Economic Impact of the Health Promotion Levy on the Sugar Market Industry

Impact Assessment Report

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Authors

Wesbound (PTY) Ltd

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1. EXECUTIVE SUMMARY

In February 2016, alongside with the tabling of the 2016/17FY national budget before Parliament, the Minister of Finance announced the government's plan to introduce a levy on sugar-sweetened beverages (SSBs), formally termed the Health Promotion Levy (HPL). The announcement was a culmination of a series of studies from the Department of Health (DoH) and the World Health Organisation (WHO), which highlight obesity as a key factor behind the rapid rise in non-communicable diseases (NCDs), especially among vulnerable groups such as women, the poor and more recently, young children. The overarching policy objective of the HPL (from a national government standpoint) is to reduce the amount of sugar content in SSBs, as part of a national government campaign to reduce obesity in South Africa.

This report constitutes the second deliverable in a series of studies commissioned by the National Economic Development and Labour Council (NEDLAC) to investigate the socio-economic impact of the HPL. This study specifically investigates the levy's impact on overall employment and economic output, as well as the HPL's impact on directly affected industries: sugar and SSBs. The analysis is conducted using a two-step analytical approach. First, we provide an in-depth review of the sugar and SSBs industries in South Africa, shedding some light on the structure of each industry along the value chain as well as providing a historical account of employment and production trends. In the second part of the study, we quantify the economic impact of the levy (specifically on jobs and output).

The value chain analysis extends coverage to both upstream and downstream sub-sectors. In the upstream segment (mainly comprising of sugarcane growers and millers), it is clear that the HPL was introduced at a time when sugarcane growers and millers were recovering from the devastation of a prolonged drought and added to this challenge, the sector was confronted by other challenges outside the levy, notably relatively cheaper sugar imports, financial distress and lower global sugar prices. While production volumes in the sector have improved markedly since the drought, price conditions for both sugarcane growers and millers have been unfavourable, resulting in lower revenues across the sector. Millers, for instance, have increasingly had to compete at low prices in the international market because of a decline in domestic demand for sugar, as SSBs manufacturers reformulated their products to be within the 4g/ml threshold of the HPL. A portion of the price loss has also been shared by sugarcane growers through the division of proceeds mechanism. Consequently, there is a noticeable decline in employment levels across upstream activities from 2017. Further down the value chain, we find evidence of a high degree of product reformulation by SSBs manufacturers in response to the levy. We also observe losses in production volumes and employment in the SSBs industry after the HPL was imposed.

In the **quantitative analysis**, a dynamic Computable General Equilibrium (CGE) model is used to assess the impact of the HPL on the sugar and SSBs industries, with specific focus on employment and economic output. CGE model simulations suggest that the HPL led to a cumulative reduction in GDP of R2.05 billion (-0.067%) by 2019. At the same time, model results suggest that due to the HPL, a cumulative of 16,621 jobs had been cut by 2019.

Looking at the HPL impact at industry level, model results suggest that the SSBs industry, which the levy was directly imposed on, had cut a cumulative 1,104 jobs by 2019 and its GVA contribution to GDP fell by a cumulative R 1.58 billion, largely due to a reduction in the household consumption of SSBs. Given that sugar is an essential input in the manufacturing of SBBs, and therefore a decline in SSBs production or the decline in sugar used by the SSBs industry due to reformulation will have an impact on the downstream sugar industry. Model results suggest that due to the HPL, the sugar industry (sugarcane farming and sugar milling) had cut a cumulative 9,711 jobs by 2019 and its GVA contribution to GDP had declined by R1.19 billion.

Table 1: Economic impact of HPL on the Sugar and SSBs Industries (Cumulative Deviation from Baseline)

Sector	2017 (Baseline)	2018	2019
Sugar Industry			
Jobs Supported	88,703	-3,823	-9,711
GVA Contribution to GDP (R' million)	13,730	-596.5	-1,186.3
Sugar-Sweetened Beverages			
Jobs Supported	13,965	-645	-1,104
GVA Contribution to GDP (R' million)	14,907	-771.1	-1,579.8
Overall Economy			
Jobs	16,168,663	-10,269	-16,621
Real GDP (R' million)	3,119,983	-1,180.9	-2,045.6

The main conclusions of the report are, firstly, that the imposition of the HPL had a significant impact (in terms of employment and output) within SSBs industry, with related industries, particularly the sugar industry, also affected. Nevertheless, product reformulation within the SSBs industry reduced some of the adverse economic effects of the HPL. At the same time, sugarcane farming and processing has also remained resilient as sugar production recovered from a prolonged drought period. That said, the costs related to product reformulation, lower global sugar prices, and a deteriorating macroeconomic (and business) environment will compound the impact of the HPL on these industries, and as the levy rate is adjusted higher each fiscal year these industries could still be heavily affected further by the HPL. Therefore, we are likely to see further, albeit lower, cuts in jobs and output in the coming years as these industries continue to adjust to the new environment. In addition, the sugar and SSBs industries cannot be viewed in isolation, given their forward and backward linkages to other sectors of the economy. Economic losses in the sugar and SSBs industries will invariably induce more job and output losses in sectors within their

supply chain. These impacts should not be ignored especially in the current environment of high unemployment and declining economic growth.

Secondly, the HPL has led to product reformulation within the SSBs industry, which is in support of the HPL's objective of reducing sugar intake in South Africa. However, evidence on whether South Africa's overall sugar intake has declined since the introduction of the HPL is limited, and this calls for further research on the health-related outcomes of the levy.

The rest of the paper is structured as follows:

Section 2: Health Promotional Levy (HPL) rationale

Section 3: Scope of the HPL

Section 4: Tax revenue derived from the HPL

Section 5: Upstream demand and supply-side analysis

Sections 6: Landscape of the beverages sector

Section 7: Economic contribution of sugar and SSBs industries

Section 8: Economic impact of HPL on sugar and SSBs industries

Section 9: Conclusion and recommendations

Section 10: Annexure

2. SUGAR TAX RATIONALE

Plans to introduce a levy on SSBs in South Africa were first announced in the February 2016 budget, delivered by then Minister of Finance, Honourable Pravin Gordhan. The earmarked effective date for the tax was initially set as April 2017, however, due to public interest in the consultative process and opposition from industry groups, the tax became effective a year later. The justification for the levy can be traced back to recommendations made by the DoH in its strategy paper for the prevention and control of obesity in South Africa[1]. The paper identifies obesity as a major risk factor linked to the growing burden of NCDs, including heart diseases, type II diabetes and some forms of cancers. NCDs are the leading cause of mortality in South Africa, accounting for more deaths than other causes combined. Approximately 35% of South African adults (above the age of 15 years) are obese – the highest in Sub-Saharan Africa. Prevalence is disproportionately skewed to the female category with an obese rate of 42% compared to 12% reported in males. In addition to adult obesity, excess weight gain is increasingly becoming prevalent among young children, with prevalence estimated at 18% by SANHANES[2].

Notwithstanding, the negative impact of NCD related illnesses have on life expectancy and general health, international studies have shown that there are economic costs associated with a high NCD prevalence. NCDs impose heavy costs on public health systems and reduce overall productivity due to premature death and/or the disability of people during their productive years. Although there is no standard estimate of the direct fiscal cost of obesity-related spending, the World Health Organisation (WHO) estimates healthcare spending attributable to NCD related illnesses (such as diabetes) to be up to 20% of total health spending[3]. In South Africa, the figure is much lower at 0.2%, however, the allocation of funding to the NCD programmes are the fastest-growing expenditure item in the health budget (see *Tax Revenue Projections vs Realised Revenue*). Evidence has also shown that lower-income groups tend to have a higher prevalence of obesity. Less privileged households have been reported to buy the least nutritious foods that are gastronomically the most filling and energy-dense. In the South African context, a significant correlation was identified between obesity and the individual years of completed education and the number of assets owned by the household[4].

Globally, several drivers for obesity are cited and these are typically grouped into four categories, which include: lack of knowledge, poor diets, physical inactivity and inappropriate early childhood feeding practices. The strategy paper for the prevention and control of obesity in South Africa points out excess sugar consumption as one major

[1] Strategy for The Prevention and Control of Obesity in South Africa: 2015-2020, Department of Health, 2016

[2] South African National Health and Nutrition Examination Survey (SANHANES-1), Shisana et al., 2013

[3] Preventing Chronic Diseases: A Vital Investment, WHO, 2005

[4] Food prices and energy density as barriers to healthy food patterns in Cape Town, Steyn and Temple, 2009

component of weight gain. The progression of obesity in South Africa has occurred in conjunction with urbanisation and an increase in the sale of sugar-sweetened beverages (SSB) and high calories energy-dense foodstuff. The move to impose a levy on SSB is, therefore, part of a multi-facet effort to curb obesity by the reducing consumption of sweetened soft drinks amongst other policy interventions.

The rationale to introduce the sugar tax can be summarised in the following ways:

- To reduce obesity in South Africa and improve the general wellness of the South African population;
- To reduce the heavy health cost imposed by obesity-related illnesses to public health system;
- To reduce prevalence among the low-income strata and in other vulnerable cohorts, most notably women and children.

3. SCOPE OF THE HPL

In this section, the study provides a technical overview of the HPL. Tax-related information used in this study is sourced from National Treasury publications, while data on beverages was extracted from the 2016 Euromonitor report on beverages in South Africa.

Box 1: Summary of key points – Tax scope

- The sugar tax is levied on sugar-sweeten beverages, which encompasses about 89% of beverages sold in the domestic market.
- The threshold is set at 4g/100ml, which means that every gram above 4g/100ml is taxable at 2.21c/gram.
- The tax is levied at the source of production, i.e. levied on beverages that are sold in the SA market.

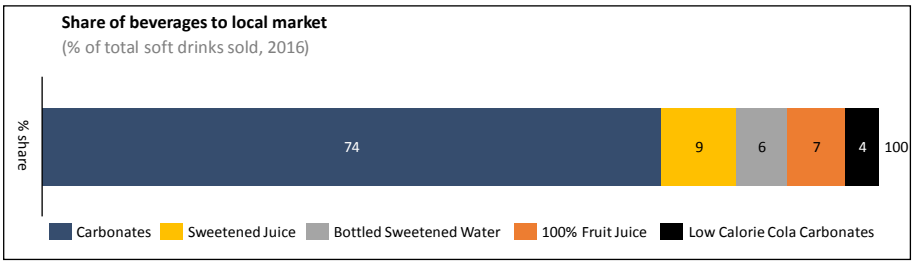
The HPL is imposed on SSBs, which are defined as beverages that contain added caloric sweeteners such as sucrose, high-fructose corn syrup or fruit-juice concentrates, which include but are not limited to soft drinks, fruit drinks, sports drinks, energy and vitamin water drinks, sweetened iced tea and lemonade, among others[5]. In line with this definition, beverages that only contain natural sugars or sugars naturally built into the structure of the ingredients, e.g. unsweetened milk, milk products and 100% fruit juices are exempted from the tax. The rate is fixed at 2.21 cents per gram of the sugar content that exceeds 4 grams per 100ml, equivalent to an effective tax rate of 12.1%. The minimum threshold is set at 4g/100ml, which implies that every gram above 4g/100ml is taxable at 2.21c/gram. The tax is charged at the source of production (otherwise referred to as duty at source) for ease of administration. This design feature also allows producers to pass on the cost burden of the

[5] Taxation of Sugary Beverages in South Africa – Social Impact Assessment, National Treasury, 2016

tax to consumers and potentially achieve the desirable behavioural impact. This property also allows producers to reformulate their products to reduce their tax liability, which is another policy objective of the HPL.

Data sourced from Euromonitor (annual averages from 2011 to 2015) shows that in-scope or taxable beverages, i.e. with a minimum concentration of 5g/100ml, account for more than 89% of all beverages supplied to the local market. By disaggregation, taxable products include carbonates (74%), sweetened juice (9%), bottled sweetened water (6%) and low-calorie carbonates (4%).

Figure 1: Share of beverages to the local market



Source: Euromonitor, 2016

4. TAX REVENUE PROJECTIONS VS REALISED REVENUE

This section provides insight on revenues collected from the sugar levy, covering the two years after the effective tax year. The coverage is supplemented by an analysis of expenditure trends within the health budget (or vote 18 of the National Budget allocation). The information and analysis presented in this section makes use of fiscal data and projections from the National Budget (2020/21 fiscal year).

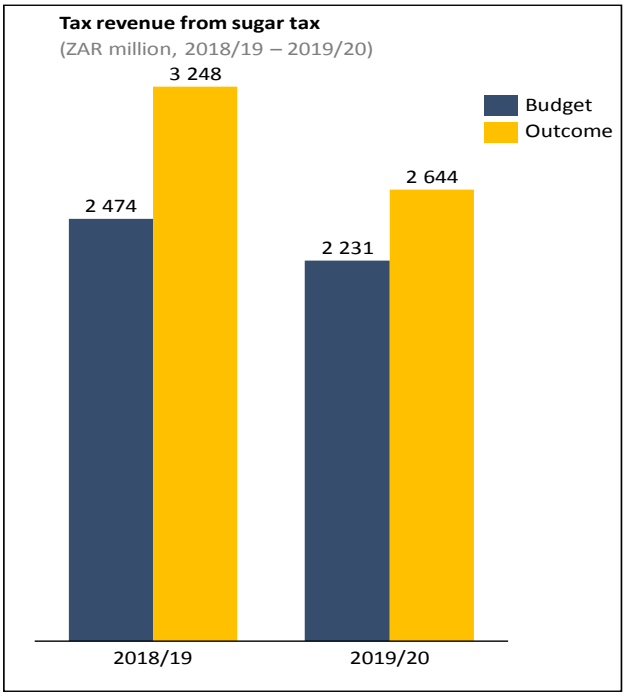
Box 2: Summary of key points – tax revenue

- For the 2018/19 fiscal year, tax revenues collected from the HPL exceeded budget estimates by R700 million. In the subsequent tax year, the deviation was R400 million.
- Tax revenues collected from the tax levy declined from R3.2 billion in 2018/19FY to R2.6 billion 2019/20FY. The decline suggests a significant degree of reformulation in the beverages sector over the same period.

Similar to other excise duties and product-specific levies, the tax on SSBs is implemented through the Customs and Excise Act (Act 91 of 1964). For the fiscal year ended February 2019 - the implementation year of the sugar tax - the total tax revenue collected from the HPL amounted to R3.2 billion against a budget estimate of R2.4 billion. This represents a

R700 million deviation or 28% in percentage terms. In the 2019/2020FY – the latest year for which data is available - tax revenues collected from the levy amounted to R2.6 billion against a budget estimate of R2.2 billion. This represents a R400 million or an 18% deviation from the budget target.

Figure 2: Tax revenue from HPL



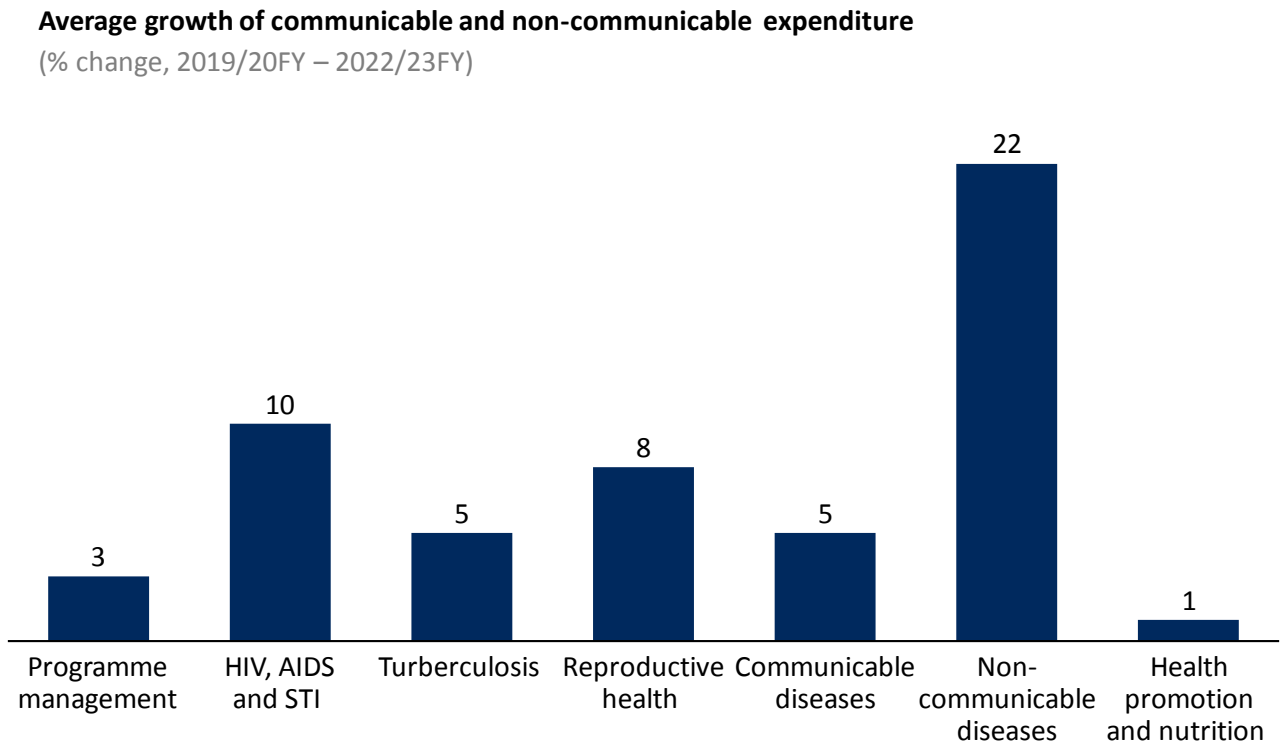
Source: National Treasury National Budget, 2020

The year-on-year decline in tax revenue from the HPL underscores a significant degree of reformulation in the industry. The Beverages Association of South Africa (BEVSA) reports that the key producers in the industry are reformulating their products, i.e. reducing the sugar content by 15% and increasing the offering of low and zero sugar options[6].

Proceeds from the HPL are not ring-fenced to be allocated exclusively towards programs aimed at curbing the prevalence of non-communicable diseases. As such, it is difficult to estimate the direct usage of these proceeds, however, a closer look at the government's appropriation profile shows that 45% of the health budget is allocated towards communicable and non-communicable programs. Within this cluster, the spending is largely concentrated to the HIV, AIDS and STI component. Notably, spending on non-communicable diseases is expected to record a 22% average growth over the next three years according to the National Treasury's medium-term budget estimates, rising from R28.5 million in 2018/19 FY to R122 million in 2022/23. This, in essence, reflects an expected increase in the health burden as a result of related illnesses, which the National Treasury cites as one of the primary reasons for introducing the health levy.

[6] The Health Promotion Levy – A Net Negative Impact on South African Non-alcoholic Beverages, BEVSA, accessed June 2020

Figure 3: Average growth of health-related expenditure



Source: National Treasury Estimates of National Expenditure, 2020

5. UPSTREAM DEMAND AND SUPPLY SIDE ANALYSIS

This section provides three core analysis of the following: insights on the structure and size of the sector, key value-chains where businesses operate and lastly, the trends in the sector. The information and analysis presented makes use of the full country reports and provides a consolidated view of the sugar industry landscape in South Africa.

Box 3: Summary of key points – upstream demand and supply-side analysis

- There are over 21 000 sugarcane growers in South Africa, of which 94% are small scale growers.
- However, the production of sugarcane is dominated by large scale growers, as they account for 82% of SA sugarcane production.
- The average production area was about 375 000 hectares between 2013 and 2017. The production area declined by 1% over the same period.
- Average production of sugarcane was about 17 million tons between 2013 and 2017.
- Sugarcane production declined by 3% between 2014 and 2017 due to drought.

Post drought, production increased by 12% between 2017 and 2019.

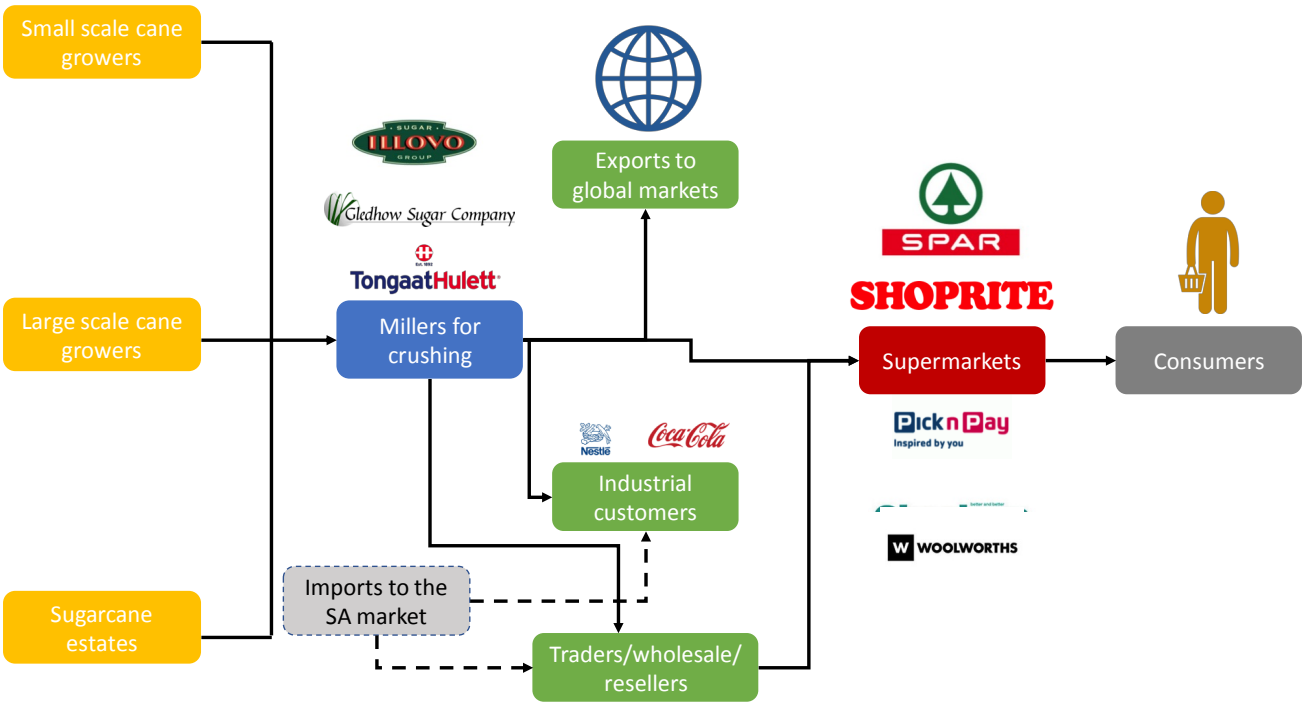
- The price of sugarcane increased by 11% during the drought period, driven by the lower supply of sugarcane. Post drought, the price declined by 15% between 2017 and 2019.
- Sugarcane growers employ about 66 000 individuals in South Africa.
- The South African sugar industry had 12 mill plants as at end 2019, owned by six companies. In the recent past two of the largest mills had to close or suspend operations, underscoring financial challenges experienced by some players in the industry.
- The average production of sugar between 2013 and 2019 was 1.9 million tons.
- The production of sugar declined by 6% during the drought period and increased significantly by 19% post the drought period. For the latter period, the increase was driven by internal demand of sugar as exports increased post the drought period.
- However, the general demand for sugar may be declining. This can be inferred with an 8% decline in the level of employment in the milling sector between 2007 and 2020.

5.1. VALUE CHAIN ANALYSIS

South Africa has 14 sugar mills that are operated by six companies such as Illovo Sugar, Tongaat Hulett Sugar and Gledhow Sugar Company, to name a few. Some of the millers have their own sugarcane growing estates that contribute about 8% of the production of sugarcane in South Africa.

The figure below illustrates the value chain of the sugar industry in South Africa. Primary inputs include sugarcane that is grown by three players classified into small and large sugarcane growers as well as sugarcane estates owned by milling companies. Millers such as Tongaat Hulett, Illovo Sugar and Gledhow Sugar Company are the main customers for sugarcane growers. Millers are responsible for crushing the sugarcane, which is then processed into sugar, syrup and other by-products. The beneficiation of sugarcane is then sold to international markets in the form of exports, sold to industrial companies who use it in the production of their products (further beneficiation) or sold directly to traders/wholesalers/resellers and supermarkets. The latter products are then on-sold to customers.

Figure 4: Sugar value chain



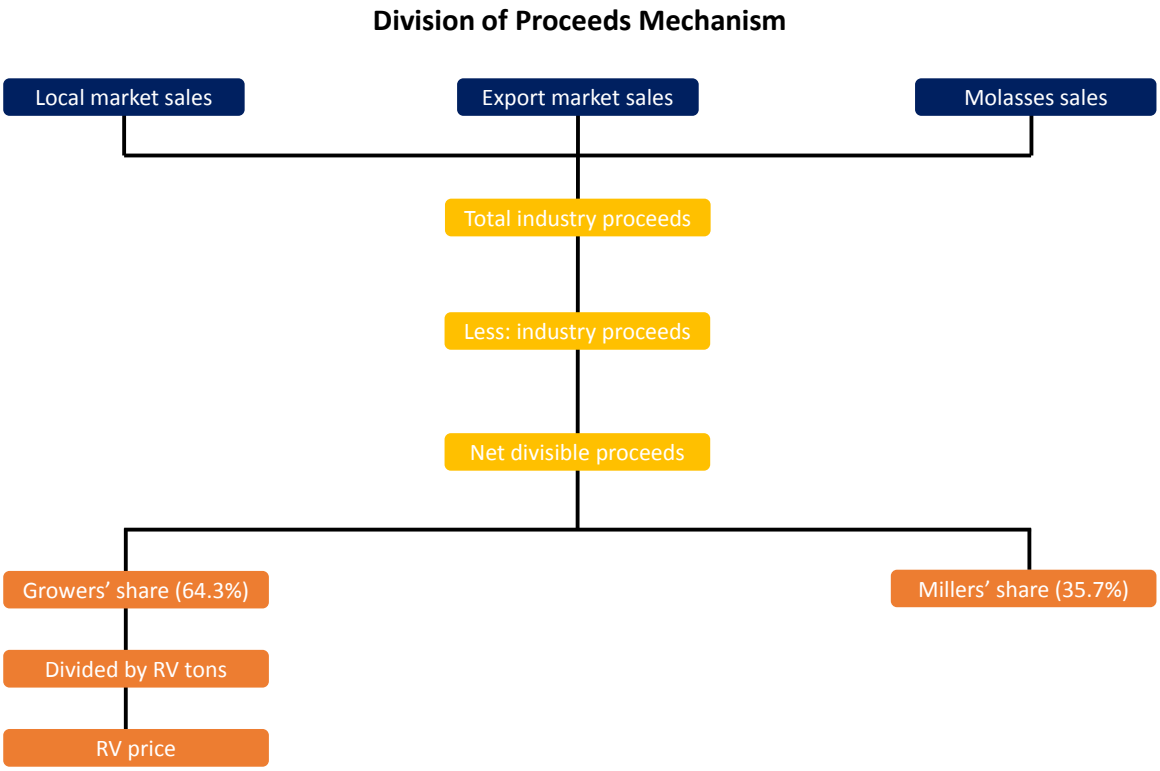
Source: Adapted from the Centre for Competition Regulation and Economic Development, Growth and Development in Sugar to Confectionery Value Chain for South Africa and Zambia

Division of proceeds

The division of proceeds (DoP) mechanism is a key feature of the sugar industry regulatory structure and is primarily concerned with the terms of revenue sharing between sugarcane growers and millers. Understanding the revenue sharing structure is important for the ensuing discussions, as it helps shed light on key drivers of economic activity across the value chain and the various challenges currently affecting the sector. Under the current DoP mechanism, total industry revenue from domestic and export sales (including molasses but excluding other downstream products) are pooled into one receivable fund. From this pool, industry charges such as administration costs are deducted to arrive at the net divisible revenue amount for the industry, which is subdivided between millers and the grower segments using a 35.7% and 64.3% revenue split as prescribed by the Sugar Industry Agreement (2000)[7]. The chart below illustrates the flow of funds across participants in the upstream sugar value chain.

[7] Sugar Industry Agreement (SIA), 2000

Figure 5: Division of Proceeds Mechanism



On the farming end, revenues are shared according to a Recovery Value (RV) appropriation formula and the price payable to each farmer is known to as the RV price. The price paid to growers is based on the quality of sugarcane delivered to the mills and the net revenue millers derive from the sale of sugar in the domestic and international markets[8]. For millers, the redistribution mechanism governing the sector is designed to ensure that all millers experience equal exposure to the export markets[9]. Under this arrangement, millers are granted quotas in proportion to the industry's sales in different markets. Industry players that exceed their production ceiling (either in the domestic or international markets) are required to redistribute such proceeds/losses to other mills across the value chain. This implies that gains (or costs) associated with having a competitive advantage in the domestic market (or export market) are equally shared among millers.

From the above discussion, it is important to highlight the role exposure to international markets has on the distribution of proceeds in the industry. Unlike in many agricultural activities where opportunities exist to export profitably to international markets, sugar exports are almost exclusively sold below the cost of production or at a loss according to industry accounts. As such, grower RV prices (and proceed for mill processors alike) are negatively related to the level of surplus sugar diverted to the export market. According to industry accounts, approximately 200 000 tonnes in lost sales to the domestic market in the

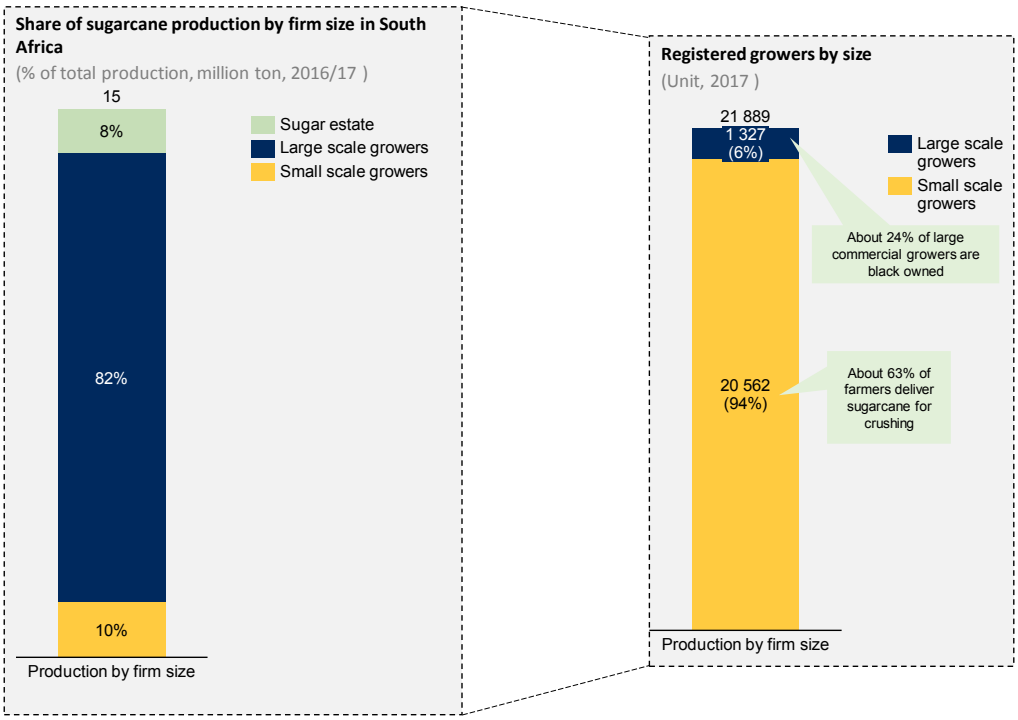
[8] South African Sugar Production Forecast to Grow Despite Revenue Pressures, GAIN, 2019

[9] Commodity Study Small-Scale Sugar Production, Institute for Poverty, Land and Agrarian studies, March 2020

first year of the levy was diverted to the offshore market, which resulted to significant financial losses for sugarcane growers and processors.

5.1.1. Sugarcane growers

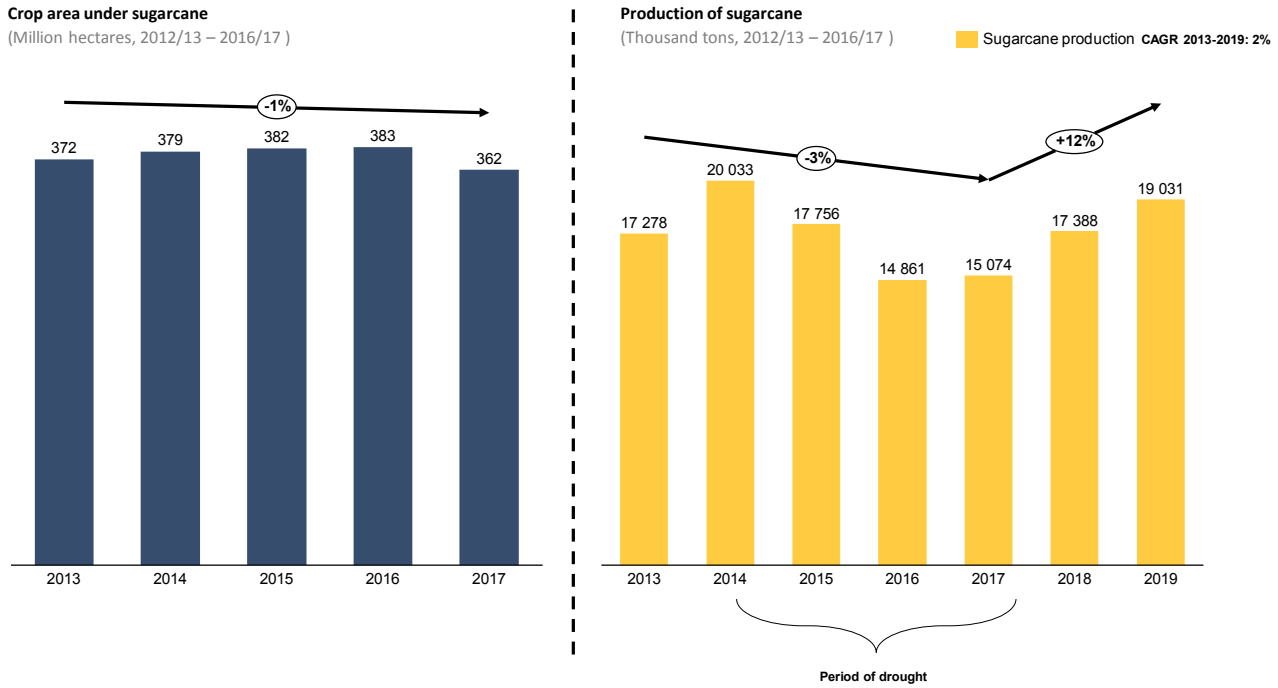
Figure 6: Profile of sugarcane growers by size



Source: Department of Agriculture, Forestry and Fisheries, 2017

The sugarcane industry is mainly comprised of small-scale growers, who together make up about 94% of the sugarcane growers in the industry. Large-scale growers (comprising of larger independent sugarcane producers) are however responsible for most of the production output (approximately 83%), while small-scale growers only produce 9% of the total sugarcane output in the industry. Sugarcane producers supply their output to 12 mills across the country, among which three predominate: Illovo Sugar (now a subsidiary of Associated British Foods), TSB (now a subsidiary of RCL) and Tongaat-Hulett.

Figure 7: Crop area and production of sugarcane

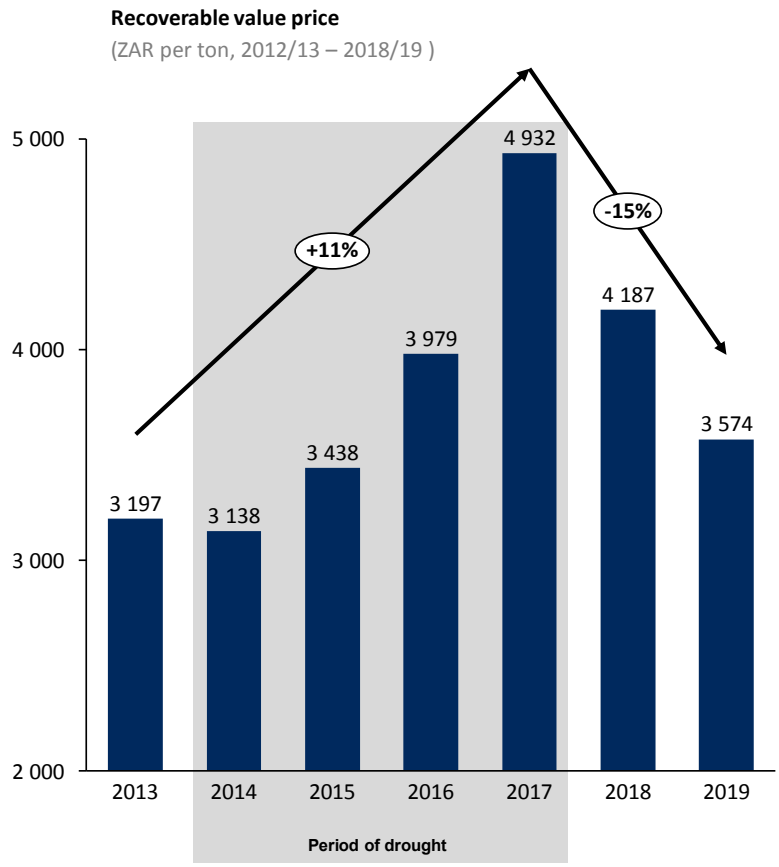


Source: Department of Agriculture, Forestry and Fisheries, 2017 | South African Sugar Association, 2019

Between 2013 and 2017, the crop area of sugarcane has decreased by a compound annual growth rate (CAGR) of 1%. Over the same period, production volumes declined by a CAGR of 3%. The decline in production volume was mainly driven by the drought season in South Africa. In addition, the cost of production (fertilizers, labour, electricity and fuel) in the industry has also increased for farmers, poor cane prices to farmers, and most importantly, withdrawal of support from sugar milling companies have added pressure on production levels10. Between 2017 and 2019 (post-drought period), the production of sugarcane has increased by a CAGR of 12%. The is explained by improved sugarcane yields (in part due to improved weather conditions and profitability post-2016), supplemented by sizeable imports from other SACU members, notably from eSwatini, during the course of this period.

[10] A Profile of the South African Sugar Market Value Chain, DAFF, 2017

Figure 8: Recoverable value price for growers



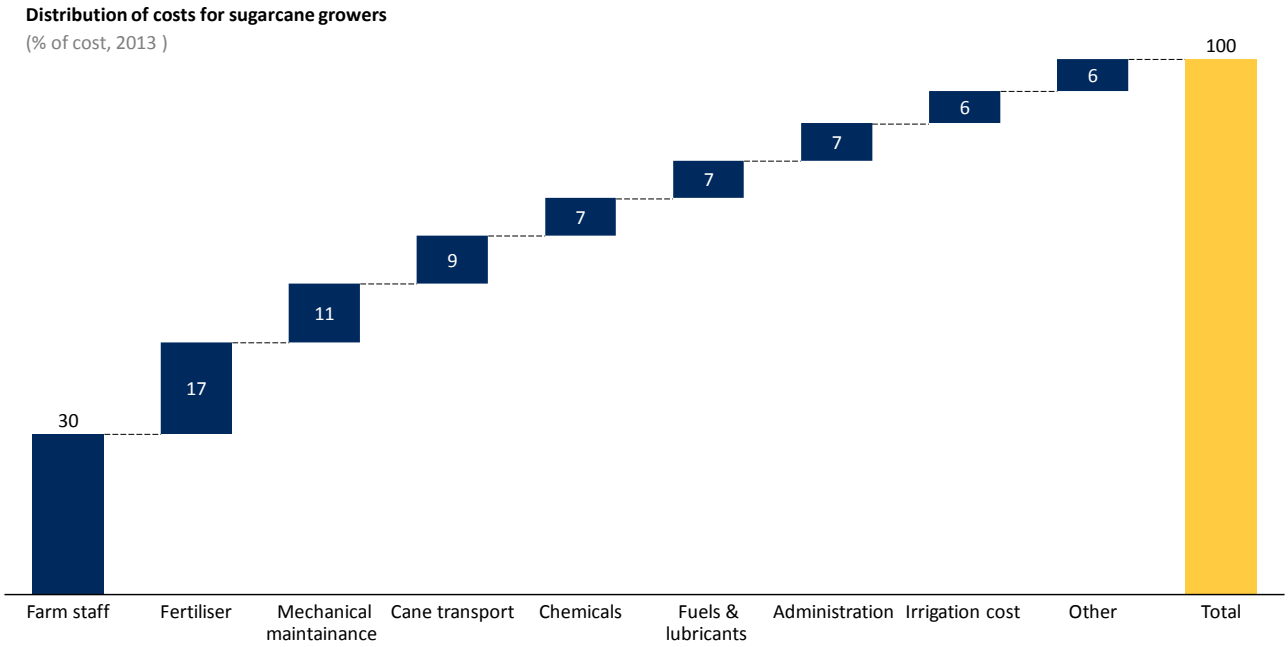
Source: Department of Agriculture, Forestry and Fisheries, 2017 | South African Sugar Association, 2019

Prices paid to sugarcane growers increased during the drought period by a CAGR of 11%. This may have been driven by a decline in the supply of sugarcane due to drought. Post drought period, the price of sugarcane declined significantly by 15% between 2017 and 2019. The decline in the latter period is mainly driven by lower global prices and lower demand for sugar in the domestic market, which is further discussed below (section 5.1.3 Millers). There has also been an oversupply of sugar from competing imports. Noticeably, these stemmed from two sources, the main being duty-free imports eSwatini (a member of the South African Customs Union), particularly during periods when world sugar prices are significantly higher than domestic sugar prices. However, as world sugar prices started declining rapidly post 2014 imports from countries such as India, European Union, Thailand, Pakistan and Russia rose markedly, and this had a negative impact on the price of sugar.

In addition, input costs have been increasing at a higher rate than RV prices. This implies that farmers need to become more efficient at producing sugarcane to remain profitable and competitive in the global market. The highest cost input for farmers is mainly farm staff and fertilisers, which both account for about 47% of the total cost, as illustrated below.

However, improving production may imply adoption of technology which will impact employment levels negatively.

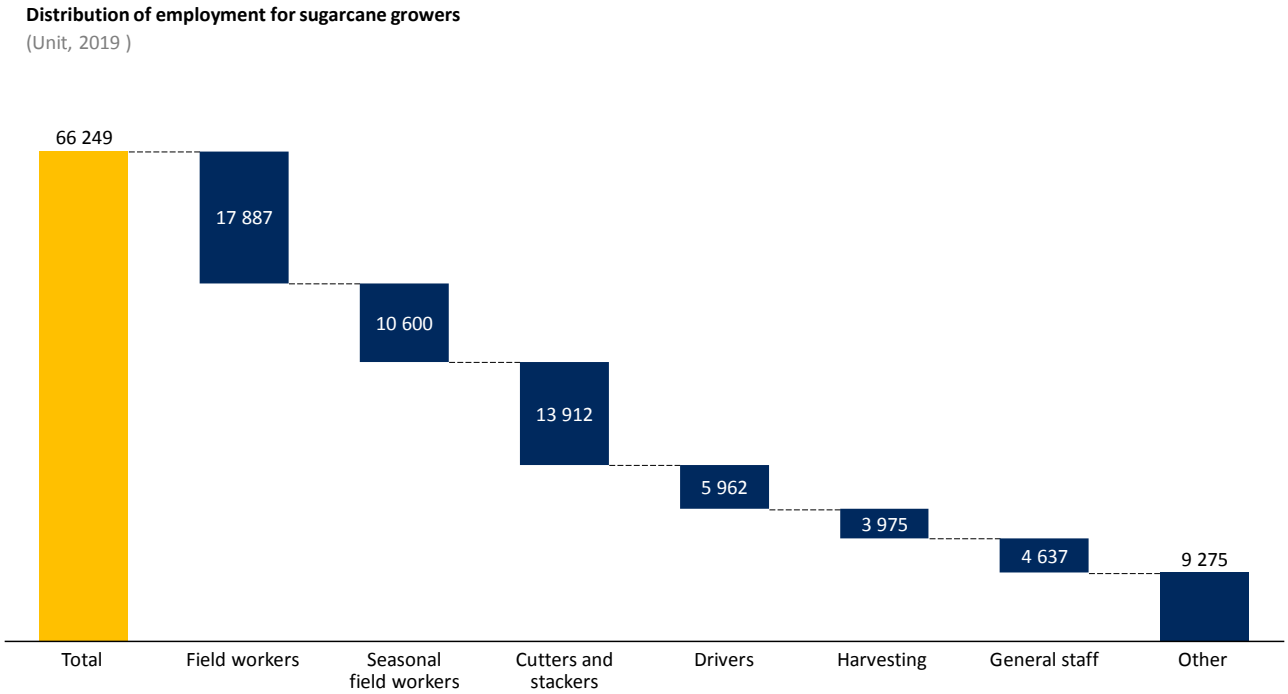
Figure 9: Distribution of costs for sugarcane growers



Source: SA Canegrowers, accessed June 2020

5.1.2. Employment contribution

Figure 10: Distribution of employees



Source: DAFF, 2019 | Dr Thomas Funke (percentage distribution purposes), 2011

With regards to employment, sugarcane growers employ approximately 66 250 workers. Over 40% of the employed population in the cane-grower industry are field workers, of which 16% are temporarily employed. Cutters and stackers constitute the second-largest employed population.

5.1.3. Millers

As aforementioned, South Africa has 12 mills comprising six companies. Illovo Sugar and Tongaat Hulett Sugar own four (4) mills each, RCL Foods owns three (3), while Gledhow Sugar Company, UCL Company and Umfolozi Sugar Mill own one mill plant each.

Figure 11: Profile of millers

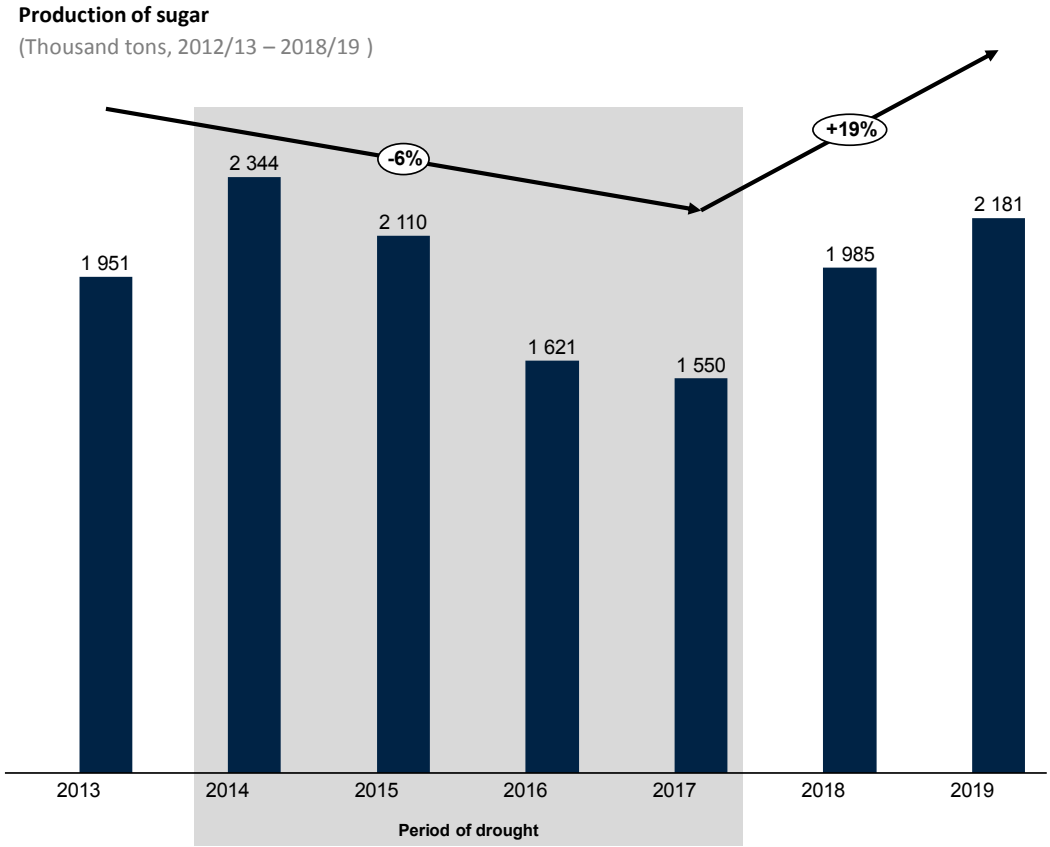
Millers	Number of mills	Commentary	Possible impact from the sugar tax
TongaatHulett	four mills (one has been closed)	Two of Tongaat Hulett's sugar mills are dedicated mainly for packaging, a central refinery mill with its own packaging division. The company also has a number of sugarcane estates and animal feed operation. Tongaat Hulett is however facing internal challenges with numerous leadership changes over the past few years and its share price has declined significantly (over 80%). With the introduction of a sugar tax, the company may face further challenges as it has closed its Darnall Sugar Mill. Supply side challenges include declining sugar prices, cheap imports and the company's inability to focus on its core business. The company previously relied on property, which has been on a decline since 2018.	
ILLOVO	four mills (one has been suspended)	Illovo SA has four sugar mills, one dedicated for refinery purposes and the other three operate as packaging plants. Illovo also has three sugarcane growing estates. In addition to producing sugar, Illovo produces other high-value downstream products. Illovo expects its sales to decline by 30% to the beverages sector. As with many millers in SA, Illovo also faces challenges from cheap imports, particularly in countries it has operations in. in addition, Illovo has also suspended its operations in one of the mills indefinitely for the 2020/2021 season.	
RCL FOODS	Three mills	RCL Foods is one of the most diverse milling companies in SA. Two of the three mills RCL Foods operates have refineries and the other one has a packaging plant. RCL Foods also has a sugarcane estate, sugar transport and animal feed divisions. RCL Food did some restructuring recently, where they combined the consumer and sugar and milling units into one single food division. These internal processes may help RCL to become more efficient and curb the impact of lower international prices	
UCL	One mill	UCL operates one mill with other non-sugar related divisions. The company runs a mixed farm and has a trading division that supplies agricultural inputs to the industry.	
Gledhow Sugar Company	One mill	Gledhow Sugar Company is located in KwaZulu Natal, and partly owned by Illovo SA (30% shares). The main customers are the food and beverages companies in Southern Africa. To curb some of the demand and supply side challenges faced by the industry, Gledhow is now diversifying its production into biofuel. This shift will assist in reducing the further impact that will come from the sugar tax.	
USM	One mill	The Umfolozi Sugar Mill is a multi-owned mill with shareholders comprising of large scale growing company, public companies growing sugarcane in the Umfolozi flats, and Small Scale Grower Trust, whose beneficiaries grow sugarcane on tribal land. The mill is also owned by an alcohol producing firm. The company's main product is brown sugar that it sells to industrial companies and retail market.	

*Source: various news articles | Key: **Red**: high; **Amber**: moderate; **Green**: low | half-harvey-ball: uncertain of the full extent of the impact*

Millers in South Africa face demand and supply-side challenges. The decline in international prices of sugar has impacted revenue negatively and the declining demand for sugar due to continued reformulation by SSB manufacturers will exacerbate challenges faced by millers. Two of the major producers (Tongaat Hulett and Illovo) have either shut down or suspended production in some of their mills. Other millers, however, have found ways to navigate the challenges such as improving the production process (RCL) or diversifying their production by looking into alternative biofuel energy supply derived from the sugarcane (Gledhow Sugar Company). Millers that also have other divisions outside sugar may be able to weather the storm such as UCL, which runs a mixed farm and supplies agricultural inputs.

Furthermore, many SSB manufacturers that have previously relied heavily on sugar in their production process before the introduction of a sugar tax have now turned into artificial sweeteners[11]. Indeed, a recent study by the Institute for Poverty, Land and Agrarian Studies (PLAAS) shows a notable increase in the importation of artificial sweeteners commonly used in the manufacturing of sugar-free coke and Fanta in the first year of the levy[12]. This is viewed as evidence that SSB producers are keeping sugar at less than 4 grams and using sweeteners to keep the sweet taste of their products. This will continue to be a major challenge as the Finance Minister increases the tax rate annually - manufacturers will also look for alternative ways to avoid the tax burden.

Figure 12: Production of sugar



Source: Department of Agriculture, Forestry and Fisheries, 2017 | South African Sugar Association, 2019

As with farmers, the production of sugar declined by 6% annually during the drought period as illustrated in the graph above. Post drought period, the production increased by 19% annually as the production of sugarcane increased in the same period. The increase is explained by an increase in the number of export orders sold to the international market as illustrated in figure 13. It is important to note in the figure that sugar production volumes

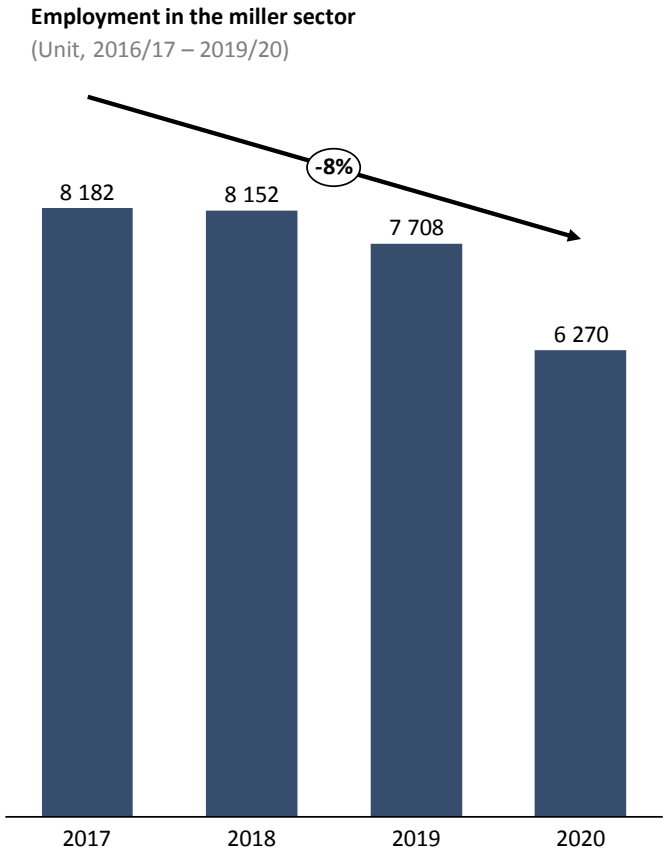
[11] Sugar tax leaves sour taste, Business Live, 2019

[12] Commodity Study Small-Scale Sugar Production, Institute for Poverty, Land and Agrarian Studies, March 2020

sold to the domestic market remained relatively unchanged post the drought period, which underscores low demand from the beverages sectors.

5.1.4. Employment contribution

Figure 13: Employment in the miller sector



Source: South African Sugar Association, 2020

The milling sector has seen a decline in the level of employment over the past five years, driven by both supply and demand-side challenges as aforementioned. One of the top three millers has seen the biggest decline, recording a circa 20% decline in annual employment over the past three years. This may have been driven by the closure of some of the sugar mill plant in February 2020 which led to about 400 job losses[13]. Other millers have reduced their staff by 1% to 2% annually.

The top three millers employ between 80 - 85% of the workforce in the milling sector. It can be inferred in the absence of data that the latter firms have a large market share in the distribution of sugar to the industrial and retail market. As such, the introduction of a health promotion levy would have a significant impact on the top three firms in terms of employment. Illovo, for example, expects demand for sugar from the beverages sector to

[13] Tongaat Hulett to close Darnall Mill leaving hundreds jobless, The North Coast Courier, 2020

decline by 30%, which implies the quantity produced will have to decrease. As demand declines, the demand for labour in the milling sector will also decrease. In addition, other supply and demand-side challenges such as cheap imports, declining prices will significantly have a negative impact on employment. To this end, interviews with industry players revealed that commercial farmers have since 2019 reduced employment levels by an estimated 9 000 jobs due to unfavourable profitability prospects brought about by the HPL.

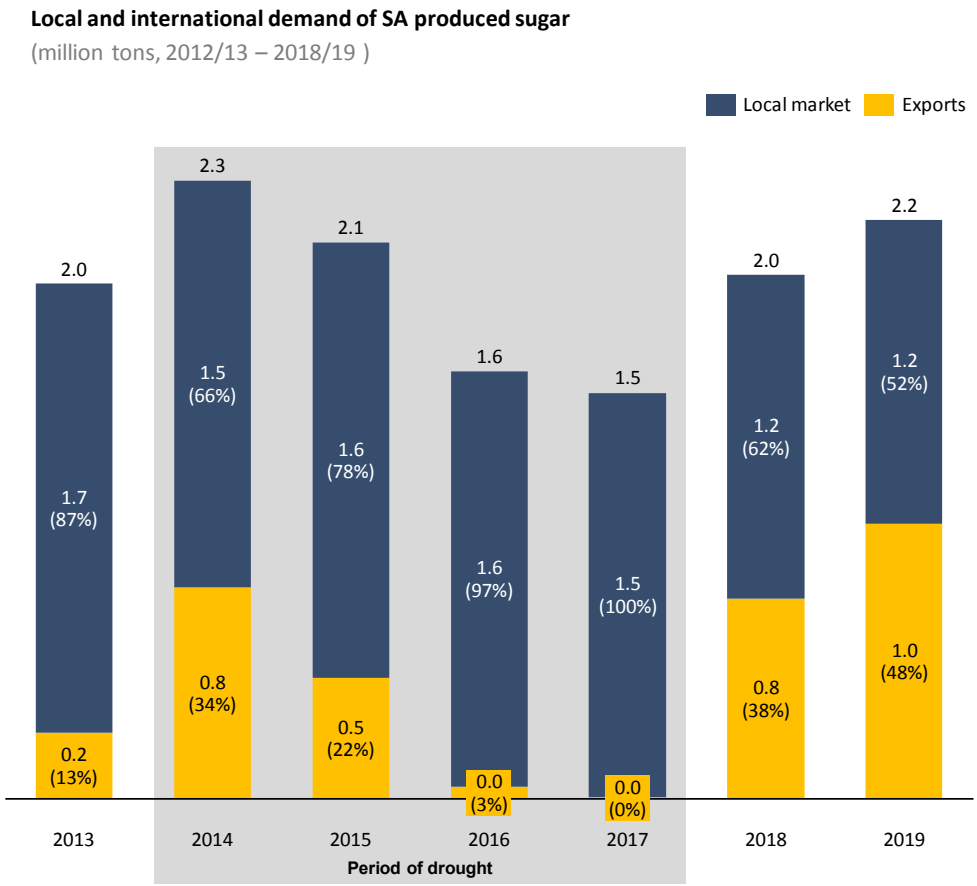
5.1.5. International markets

The South African sugar industry participates in the international market through exports and imports that do not necessarily benefit the industry. Surplus sugar (both refined and raw) produced in South Africa is normally exported in the international market, mostly at a loss[14]. The losses are shared by all industry players (Millers and growers) through distribution of proceeds mechanism as aforementioned. Majority (over 80%) of raw imports come from eSwatini, which enjoys duty-free access to South Africa, adds further challenges in the domestic market as these are likely to be cheaper than sugar produced in South Africa[15]. Imports outside of the Southern African Customs Union (SACU) access the South African market duty free if they are higher than the dollar-based reference price (DBRP). The DBRP is a domestic tariff (applied as a dollar-based reference price) applicable to all countries outside the customs union – with South Africa, Namibia, Botswana, Lesotho and eSwatini being member countries. The tariff was increased from $566 per ton in 2018 to $680 to reduce imports mainly from Brazil and the United Arab Emirates. Imports from these two countries used to account for 20% of raw sugar imports before DBRP was increased.

[14] South African Sugar Production Forecast to Grow Despite Revenue Pressures, GAIN, 2019

[15] The production cost of sugar in South Africa is likely to be greater than USD 566 per ton as the dollar based refrenced price (DBRP) was increased in 2018 to USD 680 for this reason

Figure 14: Local and international demand of SA sugar

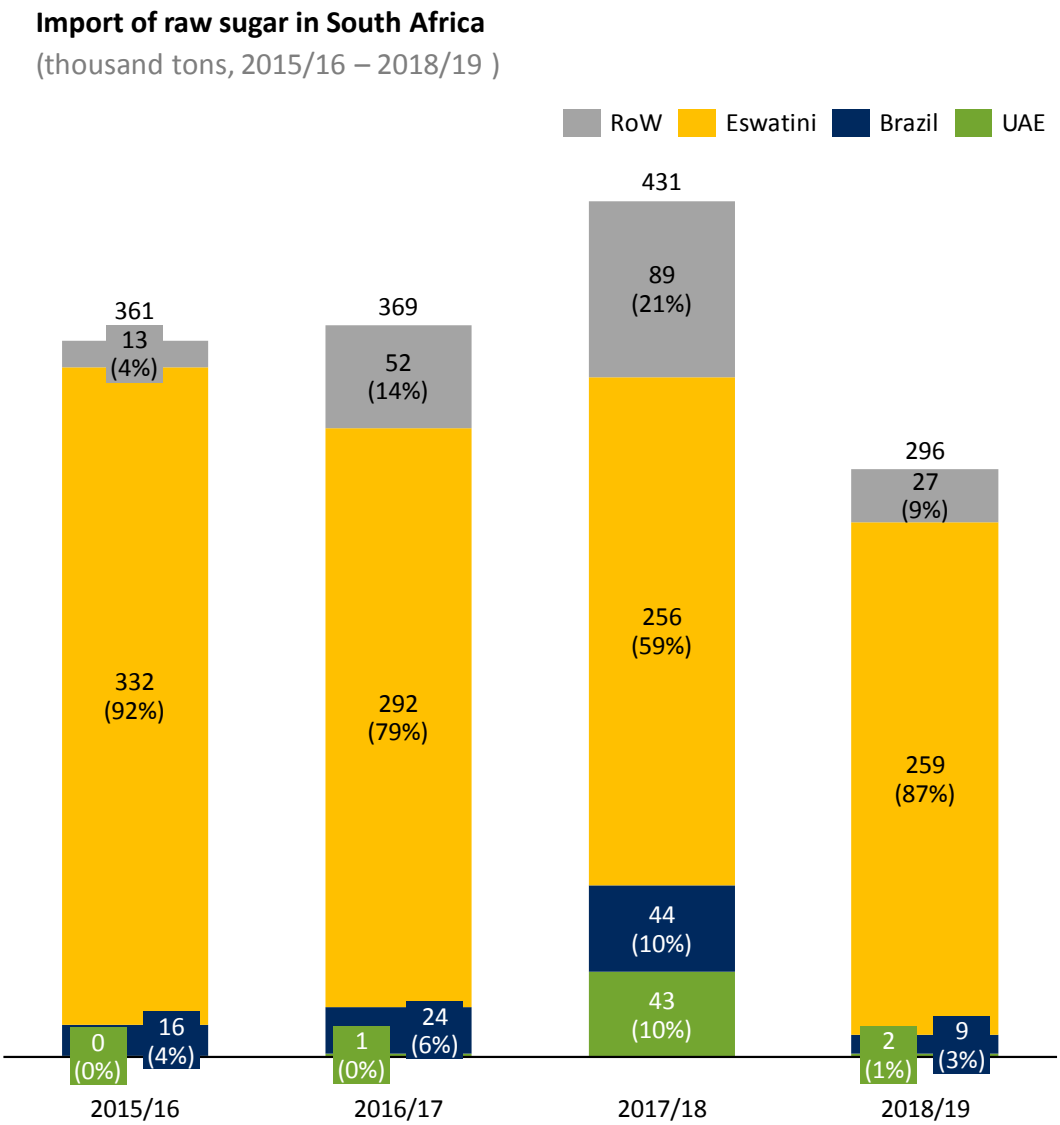


Source: South African Sugar Association, 2020

The level of exports declined significantly during the periods of drought as sugarcane production fell. Post the drought period, exports increased to an all-time high in the period observed shored up by the combined impact of higher production, low domestic demand and the large available stocks post the drought period. As exports increase, the level of losses to be shared by the industry increases as South African millers compete with other millers from Brazil, Thailand, Australia, Guatemala and subsidised sugar exports from the European Union region[16]. Given that South Africa is a price taker in the international market, millers often find themselves selling at prices that impact the industry revenues negatively.

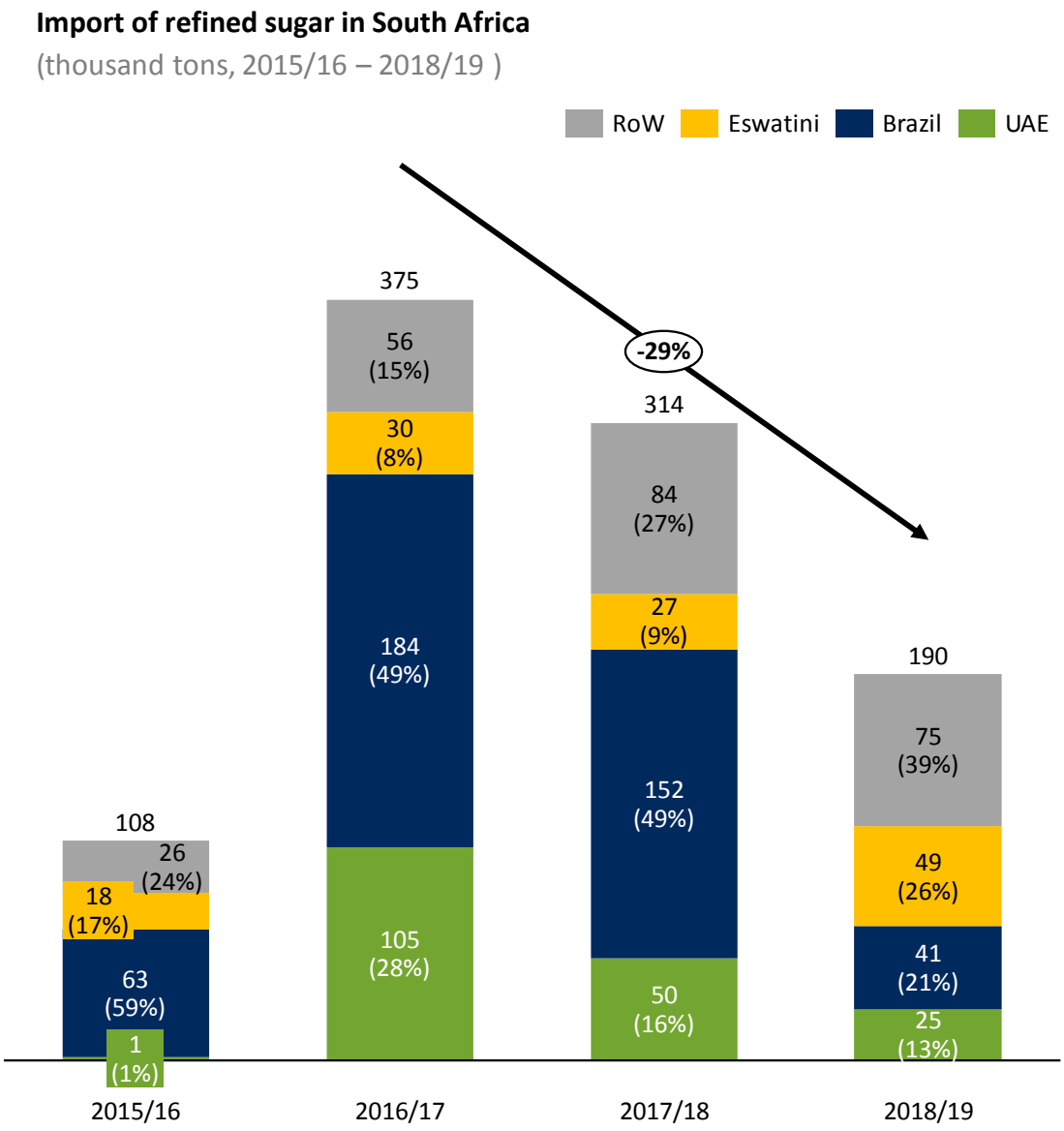
[16] A profile of the South African sugar market value chain, 2017

Figure 15: Imports of raw sugar



As aforementioned, Eswatini accounts for about 87% of raw sugar imports and 4% comes from Brazil and the United Arab Emirates while the remaining 9% is from the rest of the world (RoW). Imports of raw sugar from eSwatini make up a significant proportion of all imports to SA because the country is a member of the Southern African Customs Union (SACU) and as a general rule imports from this source market do not attract any custom duties. Notably, the proportional share of raw sugar imports from outside the customs union (especially those from Brazil and the UAE) has declined significantly since the 2015/16 period, and this is largely ascribed to intensified import restriction measures applied through DBRP.

Figure 16: Imports of refined sugar



In terms of refined sugar, Brazil and the UAE dominated the import market before the increase in DBRP in 2018, which decreased imports by CAGR of 29% between 2016/17 and 2018/19 period. This protectionist policy will help in ameliorating the challenges that the sugar industry is facing in the domestic market. However, this comes at a time were SSBs are already reformulating their production process by substituting sugar with sweeteners. Nonetheless, South African millers need to improve their production process to compete in the international market rather than relying on the DBRP. The GAIN report[17] estimates that the cost of sugar production is higher than the old DBRP of $566 per ton.

[17] USDA Foreign Agricultural Service – Global Agricultural Information Network (GAIN) Report 2019

6. LANDSCAPE OF THE BEVERAGES INDUSTRY IN SOUTH AFRICA

This section provides an overview of the beverages industry in South Africa over the last ten years, with a specific focus on demand and supply dynamics, pricing, as well as employment trends in the sector.

Box 4: Summary of key points – beverages landscape

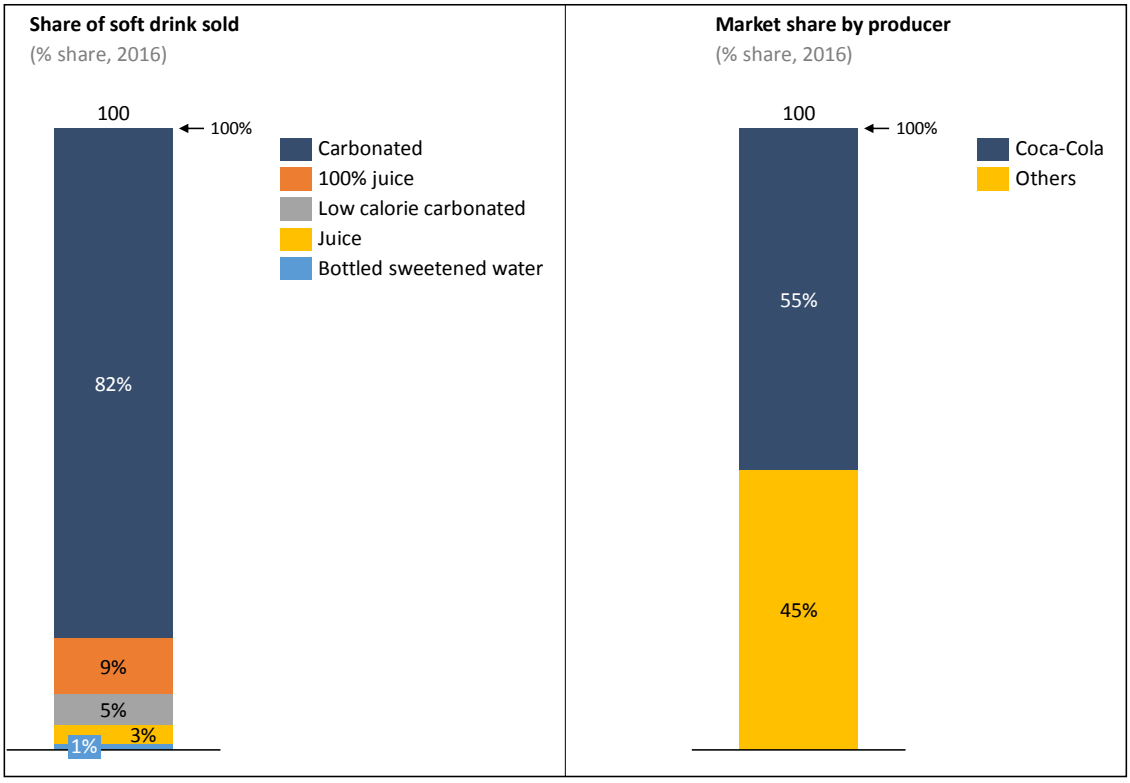
- **The non-alcoholic industry in South Africa is dominated by carbonated drinks, which account for 82% of market sales.** Coca Cola South Africa (Pty) Ltd is a dominant player in the non-alcoholic beverages landscape with an estimated market share of 55%. However, there has been a marked rise in the participation of local producers since 2010.
- Market trends show a significant expansion in the industry since the 1990s – a direct function of increased affordability and availability of products in previously underserved markets.
- A sizeable decline in SSBs volumes is observed in the first year of the levy (circa 670 million litres). Production volumes return to pre-HPL levels in 2019, suggesting a degree of reformulation in the industry and a relatively inelastic demand profile.

6.1. MARKET STRUCTURE AND KEY PLAYERS

For this study, the focus will be on the non-alcoholic beverages sector given that this is the target base for the HPL. The non-alcoholic beverages industry in South Africa is made up of a myriad of products such as juices, carbonated drinks, energy drinks, bottled water, iced tea, dilutable beverages etc. Carbonated drinks dominate this product range – accounting for 82% in market sales (Euromonitor, 2016).

In terms of players, the sector predominantly consists of multinational beverage companies with a large market share. The figure below presents a graphical industry breakdown according to products and producers.

Figure 17: Share of soft drink sold and market share by producer



Source: Euromonitor, 2016

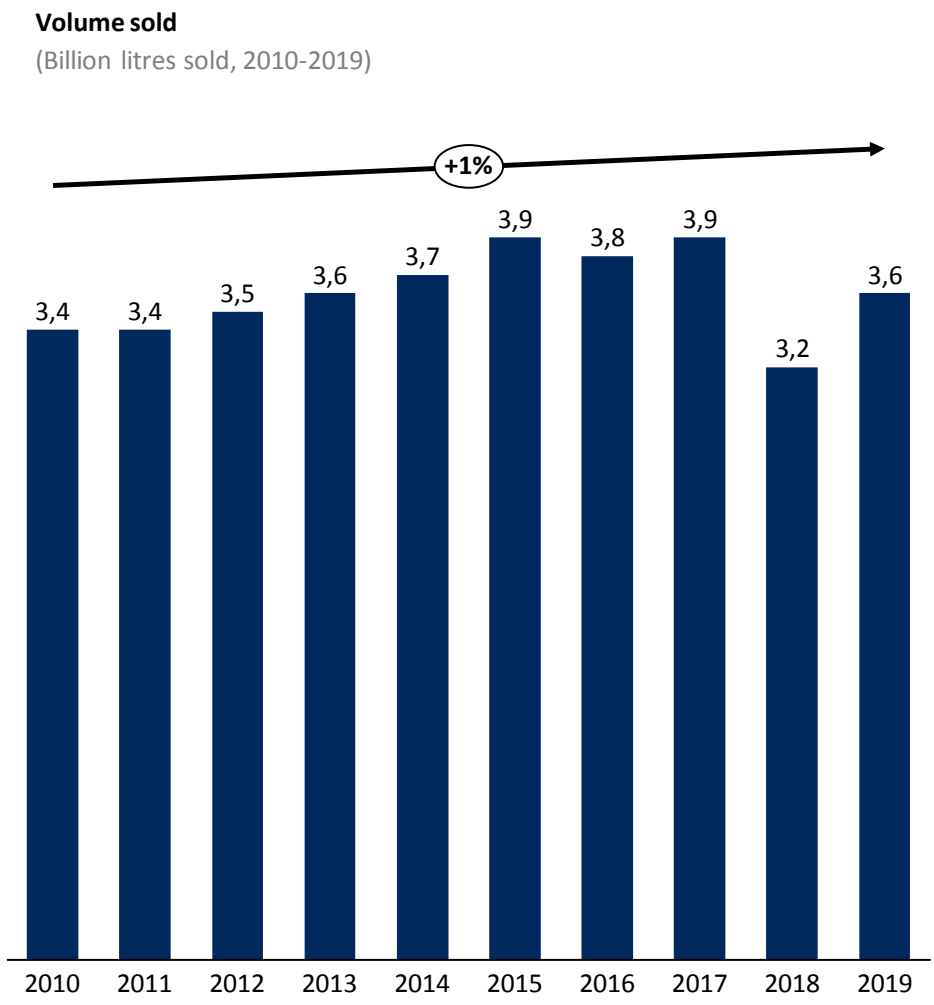
Coca-Cola SA (Pty) Ltd is the biggest distributor of beverages in the industry with a total market share of 55% (ten-year average). The bulk of beverages supplied to the domestic market are sold through the off-sale chain (80% of total sale volumes), consisting of supermarkets and small-scale vendors, while the remainder is sold through restaurants (20% of total sale volumes) or on-trade distribution.

6.2. MARKET TRENDS – DEMAND AND SUPPLY

The South African non-alcoholic beverages industry has gone through significant expansion since the 1990s. The National Treasury estimates the market to have doubled in size over the last two decades in terms of volumes sold [18]. This growth is largely attributable to an increase in the affordability of soft drinks as well as the accessibility of products in the sector. Specifically, accessibility has been improved by increasing throughput to supermarket chains and convenience stores and more importantly through the inclusion of Spaza shops in the distribution chain with direct links to the previously underserved township and rural communities. There has also been a marked increase in the serving size of soft drinks over the same period. Since 2010, however, the expansion has been modest, with the industry recording a compound annual growth rate of 1%. The graph below provides a historical view of the volumes of soft drinks sold in the SA market since 2010.

[18] National Treasury Policy Paper Taxation on Sugar Sweetened Beverages

Figure 18: Volume of soft drinks sold



Source: Stats SA (2020) and Euromonitor (2016)

Due to unavailable industry data points post-2015, the study calculates production volumes for the subsequent periods (2016 and 2017) using 2015 industry values as a base and then applying growth rates sourced from StatsSA periodic publications on manufacturing output in the beverages subsector[19]. For the years in which the levy was effective, volumes estimated from the CGE model were preferred as the best approximation for actual industry volumes. The results from these calculations show a noticeable decline in volumes produced in 2018 – the first year of the HPL – by an estimated 670 million litres (net impact after considering substitution to healthier options). However, production volumes almost return to pre-tax levels the following year, suggesting a high degree of reformulation in the industry. This observation is consistent with accounts from BEVSA of a concerted effort to reformulate products within the industry. The industry target is to reduce sugar content in

[19] Statistics South Africa Quarterly Statistical Release, Manufacturing: Production and Sales

non-alcoholic beverages by 15% over time, while also scaling up the introduction of low and zero sugar options to the production mix[20].

Given that production volumes used in this study for the post-2015 period are approximated, an effort was made to qualify the observed trends in production volumes sold with secondary data. To achieve this, researchers assessed the degree of capacity constraint experienced in the beverages industry, using capacity utilisation levels of large enterprises as a proxy. The data used in this analysis is sourced from Stats SA's quarterly publication on capacity utilisation across all economic sectors[21]. The results from this exercise are presented in the table below. The information shows no observable decline in capacity utilisation levels. That is, underutilisation levels have remained relatively unchanged since the levy announcement. Furthermore, underutilisation in the beverages industry is comparably lower in this period compared to 2012 and 2013. Lastly, the study does not observe a sharp increase in underutilisation levels attributable to insufficient demand in the years in which the levy was implemented (2018 and 2019). Together, these observations suggest the demand for beverages (most of which is accounted for by SSBs) did not decline significantly in response to tax-induced increases in the price for SSBs. The study explores this observation further in section 8 within a CGE framework.

Table 2: Utilisation of resources

Year	Capacity Utilisation	Underutilisation	Insufficient Demand
2012	82.0	18.0	9.7
2013	83.1	16.9	8.9
2014	84.6	15.4	8.1
2015	84.6	15.4	7.9
2016	86.0	14.0	7.1
2017	84.9	15.1	7.8
2018	84.3	15.7	7.9
2019	85.2	14.8	8.7

Source: Statistics South Africa, 2019

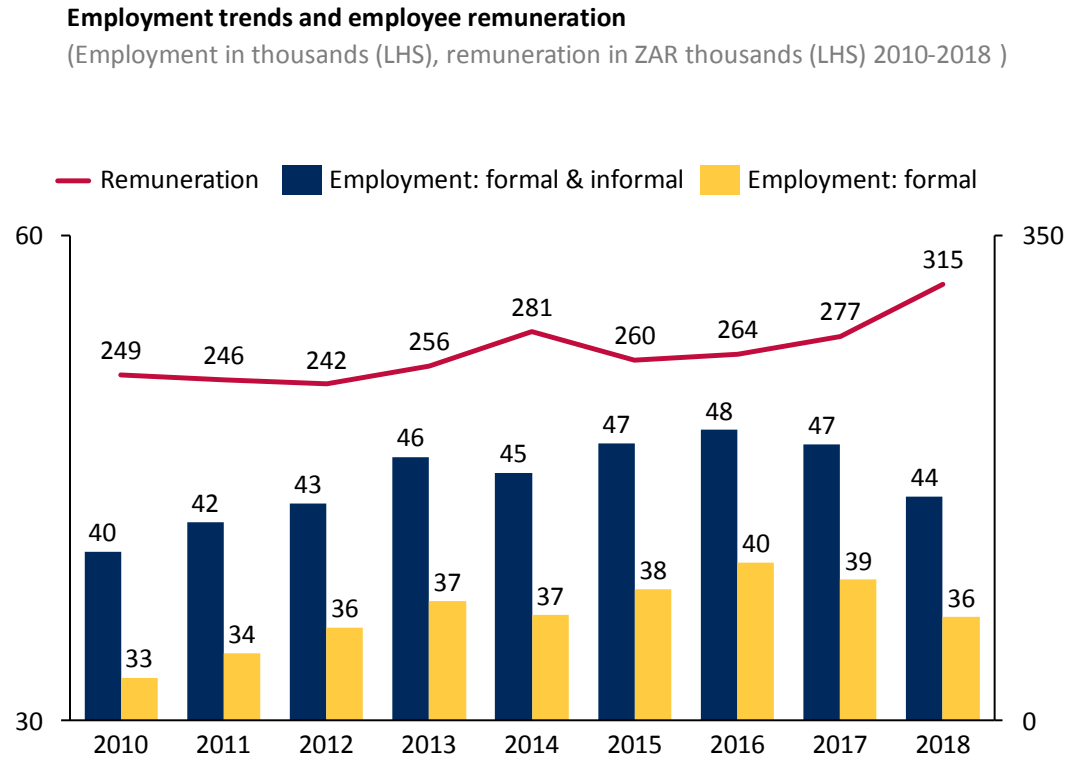
[20] Beverages Association of South Africa (BEVSA), The Health Promotion Levy – A Net Negative Impact on South African Non-alcoholic Beverages Accessed: https://www.bevsa.co.za/media-feed/media-release/default/health-promotions-levy-net-negative-impact-south-african-non-alcoholic-beverage-industry

[21] Statistics South Africa Quarterly Release, Manufacturing: Utilisation of Production Capacity by Large Enterprises

6.3. EMPLOYMENT IN THE BEVERAGES INDUSTRY

The beverages industry makes an important contribution to the South Africa economy, given its high contribution to employment and gross earnings. BEVSA estimates that the SSBs industry supports circa 290 000 jobs in South Africa (both directly and indirectly)[22]. This estimate includes employed professionals across the value chain, from manufacturing to downstream business in the distribution network. This section focuses on individuals that are directly employed in the beverages sector – in both the formal and informal subsectors. Data sourced from Quantec shows that total direct employment was recorded at 43,856 workers as at the end of 2018. Importantly, the sample also includes workers employed in the alcoholic beverages sector, which according to the National Treasury's estimates accounts for 57% of total employment in the sector. The broad definition of employment in the beverages industry is preferred for this illustration considering that it is the only publicly available metric in a time-series format. Of the total number of individuals employed in the sector, the vast majority of workers (estimation: 36,382) are employed in the formal sector under permanent employment arrangements. This number largely comprises of workers within the manufacturing cluster, which includes processing and packaging. Temporary workers are largely concentrated in the informal sector.

Figure 19: Beverage industry employment trends and employee remuneration



Source: Quantec & Statistics South Africa

[22] Beverages Association of South Africa (BEVSA), The Health Promotion Levy – A Net Negative Impact on South African Non-alcoholic Beverages.

The above graph shows a 3,193 decline in total employment in the first year after the effective date of the levy – with most of the losses recorded in the formal employment component (2,312 workers). However, it is important to note that the statistics used in this analysis include the alcoholic beverages subsector, which contributes approximately 57% to total employment in the beverages sector. It is the view of researchers that the higher job losses are not entirely attributable to the tax; other factors could have played an important role in the decline, notably, above-inflation salary increases post-2015. This had a negative impact on the cost structures of firms operating in the industry. In section 8 (see *Employment* sub-section), the paper investigates the impact of the HPL on employment in the SSBs sub-sector.

7. ECONOMIC CONTRIBUTION OF SUGAR AND SUGAR SWEETENED BEVERAGES INDUSTRIES

In this section, we quantify the contribution of the sugar and SSBs industries to the South African economy. The results presented here are for 2017, our baseline year where the HPL was not yet implemented. This assessment is conducted within the confines of a Social Accounting Matrix (SAM) multiplier analysis (see *Methodology*) and will examine three channels of expenditure which stimulate economic activity across South Africa. The three channels of impact are:

- **Direct impact:** captures the respective industry's activity across its operations within South Africa. It encompasses the economic activity and employment created by the industry itself.

- **Indirect impact:** occurs as a result of each industry's expenditure on input goods and services from South African suppliers. This expenditure stimulates economic activity and employment along the respective industry's supply chain.

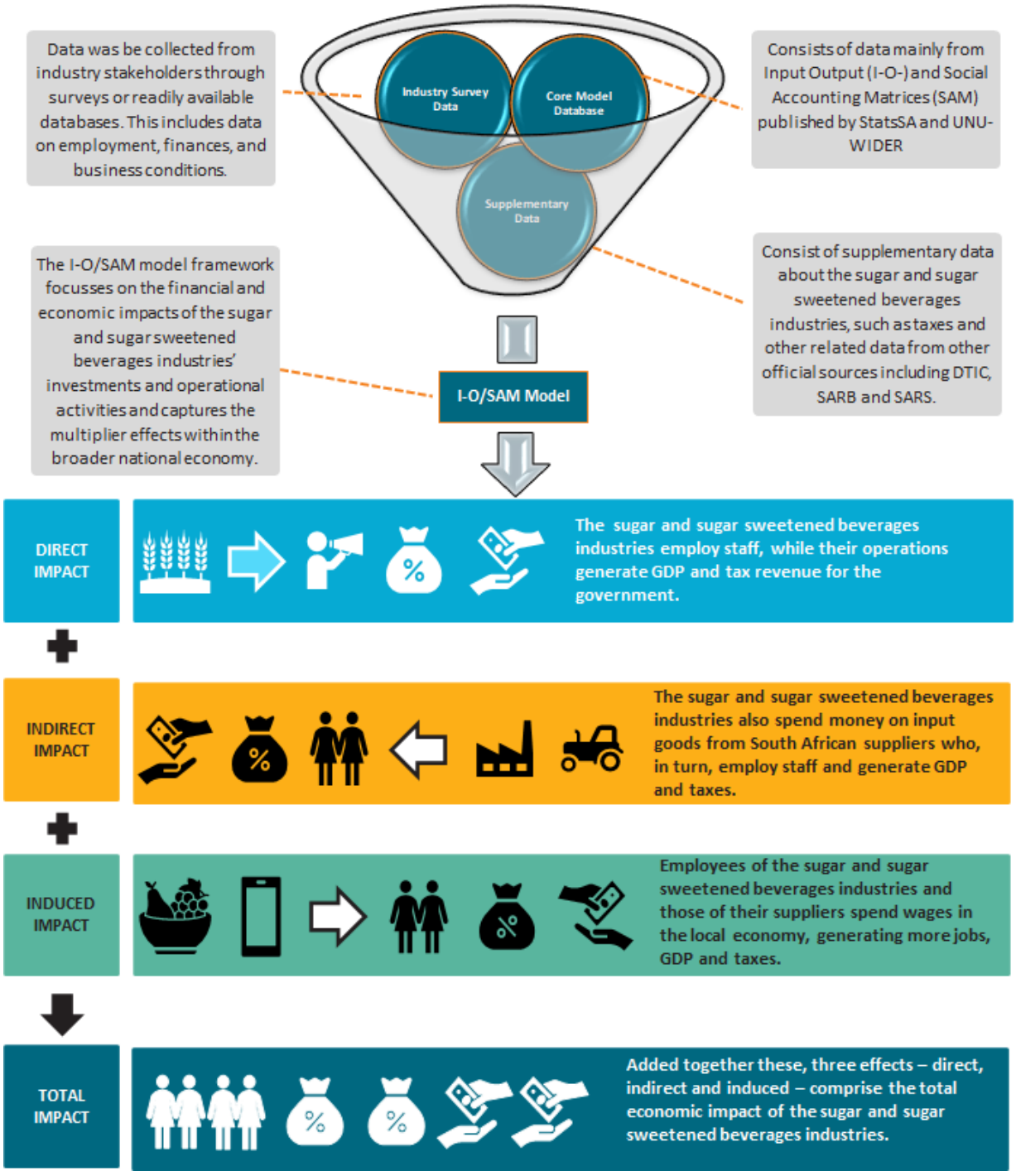
- **Induced impact**: arise as the respective sector and firms in its supply chains pay their staff wages. These employees spend a proportion of this income in the domestic economy, typically at the retail and leisure outlets close to where they live. These impacts ripple out across the rest of the South African economy through these outlets' supply chains.

The economic impacts measured in this study are quantified using two metrics. These are:

- **Gross value added (GVA) contribution to GDP:** this measures the contribution to the economy of each industry in South Africa. It is a measure of net output, most easily thought of as the value output less the value of intermediate consumption.

- **Employment:** this is the number of jobs supported by and through each industry's operations. For this study, it is measured on a headcount, rather than a full-time equivalent basis to facilitate comparison with employment data for the relevant sectors sourced from official sources (Figure 20).

Figure 20: Illustration of Economic Impact Channels



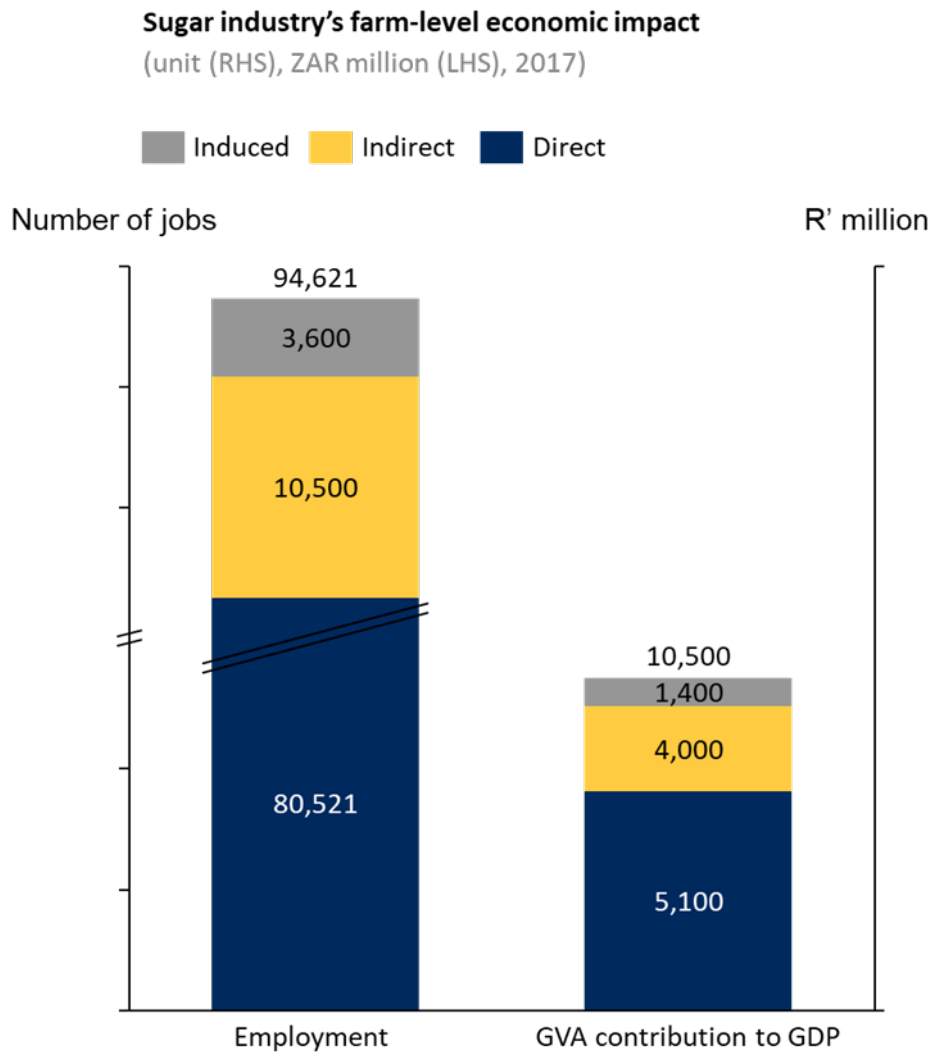
Source: Author's illustration of economic impact channels

7.1. SUGAR INDUSTRY

As elaborated in *Section 5.1* above, South Africa's sugar industry is anchored by two main components: sugarcane farming and sugar milling. Therefore, for the industry, we analyse the farm-level impact, which is the economic impact as a result of the activities of sugarcane growers and the economic impact stimulated by the operations of sugar mills.

7.1.1. Farm-level economic impact

Figure 21: Sugar industry's farm-level economic impact in 2017



Source: Industry sources and SAM Model

7.1.1.1. Employment

Sugarcane farming stimulates employment across South Africa through several channels: sugarcane growers employ people directly (direct impact), they purchase input goods and

services from South African suppliers (indirect impact) and pay wages which are spent in domestic outlets on consumption goods and services (induced impact). Each of these channels generates jobs. Results from the SAM multiplier analysis suggests that in 2017, including all impact channels, sugarcane growers supported 94,621 jobs in South Africa (Figure 21). To put this figure into perspective, it was equal to about 11.2% of all employees in South Africa's agricultural sector in 2017.

An estimated 80,521[23] people were directly employed by the sugarcane farming sub-industry across the country in 2017. This direct employment was supplemented by indirect employment within the sugarcane growers' supply chain and induced employment as a result of employees spending their wages in the domestic economy. Results from the SAM multiplier analysis suggest that sugarcane farming's supply chain indirectly supported about 10,500 jobs while the wages paid by growers in 2017 induced an additional 3,600 jobs across the country.

7.1.1.2. GVA contribution to GDP

In addition to supporting employment, sugarcane farming makes a notable contribution to South Africa's economic activity, which is conventionally measured by GDP. As with employment, this total contribution represents the sum of the three types of impact – direct, indirect and induced, illustrated in Figure 21. Results from the SAM multiplier analysis suggest that, in total, sugarcane farming's contribution to South Africa's economic output amounted to about R10.5 billion in 2017 or about 0.2% of all economic output in the country. To give an alternative sense of the scale of sugar farming's contribution to South African GDP, it was equivalent to 9.6% of the agricultural sector's 2017 GDP.

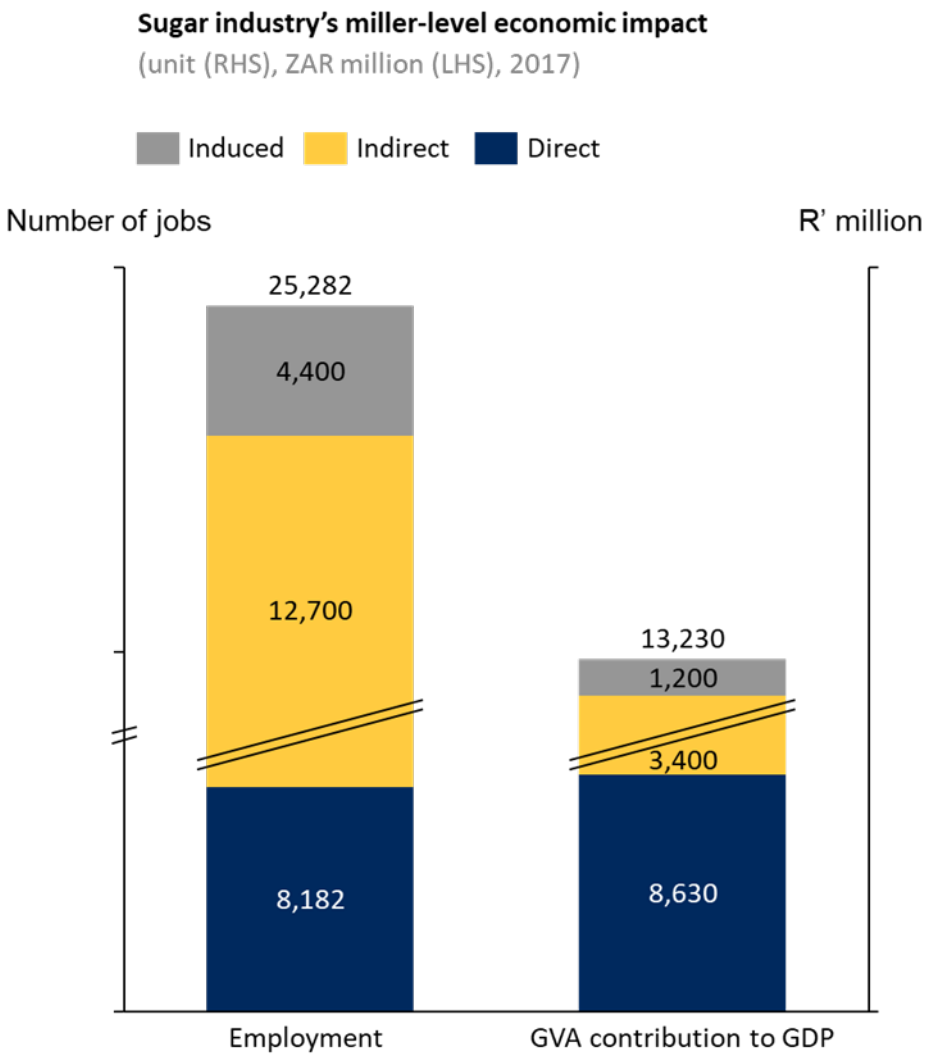
In isolation, sugarcane farming directly contributed about R5.1 billion to South Africa's economy in 2017[24] (Figure 21). As with the effects on employment, the sugarcane farming sub-industry's expenditure on input goods and services feeds through to the numerous nodes of its supply chain, sustaining economic activity and jobs in the broader economy. Through its supply chain, sugar cane farming indirectly contributed about R4.0bn to South Africa's GDP in 2017 (Figure 21). In addition to direct and indirect (supply chain) GDP contribution, a further economic stimulus is created when the sugarcane farming sub-industry and the firms in its supply chain pay wages, which are then spent in the domestic economy. The wage-spend of those employed by the sugarcane farming sub-industry and within its supply chain (induced impact) contributed a further R1.4 billion to South Africa's GDP in 2017.

[23] According to DAFF's profile of the South African sugar market value chain, in 2017 the sugar industry directly employed about 79,000 people, of which 12,751 people are employed by sugar millers. Therefore, we estimate the people directly employed by sugarcane growers at 66,250 (79,000 – 12,751). At the same time, in 2017 there were 1,347 large scales growers and an estimated 14,228 small scale growers that delivered sugarcane to be crashed in the year. This puts the total number of people directly employed by the sugarcane farming sub-industry at 80,521 (62,250 farmworkers + 12,944 small scale growers + 1,327 large scale growers)

[24] DAFF. (2019). A Profile of the South African Sugar Market Value Chain - 2017.

7.1.2. Sugarcane processing impact

Figure 22: Sugar industry's miller-level economic impact in 2017



Source: Industry sources and SAM Model

7.1.2.1. Employment

The activities operations of the various sugar mills stimulate employment across South Africa through several channels: these millers employ people directly (direct impact), they purchase input goods and services from South African suppliers (indirect impact) and pay wages which are spent in the domestic economy (induced impact). Each of these channels generates jobs. Results from the SAM multiplier analysis suggests that in 2017, including all these impact channels, sugar millers supported about 25,282 jobs in South Africa (Figure 22).

Looking at the direct channel, sugar millers directly employed an estimated 8,182 people[25] across all their operations in South Africa in 2017. This direct employment was supplemented by indirect employment within the millers' supply chain and induced employment as a result of their employees spending wages in the domestic economy. Results from the SAM multiplier analysis suggest that the sugar millers' supply chain indirectly supported about 13,700 jobs while the wages paid by these millers in 2017 induced an additional 4,700 jobs across the country.

7.1.2.2. GVA Contribution to GDP

In addition to supporting employment, sugar millers make a notable contribution to South Africa's economic activity. As shown in Figure 22, this contribution represents the sum of the three types of impact – direct, indirect, and induced. Results from the SAM multiplier analysis suggest, in total, the sugar millers' contribution to South Africa's economic output amounted to about R13.2 billion in 2017.

In isolation, we estimate that the operations of sugar millers made a R8.6 billion direct contribution to South Africa's economy in 2017 (Figure 22). These sugar millers' expenditure on input goods and services feeds through to the numerous nodes of their supply chain, sustaining economic activity and jobs in the broader South African economy. Results from the SAM multiplier analysis suggests that through their supply chain, these millers indirectly contributed about R3.4 billion to South Africa's GDP in 2017 (Figure 22). In addition to direct and indirect (supply chain) GDP contribution, a further economic stimulus is induced when the employees of sugar millers and those of firms in their supply chain spend their wages in the domestic economy. Results from the SAM multiplier analysis suggest that the wage-spend of these employees contributed an additional R1.2 billion to South Africa's GDP in 2017.

7.1.3. Overall sugar industry impact

As a whole, the sugar industry directly contributed about R13.7 billion to South Africa's GDP in 2017, supporting an estimated 88,703 jobs. Results from the SAM multiplier analysis suggest that through its supply chain activity, the sugar industry indirectly contributed R7.4 billion to South Africa's GDP and supported 23,200 jobs in 2017. At the same time, the wage-spend of employees within the industry and its supply chain contributed a further R2.6 billion to GDP and induced about 7,400 jobs in 2017. Taking into account all the impact channels, the sugar industry is estimated to have contributed R23.7 billion to GDP and supported 119,903 jobs in 2017. To give an alternative sense of the scale of the sugar industry's GDP contribution, it is equivalent to about 0.5% of South Africa's total GDP in 2017.

[25] According to DAFF's profile of the South African sugar market value chain, in 2017 sugar millers directly employed about 12,751 people. However, the latest data provided by SASA, shows that these sugar millers directly employed 8,182 people.

The wider economic contribution (indirect and induced) varies widely across studies, particularly employment contribution. A 2013 study by Conningarth Economists[26] estimates the indirect and induced employment contribution of the sugar industry at a total of 19,019, while DAFF[27] reports this contribution at 350,000 jobs – a number widely quoted by sugar industry reports[28,29]. The treatment of small-scale growers, temporary farmworkers and subsistence sugar farming in the modelling exercise explain these vast differences. In this study, indirect and induced employment impacts are determined by industry-level labour productivity and household expenditure data, both obtained from StatsSA. Nevertheless, the role of the sugar industry as a provider of livelihood, especially in KwaZulu Natal and Mpumalanga, cannot be overemphasised. According to industry sources, approximately one million people depend on the sugar industry for a living[30].

7.2. SUGAR-SWEETENED BEVERAGES IMPACT

7.2.1. Employment

The direct activities involving the manufacturing, retail and distribution of SSBs stimulates employment across South Africa. This is through several channels: the SSBs industry employs people directly (direct impact), it purchases goods and services from South African suppliers (indirect impact) and pays wages which are spent in domestic outlets on consumption goods and services (induced impact). Each of these channels generates jobs. Results from the SAM multiplier analysis suggests that in 2017, including all impact channels, the SSB industry supported an estimated 170,565 jobs in South Africa (Figure 23 below). To put this figure into perspective, it is equal to about 9.6% of all employees in South Africa's manufacturing sector in 2017.

According to industry sources, the SSBs industry directly employed an estimated 13,965 people in 2017. This direct employment was supplemented by indirect employment within the industry's supply chain and induced employment as a result of the employees spending their wages in the domestic economy. Results from the SAM multiplier analysis suggests that the SSBs industry's supply chain indirectly supported about 116,600 jobs while the wage-spend of the employees of the SSBs industry and those employed by firms in the SSBs industry's supply chain induced an additional 40,000 jobs across the country.

26 Conningarth Economists. (2013). Growing the ugar Industry in South Africa: Document 1: Overview of the Sugar Industry in South Africa: Contribution to Social and Economic Development and Contentious Issues.

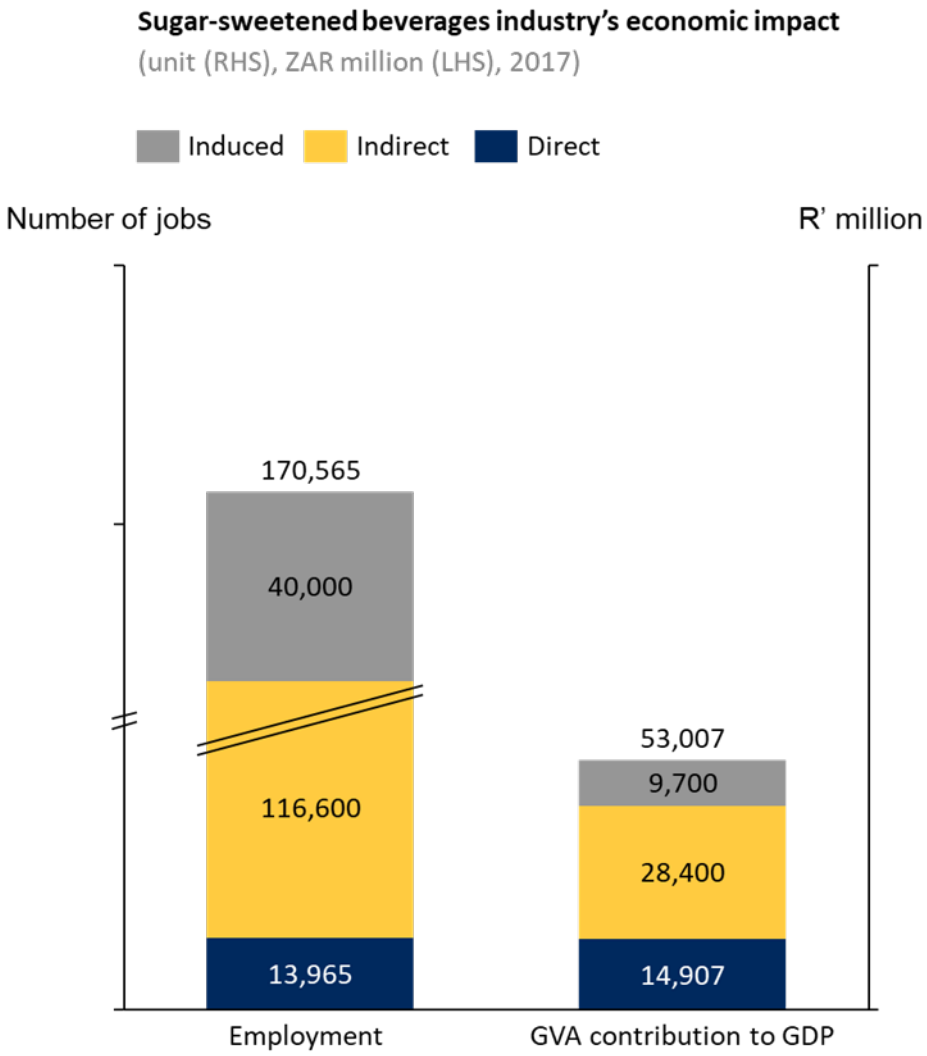
27 DAFF. (2019). A Profile of the South African Sugar Market Value Chain – 2017.

28 SASA. (2016). South African Sugar Industry Directory 2016/2017.

29 SASA. (2019). South African Sugar Industry Directory 2019/2020.

30 SA Canegrowers. (2020). 2019-2020 Annual Review.

Figure 23: Sugar-sweetened beverages industry impact in 2017



Source: StatsSA, DTI and SAM Model

7.2.2. GVA Contribution to GDP

In addition to supporting employment, the SSBs industry makes a notable contribution to South Africa's economic activity. Results from the SAM multiplier analysis suggest that, in total, the SSBs industry's contribution to South Africa's GDP is estimated at R53.0 billion for 2017, equivalent to 1.1% of the country's GDP. As shown in Figure 23, this contribution represents the sum of the three types of impact – direct, indirect, and induced. To give an alternative sense of the scale of the millers' contribution to South African GDP, it was equivalent to 9.5% of the overall manufacturing sector's GDP in 2017.

The direct activities (manufacturing, retail and distribution) of the SSBs industry is estimated to have directly contributed R14.9 billion to South Africa's GDP in 2017 (Figure 23). In addition, the SSBs industry's expenditure on input goods and services (including sugar) feeds through to the numerous nodes of its supply chain, sustaining economic activity and

jobs in the broader South African economy. Results from the SAM multiplier analysis suggests that through its supply chain, the SSBs industry indirectly contributed about R28.4 billion to South Africa's GDP in 2017 (Figure 23). In addition to the direct and indirect (supply chain) GDP contribution, further economic stimulus is created by the wage-spend of the employees in the SSBs industry and those firms in its supply chain. This wage-spend induced R9.7 billion contribution to South African GDP in 2017.

8. ECONOMIC IMPACT OF THE HPL ON SUGAR AND SUGAR SWEETENED BEVERAGES INDUSTRIES

This section aims to provide an assessment of the economic impact of the HPL. Outputs were derived using a dynamic Computable General Equilibrium (CGE) model developed to assess the impact of HPL on the sugar and SSBs industries (see Methodology). The study will focus on the levy's impact on overall employment and economic output (GDP) as well as the impacts on those industries directly affected by the levy: sugar and SSBs. A standard approach to policy analysis using CGE models is to examine the impacts of an exogenous shock by computing the differences between a scenario in which the shock has occurred – the implementation of the HPL – and a counterfactual scenario in which the shock under examination has not occurred – the baseline scenario. In this study, we take the same approach, and our base year is 2017 before the HPL was implemented. The impacts presented here are for the 2018-2019 period.

In the run-up to the implementation of the HPL, several studies were undertaken by industry stakeholders, including the government, SSBs manufacturers and the sugar industry, to determine the economic impact of the levy. These studies were ex-ante or forward-looking in nature, as the levy was yet to be implemented. In contrast, in this study, we conduct an ex-post or backwards-looking analysis, which allows for a comparison of the actual outcomes to the counterfactual scenario wherein the HPL was not implemented. That is, the impact of the HPL is therefore measured by removing it, using a historical CGE model closure[31]. The benefit of this approach is that one can accurately control for other issues affecting the industry and the overall economy in order to isolate the impact of the HPL accurately.

8.1. SCENARIO DESIGN

To conduct this analysis with our CGE model, we run two simulations. First, we run a *baseline scenario*, modelling the time path of the economy in the presence of the HPL. Our

[31] For more detailed information on historical closures see: Dixon, P.B. & Rimmer, M. T. (2002). Dynamic General Equilibrium Modelling for Forecasting and Policy: A Practical Guide and Documentation of MONASH. Amsterdam: North Holland.

baseline incorporates historical macro data from the National Treasury, the South African Reserve Bank and StatsSA. Specifically, we adopt forecasts for the GDP expenditure components, employment, tax revenue and population growth.

The second simulation incorporates all of the features of the baseline scenario, plus HPL-related shocks reflecting an environment where the levy is absent or removed. This *counterfactual scenario* essentially shows the impact of a R5.8 billion (R3.2 billion in 2018; R2.6 billion in 2019) removal of the taxes paid by households on the consumption of SSBs. The study also incorporates other industry-level data provided by industry sources,[32]particularly downstream industries, including the decline in sugar demand by SSBs manufacturers and the subsequent jobs cuts in the sugarcane farming and sugar processing sub-industries. The results of the *counterfactual scenario* are reported as cumulative percentage deviations away from the *baseline scenario*. The model is solved using the Generalized Algebraic Modelling System (GAMS)[33] (see Methodology).

8.2. SUMMARY OF FINDINGS

8.2.1. INDUSTRY RESULTS

8.2.1.1. Consumption

A key factor in determining the impact of the HPL on the purchases of SSBs is the extent to which the levy changes the prices faced by consumers. The magnitude of this change depends on the extent to which manufacturers and retailers of SSBs pass any costs (or savings if the SSBs manufacturer switch to cheaper inputs, e.g. sweeteners) related to the levy onto consumers. Pass-through rates vary widely across countries and beverages. Some studies[34] show that in most instances part of the costs related to the levy is passed on to consumers while in other cases manufacturers have used the opportunity of the introduction of a tax to increase prices by more than the effective tax rate – a mandated increase in the price of a good may present the manufacturer with the opportunity to increase profit margins. Tax pass-through rates depend on several factors, including the elasticity (or responsiveness) of demand to price changes.

Moreover, recent evidence from an empirical study by Stacey et al. (2019)[35] estimates the overall SSBs pass-through rate in South Africa at approximately 68%. However, for smaller containers, e.g. cans, the preferred method of dispensation by manufacturers, the study

[32] Data obtained from surveys and bilaterall discussions with SASA, SA Sugarcane Growers and other industry stakeholders.

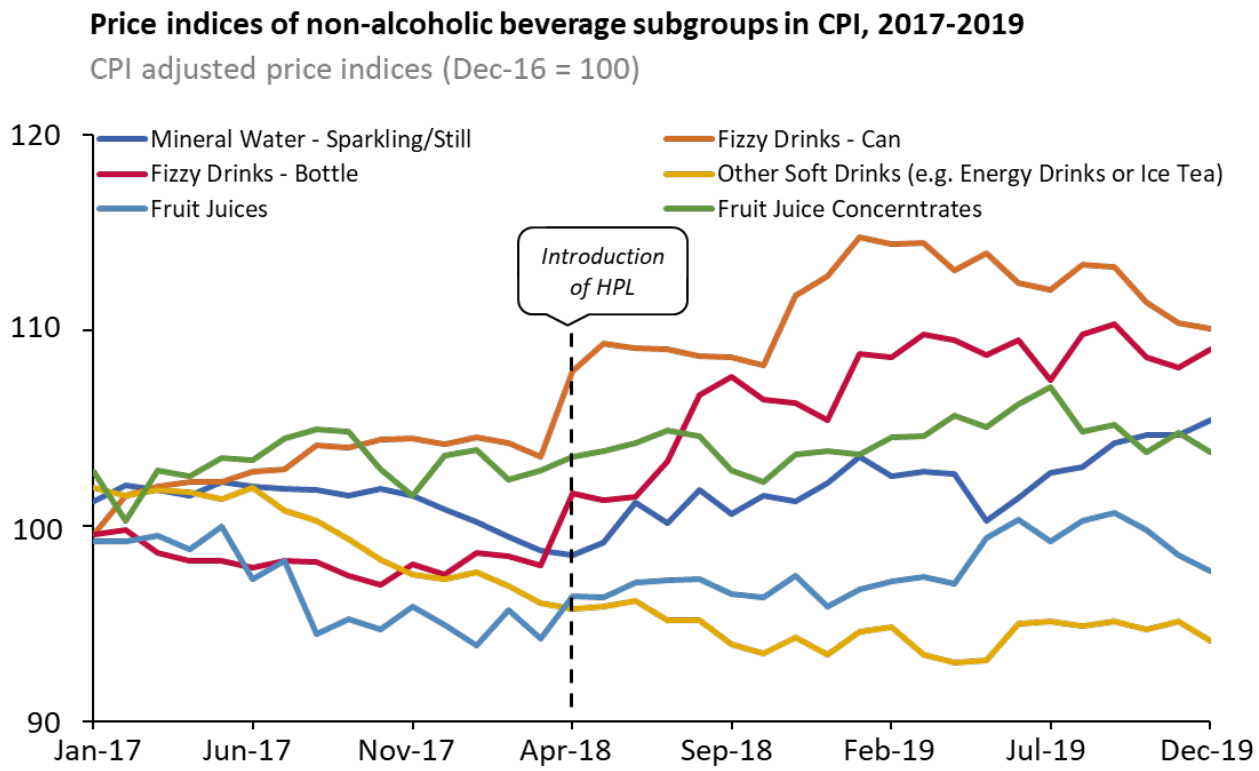
[33] Bussieck M.R., Meeraus A. (2004) General Algebraic Modeling System (GAMS). In: Kallrath J. (eds) Modeling Languages in Mathematical Optimization. Applied Optimization, vol 88. Springer, Boston, MA.

[34] Cawley, J, & Frisvold, D. (2015). The incidence of taxes on sugar-sweetened beverages: the case of Berkeley, California. NBER Working Paper Series: 21465.

[35] Stacey. N. et. al. (2019). Sugar-based beverage taxes and beverage prices: Evidence fro m South Africa's Health Promotion Levy. Social Science & Medicine 238 (2019).

observed a more significant pass-through point estimate of approximately 100%. While the study found that the pass-through varies between 51% and 56% for larger (400 ml) high sugar carbonates. This finding on differing pass-through rates for different pack or container sizes is not peculiar to South Africa nor SSBs. Colchero et al. (2019)[36] found that the pass-through rates of the excise tax on SSBs implemented in Mexico in 2014 were higher in smaller packages size. Russell & van Walbeek (2015)[37] found that pass-through rates differ across different pack sizes of alcoholic beverages - the pass-through rate was lower in 750ml bottles compared to 340ml cans.

Figure 24: Comparison of price indices of non-alcoholic beverages sub-groups in CPI



Source: DTIC

Recent data from the DTIC support the notion that the burden of the levy was passed on to the consumer in the form of higher prices. Figure 24 above shows the consumer price indices of selected non-alcoholic beverages sub-groups between 2017 and 2019. It is clear that the CPI-adjusted price indices of non-alcoholic beverages, particularly fizzy drinks, rose following the implementation of the HPL in April 2018. The most significant increases were observed in the price indices related to 'fizzy' drinks in cans or bottles, which increased by 4.2% m-o-m and 3.7% m-o-m in April 2018, respectively.

[36] Colchero. M. et al. (2015). Changes in Prices After an Excise Tax to Sweetened Sugar Beverages Was Implemented in Mexico: Evidence from Urban Areas. PLoS ONE (10)12.

[37] Russell. C & van Walbeek. C (2016). How does a Change in the Excise Tax on Beer Impact Beer Retail Prices in South Africa? South African Journal of Economics 84(4).

Given the varying degree of pass-through rates among different drink sizes and brands, and in line with best international practices on tax impact modelling, in this study, we assume a 100% pass-through rate. That is, we assume that manufacturers pass through the entire cost of the levy to households. While these costs passed to consumers include reformulation costs, it is worth noting that this study could not isolate organic product reformulation – the reformulation that would have occurred with or without the HPL – from HPL-led product reformulation due to data constraints. Therefore, the pass-through rate could differ from the assumed rate of 100%.

In economic modelling, the impact of price changes on the demand for a product is determined by the price elasticity of demand, which can be positive or negative. Price elasticities of demand can be of several types; the ones used in this analysis are the own-price elasticity of demand for SSBs (i.e. the sensitivity of demand for SSBs to a change in SSBs price) and the cross-price elasticities of demand for other beverages to the price of SSBs. We assume that the price elasticity of demand for SSBs is inelastic, and we use the National Treasury's estimate of an own-price elasticity of SSBs demand of -0.73[38]. This elasticity is preferred as it is estimated using actual data on the South African economy and the SBBs industry as opposed to other studies[39,40] that use elasticities sourced from other countries with different characteristics to South Africa. While this elasticity has been partially validated by other studies using actual industry data (i.e. Econex estimated the own-price elasticity of demand at -0.79[41]) and we agree with the methodology used by National Treasury, the limitations of this study, however, is that this elasticity could not be validated, particularly since the National Treasury did not provide any detail on robustness checks. The validation exercise could not be undertaken due to industry-level data constraints.

On the other hand, the cross-price elasticity of demand for other beverages, which measures the responsiveness of the quantity demanded for a good to a change in the price of another good, is assumed to be 0.53. Also important is the income elasticity of demand, which measures the effect of a change in income on the demand of a commodity. Income elasticity of between 0 and 1 indicates a necessity good, for which its demand grows proportionately less than income growth, while income elasticities greater than 1 indicates a luxury good. In this study, we assume that SSBs are luxury goods with an income elasticity of 1.31 (*see Methodology*).

Based on our assumptions and scenario design, simulation results, shown in Table 3 below, suggest that the observed price increases in SSBs led to a decline in household

[38] National Treasury (2016), Taxation of Sugary Beverages in South Africa – Social Impact Assessment.

[39] Manyema, M. et al. (2014). The Potential Impact of a 20% Tax on Sugar-Sweetened Beverages on Obesity in South African Adults: A Mathematical Model. PLoS ONE 9(8).

[40] Oxford Economics. (2016). The Economic Impact of Taxation of Sugar Sweetened Beverages in South Africa. International Tax and Investment Centre (ITIC).

[41] Econex. (2016). Economy-wide implications of the proposed tax on sugar sweetened beverages (SSBs). Research Note 42.

consumption of SSBs. The model estimates that household consumption of SSBs declined by a cumulative R3.2 billion relative to baseline levels (2017). On year on year basis, model results show that the decline in household consumption of SSBs in 2019 was higher (R1.64 billion) compared to the first year of the levy (R1.57 billion), in line with the lower revenue collected (see *Tax Revenue Projections vs Realised Revenue*). This, in part, also reflects the SSBs manufacturers' continued product reformulation efforts in order to reduce their levy liability.

Table 3: HPL Impact on SSBs Household Consumption (Cumulative Differences from the Baseline)

	2017 (Baseline)	2018	2019
Household Consumption (R' millions)	42,052	-1,571	-3,214
Household Consumption (%)		-3.74	-7.64

Source: National Treasury, DAFF, DTIC and authors' calculations based on data from CGE Model.

Although the tax, as intended, reduced the consumption of sugar-sweetened beverages, model results suggest that the increase in the consumption of non-SSBs was not as large as the decline in SSBs. This is in line with findings of some studies[42] looking at the health-related impacts of the HPL which suggest that consumers do not necessarily switch in large numbers to diet drinks or bottled water as a result of the levy. This reflects the fact that the HPL alone cannot address the issue of diabetes and obesity, but should instead be part of an overall strategy with a clear goal of reducing the prevalence of both diabetes and obesity in South Africa. This is also echoed by the DoH's strategy on obesity prevention and control[43], which notes that the HPL or similar taxes will have a modest impact in addressing obesity, albeit having a lower cost of implementation compared to physical counselling. Physical counselling has a higher cost of implementation but has the most significant impact on reducing obesity.

8.2.1.2. Employment

Table 4: HPL Impact on Employment (Cumulative Differences from the Baseline)

Sector	2017 (Baseline)	2018	2019
Sugar Farming (Jobs)	80,521	-3,708	-9,154
Sugar Processing (Jobs)	8,182	-116	-558
Sugar-Sweetened Beverages (Jobs)	13,965	-645	-1,104
Overall Employment (Jobs)	16,168,663	-10,269	-16,621

Source: National Treasury, DAFF, DTIC and authors' calculations based on data from CGE Model.

Using data provided by industry sources, StatsSA and the DTIC, the total number of people directly employed by the SSBs industry in 2017 is estimated at of 13,965. Given the decline

[42] Econex. (2016). Health Report. The impact of sugar tax on SSBs on the prevalence of obesity.

[43] Department of Health. (2016). Strategy for the Prevention and Control of Obesity in South Africa: 2015 – 2020.

in household consumption of SSBs due to the introduction of the HPL (Table 3), and in turn the decline in SSBs production, model results suggest that the industry lost a cumulative 1,104 jobs as a result of the levy – 645 jobs lost in 2018 and an additional 459 jobs lost in 2019.

Sugar is an essential input in the manufacturing of SBBs, and therefore a decline in SSBs production or the decline in sugar used by the SSBs industry due to reformulation will have an impact on the downstream sugar industry. Informed by industry-level data, model results suggest that the estimated 200,000-tonne decline in local sugar demand by SSBs manufacturers due to the HPL led to widespread retrenchments within the sugarcane farming sub-industry, with a cumulative 9,154 jobs by 2019 (2018: -3,708 jobs; 2019: - 5,446 jobs). In tandem, model results also suggest that the sugar milling sub-industry had lost a cumulative 558 jobs by 2019 as a result of the HPL. Nevertheless, the sugar industry was (and still is) also facing significant financial challenges due to other factors outside of the HPL, including relatively cheaper sugar imports, financial distress and lower global sugar prices (see *Upstream Demand And Supply Side Analysis*).

8.2.1.3. Output

Using data from the National Treasury, DAFF, DTIC and industry sources, we estimate the direct GVA of the sugar farming and sugar processing industries at R5.1 billion and R8.6 billion in 2017, respectively, while the direct GVA of the SSBs industry is estimated at R14.9 billion. Given these baseline figures, model results suggest that the decline in household consumption of SSBs as a result of the HPL had led to a cumulative R1.58 billion loss in the SSBs industry's output by 2019 (2018: - R771.1 million; 2019: - R808.7 million).

Table 5: HPL Impact on Sectoral GVA and GDP (Cumulative Differences from the Baseline)

Sector	2017 (Baseline)	2018	2019
Sugar Farming (R' millions)	5,100	-214.7	-414.2
Sugar Processing (R' millions)	8,630	-381.8	-772.1
Sugar-Sweetened Beverages (R' millions)	14,907	-771.1	-1,579.8

Source: National Treasury, DAFF, DTIC and authors' calculations based on data from CGE Model.

As we have already established, the reformulation and the decline of SSBs production led to a decline in local demand for sugar, and this hurt the downstream sugar industry. The fall in local demand for sugar, in part due to the HPL, has had a significant impact on the sugar industry (see *Upstream Demand And Supply Side Analysis*). The fall in revenues, coupled with rising input costs, had a significant financial impact on growers. Indeed, our model suggests that the sugar farming sector's output had declined by a cumulative R414.2 million by 2019 as a result of the HPL (2018: - R214.7 million; 2019: - R199.5 million).

Lower domestic demand of sugar due to the HPL forced sugar millers to turn to the export market since its introduction, with the export share of sugar sales rising to 48% in 2019

from 38% the previous year. Despite the notable increase in sugar production between 2017 and 2019, revenues have not grown in step with production, largely due to lower global sugar prices. Simulation results suggest that the sugar processing sector's output had declined by a cumulative R772.1 million by 2019 due to the HPL (Table 5).

8.2.2. NATIONAL RESULTS

8.2.2.1. Employment

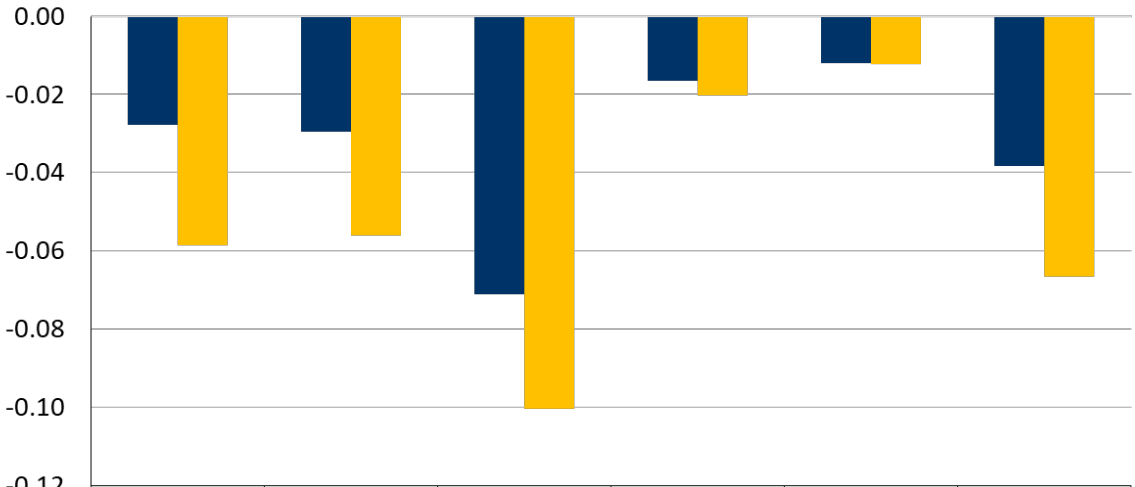
Given the backward and forward linkages of the SSBs industry with other industries in the local economy, the reduction in output in the SSBs and related sectors due to the HPL will lead jobs losses in the overall economy. For the overall economy, the model suggests that a cumulative 16,621 jobs had been lost by 2019 due to the HPL (Table 4).

8.2.2.2. Output

As noted in earlier sections, the HPL led to job losses, which in turn reduced disposable income and overall consumption within households. Model results suggest overall national private consumption in the economy had declined by a cumulative R1.05 billion (-0.03%) by 2019.

HPL Impact on overall economic output

(Cumulative % change from baseline, 2018– 2019)



	Government Consumption	Private Consumption	Investments	Exports	Imports	GDP
2018	-0.028	-0.030	-0.071	-0.017	-0.012	-0.038
2019	-0.059	-0.056	-0.101	-0.020	-0.012	-0.067

The decline in consumption put negative pressure on production and therefore resulted in a decline in both exports and imports. Model results suggest that overall exports had declined by a cumulative R180.8 million (-0.017%) in 2019, while overall imports fell by a cumulative R118.4 million (- 0.012%).

Given the knock-on effects and the induced impact of the HPL, overall investment in the economy had decreased by a cumulative R653.0 million by 2019 (-0.056%), while model result also suggests that government consumption had declined by a cumulative R366.4 million by 2019.

Overall economic impact, as measured using the expenditure approach of GDP (GDP = Private Consumption + Investment + Government Consumption + Exports – Imports), had declined by a cumulative R2.05 billion (-0.067%) as a result of the HPL (2018: - R1.18 billion: 2019: - R864.6 million).

9. CONCLUSION AND RECOMMENDATIONS

The study results show the expected outcomes from the imposition of a levy on SSBs, namely that the resulting price increase leads to a reduction in demand for SSBs, while the sectors in the SSBs industry's value chain (including sugar farming and processing) also record lower outputs. CGE model simulations suggest that the HPL led to a cumulative reduction in GDP of R2.05 billion (-0.067%) by 2019. At the same time, model results suggest that due to the HPL, a cumulative of 16,621 jobs by 2019.

Looking at the HPL impact at industry level, model results suggest that the SSBs industry, which the levy was directly imposed on, had cut a cumulative 1,104 jobs by 2019 and its GVA contribution to GDP fell by a cumulative R 1.58 billion, largely due to a reduction in the household consumption of SSBs. Given that sugar is an essential input in the manufacturing of SBBs, and therefore a decline in SSBs production or the decline in sugar used by the SSBs industry due to reformulation will have an impact on the downstream sugar industry. Model results suggest that due to the HPL, the sugar industry (sugarcane farming, sugar milling) had cut a cumulative 9,711 jobs by 2019 and its GVA contribution to GDP has declined by R1.19 billion.

The main conclusions of the report are, firstly, that the imposition of the HPL had a significant impact (in terms of employment and output) within SSBs industry, with related industries, particularly the sugar industry, also affected. Nevertheless, product reformulation within the SSBs industry reduced some of the adverse economic effects of the HPL. At the same time, sugarcane farming and processing has also remained resilient as sugar production recovered from a prolonged drought period. That said, the costs related to product reformulation, lower global sugar prices, and a deteriorating macroeconomic (and business) environment will compound the impact of the HPL on these industries, and as the levy rate is adjusted higher each fiscal year these industries could still be heavily affected further by the HPL. Therefore, we are likely to see further cuts in jobs and output in the coming years as these industries continue to adjust to the new environment. In addition, the sugar and SSBs industries cannot be viewed in isolation, given their forward and backward linkages to other sectors of the economy. Economic losses in the sugar and SSBs

industries will invariably induce more job and output losses in sectors within their supply chain. These impacts should not be ignored especially in the current environment of high unemployment and declining economic growth.

Moreover, our findings show that product reformulation, which is already taking place within the SSBs industry, lowers the adverse economic impacts. At the same time, the extent and speed at which the SSBs industry reformulates will determine the success of the HPL in achieving its health-related goals – lowering obesity and the prevalence of NCDs.

9.1. POLICY ADVOCACY POINTS

The following advocacy points arise from the HPL's implementation thus far:

Multiple-intervention approach to effectively curb obesity: Effective tax design is not only about the revenue collected, but also about ensuring that the tax implemented changes behaviour and does not discriminate against a single industry or product. In the case of the HPL, there is possible discrimination against SSBs compared to other food items with the same or higher sugar content. The approach targeting a few food items, SSBs, in this case, will not yield significant health outcomes. Rather, a multiple-intervention approach that also includes dietary and market-based interventions (as entailed in the DoH's strategy on the prevention and control obesity and related illnesses[44]) should be implemented in order to yield substantial health gains.

Tax revenue ring-fencing: A portion of, or all the tax revenues should be used for health promotion initiatives, as the stated objective of taxes of this kind is improving health outcomes. Earmarking this tax will not only ensure health objectives are met but will also increase public confidence that the tax is for health objectives and not a revenue-driven exercise. The South African government should commit to increasing investments in health promotion, targeting obesity and non-communicable diseases with the revenue from HPL.

10. ANNEXURE

10.1. SENSITIVITY ANALYSIS

For completeness, a CGE model simulation was run in which the own-price elasticity of sparkling SSBs was set to -1.29 instead of -0.73. This was primarily done to investigate the HPL impact on the economy under the assumption that demand for sparkling SSBs is elastic to changes in its own price, and because there is no consensus on elasticity values from the literature. The main results of this study are summarised in the table below.

[44] Department of Health. (2016). Strategy for the Prevention and Control of Obesity in South Africa: 2015 – 2020.

Table 6: Economic Impact of HPL if Price Elasticity of Demand of SSBs is Elastic (Cumulative Deviation from Baseline)

Sector	2017 (Baseline)	2018	2019
Overall Economy			
Jobs	16,168,663	-11,002	-17,787
Real GDP (R' million)	3,119,983	-1,512.8	-2,634.3

The results of the simulation still suggest that the HPL has had a significant impact on the economy, although the magnitudes of the effects are higher than in the simulations where the own-price elasticity of SSBs is inelastic.

10.2. METHODOLOGY

In this section, technical information, assumptions and data sources for the SAM and CGE models used in this study are detailed.

10.2.1. Social Accounting Matrix (SAM) Multiplier Model

10.2.1.1. Calculating the direct impact

The direct component of the economic footprint captures the respective industry's activity across its operations within South Africa. It encompasses the economic activity and employment created by the industry itself. The direct component is estimated using data from industry (SASA, SA Canegrowers) and official (StatsSA, DTIC and National Treasury) sources.

10.2.1.2. Calculating the wider economic impact

A Social Accounting Matrix (SAM) multiplier analysis[45] is used to estimate the wider (indirect and induced) economic contribution of the sugar and SSBs industries. The model is based on 2015[46] and 2016 SAM tables published by UNU-WIDER. A multiplier model is a detailed representation of the South African economy, showing the major interactions and spending flows between different industries, households, government, and the external sector.

Drawing on patterns of spending and earnings data observed in the SAM as well as sector-level GVA to gross output and productivity ratios, we calculate both the indirect and induced GVA and employment impacts (Figure 19).

[45] See Round, J. (2003). Social Accounting Matrices and SAM-based Multiplier Analysis. The impact of economic policies on poverty and income distribution: Evaluation techniques and tools 14 (2003): 261-276. for full discussion on SAM multiplier methodology.

[46] Stacey, N., Tugendhaft, A., & Hofman, K. (2017). Sugary beverage taxation in South Africa: Household expenditure, demand system elasticities, and policy implications. Preventive medicine, 105S(Suppl), S26–S31.

10.2.2. Computable General Equilibrium (CGE) Model

The primary analysis of the impact of the HPL on the SSBs industry was undertaken using a CGE model. The basis for the CGE model database is a Social Accounting Matrix (SAM). A SAM is a consistent data framework that captures the information in national income and product accounts; the supply-use table (SUT), as well as the monetary flows between institutions. A SAM is a square matrix in which each account is represented by a row and column. Each cell shows the payment from the account of its column to the account of its row; the incomes of an account appear along its row and its expenditures along its column.

Table 7: Illustration of SAM

	Activities	Commodities	Margins	Factors	Institutions	Savings/ Investments	Rest of the World
Activities		Domestic purchase					
Commodities	Intermediate consumption				Final consumption	Investment Consumption	Exports
Margins		Transport and Trade margins					
Factors	Gross Value Added						
Institutions	Taxes and subsidies on activities	Taxes and subsidies on commodities		Factor Revenues	Transfers		Transfers
Savings/ Investments					Domestic Savings		Foreign Savings
Rest of the World		Imports					

The principle of double-entry accounting requires that for each account of the SAM, the total revenue (row total) equals total expenditure (column total). Shown in Table 8 below is a simplified structure of a SAM and how it is disaggregated into economic components. As an example, reading across the *Commodities* row and down the *Activities* column, we see *Intermediate consumption* – where activities purchase commodities used in the production process. These various subcomponents form an important basis for the CGE model.

The core database of our model is based on a 2015[47] and 2016[48] SAM of the South African economy. Various other data sources are used to supplement and to disaggregate the raw SAM, including the Supply Use Tables (SUTs) published by StatsSA.

A dynamic CGE model was developed and calibrated to this core database. Given the dynamic nature of our model, it can estimate the economy-wide effect of the HPL over time. The model is made up of a linearised system of equations describing the theory underlying the behaviour of economic agents and is solved using within the Generalized Algebraic Modelling System (GAMS). These equations together with parameters and set coefficients, including elasticities (*see* Assumptions), determine the behaviour of economic agents in the economy (government, households, etc.) and allow for the dynamic behaviour of the model.

[47] Van Seventer. D, et al. 2019. A 2015 social accounting matrix for South Africa.

[48] Van Seventer, D. & Davies, R. 2019. A 2016 Social Accounting Matrix for South Africa with an occupationally disaggregated labour market representation.

The specification of the CGE model specifies the following three conditions, simultaneously:

1. Market clearance – at equilibrium prices, activity levels are choices where the supply of any commodity optimally balance demands by consumers and producers.
2. Zero profit – in equilibrium, no producer earns an excess profit. That is, the value of inputs per unit activity must equal or be greater than the value of outputs.
3. Income balance – at equilibrium, the value of each agent's income (government, households, etc.) must equal the value of factor endowments on the one hand and their total expenditure on the other.

The model is calibrated to ensure that the baseline grows along a balanced growth path. In the benchmark equilibrium, all reference quantities grow at the rate of labour force growth, and reference prices are discounted based on the benchmark rate of return. The balance between investment and earnings from capital is restored here by the adjustment in the steady-state growth rate that responds to changes in the marginal productivity of capital associated with changes in investment. Readjustments of the capital stock and investment continue until this growth rate and the benchmark interest rates become equal. If the growth rate in a sector (e.g. SSBs) is larger than the benchmark interest rate, then more investment will be drawn to that sector. The capital stock in that sector rises as more investment takes place, leading to diminishing returns on capital. Eventually, the declining marginal productivity of capital retards growth in that sector[49]. To solve the model, we allow for a time horizon sufficient to approximate the balanced-growth path for the economy. Currently, the model uses a 30 years horizon, which can be increased if the model economy does not converge to the steady-state.

10.2.2.1. Assumptions

Based on data from Euromonitor, the National Treasury, and StatsSA, we estimate the value of the SSBs sector at R14.9 billion in 2017, the baseline year.

The choice of own-price elasticity of demand is critical in a study of this type, as the demand effect precedes all the derived economic effects. In economic literature, the impact of a price change on the demand for a product is determined by the price elasticity of demand, which can be positive or negative. Price elasticities of demand can be of several types; the ones used in this analysis are the own-price elasticity of demand for SSBs (i.e. the sensitivity of demand for SSBs to a change in SSBs price) and the cross-price elasticities of demand for other beverages to the price of SSBs. Behavioural elasticities used in the model to determine both the own and cross-price elasticities include; the transformation elasticity between domestic and export supply, the Armington elasticity of substitution between domestic and imported goods and the elasticity of substitution across consumption goods.

[49] Bhattarai. K. et. al. 2016. The economic effects of the fair tax: analysis of results of a dynamic CGE model of the US economy. International Economics and Economic Policy 13, 451 – 466.

We assume that other beverages are substitute goods for SSBs, as per economic theory. We, therefore, expect that an increase in SSBs prices will increase consumer demand for other beverages. The price elasticities and the relationships between them will inform our analysis by predicting changes in consumption, production and factor patterns. We assume that the price elasticity of demand for SSBs is inelastic, and we use the National Treasury's estimate of an own-price elasticity of SSBs demand of -0.73. This elasticity is preferred as it was estimated using actual data on the South African economy and SBBs industry as opposed to other studies that use elasticities sourced from other countries with different characteristics than South Africa. The limitations of this study, however, is that this elasticity could not be validated due to the lack of more recent industry data and, thus, further research is required in this regard.

On the other hand, the cross-price elasticity of demand for other beverages, which measures the responsiveness of the quantity demanded for a good to a change in the price of another good, is assumed to be 0.5. Also important is the income elasticity of demand, which measures the effect of a change in income on the demand of a commodity. Income elasticity of between 0 and 1 indicates a necessity good, for which its demand grows proportionately less than income growth, while income elasticities greater than 1 indicates a luxury good. In this study, we assume that SSBs are luxury goods with an income elasticity of 1.31.

The transformation elasticity between domestic supply and export supply as well as the Armington elasticity of substitution between domestic goods and imported goods are sourced from the Global Trade Analysis Project (GTAP)[50]. The elasticity of substitution in value-added for the SSBs industry is assumed to be 1.12; the transformation elasticity between domestic supply and export supply is assumed to be 1.15; the Armington elasticity of substitution between domestic goods and imported goods in the SSB industry is assumed to be 1.15.

A recent evidence from an empirical study by Stacey et al. (2019)[51] estimates the overall SSBs pass-through rate in South Africa at approximately 68%. However, for smaller containers, e.g. cans, the preferred method of dispensation by manufacturers, the study observed a more significant pass-through point estimate of approximately 100%. While the study found that the pass-through varies between 51% and 56% for larger (400 ml) high sugar carbonates. This finding on differing pass-through rates for different pack or container sizes is not peculiar to South Africa nor SSBs. Colchero et al. (2019)[52] found that the pass-through rates of the excise tax on SSBs implemented in Mexico in 2014 were higher in

[50] Hertel, T. W., & van der Mensbrugghe. Chapter 14 Behavioural Parameters. GTAP 8 Database.

[51] Stacey. N. et. al. (2019). Sugar-based beverage taxes and beverage prices: Evidence from South Africa's Health Promotion Levy. Social Science & Medicine 238 (2019).

[52] Colchero. M. et al. (2015). Changes in Prices After an Excise Tax to Sweetened Sugar Beverages Was Implemented in Mexico: Evidence from Urban Areas. PLoS ONE (10)12.

smaller packages size. Russell & van Walbeek (2015)[53] found that pass-through rates differ across different pack sizes of alcoholic beverages - the pass-through rate was lower in 750ml bottles compared to 340ml cans. Given the varying degree of pass-through rates among different drink sizes and brands, and in line with best international practices on tax impact modelling, in this study, we assume a 100% pass-through rate. That is, we assume that manufacturers pass through the entire cost of the levy to households. While these costs passed to consumers include reformulation costs, it is worth noting that this study could not isolate organic product reformulation – the reformulation that would have occurred with or without the HPL – from HPL-led product reformulation due to data constraints. Therefore, the pass-through rate could differ from the assumed rate of 100%.

We assume that all tax revenues collected by the government are reinvested back into the economy. Although at national level the value-added tax (VAT) tax impact was accounted for, it was not explicitly modelled at industry-level due to data constraints. Industry-level VAT data was unavailable at the source.

Results in this report are presented as the cumulative difference from the status quo. That is, the change relative to 2017 (baseline), the year before the HPL was implemented. While the consumer price index is used as a numeraire in the policy run.

10.2.2.2. Closure

For this study, we use a historical model closure[54] to conduct our analysis of the South African economy over the period 2017 - 2019. We assign the variables for which movements (growth) can be observed from historical data sources for the 2017 – 2019 period. These variables include the components of real GDP, tax revenue, population and employment.

[53] Russell. C & van Walbeek. C (2016). How does a Change in the Excise Tax on Beer Impact Beer Retail Prices in South Africa? South African Journal of Economics 84(4).

[54] For a detailed explanation of historical model closure for the South African economy see: Bohlmann, H.R. and Breitenbach, M. C. (2016). Quantifying shifts in primary factor demand in the South African economy. Development Southern Africa 33(2): 286-296.