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Economy-wide implications of the proposed tax on sugar sweetened beverages (SSBs)

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It is expected that National Treasury will introduce a tax on sugar sweetened beverages (SSBs) from April 2017. Econex has considered the international evidence i.t.o. countries that have implemented a sugar tax. The evidence is at best mixed and in some countries the tax has already been withdrawn (e.g. Denmark). It is important to consider the potential effects that such a tax will have in South Africa, both in terms of health as well as the broader economic effects. Importantly, South Africa has a specific health and economic profile and the lessons from the international experience need to be considered in this context.

In order to understand how consumers will respond to an increased price for SSBs, one needs to understand the sensitivity to price, income and substitute products. In the South African research to date[1] it has been assumed (based on international studies) that the demand for SSBs are relatively price elastic (i.e. price elasticity of demand that is larger than 1). In our estimation of the price elasticity, we found that the demand elasticity for SSBs is in fact inelastic (an estimated value of 0.78). This has important implications, as a more muted consumer response would mean a lower health impact i.t.o. reduction of sugar intake and obesity. In what follows, we discuss in some detail the health effects which have been modelled to date for South Africa, and we show that there are serious flaws with the analysis and that one has to be careful about interpreting the results.

This note has to be read in conjunction with the Health Note[2] where we critique some of the claims made around the potential health impact. The aim is to stimulate debate around this issue, based on modelling which is specific to the South African case. Any model is open to criticism and it is not possible to model reality without some uncertainty, but we have followed best practice internationally in modelling the potential effects and trust that this will contribute to the body of research on this issue.

1. *National Treasury, Taxation of Sugar Sweetened Beverages, Policy Paper, 8 July 2016 and Manyema, M., Veerman, L.J., Chola, L., Tugendhaft, A., Sartorius, B., Labadoarios, D. & Hofman, K.J. 2014. "The potential impact of a 20% tax on sugar-sweetened beverages on obesity in South African adults: A mathematical model." PLoS one, Vol. 9, No. 8. (p.e105287).*
2. *Econex Research Note 41.*

* Econex has been commissioned by Beverage South Africa to conduct research on the health and economic impact of the proposed sugar tax.

1 Introduction

South Africa's National Treasury released a Policy Paper (8 July 2016)[3], detailing the scope, design, level and administration of a proposed tax on sugar-sweetened beverages (SSB). The Treasury paper contains some particulars on the expected benefits and the specifics of the tax but does not include a full cost-benefit analysis.

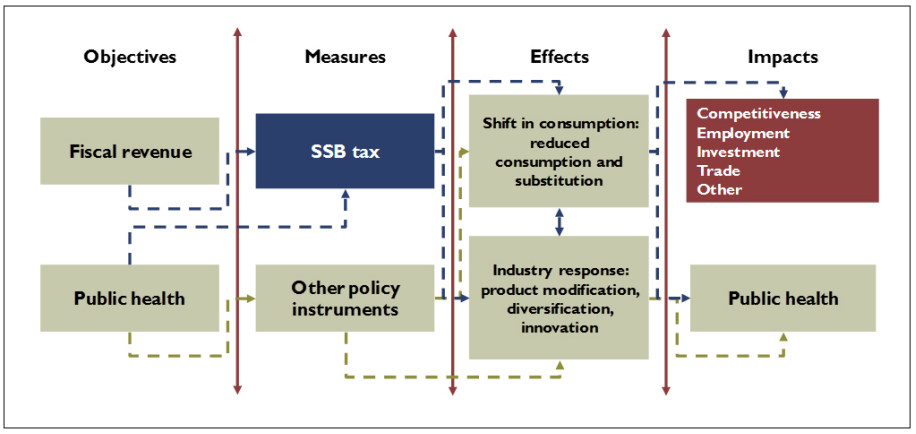
Since the SSB tax aims to alter the behaviour of consumers, incentivising them to shift towards healthier options, it is important to understand what this means for the economy. Also, to ensure that South Africa transitions to a healthier society in a cost-effective and economically efficient manner, it is important that the objectives of inclusive economic growth, poverty alleviation, job creation, alongside the lowering of consumption of SSBs, be appropriately balanced, and the trade-offs effectively managed. Consequently, given the developmental challenges facing the country, it is vital to understand what the nett effect on the economy will be of the proposed tax.

This short note presents the results and findings of a high-level modelling analysis to measure the potential economy-wide impact of the proposed tax of SSBs at different elasticity levels. The rationale for the tax may be driven by various objectives that can include public health concerns as well as fiscal revenue targets (see Figure 1). A potential direct effect of the proposed tax (and other policy instruments) can be a change in consumption patterns, which may also include substitution effects.

The application of a tax on SSBs may necessitate a response by industry – such as, for example, product reformulation, which in turn may influence consumption. The combined impacts arising from the shift in consumption patterns and the correlating industry response can lead to further implications for the wider industry supply chain – including knock-on effects to the rest of the economy – as well as consumers. Concerning the industry, these effects may potentially relate to changes in the sector's competitiveness, employment, investment and trade. In the case of consumers, any alterations in consumption patterns, taking into consideration industry responses and the impact of product substitution, may potentially have an impact on public health. Also, all these effects need time to materialise, some effects can potentially occur relatively quickly after the introduction of a tax on SSBs (e.g. effects on prices), while others (e.g. effects on consumption and public health) would potentially need more time.

The purpose of this note is to highlight the economic impact

Figure 1: Conceptual framework for the report



Source: Adapted from Ecorys, 2014[4]

3. *Taxation of Sugar Sweetened Beverages, Policy Paper, 8 July 2016. http://www.treasury.gov.za/public%20comments/Sugar%20sweetened%20beverages/POLICY%20PAPER%20AND%20PROPOSALS%20ON%20THE%20TAXATION%20OF%20SUGAR%20SWEETENED%20BEVERAGES-8%20JULY%202016.pdf*
4. *Ecorys. 2014. Food taxes and their impact on competitiveness in the agri-food sector. Report prepared for DG Enterprise and Industry, Rotterdam, Netherlands, 12 July.*

that the proposed tax may have on the broader South African economy. In the following sections, we discuss the method applied to capture the economic impact, and through our discussions of the results more carefully review the linkage between the various elements of the above conceptual framework.

2 Approach and method

This section describes the approach and method applied to model the economy-wide impact of the SSB tax in South Africa by Econex. We use a dynamic computable general equilibrium (CGE) model, along with inputs and assumptions based on discussions with industry, to execute the modelling of the tax.

2.1 Data sources

Econex uses a modified version of the TERM[5] (The Enormous Regional Model) for South Africa. The modified SA-TERM is a dynamic multi-region CGE model.[6] The model database is based on a 2012 Social Accounting Matrix (SAM[7]) of the South African economy, aggregated to 31 industries and products.

For the baseline forecast, which shows the macroeconomic projections for the main components of GDP, Econex uses IMF (2016)[8], National Treasury (2016)[9] and CEPII (2012)[10] estimates. Baseline projections paint a business-as-usual (BAU) picture of the economy without the policy change or shock under investigation.

The range of elasticities used in the various counterfactual scenarios, to capture the response by consumers to the tax-induced price change, are -1.299 (used by Manyema et al. and in the Policy Paper), an elasticity of -0.97 (validated by Bayes), and an elasticity of -0.79 (estimated by Econex using Nielsen data on the volume and value of sales).

2.2 Key assumptions

Econex applies the following assumptions and inputs in the dynamic CGE model:

1. 80% of the soft drinks industry is SSBs (i.e. the SSB subsector value is set at R14.776 billion)[11];
2. In the policy scenarios, a tax increase which translates into a 25.1% price increase in the SSB sector, is applied;
3. Econex uses three different elasticity values (-0.79, -0.97 and -1.299) to model the potential range of impacts that may result from the imposition of the tax on SSBs.
4. Econex also assumes a 100 percent tax pass-through to consumers of SSBs.

2.3 Methods

Dynamic CGE models are designed to quantify the effects of a policy change, or exogenous shock, to the economy, over a period. We estimated the economic impact of the proposed tax under alternative elasticity assumptions by reproducing the structure of the economy using a dynamic CGE model. The model allows a concise way of quantifying how the proposed tax would influence the economy by increasing the price of SSBs, incentiv-

5. *Wittwer, G. (2012) (editor), Economic Modeling of Water: The Australian CGE Experience, Springer, Dordrecht, Netherlands (186 pages).*
6. *The general theoretical structure of the SA-TERM is similar to the TERM model developed by the Centre of Policy Studies (CoPS) at Vicoria University in Australia.*
7. *Van Seventer, D., Hartley, F., Gabriel, S. and Davies, R. 2016. A 2012 Social Accounting Matrix (SAM) for South Africa. UNU-WIDER Working Paper 2016/26, April. https://www.wider.unu.edu/publication/2012-social-accounting-matrix-sam-south-africa.*
8. *International Monetary Fund (IMF). (2016). World Economic Outlook, April 2016. Washington, D.C.*
9. *National Treasury. (2016). Budget Review 2016. National Treasury, Pretoria. Published on 24 February 2016 and available online at www.treasury.gov.za.*
10. *CEPII. (2012) The Great Shift: Macroeconomic Projections for the World Economy at the 2050 Horizon. CEPII Working Paper 2012-03. Centre D'Etudes Prospectives Et D'Informations Internationales, Paris.*
11. *Based on input from industry.*

ising product reformulation not currently modelled, causing a reduction in demand, or causing substitution between products.

A standard approach to examine the impacts of an exogenous shock is to compute the differences between a scenario in which the shock has occurred – the policy simulation – and a counterfactual scenario in which the particular shock under examination did not happen – the baseline scenario. Results are then reported as percentage change deviations over time between the first baseline simulation run and the second policy simulation run. We use the dynamic approach, standard baseline forecast and policy closures as described in Wittwer et al. (2012: 37-55).[12] The nominal exchange rate is set as the numeraire in the policy run.

We introduce two separate sets of simulations to isolate and measure the impact of the proposed SSB tax. The first simulation establishes a BAU baseline forecast of the economy in the absence of the shock under investigation. The second simulation imposes the exogenous shock on the economy, i.e. the introduction of an SSB tax. The tax shock is applied to the model using different own-price elasticity levels, and the different outcomes are compared.

The comparison between the base case and policy simulations show what the effects of the tax would be on the main macroeconomic variables, such as GDP and its sub-components, CPI, employment and others, but also on industry-level components of the economy, including consumption, the SSB industry itself and other sectors that might be affected by the imposition of the tax.

3 Summary of modelling results

As explained above, the demand elasticity of SSBs will determine how consumers respond to a price increase.

If it is assumed, as Treasury does, that demand for SSBs is elastic, an increase in price will lead to a large reduction in demand, which will in turn cause large costs to the economy in terms of economic growth and unemployment. If this is the case, Treasury needs to be confident that these costs will be justified through the associated reduction in obesity.

However, if it is assumed that SSBs are inelastic, the cost in terms of economic growth and employment will be lower, but so will the associated health benefits. Also, it will lead to an unnecessary increase in expenditure especially for the poor who direct a larger proportion of their expenditure to SSBs than the rich. Under this scenario, the revenue to the fiscus will be maximised, but the tax will fail in achieving its stated health objective. It would be short-sighted of Treasury to use the SSB tax primarily as a

Table 1: Effect of SSB tax on employment and economic growth (deviation from the baseline)

	Elasticity estimate	2017	2018	2019	2020	2021
Jobs (number)	-0.79 (Econex)	-27 088	-27 760	-28 610	-29 503	-30 447
	-0.97	-27 474	-28 154	-29 012	-29 913	-30 865
	-1.299	-28 130	-28 903	-29 862	-30 855	-31 831
Real GDP (R billion)	-0.79 (Eonex)	-2.92	-2.99	-3.13	-3.27	-3.43
	-0.97	-2.96	-3.03	-3.15	-3.28	-3.42
	-1.299	-3.05	-3.11	-3.23	-3.36	-3.48

Note: Keep in mind that as a result of the SSB tax shock, both GDP and employment are now on a lower growth path as compared to the business as usual (BAU) case and the figures listed in the table show the year-on-year difference from the BAU.
Source: CGE model results and calculations based on the model results

12. See footnote 3.

means of generating revenue, and not for the stated purpose of an excise tax, which is to incorporate the negative externality of excessive SSB consumption into consumer behaviour.

As mentioned earlier, we estimated the conomic impact of the proposed tax using the SA-TERM model. The model includes a sector-level elasticity estimate of -0.87 for the beverages sector. This built-in elasticity can be adjusted to test the effect of the proposed SSB excise tax on the economy if alternative elasticities are assumed. Table 1 illustrates the effect of a 20% SSB tax on the economy for different elasticity estimates, which were used to replace the -0.87 estimate.

Based on the simulations discussed in this note, the proposed SSB tax to be implemented in 2017 is expected to result in an immediate reduction of R2.92, R2.96 and R3.05 billion in GDP for the -0.79, -0.97 and -1.299 elasticity scenarios respectively (see Table 1). The impact on GDP is lower than expected due to a counterbalance in household consumption on account of an offset by increased consumption in other sectors.

Using the dynamic CGE model, we find multiple effects from the imposition of the SSB tax. First, in the SSB sector, as might be expected, the sector's output shows a significant decrease of 20.5%, 22.0% and 24.7%, respectively.

Other sectors will also be affected by the tax. In terms of upstream materials, domestic output in the agriculture, hunting, forestry and fishing sector drops by between 0.5% and 0.6% across the three scenarios, while in the downstream industries of wholesale, retail, hotels and catering, alcoholic beverages, food and the tobacco products, a loss in output is also experienced. Conversely, in other sectors, such as mining, some manufacturing sectors and other services (e.g. transport services, communication, financial services, etc.), increases in output are experienced, thus reflecting the expected diversion and redistribution of resources from the relative factor prices changed in SSB products market (and across its value chain). What this all implies is that the tax on SSB products should have a significant adverse effect on the value added coefficients and domestic output in the SSB products sector but that it may also be beneficial to other sectors in the economy. The nett impact is, however, still negative.

A change in the labour market can also be anticipated as SSB consumption declines in response to the tax increase. In this regard, layoffs are likely to increase by 21.0% (about 3,086 workers), 22.5% (about 3,306 workers) and 25.3% (about 3,725 workers) in the SSB products sector for the three respective elasticity scenarios. In the rest of the SSB value chain, employment losses are also experienced in the manufacturing (excl. SSBev & rest of soft drinks), wholesale, retail, hotels and catering, agriculture, hunting, forestry and fishing, and in many of the directly and indirectly related services industries during the first year. Afterwards, employment directly related to SSB products and across its value chain should continue to decline as a result of reduced SSB consumption. Conversely,

and equally important, employment in other sectors not directly related to SSBs (e.g. mining and quarrying, construction, etc.) should increase, mainly because money that would have been spent on SSB products is probably spent on other goods and services.

Nationally, employment losses in the first year of the tax total approximately 27,088, 27,474 and 28,130 workers for the three respective elasticity scenarios, with the losses not only concentrated in the SSB sector. To some extent, the SSB tax will also play a notable role in a redistribution of some labour resources in those sectors that are capable of absorbing additional labour.

Irrespective of the elasticity assumed the results illustrate that the proposed SSB tax will lead to a decline in real GDP and employment. Effects are smaller under a lower elasticity value, as one would a priori expect.

These costs to the economy need to be weighed against the health impact in terms of the reduction in obesity that the proposed tax aims to achieve. It will be highly inefficient if the tax fails to meet its intended health outcomes while imposing high costs on the economy.

4 Concluding remarks

In this note, we used an adapted dynamic CGE model to quantify the impacts of National Treasury's proposed excise tax on SSBs. A "proxy" approach was followed, which used public and/or industry-specific data to calibrate the shocks.

To test the sensitivity of our results we ran the SSB tax simulations using three different price elasticities of SSB demand. The modelling results show that all the tax scenarios reduce GDP growth. The range of reduction (during the first year of impact) varies between 0.09% and 0.1%. This amounts to a total loss in GDP of between R2.92 bn and R3.05 bn during the first year of impact. In terms of employment losses, the results show that, after the first year, a total of between 27,088 and 28,130 jobs are lost. This is a notable decline in employment especially given South Africa's current economic climate.

The production of SSB-related or -connected sectors (i.e. agriculture, food, alcohol, wholesale and retail trade services, etc.) is affected most by the SSB tax. Their cost of production increases and their output declines.

The results confirm what we expect from the imposition of an SSB tax, namely that the resulting price increase leads to a reduction in demand for SSBs, as well as SSB-related or -connected products and sectors. The effect on the economy is felt beyond the SSB sector and shows that there are wider consequences to the proposed tax on SSBs, which cannot be ignored in the current economic climate in South Africa.

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