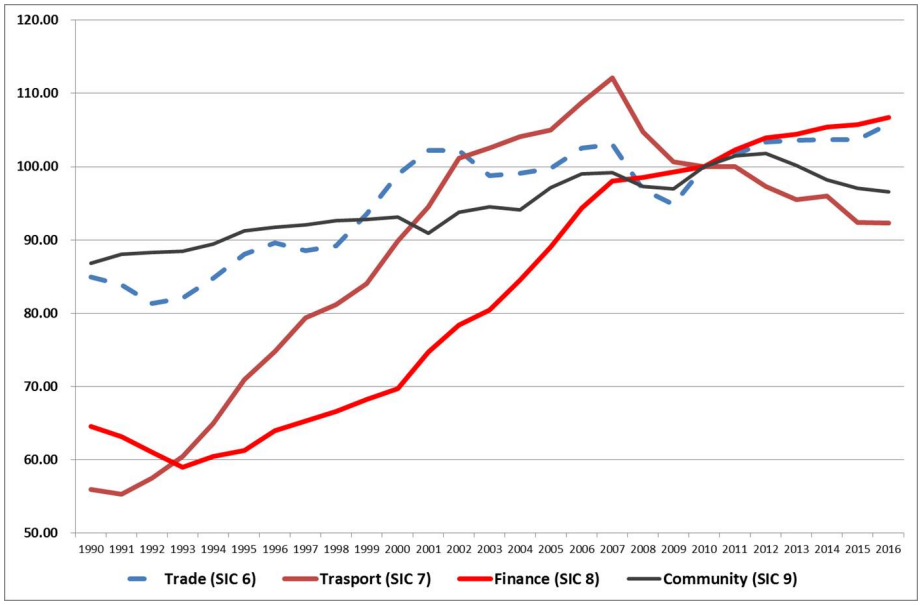

Figure 6: Multifactor productivity in service sectors (Source: Quantec Industry Database

In particular, the finance and insurance sector seems to play have a significant role in sectoral differences in productivity. The observation that service sectors have seen the biggest increase in productivity is confirmed looking at the evolution of the price of services relative to the general Gross Domestic Product deflator.

The sluggish productivity performance in the traded sector is inversely related to widespread barriers to international integration of the South African economy. The intuition of modern trade theory is that countries with high barriers to entry in international markets and low competitiveness in the domestic economy will have low productivity performances, inducing low growth and large deviations from the law of one price.

3 Balassa-Samuelson in South Africa: Sectoral analysis

The observations covered thus far have implications that are worth exploring empirically. There is a large literature evaluating the Balassa-Samuelson hypothesis, especially as an explanation of the inflation differential between developing and developed countries (see for example Bordo et al.

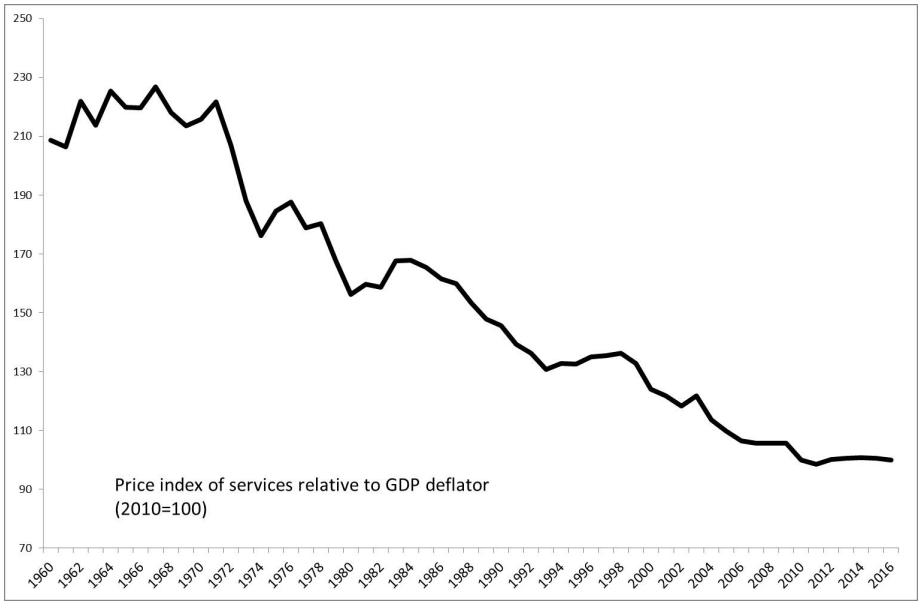

Figure 7: The Relative Price of Services in South Africa (Source: Author calculation on South African Reserve Bank Data)

(2017)). Recently the Balassa-Samuelson effect has been widely applied to explain the structural transformations and convergence of Eastern European economies. For instance, Celiku and Hoxholli (2009) estimate the Balassa-Samuelson effect for Albania, while Konopczak and Torój (2010) disaggregates between Baumol-Bowen and Balassa-Samuelson effects in the Polish economy. In all these cases, countries with high productivity in the tradable sector face higher inflation rates than countries with more balanced productivity growth: the additional inflation emanates from the non-tradable sector lagging in productivity but facing pressures from higher production and labor costs.

This means that the Balassa-Samuelson effect can be identified by looking at sectoral price differential and how it relates to productivity differential, the so called Baumol-Bowen effect (Baumol and Bowen, 1965).

The empirical framework we are going to use can be easily illustrated with a simple two sector open economy model. One sector produces for the domestic market (N for non-traded goods and services) and one sector exports (T for traded goods and services). Capital and labor are assumed

to be perfectly mobile across sectors. Regarding labor, this assumption has important implications in terms of the evolution of wages. In particular, perfect cross-sectoral mobility implies that in the long run wages between sectors are equal. In the alternative scenario, the incentive is that employees will change sectors until growing labor supply in the sector where earnings are high, combined with decreasing labor supply in the other sector would level the wages in the economy. We assume for simplicity perfect competition across sectors and that produce goods and services using a Cobb-Douglas production function with constant returns to scale. Thus, production in the traded and non-traded sector is done using the following two production function, one for each sector:

To investigate how divergent productivity dynamics between traded and non-traded sector explains for cross-sectoral inflation differential, we begin with the following two production functions, one for each sector:

$$Y_{t,T}(K_T, L_T) = A_{t,T} L_{t,T}^{\alpha_T} K_{t,T}^{1-\alpha_T} \tag{1}$$

$$Y_{t,N}(K_N, L_N) = A_{t,N} L_{t,N}^{\alpha_N} K_{t,N}^{1-\alpha_N} \tag{2}$$

where $Y_{t,T}$ and $Y_{t,N}$ are the output produced in the trade and non-traded sectors, $A_{t,T}$ and $A_{t,N}$ are the total factor productivity in the two sectors, $L_{t,T}$ and $L_{t,N}$ denotes the labor input, $K_{t,T}$ and $K_{t,N}$ are the capital inputs, α_T and α_N are labor elasticities of output.Firms in each sector face a standard profit maximization problem:

$$\max_{L_T, K_T} \left\{ P_{t,T} A_{t,T} L_{t,T}^{\alpha_T} K_{t,T}^{1-\alpha_T} - w_{t,T} L_{t,T} - r_t K_{t,T} \right\} \tag{3}$$

$$\max_{L_N, K_N} \left\{ P_{t,N} A_{t,N} L_{t,N}^{\alpha_N} K_{t,N}^{1-\alpha_N} - w_{t,N} L_{t,N} - r_t K_{t,N} \right\} \tag{4}$$

in which $P_{t,T}$ and $P_{t,N}$ denote the level of price in each sector, $w_{t,T}$ and $w_{t,N}$ denote wages in the traded and non-traded sector respectively, and r_t is the cost of capital.

Computing the first order conditions, we have:

$$\alpha_T P_{t,T} A_{t,T} K_{t,T}^{1-\alpha_T} L_{t,T}^{\alpha_T - 1} - w_{t,T} = 0 \tag{5}$$

$$\alpha_N P_{t,N} A_{t,N} K_{t,N}^{1-\alpha_N} L_{t,N}^{\alpha_N - 1} - w_{t,N} = 0 \tag{6}$$

which in turn implies that wages in each sector can be written as:

$$w_{t,T} = \alpha_T P_{t,T} A_{t,T} \left(\frac{L_{t,T}}{K_{t,T}} \right)^{\alpha_T - 1} \tag{7}$$

$$w_{t,N} = \alpha_N P_{t,N} A_{t,N} \left(\frac{L_{t,N}}{K_{t,N}} \right)^{\alpha_N - 1} \tag{8}$$

Given the long term wage homogeneity assumption [1], we can write:

$$\alpha_T P_{t,T} A_{t,T} \left(\frac{L_{t,T}}{K_{t,T}} \right)^{\alpha_T - 1} = \alpha_N P_{t,N} A_{t,N} \left(\frac{L_{t,N}}{K_{t,N}} \right)^{\alpha_N - 1} \tag{9}$$

Rearranging 9 to express the equation in terms of ratio of prices between the two sectors gives the following:

$$\frac{P_{t,N}}{P_{t,T}} = \frac{\alpha_T A_{t,T} \left(\frac{L_{t,T}}{K_{t,T}} \right)^{\alpha_T - 1}}{\alpha_N A_{t,N} \left(\frac{L_{t,N}}{K_{t,N}} \right)^{\alpha_N - 1}}$$

$$\frac{P_{t,N}}{P_{t,T}} = \frac{\alpha_T A_{t,T} L_{t,T}^{\alpha_T} K_{t,T}^{1-\alpha_T} L_{t,T}^{-1}}{\alpha_N A_{t,N} L_{t,N}^{\alpha_N} K_{t,N}^{1-\alpha_N} L_{t,N}^{-1}}$$

$$\frac{P_{t,N}}{P_{t,T}} = \frac{\alpha_T \frac{Y_{t,T}}{L_{t,T}}}{\alpha_N \frac{Y_{t,N}}{L_{t,N}}} \tag{10}$$

We can now log linearize 10 and assuming that $a_{t,T} = ln\left(\frac{Y_{t,T}}{L_{t,T}}\right)$ and $a_{t,N} = ln\left(\frac{Y_{t,N}}{L_{t,N}}\right)$ are labor productivities for traded and non-traded sectors respectively, we can rewrite equation 10 as follows:

$$p_{t,N} - p_{t,T} = \alpha_T - \alpha_N + a_{t,T} - a_{t,N} \tag{11}$$

in which variables in lower-case letters are natural logarithms of their upper-case counterparts.

Our empirical exercise starts from equation 11 which describe the Baumol-Bowen effect, *i.e.* the

[1] Wage homogeneity is clearly a very unrealistic assumption, given the strong sectoral wage disparities in the country. Nevertheless, for the model to work what is required is homogeneity in the direction of wage response to a change in productivity in one sector, which is a less stringent condition.

sectoral relationship between price differential and productivity differential. We estimate 11 using South African sectoral data. In particular, we assume that agriculture, mining and manufacturing are typically traded sectors, broadly guided by the observations in Figure 3. The rest are treated as non-traded sectors as listed in Table (2).

Tradable sector	**Non-tradable sector**
Agriculture	Electricity, gas and water
Mining	Construction
Manufacturing	Trade, catering and accommodation services
	Transport, storage and communication
	Finance, insurance, real estate and business services
	Community, social and personal services sectors

Table 2: Traded and non-traded sectors classification

Prices are defined as indices of output prices. labor productivity on the other hand is calculated as the ratio of total output (which also includes intermediary output) to total employment per sector. Our data covers the period 1993 to 2017 and were collected from Quantec Research.

As a baseline scenario we begin by conducting a fixed effects estimation of equation (11). The results are reported in Table (3)

The results are broadly in line with expectations. We find a positive relationship between sectoral price differential and the difference in productivity between traded and non-traded sectors. In particular, it confirms the intuition that an increase in productivity in non-traded sectors reduces prices of the non-traded relative to traded sectors, thus devaluing the country real exchange rate.

The baseline specification in Table (3) can be improved statistically by taking into consideration the data generating process in the panel, which shows indication of non stationarity in the series. We therefore use the Pool Mean Estimator of Pesaran et al. (1999) to re-estimate the relationship in equation (11) while considering both the long run relationship and the adjustment dynamics. The results are summarized in Table (4).

	(1) Agriculture $p_{t,N} - p_{t,Agr}$	(2) Manufacturing $p_{t,N} - p_{t,Man}$	(3) Mining $p_{t,N} - p_{t,Min}$
$a_{t,Agr} - a_{t,N}$	0.268***		
	(11.36)		
$a_{t,Man} - a_{t,N}$		0.445***	
		(8.64)	
$a_{t,Min} - a_{t,N}$			1.463***
			(14.87)
Constant	0.134***	-0.161***	-0.257***
	(8.82)	(-10.23)	(-9.35)
N	150	150	150

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Fixed Effect Estimates

The statistical analysis confirms the presence of a Baumol-Bowen effect for all traded sectors, with robust long run coefficients in line with the baseline regression in table 3 and a strong short adjustment mechanism for agriculture and manufacturing. The price effect of productivity differential is particularly strong in the case of mining which is also the sector with the highest proportion of exported output, between 70% and 80% of mined value. This suggests that the relationship between sectoral productivity and relative prices at the basis of the Balassa-Samuelson effect is particularly evident for the sector that is more clearly a traded sector and a price taker in the international market. The strong relationship between productivity differential and price differential in mining is obtained by excluding from the panel the electricity sector which is an important input in the mining industry. The electricity sector in South Africa is a public monopoly with price controls; it has had exponential increases in prices in a short period to cover large infrastructure expenditure and debt servicing, but which were not justified by a change in productivity, thus distorting the underlying relationship.

For the manufacturing and agriculture sector, the relationship between the productivity differential and price differential is less pronounced quantitatively, probably reflecting the imperfect

	(1) Agriculture $p_{t,N} - p_{t,Agr}$	(2) Manufacturing $p_{t,N} - p_{t,Man}$	(3) Mining $p_{t,N} - p_{t,Min}$
Long Run			
$a_{Agr} - a_N$	0.180***		
	(8.17)		
$a_{Man} - a_N$		0.119**	
		(2.83)	
$a_{Min} - a_N$			1.162***
			(3.45)
Short Run			
Error Correction	-0.489***	-0.403***	-0.0986***
	(-7.01)	(-6.28)	(-4.45)
$\Delta a_{Agr} - a_N$	0.115***		
	(4.86)		
$\Delta a_{Man} - a_N$		0.0763	
		(0.71)	
$\Delta a_{Min} - a_N$			0.399*
			(2.39)
Constant	0.0294**	-0.0274*	-0.0553*
	(2.70)	(-2.38)	(-2.30)
N	120	120	120

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Pool Mean Regression Estimation

classification of these two sectors as traded sectors. In the manufacturing sector, there is evidence of a long-term relationship, evidence of adjustment dynamics but an insignificant short term relationship. Although the short-run coefficient estimate is of the expected sign, it remains statistically insignificant, independently of the specification. In the long run we find a significant but relatively weaker than in agriculture. In particular, an increase of 1 percentage point in the difference between traded and manufacturing sector labor productivity raises the price differential between non-traded and manufacturing sector by 0.11 percentage point in the long run. For comparison, Konopczak and Torój (2010) using manufacturing sector as traded sector and similar non-traded sectors for

Poland, find a coefficient of 0.2 using a Fully Modified Ordinary Least Square (FMLOS) and 0.19 using a Dynamic Ordinary Least Square (DOLS).

The finance sector has a particular place in the debate about South Africa economic transformation (Rodrik (2008), Fedderke (2014)). Its size is disproportionate relative to the size of the economy and it has experienced a significant wave of innovation and integration in the international capital markets after 1994. It is therefore instructive to isolate the effect of increasing productivity of the financial sector on the relative prices. The results are displayed in Table (5).

	(1) Agriculture $p_{t,N} - p_{t,Agr}$	(2) Manufacturing $p_{t,N} - p_{t,Man}$	(3) Mining $p_{t,N} - p_{t,Min}$
$\Delta a_{Agr} - a_{Fin}$	0.177***		
	(3.81)		
$\Delta a_{Man} - a_{Fin}$		0.426***	
		(5.26)	
$\Delta a_{Min} - a_{Fin}$			1.560***
			(10.03)
Constant	0.0675*	-0.175***	-0.343***
	(2.40)	(-6.40)	(-6.97)
N	25	25	25

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Sectoral Effect of Finance Productivity

The results are qualitatively in line with the general results, but the effects are quantitatively much larger for manufacturing and mining. For manufacturing, an increase in the difference in productivity of 1 % will increase the price differential between manufacturing and finance by almost half of a per cent. For mining, the change in relative prices is even stronger, with the change in productivity differential increasing the price differential by more than one to one.

4 Real Exchange Rate and Inequality

The relationship between differences in productivity and difference in prices illustrated above can have strong distributional consequences in a very unequal society, where consumption baskets a very heterogeneous across income groups. Inequality is the defining characteristic of the South African economy. Whatever measure of inequality is used, South Africa comes always at the top of any inequality index, which is a reflection of both its history and of the structural changes after the end of apartheid.

Although South Africa's real exchange rate is in line with comparable countries, the economy is considered expensive for the majority of the population. This is often the main explanation for strong downward rigidity of wages even in the presence of an extraordinarily high unemployment rate. The affordability of the South African economy, defined as the ability of the majority of the population to access goods and services, given the prevalent income, is a combination of relative price distribution and the level of income inequality. The South African economy is very unequal and the dynamic of productivity, as will be illustrated in the next sections, increases the burden on the poorest part of the population, who are more dependent on good produced in the less productive part of the economy.

Following Leibbrandt et al. (2016), we investigate the expenditure categories that have promoted a gap between the inflation rates of poor and non-poor households. The methodology is explained in detail in the appendix. Focusing on the period 2009-2017 and using the 2014/2015 Living Conditions of Households in South Africa, we assess price changes from the CPI basket of goods and services to which poor households were overexposed. These are typically items from the CPI basket for which inflation rates for poor households exceeded those of richer households during the period considered. Our results are consistent with the findings of Leibbrandt et al. (2016) while using a different dataset and a different and more recent time period, demonstrating that this evidence is a constant distributional issues over the last 20 years. Figure 8 plots the average annual percentage change in price relative to the ratio of weights of the bottom 4 deciles relative to the top 6 deciles. The horizontal line in the graph is the average inflation rate during the period considered, while

the vertical line separates categories in which poor households are under-exposed (left of the line) from categories where they are over-exposed (right of the line).

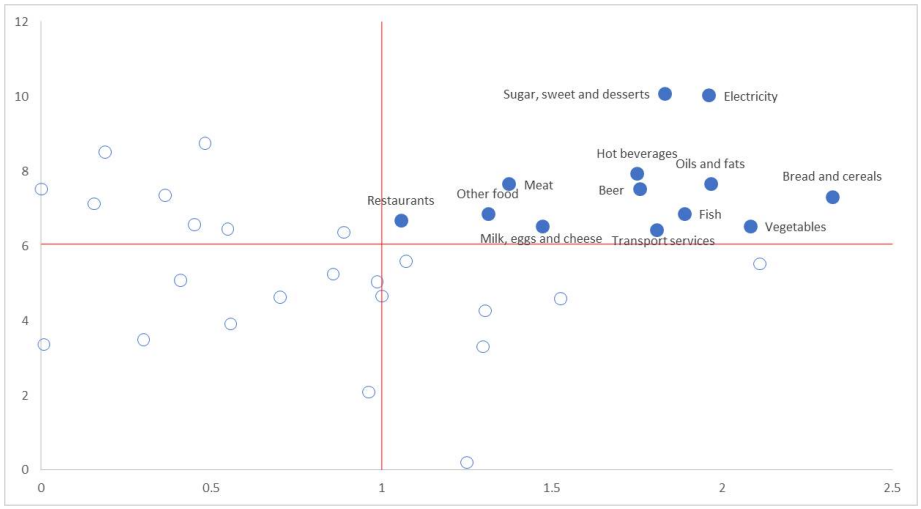

Figure 8: Poor households exposure to high-inflation expenditure categories, 2009-2017 (Source: Authors' calculations, Living Conditions of Households in South Africa 2014-2015 - StatSA

A couple of points are worth highlighting from Figure (8). Expenditure categories with high relative weights that witnessed-above inflation increases during 2009-2017 are for the most part food categories. These items are responsible for the widening gap between poor and non poor households, given that they constitute the largest part of spending by poor households. The highest rate of price increase, though, is in electricity (a non-traded sector in our analysis) which saw an average increase of 13.2 % between 2009 and 2017. The importance of electricity in the consumption basket of poor households makes the resolution of the sector crisis an important goal for growth and also distributional reasons.

The analysis also shows items in expenditure categories for poorer households in which the increase in prices has been below or around average inflation but that carry relatively high expenditure weights. These items include clothing, footwear, postal services, cold beverages and transport services. Postal services prices, for example, remained virtually unchanged during the time period in consideration while transport services saw an average price increase in line with overall average inflation. Other items that have seen above average inflation but that are more important in the

consumption basket of upper income households (in the left-high quadrant of figure 8) are water, primary and secondary education and to a lesser extent, medical services.

These findings are in line with Leibbrandt et al. (2016) which further emphasizes that the living conditions of poor households have not significantly improved, given that our study focuses on a more recent sample period. Furthermore, this analysis shows that while the South African economy is relatively cheap, the cost of goods and services used by the poorest part of the population is relatively high and is increasing. This difference is made more dramatic if we consider the highly skewed distribution of income and the very low level of participation in the labor market.

The final characteristic of the South African economy that needs to be considered is the very high skill premium driven by the skill intensity of the public sector and part of the service sector, in particular finance. Because of the skill intensity in the service sector, and the relatively closed nature of the traded sector, the productivity in the service sector is growing faster than the productivity in the traded sector.

If this is the case, this would reduce the prices of services relative to the prices of goods by increasing wages in the traded sectors by more than the sector increase in productivity. This would not only reinforce the depreciation of the real exchange rate, but also it would penalize households with a consumption basket with a higher content of traded goods.

5 Conclusion

The paper has discussed the role of sectoral productivity differential in explaining internal price dynamics and external real exchange rate evaluation. The increased productivity differential between non-traded and traded sectors in favor of the non-traded sector reinforces inequalities in the country, increases wage differentials between skilled and unskilled workers and moves resources away from low-skilled manufacturing jobs towards high-skilled service jobs.

Therefore, achieving inclusive growth in South Africa requires an increase in productivity and wages in the traded sectors. Bringing down barriers to entry, integrating South African firms into regional and international value chains, and promoting competition among firms to boost their

competitiveness are likely to reach that goal. Additionally, the South African labor market displays a significant shortage of skilled workers. Addressing this issue will essentially boost productivity dynamics across sectors while at the same time reducing the skill premium and rebalancing the distribution of skills across sectors.

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Appendix: Poor households' exposure to high inflation

The appendix details the methodology used to plot figure (8), which captures poor households' exposure to high inflation expenditure categories from 2009 to 2017. First, we obtain data on the share of expenditures by deciles for some items in the CPI baskets from the 2014-2015 Living Conditions of Households in South Africa (36 items in total), and their corresponding weights in the CPI. The Living Conditions of Households is an analysis of household expenditure and income data that provides relevant information on household consumption expenditure patterns, which is important to update the CPI basket of goods and services and assess poverty levels and patterns.

The share of expenditure by deciles is then applied on CPI weights for each item to calculate CPI weights by expenditure deciles using the following formula:

$$w_{i,j} = w_i \frac{s_{i,j}}{S_i}$$

where $w_{i,j}$ is the CPI weight of item i for decile j, w_i is the CPI weight of item i, $s_{i,j}$ is the share of expenditure on item i for individuals in decile j, and S_i, is the total share of expenditure on item i. We then calculate the average of CPI weights by expenditure deciles for the bottom 4 deciles and that of the top 6 deciles for each item. The ratio of the two gives the horizontal axis in figure (9). For the vertical axis, we calculate the annual inflation rate for each item. The average ratio of the bottom 4 deciles to the top 60 deciles gives the vertical line in the graph separating categories in which poor households are under-exposed to price changes (left of the line) from categories where they are over-exposed (right of the line). The horizontal line on the other hand is the average inflation during the period 2009-2017.

In the paper we report only the results for headline CPI. The results for total country CPI are in figure (9), which covers the same period.

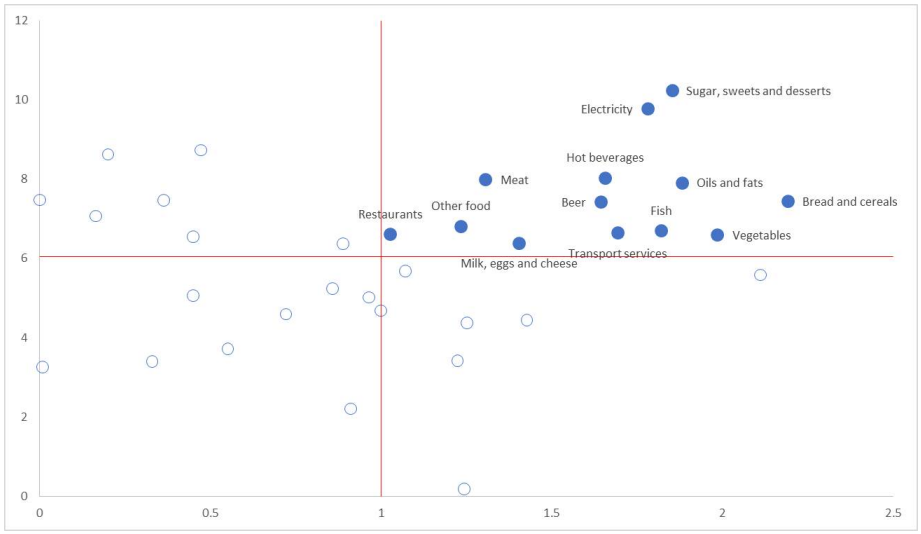

Figure 9: Poor households exposure to high-inflation expenditure categories, 2009-2017 (Source: Authors' calculations, Living Conditions of Households in South Africa 2014-2015 - StatSA