

# Liberalising into poverty? – A GTAP analysis of the SADC EPA

*Tatjana Döbeling*

Let us be blunt about it: the arrangements between ACP countries and the European Union to date have not resulted in any growing share of ACP exports. [...] that is why a new ap-approach is called for. – P. Mandelson (House of Commons, 2005)

If EPAs carry through, African countries will have to kiss goodbye to their industrialization efforts. - Tetteh Hormeku, Africa Trade Network (ACTSA 2007)

[We recognize] the substantially different levels of economic development of the EU and the ACP and [are] therefore very concerned that too rapid a reciprocal trade liberalisation between the EU and the ACP could have a negative impact on vulnerable ACP economies and States, precisely at a time when the international community should be doing its utmost to support States in their drive to meet the MDGs (European Parliament 2006)

We fear that our economies will not be able to withstand the pressures associated with liberalisation, as prescribed by the World Trade Organisation. This therefore challenges us all as partners to ensure, that the outcome of the ongoing EPA negotiations does not leave ACP countries more vulnerable to the vagaries of globalisation and liberalisation, thus further marginalising their economies. - President Festus Mogae of Botswana (CTA 2004)

I fear that all our past investments in the Green Scheme, horticultural marketing, grain storage, agricultural extension and value addition to food products would be lost and we would seriously disrupt rural economies and the livelihoods of thousands of small farmers. - Hage Geingob, National Assembly of Namibia (Geingob 2010)

Europe should not be, and is not, seeking to "take" anything from these countries. Our aim is a new framework where neighbours work together to benefit from freer trade, while we offer assistance to integrate them into the world trading system. - EU Trade Commissioner P. Mandelson, (Mandelson 2004)



## Liberalising into poverty? – A GTAP analysis of the SADC EPA

*Tatjana Döbeling*

**Supervisor:** Yves Surry, Swedish University of Agricultural Sciences,  
Department of Economics

**Examiner:** Rob Hart, Swedish University of Agricultural Sciences,  
Department of Economics

**Credits:** 30 hec  
**Level:** A2E  
**Course title:** Independent Project/ Degree in Economics  
**Course code:** EX0811  
**Programme/Education:** Agricultural Economics and Management – Master's programme

**Place of publication:** Uppsala  
**Year of publication:** 2017  
**Cover picture:** own compilation  
**Name of series:** Degree project/SLU, Department of Economics  
**Part number:** 1117  
**ISSN:** 1401-4084  
**Online publication:** <https://stud.epsilon.slu.se>

**Keywords:** Economic Partnership Agreement, SADC, Southern Africa, GTAP,  
state budget, current account, regional trade, infant industry,  
agriculture, subsistence farming

**Sveriges lantbruksuniversitet**  
**Swedish University of Agricultural Sciences**

Faculty of Natural Resources and Agricultural Sciences,  
Department of Economics



## Liberalising into poverty? A GTAP analysis of the SADC EPA

### Abstract

This thesis aims to test the concerns about the Economic Partnership Agreement (EPA) between the EU and six southern African countries, based on a policy simulation with the GTAP-Model. As with other EPAs, opponents worried about the state budgets, the current accounts, the regional trade, the agricultural sector and the industry. Other than in other model based studies of the EPAs, which concentrate on general welfare effects, this thesis aims to give detailed answers to the named concerns:

- ❖ The state revenue decreases. An increase in sales taxes can balance the state budget, if deteriorations for some sectors are accepted
- ❖ The current account does not suffer strongly from the agreement, but the trade balance to the EU is strongly impaired, and so are the terms of trade of the African partners.
- ❖ The regional trade decreases, but this is offset by increasing trade with the EU and increasing exports to other countries.
- ❖ Agriculture and industry are not strongly affected in their value added, but concentrate stronger on exports, which probably challenges smallholders and possibly small manufacturers. Additionally, wages, employment and land rents are discussed.

Even if the changes are often moderate, different effects accumulating in certain countries (like Mozambique) might present policy makers with difficult problems.

## Acknowledgements

Cordial thanks to Professor Yves Surry, who introduced me first to GTAP, supervised this thesis and continuously lent support. A thousand thanks also to Dr. Janine Pelikan, who provided me with the most recent version of TASTE and answered my question on this. Moreover, my thanks to Professor Terrie Walmsley, who gave some helpful hints in which directions not to go.

# Contents

<b>List of tables</b>	<b>ix</b>
<b>List of figures</b>	<b>xiii</b>
<b>Abbreviations</b>	<b>xv</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Motivation and context of the study	1
1.2 Literature review	2
1.3 Research question and objectives	5
<b>2 Background</b>	<b>8</b>
2.1 The EPA negotiations	8
2.2 Economic structure of the southern African partners	9
2.3 The new SADC EPA	11
2.4 Concerns about the EPA	12
2.4.1 A declining state budget	12
2.4.2 A deterioration to the current account	13
2.4.3 Diminishing regional trade	14
2.4.4 A hazard to the infant industry	15
2.4.5 A hazard to agriculture	15
<b>3 Methodology</b>	<b>17</b>
3.1 Choice of the model	17
3.2 Theoretical framework of GTAP	19
3.3 Limits to the model and scope of the research	20
2.4.1 On the translation of the agreement into shocks	20
2.4.2 Reliability of the data behind GTAP	21
2.4.3 Missing dynamic effects	22
2.4.4 On the structure of CGE models	23
<b>4 Policy simulation</b>	<b>25</b>
4.1 Aggregation scheme	25
4.1 Basic simulation and variations	27

4.2	Definition of the shocks	29
<b>5</b>	<b>Results and discussion</b>	<b>31</b>
5.1	General results	32
5.2	Results for the areas of concern	34
	2.4.1 A declining state budget	34
	2.4.2 A deterioration for the current account	35
	2.4.3 Diminishing regional trade	37
	2.4.4 A hazard to agriculture and industry	39
5.3	Possible adaptations to increase the accuracy	45
<b>6</b>	<b>Conclusion</b>	<b>47</b>
	<b>References</b>	<b>51</b>
<b>7</b>	<b>Appendices</b>	<b>61</b>
7.1	The EPA negotiations	61
7.2	Economic structure of the partner countries	68
7.3	Aggregation scheme	79
7.4	Calculating the tariffs	84
7.5	Turning TRQ into tariffs	88
7.6	Changing the closures for the variations	90
7.7	Excursion: Why rules of origin matter	91
7.8	General results	94
7.9	State revenue	95
7.10	Current account	98
7.11	Regional trade	102
7.12	Agriculture and industry	107





## List of tables

- Table 1: The changes of the GDP compared for the different simulation variations (own calculation from GTAP output, GDPEXP) 32
- Table 2: The changes of the welfare compared for the different simulation variations (own calculation from GTAP output, WELFARE) 33
- Table 3: Total welfare effects, tariff revenue gains in the EU and total welfare effects in the SADC EPA group. 33
- Table 4: Calculation of the total revenue changes – same calculation as in Table 25, but comparing the outcomes of all simulations. Unsurprisingly, when the revenues ratio to the GDP is fixed exogenously (as in VAR2), the total revenue losses differ much from the other scenarios. 34
- Table 5: Changes in the trade balance towards the EU. Note that South Africa had a trade deficit before, so the “increase” shown here is in fact a widening of the deficit (therefore also coloured red, although positive).35
- Table 6: Changes in the current account of the countries. Note again that the EU, Mozambique and South Africa had a trade deficit before, so the “increase” shown here is in fact a widening of the deficit (own calculation from GTAP output, note also that GTAP only includes the trade balance in the current account) 36
- Table 7: Changes in the total terms of trade effect in the different simulation variations.. Since the data is taken from GTAP’s calculation of the welfare in equivalent variation, these values can be interpreted like money values (data from the GTAP simulation) 37
- Table 8: Changes in regional trade within the SADC EPA group, within the SADC and within Africa (own calculation based in GTAP output, VIWS. The last two groups are net of the previous named groups) 37
- Table 9: Comparison of trade changes(M=imports, X=exports) in absolute numbers. Note that the groups “regional (SADC EPA)” and “regional

(RoA)" are net of other groups, i.e. the first green column shows how much less is imported from SADC countries that are not already depicted in the Regional Group that concluded the EPA (Data from the GTAP database, VIWS)	38
Table 10: Changes in the value added of all sectors in all countries in the basic simulation (calculated from the GTAP output, VFM)	40
Table 11: changes in domestic purchases of domestically produced goods (calculated from the GTAP output, VDFM, VDGM, VDPM). The simulation variations show similar trends.	41
Table 12: changes in non-margin exports of domestically produced goods (calculated from the GTAP output, VXMD). The simulation variations show similar trends.	41
Table 13: Wage changes for unskilled labour in all simulations (GTAP output, pm). Note that the wage was fixed exogenously in VAR1a and VAR1c, so the change is 0% there.	43
Table 14: Same as above, but for skilled labour	43
Table 15: Real wage changes for unskilled labour in all simulations (GTAP output, pfactreal).	43
Table 16: Same as above, for skilled labour	44
Table 17. The intra-regional trade intensity index determines whether trade within the region is greater (index > 1) or smaller (index < 1) than should be expected on the basis of the region's importance in world trade (ARIC 2013). For this it divides the intra-regional trade share ( $T_{ii}/T_{iw}$ ) with the share in world trade ( $T_{iw}/T_{ww}$ ) (ARIC 2013). Own calculation from GTAP output, VIWS	72
Table 18: tariff changes as calculated (aggregated for all commodities)	87
Table 19: tariff changes as calculated (with their resulting tariffs) and as announced by the EU commission (with their resulting tariffs).Own calculation was done with TASTE and trade weights – reference group weights show a lower reduction of tariffs towards the EU and a stronger reduction of tariffs towards the SACU.	88
Table 20: Contributors to the GDP before the shock (GTAP database, GDPEXP)	94
Table 21: The change of the GDP in the basic simulation, composed of consumption, investment, government expenditures and exports net of imports (own calculations from GTAP database, GDPEXP). Note that the EU; Mozambique and South Africa had a negative trade balance before the shocks, so the 'positive' changes of net exports are actually a widening of the trade deficit and coloured in red. Namibia, Botswana and Lesotho&Swaziland had a positive trade	

balance before the shock, so their negative changes are more intuitive. In VAR1a-c the results are almost identical, but in VAR2 all effects are strongly mitigated, which results in a 0% change in GDP for all regions (see also next table). 94

Table 22: The changes of the welfare compared for the different simulation variations, now expressed as percent of the GDP (own calculation 95

Table 23: The decomposition of the welfare change in the basic simulation (GTAP output, WELFARE). In the simulation variations the results are similar, but variations with unemployment also have endowment effects, which are (except for Namibia) negative. 95

Table 24: sources of state revenue, formulas taken from Hertel (1997, p. 24) 96

Table 25: Tariff losses and revenue losses through the EPA in the basic simulation. Calculations based on the GTAP output (several headers). 96

Table 26: Percentage change of the trade balance with the EU in the basic simulation (data is calculated out of the GTAP output for the variable VIWS). This change is slightly counterintuitive: Whether a country widens its trade deficit or its trade surplus, both is a “positive” percental change. Colours are used to clarify which sectors win and lose (green in the trade balance improves, red if it diminishes). 101

Table 27: Same terms of trade effects as in the table before, but now set into relation to the countries GDP (data from the GTAP simulation) 102

Table 28: changes in the intra-regional trade intensity index before and after the basic simulation in different regional groups: The SADC EPA group, the whole SADC group including the SADC EPA group, and the whole of Africa including the former two. Underneath, the percentage changes of the index are given – which, as such, cannot be reasonably interpreted, but illustrates the idea that the trade with “further away” groups are less affected than the close regional groups (own calculation out of the GTAP output, VIWS) 105

Table 29: changes in the intra-regional trade intensity index (same calculation as above) for all simulation variations. If the percentage change would be calculated here as well, it would always be -4,9%, -1,9% and -0,7% as in Table 28. 106

Table 30: correlation coefficient between the absolute change in EU imports and several imports, exports and the value added. The coefficient can take values between -1 (very negative correlation) and 1 (very positive correlation) (Basic simulation, own calculation from GTAP output, several variables) 107

Table 31: changes in the value added for sectors connected to food production. The colours indicate the strength of the change. Sectors that lose more than 0,5% of their value added are additionally highlighted with red font colour (data from the GTAP output, VFM).	108
Table 32: changes in the value added for sectors connected to the industry. The colours indicate the strength of the change. Sectors that lose more than 0,5% of their value added are additionally highlighted with red font colour (data from the GTAP output, VFM).	109
Table 33: employment changes in the two versions that allowed for unemployment (data from the GTAP output, qo)	112
Table 34: employment changes for skilled and unskilled labour for VAR1a (data from the GTAP output, qfe)	112
Table 35: employment changes for skilled and unskilled labour for VAR1c (data from the GTAP output, qfe)	113

## List of figures

- Figure 1: Example of numbers of the harmonized system, here showing the chapter (HS2, 2 digits), heading (HS4, 4 digits) and subheading (HS6, 6 digits) 20
- Figure 2: GDP per capita for the SADC EPA members in 2014 (data from the World Economic Outlook database of April 2017, provided by the IMF). The ordinate shows current USD per person. 68
- Figure 3: GDP expressed in PPP for 2014 for all signatories of the SADC EPA (data from the World Economic Outlook database of April 2017, provided by the IMF). The ordinate shows the current international dollars in billions. 69
- Figure 4: The composition of the GDP by sector of origin (data from the World Fact Book, latest estimations, provided by the CIA). Not all columns sum up to 100% in the original data. The last three columns show an average for all African SADC EPA members, where their shares are weighted with their GDP in PPP from the World Economic Outlook database. 70
- Figure 5: GDP from the expenditure side. Note that the imports are subtracted from the other parts (source: GTAP database, GDPEXP) 71
- Figure 6: Value added for skilled and unskilled labour, with colours indicating the sources of this value added (source: GTAP database, VFM) 73
- Figure 7: Composition of the value added (data from the GTAP database, VFM) 74
- Figure 8: Source of imports, measured in world prices (source: GTAP database, VIWS) 75
- Figure 9: Destination of exports, measured in world prices, exports to the EU labelled with their percentage (source: GTAP database, VXWD) 76
- Figure 10: Composition of the exports from the EU. (data from the GTAP database, variable VIMS) 77

Figure 11: Composition of the exports to the EU. (data from the GTAP database, variable VIMS, values on the ordinate are normalized [...])	78
Figure 12: Composition of the imports from the EU. (data from the GTAP database, variable VIMS)	78
Figure 13: Value added for the factor 'Agricultural & Unskilled', with colours indicating the sources of this value added (source: GTAP database, VFM)	84
Figure 14: State revenue changes through the EPA (basic simulation, own calculation from GTAP output, several headers)	97
Figure 15: Current accounts of the countries and their changes, as given by GTAP - this is simply the trade balance.	98
Figure 16: Export and Import structure before and after the basic simulation (taken from the current account data from the GTAP simulation, i.e. with all countries)	99
Figure 17: Exports and imports with the EU before and after the basic simulation (data from the GTAP simulation, VIWS)	100
Figure 18: Changes in trade with the EU within the SADC EPA group in the basic simulation (data from GTAP database, VIWS)	103
Figure 19: Comparison of trade changes in absolute numbers. Note that the groups "regional (SADC EPA)" and "regional (RoA)" are net of other groups, i.e. the first green column shows how much less is imported from SADC countries that are not already depicted in t	104
Figure 20: changes in wages and other factor incomes. Note that these changes apply to all sectors, as all factors are perfectly mobile (data from GTAP database, pm)	110
Figure 21: Real changes in wages and other factor incomes in percent (relative to the consumers' price index). Note that these changes apply to all sectors, as all factors are perfectly mobile (data from GTAP database, pfactreal)	111

## Abbreviations

ATDC/TDCA	The Agreement on Trade, Development and Cooperation is a European Union Association Agreement between the EU and South Africa (signed in 1999, provisionally applied since 2000, fully entered into force 2004, since then adapted through additional protocols, mainly to take account of the accession of new member states of the EU). In 2007 it was decided to conduct revisions under the SADC EPA (Republic of South Africa 2009; Council of the European Union 2017). While the EU abbreviates the agreement as ATDC, South Africa abbreviates it as TDCA. In this thesis, ATDC is used.
AVE	<i>Ad valorem</i> equivalent
CGE/AGE	Computable General Equilibrium model, sometimes also referred to as Applied General Equilibrium model
COMESA	Common Market for Eastern and Southern Africa
EBA	Everything but Arms Agreement
ECOWAS	Economic Community of West African States
EPA	Economic partnership agreement
ESA	Eastern and Southern Africa
EU	European Union
GATS	General Agreement on Trade in Services
GSP	Generalized system of preferences
GTAP	Global Trade Analysis Project – the Computable General Equilibrium (CGE) model that was used in this thesis
IEPA	Interim EPA
LCD	Least Developed Countries
REC	Regional Economic Community, i.e. groupings of African



	countries within the African Union, which are supposed to achieve economic integration. These groups were used as the regional groups that entered the EPA negotiations (forming <i>e.g.</i> the ECOWAS EPA, the EAC EPA or the SADC EPA), but the signing states of the final EPA are – despite their name – often not identical with the initial regional communities (for example, the SADC EPA does not include all countries of the SADC). Despite that, the regional groups of the EPAs are often called RECs in the literature. To avoid misunderstandings, it is preferred to use the term “Regional Group” here, whenever the group in the context of the EPA negotiations is meant.
RoO	Rules of Origin
SACU	Southern African Customs Union
SADC	Southern African Development Community
SADC EPA	EPA between Botswana, Lesotho, Mozambique, Namibia, Swaziland and South Africa. The name is ambiguous, as only a fraction of the SADC members is in this EPA.
TRQ	Tariff rate quota
WTO	World Trade Organisation





# 1 Introduction

## 1.1 Motivation and context of the study

Two Yaoundé Conventions and four Lomé Conventions had regulated the trade between the European Union (EU) and the African, Caribbean and Pacific Group of States (ACP) since the early 1960s. These systems gave unilateral preferences towards the ACP countries, but disappointed in their results: “the share of the ACP trade in the EU market was continuously falling and most countries did not manage to use these preferences to diversify their economic structures” (Ramdoo 2014, p. 1). Moreover, these preferences were not compatible with the rules of the WTO, as they “discriminated against non-ACP developing countries” (*ibid.*, p. 1). The Cotonou Agreement, concluded in 2000, is supposed to redefine the relationship by replacing the non-reciprocal trade-preferences with Economic Partnership Agreements (EPAs) (Kone 2008).

The SADC EPA<sup>1</sup>, a comprehensive agreement EPA with Botswana, Lesotho, Mozambique, Namibia, Swaziland and South Africa, was successfully concluded in 2014 and signed in 2016 (the initially included Angola did not conclude the EPA, Mozambique ratified in April 2017) (European Commission 2017). But it is strongly disputed, if this agreement is not only “in conformity with the General Agreement on Tariffs and Trade

---

<sup>1</sup> The SADC is the Southern African Development Community. The name “SADC EPA” is ambiguous, as only a fraction of the SADC members is in this EPA, others are in the EPA of the Eastern and Southern Africa (ESA). Indeed, the splitting of the SADC members into the SADC EPA and the ESA EPA was a compromise: All countries of the southern and eastern African regions (except for Mozambique) belong to two or more regional integration schemes. As both SADC and COMESA intend to establish custom unions, creating a conflict of interest that was solved with the splitting of both regions (Meyn 2008)

(‘GATT 1994’), and in particular Article XXIV thereof.” (L250, Article 20), but also meet the expectations of an improved trade situation and a diversified economy in the Regional Groups. Hence, this thesis seeks to translate the agreement text into the theoretical framework of a Computable General Equilibrium (CGE) model and give a careful assessment on its effects. More precisely, the CGE used here is the Global Trade Analysis Project, GTAP, with the GTAP 9 Data Base<sup>2</sup>.

## 1.2 Literature review

Within the last ten years, impacts of the SADC EPA were estimated several times – however, these analyses all refer to previous versions of the EPA or have only rudimental knowledge about the detailed changes, using different scenarios about what an agreement could look like.

Keck and Piermartini analysed the SADC EPA with the help of GTAP in 2007, but back then, not only the precise tariff reductions and exceptions were unknown, but also Angola and Tanzania still belonged to the SADC EPA group. Only in November and December of that year the Interim Agreement was terminated, which was not joined by South Africa and would only be signed two years later (Bilal & Ramdoo 2010). For the EU, only the members of 2004 were included (thereby missing Romania, Bulgaria and Croatia). Additionally, they still used GTAP 6, in which Namibia could not be viewed independently of Lesotho and Swaziland. More importantly, with a reference year of 2001, the Cotonou Agreement was still fresh and the staged tariff elimination in the Agreement on Trade, Development and Cooperation between the EU and South Africa (ATDC) was far from being finished, which probably influenced the outcomes.

The study lists the total welfare effects, measured as equivalent variation, which is composed from the gains of a more efficient reallocation, the terms of trade (caused by changing import- and export prices) and to smaller extents by changes in saving and investment and increased net revenues through tax pooling. Only South Africa has welfare gains through all scenarios the study puts up, the BLMNS group (short for Botswana, Lesotho, Mozambique, Namibia and Swaziland) has few small gains and several losses.

---

<sup>2</sup> The data base of GTAP is updated every few years. The most current data base is the GTAP 9 Data Base, which includes data from 2011, while the most recent reference year in GTAP 8 is 2007 and in GTAP 7 is 2004.

Also in 2007, Perez and Karingi use GTAP to estimate “the impact of the EPAs on Sub-Saharan African economies, considering different levels of commitment in African tariff eliminations” (Perez & Karingi 2007, p. 1878), with a focus in changes in trade, welfare, industrial structures and prices, and fiscal revenues. They put up six scenarios, assuming 1) mutual total elimination of tariffs, 2) tariff alignments of the ACP countries to the EU level, 3) regional integration in the EPA groups, 4) full tariff elimination with increased taxes and 5+6) tariff elimination of 80% resp. 60% of the EU imports towards the ACP. Results are mostly presented for all ACP countries in sum with some addendums on the special role of South Africa or the SADC group. Since at that time the majority African countries are captured through regional composites, for which the data is derived from a representative economy, they see the accuracy and detail as limited.

In 2008, when Botswana, Lesotho, Namibia, Swaziland and Mozambique had signed a bilateral interim EPA, Morrissey and Zgou (2008) analysed this with a partial equilibrium model, limited on the effects of agriculture. Three effects are summed up after the tariff reduction causes lowered prices for imports from the EU: The lower prices cause an increased total consumption (consumption effects). Where the EU is a more efficient producer, the tariff reduction allows a redirection of trade towards this more efficient supplier (trade creation). Where the EU has higher production costs and is only favoured after the agreement because it has lower tariffs, imports are deflected towards the EU although being a less efficient supplier (trade diversion). These three effects are summed up to get the whole welfare effect. From the SADC EPA group only Mozambique and South Africa are analysed. Without the exclusion of sensitive products, they both have a small welfare gain (0.003 resp. 0.006% of the GDP) – with the exclusion of sensitive products South Africa keeps its gains, but Mozambique loses welfare (0.001% of the GDP). At the same time, Mozambique loses 0.44% respectively 0.23% (excluding sensitive products) of the GDP in tariff revenues and South Africa loses 0.15% in both cases. The author sees enough time for tax substitutions, as the countries would have at least ten years to implement the tariff reduction.

By 2009 the details of the interim EPA were accessible, which plans an 86% tariff reduction for Botswana, Lesotho, Namibia and Swaziland within two years, an 80.5% reduction for Mozambique within one year and no entry of the agreement for South Africa. On this basis, Vollmer *et al.* (2009) analyse the effects of several EPA agreements for several Sub-Saharan partners, among them Namibia, Botswana and Mozambique. They avoided a CGE study due to

the lack of sufficiently detailed data (Vollmer *et al.* 2009) – and indeed, from the 10 African countries they planned to analyse, 5 were not included in the then latest version of GTAP, GTAP 7 (Purdue University, 2007). In the partial equilibrium analysis based on a framework by Milner *et al.* (2005), they compare the import demand from partner countries, the EU and the rest of the world under decreasing tariffs for the EU. Also here, the welfare is measured as the sum of consumption, trade diversion and trade creation effects. Namibia, Botswana and Mozambique all gain welfare from a full liberalization. While Namibia and Botswana almost achieve their full potential with the interims EPA, the more limited liberalization of Mozambique leaves the country with smaller benefits to its welfare.

Fontagné, Laborde and Mitoritonne (2011) use the same partial equilibrium model as Vollmer *et al.*, but introduced further constraints and modelling to keep consistency between demand at the detailed level and at the sectoral level of GTAP. Instead of looking at the interim EPA, they construct two scenarios of agreements that would align with the liberalization requirements: one that protects the local agriculture, one that protects the tariff revenues. According to their results, the SADC group takes away rather small revenue losses in comparison with the other ACP (in the scenario of agricultural protection it still is 58%)

Just like the approach by Vollmer *et al.*, the focus is on the demand side. This means that welfare effects on the supply side are not considered. The supply is assumed to be perfectly elastic (Fontagné, Laborde & Mitoritonne 2011) which means for the suppliers in the ACP countries that even a small price decrease would have a strong effect. Even if the Armington conditions causes local consumers to stick to their local products to some extent, a suddenly lowered income price could cause the local production to collapse. But while benefits and losses for the consumers and the state budget are reflected, these welfare effects on the producers' side are missing.

Angelo (2013) analyses the impacts of all EPAs at once with the help of GTAP. For reasons of clarity and comprehensibility this requires strong aggregation, in this case towards only four sectors and a single region for the whole SADC EPA group. Four scenarios are set up, comparing the EPAs with and without regional integration with the alternative trade regimes (the general system of preferences, GSP and the everything but arms agreement, EBA) with and without regional integration.

She puts emphasis on the deteriorated balance of trade for the ACP countries (decreasing for the SADC EPA group with both EPA scenarios,

increasing without EPA), deindustrialization (production in industry decreases by 1.2% resp. 0.8% in both EPA scenarios while other sectors rise – while under the alternative scenario, all sectors shrink) and revenue losses (30.0 to 32.7% loss for SADC with the EPA, 0.3 to 3.8% loss without the EPA). On the positive side she shows a higher employment for unskilled labour, positive welfare effect (measured as equivalent variation), a trade creation that dominates trade diversion and a real GDP growth.

This list of studies is not exhaustive. Some models are not described in further detail, as they analyse EPAs, but do not give conclusions for the current SADC EPA group, such as the one by Bouët, Laborde and Mevel (2007). Other papers, such as the analysis by Ramdoo (2014), who compared the EPAs of West African States (ECOWAS EPA) with the SADC EPA in 2014, bring up interesting possible issues around the SADC EPA, but do not set up a model to measure or calculate any effects. And finally, there are several papers older than ten years, which Perenz (2006) summed up as being mostly based on partial equilibrium models, showing the European exports as the main beneficiaries. Less non-European suppliers export to the ACP countries, the welfare of the ACP consumers would boost, public revenue losses are often emphasized, and in some cases the producers in the ACP countries experience a relative loss of economic efficiency. Also, according to Perez (2006), general equilibrium analyses have rarely been used to estimate the impacts of EPAs before 2006. These studies naturally face even more lack of trade data and have no possible access to details of the trade agreement.

Consequently, according to the best knowledge of the author, there is no analysis of the conclusive SADC EPA, and in general little few studies that focus on the SADC EPA instead of giving a general overview over several different agreements.

### 1.3 Research question and objectives

In the course of the negotiations, what could have been a sober economic assessment turned into a heated ideological debate. NGOs labelled the EPAs as the “clean-out sale of Africa”<sup>3</sup> (EPA-Kampagne 2007), while the EU Trade Commissioner Peter Mandelson and the EU Development Commissioner Louis Michel accused the campaigners to caricature the ACP countries as weak and

---

<sup>3</sup> German title of the press release of the EPA campaign, translation T.D.



helpless. To them, the ACP countries could only decide between EPAs and the unfavourable general system of preferences (GSP), so “[c]alling for an end to EPA negotiations when there is no credible alternative is playing poker with the livelihoods of those we are trying to help.” (Mandelson & Michel 2007, p. 2). Protesters predicted sombre prospects once the EPAs would be in place and saw a wide range of alternatives, from more protectionism to more financial aid.

The general question to be answered in this thesis is: Will the EPA affect the SADC EPA group as negative as the critics of the trade agreement affirm?

To answer this, several macroeconomic effects that arouse concerns are assessed in detail:

- Opponents argue that the state budgets will decrease, as less tariff revenues flow in. This effect is measured, as well as the possibility to even out tariff revenue losses with a tax reform
- Opponents argue that while their barriers against imports fall away, the African partners are hardly capable of increasing their exports. This would distort the current accounts of the Southern African partners. These effects are investigated, also with special regard to the trade balance towards the EU and the terms of trade.
- Opponents see the EU as a superior partner in trade, which harms the regional trade. They however disregard possible positive effects on production and exports if prices for intermediate inputs should decrease through an EPA. Both will be taken into account.
- Opponents also worry about the agricultural sector and the industry, as both might not be competitive. To answer to this concern, several different parameters, such as value added, wages, production for export markets and domestic consumption and employment, are considered.

With this kind of approach, this thesis differs from most other studies on the EPA: As the literature review showed, several studies focus on the calculation of welfare effects when analysing a trade agreement. This measurement is however too aggregated to answer precisely to the concerns of opponents of the agreement, neither is it an intuitive concept to non-economists<sup>4</sup>, which is why this thesis does not focus too much on this (elsewhere helpful) tool.

---

<sup>4</sup> In GTAP, welfare is measured in equivalent variation welfare effects. Equivalent variation is a way to measure the value of a change in monetary units value by asking the question, which change of a country’s wealth would have the same effect on the wellbeing of the country as the policy change. For this several welfare effects of the policy are summed up, including the

The research question as such also differs from another question that has been asked for the the EPAs before: Are the EPAs to be preferred over the GSP? Some studies compare the options of GSP and EPA and see a comparison to the Lomé status as unhelpful, since returning there is not an option (see *e.g.* Fontagné, Laborde and Mitaritonna 2011). This is however not the question of the campaigners, who don't see the GSP system as the only alternative. It is also not the research question of this thesis, as the political decision in favour of the EPA is already finalized.

The policy is analysed with a computable general equilibrium model, GTAP. After giving some backgrounds on the EPA (chapter 2), the choice and functioning of this model is explained (chapter 3) and a basic simulation of the EPA is conducted, that calculates the equilibrium reached ten years after the implementation of the EPA (chapter 4). To test its outcomes under varying conditions, further variations are made, that make adaptations to the local factor market and adaptations to the states response to revenue losses. This is supposed to at least partially substitute the lack of a sensitivity analysis, which cannot be done, as it requires an additional GEMPACK licence in GTAP.

---

combined changes of utility of household consumers and government from their purchase in goods and services and the domestic savings (Burfisher 2011: 100). Corong et al. (2017) explain in chapter 3.11 that the real aggregation is much more difficult, containing preference shifts, scaling factors, changes in allocative efficiency, changes in endowments, depreciation, changes in technology, changes in terms of trade and changes in population. Even if GTAP allows looking at these components of the welfare in a disaggregated way, these calculations give a rather inconvenient answer to concerns about diminishing regional trade, a more precarious situation for the farmers, etc. Additionally, the understanding of the term 'welfare' differs even among economists (as explained in the literature review, partial models use a different welfare assessment. For different welfare calculations in different CGE models, see Burfisher 2011, p. 95-100)

## 2 Background

In the following, an overview is made over the negotiations, the economic structure of the signatories, and the contents of the SADC EPA. The part on the negotiations is only adumbrated here, to keep the main text compact – a more detailed summary of the events, which can explain why the EPAs are so controversial, which alternatives were available, with which motivation the EU entered the negotiations over a trade agreement that goes beyond the requirements by the WTO, and why African countries agreed on terms that were strongly criticized by their civil society and several politicians, can instead be found in the Annex. The part on the economic structure on one hand is supposed to illuminate the decisions for the aggregation and the settings for the simulation<sup>5</sup>, on the other hand it provides the basis from which to understand the results of the simulation. The explanation of the contents of the SADC EPA is necessary to set up the shocks in the simulation.

### 2.1 The EPA negotiations<sup>6</sup>

From 2001 to 2007 the EU and the ACP countries were given time to negotiate the WTO-compatible EPAs (UNECA 2007). These agreements were not negotiated with all ACP countries at once, but with six regional groups, one of them being the here analysed group of Southern African countries.

---

<sup>5</sup> Before running an analysis in GTAP, the sectors, factors and regions have to be aggregated in a way that is likely to provide the most important information. For this simulation, this means *e.g.* that the service sector stays rather aggregated as the SADC EPA did not conclude tariff changes for the trade in services and that fish has its own sector, as it is of some importance to Namibia. Also, decisions about the sluggishness of the factors or the closure rules need to be made. For example, the unemployment is so high that it is considered in some variations of the model. The details of the aggregation can be found in the Appendix 7.3. A demonstration on how to change closure rules will be given in Appendix 7.6.

<sup>6</sup> A much more detailed summary of the negotiations can be found in Appendix 7.1

The negotiations were pressurized not only by the WTO (e.g. through Latin American banana exporters who saw their trade with the EU in disadvantage compared to the ACP, see Meyn 2008), but also by the EU itself. The EU aimed for an agreement including “services and investment and trade-related areas such as trade facilitation, intellectual property and cooperation on competition policy” (Mandelson 2007, p. 1), which was neither demanded by the WTO, nor wanted by the ACP. Alternatives next to the dichotomy of ‘either EPA or GSP’ were given little attention. Despite this hard course, a comprehensive agreement EPA with the whole SADC EPA Group including South Africa was successfully concluded on July 15<sup>th</sup>, 2014, signed by the EU, the SACU and the European Parliament in 2016, and ratified in 2017 also by Mozambique (European Commission 2017).

## 2.2 Economic structure of the southern African partners<sup>7</sup>

Although South Africa’s GDP (in PPP) lies between that of the Netherlands and Belgium and although some BLMNS countries have a GDP that is comparable to smaller economies in the European Union such as Estonia, Cyprus and Malta (Figure 3), the members of the SADC EPA group are much poorer than the members of the European Union: As shown in Figure 2, they have a much lower GDP per capita than the members of the EU, falling even below Romania and Bulgaria.

The service sectors strongly contribute to the GDP in the SADC EPA group according to GTAP and other sources (Figure 7, Figure 4). Compared to the EU, the Southern African states have a bigger industrial and agricultural sector and a smaller service sector. Even if differences are not strong in the aggregation, countries like Mozambique (with an agricultural sector of 25% of the GDP) or Swaziland (with an industrial sector of 37%) might be affected strongly if the EPA places the agriculture or the industry in a competitive disadvantage.

Food production is obviously important to several countries (Grains&Crops with 18% of the value added in Mozambique, but to some extent also Meat&Livestock with 5% in Botswana and Fish with 4% in Namibia, Figure 7), but these numbers alone do not depict what a loss in the agricultural sector would mean to the countries. To understand this, the number of subsistence

---

<sup>7</sup> For graphs and sources to this chapter, please see the Appendix under 7.2

farmers has to be seen: According to the World Factbook by the CIA it employs the majority of the work force in Mozambique and Lesotho, 70% of the population in Swaziland, roughly two-thirds of the rural dwellers in Namibia and many people in Botswana. Even in South Africa there is a communal sector, where the majority of households are subsistence-based and use only limited amounts of external inputs and technology (Palmer & Ainslie 2002). As we will later see, these farmers face higher challenges when it comes to intersectoral mobility, which is then reflected in the first variation of the simulation.

The industry might not appear very large in the BLMNS countries, yet it exists and is fostered: The World Factbook states *e.g.* that Lesotho's narrow economic base depends, apart from agriculture, remittances, and regional customs revenue, also on textile manufacturing.

Similarly, the dependency on extraction does not become visible by only looking at its contribution to the GDP: While Botswana's dependency on diamond mining is visible by the share of the GDP (the extraction sector of 25% of the value added, Figure 7), Namibia's dependency on extraction seems more moderate with 9% of the value added. To see the real relevance of this sector, one has to know 50% of its exchange earnings come from there (CIA 2017c).

The primary and secondary sectors are a bigger source of income to unskilled workers (Figure 6), which are the majority in the African partner states (except for South Africa, they contribute more to the value added, despite their assumably lower wages).

Furthermore, roughly a quarter of the population is unemployed (according to the World Factbook: Botswana: 20%, but higher according to unofficial estimations, Lesotho: 28%, Mozambique: 22%, Namibia: 28%, Swaziland: 28%, South Africa 26%, but higher among the black youth). This makes the GTAP assumption of full employment questionable, which is why this assumption is dropped in some variations of the simulation.

Exports contribute between 39% and 44% to the GDP of almost all countries, only Botswana is significantly deviating (28%) (Figure 5). Only Lesotho&Swaziland have a trade surplus. The region is economically integrated via SADC and (except for Mozambique) the SACU. Even if the trade within the region does not become strongly apparent in Figure 8 and Figure 9, the regional trade of the SADC EPA group is bigger than to be expected according to their importance in the world trade (to be seen in the intra-regional trade index of over 1 in Table 17). The region is also connected

to other African states - McDonald and Walmsley (2003) name, apart from the SADC, the Common Market for Eastern and Southern Africa (COMESA), and the Cross-Border Initiative (CBI) as the most important ones. However, with a closer look at import sources and export destinations in the GTAP database, it becomes clear that the BLMNS are not so much integrated with each other or other African countries, but mostly have strong ties to South Africa.

Furthermore, there are two important agreements with the European Union: the Everything But Arms Agreement (EBA), that extensively abolishes tariffs for exports from least developed countries such as Lesotho and Mozambique, and the trade agreement with South Africa (ATDC). While the African countries are only a minor trading partner for the EU, the trade flows from and to the EU make a big share of the Southern African trade flows. 25% of South Africa's exports are directed at the EU markets, and for the BLMNS countries it ranges from 37% (Lesotho & Swaziland) to 70% (Botswana) (Figure 9). These exports are coming from the extraction sector (especially from Botswana), from Heavy Manufacturing (especially from Mozambique) and to smaller extents also from processed food and services (Figure 10). The Southern African states also heavily rely on EU imports, here South Africa the most with 34% of its imports and Mozambique the least with 21% (Figure 8). These mostly come from the manufacturing and service sector (Figure 12).

## 2.3 The new SADC EPA

The SADC EPA makes changes to trade policies, such as tariffs, tariff rate quotas (TRQ)<sup>8</sup> and rules of origin (RoO). As mentioned before, the agreement additionally contains paragraphs on issues such as domestic environmental and labour protection, development aid, intellectual property rights, etc. However, a mere CGE-analysis has to settle for the implementation trade policies.

Even if negotiated together, the SADC EPA does not give a uniform trade scheme: When South Africa exports to the EU, they face slightly higher tariffs than the BLMNS group, while when the EU exports to the SADC EPA group, Mozambique is granted a higher tariff protection than the other members. An overview of the tariff reductions can be seen in Table 19.

While a wide range of tariffs is completely eliminated, some sensitive goods stay protected by sticking to the previous tariff, defining a new tariff or

---

<sup>8</sup> A TRQ is a two-tier tariff: a lower tariff for a certain quantity of goods, and a higher tariff – usually the MFN tariff – for all imports beyond the quota

applying a TRQ, and some tariffs change within a longer schedule, giving the affected sectors time to adapt (see Appendix 7.4)

Rules of Origin (RoO) are a crucial determinant when trade agreements are supposed to support regional integration or enable supply chains between countries that cannot sustain a complete production network on themselves. They are hard to model, but should, whenever possible, still be considered in the simulation of trade agreements (a little excursion on this can be found in Appendix 7.7). However, there are no changes in them that could be modelled: The rules of origin under Lomé and Cotonou were largely the GSP standards with some minor improvements (Naumann 2008) and went through some major revisions for the IEPA (Naumann 2012). These RoO were not changed anymore for the final EPA<sup>9</sup>. Since they are thereby still the same rules since 2008, they are indirectly taken into account in the trade streams that GTAP 9 uses (based on data for 2012)<sup>10</sup> and cannot be modelled any further.

Additionally, the EU aims at development cooperation (Part I, Chapter III, Article 12 of the agreement), without determining an exact amount. As Bilal & Roza (2007) explain, these can only assist governments during their adjustment process, will not permanently even out the revenue losses, and countries still have to engage in the adjustment process.

## 2.4 Concerns about the EPA

### 2.4.1 A declining state budget

The EU committee of the French National Assembly warns in their report of 2006, that the EPA will cause a shock for the budget with the cessation of tariff incomes for the governments of the ACP states (Lefort 2006). Indeed, tariff revenues are a much more important source of state incomes in the African partner countries: While tariff revenues make less than 1% of the state budget in the European Union, they had a share between 11% (South Africa) and 69% (Botswana) of the state revenues before the EPA (data taken from

---

<sup>9</sup> This can be seen in MAcMAP under 'Trade Agreements and Rules of Origin' – a free account needs to be registered before entering this part of the page.

<sup>10</sup> Although GTAP does not model the rules of origin, which limits the accuracy of simulations in which rules of origin are supposed to change (Perez 2006).

GTAP, see Table 25)<sup>11</sup>. Other critics share this concern, pointing also to the fact that especially LDCs with high debt might experience very negative consequences on their development and poverty alleviation, even if the public revenues would just decrease by a few percentage points (Bilal & Roza 2007).

Proponents of the agreement argue however that

- The cessation of tariff incomes would not be immediate but take place over a longer time span. In the meantime, where tariffs are lower but not abolished, the stimulation of imports could even raise the tariff incomes (Bilal & Roza 2007)
- Also tariffs are not planned to be taken away completely and will stay on a relatively high level compared to other developing countries nevertheless (Lefort 2006).
- The additional growth through the trade agreement will even out the income losses through tariffs (Lefort 2006). As Bilal and Roza point out, if the agreement promotes growth, the additional tax revenue might be seen the later, the slower the elimination process of tariffs is scheduled.
- Tariffs would work as a source of corruption, as they guarantee a constant cash flows for those who manage to stay in power (Lefort 2006)

Proponents of the EPA also note that often only a small share of tariffs would be collected, and that the tax administration in developing countries would often be inefficient (Bilal & Roza 2007). The ACP countries should collect tariffs and other revenues more efficiently to even out the losses, or use the EPAs as an impetus to reform their tax systems (in this context, Lefort (2006) comments on the lack of betterment levies in several countries, but also on the extreme case of fiscal paradises). To take this suggestion into account, the second variation of the model explicitly introduces a tax that evens out all tariff revenue losses.

#### 2.4.2 A deterioration to the current account

The report by the EU committee of the French National Assembly argues that the opening of the economy mainly means an opening of the ACP markets to European products, and not so much the other way around (Lefort 2006): The quasi-duty-free access to the European market, that Sub-Saharan exporters

---

<sup>11</sup> The numbers by GTAP are flawed, since they do not consider the revenue sharing formula between the SACU countries into account. According to the World Factbook, 49% of the government revenue of Swaziland and 44% of the government revenue in Lesotho come from SACU custom duties – unlike their theoretical ‘own’ tariff revenues of 18,6% in GTAP.



enjoyed through the Lomé-Scheme, respectively the EBA initiative, did not lead to a strong share of ACP trade in the EU market or diverse economic structures (Ramdoo 2014, Perez & Karingi 2007), since not high tariffs, but high transaction costs and supply-side rigidities keep African exporters from making use of the market access (Perez & Karingi 2007). Additionally, the regulatory landscape of the EU might de-facto limit their access to EU markets (Ramdoo 2014): Mayn (2008) names here the increasingly stringent food safety standards decrease the exports in traditional ACP sectors such as fish, meat, fruit, vegetables, spices, oil and horticultural products. If indeed imports from the EU can enter the APC countries more easily, without creating much new exports for the area, this would have a negative effect on the trade balance and thereby impairing the current account of these areas (Lefort 2006).

But not only the absolute amounts of imports and exports matter, also the purchasing power of a country's exports (Burfisher 2011). If the country's export goods gain in value, while the price of import goods stay the same, a country can "buy more imports for its exports" – this ratio of export prices to import prices is called the terms of trade. The report by the EU committee of the French National Assembly warns that the EPA could have a negative effect on the terms of trade: the real exchange rate of ACP countries with a flexible exchange rate would decrease, reducing their purchasing power for foreign goods (Lefort 2006).

### 2.4.3 Diminishing regional trade

During the negotiations, the regional economic communities (REC) were supposed to self-determine a regional trading agreement, since "regional integration is a key instrument for the integration of ACP countries into the world economy" (European Commission 2000, Article 35,2). Such an agreement would be a free trade area or a custom union (United Nations 2011). But opponents of the SADC EPA argued that the SADC EPA gives some challenges to the emerging of Intra-African custom unions. Oxfam illustrates that with the ATDC: When South Africa agreed on lowering their tariffs towards the EU, the other SACU members were forced to adapt their tariffs due to the common external tariff of the SACU (Godfrey 2006). Similarly, any non-EPA countries that would want to form a custom union with an EPA country would have to adapt their tariffs towards the EU to EPA standards without benefiting of the preferential market access. Oxfam's argumentation ignores that regional integration is not only possible with custom unions, but also over free trade areas (which do not require a common external tariff).

Such a free trade area in fact evolved with the Tripartite Free Trade Area, concluded by the SADC, the EAC and the COMESA, which was signed in 2015 and could be approved by the national parliaments in 2017 (BBC 2015). Oxfam also argues that countries that are not inside an EPA, but want to form a regional group with an EPA country, would not be able to protect themselves from the liberalized imports from the EU without erecting barriers against their neighbours (Godfrey 2006). However, this could be done with rules of origin.

Nevertheless, in a more straightforward fashion, locally produced commodities could be crowded out by the increasing imports of European goods, as warned by Lefort (2006) and supported by the analysis by Perez and Karingi (2007).

But not only consumers, also producers could be allured by the new market access, that gives security over a long lasting duty-free regime (opposed to an inner-African market with only regional trade agreements and a generally low level of trade). African exporters might prefer this new accessible destination and be further discouraged from inner-African trade (Ramdoo 2014).

#### 2.4.4 A hazard to the infant industry

The deficiencies in infrastructure make energy, water, transportation and electricity costlier in Africa, which makes it harder for the local industry to be competitive (Lefort 2006). Opponents of the agreement, such as the fair-trade organisation Traidcraft, the Trades Union Congress and the organisation ‘Action for South Africa’, warn that the EPAs will harm the industry sector, naming several examples of African countries where liberalisation led to job losses and deteriorating labour standards (ACTSA 2007). Proponents argue that good “trade links with growing and technologically sophisticated markets can boost domestic productivity growth” (Bacchetta 2012). Through positive spill over effects economic reforms could be realized and private investors might invest in the local economy to reap the benefits of the EU market (Ramdoo 2014).

#### 2.4.5 A hazard to agriculture

As European producers are more competitive through mechanization, they are expected to take over the market (Bilal & Roza 2007). Such shifts of production towards more productive areas is a normal and wanted process within trade agreements, as consumers are expected to benefit from cheaper imports (while the inferior country shifts to producing more of the goods it has

a comparative advantage in). However, when it comes to agriculture, several countries prefer to exclude goods as sensitive in favour of the rural population and their small incomes (*ibid.*). There are several reasons for this:

- The agricultural sector keeps relatively many people out of poverty providing employment (*ibid.*). The abilities to switch into more beneficial sectors is limited for many smallholders, as certain structures, such as gender-specific labour division, are unlikely to change<sup>12</sup>
- By creating incomes, export revenues and employment, but also sometimes directly by supplying foodstuffs, a weakened agriculture sector can even affect the food security in countries, both by influencing food availability and access (Matthews 2010).
- Even if the EPA agreements would lower factor prices or lower prices for imported goods, those make only a small share of the expenditures of self-sustaining farmers – so the risks of losing their basis of existence could not be evened out by price effects that other consumers benefit of (Lefort 2006).
- If the sector is destabilized through a harsher competition, this could lead to rural exodus and a stronger forming of slums (Lefort 2006).

McDonald and Walmsley (2003) suggest that if the EU is serious about assisting African development through trade agreements, it should be aware of the importance of the liberalisation of trade in food and agricultural products.

---

<sup>12</sup> The UNCTAD notes that trade liberalization usually favours agricultural exports over the production of food crops (Peters 2005). The switch towards cash crops are often more difficult for women, as they tend to be smallholders and face difficulties in their property rights for land and their access to credits, fertilizers and other resources (Peters 2005). Whether female or not, smallholders additionally have greater difficulty in complying with sanitary and phytosanitary as well as environmental standards (Peters 2005). Differences like these might put smallholders and subsistence farmers in a very different start position when it comes to adaptation to a trade agreement (Peters 2005). Consequently, case studies would show that benefits of liberalization in developing countries have largely accrued to medium- and large-scale farmers in sectors where often only a few farmers and employees are female (Peters 2005).

## 3 Methodology

In this chapter, the methodology behind the analysis is explained. The model that is used is the standard GTAP model, a Computable General Equilibrium model (CGE) where several factors, sectors and regions interact. First, the advantages of using a CGE for the intended analysis are presented. This is followed by a short overview over the most important elements of GTAP (without the aspiration to give a convenient explanation of the logic behind GTAP within a view paragraphs – for a thorough explanation, Hertel (1997) is the recommended source). And finally, the many limits of the scope of such an analysis are explained.

### 3.1 Choice of the model

A broad range of models have been created to analyse the economic impacts of policy changes.<sup>13</sup> As could be seen in the literature review, partial equilibrium models are a commonly used for trade policies like the EPA.

Why is instead an economy-wide model preferred here?

As Perez & Karingi (2007) point out, changed tariffs and quotas do not only affect the sector they are applied on, but also the sectors that supply intermediate inputs to this production as well as sectors that depend on the output of the influenced sector. These forward and backward linkages make it necessary to use a model that captures inter- and intra-sectoral changes, which then is given with a general equilibrium methodology (*ibid.*). Partial

---

<sup>13</sup> Theoretically, one could also discuss the usage of approaches that are not models based on economic theory, such as time series projection. Time series projections extrapolate historical data to forecast the future, but they emphasise more statistical behaviour than underpin the economic theory behind behavioural equations (van Tongeren, van Meijl, Surry 2001: 152). Naturally, they are thereby more useful in situations where there are no external shocks distorting the current trends.

equilibrium models do not allow factors to move between sectors and demands to interact, and can thereby not provide a complete representation of national economies and their trade relations with other economies (van Tongeren, van Meijl & Surry 2001). These trade relations also contain important welfare effects such as the terms of trade, which would be ignored in a partial equilibrium model (Fontagné, Laborde & Mitaritonna 2011). Fontagné, Laborde and Mitaritonna (2011) add that partial models widely used by the World Bank, such as SMART and TRITS, do not link products and countries, but look at one market at a time and can, without further constraints, create inconsistent results, such as a total trade diversion that is bigger than the initial level of imports.

Among the economy-wide models, not only CGE like GTAP are available, but also macro-economic models and input-output models. Since macro-economic models however focus on phenomena such as inflation and exchange rates and input-output models lack the behavioural response of producers, consumers, importers, exporters and possibly other actors, CGE models are favourable here (van Tongeren, van Meijl & Surry 2001). This is especially true in developing countries, where agricultural activity has a high share in the economy: As trade liberalization policies are more likely to cause significant second-round effects, AGE models are the only coherent option for the analysis (*ibid.*).

In short, in case of an *ex ante* assessment of the effect of a multilateral market access change, a CGE model seems to be the most appropriate methodology (Bacchetta *et al.* 2012).

Within a model, several assumptions can be made about the market. *E.g.* if the products are considered to be heterogeneous, intra-industry trade can be explained in a better fashion (van Tongeren, van Meijl & Surry 2001). A heterogeneity can *e.g.* be installed by monopolistic competition (where high fixed costs create a situation that only allows a limited number of firms – that then can benefit from scale economies – to imperfectly compete in the market) or by imperfect substitution fashion (*ibid.*). Imperfect competition is a likely choice to model trade liberalizations of services and increasingly to model liberalization of manufactures (*ibid.*).

In the standard GTAP version the products are limited substitutes through the Armington assumption. There are several whole extensions for GTAP to adapt the model closer to real economic situations, *e.g.* to allow monopolistic competition or Cournot oligopoly with scale economies (GTAP-IRTS), firm heterogeneity (GTAP-HET), or a recursive dynamic version of GTAP (GDyn)

(Corong *et al.* 2017). Other extensions allow a better focus on policies *e.g.* in the agricultural sector, labour migration or poverty (*ibid.*).

The CGE that is used here is the standard GTAP model, a multiregion, multisector, computable general equilibrium model. The data and model used here are derived from the GTAP 9 database, which includes 57 sectors, 140 regions and 8 factors.

## 3.2 Theoretical framework of GTAP

The GTAP model is explained by in the ‘GTAP-book’ (Hertel 1997). Brockmeier (2001) provides a graphical exposition of the whole model. General explanations about CGE modelling, with many helpful examples for the GTAP model, are given by Burfisher (2011). Since the model was developed further over time, Corong *et al.* (2007) gives a comprehensive documentation of the model for version 7.

GTAP is built on two kinds of equations. The behavioural equations are based on microeconomic theory and reflect the reactions of optimizing agents, such as consumers and producers on international and domestic markets while the accounting relationships ensure that the receipts and expenditures of consumers, producers, and the government are balanced (Brockmeier 2001, Perez & Karingi 2007).

Additionally, there are model closures, which define which variables are exogenous and which are endogenous (Burfisher 2011). They can be changed to adapt the model to different economic environments or periods of adjustment (Corong *et al.* 2017). For instance, the macroeconomic closure describes whether savings or investments adjust to maintain the identity that savings equals investment (Burfisher 2011). In the default closures of the GTAP model, the quantity of savings changes with income at an exogenously given savings rate, which causes the investments to adapt (*ibid.*). Consumers do hence not increase their demand for consumption goods as much as they would in the investment-driven model, instead this rather results in an increase in the production of machinery and equipment (*ibid.*). This default macro closure is kept for the analysis. The “standard closure of the model is a classical representation of the global economy, with constant returns to scale, perfect competition, and a systematic adjustment between supply and demand through prices.” (Perez 2006, p. 1003).

Within the behavioural equations, several elasticities are used – not only to describe consumers’ reactions (price elasticities), but also to explain for instance with how much ease factors move across industries when wages or rents are changing (factor mobility elasticity). GTAP assumes that the factor mobility stays the same for all ratios of factor employment and all levels of aggregate factor supply (it uses CET functions) (Burfisher 2011), and similarly assumes constant elasticities of substitution (it uses CES functions)<sup>14</sup>. A special elasticity that should be mentioned is the Armington elasticity: GTAP uses variants of the Armington assumption to model intra-industry trade (Keck & Piermartini 2007). The Armington assumption – namely that domestic and imported goods from different regions are imperfect substitutes – is incorporated in GTAP by differentiating products on the basis of their country of origin (Kone 2008). Firms, consumers and the government decide their amount of imported goods (and their compilation among the imported goods) according to this elasticity of substitution.

### 3.3 Limits to the model and scope of the research

#### 2.4.1 On the translation of the agreement into shocks

The tariffs in the agreement are aggregated with the help of TASTE, a program that adapts detailed trade and tariff data to GTAP-related purposes. In the EPA, all commodities are listed with their code of the harmonized system.

This system describes product categories with decreasing detail the more number are added (see Figure 1). It is called “harmonized” as all member countries of the World Customs Organization (WCO) share the same description down to the

<p>06 Live trees, plants, bulbs, roots, cut flowers, etc  0603 Out flowers, dried flowers for bouquets, etc  060313 Fresh orchids</p>
---

*Figure 1: Example of numbers of the harmonized system, here showing the chapter (HS2, 2 digits), heading (HS4, 4 digits) and subheading (HS6, 6 digits)*

<sup>14</sup> This is not to say that substitution is possible anywhere. For example, the production functions are assumed to have a fixed ratio of value added and intermediate inputs (taking the form of a Leontief function), and nested in that another Leontief-function for the composition of intermediate inputs. But within the value added nest, the decisions for different primary factors are according to a CES function, and so are the decisions between the imported and domestic kind of an intermediate input.

subheading (HS6) and report their trade data for HS6 to UNCTAD (Bacchetta 2012).

Even if the EPA agreement sometimes defines tariffs beyond the subheading, only tariffs up to HS6 can be considered, as levels beyond that are neither harmonized, nor is there data on their trade flows in the COMTRADE or the TASTE database. The exceptions in the agreement that are detailed on HS8 or beyond are hence mostly calculated to experience the same tariff change as their superordinate subheading<sup>15</sup>. The attribution became additionally intricate by tariffs that are not *ad valorem*, but specific tariffs, mixed tariffs or tariff rate quotas. These tariffs are recalculated as explained in the Appendices 7.4 and 7.5. The weighting of the tariffs to aggregate the HS system into the GTAP sectors can also attract criticism, as weighting by import shares typically suffers from both, trade fluctuations and the endogeneity bias (the tariff influences the imports – in the extreme case, a prohibitive tariff has zero imports and is thereby not included at all in the average). As explained in further detail in the Appendix 7.4, TASTE tackles this issue at least to some extent with referent group weights.

#### 2.4.2 Reliability of the data behind GTAP

The source of the data behind GTAP is explained in detail in Gehlhar *et al.* (1997). Although “GTAP is supported by a strong group of institutional stakeholders which puts high requirements on the quality, timeliness and documentation of the data” (van Tongeren, van Meijl & Surry 2001), its reliability is sometimes contested.

Especially parameters that can only be observed indirectly, such as elasticities, can easily be questioned and strongly affect the outcome. Zhang (2006) shows that the terms of trade found in the simulation depend on the height of the Armington elasticity, and that this also seems to be the case for the comparably complex two-tier Armington substitution used by GTAP. Perez and Karingi (2007) conclude, regarding Zhang’s results, that it is important to bear in mind that the results if CGE simulations depend on the magnitude of various parameters.

---

<sup>15</sup> Which becomes arbitrary in case the subheading only consists of ‘exceptions’ without a clear majority for one rule. In some cases with obvious ongoing protection the initial tariff was simply kept, in other cases an attribution was made according to the best understanding of the author. See Appendix 7.4 for more detail.



But even directly measured, statistical data over trade flows and tax collection might not be as realistic as desired: Gehlhar *et al.* (1997) explains that subsidies towards the agricultural sector are often designed flexibly, so that they can react to the strong volatility for this sector (as supply elasticities caused *e.g.* by the weather, exchange rate volatility and price-inelastic demand contribute to world price volatility), while GTAP only measures this support with an average over several years, representative of the late 1980s.

Furthermore, Fontagné, Laborde and Mitaritonna (2011) and Bilal and Roza (2007) all note that there is an imperfect tax collection; which, as Perez and Karingi (2007) add, are recognized in many African countries affected by EPAs. They might be legitimate (food aid, diplomatic services, exemptions *e.g.* for export-processing zones, public and private investment goods, etc.), unintended (red tape) or illegal (corruption, smuggling) and lead to a gap between the theoretical tariff duty receipts and the practical ones. This can put a bias in two directions: the state budget could be affected even worse than expected (if the tariff collection becomes *e.g.* even harder for the remaining goods that have a tariff) or the negative effect might be overstated (if tariff revenues were in fact already low before and the state can improve its revenues with administrative reforms).

### 2.4.3 Missing dynamic effects

The idea behind having staging categories for different commodities, which allows tariffs to be eliminated in steps over a longer time, is that the local industry has time to catch up in their competitive capacities. This GTAP analysis is however comparative static in scope and does not take account of dynamic effects triggered by further liberalization. A dynamic model could allow capital to accumulate and take into account that policies can accelerate the pace of technical innovation, which the WTO calls two of the most powerful sources of economic growth (Piermartini & The 2005). Examples for such effects are “increased competition, economies of scale, improvements of the investment climate and technological change” (Keck & Piermartini 2007, p. 89). But not only positive effects are missed: GTAP fails to capture some of the costs associated with the transition, such as retaining, temporary unemployment, the retooling of capital or even the impossibility to transfer specialized capital (Piermartini & The 2005). These periods of unemployment and dislocation could exact a high societal price (Burfisher 2011). When the EPA includes several measurements that are supposed to make it easier for the African partners – like slow tariff elimination over several years or slowly

increasing tariff rate quotas – the GTAP results cannot tell us whether these measurements could alleviate negative side effects of the agreement.

Even tariff revenues can be affected by the fact that the simulation “jumps” over the ten years in this simulation, as the lowered tariffs, as long as they are not down to zero, can stimulate imports and thereby create higher tariff revenue – depending on the initial height of the tariffs and the elimination process (Bilal & Roza 2007).

#### 2.4.4 On the structure of CGE models

CGE models are based on economic theory and hence require many assumptions regarding the database, behavioural equations and parameters – which is the root of much scepticism and criticism (Gehlhar 1998). GTAP for example doesn’t allow primary factors (like labour or capital) to move across borders or change in amount, although worker’s migration or capital accumulation are obviously existing occurrences in the real world. On the other hand, factors like agricultural land and capital can be employed in a different sector within one country, which would normally not be done in short- or medium-term models (van Tongeren, van Meijl & Surry 2001). There are no domestic margins (such as transport costs), no foreign income receipts or payments, no remittances and no international aid flows, no transfers or property income receipts in the governments’ accounts (Corong *et al.* 2017)

A frequent issue of criticism is the Armington elasticities. The Armington model uses imperfect substitution, but not for each firm, but rather for each country of origin (van Tongeren, van Meijl & Surry 2001). This means the consumers’ preferences are fixed exogenously. An unrealistic feature about the Armington Model is that even very small importers are able to influence world market prices (*ibid.*). Another problem of this set-up of the model is fact that trade flows with a value of zero (which exist for some commodities traded between SADC countries, in the aggregation used in this thesis *e.g.* in the fish sector) cannot turn into non-zero trade flows under that setup of the model (Keck & Piermartini 2007). There are alternative models that have tried to endogenously explain the ties between certain import and export relationships, such as the gravity model<sup>16</sup>. Kuiper and van Tongeren (2007) have tried to

---

<sup>16</sup> Gravity models assume that economically big countries trade more with each other and trade less with increasing trade costs. Just like gravity is a formula of the masses of two bodies divided by the square of their distance, the volume of trade between any two countries is approximated with a formula of their economic size divided by the trade costs (generated out of different

combine the Armington formulation with an econometrically estimated gravity model to solve the “small shares stay small” problem.

A possible point of criticism could also be the missing nominal exchange rate in GTAP. However, GTAP does have a real exchange rate mechanism: A change in the relative factor prices across countries reflects “changes in the relative prices of goods that are similar in effect to a change in the real exchange rate” (Burfisher 2011, p. 155). This way, if a shock causes factor prices to depreciate in one country, this country becomes more competitive as an exporter, with similar effects to a nominal exchange rate depreciation (*ibid.*).

Some assumptions and mathematical issues that are objectionable can be solved with adapted closures, additional shocks and setting in the model. For example, the precision of the approximations of changes in GTAP<sup>17</sup> or the aggregation bias after the usage of TASTE<sup>18</sup> have solutions within the programs that are used. Other inadequacies are inherent in the GTAP model. It should however be positively noted that the accuracy of GTAP was tested in a backcast simulation over developments in the Pacific Rim, where Gehlhar (1998) saw a good correlation between GTAP predictions and real changes of export shares<sup>19</sup>.

---

variables, including not only distance, but also dummies for islands, landlocked countries, common language, colonial connection, and so on) (Piermartini & The 2005).

<sup>17</sup> Most of the relationships are expressed in terms of value, such as the value of exports, the value of domestic purchases by the government or the value of a certain factor employed by a production sector. For this, the equations must be linearized via total differentiation. The model itself, despite its linear representation, stays non-linear – the linearized form is just a good approximation for small changes. To improve the approximation for bigger changes, the model is solved several times in small steps. A more detailed and graphical explanation of this can be found in Hertel, Tsigras 1997, chapter V, complemented by Corong et al. (2017), under the headline “implementation”.

<sup>18</sup> The TASTE documentation warns that potentially neither of the possible set of weights “is consistent with the GTAP data, giving rise to potential problems of aggregation bias: tariff shocks might be wrongly influenced by the level of user aggregation. To combat this problem, you have the option of scaling the chosen set of weights so that they sum to the GTAP database trade matrix VIWS.” (Horridge & Laborde 2010, p. 9)

<sup>19</sup> Gehlhar (1998) tested how well GTAP would predict the export share changes of the Pacific Rim. For this, he returned the endowment levels to their 1982 levels, then ran different simulations for the next ten years and compared the predicted export shares with the real values of 1992. He could show that with some easy adaptations, the model performs fairly well: When all his suggested adaptations were used, the correlation coefficients between predicted and real values were 0.78 for all countries, with coefficient values of up to 0.97 for specific countries. Rapid structural changes, such as a rapid deterioration in the oil price, impaired the ability of

## 4 Policy simulation

In this chapter, the settings concerning the actual simulation are explained. GTAP 9 has data for 140 regions, 57 sectors and 8 factors. Before making any kind of simulation, in order to reduce the magnitude of the calculations, these regions, sectors and factors need to be aggregated down to the ones that are relevant for the research question (normally not more than 10 sectors and 10 regions). This aggregation is described in the following. The five simulations implement the same tariff shocks (i.e. the tariff reductions that are defined in the EPA agreements), but they apply different settings concerning the closure rules and the elasticities. This serves the purpose of gaining results for different economic circumstances (like unemployment, sluggish factor mobility or a tax reform). The basic simulation and the variations are explained in 4.1. Finally, it is explained how the SADC EPA is translated into shocks.

### 4.1 Aggregation scheme<sup>20</sup>

The regions in GTAP are aggregated to nine regions: Mozambique, Namibia, Botswana and South Africa have their own region, Lesotho and Swaziland cannot be separated. For perspectives on the regional integration, the other SADC countries get another region (the Seychelles cannot be included here, as they have no own region in GTAP), and so does the rest of Africa. Furthermore, the EU is one region. All other countries are aggregated to the “Rest of the World”.

---

GTAP to make a good prediction for the affected countries. However, he also showed that GTAP tends to underpredict the changes in his case.

<sup>20</sup> More details on the aggregation can be found in the appendix 7.3.

In the factor aggregation, different forms of labour and other primary factors have to be aggregated. For this simulation, the aggregated factors are skilled labour, unskilled labour, land, natural resources and capital.

During the aggregation, the mobility of these factors is also determined: When wages and rent change across industries, factor mobility describes the ease with which factors move across industries (Burfisher 2011). Some CGE model give the option for factor movement across countries (*ibid.*) however in GTAP the total amount of factor endowment is fixed for each country. The elasticity of transformation *ETRAE* shows the responsiveness of factors to changes in relative returns from close to zero (fixed allocation) to minus infinity (perfectly mobile) (Hertel et al. 2016). Transition costs, such as retraining and job search costs, are expected to reduce the mobility – however, if the change lasts long and *e.g.* workers can expect a lasting benefit from a career change, these costs become less relevant and factors can be expected to be mobile (Burfisher 2011).

For the basic simulation, all labour and capital is set to be fully mobile. This is not very realistic for a ten-year simulation – among the unskilled labour, there seems to be a gap in the labour mobility between the agricultural sector and the other sectors (see Acar (2003) for a summary of studies on that and Appendix 7.3 for an explanation why agricultural labour cannot be split off other forms of labour). Also, skilled labour, even if it might have more job flexibility due to education or better information on alternative jobs, might have stable careers (as far as that is possible when their branch is affected by the EPA) or a high degree of specialisation, which might make them reluctant to leave their job (Burton and Parker 1969). Since the mobility of the factors have a strong effect of the sectoral reallocation, the factor mobility elasticities are subject to changes in the simulation variations.

In the sector aggregation, agricultural (Meat&Livestock, Grains&Crops) and other food related commodities (Food Processing, Fishing) are left rather disaggregated, just as well as important branches of the industry (Heavy Manufacturing, Light Manufacturing, Textiles) and other sectors important to the regions (Extraction). This happens at the cost of two strongly aggregated sectors reflecting services (plus the construction sector, which is merged in there).

## 4.1 Basic simulation and variations

Basic simulation	Tariffs and agricultural export subsidies are shocked (negative tariffs are set to zero), Factors are mobile and fully employed Armington elasticities are increased by 20%. Solution found with Gragg's method (as by default).
Variation 1a	Unlike in the basic simulation, there is labour unemployment
Variation 1b	Unlike in the basic simulation, the factors labour and capital are more sluggish (elasticity of factor transformation of -1)
Variation 1c	Both changes of Variation 1a and 1b are applied simultaneously.
Variation 2	Unlike in the basic simulation, state revenues are fixed, output taxes are endogenously

In the basic simulation (BASIC), the tariff changes of the SADC EPA are implemented as shocks, without changing anything on the GTAP framework (by adapting closures, etc.). The only adaptation is an adaptation of the Armington elasticities, as Gehlhar finds that the default trade elasticities in the GTAP model are “too small for a 10-year simulation” (1998, p. 358), and that the results of his backcast analysis could be improved by increasing these parameters by 20% before implementing any shocks (this is the same for the variations). Labour and capital are assumed to be perfectly mobile across the sectors of one country (although the splitting of skilled labour and unskilled labour prevents shifts between these groups), while land has by default an elasticity of transformation of -1 and natural resources one of -0.001 (van Banse *et al.* 2013).<sup>21</sup>

In the first variation of the model (VAR1a-c), the conditions of the factor market are varied. Since African countries typically show excess supply of unskilled labour, which can be drawn on by industries in the event of increased production, GTAP's assumption of full employment is inappropriate for these countries (McDonald, Walmsley 2003). For this reason, it is favourable to fix the real wage rate exogenously and endogenize the supply of labour (in these

---

<sup>21</sup> This allows to model complex land use decisions in a simplified way: Even if land owners can to some extent shift from low-rent to high-rent sectors, not all crops can grow in any soil and climate, and not all pastures are arable land (Baltzer & Kløverpris 2008). Consequently, land rents do often not equalize across sectors (Baltzer & Kløverpris 2008). It is easy to imagine that different natural resources aggregate an even wider spectrum of very different factors – forests used by forestry, waterbodies used by fishery, mines used by the extraction industry, etc. (Hertel, Tsigas & Narayanan 2012) – that are sector-specific and hence very sluggish.

countries and in the rest of the world). *Inter alia* McDonald and Walmsley (2003) used this alteration to analyse the impacts of the Free Trade Agreement between South Africa and the EU on Botswana, or in a study about the impact of the West African EPA on the Ivory Coast (see Kone 2008).

In another paper, McDonald, Thierfelder and Walmsley (2014) note that the gains of a trade policy reform involve much greater structural reforms in developing countries than in developed countries. Hence the extent of factor reallocation may be overestimated when factors are simply assumed to be mobile. A low mobility could be favourable to the wages of some groups; *e.g.* the real earnings of unskilled agricultural labour are higher when there is little mobility between farm and non-farm sectors (Acar 2003; see also footnote 12 for the special challenges of subsistence farmers). Immobility of factors can be modelled in different ways<sup>22</sup>; unfortunately, the standard GTAP model only allows a change of the elasticity of transformation. In the range from 0 (completely sluggish) to  $-\infty$  (completely mobile), a high sluggishness of -1 is assumed in simulation variation 1b and 1c for skilled labour, unskilled labour and capital<sup>23</sup>.

---

<sup>22</sup> In the very long run, factors such as capital can be completely shifted from one economic sector to another, when depreciating capital in inefficient sectors is not replaced much, and the money is instead invested in capital accumulation in other sectors (without changing the total amount of capital). This mobility is however not realistic in a scenario over ten years: It seems natural to assume that capital such as tractors can be used in different forms or farming, while not being of much use in manufacturing, extraction or fishing. Consequently, some CGE models – such as GTAP-AGR or GLOBE – allow the user to model restricted capital mobility between sectors (van Banse et al. 2013). Similarly, also the labour markets can be segmented, *e.g.* between rural and urban labour (possible in MIRAGE, LINKAGE or GLOBE) or between farm and off-farm employment (possible in GTAP-AGR). The standard GTAP model does not include this possibility, instead only the elasticities of transformation can be adapted. Elasticities of transformation can differ much for different sectors; the literature especially notices a gap of mobility between farm labour and non-farm labour (Acar 2003). Equally other conjectures, such as the training opportunities of workers, the scale of the simulation and thereby the time frame in which the factor reallocation can take place or the expectations of the workers how profitable a job change would be in the long term, might influence the elasticity of transformation in the labour market.

<sup>23</sup> The elasticity of transformation can be recalculated out of the labour supply elasticity and the revenue share of the related labour with the formula  $\epsilon_{\text{trans}} = \epsilon_{\text{labour supply}} / (\text{revenue share} - 1)$  (Acar 2003). For instance, if 3,19% of the workers switch from agricultural work to other unskilled work when the wages in other unskilled work rises by 1% and if 6,8% of all unskilled work is agricultural work, then the elasticity of transformation is  $3.19 / (0.068 - 1) = -3,42$ . However, this formula assumes there is only one ‘gap’: between agricultural and non-agricultural workers – it does not include other parts of unskilled works (also shop workers and clerks might not be perfectly mobile between their jobs), nor does it answer the questions for shifts within one sector (how willing are farmers to switch from animal husbandry to crop farming?). In Acar 2003,

In VAR1a, unemployment is allowed. In VAR1b, labour and capital is sluggish. In VAR1c, both changes are implemented simultaneously.

The second variation (VAR2) simulates that the Southern African countries compensate their decreasing tariff revenues with additional taxes. Such a measurement has been done in a study on EPAs in Sub-Saharan-Africa by Perez and Karingi (2007): the tax on private commodity consumption (for imported and domestic goods) is changed to be endogenous in the closure rules, while the rate of indirect tax revenue to national income stays fixed.

## 4.2 Definition of the shocks

The EPA agreement contains several changes in tax, mainly tariff eliminations, tariff changes and tariff rate quotas. Since these changes are often stretched over several years, allowing the local economy to slowly adapt to the new conditions. Ten years after the agreement is in place, most tariffs are at their final stage, so the analysis will be made over the equilibrium that will be reached then. As the goods defined in the agreement are mostly only tiny fractions of the aggregated goods in GTAP, the tariff changes are calculated for those aggregated goods via import-weighted average tariff rates.

Using TASTE, a program that adapts detailed trade and tariff data to GTAP-related purposes, has many advantages. Pre-existing tariffs, which may not all be defined as *ad valorem* tariffs (e.g. 5% of the imported value), but be specific tariffs (e.g. 15€/ton) or compound tariffs (*ad valorem* + specific tariff) are included as *ad valorem* equivalents (AVEs) in there – so if, according to the agreement, a tariff stays the way it was before the agreement, the applied tariff is given in the *ad valorem* form that can be directly used in GTAP.

New specific or mixed tariffs, as well as new tariff rate quotas, however first need to be recalculated into AVEs before being put into TASTE. Especially for TRQ there is no ‘standard solution’ (see Appendix 7.5). Other (mainly tariffs that are defined beyond the 8 digit level) cannot be taken into account at all (see Appendix 7.4)

For all goods, the applied tariffs are used. While bound tariffs are the maximum tariff rate a country can levy on a particular product under commitments made at the WTO, the applied tariff is the level of tariff actually

---

elasticities of transformation within unskilled labour are calculated as -2,030 and -3,045 (based on assumed data over the USA).



levied at the border by the country. As Bilal and Roza (2007) point out, the applied tariffs are often significantly lower than the bound tariffs. Hence, Perez and Karingi (2007) explain, using bound tariffs would overstate the impacts of the tariff elimination on the concerned economies.

## 5 Results and discussion

In this chapter, the output from all simulations is given, interpreted and discussed.

In a general perspective on the development of the GDP and the welfare, all countries of the SADC EPA group are afflicted - although all of them can improve their GDP loss by a tax reform.

The tariff revenue losses of up to 25% have an effect on the total revenue losses. Since the GDP decreases, other tax incomes do not naturally even that out - but an increase in output taxes can balance the state budget (this option will be discussed in more detail later)

The current account does not suffer strongly from the agreement (changes are under 2%), but there is some trade deflection: The imports from the EU strongly increase and have a negative effect on several other sources of imports, the exports to the EU and some other areas increase. The trade balance to the EU is strongly impaired, and so are the terms of trade of the African partners.

The countries of the SADC EPA group can expand their regional exports, but the regional imports are strongly decreasing. In total, the regional trade (measured with the intra-regional trade intensity index) decreases.

Agriculture and industry are especially challenged in Mozambique, which will be shown in the decreasing contribution to the total value added, a stronger orientation towards export markets and employment losses (while wages only change moderately and have to be seen in the context of price developments and the degree of self-subsistence).

Another result that can be drawn from the output is that even if the relative changes are often not very strong, especially Mozambique sees several negative effects at the same time.

## 5.1 General results<sup>24</sup>

In all areas, the biggest contribution to the GDP came from the consumption (Table 20). This is affected the hardest in Mozambique (-0.4% in the basic simulation), so it is not surprising that Mozambique experiences the biggest GDP losses throughout all simulations ( Table 21, Table 1).

GDP	basic simulation	VAR1a	VAR1b	VAR1c	VAR2
EU	0,00%	0,00%	0,01%	0,01%	0,01%
Mozambique	-0,40%	-0,38%	-0,80%	-0,81%	-0,04%
South Africa	-0,04%	-0,05%	-0,05%	-0,08%	0,01%
Namibia	-0,02%	-0,01%	-0,19%	-0,19%	-0,01%
Botswana	-0,03%	-0,03%	-0,06%	-0,09%	-0,02%
Lesotho&Swaziland	-0,03%	-0,04%	-0,11%	-0,14%	-0,04%

*Table 1: The changes of the GDP compared for the different simulation variations (own calculation from GTAP output, GDPEXP)*

Mozambique can, however, strongly reduce these GDP losses by introducing a tax that evens out state revenues (VAR2). Not only does this reduce the losses in government expenditure, but it also strongly reduces the losses in consumption (both basic simulation: -0.39%, VAR2: 0.01%), and even alleviates the losses that Mozambique experiences in its trade balance (basic simulation: trade deficit widens by 0.73%, VAR2: trade deficit only widens by 0.21%). The tax reform causes similar effects on government expenditures, consumption and net exports in the other African partner countries (although the numbers are less impressive there), which improves the changes in the GDP for all African partner countries.

Interesting for a first overview are also the welfare changes: GTAP calculates high losses for Mozambique and South Africa (Table 2). As they are calculated in terms of equivalent variation, they can be interpreted like money losses. To get some perspective for these gains and losses in relation to the size of the economies, Table 22 shows all welfare changes are percentage changes of the initial GDP. Again, Mozambique clearly shows the highest losses.<sup>25</sup>

<sup>24</sup> The other figures and tables to this chapter can be found in Appendix 7.8

<sup>25</sup> These welfare losses are mainly driven by losses in commodity terms of trade and investment-savings terms of trade, and to smaller extents also allocative efficiency effects. The losses in investment-savings terms of trade are based on the ratio between the price domestically produced capital investment goods and the ‘price of savings’ (a GTAP internal, theoretical

Welfare	basic simulation	VAR1a	VAR1b	VAR1c	VAR2
EU	234,4	234,5	259,2	300,7	302,6
Mozambique	-16,2	-13,1	-30,4	-41,7	-34,1
South Africa	-51,0	-76,8	-92,3	-125,2	-107,7
Namibia	0,7	1,6	0,2	1,4	-0,4
Botswana	1,1	0,0	-0,3	-3,7	0,1
Lesotho&Swaziland	0,4	-0,1	0,7	-1,3	0,6

Table 2: The changes of the welfare compared for the different simulation variations (own calculation from GTAP output, WELFARE)

	basic simulation	VAR1a	VAR1b	VAR1c	VAR2
total welfare	169	146	137	130	161
tariff revenue gains in the EU	262	261	212	280	280
total welfare SA+BLMNS	-65	-88	-122	-171	-142

Table 3: Total welfare effects, tariff revenue gains in the EU and total welfare effects in the SADC EPA group.

In the context of the intended development cooperation, it is worth noting that the total welfare losses occurring in the African partner states are smaller than the total welfare gains of the EU; which makes it theoretically possible that the development cooperation named in the agreement could archive compensation between the winners and losers of the agreement (Table 3). Of course, this becomes more complicated if the winners are private and have no political will to support the African partner countries. But as the same table shows, even when the gains in state revenues in the EU are compared with the total welfare losses in the SADC EPA group, the EU's state revenues are bigger – which theoretically allows the EU to use a part of their state revenue

---

number) (Burfisher 2011). It reflects the idea that investment sales are also a source of income to a country, and that a higher price would generate a higher income (Keck & Piermartini 2007). This is criticized by Keck and Piermartini (2007), as it would not well represent the true benefits of savings and investment. Furthermore, in more current versions of GTAP, this welfare component has been “has been considerably muted in the current version of the GTAP model by permitting psave(r) to vary by region. In particular, psave(r) moves closely with pcgds(r) in order to capture the fact that the majority of savings is invested domestically.” (Huff & Hertel 2000, p. 17). The allocative efficiency effects are the excess burden of each tax. The commodity terms of trade effects will be closer looked when the current account in analysed. More information on the welfare decomposition can be found in Huff & Hertel (2000).

gains out of the EPA to alleviate the losses of the SADC EPA countries. Bilal & Roza (2007) however argue that there might be little political will for a one-for-one compensation, since this kind of compensation might give higher transfers to bigger, more developed countries (such as South Africa here) than to the underdeveloped countries.

## 5.2 Results for the areas of concern

### 2.4.1 A declining state budget<sup>26</sup>

A former study estimated that the SADC EPA group will lose 19.4% of their customs revenue, which is 5.0% of their total public revenue, thereby being slightly under the average of the ACP groups (McKay 1998, see Bilal and Roza 2007, p. 10). The simulation in this thesis does not deviate from this too much: Especially Mozambique and Namibia can experience high tariff revenue losses (Table 4, on the importance of tariffs, see Table 25, Figure 14). The total state revenues are especially affected in Mozambique and Botswana, if not evened out by a revenue-balancing tax as in Var2 (Table 4). As will be seen in the following chapters, such a tax increase does not cause major disruptions to the other regarded areas (apart from the value added of the sectors Fish, Light Manufacturing and Textiles in Mozambique and the real wages in Table 15, Table 16) and even has some positive effects on the GDP or current account losses.

revenue changes	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
basic simulation	0,01%	-5,70%	-0,39%	-0,47%	-3,37%	-0,46%
VAR1a	0,01%	-5,68%	-0,40%	-0,47%	-3,37%	-0,47%
VAR1b	0,00%	-5,74%	-0,39%	-0,47%	-3,38%	-0,46%
VAR1c	0,00%	-5,74%	-0,38%	-0,47%	-3,38%	-0,46%
VAR2	0,01%	0,15%	0,04%	0,02%	0,03%	0,01%

Table 4: Calculation of the total revenue changes – same calculation as in Table 25, but comparing the outcomes of all simulations. Unsurprisingly, when the revenues ratio to the GDP is fixed exogenously (as in VAR2), the total revenue losses differ much from the other scenarios.

It should be noted that these numbers cannot be taken literally because of the revenue sharing formula of the SACU countries (as mentioned in footnote

<sup>26</sup> More figures and tables to this chapter can be found in Appendix 7.9

11 and further explained in chapter 5.3). For Mozambique, as not being part of the SACU, the losses are however not alleviated by that.

#### 2.4.2 A deterioration for the current account<sup>27</sup>

The trade balance towards the EU deteriorates for all African partners. South Africa, which again already had a trade deficit with the EU before the EPA, widens this deficit by around 7%. Namibia and Lesotho&Swaziland lose some of their surplus (in the strongest cases over 9% resp. over 5%), Botswana gets off comparably lightly with a loss of maximum 1.5%. The most extreme case is Mozambique, which loses up to 38% of their trade surplus towards the EU (Table 5). All losses in the trade balance with the EU to the Southern African countries equate to gains on the side of the European Union: The European Union already had a strong trade surplus towards the SADC EPA group, which is expands by 25.3% with the EPA at the costs of the Southern African producers.

trade balance with the EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
basic simulation	-38,48%	7,70%	-9,18%	-1,46%	-5,49%
VAR1a	-26,54%	5,58%	-1,65%	-0,92%	-2,22%
VAR1b	-26,87%	5,70%	-1,65%	-0,93%	-2,27%
VAR1c	-26,86%	5,71%	-1,65%	-0,93%	-2,27%
VAR2	-26,38%	5,53%	-1,62%	-0,91%	-2,21%

*Table 5: Changes in the trade balance towards the EU. Note that South Africa had a trade deficit before, so the “increase” shown here is in fact a widening of the deficit (therefore also coloured red, although positive).*

It is possible to give a closer look to the sectors that experience the biggest losses in their trade balance towards the EU (Table 26). Clearly heavy and light manufacturing and textiles are big losers of the EPA in almost all African partner countries.

GTAP also calculates a total current account<sup>28</sup> under the standard closure<sup>29</sup>, where the losses appear more moderate. Mozambique and South Africa, which

<sup>27</sup> More figures and tables to this chapter can be found in Appendix 7.10

<sup>28</sup> The current account in GTAP only consists of the balance of trade, since there are no observations on international transfer receipts (Hertel & Tsigas 1997)

<sup>29</sup> As Burfisher (2011) notes, a rise imports (or decrease in exports) also increases the demand for the foreign currency (respectively, decreases the demand for the current currency). The national currency would thereby depreciate, making imports less attractive to the local consumers

already had a negative trade balance before the EPA, widen this deficit by about 0,7% respectively over 1% (Figure 15, Table 6). The other countries lose some of their trade surplus, the strongest Namibia (-0,17%). All countries can mitigate this by introducing a revenue-balancing tax ( Table 6).

current account changes	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
basic simulation	0,06%	0,73%	1,07%	-0,17%	-0,12%	-0,13%
VAR1a	0,06%	0,74%	1,02%	-0,17%	-0,12%	-0,13%
VAR1b	0,03%	0,70%	1,21%	-0,17%	-0,10%	-0,15%
VAR1c	0,03%	0,70%	1,22%	-0,17%	-0,10%	-0,14%
VAR2	0,06%	0,17%	0,81%	-0,11%	-0,06%	-0,10%

Table 6: Changes in the current account of the countries. Note again that the EU, Mozambique and South Africa had a trade deficit before, so the “increase” shown here is in fact a widening of the deficit (own calculation from GTAP output, note also that GTAP only includes the trade balance in the current account)

But as made clear before, not only the absolute amount of imports and exports matter, also the purchasing power of a countries exports, which is measured with the terms of trade – i.e., the ratio of export prices and import prices (Burfisher 2011). Because there are several export and import goods, global CGE models measure the ratio of export prices and import prices with the help of a price index (Burfisher 2011).<sup>30</sup> In the welfare composition in GTAP the terms of trade are a major (negative) contributor for the African countries, hitting (in absolute terms) South Africa and Mozambique the strongest (Table 7). Relative to their economic size, Mozambique is affected the most from this (Table 27).

---

and exports of the country more attractive to the rest of the world. Therefore, modelers sometimes assume that with a flexible exchange rate, the current account balance stays fixed. This can also be done in GTAP by adapting the closures. However, this ignores international capital mobility (Gilbert 2004), and instead the standard closure will be used here.

<sup>30</sup> Actually, economically small countries with no impact on the world market prices face fixed import- and export prices independently of their trade behaviour and do hence not experience terms of trade effects (Burfisher 2011). However, in CGE models with Armington elasticities, the commodities from different countries are imperfect substitutes, which means that each country has a monopoly on its very own local products (*ibid.*). Thereby, in CGE models even small countries can experience terms of trade effects, if other countries have a low substitution elasticity (i.e. are attached enough to the countries’ exports).

terms of trade effects	basic simulation	VAR1a	VAR1b	VAR1c	VAR2
EU	140,99	141,15	130,36	130,44	141,93
Mozambique	-6,97	-7,21	-6,00	-6,02	-7,60
South Africa	-22,02	-21,47	-18,29	-18,15	-23,16
Namibia	-0,82	-0,85	-0,80	-0,82	-0,93
Botswana	-0,37	-0,32	-0,39	-0,43	-0,49
Lesotho&Swaziland	-0,48	-0,47	-0,45	-0,44	-0,51

*Table 7: Changes in the total terms of trade effect in the different simulation variations.. Since the data is taken from GTAP's calculation of the welfare in equivalent variation, these values can be interpreted like money values (data from the GTAP simulation)*

### 2.4.3 Diminishing regional trade<sup>31</sup>

The imports and exports with the EU increase (Figure 18), while several regional trade streams are decreasing (Table 8).

	SADC EPA	plus SADC	plus RoA
basic simulation	-2,17%	-0,59%	-0,22%
VAR1a	-2,16%	-0,59%	-0,22%
VAR1b	-2,21%	-0,59%	-0,22%
VAR1c	-2,21%	-0,59%	-0,22%
VAR2	-2,21%	-0,59%	-0,22%

*Table 8: Changes in regional trade within the SADC EPA group, within the SADC and within Africa (own calculation based in GTAP output, VIWS. The last two groups are net of the previous named groups)*

The absolute losses in regional exports and imports are smaller than the gains in EU exports and imports (Figure 19). This means, the streams of commerce have not simply been deflected in a zero-sum game. Apparently, the consumers are not only purchasing their normal amounts of imports from a different source, but are benefiting enough from prizes and access to preferred goods that they decide to purchase more imports than before.

Which regional trade streams are really negatively affected by the additional imports? When imports and exports are summed up, one can see that the trade within the SADC EPA, within the SADC and within Africa all decrease throughout all simulations (Table 8). But when exports and imports

<sup>31</sup> More figures and tables to this chapter can be found in Appendix 7.11



are viewed independently, the picture becomes patchier: For the trade with the rest of the SADC and the trade with the rest of Africa, regional exports are increasing, while regional imports are decreasing (Table 9). For the trade within the SADC EPA group, all trade (except for Mozambique’s exports and South Africa’s imports) is decreasing.

	South Africa		Botswana		Mozambique		Namibia		Lesotho& Swaziland	
	M	X	M	X	M	X	M	X	M	X
regional (REC)	5,3	-131,7	-6,5	-0,8	-121,6	5,2	-4,6	-0,7	-1,8	-1,2
regional (SADC)	-8,9	13,1	-1,0	0,1	-8,8	1,6	-1,9	0,4	-0,2	0,2
regional (RoA)	-18,9	11,4	-0,2	0,1	-2,3	0,2	-0,1	0,1	-0,1	0,3
EU	934,3	323,0	33,4	0,9	361,2	28,8	28,6	3,1	14,2	0,8
rest of the world	-556,6	101,2	-21,0	1,5	-176,5	6,9	-14,3	2,2	-9,0	1,8

*Table 9: Comparison of trade changes (M=imports, X=exports) in absolute numbers. Note that the groups “regional (SADC EPA)” and “regional (RoA)” are net of other groups, i.e. the first green column shows how much less is imported from SADC countries that are not already depicted in the Regional Group that concluded the EPA (Data from the GTAP database, VIWS)*

Through the ‘blackbox’ of the CGE, it is hard to understand all incentives behind consumption shifts, but a calculation on correlations could shed some light upon the issue. For this, the correlation coefficient between the absolute changes in EU imports and the absolute changes in imports, exports and value added are calculated (Table 30). The results of this show ambiguous tendencies concerning the correlation between the value added and the imports from the EU. If only imports and exports outside the regional group are regarded, there is a tendency that high EU imports correlate with lower imports from other trade partners (for six out of ten sectors) and higher exports to other trade partners (seven out of ten sectors). The correlation of imports and exports within the regional group with EU imports deviates from these tendencies – both imports and exports between SADC EPA countries are rather negatively correlated with EU imports.

How could these values be interpreted?

One possible explanation is that regional imports are crowded out by the cheap new EU imports, especially in the food or industry related sectors. Regional exports on the other hand seem to benefit more the higher the EU imports are, unless they are directed at other SADC EPA countries. So why is

there a difference for regional exports, depending on whether they stay within the SADC EPA group or are exported outside of it?

EU imports within the SADC EPA group have two effects: They bring a higher amount of final goods on the market, thereby lowering the consumer prices, *and* they bring a higher amount of intermediate inputs, lowering the production costs. The local producers can benefit from the additional intermediate inputs and may be able to produce cheaper, which is especially beneficial on markets where they do not compete with the new consumer prices and the new production costs. That means, they have better chances exporting to countries that do not have the same trade agreement with the EU. So while exports to other SADC EPA countries do not increase much, exports to other SADC countries and other African countries can thrive. As long as other markets are assumed to have no EPA agreement with the EU (which some have, but which is not simulated), they face a less strong price competition there<sup>32</sup>. Consequently, the exports to countries outside the SADC EPA can benefit from the EU imports, while the exports within the regional group, not so much.

In total, even in regional exports can increase, the regional trade suffers from the trade agreement: the regional trade intensity decreases on different levels of ‘regionality’ in all simulation variations (Table 29). The situation on the regional markets however strongly differs from sector to sector – while the EU imports seem to have a positive effect on regional exports of industrial commodities, they seem to harm the abilities to export grains and crops<sup>33</sup>. This leads to the next step: analysing the effects for potentially vulnerable sectors.

#### 2.4.4 A hazard to agriculture and industry<sup>34</sup>

The EPA causes some sectors to decrease, others can gain from it. Table 10 shows that there is no strong pattern of certain sectors always being among the losers: rather, most sectors change by less than  $\pm 0,5\%$ . However, in Mozambique there are some noticeable declines in several sectors.

---

<sup>32</sup> This means that under more realistic circumstances, where also the other EPAs are modelled, the abilities of the SADC EPA counties to export would shrink and the regional trade would be harmed more than is seen here.

<sup>33</sup> A positive correlation coefficient doesn’t state that regional exports would increase, it just states that higher EU imports correlate with higher exports OR lower losses.

<sup>34</sup> The figures and tables for to this chapter – which are unfortunately mostly too large to add them in the text – can be found in Appendix 7.12

	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho& Swaziland
Grains&Crops	-0,06%	-0,11%	1,95%	0,005%	0,04%	0,00%
Meat&Livestock	0,00%	-1,51%	0,16%	0,10%	0,00%	0,01%
Processed Food	0,01%	-0,23%	-0,03%	0,00%	-0,01%	0,00%
Fish	-0,02%	-0,57%	1,88%	-0,01%	0,08%	0,04%
Extraction	-0,01%	0,23%	0,06%	0,03%	0,01%	0,02%
Textiles	0,00%	-0,82%	-0,02%	-0,13%	0,11%	0,04%
Light Manufacturing	0,01%	-0,90%	-0,04%	-0,15%	-0,12%	-0,40%
Heavy Manufacturing	0,01%	0,56%	-0,11%	0,02%	-0,19%	-0,13%
TrnsCmUtiCns	0,01%	0,30%	0,01%	0,02%	0,04%	-0,02%
Other Services	0,00%	-0,09%	-0,02%	0,01%	0,00%	0,01%

Table 10: Changes in the value added of all sectors in all countries in the basic simulation (calculated from the GTAP output, VFM)

The changes can be split into two components: on one hand, the value added of sectors will change if the country's production experiences positive or negative growth. On the other hand, the value added will decrease if a sector is particularly uncompetitive under the EPA.

$$VA_{sector} = \text{share of total } VA_{sector} * VA$$

$$\rightarrow \ln(VA_{sector}) = \ln(\text{share of total } VA_{sector}) + \ln(VA)$$

With the SADC EPA, the sectors are not so much affected by the scant total VA growth (0,06% in Mozambique, 0,01% in South Africa and Namibia, 0,00% in Botswana and -0,01% in Lesotho and Swaziland). Table 10 hence mainly shows the restructuring from less competitive to more competitive sectors.

Opponents of the agreement have argued that uncompetitive farmers with little access to technology and the uncompetitive infant industry would suffer from the agreement, as they are particularly unable to adapt. Indeed cases like the meat and livestock sector in Mozambique confirm this worry: While Mozambique's total VA grows by 0,06%, this growth is overcompensated by the sector's decreasing share of the total VA (-1,57%). Table 10 shows that these trends appear in several countries, but that no country experiences as strong and often negative shifts as Mozambique. While the simulation variations show similar results, the existence of a tax reform has a notable impact on the sectors' value added changes (Table 31, Table 32). Again,

Mozambique could prefer to not raise such a tax due to the strong effects on Fish, Textiles and Light Manufacturing.

	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho& Swaziland
Grains&Crops	-0,04%	-0,23%	0,80%	-0,01%	0,01%	-0,02%
Meat&Livestock	0,00%	-1,63%	-0,04%	0,05%	-0,01%	0,00%
Processed Food	0,00%	-0,60%	-0,04%	-0,03%	-0,05%	-0,01%
Fish	0,00%	-0,52%	0,31%	-0,17%	-0,03%	-0,13%
Extraction	0,00%	-0,23%	-0,07%	-0,10%	-0,08%	-0,03%
Textiles	0,00%	-1,14%	-0,07%	-0,17%	-0,05%	-0,10%
Light Manufacturing	0,00%	-1,45%	-0,13%	-0,24%	-0,23%	-0,47%
Heavy Manufacturing	0,01%	-0,05%	-0,22%	-0,10%	-0,36%	-0,20%
TrnsCmUtiCns	0,00%	-0,53%	-0,06%	-0,05%	-0,02%	-0,07%
Other Services	0,00%	-0,41%	-0,05%	-0,02%	-0,03%	-0,02%
Total	0,00%	-0,42%	-0,07%	-0,05%	-0,03%	-0,06%

Table 11: changes in domestic purchases of domestically produced goods (calculated from the GTAP output, VDFM, VDBG, VDDM). The simulation variations show similar trends.

	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho& Swaziland
Grains&Crops	-0,06%	0,27%	4,79%	-0,11%	-0,02%	-0,01%
Meat&Livestock	0,01%	1,00%	-0,63%	0,13%	0,00%	-0,35%
Processed Food	0,00%	0,36%	-0,10%	-0,06%	0,10%	0,03%
Fish	-0,02%	0,75%	2,12%	0,04%	0,10%	0,04%
Extraction	-0,01%	0,11%	0,04%	0,12%	0,00%	0,03%
Textiles	0,00%	1,07%	0,01%	0,02%	0,28%	0,19%
Light Manufacturing	0,01%	1,12%	0,09%	0,07%	0,19%	-0,20%
Heavy Manufacturing	0,02%	1,52%	0,13%	0,16%	0,02%	0,04%
TrnsCmUtiCns	-0,01%	0,64%	0,09%	0,05%	0,10%	0,11%
Other Services	-0,01%	0,29%	0,07%	0,00%	0,04%	0,07%
Total	0,01%	0,76%	0,25%	0,09%	0,03%	0,06%

Table 12: changes in non-margin exports of domestically produced goods (calculated from the GTAP output, VXMD). The simulation variations show similar trends.

Another aspect of vulnerability can be seen when the produced goods are split into those that go into the domestic consumption (Table 11) and those that go into exports (Table 12): While domestic purchases decrease almost everywhere and in all sectors, the export oriented production can expect gains almost everywhere and in all sectors<sup>35</sup>. For smallholders, this is bad news: As they lack the resources to switch to cash crops and find it harder to comply with international standards (see footnote 12), their produce is mostly directed at local markets, where they need to cope with a stronger competition.

This trend of lowered domestic consumption and increasing exports can also, and even stronger, be seen in the industry. Already during the analysis of the current account, it was shown that heavy and light manufacturing and the textiles sectors are strongly losing in their trade balance with the EU (Table 26). Especially in textiles countries are doubling (South Africa), tripling (Botswana) or quintupling (Mozambique) their trade deficits with the EU or even create a trade deficit where there had been a surplus before (Namibia, and in extreme forms Lesotho&Swaziland). Even if these sectors are not led by individuals or families with extremely limited resources (as the smallholders), this means a stronger competition with imported commodities on the local markets and a stronger need to comply with the standards of the destination countries.

For the large number of smallholders, who are not easily able to change their profession, it is also interesting to take a special look at VAR1b and VAR1c, with their assumption of high labour and capital sluggishness. Table 31 shows that the factor sluggishness alone (VAR1b) does not enhance any losses, only in combination with unemployment some slight increases can be seen (especially in Mozambique).

The shift of the farmers into other sectors is also influenced by land prices: Mozambique, and to smaller extents Botswana and Namibia, experience cheaper rents (Figure 20). This might be a sign that more farmers want to give up on farming (supplying their land) than there is demand for this land by remaining farmers. These cheap prices affect the opportunity costs of those farmers who want to leave their sector (they are getting less money for the land they have to sell), but at the same time the remaining farmers could benefit from the relatively cheaper land, that they can acquire additionally (which possibly allows them to improve their situation through scale effects, which are

---

<sup>35</sup> Keck and Piermartini (2007) partly interpret the increase of export from farming and food processing as trade diversion on the cost of other developing countries, notably Latin American ones.

not taken into account in GTAP). South Africa, on the contrary, with its raise in value added in the farming sector (which also means a higher contribution of this sector to the total value added), experience a strong increase in land rents, potentially making it harder for smallholders to acquire additional land and to benefit as much of the recovery of their sector.

As to wages, an analysis of farmers' or industrial workers' wages is not independently possible (see Appendix 7.3 for details). However, unskilled labour can be analysed cross-sectorally:

unskilled labour	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
basic simulation	0,00%	0,02%	0,00%	0,01%	-0,01%	-0,01%
VAR1b	0,00%	-0,01%	0,01%	0,01%	0,01%	-0,01%
VAR2	0,00%	-0,02%	0,00%	0,01%	-0,02%	-0,01%

Table 13: Wage changes for unskilled labour in all simulations (GTAP output, pm). Note that the wage was fixed exogenously in VAR1a and VAR1c, so the change is 0% there.

skilled labour	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
basic simulation	0,01%	0,06%	-0,01%	0,01%	0,00%	-0,01%
VAR1b	0,00%	0,03%	-0,01%	0,02%	0,01%	0,00%
VAR2	0,01%	0,07%	-0,01%	0,01%	-0,01%	-0,01%

Table 14: Same as above, but for skilled labour

These are the absolute wage changes – if the real wage changes are regarded, there are no negative changes as long as there is no tax reform (Table 15, Table 16). This is because the additional imports increase the supply of many goods, lowering the price level for the average consumer basket.

	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
basic simulation	0,00%	0,26%	0,02%	0,03%	0,02%	0,03%
VAR1a	0,00%	0,25%	0,02%	0,02%	0,03%	0,04%
VAR1b	0,00%	0,27%	0,03%	0,03%	0,03%	0,03%
VAR1c	0,00%	0,28%	0,02%	0,02%	0,02%	0,03%
VAR2	0,00%	-0,43%	-0,07%	-0,03%	-0,06%	-0,02%

Table 15: Real wage changes for unskilled labour in all simulations (GTAP output, pfactreal).

	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
basic simulation	0,00%	0,30%	0,01%	0,04%	0,03%	0,03%
VAR1a	0,00%	0,25%	0,02%	0,02%	0,03%	0,04%
VAR1b	0,00%	0,31%	0,01%	0,04%	0,03%	0,03%
VAR1c	0,00%	0,28%	0,02%	0,02%	0,02%	0,03%
VAR2	0,00%	-0,35%	-0,08%	-0,03%	-0,05%	-0,02%

Table 16: Same as above, for skilled labour

Especially Mozambican consumers can benefit from the lower price level (Table 15, Table 16). Consequently, especially for Mozambique, the concern about self-sustaining farmers is relevant: If these farmers do not show the average consumption behaviour of unskilled workers, they might benefit much less from the lowered prices, while possibly still facing income losses similar to the lowered wages.

If we instead assume that the market equilibrium is reached with employment changes (VAR1a and VAR1c), due to the way this is modelled in the GTAP closures, wages are exogenously fixed. For the skilled labour, the losses and gains in the sectors are identical, but since there is a different composition of skilled and unskilled workers in the sectors, skilled workers have a differing number of total employment changes. All countries but Namibia see employment losses, while skilled workers are worse off than unskilled workers in all countries but South Africa (Table 33). Mozambique does not only suffer from the highest total employment losses for skilled and unskilled labour (Table 33), but also has some strongly affected sectors, such as Meat&Lifestock (-1,43% in Var1a, Table 34, -0,92 in Var1c, Table 35), and to a lesser extend textiles and light manufacturing (-0,77% and -0,86% in Var1a, Table 35, -0,43% and -45% in Var1c, Table 35). The South African Gains&Crops sector, on the other hand, sees an upsurge (+1,61% in Var1a, Table 34, +0,86% in Var1c, Table 35). The transition can cause costs of dislocation, occupational retraining and unemployment. These costs also depend on the sectors on which workers can fall back – for example, the employment gain in the Mozambican heavy manufacturing sector can give job-seeking workers from the light manufacturing sector a chance to find new employment that is likely to involve less transition costs than a change into the service or agricultural sector.

While several of the seen changes have a magnitude of only a few percent, in cases like Mozambique – where especially Meat&Lifestock, Light Manufacturing and Textiles face a harder competition on the local markets,

smallholders have limited possibilities to make use of the improved export markets, and wages and employments are under pressure – problems accumulate. Considering their widening trade deficit towards the EU and their decreasing state revenues – Mozambique may find itself in a predicament: If they want to improve the structural problems of smallholders with an improved access to credits and other resources and invest in their infrastructure, they lack the money due to the loss in tariff revenues. The government can balance this over the value added tax, but thereby the consumers face higher rather than lower prices through the EPA.

### 5.3 Possible adaptations to increase the accuracy

The list of possible further adaptations and model variations to adapt the model closer to reality has no limit.

Keck and Piermartini recommend “not to evaluate an FTA in isolation when participating countries are involved in similar efforts with other partners” (2007, p. 112). This is clearly true for the SADC EPA: By not being the only group of less developed countries with a new preferential status to the EU, but one of many EPA groups, the Southern African states have a less preferential role (although producers can benefit from intermediate inputs imported from the EU, it is likely that they cannot use that as well on export markets if the destination countries also have an EPA, see footnote 32). On the other hand, they can also gain from the rules of origin, which depend on the other EPAs (products from other EPA signatories can be treated like own wholly obtained goods). And of course, the EU is involved in several other FTA negotiations, and so are some of the Southern African states (as *e.g.* the Tripartite Free Trade Area).

Additionally, authors like Ramdoo (2014) or Mayn (2008) make clear that there are non-tariff barriers that de facto limit the access to the EU market. Standards, Inspections and Controls on products in more and less developed countries may differ, even if the WTO sets some requirements to avoid protectionist usage of standards, as with the SPS or the TBT agreement<sup>36</sup>. It might be possible to recalculate differences in standards and procedures into tariff equivalents (Cadot *et al.* (2007) give a methodology for this), which

---

<sup>36</sup> according to the SPS agreement sanitary and phytosanitary measures should be based on scientific analysis rather than protectionist incentives. Similarly, the TBT agreement requires technical standards are not discriminatory (see WTO 1998 and WTO 2014 for further information).



could theoretically allow to include non-tariff measurements into the GTAP framework – however, to do this would require an analysis by itself.

Gehlhar (1997) shows in his analysis on the Pacific Rim, that the export share changes of East Asia are predicted significantly better if labour and human capital is separated and capital and human capital are set to be complementary inputs.

McDonald & Walmsley (2003) note that GTAP does not depict the tariff revenue changes right, as all tariff revenues within SACU are collected by South Africa and then distributed among the member states according to a revenue sharing formula. They changed the closure rules to adapt for this, however taking over such an approach would have strongly affected the model (*e.g.* by fixing the trade balances of all but one country). A manual recalculation on the other hand appears to be of a too wide scope for this thesis (see Flatters, Stern 2005 for details on the calculation).

McDonald and Walmsley (2003) note that Botswana's diamond exports are *de facto* fixed by the De Beers cartel in prices and quantity, its beef exports are influenced by an agreement with the EU and its crop production is naturally limited in expansion due to climatic circumstances, and include such assumptions in their model.

However tempting it might be to make a more accurate and thorough analysis, this thesis had to stick to a more basic analysis due to the limits in time, page number and expertise of the author.

Beyond that, there are variations that are not too extensive and were seriously considered as further model variations. *E.g.* the variation by Keck and Piermartini, who note that “many of the bilateral trade flows in the database, especially between SADC countries, are practically zero. Given the way the GTAP model is set up, an absence of current trade cannot result in any trade flows after liberalisation has taken place” (2007, p. 107). This can be prevented by increasing all these imports with a small number and might have brought different results especially for the regional trade. Such a variation was not included, as more than five simulations were considered confusing to keep track of for the reader.

Two more variations (in which Mozambique's tariffs were shocked over the ‘target rate’ command instead of ‘%change power shocks’, respectively in which the labour aggregation did not only separate skilled and unskilled labour, but also agricultural labour) were tried out without bringing the hoped improvements and were hence given up again very fast (details on this can be found in Appendix 7.4 and 7.3).

## 6 Conclusion

Considering that the tariffs were very small initially, the tariff reduction brings some surprisingly negative effects.

The argument that the economic growth promoted by the EPA would even out revenue losses, could be refuted. According to the results of the simulation, not only will the tariff revenues decrease: Instead of growth the African partners will also experience a decline of the GDP. Mozambique incurs the highest losses both in tariff revenues (over 16%) and total state revenues (over 5%). A revenue fixating tax can even out these revenue losses and cushion the current account and the GDP changes – however, they also have an effect on the sectors' value added, especially in Mozambique – where the value added of the sectors Fish, Light Manufacturing and Textiles are declining much stronger when such a tax is in place. Additionally, such a tax raise negate the positive effect the EPA has on the price level.

Opponents of the agreement feared that the opening of the markets would hardly add export opportunities for the SADC EPA group, while bringing a strong inflow of imports. Indeed, also in the past, a lack of market access has not been the bottleneck for the expansion of Southern African exports - so a lowering of the tariffs does not entail many new exports: The trade balance with the EU deteriorates strongly in all African partner countries - although the total current account is affected by changes under 2%. The terms of trade additionally decrease, i.e. the 'worth' of the remaining exports shrink, as their purchasing power decreases.

Some opponents were also concerned about the regional trade, since local consumers may favour EU imports over regional imports. While there is trade deflection, there is also trade creation: Both EU imports and exports increase stronger than regional imports and exports decrease. The EU imports crowd

out regional imports, but increase exports to important trade partners outside the SADC EPA (such as the other SADC countries). In total, regional trade however decreases.

Opponents of the agreement see agriculture - with its high share of subsistence farmers and smallholders - and the infant industries as specifically endangered through the opening of the markets, as they would have no chance to compete with these sectors from the EU market. The resulting shifts away from those sectors can be seen the strongest in Mozambique (except Heavy Manufacturing), while the changes are moderate in the other African partner countries and even positive for the Grains&Crops sector and the Fish sector in South Africa.

Smallholders are however in a harsher position, as there is a stronger orientation towards exports. With their limited access to credits, fertilizers and other resources (especially when female) and the difficulties to comply with the sanitary, phytosanitary and environmental standards of the destination country, smallholders will probably find it difficult to get their share of the benefits of increasing exports. At the same time, they have to compete against the EU imports on their local markets and it can be shown that the domestic purchases of domestically produced goods decrease.

Changing land prices bring winners and losers in the agricultural sectors, depending on whether a farmer wants to change his profession and give up his land or if he wants to expand and benefit from positive economies of scale (which are not considered in GTAP).

While the nominal wages hardly changes, occurring minor losses are overcompensated by lowered consumers' prices for most workers - this may however not be the case for subsistence farmers, whose market basket might deviate from the average (as they base much of their food consumption on own production rather than market purchases, and do therefore not benefit *e.g.* from lower food prices as much).

Job losses stay far below 1% in most sectors of the SADC EPA members (except for the Meat&Livestock sector in Mozambique) and the sluggishness in factor mobility, which could also especially affect smallholders, rather leads to less job losses.

The industry even if they operate as firms rather than in a state of subsistence economy, face the same challenges of decreasing domestic purchases and rising exports, which require compliance with standards. Their real factor incomes are increasing and factor sluggishness does not seem to have a major effect here, either, but stronger than agriculture, the sector is

affected from employment changes: Especially in Mozambique and Lesotho&Swaziland, some unemployment of close to or over 1% has to be expected in sectors of the industry.

Proponents and opponents moreover both argued with factors such as spill over effects or labour standards, that cannot be analysed with a CGE.

Concerning the precarious situation for subsistence farmers and smallholders, a better tariff protection of the agricultural sector might however not have been the best alternative: Matthews (2010), when talking about the effects of the EPAs on food security, takes the unequivocal stand that these structural problems need to be solved rather with investments than with trade restrictions:

---

*“Small-scale farmers need access to modern inputs, resources and technologies – such as high-quality seeds, fertilisers, feed and farming tools and equipment – that will allow them to boost productivity and production. This requires investment in agriculture, rather than trade restrictions. Requiring consumers to pay high prices simply to maintain an unproductive agriculture is not a sustainable strategy to improve food security. The potential of EPAs to improve food security can only be realised by a focus on greater agricultural investment and improved institutions.” (Matthews 2010, p. 26)*

---

And even Germanwatch, one detractor of the EPA, sees the necessity to help farmers to overcome supply-side constraints, by addressing “for instance transport and marketing, storage facilities, agricultural inputs, credit systems for smallholder farming, weak tax systems, public procurement, etc.” (Bertow & Schultheis 2007, p. 48).

In the funding of those investments, the tariff revenue losses however have to be mentioned: Mozambique has the highest relative loss of state revenues, the highest relative loss in the trade balance with the EU (even if not the highest loss in the current account), the highest loss of employment for both skilled and unskilled workers, the highest loss of employment in agricultural sectors and the highest loss of employment in industrial sectors. Even if the suggested tax reform had positive effects and could even out the revenue losses, there might be little enthusiasm among the voters for increasing taxes during times of an economic drain. Instead, the state might try to compensate

the losing sectors and support the higher amount of unemployed people with the help of debt, deepening the existing twin deficit.

In conclusion, it can be said that most concerns of the critics of the agreement have proven to point in the right direction. The outcomes are often not very dramatic, many changes are under 1%, but they exist and they can accumulate. Even if Mozambique is sure the most extreme example, other countries might face similar situations. Their endeavours to reduce public debts, to improve exports, substitute imports through own production, deepen the regional integration, support their large share of subsistence farmers and foster the infant industry at the same time are likely to be seriously aggravated by the new SADC EPA.

## References

- L 250 (16.09.2016): ECONOMIC PARTNERSHIP AGREEMENT between the European Union and its Member States, of the one part, and the SADC EPA States, of the other part. In: Official Journal of the European Union.
- Acar, Mustafa (2003): Agricultural Unskilled Labor Mobility: Does It Matter? In: Journal of Economic Integration, S. 164–187.
- ACTSA (Ed.) (2007): New deals, new danger. EPAs: A threat to workers. Action for Southern Africa (ACTSA), Traidcraft, Trades Union Congress (TUC) (actsa trade, 5761). Available at: <http://www.actsa.org/Pictures/UpImages/EPA/EPA%20Trade%20Union%20Briefing.pdf>, [10.07.2017].
- Adamu Angelo, Alemnesh (2013): The implication of economic partnership agreement for Africa, Caribbean and Pacific groups. A General Equilibrium Analysis. Swedish University of Agricultural Sciences.
- Asia Regional Integration Center (ARIC) (Ed.) (Last update: 2013): Integration Indicators technical notes. Trade Indicators. Asian Development Bank. Available at: <https://aric.adb.org/integrationindicators/technotes>, Last update: 31.10.2013 [18.07.2017].
- Bacchetta, Marc; Beverelli, Cosimo; Cadot, Olivier; Fugazza, Marco; Grether, Jean-Marie; Helble, Matthias; Nicita, Alessandro & Piermartini Roberta (2012): A practical guide to trade policy analysis.
- Baltzer, Kenneth; Kløverpris, Jesper (2008): Improving the land use specification in the GTAP model. Copenhagen, Denmark: Institute of Food and Resource Economics (Working papers / Institute of Food and Resource Economics, 02/08).
- BBC (2015): Africa creates TFTA - Cape to Cairo free-trade zone (2015). In: BBC news, 10.06.2015. Available at: <http://www.bbc.com/news/world-africa-33076917>, [03.07.2017].
- Bertow, Kerstin; Schultheis, Antje (2007): Impact of EU's agricultural trade policy on smallholders in Africa. Germanwatch.
- Bilal, San; Roza, Vincent (2007): Addressing the Fiscal Effects of an EPA. European Centre for Development Policy Management. Available at:

- <http://ecdpm.org/wp-content/uploads/2013/11/Addressing-Fiscal-Effects-EPA-2007.pdf>, [10.05.2017].
- Bilal, Sanoussi; Ramdoo, Isabelle (2010): Which way forward in EPA negotiations? Seeking political leadership to address bottlenecks. ECDPM. Available at: <http://www.ecdpm.org/dp100>.
- Bouët, Antoine; Laborde, David; Mevel, Simon (2007): Searching for an alternative o Economic Partnership Agreements. IFPRI (IFPRI briefing paper).
- Brockmeier, Martina (2001): A graphical exposition of the GTAP model. (GTAP Technical Papers, Paper 5). Available at: <http://docs.lib.purdue.edu/gtapt/5> [04.07.2017].
- Burfisher, Mary E. (2011): Introduction to computable general equilibrium models. In: Introduction to computable general equilibrium models.
- Burton, John F. (Jr.); Parker, John E. (1969): Interindustry Variations in Voluntary Labor Mobility. In: Industrial and Labor Relations Review 22 (2), S. 199.
- Cadot, Oliver; Asprilla, Alan; Gourdon, Julien; Knebel, Christian; Peters, Ralf (2015): Deep regional integration and non-tariff measures. A methodology for data analysis. Available at: [http://unctad.org/en/PublicationsLibrary/itcdtab71\\_en.pdf](http://unctad.org/en/PublicationsLibrary/itcdtab71_en.pdf), [11.07.2017].
- Central Intelligence Agency (CIA) (03.08.2017a): The World Factbook. Mozambique. Available at: <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/mz.html>, last updated: 03.08.2017a, [10.08.2017].
- Central Intelligence Agency (CIA) (03.08.2017b): The World Factbook. Swaziland. Available at: <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/wz.html>, last updated: 03.08.2017b, [10.08.2017].
- Central Intelligence Agency (CIA) (03.08.2017c): The World Factbook. Namibia. Available at: <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/wa.html>, last updated: 03.08.2017c, [10.08.2017].
- Central Intelligence Agency (CIA) (03.08.2017d): The World Factbook. Botswana. Available at: <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/bc.html>, last updated: 03.08.2017d, [10.08.2017].
- Central Intelligence Agency (CIA) (03.08.2017e): The World Factbook. Lesotho. Available at: <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/lt.html>, last updated: 03.08.2017e, [10.08.2017].
- Central Intelligence Agency (CIA) (Ed.) (2017): The World Factbook. GDP - COMPOSITION, BY SECTOR OF ORIGIN. Available at:

- <https://www.cia.gov/library/publications/resources/the-world-factbook/fields/2012.html#84>, last updated: 03.08.2017, [17.08.2017].
- Corong, Erwin (2007): Computing for Import-Weighted Average Tariff Rates. Available at: [https://www.pep-net.org/sites/pep-net.org/files/typo3doc/pdf/Weighted\\_Tariff\\_2.pdf](https://www.pep-net.org/sites/pep-net.org/files/typo3doc/pdf/Weighted_Tariff_2.pdf), [23.02.2017].
- Corong, Erwin; Hertel, Thomas; McDougall, Robert; Tsigas, Marinos; van der Mensbrugge, Dominique (2017): The Standard GTAP Model, version 7. In: JGEA 2 (1), S. 1–119.
- Council of the European Union (Ed.) (2017): Party. Available at: <http://www.consilium.europa.eu/en/documents-publications/agreements-conventions/party/?pid=ZA>.
- Dingel, Jonathan (2016): Measuring rules of origin (Trade DiversionCommentary on development, globalization, and trade by Jonathan Dingel). Available at: <https://tradediversion.net/2016/10/25/measuring-rules-of-origin/>, last updated: 27.10.2016, [02.06.2017].
- EPA-Kampagne (14.05.2007): Grünes Licht für den Ausverkauf Afrikas. Deutsche EU-Ratspräsidentschaft drängt auf Freihandel zwischen der EU und Afrika. Available at: [http://www.stopepa.de/img/PM-EPA07\\_140507.pdf](http://www.stopepa.de/img/PM-EPA07_140507.pdf), [10.07.2017].
- European Commission (2016): Economic Partnership Agreement (EPA) between the European Union and the Southern African Development Community (SADC) EPA Group. Key advantages. Available at: [http://trade.ec.europa.eu/doclib/docs/2014/october/tradoc\\_152818.pdf](http://trade.ec.europa.eu/doclib/docs/2014/october/tradoc_152818.pdf), [17.08.2017]
- European Commission (2017 (updated)): Overview of Economic Partnership Agreements. European Commission. Available at: [http://trade.ec.europa.eu/doclib/docs/2009/september/tradoc\\_144912.pdf](http://trade.ec.europa.eu/doclib/docs/2009/september/tradoc_144912.pdf), [16.08.2017].
- European Commission (Ed.) (2000): ACP-EU Partnership Agreement Signed in Cotonou on 23 June. Supplement to "The Courier". Brussels.
- European Commission (Ed.) (2017): Generalised Scheme of Preferences (GSP). Available at: [http://ec.europa.eu/trade/policy/countries-and-regions/development/generalised-scheme-of-preferences/index\\_en.htm](http://ec.europa.eu/trade/policy/countries-and-regions/development/generalised-scheme-of-preferences/index_en.htm), last updated: 24.02.2017.
- European Parliament (01.12.2006): resolution on the development impact of Economic Partnership Agreements (EPAs) (2005/2162(INI)). OJ C 292E, S. 121–127. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52006IP0113>, [10.07.2017].
- Falvey, Rod; Reed, Geoff (2000): Rules of Origin as Commercial Policy Instruments (Research Paper 2000/18).



- Flatters, Frank; Stern, Matthew (2005): Implementing the SACU Revenue-Sharing Formula. Customs Revenues. Available at: [http://pdf.usaid.gov/pdf\\_docs/PNADF156.pdf](http://pdf.usaid.gov/pdf_docs/PNADF156.pdf), [14.08.2017].
- Fontagné, L.; Laborde, D.; Mitaritonna, C. (2011): An Impact Study of the Economic Partnership Agreements in the Six ACP Regions. In: *Journal of African Economies* 20 (2), S. 179–216.
- Fox, Alan K.; Powers, William; Winston, Ashley (2007): Textile and Apparel Barriers and Rules of Origin in a Post-ATC World. US International Trade Commission, Office of Economics (Working Paper 2007-06).
- Gehlhar, Mark (1997): Historical analysis of growth and trade patterns in the Pacific Rim. an evaluation of the GTAP framework. In: Thomas W. Hertel (Ed.): *Global trade analysis. Modeling and applications*.
- Gehlhar, Mark; Gray, Denise; Hertel, Thomas W.; Huff, Karen M.; Ianchovichina, Elena; McDonald, Bradley J. *et al.* (1997): Overview of the GTAP data base. In: Thomas W. Hertel (Ed.): *Global trade analysis. Modeling and applications*, S. 74–123.
- Griffith, Mari; Powell, Sophie (2007): Partnership under pressure. An assessment of the European Commission’s conduct in the EPA negotiations. Tearfund/Tradecraft.
- Republik of Namibia (27.05.2010): An update on the EPA negotiations. Ministerial Statement made by the Hon. Hage Geingob, MP in the National Assembly. Available at: [http://www.swapoparty.org/namibia\\_today/an\\_update\\_on\\_the\\_epa\\_negotiations.pdf](http://www.swapoparty.org/namibia_today/an_update_on_the_epa_negotiations.pdf).
- Georges, Patrick (2008): Liberalizing NAFTA Rules of Origin: A Dynamic CGE Analysis. In: *Review of International Economics* 16 (4), S. 672–691.
- Gilbert, John P. (2004): GTAP Model Analysis: Simulating the Effect of a Korea-US FTA Using Computable General Equilibrium Techniques. In: *Free Trade Between Korea and the United States*, S. 89–118. Available at: [https://piiie.com/publications/chapters\\_preview/326/appbiie311x.pdf](https://piiie.com/publications/chapters_preview/326/appbiie311x.pdf), [08.08.2017].
- Godfrey, Claire (2006): Unequal Partners: How EUACP Economic Partnership Agreements (EPAs) could harm the development prospects of many of the world's poorest countries. Oxfam International.
- Grant, Catherine (2006): Southern Africa and the European Union: the TDCA and SADC EPA. (TRALAC Trade Brief, 1). Available at: [http://www.tralac.org/wp-content/blogs.dir/12/files/2011/uploads/20060518\\_TDCA\\_SADC\\_EPA\\_Grant.pdf](http://www.tralac.org/wp-content/blogs.dir/12/files/2011/uploads/20060518_TDCA_SADC_EPA_Grant.pdf), [03.07.2017].
- Heron, Tony; Siles-Brügge, Gabriel (2012): Competitive Liberalization and the ‘Global Europe’ Services and Investment Agenda: Locating the Commercial Drivers of the EU-ACP Economic Partnership Agreements\*. In: *JCMS: Journal of Common Market Studies* 50 (2), S. 250–266.

- Hertel, Thomas W. (Ed.) (1997): Global trade analysis. Modeling and applications. Global Trade Analysis Project; issuing body.
- Hertel, Thomas W., et al. (2016): Chapter 14: Behavioral Parameters. In: Narayanan, G. Badri and Terrie L. Walmsley, Eds. 2008. Global Trade, Assistance, and Production: The GTAP 7 Data Base.
- Hertel, Thomas; Hummels, David; Ivanic, Maros; Keeney, Roman (2007): How confident can we be of CGE-based assessments of Free Trade Agreements? In: Economic Modelling 24 (4), S. 611–635.
- Hertel, Thomas W.; Tsigas, Marinos E. (1997): Structure of the GTAP. In: Thomas W. Hertel (Ed.): Global trade analysis. Modeling and applications.
- Hertel, Thomas; Tsigas, Marinos E.; Narayanan, G. Badri (2012): Chapter 12. a: Primary factor shares. In: G. Badri Narayanan, Angel Aguiar und Robert McDougall (Ed.): Global Trade, Assistance, and Production: The GTAP 8 Data Base.
- Horridge, Mark; Laborde, David (2010): TASTE. a program to adapt detailed trade and tariff data to GTAP-related purposes.
- House of Commons, United Kingdom (Ed.) (2005): International Development - Minutes of Evidence. Available at: <https://www.publications.parliament.uk/pa/cm200405/cmselect/cmintdev/68/5020701.htm>, [10.07.2017].
- Huff, Karen M.; Hertel, Thomas W. (2000): Decomposing welfare changes in the GTAP model (GTAP Technical Paper, 5). Available at: <https://www.gtap.agecon.purdue.edu/resources/download/2365.pdf>.
- International Monetary Fund (Ed.) (2017): World Economic Outlook database. Available at: <http://www.imf.org/external/pubs/ft/weo/2017/01/weodata/download.aspx>, [06.07.2017].
- Keck, Alexander; Piermartini, Roberta (2007): The Impact of Economic Partnership Agreements in Countries of the Southern African Development Community. In: J Afr Econ 17 (1), S. 85–130.
- Kone, Youssouf (2008): Economic and social impacts of the prospective EU-ECOWAS partnership agreements. The evidence from Côte d'Ivoire.
- Kuiper, Marijke; van Tongeren, Frank (2007): Using gravity to move Armington. an empirical approach to the small initial trade share problem in general equilibrium models (prepared for the Ninth Annual Conference on Global Economic Analysis, June 15-17, 2006 in Addis Ababa, Ethiopia). Available at: <https://www.gtap.agecon.purdue.edu/resources/download/2633.pdf>, [15.08.2017].
- Lefort, Jean-Claude (2006): Rapport d'information sur la négociation des accords de partenariat économique avec les pays d'Afrique, des Caraïbes et du Pacifique. Délégation de l'Assemblée nationale pour l'Union européenne

- (N° 3251). Available at: <http://www.assemblee-nationale.fr/12/europe/rap-info/i3251.asp>, [15.02.2017].
- MAcMAp (© 1999-2016): Methodology. Available at: [http://www.macmap.org/SupportMaterials/Methodology.aspx#method\\_D](http://www.macmap.org/SupportMaterials/Methodology.aspx#method_D), [24.05.2017].
- Mandelson, Peter (2004): This is our 21st century challenge. My mission is to make Europe's trade policies work for the poor, 01.12.2004. Available at: <https://www.theguardian.com/politics/2004/dec/01/eu.world>.
- Mandelson, Peter (2007): Comments by Peter Mandelson at the INTA Committee, European Parliament. Strasbourg. Available at: [http://trade.ec.europa.eu/doclib/docs/2007/october/tradoc\\_136542.pdf](http://trade.ec.europa.eu/doclib/docs/2007/october/tradoc_136542.pdf).
- Mandelson, Peter; Michel, Louis (2007): An open letter to anti-poverty campaigners from EU Trade Commissioner Peter Mandelson and EU Development Commissioner Louis Michel. Available at: [http://trade.ec.europa.eu/doclib/docs/2007/september/tradoc\\_136108.pdf](http://trade.ec.europa.eu/doclib/docs/2007/september/tradoc_136108.pdf), [17.05.2017].
- Matthews, Alan (2010): Economic partnership agreements and food security. (Institute for International Integration Studies Discussion Paper, 319). Available at: <http://www.tcd.ie/iis/documents/discussion/pdfs/iisdp319.pdf>, [08.07.2017].
- McDonald, Scott; Thierfelder, Karen; Walmsley, Terrie L. (2014): Factor Market Flexibility and the Implications of Trade Policy Reforms.
- McDonald, Scott; Walmsley, Terrie L. (2003): Bilateral Free Trade Agreements and Customs Unions: The Impact of the EU Republic of South Africa Free Trade Agreement on Botswana (GTAP Working Papers, 23). Available at: <https://www.gtap.agecon.purdue.edu/resources/download/2003.pdf>, [15.02.2017].
- Meyn, Mareike (2008): Economic Partnership Agreements: A 'Historic Step' Towards a 'Partnership of Equals'? In: *Development Policy Review* 26 (5), S. 515–528.
- Morrissey, Oliver and Zgovu Evious (2008): The Impact of Economic Partnership Agreements on African, Caribbean and Pacific Countries Imports and Welfare. Ghent (a TRADEAG Organized Session at the European Association of Agricultural Economists (EAAE)).
- Narayanan, G. Badri; Aguiar, Angel; McDougall, Robert (Ed.) (2012): *Global Trade, Assistance, and Production: The GTAP 8 Data Base*. Center for Global Trade Analysis, Purdue University.
- Narayanan, G. Badri and Terrie L. Walmsley, Eds. 2008. *Global Trade, Assistance, and Production: The GTAP 7 Data Base*, Center for Global Trade Analysis, Purdue University. Available online at: [http://www.gtap.agecon.purdue.edu/databases/v7/v7\\_doco.asp](http://www.gtap.agecon.purdue.edu/databases/v7/v7_doco.asp)

- Naumann, Eckart (2008): Rules of Origin and EPAs: What has been agreed? What does it mean? What next? Hg. v. Trade Law Centre for Southern Africa Associate. Stellenbosch, South Africa.
- Naumann, Eckart (2010): Rules of origin in EU-ACP economic partnership agreements. Hg. v. International Centre for Trade and Sustainable Development (ICTSD). Available at: <http://www.ictsd.org/downloads/2011/12/rules-of-origin-in-eu-ACP-economic-partnership-agreements.pdf>, [25.05.2017].
- Odion, William E.; Agbebaku, P. E.; Kadiri, M. A. (2010): The European Union (EU)-African, Caribbean and Pacific (ACP) Strategic Economic Partnership Agreement (EPA): Weakening or Deepening African Development? In: Pakistan Journal of Social Sciences 7.3, S. 269–274.
- Palmer, Tony; Ainslie, Andrew (2002): Country Pasture/Forage Resource Profiles. South Africa. Available at: <http://www.fao.org/ag/agp/agpc/doc/Counprof/southafrica/southafrica.htm>, [27.01.2012].
- Perez, Romain (2006): Are the economic partnership agreements a first-best optimum for the African Caribbean Pacific Countries? In: Journal of World Trade 40.6 (2006):. 40.6, S. 999–1019.
- Perez, Romain; Karingi, Stephen Njuguna (2007): How to Balance the Outcomes of the Economic Partnership Agreements for Sub-Saharan African Economies? In: World Economy 30 (12), S. 1877–1899.
- Peters, Ralf (2005): Multilateral Negotiations on Agriculture and Possible Effects on Women in Developing Countries. In: Anh-Nga Tran-Nguyen und Americo Beviglia-Zampetti (Ed.): Trade and Gender. Opportunities and Challenges for Developing Countries. New York: United Nations Publications (Entrepreneurship and SMEs Ser), S. 123–140.
- Piermartini, Roberta; The, Robert (2005): Demystifying modelling methods for trade policy. World Trade Organization (WTO Discussion Paper, 10). Available at: [https://www.wto.org/english/res\\_e/publications\\_e/disc\\_paper10\\_e.htm](https://www.wto.org/english/res_e/publications_e/disc_paper10_e.htm), [23.02.2017].
- Purdue University (3.30.2017): GTAP Data Bases: GTAP 8 Data Base Final Release 1 Release Candidate 1 Regions. Available at: <https://www.gtap.agecon.purdue.edu/databases/regions.asp?Version=7.211>, last updated: 3.30.2017, [25.04.2017].
- Ramdoos, Isabelle (2014): ECOWAS and SADC economic partnership agreements: A comparative analysis. ECDPM. Maastricht (ECDPM Discussion Paper 165). Available at: <http://ecdpm.org/publications/ecowas-sadc-economic-partnership-agreement-comparative-analysis/>, [26.03.2017].
- Republic of South Africa (Ed.) (2009): Trade, Development and Cooperation Agreement (TDCA). Department: International Relations and Cooperation.

- Available at: <http://www.dirco.gov.za/foreign/saeubilateral/tdca.html>, last updated: 21.10.2009, [25.05.3017].
- Schmieg, Evita (2013): EU-Wirtschaftspartnerschaftsabkommen mit Sub-Sahara-Afrika. Kompromisslinien für ein konstruktives Verhandlungsergebnis bis September 2014. Available at: [https://www.swp-berlin.org/fileadmin/contents/products/aktuell/2013A70\\_scm.pdf](https://www.swp-berlin.org/fileadmin/contents/products/aktuell/2013A70_scm.pdf), [23.02.2017].
- Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) (16.09.2004): Fundamental concerns are raised at the ACP-EU Council meeting. Available at: <http://agritrade.cta.int/Back-issues/Agriculture-monthly-news-update/2004/June-2004>, [10.07.2017].
- Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) (22.03.2010): South Africa under pressure to sign EPA. Available at: [http://brussels.cta.int/index.php?option=com\\_k2&id=4205&view=item&Itemid=](http://brussels.cta.int/index.php?option=com_k2&id=4205&view=item&Itemid=), [09.07.2017].
- Tran-Nguyen, Anh-Nga; Beviglia-Zampetti, Americo (Ed.) (2005): Trade and Gender. Opportunities and Challenges for Developing Countries. New York: United Nations Publications (Entrepreneurship and SMEs Ser).
- UNCTAD (2015): Generalized System of Preferences: Handbook on the Scheme of the European Community. New York and Geneva. Available at: [http://unctad.org/en/PublicationsLibrary/itcdtsbmisc25rev4\\_en.pdf](http://unctad.org/en/PublicationsLibrary/itcdtsbmisc25rev4_en.pdf), [29.04.2017].
- United Nations (Ed.) (2011): Economic and welfare impacts of the EU-Africa economic partnership agreements. concept paper. Economic Commission for Africa; European Union. Available at: <http://hdl.handle.net/10855/3982>, [16.05.2017].
- United Nations Economic Commission for Africa (UNECA) (2007): Developments in International Trade and WTO/EPA Negotiations. Addis Ababa, Ethiopia (Fifth Session of the Committee on Trade, Regional Cooperation and Integration, E/ECA/CTRCI/5/2). Available at: <http://www1.uneca.org/Portals/ctrci/5th/DevIntTrdWTOEPAsNegtiations.pdf>, [11.02.2017].
- United Nations Economic Commission for Africa (UNECA) (1st 2016): Policy brief. Economic Partnership Agreements and the African Continental Free Trade Area. Available at: [http://www.uneca.org/sites/default/files/PublicationFiles/policy-brief\\_epas-and-cfta\\_final.pdf](http://www.uneca.org/sites/default/files/PublicationFiles/policy-brief_epas-and-cfta_final.pdf), [11.02.2017].
- Urban, Kirsten; Jensen, Hans Grinsted; Brockmeier, Martina (2014): Extending the GTAP Data Base and Model to Cover Domestic Support Issues using the EU as Example. Purdue University. West Lafayette, Indiana (GTAP Technical Paper, 35).
- van Banse, Martin; Shutes, Lindsay; Dixon Peter; van Meijl, Hans; Rimmer, Maureen; Tabeau, Andrzej *et al.* (2013): Factor Markets in General

- Computable Equilibrium Models (Factor Markets Working Paper, 47). Available at: [http://aei.pitt.edu/58567/1/Factor\\_Markets\\_47.pdf](http://aei.pitt.edu/58567/1/Factor_Markets_47.pdf), [03.08.2017].
- van Tongeren, Frank; van Meijl, Hans; Surry, Yves (2001): Global models applied to agricultural and trade policies. a review and assessment. In: *Agricultural Economics* 26 (2), S. 149–172.
- Vanzetti, David; Huong, Pham Lan (2014): Rules of origin, labour standards and the TPP.
- Vollmer, Sebastian; Martínez-Zarzoso, Inmaculada; Nowak-Lehmann, Felicitas; Klannx, Nils-Hendrik (2009): EU-ACP Economic Partnership Agreements. Empirical Evidence for Sub-Saharan Africa (World Development Report Background Papers). Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.584.8099&rep=rep1&type=pdf>, [25.04.2017].
- WTO (15.04.1994): General Agreement on Tariffs and Trade 1994. GATT 1994. Available at: [https://www.wto.org/english/res\\_e/booksp\\_e/analytic\\_index\\_e/gatt1994\\_e.htm](https://www.wto.org/english/res_e/booksp_e/analytic_index_e/gatt1994_e.htm), [24.04.2017].
- WTO (1998): Sanitary and phytosanitary measures: Introduction. Understanding the WTO Agreement on Sanitary and Phytosanitary Measures. Available at: [https://www.wto.org/english/tratop\\_e/sps\\_e/spsund\\_e.htm](https://www.wto.org/english/tratop_e/sps_e/spsund_e.htm), [11.07.2017].
- WTO (07.04.2004): European Communities - Conditions for the granting of tariff preferences to developing countries. WT/DS246/AB/R.
- WTO (op. 2014): Technical barriers to trade. 2014. Geneva (The WTO agreements series).
- WTO; Committee on Agriculture (06.12.2008): Revised draft modalities for agriculture. TN/AG/W/4/Rev.4/.
- WTO; Committee on Trade and Development (27.09.2011): Work programme on small economies. WT/COMTD/SE/W/22/Rev.6.
- Zhang, Xiao-Guang (2006): Armington elasticities and terms of trade effects in global CGE models. Melbourne: Productivity Commission (Staff working paper / Productivity Commission).



## 7 Appendices<sup>37</sup>

### 7.1 The EPA negotiations

From 2001 to 2007 the EU and the ACP countries were given time to negotiate the WTO-compatible EPAs. Until then they were allowed to trade by the terms of the Cotonou agreement, which did not meet WTO criteria – granted to them through a waiver by the other WTO members (UNECA 2007). Six regional EPA groups formed. All African groups showed a high heterogeneity, including “at least one ‘large’ non-LDC member with (economically) small LDC members” (Morrissey & Zgovu 2008, p. 4), which leads to the problem that most benefits accrue to the largest and biggest member (*ibid.*). In the SADC this is the ‘large’ South Africa (which already had a trade agreement with the EU) with LDCs such as Swaziland, Mozambique and (at the beginning of the negotiations) Angola.

Apart from the pressure from the WTO, the African ACP countries had enough incentive to enter into the negotiations: As both the EU and the USA are involved in several negotiations with different less developed countries, Africa had to fear being isolated from bilateral trade agreements (UNECA 2007). Richer countries with more negotiating capacity could, as the UNECA puts it, place themselves in the centre of a network of trade agreements,

---

<sup>37</sup> Within the text, a period (.) is used as a decimal mark. In the Appendix, due to the links to Excel, this could not be done and a comma (,) is used in the table and figures. Also, the ordinates in many diagrams show monetary values, which are not straightforward interpretable as US-Dollars, Euros, or something else. The GTAP Data Base is denominated in millions of base year US dollars. Under standard closures in GTAP, one price variable is held fixed, and other prices are evaluated relative to this numéraire (Corong et al. 2017). By default the numéraire is “a global price index of factor remuneration, PFACTWLD, which is aggregated over all endowments, activities and regions, i.e., it represents the average global return to endowments” (*ibid.*, p. 50). The absolute values are however unimportant, as the figures are only supposed to illustrate relative sizes and shares.



thereby attracting more investments (*ibid.*). To avoid this, African countries had to improve their negotiation capabilities (*ibid.*). McDonald and Walmsley (2003) also argue that Botswana, Lesotho, Namibia and Swaziland were at least partly compelled to follow South Africa's trade policies because of the custom union all these countries share (the Southern African Custom Union, SACU). This is because of the common external tariff a custom union like the SACU imposes: When South Africa concluded the Free Trade Agreement with the EU (the ATDC) the other countries in the custom union were forced to reduce their tariffs on imports from the EU at the low rate agreed by South Africa in the ATDC (Grant 2006). While they lose their tariff revenue, they did by the same token not have South Africa's preferential access to the EU market (*ibid.*). Signing an EPA is a possibility for them to get themselves out of this 'lose-lose' situation.

Despite all incentives and pressures to conclude a trade agreement, several deadlines for progress in negotiations on modalities (set in the Ministerial Conference of the WTO in 2005) were all missed during the first half of 2006 (UNECA 2007). The negotiating partners found themselves in a deadlock, mainly associated with the demand and offers around agriculture (*ibid.*). By the end of 2007, when the negotiations between the ACP countries and the EU were scheduled to be concluded (Fontagné, Laborde & Mitaritonna 2011), only the Caribbean EPA had been finished as a comprehensive agreement (Ramdoo 2014). More than half of the ACP countries had no agreement; the others had interim agreements with a narrow scope, covering only trade in goods and development cooperation (*ibid.*). Several of them were entered at the very last minute, out of the fear to lose the EU preferences (Meyn 2008). Even then, several African partners did not sign or implement the concluded deals – in CEMAC, ECOWAS and the Pacific EPA, less than a fifth of the original members initialled an EPA (*ibid.*). Botswana, Lesotho, Swaziland and Mozambique signed their interim EPA in 2009 (Ramdoo 2014), which was (as most other EPAs at that time) not a joint liberalization offer, but in fact a bilateral trade deal with country-specific liberalization schedules (Meyn 2008)<sup>38</sup>. South Africa, Angola and Namibia refused to sign. For some time, the EU continued to grant them the same privileges in terms of trade access, but in 2010 the EU regarded this as untenable and increased the pressure by threatening to deny these privileges to non-signatories (CTA 2010).

---

<sup>38</sup> This is still the case for the final EPA, where Mozambique and South Africa have deviating tariffs

Meyn (2008) sees the high pressure under which the EPAs were concluded as a sign of the asymmetry in power and expertise, and questions how much the EPAs could have been properly negotiated under these circumstances. The EU justified its urging with the pressure from the WTO: Peter Mandelson emphasized at the International Trade Committee of the European Parliament that the EPA negotiations were rather negotiations with non-ACP developing countries and the WTO to find an agreement for the ACP countries that will “survive scrutiny in the WTO” (Mandelson 2007, p. 1). Indeed, there has been pressure by Latin American banana exporters and the USA, who in the 1990s filed WTO complaints against the EU treatment of ACP countries (Meyn 2008). However, if the WTO requirements were the main issue, one would expect the EPA mainly to fulfil WTO requirements. Yet the EPAs were not aimed at just being a WTO-compatible goods arrangement, but should cover issues such as “services and investment and trade-related areas such as trade facilitation, intellectual property and cooperation on competition policy” (Mandelson 2007, p. 1). Several of the topics that are not required by the WTO raised the concerns of the ACP countries, as they could rather be negotiated on a case-by-case basis (Meyn 2008). The GATS-compatible service offer and the European Community requirement for ‘standstill’ and ‘most favoured nation’ clauses were not accepted by most EPA regions, including the SADC EPA group<sup>39</sup> (*ibid.*). So why did the EU expedite issues that were neither required by the WTO, nor appreciated by the ACP countries?

Meyn (2008) answers this by mentioning the ‘Global Europe: Competing in the world’ trade strategy, which intrinsically aimed at FTA with regions that are more interesting for European companies, but influenced the Commissions expectations to negotiate agreements that go beyond the WTO requirements. Heron and Siles-Brügge (2012) deepen this argument and compare aspects of the EPAs to commercially oriented bilateral agreements<sup>40</sup>. Opposed to that, the EU denies that this agreement was aimed at seeking market access for the EU,

---

<sup>39</sup> The GATS is the General Agreement on Trade in Services. The ‘standstill’ clause freezes the existing applied tariff in mutual trade. With the ‘most favoured nation’ clause any new tariff commitments granted to ‘major trading economies’ have to automatically also be given to any partner of the EPA (Meyn 2008).

<sup>40</sup> Heron and Siles-Brügge (2012) see commercial drivers behind the liberalization commitments that go beyond the WTO requirements. However, most of their analysis seems to refer to the CARIFORUM EPA. When this EPA – which includes major parts on investment and services (Title II) and other trade related issues (Title IV), with detailed rules on intellectual property rights – is compared to the SADC EPA, it is apparent that the SADC EPA group’s commitments have a much more moderate extent and mentions these topics mostly to broach possible future negotiations.

and sees binding rules on services and related issues as necessary to maximize the development potential (Mandelson 2007).

The pressure was increased by the narrative that the WTO would not allow for any alternative to the EPAs that would be less threatening for the ACP countries. Non-LCDs countries (i.e. countries that are not acknowledged as ‘least developed countries’ by the United Nations) that would be unwilling or unable to complete an EPA would lose their preferences and merely have access to the GSP (Mandelson 22.10.2007). This was a serious menace: Mayn summarizes her previous studies stating that “In Botswana and Namibia the taxes imposed on beef exports would be equivalent to tariffs of up to 132%, exceeding those paid by some of the most competitive suppliers in the world, and most likely end African beef exports to the EU immediately” (2008, p. 523). Consequently, as Bouët, Lamborde and Mervel summarize it, the debate was soon reduced “to the proverb: *Of two evils, EPA or GSP, one must choose the lesser*” (2007, p. 3). Indeed, this dichotomy do not reflect the whole picture.

If the Southern African states would not have signed the EPA, the Cotonou-Agreement would still have ended, and they would have fallen into different alternatives

- Least developed countries, such as Lesotho and Mozambique, would have fallen under the Everything But Arms Agreement (EBA) (UNCTAD 2015)
- Other developing countries would have fallen into the Generalized System of Preferences (GSP), such as Botswana, Namibia and Swaziland<sup>41</sup>
- If these countries would ratify and implement a list of international conventions on core labour and human rights principles, they could also have access to the GSP+ regime, which grants full tariff removal on essentially the same product categories as GSP (Meyn 2008; European Commission 24.02.2017)
- If neither EBA nor GSP applies, a country can just rely on MFN tariffs. This is however not valid for the remaining South Africa, as they have the ATDC

Beyond these existing tariff systems, another solution was discussed little:

---

<sup>41</sup> These three had previously been excluded from the GSP because of the interim EPA (IEPA) resp. the final EPA, but since they are neither LDC, nor are listed as high-income or upper-middle-income countries by the World Bank (UNCTAD 2015), they would fall back into this status again

Bouët, Laborde and Mevel (2007) point out, that the Enabling clause would have allowed for the construction of new tariff systems, based on the development stage of the partners. The Enabling clause, as discussions inside the WTO concluded<sup>42</sup>, allow for tariff differentiation towards certain similarly-situated groups within the GSP beneficiaries. Bouët, Laborde and Mevel (2007) argue that the group of ‘small vulnerable economies’, as acknowledged by the WTO, meets this criterion<sup>43</sup>. This would have given the EU the possibility to create a different, non-reciprocal tariff schedule for several ACP countries, which would have included *inter alia* Namibia, Botswana and Swaziland. Considering that Lesotho and Mozambique are covered by the EBA and South Africa is covered by the ATDC, the EU could have found an alternative for all current SADC EPA countries that would probably have resulted in less strong tariff elimination for goods from the EU without violating the WTO regulations.<sup>44</sup>

Finally, even within the framework of the EPA negotiations, the required degree of tariff elimination is up to interpretation. Article XXIV of the GATT 1994 requires custom unions to eliminate duties and other restrictive regulations of commerce for “substantially all trade”. Although there is no clear and agreed definition of what that means, the EU “has set a benchmark of a minimum of 80% liberalisation over a period of generally 15 years, for tariff liberalisation in all EPAs” (Bilal & Ramdoo 2010, p. 14). This was, especially

---

<sup>42</sup> The Enabling clause allows countries to provide differential and more favourable treatment to developing countries, which does not have to be granted to other WTO members. In the WTO document WT/DS246/AB/R the terms ‘non-discriminatory’ and ‘similarly-situated’ are discussed in detail. The European Community advanced the opinion that non-discriminatory treatment allows for the possibility to treat objectively different situations different (paragraph 149). Developing countries could be granted unequal competitive conditions in response to their special needs, *e.g.* in the form of tariff differentiation, if that is seen as an adequate response. India had a stricter view on this, not allowing for any different treatment of GSP beneficiaries. The WTO comments this by explaining in paragraph 156 that a non-discriminatory does not require identical tariff preferences for all developing countries and concludes in paragraph 173 that ‘non-discriminatory’ tariff differences have to be available to all similarly-situated GSP countries, which is in consensus to the statements of the European Community (Paragraph 153).

<sup>43</sup> The WTO states that the term ‘Small, vulnerable economies’ “applies to Members with economies that, in the period 1999 to 2004, had an average share of (a) world merchandise trade of no more than 0.16 per cent or less, and (b) world trade in non-agricultural products of no more than 0.1 per cent and (c) world trade in agricultural products of no more than 0.4 per cent.” (TN/AG/W/4/Rev.4/ paragraph. 157). Botswana, Namibia and Swaziland are included in the list of such countries in a WTO document of 2011 (WT/COMTD/SE/W/22/Rev.6 Annex I).

<sup>44</sup> Such a solution would also have to be aligned with a common external tariff for the whole SACU group. Both the ATDC and the Interim EPA were however concluded without much regard for this.

for LCD, a point of concern, as they felt that this coverage and time frame does not match with their level of development, their need for industrialization, their national sensitivities and their need for tariff revenues (*ibid.*). Even if this was a serious obstacle in the negotiations, the EU showed little flexibility – which, according to Bilal and Ramdoo (2010), cannot be so much explained by WTO requirements, then by a strategical assertiveness of the EU to not cause a precedence that could weaken their position in further trade negotiations with other countries.

In the SADC EPA group this problem seems to have been solved by accommodations of both sides: The SACU group – including the LDC Lesotho – was willing to agree on an 86% liberalization in the interim EPA and the final EPA (Bilal, Ramdoo 2010, European Commission 2016). Mozambique, the other LDC in the group, was granted a deal that only liberalizes 81% of the trade in the interim EPA, which was even lowered to 74% in the final agreement (*ibid., ibid.*)<sup>45</sup>.

The main issue in the negotiations of the SADC EPA was rather to align the market access offers of the diverse group – with South Africa on one side, which already has an agreement with the EU (ATDC) and the other members of the SADC EPA group on the other hand, which are less developed (Bilal & Ramdoo 2010).

It is not completely clear why the EU seems to have shown little interest in alternatives or “softer” EPAs. The open letter by the responsible EU Commissioners (Mandelson & Michel 2007) straightens out that the EU sees the status quo – Africa’s dependency on trade preferences – as an option that failed to deliver development. Meyn (2008) vents a general decreasing interest of the EU to aim at the development of the ACP countries: Because of additional member states of the EU, who have no colonial ties and face huge development challenges themselves, the EU would focus on its new members, East European neighbours or – concerned about security and migration – on the Near East.

With all these obstacles, it took ten years of negotiations, until on July 15<sup>th</sup>, 2014 a comprehensive agreement EPA with the whole SADC EPA Group including South Africa was successfully concluded (European Commission 2017). The agreement was signed by the EU and the SACU members on June 10<sup>th</sup>, 2016, the European Parliament gave its consent on September 14<sup>th</sup>, 2016 (European Commission 2017). The agreement enters into force 30 days

---

<sup>45</sup> Own calculations on how much the tariffs are really reduced are listed in Appendix 7.4

following the deposit of the last instrument of ratification, acceptance or approval, but is provisionally applied earlier (L250, Article 113): While the SACU members have applied the agreement provisionally as of October 10<sup>th</sup>, 2016 and are currently addressing implementation issues, Mozambique ratified late on April 28<sup>th</sup>, 2017 and will – after submitting the ratification instrument to the European Commission – only start with provisionally applying the EPA (European Commission 2017).

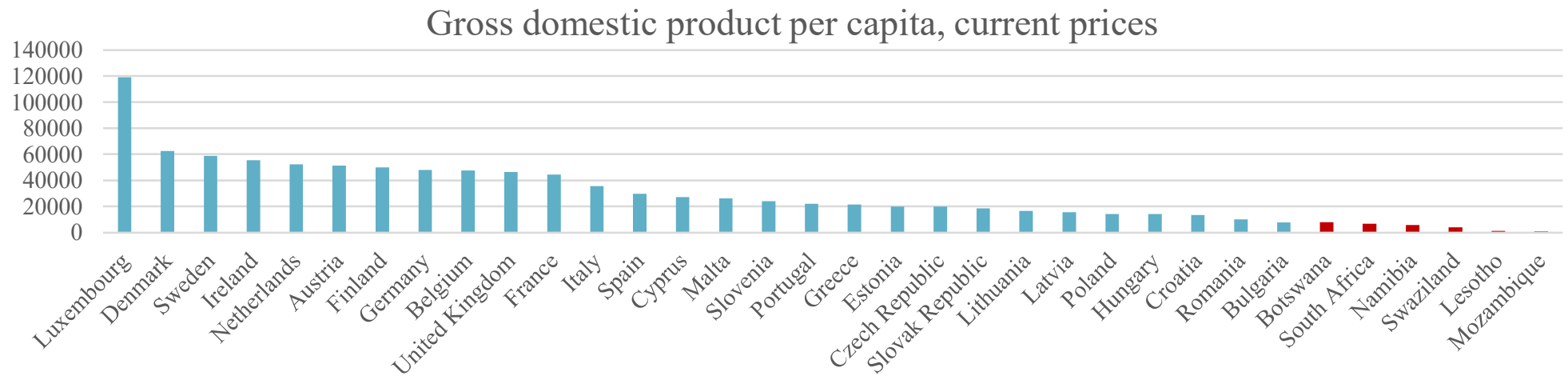


Figure 2: GDP per capita for the SADC EPA members in 2014 (data from the World Economic Outlook database of April 2017, provided by the IMF). The ordinate shows current USD per person.

## 7.2 Economic structure of the partner countries

## Gross domestic product based on purchasing-power-parity (PPP) valuation of country GDP

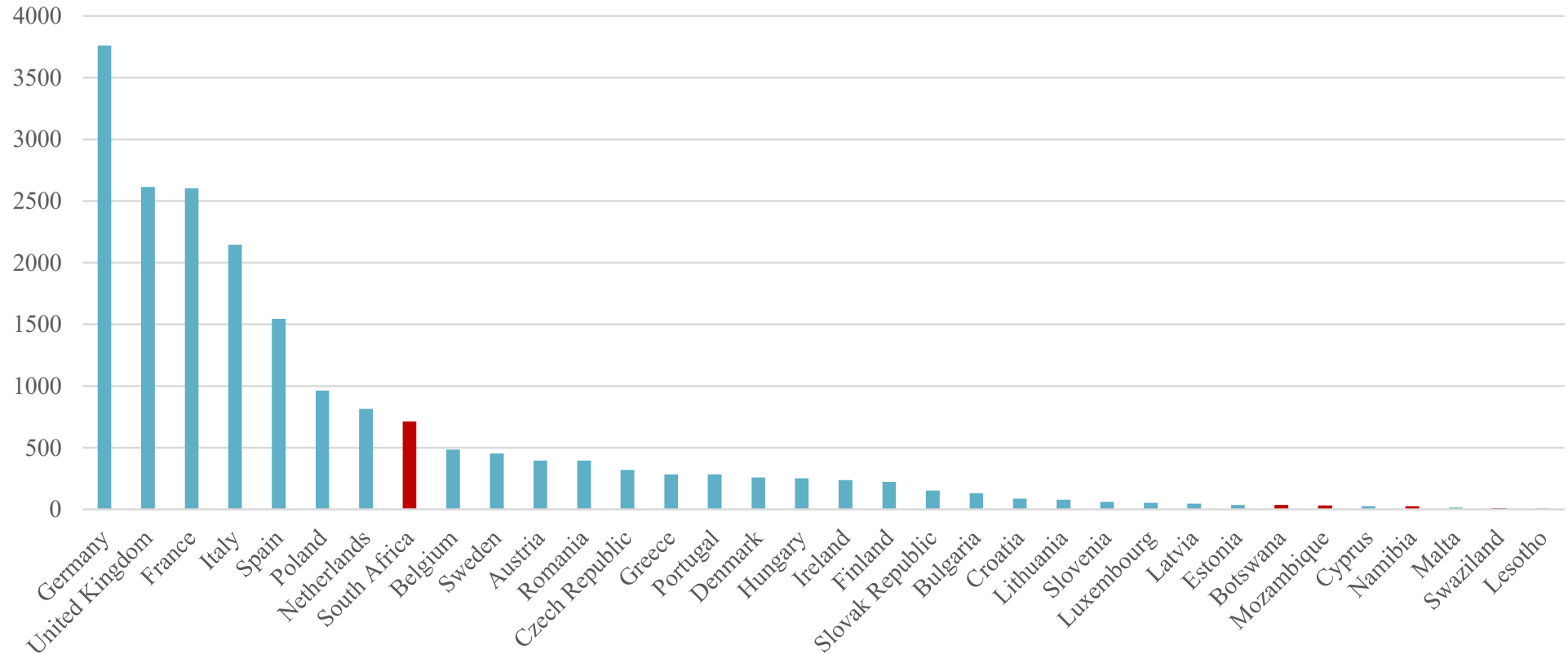
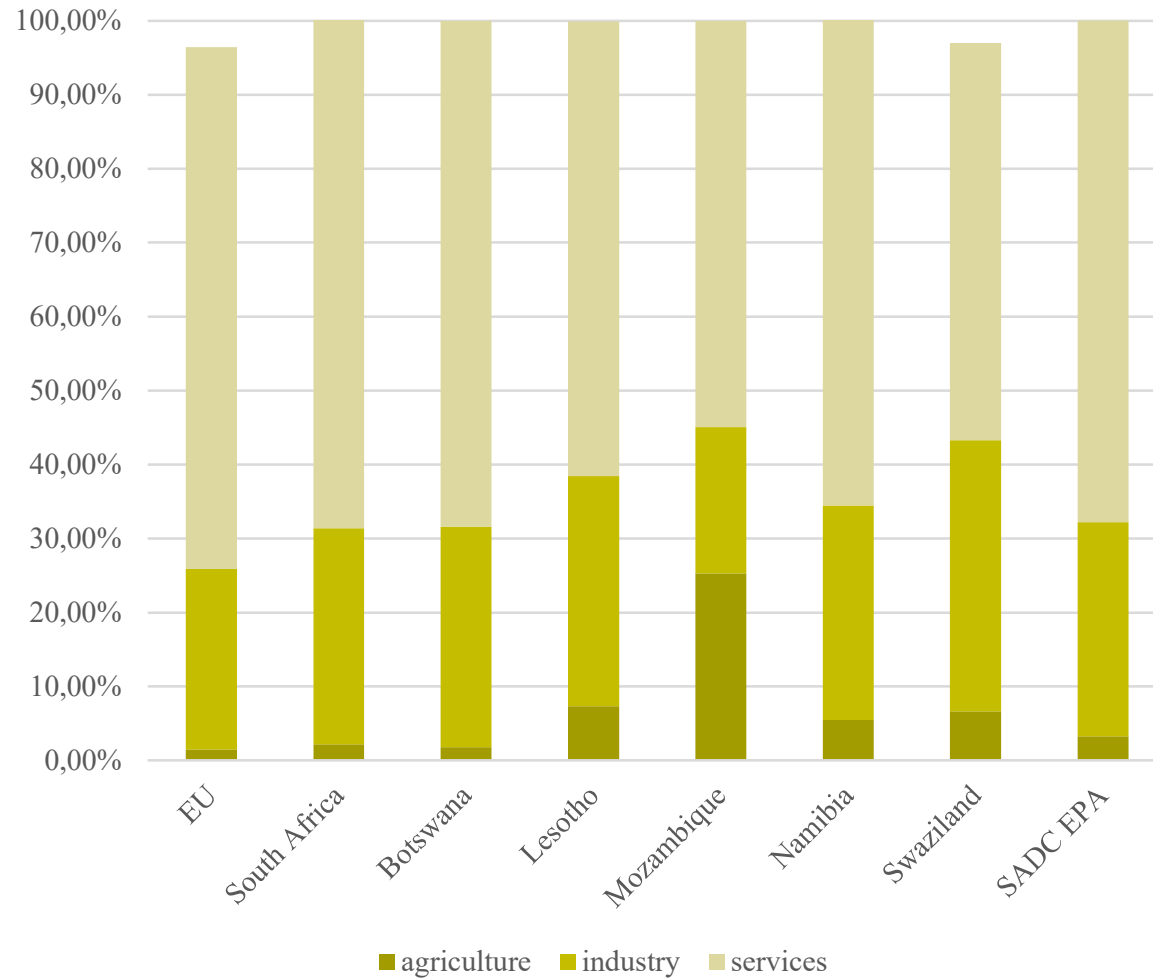


Figure 3: GDP expressed in PPP for 2014 for all signatories of the SADC EPA (data from the World Economic Outlook database of April 2017, provided by the IMF). The ordinate shows the current international dollars in billions.



### Composition of the GDP by sector of origin



*Figure 4: The composition of the GDP by sector of origin (data from the World Fact Book, latest estimations, provided by the CIA). Not all columns sum up to 100% in the original data. The last three columns show an average for all African SADC EPA members, where their shares are weighted with their GDP in PPP from the World Economic Outlook database.*

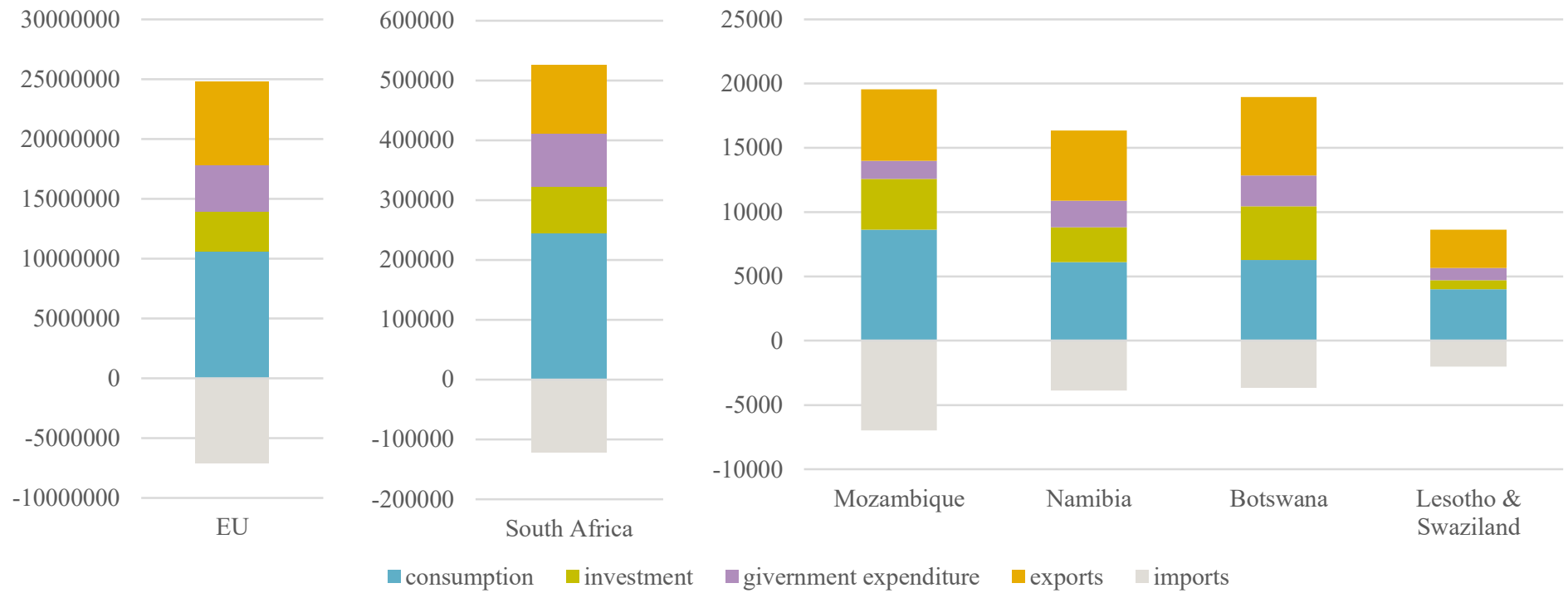


Figure 5: GDP from the expenditure side. Note that the imports are subtracted from the other parts (source: GTAP database, GDPEXP)

regional imports and exports ( $T_{ii}$ )	5965,037203
exports and imports of the region towards the world ( $T_{iw}$ )	266242,0128
total world exports and imports ( $T_{ww}$ )	20153934,91
Intra-regional trade intensity index ( $(T_{ii}/T_{iw})/(T_{iw}/T_{ww})$ )	1,695976508

*Table 17. The intra-regional trade intensity index determines whether trade within the region is greater (index > 1) or smaller (index < 1) than should be expected on the basis of the region's importance in world trade (ARIC 2013). For this it divides the intra-regional trade share ( $T_{ii}/T_{iw}$ ) with the share in world trade ( $T_{iw}/T_{ww}$ ) (ARIC 2013). Own calculation from GTAP output, VIWS*



Figure 6: Value added for skilled and unskilled labour, with colours indicating the sources of this value added (source: GTAP database, VFM)

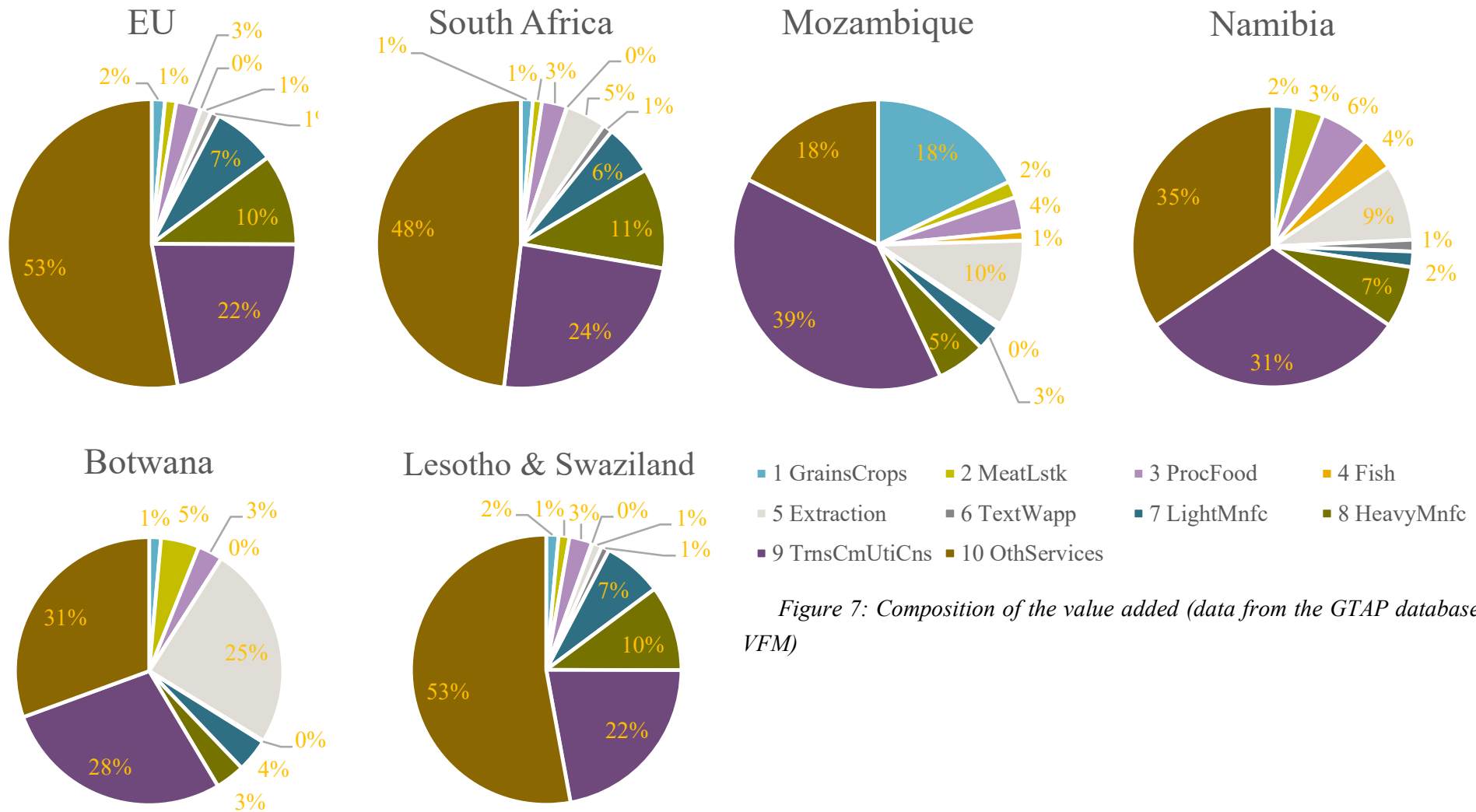


Figure 7: Composition of the value added (data from the GTAP database, VFM)

## Source of imports

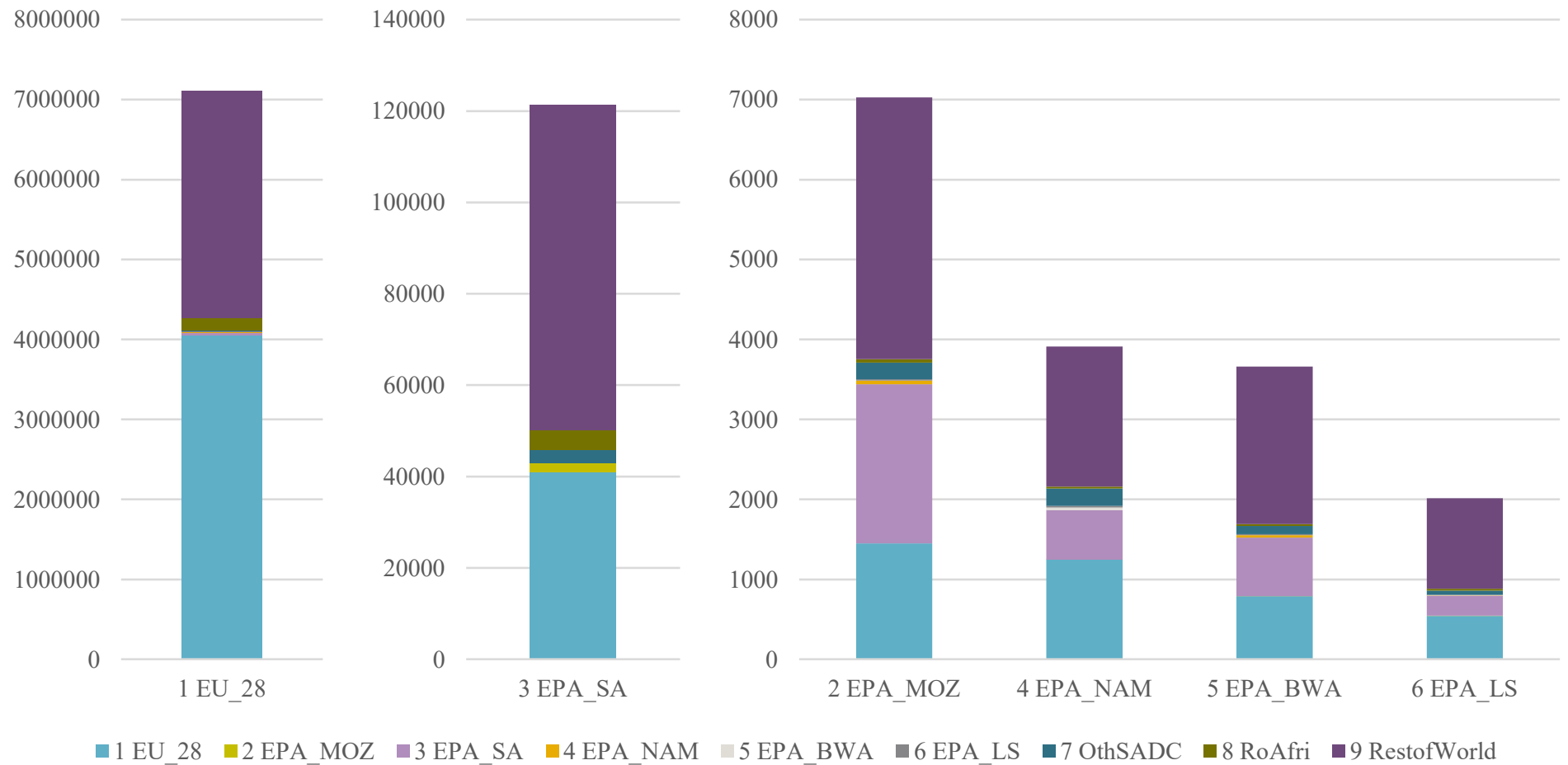


Figure 8: Source of imports, measured in world prices (source: GTAP database, VIWS)

## Destination of exports

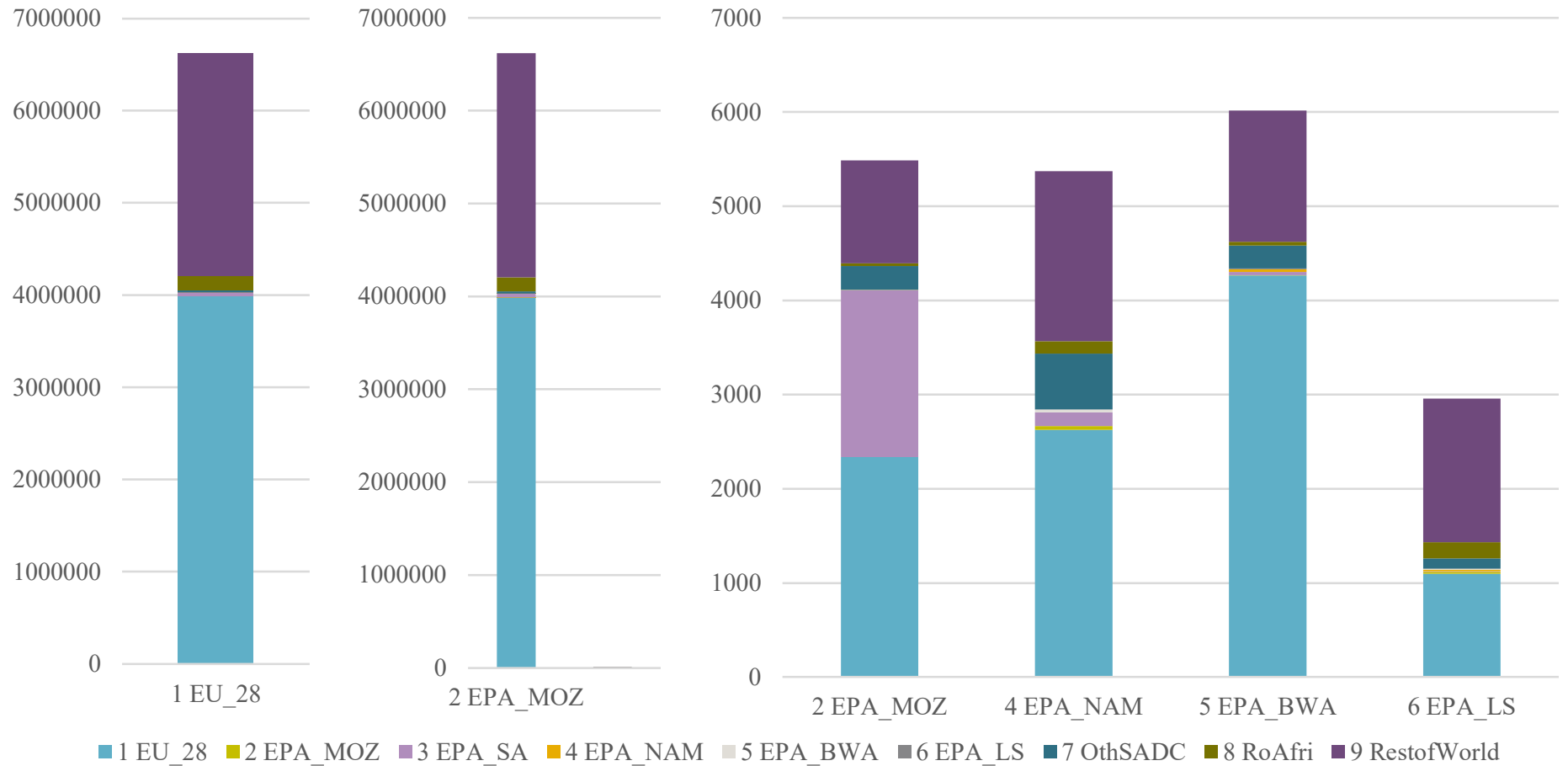


Figure 9. Destination of exports, measured in world prices, exports to the EU labelled with their percentage (source: GTAP database, VXWD)

## Composition of the exports to the EU

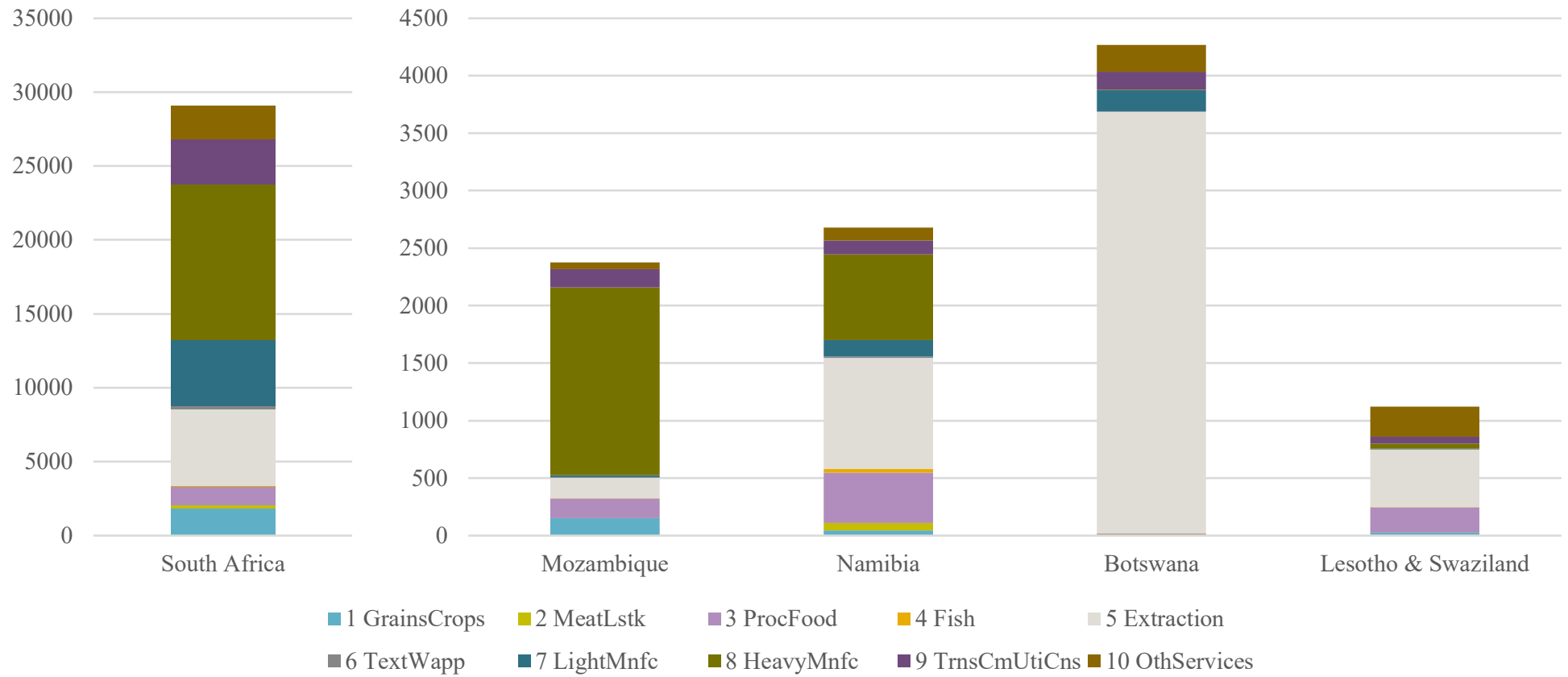


Figure 10: Composition of the exports from the EU. (data from the GTAP database, variable VIMS)



## Composition of imports from the EU

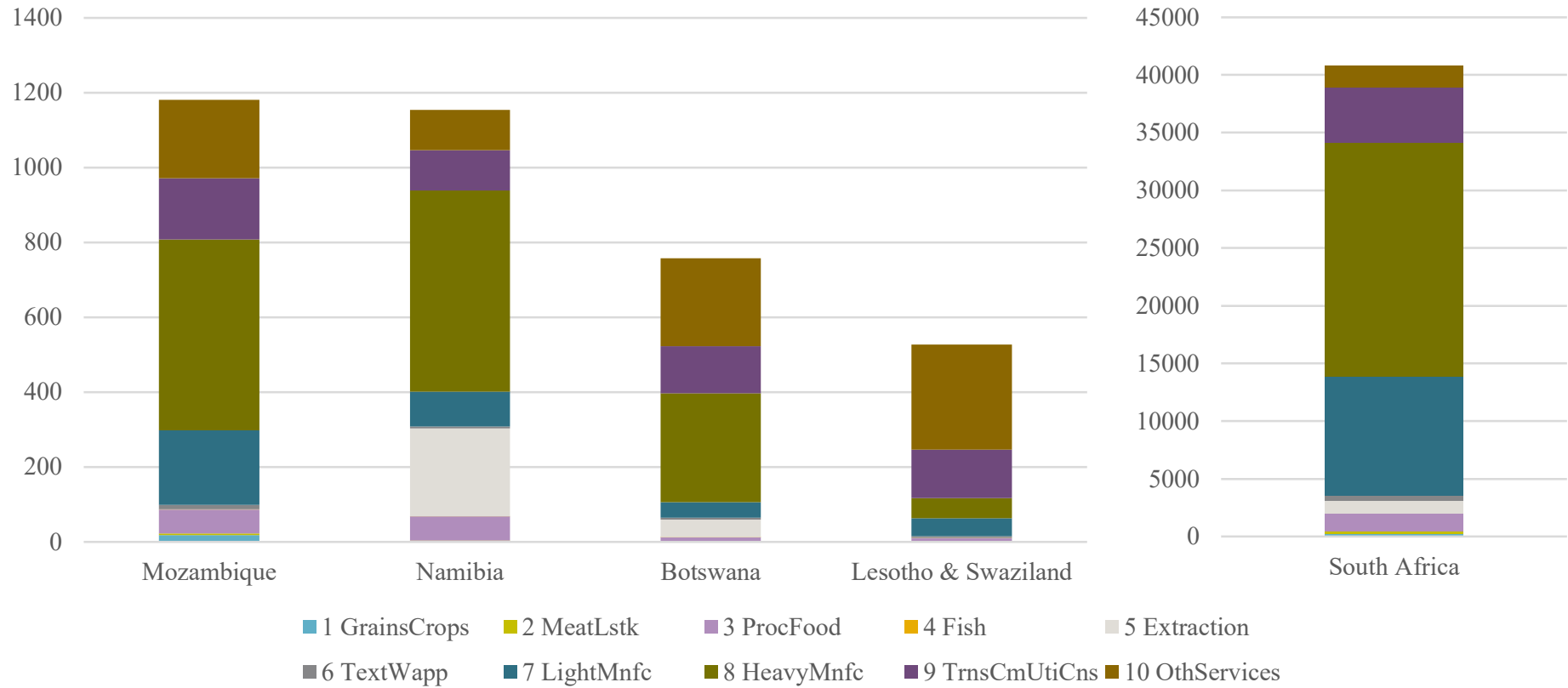


Figure 12: Composition of the imports from the EU. (data from the GTAP database, variable VIMS)

## 7.3 Aggregation scheme

Commonly not more than ten sectors are used. Since agricultural products should not be too aggregated (Crops&Grains stay separated from Meat&Livestock) and sensitive products like fish should be regarded individually, other sectors have to be aggregated. As explained in chapter 2, this is done to the service sector, as it is not directly affected by tariff changes. There are two sectors that are connected to service, one aggregating transport, communication, utilities and construction, and the other aggregating “other services”. An obvious disadvantage is that construction does not fit into this group, as it belongs to the secondary sector rather than the tertiary. However, since there is not much use in giving construction an individual sector and since transport, communication, utilities and construction together give some conception about the investments in infrastructure, this separation is chosen to be the most meaningful.

### GrainsCrops (Grains and Crops)

- Paddy rice (pdr)
- Wheat (wht)
- Cereal grains nec (gro)
- Vegetables, fruit, nuts (v\_f)
- Oil seeds (osd)
- Sugar cane, sugar beet (c\_b)
- Plant-based fibers (pfb)
- Crops nec (ocr)
- Processed rice (pcr)

### MeatLstk (Livestock and Meat Products)

- Cattle, sheep, goats, horses (ctl)
- Animal products nec (oap)
- Raw milk (rmk)
- Wool, silk-worm cocoons (wol)
- Meat: cattle, sheep, goats, horse (cmt)
- Meat products nec (omt)

### ProcFood (Processed Food)

- Vegetable oils and fats (vol)
- Dairy products (mil)
- Sugar (sgr)
- Food products nec (ofd)

- Beverages and tobacco products (b\_t)

#### Fish (Fish)

- Fishing (fsh)

#### Extraction (Mining and Extraction)

- Forestry (frs)
- Fishing (fsh)
- Coal (coa)
- Oil (oil)
- Gas (gas)
- Minerals nec (omn)

#### TextWapp (Textiles and Clothing)

- Textiles (tex)
- Wearing apparel (wap)

#### LightMnfc (Light Manufacturing)

- Leather products (lea)
- Wood products (lum)
- Paper products, publishing (ppp)
- Metal products (fmp)
- Motor vehicles and parts (mvh)
- Transport equipment nec (otn)
- Manufactures nec (omf)

#### HeavyMnfc (Heavy Manufacturing)

- Petroleum, coal products (p\_c)
- Chemical,rubber,plastic prods (crp)
- Mineral products nec (nmm)
- Ferrous metals (i\_s)
- Metals nec (nfm)
- Electronic equipment (ele)
- Machinery and equipment nec (ome)

#### TrnsCmUtiCns (Transport, Communication, Utilities and Construction)

- Trade (trd)
- Transport nec (otp)
- Sea transport (wtp)
- Air transport (atp)
- Communication (cmn)
- Electricity (ely)
- Gas manufacture, distribution (gdt)
- Water (wtr)
- Construction (cns)

#### OthServices (Other Services)

- Financial services nec (ofi)
- Insurance (isr)
- Business services nec (obs)
- Recreation and other services (ros)
- PubAdmin/Defence/Health/Educat (osg)
- Dwellings (dwe)

In the regional aggregation, the European Union is aggregated to one region, while the African SADC EPA countries are disaggregated as much as possible. This is possible for South Africa, Mozambique, Botswana and Namibia; however, Lesotho and Swaziland are aggregated in the GTAP database and hence need to remain aggregated. To be able to see changes in the trade relations with their neighbouring countries, the other SADC countries make another region, just as well as the Rest of Africa.

#### EU\_28 (European Union 28)

Austria (aut)  
 Belgium (bel)  
 Cyprus (cyp)  
 Czech Republic (cze)  
 Denmark (dnk)  
 Estonia (est)  
 Finland (fin)  
 France (fra)  
 Germany (deu)  
 Greece (grc)  
 Hungary (hun)  
 Ireland (irl)  
 Italy (ita)  
 Latvia (lva)  
 Lithuania (ltu)  
 Luxembourg (lux)  
 Malta (mlt)  
 Netherlands (nld)  
 Poland (pol)  
 Portugal (prt)  
 Slovakia (svk)  
 Slovenia (svn)  
 Spain (esp)  
 Sweden (swe)

United Kingdom (gbr)  
Bulgaria (bgr)  
Croatia (hrv)  
Romania (rou)  
EPA\_MOZ Mozambique  
Mozambique (moz)  
EPA\_SA South Africa  
South Africa (zaf)  
EPA\_NAM Namibia  
Namibia (nam)  
EPA\_BWA Botswana  
Botswana (bwa)  
EPA\_LS Lesotho, Swaziland  
Rest of South African Customs (xsc)  
OthSADC other SADC (w/o Seychelles)  
South Central Africa (xac)  
Madagascar (mdg)  
Malawi (mwi)  
Mauritius (mus)  
Tanzania (tza)  
Zambia (zmb)  
Zimbabwe (zwe)  
RoAfri Rest of Africa  
Egypt (egy)  
Morocco (mar)  
Tunisia (tun)  
Rest of North Africa (xnf)  
Benin (ben)  
Burkina Faso (bfa)  
Cameroon (cmr)  
Cote d'Ivoire (civ)  
Ghana (gha)  
Guinea (gin)  
Nigeria (nga)  
Senegal (sen)  
Togo (tgo)  
Rest of Western Africa (xwf)  
Central Africa (xcf)  
Ethiopia (eth)  
Kenya (ken)

Rwanda (rwa)  
Uganda (uga)  
Rest of Eastern Africa (xec)  
RestofWorld Rest of World  
All other countries

In the factor aggregation, it is tried to split agricultural workers from other unskilled workers to later give independent results (*e.g.* about their nominal and real wage changes). The disaggregated GTAP database contains several forms of unskilled labour, which are described as ‘Clerks’, ‘Service/Shop workers’ and ‘Agricultural and Unskilled’. In a first aggregation, ‘Agricultural and Unskilled’ was disaggregated from the other two forms of unskilled labour, hoping that it would really reflect mainly farmers. After taking this aggregation into GTAP and extracting some data, it was however noted that the ‘Agricultural and Unskilled’ labour indeed contained much more than just farmers (Figure 13). Hence, the factor labour is only split in two subgroups: skilled labour and unskilled labour.

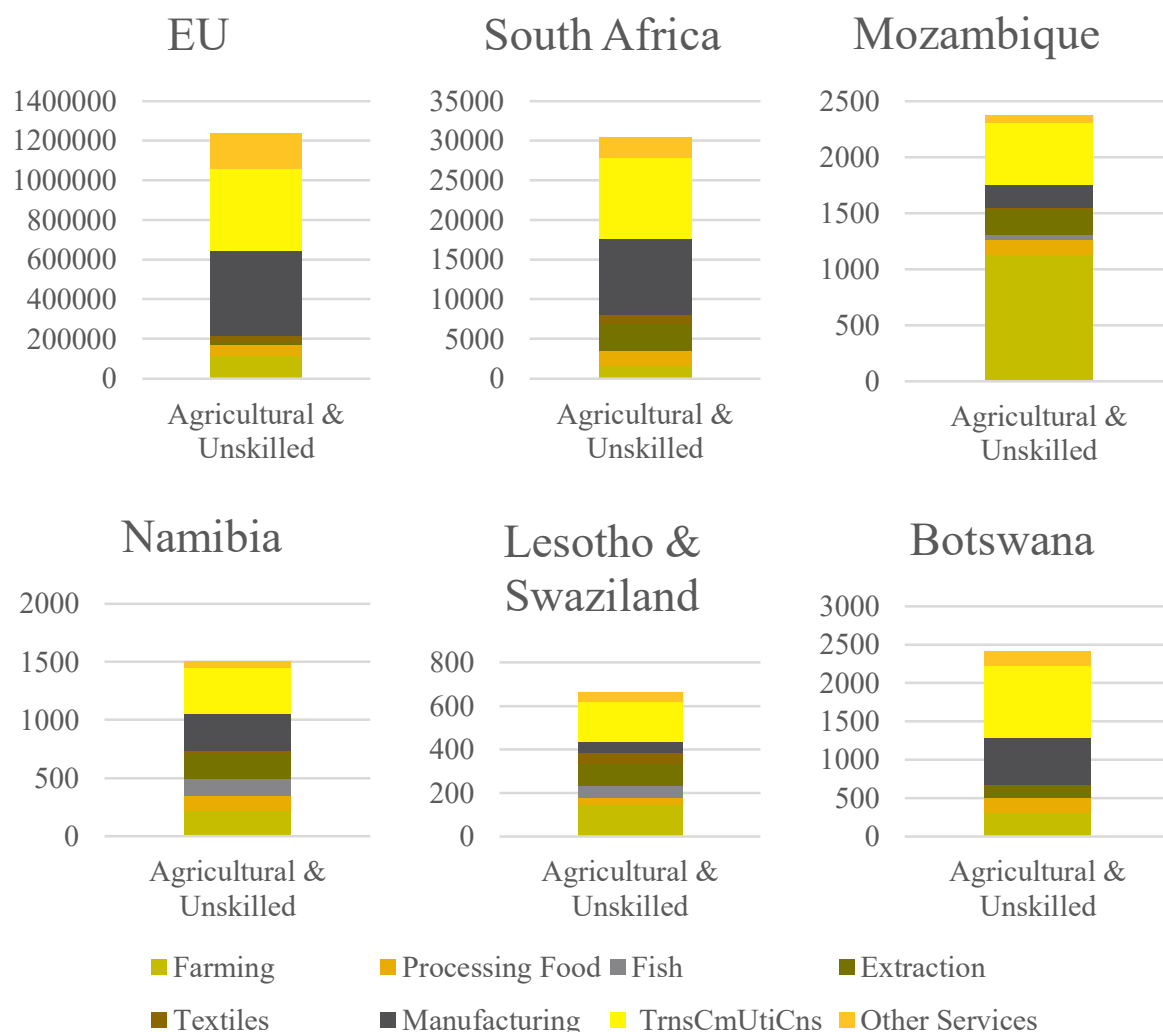


Figure 13: Value added for the factor 'Agricultural & Unskilled', with colours indicating the sources of this value added (source: GTAP database, VFM)

Note: It might seem more intuitive to the reader if there would be a graph showing the composition rather in numbers of workers or in hours worked rather than in value flows. However, the GTAP model, due to being based on value calculations, does not need or have explicit data for quantities or prices (Corong et al. 2017), so that such a diagram can unfortunately not be generated out of the GTAP database

## 7.4 Calculating the tariffs

The over 2000 pages of agreement text (most of it consisting of the appendix that specifies the tariffs for each commodity) are far from just being a list of new *ad valorem* tariffs. The agreement gives tariffs in different forms, among them specific tariffs (i.e. a certain amount of money have to be paid per

volume unit, like kilogram, independently of the current price), *ad valorem* tariffs (a percentage of the value of imports has to be paid, which connects the tariff not only to the import amounts, but also to the import prices<sup>47</sup>), mixed tariffs (a combination of specific and *ad valorem* tariffs), percentage reductions on the current MFN tariff, percentage point reductions on the current MFN tariffs and tariff rate quotas (TRQ are further explained in Appendix 7.5). TASTE – the programme used here to aggregate the tariffs for the GTAP sectors – can only calculate with *ad valorem* tariffs, so all other tariffs need to be recalculated.

Many of the tariffs and quotas change over the years, to expand the liberalization over a larger time horizon. For this simulation, it all tariffs are set to the calculated level they will have ten years after the start of the agreement.

To recalculate mixed tariffs, the current<sup>48</sup> prices need to be taken out of MAcMAp – which works simply because the new mixed or specific tariffs usually replace old mixed or specific tariffs. For example, the good with the HS code 071040 (sweetcorn) has a mixed tariff when exported from South Africa into the EU. On MAcMAp it can be seen that when this good is imported into France<sup>49</sup>, a tariff of 5.1% + 9.4 EUR/100 kg/net eda has to be paid<sup>50</sup>. The *ad valorem* equivalent tariff according to MAcMAp is 14.99%.

If  $5.1\% + 9.4 \text{ €}/(100 \text{ kg}) = 14.99\%$ , then  $9.4 \text{ €}/(100 \text{ kg}) = 9.89\%$ , then  $\text{€}/(100 \text{ kg}) = 0.0989/9.4$ . This is the price per 100 kg.

In the agreement, the new mixed tariff is 1.6 % + 9.4 EUR/ 100 kg/net eda. If we replace the price per 100 kg with our newly found price, we get  $1.6\% + 9.4 * 0.0989/9.4 = 0.092 = 11.49\%$ . This is the *ad valorem* equivalent tariff.

In a similar fashion, we can calculate all *ad valorem* equivalent tariffs for mixed tariffs and for specific tariffs (specific tariffs have simply 0% in the first part).

Goods with more than 8 digits are handled differently. Often the 6-digit-level above it only consists of 8-digit-commodities with the same rule; or at least has a strong majority of 8-digit-commodities with one rule, while the

---

<sup>47</sup> *Ad valorem* tariffs are measured in percentage of the cif value of imports (Burfisher 2011)

<sup>48</sup> For current prices, 2014 has shown to be a good year, as both MAcMAp and (if needed) COMTRADE have most data reported for that year. In exceptions of missing data, data from earlier or later years is used.

<sup>49</sup> France is just picked is an example with well reported data – due to the ATDC other European countries have the same tariffs

<sup>50</sup> This is the tariff for 0710400000  
<http://www.macmap.org/QuickSearch/FindTariff/FindTariffResults.aspx?product=071040&country=251&partner=710&year=2014&source=1|ITC&AVE=1>



others could be treated as exceptions. But sometimes there is no clear majority. Depending on the commodity and the kind of tariffs, often the simple average is taken (which sometimes required to recalculate the TRQ or mixed tariffs in there), sometimes the rule of a commodity without absolute majority is taken (especially when all the surrounding goods had the same rule) and sometimes, if a commodity seems to be highly protected by several different rules, simply the old tariff rate is kept.

If no new tariff rules are specified, each product should have the Most-Favored-Nation ('MFN') rate of duty from the time the agreement enters into force, possibly adapted to later changes if that is favourable to the nation facing the new tariff (L250, Article 23). Some products (like certain fish) only get a reduced tariff, decreasing over time till they are eliminated, other products (like certain dairy products and certain flowers) get a tariff rate quota that is extended over time. In Annex II the SACU explains new tariffs towards the EU, where again certain commodities – usually from the agricultural or food sector – are protected with tariff rate quotas or persisting tariffs. In Annex III Mozambique declares its changes towards the EU in a similar fashion.

Despite all efforts, the tariff changes from TASTE, when taken over into GTAP, do not have a perfect precision. For some strongly liberalized trade flows, the import taxes (rTMS) turn negative, as the shock of the tariff was bigger than the initial tariff in the GTAP data base. This would mean that instead of just abolishing a tariff, the countries would subsidise imports – which is not the intention of the EPA. For the affected trade flows, the tariff shock that TASTE calculated is commented out and a new tariff is calculated with GTAP, now not changing the %change power of the tms, but rather setting the target rate to zero. As a result, those tariffs now have a completely abolished (or at least very close to zero, because of rounding differences) tariff.

When the average tariff changes for a GTAP sector are calculated out of the tariff changes for the HS sectors, some form of weighting needs to take place between the different goods. The weighting itself plays a crucial role for the final tariffs. A simple average has a poor level of relevance, as it does not reflect that a strongly good's tariff should influence the average stronger than a sparsely imported one (Fontagné, Laborde & Mitaritonna 2011). But if the tariffs are weighted with their trade value, a good that currently has a prohibitive tariff and thereby a traded amount of zero would not be reflected at all in the average – biasing the current protection level downwards (*ibid.*). To address this bias of trade-prohibiting tariffs, but also to address “data problems,

such as volatility between years, or inconsistencies between reporting by importers and exporters” (Horridge & Laborde 2010 p. 9), TASTE does not only give the possibility to weight the tariffs with their trade weights, but alternatively by ‘reference group’ weights, that are adjusted by MacMapHS6. These ‘reference group’ weights are used.

But “[p]otentially, neither set of weights is consistent with the GTAP data, giving rise to potential problems of aggregation bias: tariff shocks might be wrongly influenced by the level of user aggregation” (*ibid.*, p. 9). To combat this problem, TASTE also gives the option of scaling the chosen set of weights so that they sum to the GTAP database trade matrix VIWS – of which this simulation also makes use.

These are the tariff changes between the SADC EPA members:<sup>51</sup>

		importer					
tariff change		EU_28	MOZ	SA	NAM	BWA	LS
exporter	EU_28	0%	-68%	-22%	-67%	-54%	-23%
	MOZ	0%	0%	0%	0%	0%	-5%
	SA	-57%	0%	0%	0%	0%	0%
	NAM	-90%	-1%	0%	0%	0%	0%
	BWA	0%	-1%	0%	0%	0%	0%
	LS	-87%	0%	0%	0%	0%	0%

Table 18: tariff changes as calculated (aggregated for all commodities)

Surprisingly, even though Mozambique has abolished all tariffs towards EU imports (not all at the beginning of the implementation, but all until 10 years after the beginning of the implementation, which is what the simulation looks at), their tariff reduction is only 68%, not 100%. This was first seen as an inaccuracy of the calculation of TASTE, so instead of applying the TASTE %change power shocks, again all tariffs for imports from the EU to Mozambique were set to target rates of zero. But this could not solve the error: The reduction was now even only 65%. It seems likely that this is a calculation error that is hard to fix: the initial tariff for EU imports to Mozambique is

<sup>51</sup> These tariffs are not the %changes shown for tms in the results, neither are they the difference between rTMS from the base data and the updated data, as neither offers a weighted aggregate between the countries. To get a weighted aggregate, the VIMS and VIWS from base data and updated data are regarded (keeping importers and exporters disaggregated, but products aggregated). Since  $VIMS = VIWS \cdot (1+t)$  (where t stands for the tariff),  $(VIMS-VIWS)/VIWS$  is a straightforward way to get the average tariffs between two countries in a weighted aggregation for all sectors.

already only at 5% (Table 19), and the final tariff does not seem to sink below 1.6% (TASTE shocks) resp. 1.8% (manual shocks for Mozambique with target rate). From here on, the TASTE calculation without manual shocks for Mozambique is used again, as they come closer to the “ideal”. Similarly, also the tariffs from the BLMNS countries to the EU were completely abolished except for ammunition, but according to the calculation only 88% are abolished. But even more than in the case of Mozambique, this does not really affect the resulting tariffs: The initial tariffs were around 0.0002%, so whether a tariff close to zero is abolished by 100% or only 88%, does not really change the outcomes (Table 19).

The EU commission published by how much the tariffs would decrease by trade volume (trade volume here probably referring to a trade weighted average, just as in the calculation) (European Commission 2016). Interestingly, the official tariff cuts are stronger (except for those towards Mozambique) than in the TASTE aggregation (Table 19). While the simulated time frame is 10 years after the start of the agreement, the document by the EU commission leave open whether they calculate the tariff changes for the begin of the tariff schedule or for its end. The latter would cause some additional difference in the numbers, as the EU abolished its tariffs towards the SACU abruptly, while the SACU and Mozambique are granted a longer time frame.

	tariff before	calculated tariff reduction	resulting tariff	announced tariff reduction	resulting tariff
BLMNS to EU	0,0%	100,0%	0,0%	100,0%	0,0%
SA to EU	0,4%	63,2%	0,2%	98,7%	0,0%
EU to SACU	2,1%	11,8%	1,8%	86,2%	0,3%
EU to Moz	5,7%	100,0%	0,0%	74,0%	1,5%

*Table 19: tariff changes as calculated (with their resulting tariffs) and as announced by the EU commission (with their resulting tariffs). Own calculation was done with TASTE and trade weights – reference group weights show a lower reduction of tariffs towards the EU and a stronger reduction of tariffs towards the SACU.*

## 7.5 Turning TRQ into tariffs

The SADC EPA classifies several commodities in categories that give detailed tariff rate quotas. Before these tariff rate quotas can be included in the TASTE aggregation, they need to be recalculated into *ad valorem* equivalents. No standardized process exists for this problem. A common way to get an *ad valorem* equivalent in the case of tariff rate quotas is to calculate a marginal

tariff. MAcMAP for example states “The choice between the IQTR and the OQTR depends on the quota fill rate. If the quantity imported is smaller than 80% of the quota volume, the AVE is calculated based upon the IQTR. Once the import quantity exceeds 98% of the quota volume, the AVE is calculated based upon the OQTR. Finally, if bilateral imports in the preceding year fall between 80 and 98% of the quota volume, the AVE of the tariff rate quota is calculated as the simple average of the IQTR and OQTR AVEs.” (MAcMAP 1999-2016). This is a reasonable ex post method – however, when a new tariff rate quota is introduced, the resulting import quantities are not known.

To be able to approximate the *ad valorem* tariff, an optimization problem was made up, based on three simple conditions.

First, a formula for the *ad valorem* tariff equivalent is needed. If the assumed new import amount is under the quota, there is no problem, as simply the IQTR can be used. If the assumed new import amount exceeds the quota, the *ad valorem* tariff equivalent is calculated as follows:

$$AVE = \frac{quota * IQTR + (new\ imports - quota) * OQTR}{new\ imports}$$

This formula depicts a tariff that – if applied to all estimated new imports – gives identical tariff revenues, and should hence give the same welfare effects.

Since consumers can be expected to react to tariff changes – respectively the resulting import price changes – this change in import demand is used to estimate the new amount. The GTAP database lists import elasticities for all their sectors, export countries and import countries, which is used here.

$$new\ imports = (1 + (\%price\ change * price\ elasticity_{import\ demand})) * old\ imports$$

Finally, the price increase through the new tariff has to be estimated (“new tariff” here is again the *ad valorem* tariff equivalent from the first equation).

$$\%price\ change = \frac{(1 + AVE) * price + (1 + old\ tariff) * price}{(1 + old\ tariff) * price}$$

Or simpler:

$$\%price\ change = \frac{AVE - old\ tariff}{1 + old\ tariff}$$

This price change approximation is a very isolated approach that would fit rather into a partial equilibrium model – any kind of effects of the producers’ price that could emerge from a different resource allocation is not taken into account. Additionally, the world market prices are not assumed to change though the change in demand. More importantly, an import demand elasticity is used that was not intended for individual trade lines, but for much larger GTAP sectors. In order to have an approach that only needs limited amounts of data, this drawback is however accepted.

There are three equations and two unknown variables (the ad valorem equivalent and the estimated new amount) and the price change as an auxiliary variable. Thereby, the Solver in Excel can find a unique solution in a convenient way (as an arbitrary goal function, the assumed imports are maximized).<sup>52</sup> This *ad valorem* tariff equivalent can then be put into TASTE.

## 7.6 Changing the closures for the variations

To create unemployment, the following commands are added to the closure rules:

```
swap qo("UnSkLab","EPA_SA") = ps("UnSkLab","EPA_SA");
swap qo("UnSkLab","EPA_BWA") = ps("UnSkLab","EPA_BWA");
swap qo("UnSkLab","EPA_LS") = ps("UnSkLab","EPA_LS");
swap qo("UnSkLab","EPA_MOZ") = ps("UnSkLab","EPA_MOZ");
swap qo("UnSkLab","EPA_NAM") = ps("UnSkLab","EPA_NAM");
swap qo("SkLab","EPA_SA") = ps("SkLab","EPA_SA");
swap qo("SkLab","EPA_BWA") = ps("SkLab","EPA_BWA");
swap qo("SkLab","EPA_LS") = ps("SkLab","EPA_LS");
```

---

<sup>52</sup> In practice, the calculation becomes unsatisfactory in the moment data is needed – which is found in either too short or too abundant forms. For the ‘old amount’ a three year average of the years 2013, 2014 and 2015 is used, but since these years do not always have reported data in COMTRADE, different years have to be used in some cases. The ‘old tariff’ is taken from MacMap, but several goods have very different tariffs for commodities that are specified up to a ten digit level, in which simply the first tariff in the list is used. If this tariff happened to be a tariff rate quota, the marginal tariff was used. And finally, the details in the trade agreement – which are listed far beyond the 6 digit level, with quotas often further specified according to *e.g.* container size or alcohol concentration – are strongly simplified to not go too far beyond the time constraints of this thesis.

```
swap qo("SkLab","EPA_MOZ") = ps("SkLab","EPA_MOZ");
swap qo("SkLab","EPA_NAM") = ps("SkLab","EPA_NAM");
```

To balance the government budget, the following commands are added to the closure rules:

```
swap tp("EPA_SA") = del_ttaxr("EPA_SA");
swap tp("EPA_BWA") = del_ttaxr("EPA_BWA");
swap tp("EPA_LS") = del_ttaxr("EPA_LS");
swap tp("EPA_MOZ") = del_ttaxr("EPA_MOZ");
swap tp("EPA_NAM") = del_ttaxr("EPA_NAM");
```

## 7.7 Excursion: Why rules of origin matter

What counts as an export from a country? If all goods that were shipped from an EPA partner would benefit from the favourable market access, there would be an incentive for trade deflection (i.e. goods from other countries would be exported *e.g.* via Mozambique to Europe, to face lower tariffs) (Naumann 2010). To ensure that only those commodities gain a preferential trade status that were processed in a country beyond merely superficial operations, the Rules of Origins are defined (*ibid.*). However, the precise definition of the Rules of Origin also restricts the production possibilities and choices of imported inputs and can thereby have a big effect on a countries production and export possibilities (*ibid.*)<sup>53</sup>. The double-transformation requirements under the GSP would for example only accept fish as wholly obtained, if onerous requirements concerning the vessel, crew and location of the fishing activity – meaning “unless countries had a significant locally owned commercial fishing fleet or concluded cooperation or joint-venture agreements with EU operators, they were unable to export to the EU under preference” (*ibid.*).

Naumann (2010) names several effects RoO can have, thus for restrictive RoO:

- They are reducing the possibility to make use of cheap imported inputs in the own production, thereby causing higher costs in production and making a country less competitive than other exporters with more favourable RoO or local producers of the importing country

---

<sup>53</sup> At least if the producer wants to make use of the preferential tariffs. Producers always have the possibility to export goods that do not align with the Rules or Origin at MFN tariffs

- If RoO give few commercially feasible options to exporters, they can function as a trade barrier<sup>54</sup>
- As also consumers and retailers are affected by this price increase and reduction of choice, the restrictive RoO are likely to cause negative welfare effects
- However, upstream producers (i.e. the suppliers of inputs) in the exporting country benefit from restrictive rules of origin, as the other producers must favour consuming their inputs under increasing restrictions for imported inputs – this can possibly foster the development of local industries just as well as regional integration<sup>55</sup>

The SADC EPA includes the RoO over Article 22 and specifies them in Protocol 1. Since trade deflection is unlikely between states that face the same tariff from the import destination, the EPA allows for bilateral and diagonal cumulation, that states that all inputs that are from other SADC EPA countries (and even from EPA members of other ACP countries, as well as from the EU) are treated just like local inputs (L 250, Protocol I, Title II, Article 3, 4).<sup>56</sup> This is only guaranteed for goods where EPA states indeed face the same trade status – imports from South Africa that still face a tariff may for example not be exported via another SADC EPA member that faces no tariffs.

Since the GTAP model does not take rules of origin into account (Perez 2006), many authors do not implement changes in their simulations. This is partly due to the little importance that many authors attach to them, partly due to the complexity of structures required for their analysis, especially in general

---

<sup>54</sup> Especially in developing countries these effects of RoO are used for protectionist interests: “They play a role in the application of laws relating to marking, labeling, and advertising; duty drawback provisions; government procurement; countervailing duty and safeguard proceedings; and quantitative restrictions, including import prohibitions and trade embargoes” (Falvey & Reed 2000, p. 1).

<sup>55</sup> If restrictions are well designed, they can provide an incentive to develop upstream industries and economies of scale (Naumann 2010). Similarly, with favourable rules of origin that allow cumulation, the access to the EU markets could promote regional cooperation: An increased market could make local value chains of several partners worthwhile, impelling improvements in cross-border customs procedures, transport costs and coordinated hard and soft infrastructure and logistics (Ramdoo 2014). Since this doesn’t create a platform for local processing and vertically integrated industries, but only hopes for improvement through throttling trade, Naumann however sees this development model as not so successful.

<sup>56</sup> Several legal notions make sure that this cannot again be misused, by stating that the imported inputs must be further processed in the countries the cumulation allows for, or by adding for Southern African exports with a less favourable market access, that they may not be exported via another SADC EPA member.

equilibrium models (Falvey & Reed 2000). The studies that try to include RoO into their models found different approaches. Fox, Powers and Winston (2007) add an estimated compliance cost, which the RoO cause to the exporting producers. Similarly, Georges (2008) looks for the increase in the unit cost that the RoO cause to each sector of each country. While such approaches may be able to approximate the welfare effects of RoO, they cannot explain redirected trade flows that would be caused if a Southern African country may unrestrictedly import inputs from other ACP countries, but only in limited amounts of non-ACP countries. In a different take, Vanzetti and Huong (2014) make the reasonable assumption that a country cannot make use of the full tariff reductions in sectors where it is not self-sufficient, and reduce the tariff change by the degree of self-sufficiency<sup>57</sup>. This approach can also not explain trade shifts between the different input suppliers. Additionally, one could argue that RoO should ideally not be modelled over the same parameter as tariffs, as they rather work as compliments than as substitutes to tariffs, as Falvey's and Reed's analysis (2000) demonstrates. While tariffs would focus on the elasticity of supply of value added, the rules of origin would influence the composition of intermediate inputs (*ibid.*). A possible way to take this into respect could be the adaptation of Armington elasticities.

The RoO are a crucial factor in the trade for southern African states. This can be maybe seen in the fact that an LDC like Mozambique, which already has very favourable tariffs due to the EBA and has no pressure to align with the custom union of the SACU states, still had enough incentive to join the IEPA and later the EPA.<sup>58</sup>

---

<sup>57</sup> This approach becomes more complicated when the country does not have to be self-sufficient, but can rely on intermediate inputs from other ACP countries, as in the SADC EPA

<sup>58</sup> Apart from more liberal RoO compared to those under the EPA agreement, the EU also included topics in the negotiations such as the EU commodity protocol on bananas, rice and sugar, reduction in subsidies to agricultural production and export or a financial compensation for revenue losses (United Nations 2011). Why were the incentives then strong enough for Mozambique and Swaziland, but not for Angola? The reason might be Angola's oil-exports, which could increase their merchandise exports (between 2000 and 2005) stronger than other African countries and even stronger than the world on average (UNECA 2007). Possibly, Mozambique was also not aware of the new RoO: "They [the ACP countries] are effectively being asked to sign up blind in the faith that the new rules will be more development friendly. However, indications from internal negotiations within the EU indicate a strong likelihood that the new rules of origin may end up being worse than the current ones." (Griffith & Powell 2007)



## 7.8 General results

GDPEXP	consumption	investment	government expenditure	net exports	Total
EU	60%	19%	22%	-1%	100%
Mozambique	69%	31%	11%	-11%	100%
South Africa	61%	19%	22%	-2%	100%
Namibia	49%	22%	17%	13%	100%
Botswana	41%	27%	16%	16%	100%
Lesotho& Swaziland	61%	10%	15%	15%	100%

Table 20: Contributors to the GDP before the shock (GTAP database, GDPEXP)

GDPEXP	C	I	G	X-I	Total
EU	0,0%	0,0%	0,0%	0,1%	0,0%
Mozambique	-0,4%	0,0%	-0,4%	0,7%	-0,4%
South Africa	0,0%	0,0%	0,0%	1,1%	0,0%
Namibia	0,0%	0,1%	0,0%	-0,2%	0,0%
Botswana	0,0%	0,0%	0,0%	-0,1%	0,0%
Lesotho& Swaziland	0,0%	0,1%	0,0%	-0,1%	0,0%

Table 21: The change of the GDP in the basic simulation, composed of consumption, investment, government expenditures and exports net of imports (own calculations from GTAP database, GDPEXP). Note that the EU; Mozambique and South Africa had a negative trade balance before the shocks, so the 'positive' changes of net exports are actually a widening of the trade deficit and coloured in red. Namibia, Botswana and Lesotho&Swaziland had a positive trade balance before the shock, so their negative changes are more intuitive. In VAR1a-c the results are almost identical, but in VAR2 all effects are strongly mitigated, which results in a 0% change in GDP for all regions (see also next table).

Welfare	basic simulation	VAR1a	VAR1b	VAR1c	VAR2
EU	0,0013%	0,0013%	0,0011%	0,0011%	0,0013%
Mozambique	-0,1292%	-0,1044%	-0,1224%	-0,1212%	-0,1411%
South Africa	-0,0126%	-0,0190%	-0,0108%	-0,0110%	-0,0142%
Namibia	0,0055%	0,0128%	0,0052%	0,0128%	0,0041%
Botswana	0,0070%	0,0002%	0,0038%	0,0095%	0,0066%
Lesotho&Swaziland	0,0067%	-0,0018%	0,0072%	0,0044%	0,0060%

Table 22: The changes of the welfare compared for the different simulation variations, now expressed as percent of the GDP (own calculation from GTAP output, WELFARE, GDPEXP)

WELFARE	1 alloc_A1	2 endw_B1	3 tech_C1	4 pop_D1	5 tot_E1	6 IS_F1	7 pref_G1	Total
1 EU_28	88,0	0,0	0,0	0,0	141,0	5,3	0,0	234,4
2 EPA_MOZ	-2,6	0,0	0,0	0,0	-7,0	-6,6	0,0	-16,2
3 EPA_SA	-24,1	0,0	0,0	0,0	-22,0	-4,9	0,0	-51,0
4 EPA_NAM	0,9	0,0	0,0	0,0	-0,8	0,6	0,0	0,7
5 EPA_BWA	0,2	0,0	0,0	0,0	-0,4	1,3	0,0	1,1
6 EPA_LS	0,3	0,0	0,0	0,0	-0,5	0,6	0,0	0,4

Table 23: The decomposition of the welfare change in the basic simulation (GTAP output, WELFARE). In the simulation variations the results are similar, but variations with unemployment also have endowment effects, which are (except for Namibia) negative.

## 7.9 State revenue

The state earns all its revenue out of taxes, which are the following

$\sum_{i \in \text{NSAV}} VOM(i,r) - VOA(i,r)$	1. Output/Production taxes
$\sum_{j \in \text{PROD}} \sum_{i \in \text{ENDW}} VFA(i,j,r) - VFM(i,j,r)$	2. Tax on the use of endowments
$\sum_{i \in \text{TRAD}} VIPA(i,r) - VIPM(i,r)$	3. Tariffs from households' import consumption
$\sum_{i \in \text{TRAD}} VDP A(i,r) - VDP M(i,r)$	4. Taxes from households' domestic purchases
$\sum_{i \in \text{TRAD}} VIGA(i,r) - VIGM(i,r)$	5. Tariffs from governments' import consumption
$\sum_{i \in \text{TRAD}} VDGA(i,r) - VDGM(i,r)$	6. Taxes from governments' domestic purchases
$\sum_{j \in \text{PROD}} \sum_{i \in \text{TRAD}} VIFA(i,j,r) - VIFM(i,j,r)$	7. Tariffs from firms' import consumption
$\sum_{j \in \text{PROD}} \sum_{i \in \text{TRAD}} VDFA(i,j,r) - VDFM(i,j,r)$	8. Taxes from firms' domestic purchases

---


$$\sum_{i \in \text{TRAD}} \sum_{r \in \text{REG}} VXWD(i,r,s) - VXMD(i,r,s)$$

9. Export taxes, used to e.g. ensure that adequate supplies of vital goods remain available for the home market (Burfisher 2011)

---

$$\sum_{i \in \text{TRAD}} \sum_{r \in \text{REG}} VIMS(i,s,r) - VIWS(i,s,r)$$

10. Import taxes

---

Table 24: sources of state revenue, formulas taken from Hertel (1997, p. 24)

To simplify the analysis, all tariffs revenues (3, 5, 7) and all taxes from domestic purchases (4, 6, 8) are grouped in the following.

We can see in Table 25 that taxes for import consumption and taxes on imports only make up a limited share of the state revenues. In total numbers South Africa seems to lose the most state revenue of the African partners, but when regarded in percentages, it becomes clear that Mozambique and Botswana suffer the most from this shock to their state revenue.

	EU	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland
tariff revenues before	41306	315	5409	108	95	76
tariff revenues after	41267	262	5235	104	91	74
loss tariff revenues	-0,09%	-16,83%	-3,21%	-3,55%	-4,84%	-2,44%
revenue before	5040245	1000	49227	795	137	406
revenue after	5040507	943	49034	791	133	404
revenue losses	0,01%	-5,70%	-0,39%	-0,47%	-3,37%	-0,46%
share of tariff revenues in total state revenues (before simulation)	0,8%	31,5%	11,0%	13,6%	69,3%	18,6%

Table 25: Tariff losses and revenue losses through the EPA in the basic simulation. Calculations based on the GTAP output (several headers).

### State revenue changes through the EPA (basic simulation)

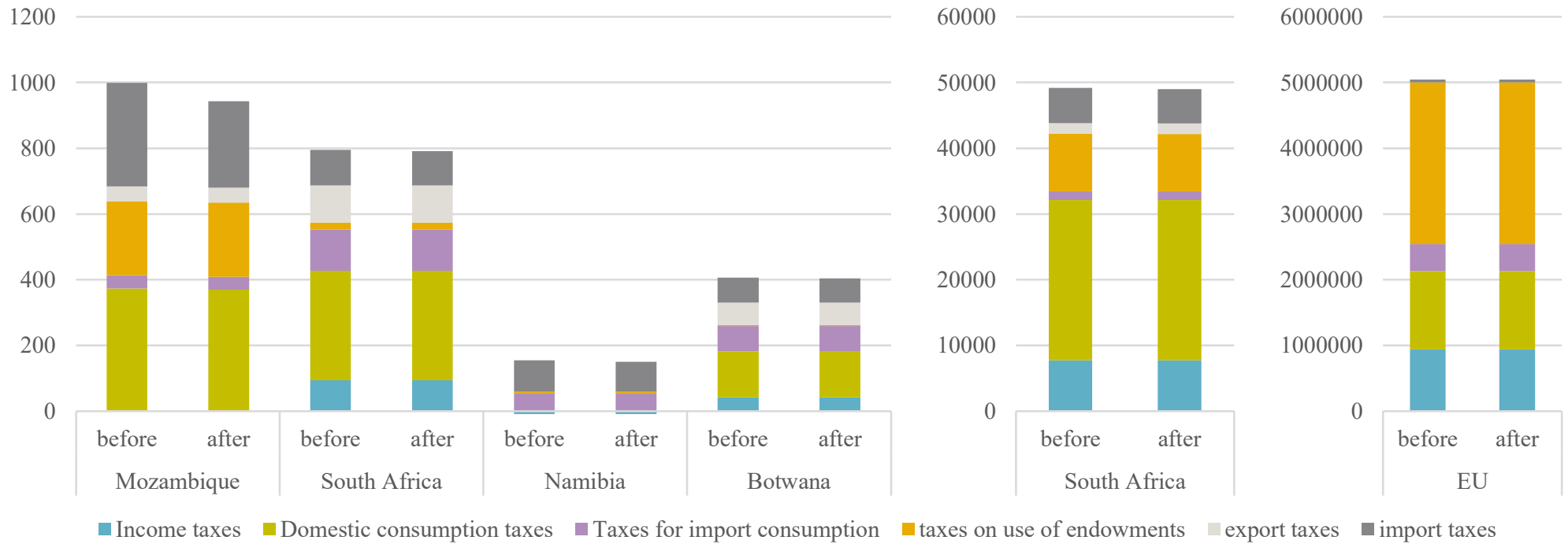


Figure 14: State revenue changes through the EPA (basic simulation, own calculation from GTAP output, several headers)

## 7.10 Current account

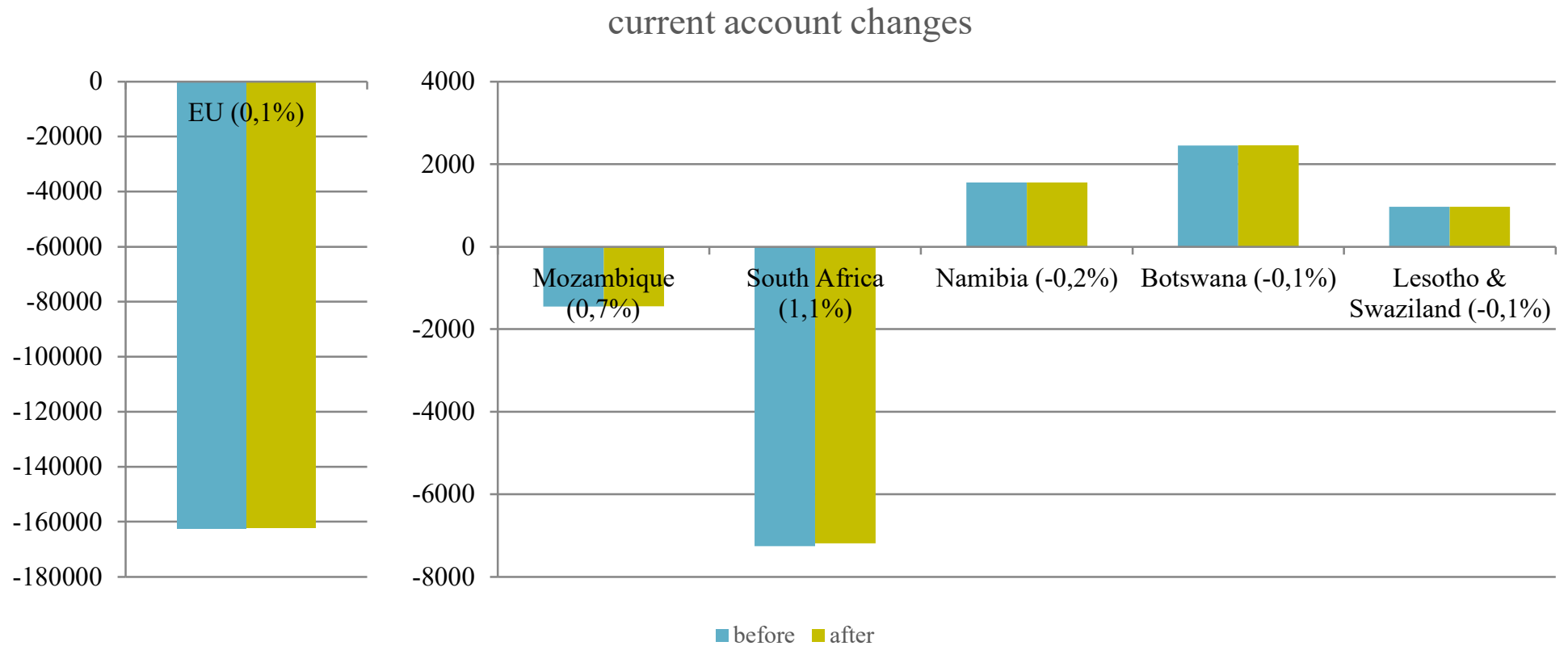


Figure 15: Current accounts of the countries and their changes, as given by GTAP - this is simply the trade balance.

## Export structure



## Import structure

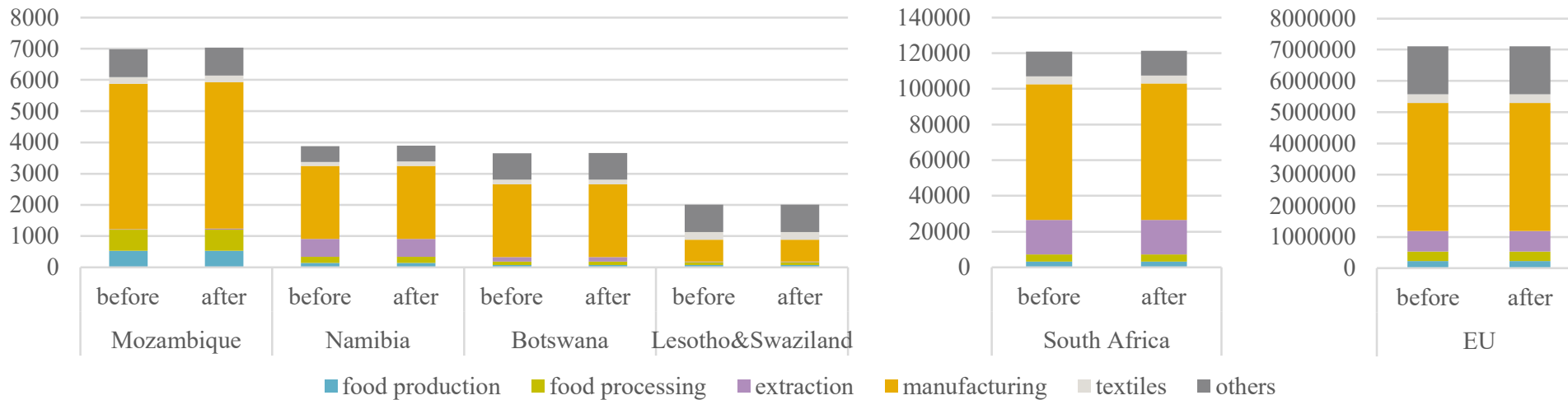
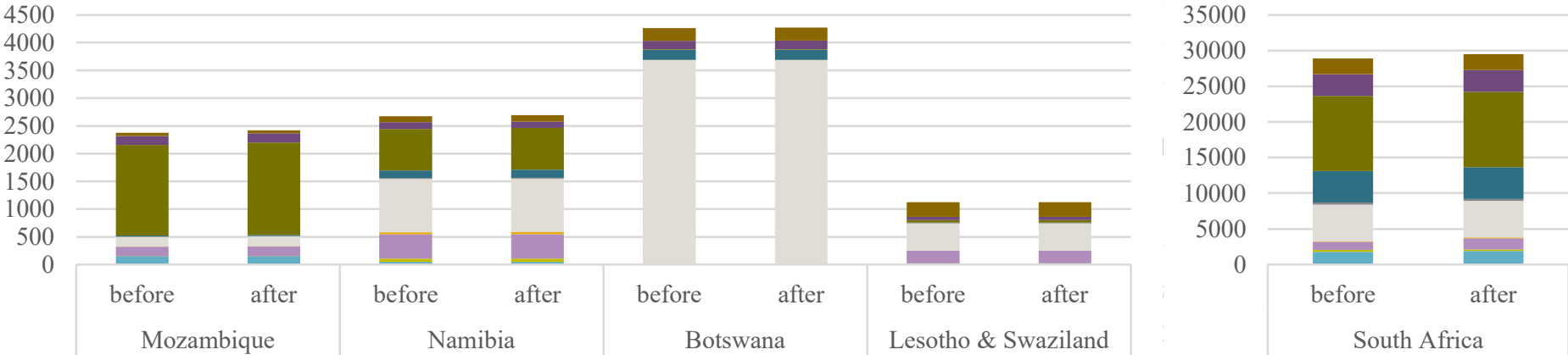


Figure 16: Export and Import structure before and after the basic simulation (taken from the current account data from the GTAP simulation, i.e. with all countries)

### Exports to the EU



### Imports from the EU

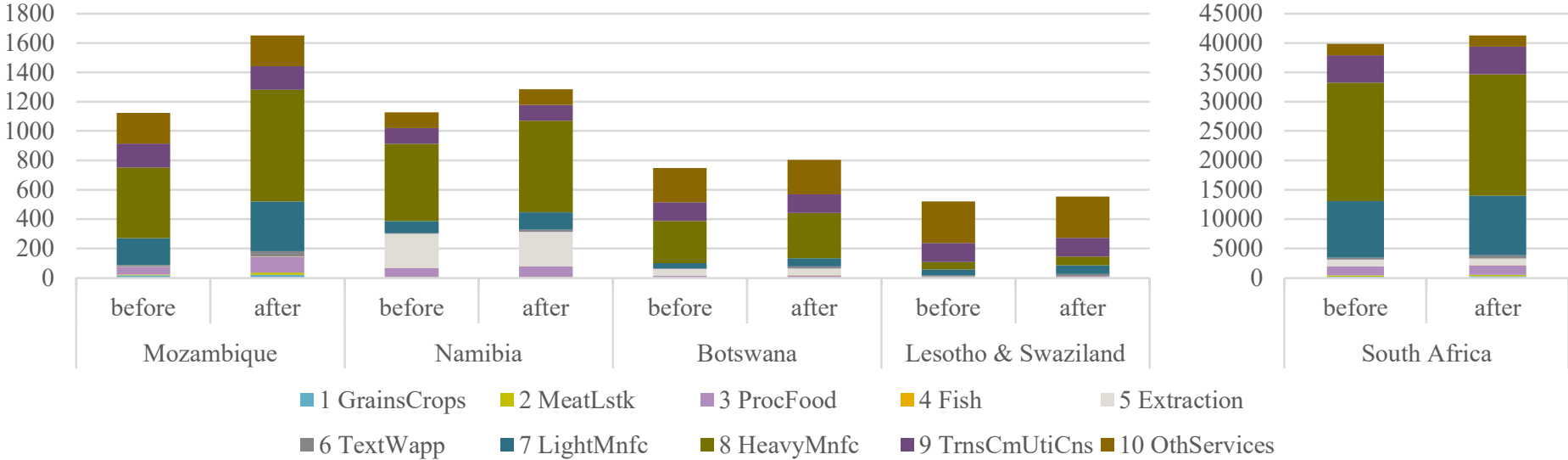


Figure 17: Exports and imports with the EU before and after the basic simulation (data from the GTAP simulation, VIWS)

	Mozambique	South Africa	Namibia	Botswana	Lesotho & Swaziland	total
1 GrainsCrops	-1%	2%	0%	0%	0%	2%
2 MeatLstk	272%	47%	-1%	0%	25%	-32%
3 ProcFood	-42%	-104%	-2%	126%	-1%	73%
4 Fish	-1%	9%	0%	2%	1%	6%
5 Extraction	0%	0%	0%	0%	0%	0%
6 TextWapp	556%	237%	-161%	310%	-679%	290%
7 LightMnfc	94%	10%	-52%	-11%	42%	14%
8 HeavyMnfc	-21%	5%	-42%	8%	101%	10%
9 TrnsCmUtiCns	-75%	-1%	7%	2%	-1%	-1%
10 OthServices	-1%	1%	6%	-11%	-5%	4%
total	-38%	8%	-9%	-1%	-5%	39%

Table 26: Percentage change of the trade balance with the EU in the basic simulation (data is calculated out of the GTAP output for the variable VIWS). This change is slightly counterintuitive: Whether a country widens its trade deficit or its trade surplus, both is a “positive” percental change. Colours are used to clarify which sectors win and lose (green in the trade balance improves, red if it diminishes).



terms of trade effects/GDP	basic simulation	VAR1a	VAR1b	VAR1c	VAR2
EU	0,00%	0,00%	0,00%	0,00%	0,00%
Mozambique	-0,06%	-0,06%	-0,05%	-0,05%	-0,06%
South Africa	-0,01%	-0,01%	0,00%	0,00%	-0,01%
Namibia	-0,01%	-0,01%	-0,01%	-0,01%	-0,01%
Botswana	0,00%	0,00%	0,00%	0,00%	0,00%
Lesotho&Swaziland	-0,01%	-0,01%	-0,01%	-0,01%	-0,01%

*Table 27: Same terms of trade effects as in the table before, but now set into relation to the countries GDP (data from the GTAP simulation)*

## 7.11 Regional trade

## Changing trade with the EU

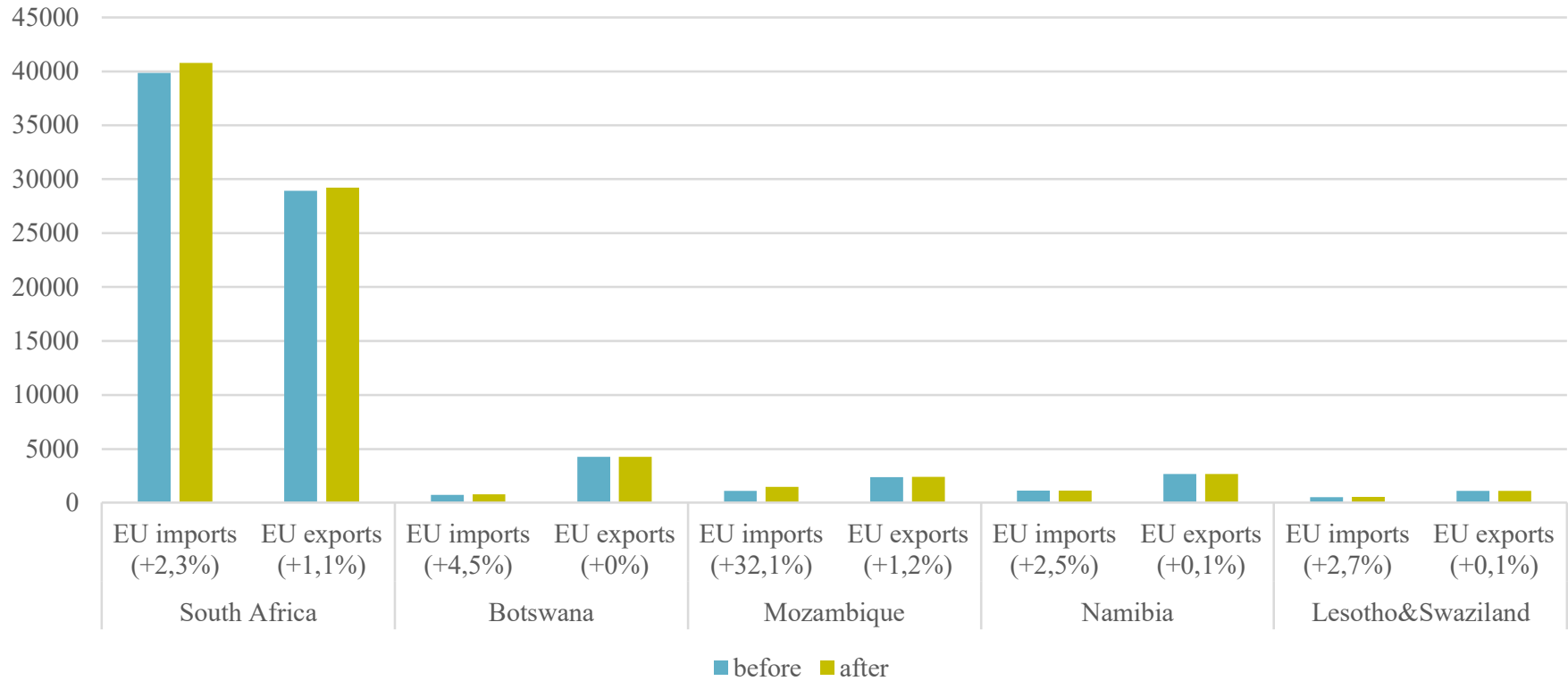


Figure 18. Changes in trade with the EU within the SADC EPA group in the basic simulation (data from GTAP database, VIWS)

## Comparison of trade changes

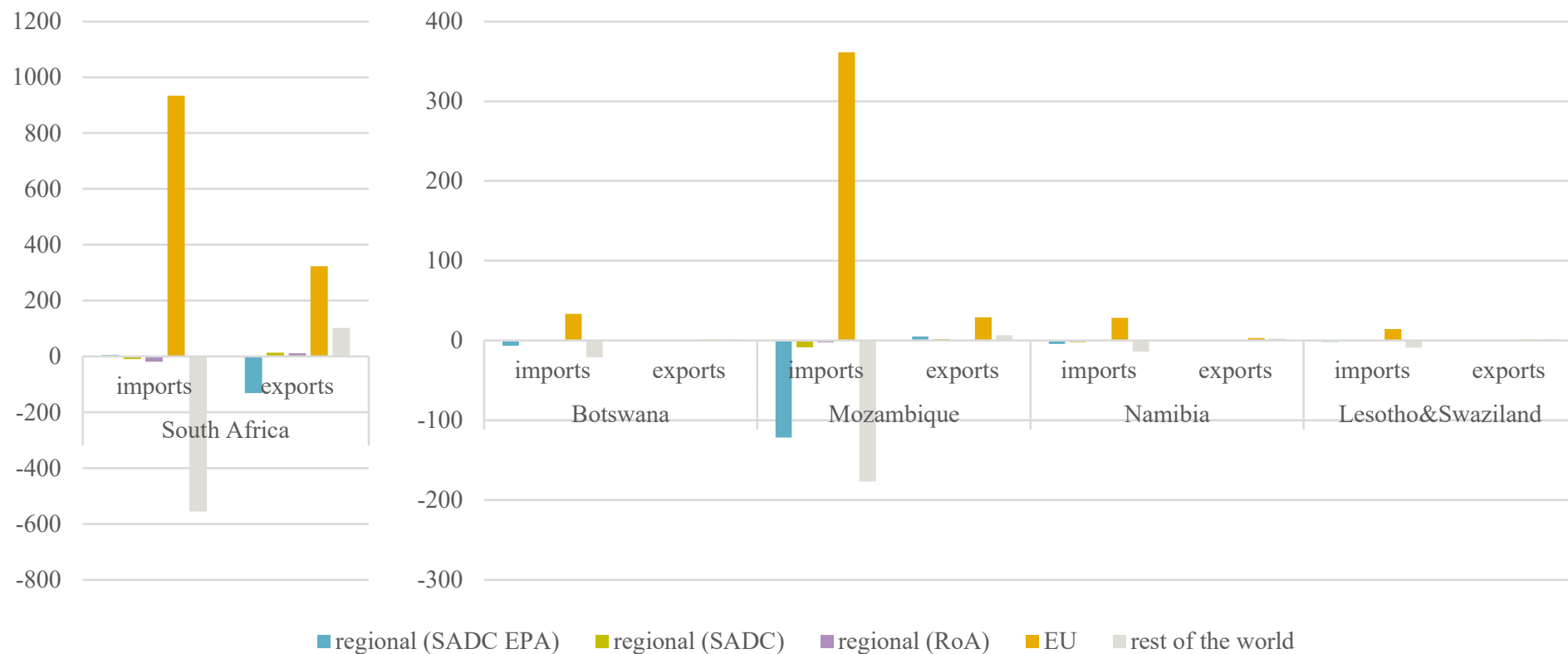


Figure 19: Comparison of trade changes in absolute numbers. Note that the groups “regional (SADC EPA)” and “regional (RoA)” are net of other groups, i.e. the green column shows how much less is imported from SADC countries that are not already depicted in the blue column of SADC EPA countries

	SADC EPA	plus SADC	plus RoA
regional imports and exports	5965,04	22627,38	64488,07
exports and imports of the region towards the world	266242,01	409909,55	1228823,09
total world exports and imports	20153934,91	20153934,91	20153934,91
Intra-regional trade intensity index	1,695977	2,714051	0,860717
	SADC EPA	plus SADC	plus RoA
regional imports and exports	5835,83	22492,85	64343,75
exports and imports of the region towards the world	267291,64	410951,50	1229854,29
total world exports and imports	20154565,54	20154565,54	20154565,54
Intra-regional trade intensity index	1,646287	2,684335	0,857378
	-2,9%	-1,1%	-0,4%

*Table 28: changes in the intra-regional trade intensity index before and after the basic simulation in different regional groups: The SADC EPA group, the whole SADC group including the SADC EPA group, and the whole of Africa including the former two. Underneath, the percentage changes of the index are given – which, as such, cannot be reasonably interpreted, but illustrates the idea that the trade with “further away” groups are less affected than the close regional groups (own calculation out of the GTAP output, VIWS)*

regional trade index	SADC EPA	SADC	Africa
initially	1,696	2,714	0,861
basic simulation	1,646	2,684	0,857
VAR1a	1,646	2,684	0,857
VAR1b	1,646	2,685	0,857
VAR1c	1,646	2,685	0,857
VAR2	1,646	2,684	0,857

Table 29: changes in the intra-regional trade intensity index (same calculation as above) for all simulation variations. If the percentage change would be calculated here as well, it would always be -4,9%, -1,9% and -0,7% as in Table 28.

	Grains & Crops	Meat & Livestock	Food Proc.	Fish	Extraction	Textiles	Light Manu.	Heavy Manu.	TrnsCmUti Cns	Other services
regional imports (SADC EPA)	0,2411	-0,9998	-0,9999	0,8700	-0,5690	0,1188	-0,1362	-0,0505	-0,9913	0,3638
regional imports (otherSADC)	-0,8206	-0,9976	-0,9996	0,9841	0,3735	-0,5987	-0,3626	-0,8440	0,9400	0,9750
regional imports (RoA)	-0,9984	-0,9069	-0,9881	0,9467	0,6014	-0,9587	-0,9834	-0,9794	0,9994	0,9981
imports RoW	-0,8729	-0,8813	-0,9928	0,9808	0,5024	-0,9998	-0,9942	-0,9988	0,9995	0,9931
regional exports (SADC EPA)	-0,9900	-0,9890	-0,9664	-0,8764	-0,5322	-0,9908	-0,9904	-0,9913	-0,1680	0,6764
regional exports (otherSADC)	-0,9716	-0,9895	-0,0115	-0,9859	0,6739	0,9961	0,9929	0,9952	-0,1000	0,9417

regional exports (RoA)	-0,9917	-0,9886	0,7865	-0,9498	0,9707	0,9982	0,9920	0,9915	0,9548	0,9949
exports RoW	-0,9846	-0,9896	0,9622	-0,9914	0,9958	0,5136	0,9956	0,9943	0,9773	0,9980
VA in the country	0,9888	-0,7307	-0,0658	0,9642	-0,5985	-0,9284	-0,9897	-0,9152	-0,1333	0,9693

Table 30: correlation coefficient between the absolute change in EU imports and several imports, exports and the value added. The coefficient can take values between -1 (very negative correlation) and 1 (very positive correlation) (Basic simulation, own calculation from GTAP output, several variables)

## 7.12 Agriculture and industry<sup>59</sup>

		basic	VAR1a	VAR1b	VAR1c	VAR2
South Africa	Grains&Crops	1,95%	1,95%	1,88%	1,88%	0,75%
	Meat&Livestock	0,16%	0,16%	0,11%	0,11%	0,03%
	Food Processing	-0,03%	-0,03%	-0,07%	-0,07%	0,67%
	Fish	1,88%	1,87%	1,95%	1,95%	2,77%
Botswana	Grains&Crops	0,04%	0,04%	0,17%	0,18%	-0,09%
	Meat&Livestock	0,00%	0,00%	0,01%	0,01%	-0,08%
	Food Processing	-0,01%	-0,01%	0,00%	0,00%	-0,26%

<sup>59</sup> On the sectors: Both Fish and Food Processing do not belong to farming, yet they are closely connected to the food sector and have been included in other studies. Fishery is partly done by self-sustaining fishers that might face similar challenges as smallholders, while the processing of food is closely related through forward linkages). It can obviously be questioned whether TrnsCmUtiCns is not entirely an industrial sector, but since construction is technically part of it, it is listed here for completeness

	Fish	0,08%	0,06%	0,14%	0,15%	-0,07%
Mozambique	Grains&Crops	-0,11%	-0,09%	-0,09%	-0,09%	-0,39%
	Meat&Livestock	-1,51%	-1,49%	-1,86%	-1,86%	-1,70%
	Food Processing	-0,23%	-0,20%	-0,32%	-0,32%	-0,97%
	Fish	-0,57%	-0,50%	-0,72%	-0,71%	-2,12%
Namibia	Grains&Crops	0,00%	0,01%	0,03%	0,04%	-0,05%
	Meat&Livestock	0,10%	0,10%	0,06%	0,07%	-0,32%
	Food Processing	0,00%	0,00%	0,00%	0,00%	-0,12%
	Fish	-0,01%	-0,01%	-0,01%	-0,01%	-0,34%
Lesotho&Swaziland	Grains&Crops	0,00%	-0,01%	0,02%	0,01%	-0,05%
	Meat&Livestock	0,01%	0,00%	0,01%	0,01%	-0,05%
	Food Processing	0,00%	0,00%	0,01%	0,01%	-0,09%
	Fish	0,04%	0,03%	0,03%	0,03%	-0,20%

Table 31: changes in the value added for sectors connected to food production. The colours indicate the strength of the change. Sectors that lose more than 0,5% of their value added are additionally highlighted with red font colour (data from the GTAP output, VFM).

		basic	VAR1a	VAR1b	VAR1c	VAR2
South Africa	Textiles	-0,02%	-0,03%	-0,04%	-0,04%	-0,45%
	Light Manufacturing	-0,04%	-0,05%	-0,04%	-0,04%	-0,22%
	Heavy Manufacturing	-0,11%	-0,12%	-0,11%	-0,11%	-0,08%
	TrnsCmUtiCns	0,01%	0,00%	0,03%	0,03%	0,02%
Botswana	Textiles	0,11%	0,09%	0,04%	0,05%	0,45%

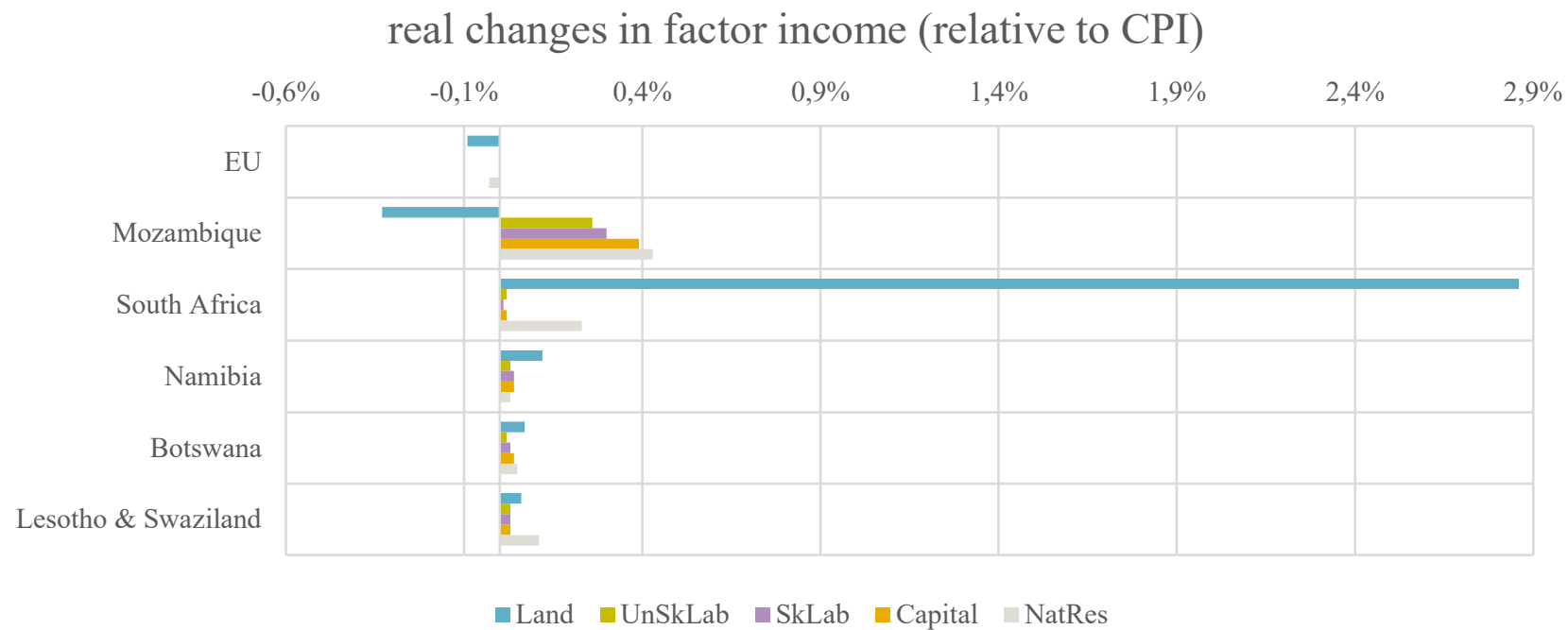
	Light Manufacturing	-0,12%	-0,13%	-0,12%	-0,11%	-0,21%
	Heavy Manufacturing	-0,19%	-0,23%	-0,09%	-0,07%	-0,07%
	TrnsCmUtiCns	0,04%	0,03%	0,06%	0,07%	0,00%
Mozambique	Textiles	-0,82%	-0,79%	-0,89%	-0,89%	-2,21%
	Light Manufacturing	-0,90%	-0,87%	-0,93%	-0,93%	-1,88%
	Heavy Manufacturing	0,56%	0,60%	0,29%	0,30%	1,04%
	TrnsCmUtiCns	0,30%	0,31%	0,32%	0,32%	0,23%
Namibia	Textiles	-0,13%	-0,13%	-0,12%	-0,11%	-0,72%
	Light Manufacturing	-0,15%	-0,15%	-0,20%	-0,20%	-0,39%
	Heavy Manufacturing	0,02%	0,03%	0,01%	0,01%	0,08%
	TrnsCmUtiCns	0,02%	0,03%	0,03%	0,04%	0,06%
Lesotho&Swaziland	Textiles	0,04%	0,03%	0,00%	-0,01%	0,10%
	Light Manufacturing	-0,40%	-0,41%	-0,46%	-0,46%	-1,11%
	Heavy Manufacturing	-0,13%	-0,14%	-0,14%	-0,14%	-0,06%
	TrnsCmUtiCns	-0,02%	-0,03%	0,01%	0,01%	-0,04%

Table 32: changes in the value added for sectors connected to the industry. The colours indicate the strength of the change. Sectors that lose more than 0,5% of their value added are additionally highlighted with red font colour (data from the GTAP output, VFM).





*Figure 20: changes in wages and other factor incomes. Not that these changes apply to all sectors, as all factors are perfectly mobile (data from GTAP database, pm)*



*Figure 21. Real changes in wages and other factor incomes (i.e. relative to the consumers' price index). Note that these changes apply to all sectors, as all factors are perfectly mobile (data from GTAP database, pfactreal)*

		Mozambique	South Africa	Namibia	Botswana	Lesotho&Swaziland
VAR1a	Skilled	-0,17%	0,00%	0,01%	-0,07%	-0,08%
	Unskilled	-0,13%	-0,02%	0,03%	-0,05%	-0,07%
VAR1c	Skilled	-0,17%	0,00%	0,01%	-0,07%	-0,08%
	Unskilled	-0,13%	-0,02%	0,03%	-0,05%	-0,07%

Table 33: employment changes in the two versions that allowed for unemployment (data from the GTAP output, qo)

	Botswana	Lesotho&Swaziland	Mozambique	Namibia	South Africa
GrainsCrops	0,03%	0,00%	-0,07%	-0,01%	1,61%
MeatLstk	0,00%	0,01%	-1,43%	0,09%	0,05%
ProcFood	-0,01%	0,00%	-0,20%	0,01%	-0,03%
Fish	0,02%	0,01%	-0,18%	0,00%	0,66%
Extraction	0,01%	0,01%	0,09%	0,01%	0,03%
TextWapp	0,09%	0,03%	-0,77%	-0,12%	-0,03%
LightMnfc	-0,13%	-0,41%	-0,86%	-0,15%	-0,05%
HeavyMnfc	-0,23%	-0,15%	0,63%	0,03%	-0,12%
TrnsCmUtiCns	0,03%	-0,03%	0,35%	0,03%	0,00%
OthServices	-0,01%	0,00%	-0,06%	0,02%	-0,03%
Total	-0,05%	-0,07%	-0,13%	0,03%	-0,02%

Table 34: employment changes for skilled and unskilled labour for VAR1a (data from the GTAP output, qfe)

Skilled Labour	Botswana	Lesotho&Swaziland	Mozambique	Namibia	South Africa
GrainsCrops	0,09%	0,01%	-0,03%	0,02%	0,86%
MeatLstk	0,01%	0,00%	-0,92%	0,04%	0,02%
ProcFood	0,01%	0,00%	-0,14%	0,01%	-0,04%
Fish	0,04%	0,01%	-0,19%	0,00%	0,51%
Extraction	0,00%	0,00%	0,06%	0,01%	0,02%
TextWapp	0,03%	-0,01%	-0,43%	-0,04%	-0,03%
LightMnfc	-0,05%	-0,23%	-0,45%	-0,08%	-0,03%
HeavyMnfc	-0,03%	-0,08%	0,17%	0,02%	-0,06%
TrnsCmUtiCns	0,04%	0,00%	0,18%	0,04%	0,01%
OthServices	0,01%	0,00%	-0,06%	0,02%	-0,01%
Total	-0,05%	-0,07%	-0,13%	0,03%	-0,02%

*Table 35: employment changes for skilled and unskilled labour for VAR1c (data from the GTAP output, qfe)*