

Will Madagascar benefit from the South African market opening to SADC goods ?

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Abstract:

After hesitating during more than a decade, Madagascar which is already a member of COMESA (Common Market of Eastern and Southern Africa) and is negotiating the new Economic Partnership Agreement between ACP and EU as a member of ESA (Eastern and Southern Africa) group decides to join SADC (Southern African Development Community). By doing that, Madagascar expect to enhance its trade flows with SADC country in general and with South Africa in particular. But will Madagascar really gain from the South African market opening to SADC goods ?

For analyzing this issue, two kinds of modelling approaches are used. First, we use GTAP modelling to verify if each sub-division of SADC region can benefit from FTA within this community, and to check with which economic activity will gain the sub-region including Madagascar from the FTA. Then we find that FTA boosts export of the Rest of SADC to South Africa, and every sub-region will record a positive change of welfare even if safeguard measurement is implemented for several commodities.

In second stage, we focus on effect of tariff removal of South Africa to all goods from other SADC members. In this case, we use WITS/TRAINS software with its possibility of getting information on 6-digit Harmonized System description of goods. Despite the fact that the trade liberalisation reveal to be a pro-poor strategy for the Rest of SADC (excluding SACU), it looks difficult to state whether Madagascar will benefit or not from the FTA within SADC. One wonders if Madagascar is not paying now its weak linkages to Southern Africa especially with the Republic of South Africa, as competition from some SADC members is strong.

INTRODUCTION

After hesitating during more than a decade, Madagascar which is already a member of COMESA (Common Market of Eastern and Southern Africa) and which is negotiating the new Economic Partnership Agreement between ACP and EU as a member of ESA (Eastern and Southern Africa) group decides to join SADC (Southern African Development Community). By doing that, Madagascar expects to enhance its trade flows with SADC country in general and especially with South Africa.

The decision to join SADC seems at first to be political. It still represents a debate within Malagasy business. Skepticism exists on the gain from this regional integration ; one wonders if it will not rather result on the falling down of production, on the retrenching employees. So at the time being, if industry association and organized employer do not make pressure on the Government to scrap the decision to join SADC, they are doing lobbying to implement safeguard measurement in order to protect Malagasy industry. Furthermore, if people believe the economy in general will benefit from this regional integration, one does not want the deepening integration to go farther than a Free Trade agreement (FTA). Indeed, a rapid survey carried out in a sample of 105¹ companies gives the following information : if an absolute majority of companies agrees on a tariff reduction within SADC, the proportion of those in favor of integration within SADC declines when it is question of FTA, and finally represents less than half of companies when it is question of customs union or common market. The fear of deepening integration may due here to different facts such as the lack of linkage with Africa, the introversion of Malagasy economy, lack of competitiveness.

Theory asserts that consumer will gain because of tariff alleviation and its implication on cutting down of imported goods price and on increasing competition on the domestic market. But what about producers and exportation of Madagascar to SADC ? Will Malagasy exportation to SADC increase ? If not, integration within SADC is questionable. Will the FTA leads to an economic growth ? Because of all of that, it is a priority for Madagascar to know if it can gain from the integration within SADC and to realize an analysis on this issue, and that is the interest of this present study.

Two kinds of modelling approaches are used for this study. First, we use GTAP modelling to verify if each sub-division of SADC region can benefit from FTA between this community, and to check with which economic activity will gain the sub-region including Madagascar from the FTA. Our study is limited to this step given the fact that data of Madagascar (say Malagasy data) separated from other regions are not available from the moment being. In order to analyze the direct impact integration of Madagascar within SADC (i.e what may be the effects on the Malagasy economy), two versions of GTAP data base are used. The first one is an adaptation of the EU-South Africa FTA 21*10 (post-altertax). The Economic activity is divided into 21 parts, and the world in 10 regions. From this basic version, the changes we improve are both in the closure and the shock.

For instance, the fixed exportation of Botswana of meat to Europe, of Diamond is relaxed, likewise for tariff reduction between the EU and South Africa. But the fixed ratio of trade balance to income of all developing regions, with savings as a proportion of income being treated as variable are maintained. For the shock, only import duty removal is implemented within SADC.

The second one is also an extension of the EU-South Africa 7*5 with improvement in unskilled labour endogenization for the South Africa, the Rest of Southern of Africa, and the Rest of sub Saharan Africa.

¹ Deepening integration within SADC, perception of Malagasy businesses and Non State Actors, by Eric RAMILISON, a Friedrich Ebert Foundation study.

In second stage, we focus on effect of tariff removal of South Africa to all goods from other SADC members. In this case, we use WITS/TRAINS software with its possibility of getting information on 6-digit HS description of goods.

As these two modelling neither refer to the same equation of behaviour of agents nor to the same measurement of indicator like welfare, and they have neither the same principle (GTAP refers to a general equilibrium, while WITS/TRAINS is a partial-equilibrium depending), the results of their simulation should not be compared. Nevertheless, they may come out of the same tendency. And we think, there may be complementarities in their findings, thus carrying out study with the two approaches can be helpful in understanding how integration of Madagascar within SADC may result.

The paper is divided in two chapters. The first refers to simulation of FTA within SADC with GTAP modelling. Three simulations are made for understanding how parts of SADC benefit from the FTA. Two of them are based on 21 commodities and 10 regions version of GTAP (in the second some restriction are improved on the commodities covered by the FTA), while the third relates to a 7 commodities and 5 regions version of GTAP.

The second chapters analyses the negative effect of South African market opening to all SADC goods to export of Madagascar to South Africa. The tools used for the analysis in this section is WITS software. A general conclusion ends up the report.

I. – GTAP MODELLING OF FREE TRADE AGREEMENT (FTA) WITHIN SADC

IA. - SIMULATION OF FTA WITHIN SADC with 21 commodities and 10 regions GTAP MODELLING

From the EU-South Africa FTA 21*10, we simulate FTA within SADC (that means within the following country or regions: Botswana, the Rest of SACU, the Rest of SADC). Because of the union custom within SACU, a fixed proportion share of tariff revenue is set up in the simulation between Botswana and the Rest of SACU. No restriction is introduced in Botswana exportation, while the shock consists of reducing to zero the import tariff in bilateral trade within Botswana, the Rest of SADC and the Rest of SACU. In order to capture the unemployment of unskilled labour, the real wage rate for this endowment commodity was fixed exogenously, and its supply was endogenised. Our simulation is a derived version of those one made by Scott Mc Donald and Terrie Walmsley : “Bilateral Free Trade Agreements and customs unions”.

Two kinds of simulation are done here. In the first stage, we simulate FTA with no restriction in commodities, while in the second stage, the following commodities : dairy products, textiles, vehicles and transport equipment, sugar and sugar products and grain crop are removed from the FTA.

IA1. - Simulation of FTA within SADC with no restriction in commodities

Impact on economic growth

Table 1
Aggregation of Commodities

Commodity description	GTAP Commodities
Grain Crops	Paddy rice, Wheat, Cereal grains nec.
Vegetables and fruits	Vegetables, fruits, nuts
Other agriculture	Oil seeds, sugar cane, sugar beet, plant-based fibers, crops nec., forestry , cocoons, fishing,
Livestock agriculture	Bovine cattle, sheep and goat, horse, wool silk-worm
Fuels & Minerals	Coal, Oil, Gas, Minerals nec.
Meat products	Meat products, horse meat products
Dairy products	Dairy products
Sugar and sugar products	Sugar
Other food products	Vegetable oils and fats, processed rice, food products nec.,
Beverages and tobacco	Beverages and tobacco products
Textiles	Textiles, wearing apparel, leather products
Wood and paper	Wood products, paper products, publishing
Petroleum and chemical products	Petroleum, coal products, chemical, rubber, plastic products, minerals products
Metals	Ferrous metals, Metals nec.
Metals products	Metal products
Vehicles and transport equipment	Motor vehicles and parts, transport equipment nec.
Other Manufacturing	Electronic equipment, Machinery and equipment nec., manufactures nec.
Utilities	Electricity, Gas manufacture, distribution, water
Construction	Construction
Trade, transport and communication	Trade, Transport nec., Sea transport, Air transport, communication
Services	Financial services nec., insurance, business services nec., recreation and other services, PubAdamin/Defence/Health/Educat, Dwellings

Table 2
Aggregation of Regions

Model Region	GTAP 5 Regions
Botswana	Botswana
South Africa	SACU less Botswana
The Rest of SADC	Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, the Rest of southern Africa
The Rest of Africa	Morocco, the Rest of north Africa, Uganda, the Rest of sub-saharan Africa
EU	Austria, Denmark, Finland, France, Germany, United Kingdom, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, Belgium
NAFTA	Canada, the United States of America, Mexico
MERCOSUR	Argentina, Brazil, Uruguay
The Rest of Europe	Switzerland, the Rest of EFTA, Hungary, Poland, the Rest of Central European, Assoc
The Rest of America	Central America and the Caribbean, Colombia, Peru, Venezuela, the Rest of Andean Pact, The Rest of South America
The Rest of the world	Australia, New Zealand, Chile, China, Hong Kong, Japan, Korea, Taiwan, Indonesia, Malaysia, Philippines, Singapore, Thailand, Viet Nam, Bangladesh, India, Sri Lanka, the Rest of South Asia, Former Soviet Union, Turkey, the Rest of Middle East, the Rest of the World

The FTA within SADC will generate an economic growth in the community. While there is no change in GDP for other region, Botswana turns to be the first to gain in term of economic growth. GDP will grow by 2.21% for Botswana, whereas this increasing rate is estimated to 0.7% for South Africa and 0.96% for the other SADC countries.

Table 3
Change of some indicators by sub regions of SADC

Country or region	GDP growth rate (%)	Welfare equivalent change (millions USD)	Growth rate (%) of volume of aggregate import	Growth rate (%) of volume of aggregate export	Consumption price index of private household
Botswana	2.21	126	6.76	5.30	-2.166
The Rest of SACU	0.7	1227.6	4.20	3.21	0.577
The Rest of SADC	0.96	351.9	10.16	10.14	-0.740

Source : GTAP 5.4, model estimates

As an evidence of non effect or weak impact on economic growth for the other regions, almost commodities of other regions will observe a change of output at a rate less than 0.05% in absolute value. An exception is to be noticed here for sugar and sugar products. Demand of this commodity will decline by 0.17% in Mercosur region.

For the Rest of SADC, dairy product will gain more compared to other commodity in term of economic growth because this economic activity will experience the highest increasing rate of demand in the Rest of SADC: 49.84%. Then, come others economic activities like sugar and related goods (13.35% of output increasing rate), textiles (11.58%) and construction (6.81%).

Growth of output appears to be more moderate for other commodities (growth rate less than 4%), and even if reducing of output is observed in the Rest of SADC, (for instance for vegetables and fruit,

minerals, petroleum and chemical, services) decreasing rate is limited because in worst case, it is estimated to -1.19% (for vegetables and fruits).

However the highest growth of GDP is for Botswana, discrepancy of the output growth of commodity is also noticed in this country. Change rate of output, due to tariff removal within SADC ranges from -69.88% for sugar and sugar products to 52.20% for textiles. Output will fall down by 22.75% for beverages and tobacco and, respectively by 8.58%, 7.28%, 5.67%, and 2.61%, for other food products, dairy products, other agriculture, and grain crops. Moreover, the output demand increases by 37.87% for vehicles and transport equipment, respectively by 15.56%, 14.53%, 7.85%, 7.12%, for metals products, other manufacturing, metals and petroleum and chemical. Relaxing fixed export of minerals does not result in increasing output of the related economic activity. Growth rate of minerals output is equal to 0.000%.

For the Rest of SACU (represented by South Africa), out of 21 commodities, the 9 following will observe a reduction of their output. Grain crops (-1.58% change of output), vegetables and fruit (-0.15%), other agriculture (-1.11%), livestock (-0.07%), minerals (-0.38%), dairy products (-1.89%), sugar and sugar products (-6.34%), beverages and tobacco (-1.90%) and metals (-2.29%). The commodities benefiting more of increasing of their demand are textiles (5.34%), metals products (4.87%), vehicles and transport equipment (5.74%), other manufacturing (4.64% change of output).

We should highlight here that the impact of FTA within SADC on demand of one commodity, in case of the Rest of SACU, is always in weak magnitude given the fact that South Africa is very powerful in term of economy compare to the other SADC countries.

Trade growth

Change in importation

The FTA enhances regional trade within the SADC countries. The only regions where an increasing of their importation is recorded are Botswana, the Rest of SACU (say South Africa), and the Rest of SADC. Total import volume grows by 6.76% in Botswana, 4.20% for the Rest of SACU, and 10.16% for the Rest of SADC. For the other regions, the growth rate of volume of merchandise imported is so low (less than 0.02% in absolute value) that we can state that there is a stagnation of importation.

With its highest increasing rate of volume of importation of aggregate tradeable commodities, the importation of the Rest of SADC rises especially for sugar and sugar products, other manufacturing, vehicles and transport equipment, metal, wood and paper, metal products, minerals, textiles, vegetables and fruits, beverages and tobacco, and other agriculture. For these mentioned commodities, the increasing rate of volume of importation ranges between 9.02% (the lowest for other manufacturing) and 83.27% (the highest for other agriculture).

For the Rest of SACU, which seems to observe the lowest change of volume of total importation, exceptionally the volume of importation of sugar and sugar products will spread by 142.04%, which means that the volume of importation of these goods will be more than two-time higher after the FTA. At the same time, beverages and tobacco, dairy products, other agriculture, grain crops, and textiles will register a growth rate of 63.97%, respectively 21.40%, 15.65%, 9.71%, 8.60% of the volume of their importation, whereas for the other kind of goods, the growth rate is limited under 7%.

Even if Botswana is a meat exporter (to Europe, and South Africa), because of tariff removal within SADC, the importation of meat products especially from SADC will rise by 20.55%. But meat products

are not the only commodity to experience an increasing of importation. So are the situations for beverages and tobacco, textiles, metals, metals products, and dairy products. The increasing of the volume of importation of these commodities reaches 14.53% for dairy products and spreads to 39.90% for beverages and tobacco. Growth rate is less relevant for other commodity, (9.36% for other agriculture and limited under 6% for other goods & services).

Table 4
Growth rate (%) of volume of import of tradeable commodity
(Tariff reduced to zero for bilateral trade within SADC for all commodities)

Commodity / Region	Botswana	The Rest of SACU	The Rest of SADC
Grain crops	-2.65	9.71	3.41
Vegetables and fruit	0.89	5.73	21.85
Other agriculture	9.36	15.65	83.27
Livestock	2.28	1.19	8.67
Fuels and Minerals	5.97	2.57	17.44
Meat	20.55	3.54	4.12
Dairy products	14.53	21.40	1.16
Sugar and sugar products	-6.87	142.04	10.59
Other food products	2.99	6.97	8.12
Beverages and tobacco	39.90	63.97	25.83
Textiles	20.51	8.60	19.67
Wood and paper	2.65	3.76	18.68
Petroleum and chemical	4.06	2.54	7.72
Metals	20.32	3.69	9.84
Metals products	14.84	5.00	18.22
Vehicles and transport equipment	3.10	4.96	13.57
Other Manufacturing	3.89	2.94	9.02
Utilities	3.09	1.92	0.90
Construction	4.97	3.99	0.20
Trade and communication	4.29	2.19	0.67
Services	4.53	2.55	0.74

Source : GTAP 5.4, model estimates

Change in exportation

The change of exportation after a shock in trade shows how much countries react to this shock. A positive change of export from one country means that this one takes an advantage from the shock. Its products may become more competitive (for instance because of tariff reduction price of goods from this country becomes cheaper), whereas a negative change of the export indicates a loss of competitiveness. Because of all of these possibilities, it is interesting to know what happen to export.

Like in the case of importation, Botswana, the Rest of SACU and the Rest of SADC happen to be the only regions to gain in term of exportation. The volume of total export rises respectively by 5.30%, 3.21%, 10.14%, for these regions, while reduction of export in volume is always below 0.02% (in absolute value) for other regions. That means diversion effect of FTA within SADC on exportation of other region is limited. Nevertheless, the exportation in volume of beverages and tobacco from the Rest of sub Saharan Africa will be cut down by 3.70%, so will be for metals products (-1.00% of reduction) for exportation in volume from the Rest of sub Saharan Africa. Exportation of sugar and sugar products from Mercosur region will fall down by 1.07%. For other commodity, and for all regions, change in volume of export remains below 1% in absolute value.

The Rest of SADC will basically gain in term of increasing of export volume by commodity because of FTA within SADC. Except for minerals, “utilities”, and services of which the volume of exports will decrease by 0.21% respectively 2.05% and 1.69%, exportation will increase for all tradeable commodities. Exportation will expand for economic activities like dairy production, or beverages and tobacco. Flows of exportation of these commodities will be respectively more than six times and four times more important. But exportation will reach also high rate growth for commodity like grain (28.62%), wood and paper (40.45%), metals products (68.26%) other food (33.29%) meat product (25.07%), textiles (38.53%).

Dairy product, beverages and tobacco, textiles, petroleum and chemical are all sectors existing in Madagascar. Unfortunately, except textiles in which operates many exporting companies (Madagascar at this time benefits the AGOA: African Growth Opportunity Act), almost of products of these sectors are for domestic sale, so the ability of Madagascar to react in the same way like The Rest of SADC as a whole is very questionable.

Table 5
Growth rate (%) of volume of export of tradeable commodity
(Tariff reduced to zero for bilateral trade within SADC for all commodities)

Commodity / Region	Botswana	The Rest of SACU	The Rest of SADC
Grain crops	-7.92	-2.52	28.62
Vegetables and fruit	-2.34	0.07	2.60
Other agriculture	-10.95	0.39	6.25
Livestock	-2.01	-1.08	1.55
Fuels and Minerals	-0.01	-1.73	-0.21
Meat	1.67	-2.21	25.07
Dairy products	3.80	-14.69	572.63
Sugar and sugar products	-70.01	6.56	16.44
Other food products	2.01	5.25	33.29
Beverages and tobacco	-5.71	12.68	337.53
Textiles	57.95	27.34	38.53
Wood and paper	12.75	5.45	40.45
Petroleum and chemical	13.93	9.11	21.25
Metals	7.27	-3.64	5.10
Metals products	-0.84	33.40	68.26
Vehicles and transport equipment	38.09	34.41	66.93
Other Manufacturing	25.83	12.85	13.69
Utilities	-6.34	-4.56	-2.05
Construction	-2.24	-2.88	3.18
Services	-4.83	-3.86	-1.69

Source : GTAP 5.4, model estimates

For the Rest of SACU, the decreasing of exportation in volume is observed for tradeable commodities like grain, livestock, minerals, meat products, dairy products, metals, utilities, construction, and services. Highlight should be done here in change of exportation of manufacturing. As South Africa is the most industrialized country in Africa, FTA within SADC drives high increasing of exportation of metals products (33.4%), vehicles and transport equipment (34.41%), textiles (27.34%) other manufacturing (12.85%), beverages and tobacco (12.68%), petroleum and chemicals (9.11%), sugar and sugar products (6.56%), wood and paper (5.45%), other food products (5.25%).

Exception is observed here for dairy products. The exportation of this aggregate good will fall down by 14.69%, which may explain its exclusion at first time from FTA.

Botswana will see its volume of exportation increase for textile (57.95%), vehicles and transport equipment (38.09%), other manufacturing (25.83%), petroleum and chemicals (13.93%), wood and paper (12.75%), whereas sugar and sugar products (-70.01%), other agriculture (-10.95%), grain crops (-7.92%) undergo serious falling down of their export.

Effect on domestic sales

Two reasons motivate to consider a good a sensitive product, and to exclude it from the FTA. The first one refers to trade balance deficit, while the second relates to the loss of producer, to the retrenching of employees. We try to have more idea about the second effect through analysis of domestic sales change, or change of demand. The reduction of domestic sale or demand means that the related economic activity is facing competition from importation and that may result in closing down of plant. That is why it is interesting to analyse change of domestic sale. Of course, a mistake is made if one only focuses on change of domestic sale to justify that one commodity should be regarded as a sensitive product, as a part of output can be exported while another is for domestic sale. But if the destination of whole production is domestic market then the analysis of either output change or domestic sale change gives the same findings.

For the Rest of SADC, only six economic activities among twenty one register an increasing of domestic sales. These six economic activities are: grain crops, other agriculture (not comprising fruits and vegetables, grains), livestock, utilities, construction, trade and communication. For them, the growth rate of domestic demand ranges from 0.05% (for other agriculture) to 6.85% for construction. Most important decreasing rate of domestic sales is for sugar and sugar products (-24.18%), then come equivalent decreasing rate for vehicles and transport equipment (-18.12%), metals (-10.12%), textiles (-6.55%), that means competition from importation is keen for these commodities.

There is also decreasing of domestic sale for wood and papers (-3.96%), dairy products (-2.86%), beverages and tobacco (-1.92%), petroleum and chemical (-1.07%), other manufacturing (-3.89%), vegetables and fruits (-1.77%), metals products (-1.67%). If all of these tendencies are also verified in Madagascar which has similar economic characteristics to the Rest of SADC, then we can state that Madagascar (in which the whole production of these commodities is for domestic market), may be in trouble when opening its market to those related goods.

Like the case of the Rest of SADC, either for Botswana or the Rest of SACU (say South Africa), domestic sales of sugar and sugar products will face the highest magnitude of decreasing because of tariff removal. Decreasing rate will reach -54.82% and -14.30% for these regions. That is why, these regions strongly suggest that sugar and sugar products should be classified as sensitive products not to be covered by FTA. The falling down of domestic sale of dairy products (by -7.41% in Botswana) of textiles (-6.55% in the Rest of SADC) justifies also why trade protocol excludes these commodities from FTA, while there is not evidence of such effect for vehicles and transport equipment in the Rest of SADC.

For Botswana, after sugar and sugar products, and dairy products, beverages and tobacco, other food products, other agriculture, grain crops, will face a decreasing of domestic sales by respectively: 11.47%, 5.06%, and 2.50%.

The Rest of SACU, which is dominated by South Africa, will see domestic sales decreasing for the following commodities: sugar and sugar products, beverages and tobacco (-2.70%), dairy products (-1.46%), grain crops (-1.39%), other agriculture (-1.32%), other food products (-0.48%), vegetables and fruits (-0.32%). It is worthy to mention that for the Rest of SACU, except for sugar and sugar products, magnitude of decreasing is very low.

Gain in welfare and consumption price change

Gain in welfare and consumption price reduction is among positive impacts expected from trade liberalisation. The FTA within SADC will implicate private household price of consumption reduction by 2.166% in Botswana and by 0.740% in the Rest of SADC. In counter part, this indicator will rise by 0.577% in South Africa.

Only Botswana, South Africa and the Rest of SADC will gain in term of welfare equivalent change after a FTA between SADC. The gain is respectively estimated to 126 millions USD for Botswana, 1 227.6 millions USD for South Africa and 351.9 millions USD for the Rest of SADC.

Welfare decomposition shows that if South Africa relatively gains more in term of trade effect compare to Botswana (weight of term of trade effect is 22.31% for South Africa and 9.28%), in counter part, share of allocative efficiency is more important for Botswana (23.57% of total welfare) than for South Africa (13.48% of total welfare). For the two regions, endowment effect (due to growth in employment of unskilled labour) represents a substantial component of change in welfare (66.38% for South Africa and 59.92% for Botswana). The case of the Rest of SADC is somewhat different. Negative effect is observed in term of trade effect and in allocative efficiency effect, so endowment effect explains more than gain in welfare change. Endowment effect represents here 123.33% of gain in welfare in the Rest of SADC.

Change in demand for unskilled labour

Except the Republic of South Africa, Botswana, Swaziland and Namibia, the members of SADC are Less Developing Countries. In other world, developing strategy which can tackle poverty is emphasized and encouraged in these countries. Because of that, it is interesting to know how the FTA results in job creation or in demand for unskilled labour.

According to the equation behaviour of agents in GTAP CGE modelling, demands for endowment commodities are relevant to the expectation of output or value added, so the more increase the output or value added the more grows the demand for endowment commodity. So like outcome in output change, tariff removal within SADC result in high growth of demand for unskilled labour in the Rest of SADC in economic activities like dairy production, sugar and related goods production, textiles, construction. Growth rates of demand of unskilled labour for these economic activities are respectively 53.57%, 16.03%, 14.26%, and 9.40%. But in fact, in the Rest of SADC, demand for unskilled labour will increase except for vegetables and fruits and minerals.

In counter part, Botswana will experience a cut down by 69.19% respectively 19.56% of demand in unskilled labour in sugar and sugar products, and in beverages and tobacco production. Botswana may face retrenching of unskilled labour employees in these economic activities. In other hand, demand for unskilled labour will rise by 55.38% for textiles, 43.07% for vehicles and transport equipment, 19.73% for metals products, 12.33% for trade and communication.

On the contrary to the discrepancy in change in case of Botswana, for South Africa, the change in demand for unskilled labour is always moderate like it will happen for the variation of output after the shock in tariff removal. In absolute value term, changes of demand for unskilled labour never exceed 7%, so while it is estimated to 6.51% for vehicles and transport equipment and 5.83% for textiles, 5.49% for metals products the most relevant reduction at -5.80% is reached by sugar and sugar products. So we can say that employment in South Africa is moderately affected by the shock in tariff.

The main finding from the analysis here is that the Rest of SADC will be the first to benefit from job creation (for unskilled labour) if the FTA covers all goods. Unfortunately, commodities in which the Rest of SADC will observe highest growth of demand for unskilled labour are those which will be excluded from FTA.

Some commodities compared to others are likely to be more affected negatively by the shock of tariff removal. Such commodities are :

- Sugar and sugar products. The domestic sale of this commodity will fall down especially in Botswana, and in the Rest of SADC, this fact results on drastic reduction of demand for unskilled labour for sugar production in Botswana and on moderate reduction in South Africa.
- Dairy products. The export from the Rest of SACU in this commodity will decline and so will its domestic sale in Botswana and its output in Botswana.
- Textiles, this commodity will experience an increasing of import in Botswana and in the Rest of SADC but the major fact relates to decreasing of domestic sale in the Rest of SADC.
- Vehicles and transport equipment which domestic sale in the Rest of SADC will decrease.

The negative effect they are facing justifies why these commodity are in first time excludes from FTA within SADC (trade protocol stipulates that in FTA within SADC will be established in 2008 for at least goods representing 85% of bilateral trade flows, while safeguard measurement will be removed step by step until 2012 for the 15% left goods). Because of such agreement, an other simulation will be made henceforth with some restriction in the commodities shocked with tariff removal.

IA2. – Simulation of FTA within SADC with some restriction in commodities

Model closure and shock are similar to the former simulation but there is some change in commodities covered by the tariff removal. As dairy product, cotton, leather made shoes, sugar, wheat and flour, vehicles, transport equipment and their parts are regarded in trade protocol of SADC as sensitive products, (that means, for the out coming FTA in 2008 tariff for these commodities will be maintained) commodities to which they belong in our 21 commodities GTAP model will be removed from our FTA simulation. So the following commodities will no longer have their bilateral tariff within SADC reduced to zero :

- dairy products, textiles, sugar and sugar products, grain crops, vehicles and transport equipment and their part.

Impact on output

There is no longer a lot of change of output when grain crops, dairy products, sugar, textiles, vehicles and transport equipment are removed from FTA. According to such change in the simulation, for the Rest of SADC, variation of output in percentage is restricted below 8%. For instance, the output of dairy products stagnates, as its growth rate is estimated to 0.026%, while output of textiles, sugar and sugar products, grain crops grows slightly by 2.08% respectively 1.15%, 0.50%. Despite of its removal from FTA, vehicles and transport equipment demand still rises by 7.57%, at the highest increasing rate for all commodities for the Rest of SADC.

Finally, for the Rest of SACU, sectors which will observe the highest increasing of output are beverages and tobacco, vehicles and transport equipment, metals, construction and other manufactures. The growth rate of output of other manufactures is estimated to 3.70%, whereas it is equal to 6.75% for beverages and tobacco.

For South Africa, negative effect of the removal of grain crops, dairy products, sugar, textiles, vehicles and transport equipment from FTA within SADC is observed. Because of such decision, output will

decrease by 0.93% for vehicles and transport equipment, by 0.711% respectively 0.48% and 0.47% for textiles, sugar and sugar products, grain crops. Like in the case of the Rest of SADC, there will be a stagnation of output for dairy products as the growth rate is estimated to 0.01% only.

Except metals products and other manufactures which output will respectively rise by 4.13% and 4.82%, change in percentage of output is always lower than 2%.

In the case of Botswana, safeguard measurement applied to dairy products, sugar and sugar products, vehicles and transport equipment permits increasing by 3.20% respectively 2.42% and 2.97% of demand on these commodities. Increasing rate is largely weaker for textiles : 0.82%, while output will decrease by 1.42% for grain crops.

One wonders here why Botswana did not negotiate beverages and tobacco to be removed from FTA as output of this sector will drop by 23.08%. But beverages and tobacco is not the only economic activity to experience negative effect of trade liberalisation within SADC. So are other food manufactures and other agriculture with their respective cut down by 9.11% and 5.30% of their output. In counter part, other manufactures, metals, petroleum and chemical seem to be not threaten by competition of imported goods from other SADC country as their output will expand respectively by 6.41%, 6.35% and 5.81%.

Impact on import

Table 6
Growth rate (%) of volume of import of tradeable commodity
(Tariff reduced to zero for bilateral trade within SADC with some restriction in commodities)

Commodity / Region	Botswana	The Rest of SACU	The Rest of SADC
Grain crops	-3.82	0.62	1.00
Vegetables and fruit	-0.37	4.27	19.16
Other agriculture	8.67	15.37	83.11
Livestock	2.44	0.77	5.54
Fuels and Minerals	3.49	2.29	17.24
Meat	25.13	1.95	3.15
Dairy products	1.40	0.96	-0.89
Sugar and sugar products	0.83	0.90	-0.36
Other food products	6.30	5.07	6.45
Beverages and tobacco	72.08	30.36	14.59
Textiles	0.55	1.00	-0.57
Wood and paper	1.06	2.82	12.85
Petroleum and chemical	0.98	1.64	5.61
Metals	1.58	2.65	7.53
Metals products	1.06	3.48	10.29
Vehicles and transport equipment	0.89	2.09	2.80
Other Manufacturing	0.37	1.79	5.09
Utilities	-0.47	1.26	0.18
Construction	0.39	2.33	-0.88
Trade and communication	0.67	1.32	0.017
Services	0.90	1.46	-0.07

Source : GTAP 5.4, model estimates

When removed from FTA, grain crops, dairy products, sugar and sugar products, and textiles will no longer observe high growth of their importation either in Botswana, in South Africa or in the Rest of

SADC. The highest increasing rate of importation of these commodities is: 1% for grain crops which is noted in the Rest of SADC, 1.40% for dairy products (noticed in Botswana), 0.9% for sugar and sugar products which is observed in South Africa, and 1% for textiles in South Africa.

Vehicles and transport equipment represents the sensitive products for which importation demand remain higher. Even though, the increasing rate is moderate because it reaches at most 2.80% for the Rest of SADC.

The Rest of SADC remains to be the most dynamic in import when sensitive products are removed from FTA. Volume of total import of this region will increase by 6.50% while equivalent growth of volume in import are 2.4% for South Africa and 1.48% for Botswana. Compared to what happen if there is no restriction on commodities, growth rate of import in volume will be cut down with higher magnitude for Botswana and South Africa than for the Rest of SADC: to one fourth of equivalent magnitude when there is non restriction in case of Botswana, to half for South Africa, and to 63.68% for the Rest of SADC. That means, restriction reduces drastically the expected change in import. Nevertheless, it is worthy to mention that like with FTA with no restriction in commodities, the increasing of imported volume of goods is more relevant for some commodities than for others. In this case, import demand for meat products and beverages and tobacco will rise by 25.13% and 72.08% in Botswana.

In the Rest of SACU, import demand for other agriculture, beverages and tobacco will grows by respectively 15.37% and 30.36%. Finally, in the Rest of SACU, six kinds of goods will observe high growth of import demand. These goods are produced or related to vegetables and fruits, other agriculture, minerals and fuels, beverages and tobacco, wood and paper, metals products. Growth rate of import demand ranges from 10.29% for metals products to 83.11% for other agriculture.

Such increasing of import demand of goods mentioned formerly testify opportunities of exportation that Madagascar should take in account in order to benefit from the FTA.

Impact on export

When grain crops, textiles, vehicles and transport equipment, sugar and sugar products and dairy products are not included in FTA increasing rate of volume of aggregated commodity declines to 0.94% for Botswana, 1.79% for the Rest of SACU (say South Africa) and 6.62% for the Rest of SADC. That means there is not much benefit for Botswana and South Africa in term of export, meanwhile gain for the Rest of SADC remains not insignificant.

For the Rest of SADC, commodities like beverages and tobacco, metals products, wood and paper, other food products, petroleum and chemical and meat products keep their dynamism in term of export observed with the simulation with no restriction in commodities for FTA. So growth rate of volume exported of beverages and tobacco is estimated to 341.06%, while equivalent rates are equal to 66.90% for metals products, 34.71% for other foods and 26.67% for meat products.

But except for vehicles and transport equipment, for which growth rate of volume of export is equal to 10.14%, for the four other commodities say: grain crops, dairy products, sugar and sugar products, and textiles whose output are considered as sensitive goods, the growth rate of export is henceforth limited (less than 3.3%).

Like in case of the Rest of SADC, exclusion from FTA cut down the change in volume of export of sensitive goods from Botswana or the Rest of SACU. In absolute value, percentage change of volume will

never exceed 4% for export of the following commodities: vehicles and transport equipment, textiles, sugar and sugar products, dairy products, and grain crops.

Table 7
Growth rate (%) of volume of export of tradeable commodity
(Tariff reduced to zero for bilateral trade within SADC with some restriction in commodities)

Commodity / Region	Botswana	The Rest of SACU	The Rest of SADC
Grain crops	1.54	-1.91	0.47
Vegetables and fruit	0.64	0.76	4.27
Other agriculture	-8.21	1.09	8.05
Livestock	-0.75	-0.51	3.15
Fuels and Minerals	0.00	-1.47	0.38
Meat	5.09	-1.61	26.67
Dairy products	2.57	0.08	2.25
Sugar and sugar products	2.43	-1.21	1.17
Other food products	2.37	5.73	34.72
Beverages and tobacco	-2.98	13.84	341.06
Textiles	0.78	-2.44	3.30
Wood and paper	15.01	6.35	39.82
Petroleum and chemical	14.99	9.48	21.81
Metals	6.41	-2.08	7.24
Metals products	0.53	31.58	66.90
Vehicles and transport equipment	2.98	-3.85	10.14
Other Manufacturing	20.86	13.69	14.82
Utilities	0.31	-3.01	0.56
Construction	0.69	-1.76	4.27
Services	0.13	-2.30	-0.26

Source : GTAP 5.4, model estimates

In other hand, Botswana will see export of wood and paper, petroleum and chemical, other manufactures, metals, meat products, expands respectively by 15.01%, 15.00%, 20.86%, 6.41%, 5.09%. In the Rest of SACU, commodities which observe high increasing of export are: metals products, beverages and tobacco, other manufactures, and other food products. Growth rate of volume exported is respectively equal to 31.58%, 13.84%, 13.69% and 5.72% for these sectors.

Impact on domestic sales

Because of tariff maintaining in importation for some sectors, domestic production will not much suffer from foreign competition so domestic sale will not record an important reduction for sensitive products like grain crops, dairy products, sugar and sugar products, textiles, vehicles and transport equipment. When reduction is observed, its highest rates are: -1.48% for grain crops (noticed in Botswana, -0.20% for dairy products (in case of the Rest of SADC), -0.04% for sugar and sugar products in South Africa (but the reduction is here so weak that we can assume there is no reduction), -0.29% for textiles in South Africa and -0.46% for vehicles and transport equipment in South Africa.

But out of so-called sensitive products, some goods are likely to be substituted by their equivalents imported as falling down by 10.15% of domestic sale of metals, respectively by 4.72% and 4.64% of domestic sale of wood and paper and other manufactures tell us in the Rest of SADC. Declining of domestic sale is not restricted to these sectors in the Rest of SADC. Metals products, petroleum and chemical, minerals, vegetables and fruits, beverages and tobacco, other food products are also concerned of this issue.

In the Rest of SACU, 7 sectors will be threaten by the domestic sale reduction: grain crops, vegetables and fruits, other agricultures, other food products, beverages and tobacco, textiles and vehicles and transport equipment but the reduction is under control for almost of them as magnitude of change in percentage is less than 1%, except for beverages and tobacco with which it reaches -2.81%.

Table 8
Change rate (%) of domestic sale of tradeable commodity
(Tariff reduced to zero for bilateral trade within SADC with some restriction in commodities)

Commodity / Region	Botswana	The Rest of SACU	The Rest of SADC
Grain crops	-1.48	-0.19	0.50
Vegetables and fruit	0.91	-0.30	-1.77
Other agriculture	-4.97	-0.95	-1.13
Livestock	0.77	-0.01	0.70
Fuels and Minerals	-0.53	0.38	-2.14
Meat	-1.00	-0.1	-1.02
Dairy products	3.21	0.00	-0.12
Sugar and sugar products	0.61	-0.04	0.92
Other food products	-12.25	-0.53	-1.38
Beverages and tobacco	-23.44	-2.81	-1.74
Textiles	1.17	-0.30	1.27
Wood and paper	-0.77	.21	-4.72
Petroleum and chemical	1.74	.044	-2.13
Metals	4.80	0.87	-10.15
Metals products	0.33	0.88	-2.77
Vehicles and transport equipment	2.05	-0.46	6.70
Other Manufacturing	2.47	0.32	-4.64
Utilities	1.03	0.38	1.59
Construction	0.74	1.40	4.59
Trade, transport, communication	1.03	0.31	0.64
Services	0.94	0.17	-0.79

Source : GTAP 5.4, model estimates

Similarly to what has been seen in case of output change, for Botswana, domestic sale will drop down for beverages and tobacco, other food products and other agriculture, respectively by 23.44%, 12.25% and 4.97%, while reduction of domestic sale remains moderate for grain crops, meat products, wood and paper, minerals with the negative change lower than 1.50% in magnitude.

Impact on demand for unskilled labour

The five sensitive products which are grain crops, dairy products, textiles, vehicles and transport equipment, sugar and sugar products will not face reduction of demand for unskilled labour in the Rest of SADC. Except for grain crops for which the demand for unskilled labour will reduce by 1.18%, similar situation appears in Botswana.

In South Africa, when reduction of the demand for unskilled labour from sensitive products processes occurs, it remains limited at less than 0.54% in magnitude.

Instead of the five sensitive commodities, in Botswana, beverages and tobacco and other agriculture are the most affected by the trade liberalisation within SADC in term of demand for unskilled labour reducing. Indeed, the demand for this endowment commodity will decline by 22.04% for beverages and tobacco, by 8.71% for other food products and by 5.54% for other agriculture. At the same time, the demand for unskilled labour will increase for other economic activities especially other manufactures, petroleum and chemical, metals.

The Rest of SADC seems to be the first region to benefit from the FTA according to the positive change of demand for unskilled labour. Beverages and tobacco, metals, vehicles and transport equipment, construction and finally other manufactures reveal to be the most dynamic in term of increasing of demand for unskilled labour. The growth rate of demand for unskilled labour ranges from 5.32% (for other manufactures) to 8.98% (for vehicles and transport equipment). Only vegetables and fruit may observe a retrenching in unskilled labour job, but in a weak magnitude with the declining by 0.74% of demand for this factor.

Table 9
Change rate (%) of demand for unskilled labour by tradeable commodity
(Tariff reduced to zero for bilateral trade within SADC with some restriction in commodities)

Commodity / Region	Botswana	The Rest of SACU	The Rest of SADC
Grain crops	-1.18	-0.44	0.77
Vegetables and fruit	1.22	0.20	-0.74
Other agriculture	-5.54	-0.72	1.67
Livestock	0.97	0.01	1.04
Fuels and Minerals	0.00	-0.18	0.09
Meat	2.09	0.24	2.58
Dairy products	4.43	0.37	1.58
Sugar and sugar products	3.24	-0.16	2.64
Other food products	-8.71	0.34	3.40
Beverages and tobacco	-22.04	-1.48	8.23
Textiles	1.56	-0.45	3.61
Wood and paper	2.89	1.55	1.60
Petroleum and chemical	6.93	2.01	0.95
Metals	6.80	-0.77	6.89
Metals products	1.56	4.46	2.94
Vehicles and transport equipment	4.28	-0.54	8.98
Other Manufacturing	7.58	5.12	5.32
Utilities	2.74	0.86	3.60
Construction	2.20	1.68	6.16
Trade, transport, communication	3.06	0.63	2.54
Services	2.72	0.57	0.77

Source : GTAP 5.4, model estimates 2.14

For the Rest of SACU, except other manufactures, and metals products, for which growth rate of demand for unskilled labour reaches 5.11% and 4.46%, magnitude of percentage change is always lower than 2%, so we can conclude that FTA weakly results on unskilled labour job creating in the Rest of SACU.

Welfare change

Welfare change equivalent remains positive for all of Botswana, South Africa and the Rest of SADC. That means, restriction in commodity for the FTA still permits benefit in general for trade partners within SADC. In this present case, equivalent change in welfare is evaluated at 53.85 USD millions for Botswana, 702.87 USD millions for South Africa and 183.66 USD millions for the Rest of SADC.

Only Botswana and South Africa observe positive effect in term of allocative efficiency and in term of trade effect (Botswana gains relatively more in term of allocative efficiency, while South Africa benefits more in term of trade effect), whereas endowment effect due to increasing demand of unskilled labour explains gain in welfare for the Rest of SADC.

IB. - SIMULATION OF FTA WITHIN SADC with 7 commodities and 5 regions GTAP MODELLING

Our target in the present simulation is neither to replicate what has been done in the formers nor to compare the formers results to this one. This simulation, as sectors are more aggregated, gives a synthesis of findings, according to aggregation of commodities. More precisely ; it shows that the benefit from trade liberalisation within SADC will be more relevant for the Rest of Southern Africa for sector like unskilled labour intensive manufactures. But results at a whole can not be compared as regions for the simulations are not the same.

If in the previous simulations regions within SADC are divided in : Botswana, SACU less Botswana and The Rest of SADC, in the present simulation SADC is divided into two parts : South Africa and the Rest of Southern Africa.

Table 10
Aggregation of Commodities

Commodity description	GTAP Commodities
Agriculture	Paddy rice, wheat, cereal grains nec, vegetables, fruit, nuts, Oil seeds, sugar cane, sugar beet, plant-based fibers, crops nec, bovine cattle, sheep and goats, horses, animal products, raw milk, wool, silk-worm, cocoons, bovine cattle, sheep and goat, horse meat prods,
Extract	Forestry, Fishing, Coal, Oil, Gas, Minerals nec, Petroleum, coal products
Food	Meat products nec, Vegetables oils and fats, Dairy products, processed rice, Sugar, Food products nec, Beverages and tobacco products
Unskilled labour intensive manufactures	Textiles, wearing apparel, leather products, wood products
Skilled labour intensive manufactures	Metal products, motor vehicles and parts, transport equipment nec, electronic equipment, machinery and equipment nec, manufactures nec
Capital intensive manufactures	Paper products, publishing, chemical, rubber, plastic products, mineral products nec, ferrous metals, metals nec,
Services	Electricity, Gas manufacture, distribution, water, construction, trade, transport, financial, business, recreational services, public admin and defence, education, health, dwellings & services

Table 11
Aggregation of Regions

South Africa
The Rest of southern Africa
The Rest of sub Saharan Africa
European Union
The Rest of the World

Impact in output

Either for South Africa or the Rest of Southern Africa, Unskilled labour intensive manufactures happen to receive highest demand (evaluated in term of output growth). The demand will rise by 24.37% for this sector in the Rest of Southern Africa, while equivalent growth rate is estimated to 3.57% for skilled labour intensive manufactures, 1.78% for food manufacturing and 0.61% for agriculture.

In South Africa, positive change of output is observed only for unskilled labour intensive manufactures (growth rate equals to 1.72%), in skilled labour intensive manufactures (0.63%) and food manufacturing

(0.64%), the effect of FTA on output seems very weak for South Africa compared to what happen for the Rest of Southern Africa, similar finding appears when analysing the effect on demand for endowment.

Impact on demand for unskilled labour

FTA within SADC, with no restriction in tradeable commodities turns to be a pro-poor measurement, especially in the Rest of Southern Africa, as its permits an expanded demand for unskilled labour in unskilled labour intensive manufactures. In fact, this later sector will reach the highest increasing rate (28.59%) of demand for unskilled labour. However, other sectors in the Rest of Southern Africa will raise their demand for unskilled labour except Natural resource, extractive and related industries. Growth rate of unskilled labour demand will be equal to 7.59% for skilled labour intensive manufactures, 6.55% for services, 5.17% for food manufacturing, and 3.26% for capital intensive manufactures.

On the contrary to the findings for the Rest of Southern Africa, effect in unskilled labour demand in South Africa is very weak. Even in unskilled labour intensive manufactures, demand for unskilled labour will rise only by 2.07%.

Impact on export

Out of six exporting economic activities, half will observe within SADC (that means either for South Africa or the Rest of Southern Africa) on increasing of exportation in volume: unskilled labour intensive manufactures, skilled labour intensive manufactures, and food manufacturing. But among these three sectors, unskilled labour intensive manufacturing will be the most dynamic as its export will expand by 45.48% in the Rest of Southern Africa while in this region increasing rate of exportation of food manufacturing and skilled labour manufactures is respectively estimated to 14.58% and 12.78%.

In South AFRICA, unskilled labour manufactures will be also at the top in term of growth of volume of export. Indeed, growth rate is estimated to 17.09% for this sector whereas equivalent value are respectively 5.24% for skilled labour manufactures and 4.64% for food manufactures.

Impact on domestic sales

Competition form imported goods is dreaded because of its likely negative effect on domestic sale. But not every sector is concerned about this issue. Even if FTA is established, unskilled labour intensive manufactures, services, agriculture and skilled labour intensive manufactures will observe growth of domestic sale (respectively by 4.80%, 3.09%, 2.2% and 1.66%) in the Rest of Southern Africa.

Impact in South Africa is somewhat different. Unskilled labour intensive manufactures will face a cutting down by 2.23% of domestic sale. Equivalent reduction is very low -0.10% for skilled labour intensive manufactures, while other sector will notice an increasing, but in low magnitude (less than 0.7%).

Impact on import

Either for South Africa or in the Rest of Southern Africa, unskilled labour intensive manufactures appears to be the most dynamic in term of importation. Indeed, importation in volume of products of this sector will rise by 21.80% in the Rest of Southern Africa and by 10.05% in South Africa. But if increasing of import is moderate in South Africa (by 3.79 for agricultural goods, 2.94% for foods manufactured, and 2.65% for skilled labour intensive manufactures products), it expands for in the Rest of Southern Africa. For all goods, the growth rate of volume imported will exceed 5.7%.

Preliminary conclusion

The Results of different GTAP Simulation we carried out, show that either the Rest of SADC (SADC less SACU) or the Rest of Southern Africa (SADC less Republic of South Africa), all regions to which belongs geographically Madagascar will in general benefit from the FTA within SADC. The benefit can be assessed through different indicators like : real GDP growth, gain in welfare, reduction of household price expenditure, increasing of demand for unskilled labour, or growth of volume exported.

Unskilled labour intensive manufactures which are common to these regions reveal to be the most dynamics either in term of export or in increasing of demand for unskilled labour, so the trade liberalisation turns to be a pro-poor strategy. Even if some goods, regarded as sensitive, are excluded from the FTA, the Rest of SADC still gains from the trade liberalisation. All of these information make us think that Madagascar may also benefit from the SADC as its economy has similar characteristics to those of other members of the Rest of SADC, like Malawi, Tanzania, Mozambique.

Tariff removal within SADC boosts trade to and within the Rest of SADC and increase (but moderately) trade with South Africa. So Madagascar can take an advantage of such opportunities to promote its export to Africa, but all of that depends on Madagascar ability to penetrate the southern African market. And even though the output will grow rapidly in the Rest of SADC as a whole because of the trade liberalisation, ability of Madagascar to react like the Rest of SADC is doubtful.

Despite of hopeful results in the Rest of SADC mentioned before, other facts make also think that Madagascar may loose from the trade liberalisation. These later facts relate to the increasing of import and its negative effect (because of competition from imported goods) on domestic sale, on output and on demand for labour. Indeed, one observes falling down of domestic sale in commodities like : petroleum and chemical, other food products, vegetables and fruits, metals products, beverages and tobacco, wood and paper. The declining here seems to be moderate for the Rest of SADC, however, results may hide the magnitude of the negative effect for each country, and the effect on Madagascar is likely to be more relevant as almost of the sectors mentioned previously do not export so they probably do not have competitiveness efficiency.

But since here, no clear evidence of gain or loss of Madagascar from the FTA can be shown as we do not have a GTAP version with separated data of Madagascar, so henceforth we will check if Madagascar can gain from an opening market of South Africa to SADC goods through an analysis with WITS/TRAINS software.

II. - SIMULATION OF TARIFF ALLEVIATION ON ALL SADC GOODS ENTERING SOUTH AFRICA with the WITS/TRAINS

As the possibility offered by WITS for simulating a tariff removal is limited to one market only (in other words, to one country), we simulate here a reduction to zero of duty that goods from SADC country entering South Africa have to pay.

The interest of doing such analysis is at the time being, South Africa whose economy is the most powerful either in Africa or in SADC, and Mauritius are the only trade partners of Madagascar in SADC. Moreover, if bilateral trade between Mauritius and Madagascar is now free of duty, no preferential trade agreement has ever be negotiated between Madagascar and South Africa. Finally, South Africa is the third partner of Madagascar in its importation after EU (European Union) and China.

Trade flows between South Africa and the others members of SADC

According to the information available on trade within SADC (in 2003), the trade flow from SADC members to South Africa or in the opposite way is not balanced by partner. When we focus to South Africa export to SADC, in 2003, Zimbabwe, Mozambique, Zambia and Angola reveal to be the main destination of South African goods. The share of South African export to these SADC members are respectively 23.88%, 20.73%, 14.93% and 12.44%. At the same time, export to Madagascar is the least important as its share is only 2.76%.

Moreover, South Africa imports mainly from Zimbabwe in its trade with SADC as trade flow from this later country represents 62.15% of total import of South Africa from SADC. Similarly to the findings in export, importation of South Africa from Madagascar reveals to be among the weakest. In one sense, that means we have a lot to do to be in same level of other SADC country in term of trade with South Africa, but an other sense, this situation signifies that, given the relative relevance of its economy compared to those of countries like Swaziland, Lesotho, Madagascar is the least dynamics in South African market penetration. So if South Africa is among the main partner of Madagascar (especially in term of importation) the reverse is not true. Thus at this stage, one should wonder if Madagascar may benefit the opening of South African market to all SADC goods, specifically compared to other countries like Mozambique, Zimbabwe or Malawi.

Table 12
Trade flow between South Africa and other SADC members in 2003

SADC members	South African export (in 1 000 USD)	%	South African import (in 1 000 USD)	%
Angola	447 407,4	12,44	3 852,7	0,69
Botswana	n.a		4 039,4	0,72
DR Congo	163 615,7	4,55	4 020,7	0,72
Lesotho	n.a		21,7	0,00
Madagascar	99 248,14	2,76	1 985,3	0,35
Malawi	224 133,2	6,23	50 516,2	9,03
Mauritius	271 407,0	7,55	16 427,9	2,94
Mozambique	745 571,4	20,73	36 868,0	6,59
Namibia	n.a		573,4	0,10
Swaziland	n.a		43,4	0,01
Tanzania	248 912,6	6,92	17 940,9	3,21
Zambia	536 963,4	14,93	75 512,8	13,49
Zimbabwe	858 625,8	23,88	347 845,9	62,15
Total	3 595 885	100	559 648,3	100

Source : WITS/COMTRADE, World Bank, author calculation, n.a : not available.

Difference of duty by origin

Actually, South Africa observes different level of duty to goods from SADC entering its market by origin. If there is no taxes due for SACU products, the most relevant duty, according to MFN (Most Favoured Nation) duties, are recorded for goods coming from Madagascar and Malawi. Averages of applied tariff are respectively equal to 15.28% and 14.75% for those countries. Applied tariff are in intermediate level for commodities imported from Mauritius, Zimbabwe and Mozambique as their averages are estimated to 9.59%, 7.95% and 6.94%.

The difference of duty by importing country suppose that the advantage that partners will get from tariff removal are not the same. For every thing equal a country from which duty of goods to be paid is more relevant turns to be more competitive when tariff is reduced to zero. But the advantage does not relate

only to tariff reduction. The reality is more complicated, the advantage depends also on other facts like the kind of goods, the relevance of trade flow. Unfortunately, this later fact is in disadvantage of Madagascar.

Results of simulation of tariff removal for SADC goods entering South Africa

In the context of tariff removal of SADC goods entering South Africa (but excluding cotton, silk, cotton and silk cloth, sugar, leather made shoes, dairy products, wheat made flour, vehicles and transport equipment) countries which will register an increasing of their export to South Africa are all members of SADC.

The first winners will be Malawi, Zimbabwe, Mozambique and Mauritius. Total effect of their exportation (that means trade creation in South Africa because of price reduction plus trade diversion from other partners) to South Africa are respectively equal to 26.4 millions of US dollars (say USD), 24.9 millions USD, 5.7 millions USD and 2.07 millions USD. We notice here that the more a country export the more its gain in total effect if there is a positive change in its export.

But the analysis shows that not every SADC members will record an increasing of their export to South Africa. Trade flow will stagnates for almost of SACU members, even if importing price of their goods will not change in South Africa. So opening market of South Africa to all SADC goods does not affect their export to South Africa. Nevertheless, no change of price for one partner and reducing for an other means that for the first one, the same good becomes relatively more expensive. Because of that, there is a trade diversion (in other words, a part of exportation of country which price does not change shifts in beneficiary of an other recording a reduction of its price). Thus in case of Botswana value of export to South Africa will decline by 3.66 thousand USD. This represents mainly losses of Botswana in meat products.

In fact in term of trade diversion, all country observing an increasing of export will record also a trade diversion. According to the relevance of the value of their export to South Africa, the big winners in term of trade diversion are Zimbabwe, Malawi, Mozambique and Mauritius, with the following respective trade diversion they get : 6.4 millions USD, 5.04 millions USD, 1.29 millions USD and 765 thousand USD. In this way, Malawi will bring into line all losses of South Africa partners in the market of cotton made pants, pants with sling, short (code 610342 of harmonised system of 1996). Mauritius and Mozambique will share for their own account the losses of other countries in cotton made t-shirt and undershirt (code 610910 of harmonised system of 1996) in sale in South Africa. If Zimbabwe will take over all market losses on other leathers, dried skin (code 410439 of harmonised system of 1996), Malawi, Mozambique and Zimbabwe will share market losses on other beans (vigna spp, phascolus spp code 071339 of harmonised system of 1996).

Beside Botswana, Zambia and Madagascar will also face a decreasing of their export to South Africa even though Madagascar will observe the highest declining magnitude of the average of its applied tariff to be paid when entering South Africa : from 15.28% to zero, while the equivalent reduction is from 5.08% to zero for Zambia. So we can conclude at this stage that a high reduction of tariff is non sufficient to insure an increasing of exportation of one country when a reporter deal with more than one partner a preferential tariff agreement (see appendix 2 for more detail).

Madagascar, whose total export to South Africa looks negligible (1.98 million USD) compared to those of Zimbabwe (347.87 million USD), Malawi (50.51 million USD) and Mozambique (36.87 million USD), will experiencing a declining of its total export to South Africa by 9.9 thousand USD. At the top five of goods from Madagascar recording the most relevant market losses in the exportation to South

Africa one finds : other fruits, cooked or boiled, or non cooked (code 081190 of harmonised system of 1996), cotton made pants, pants with sling and short (code 610342 of harmonised system of 1996), cotton made t-shirt and undershirt (code 610910 of harmonised system of 1996), other leather, dried skin code 410439 of harmonised system of 1996), and others beans (vigna spp, phascolus spp code 071339 of harmonised system of 1996). Declining of export from Madagascar is at whole estimated to 9.19 thousand USD, which represents almost the market losses of Madagascar in the opening of South African market to all SADC goods. Market losses of Madagascar will be brought into line by the group Zimbabwe, Malawi, Mozambique and Mauritius. In other words, goods from Madagascar (say Malagasy goods) can be easily competed by their equivalent from Zimbabwe, Malawi, Mozambique and Mauritius in the South African market.

Table 13
Change of export from SADC members to South Africa after a removal of tariff
(data of 2001)

SADC members	Change of export (in 1 000 USD)			Simple average of applied tariff entering South Africa (%)	
	Total effect	Trade diversion	Trade creation	Before tariff removal	After tariff removal
Angola	113,98	34,12	79,86	4,03	0,0
Botswana	-3,66	-3,66	0,0	0,0	0,0
DR of Congo	3,98	1,923	2,06	1,56	0,0
Lesotho	0,0	0,0	0,0	0,0	0,0
Madagascar	-9,88	-9,88	0,0	15,28	0,0
Malawi	26 437,24	5 041,82	21 395,42	14,75	0,0
Mauritius	2 072,44	765,02	1 307,42	9,59	0,0
Mozambique	5 783,00	1 298,23	4 484,77	6,94	0,0
Namibia	0,0	0,0	0,0	0,0	0,0
Swaziland	-0,05	-0,05	0,0	0,0	0,0
Tanzania	164,73	70,31	94,44	5,11	0,0
Zambia	-402,74	-402,74	0,0	5,08	0,0
Zimbabwe	24 945,12	6 461,90	18 483,22	7,95	0,0

Source : WITS/COMTRADE, World Bank, author calculation.

The astonishing result one declining of Malagasy export to South Africa has an explanation. When there is not only one beneficiary from tariff reduction, then trade flow variation does not depend only on relative variation of tariff. Its depends also on relevance of trade, the share of trade of one partner among all partners of the country which decides to reduce tariff of imported goods from a group of countries.

Through this specific case, we show that if trade flow from a country is not strong enough compared to those from others, even though relative variation of tariff is relevant, trade diversion of a country which is among beneficiaries of tariff reduction may be negative instead of being positive. That means, for our study that if Madagascar wants to benefit from its integration within SADC, one should promote now exportation to South Africa before Free Trade Agreement is established.

CONCLUSION

After long time of hesitating, Madagascar decides to join the SADC but apparently without enough consultancy or debate on the issue. When focusing on the current trade flow and economy situation, it looks difficult at this stage to state whether Madagascar will benefit or not from the FTA within SADC.

The simulations made with GTAP show that different regions in SADC like, Botswana, the Rest of SACU (less Botswana) and the Rest of SADC (less SACU), will benefit from the FTA as every one will record a positive change of welfare. But the liberalisation of trade within SADC, considered as a shock may affect negatively some region like Botswana, as output, domestic sale and demand for unskilled labour will drastically decline in this country for the following commodities sugar and sugar, products, dairy products, vegetables. That is justifying the safeguard measurement for several goods. But, even if some goods regarded as sensitive are excluded from the FTA, all the three regions mentioned before of SADC will continue to gain from the trade liberalisation. This gain can be assessed from different indicators like real GDP growth, positive change of equivalent welfare, increasing of export, increasing of demand for unskilled labour. A special mention should be done relating to the Rest of SADC, endowment effect (basically due to increasing of demand of unskilled labour) on decomposition of welfare explain (more than) the gain in welfare. Moreover, unskilled intensive labour manufactures reveal to be the most dynamic in term of growth of demand for labour. For Less Developing Countries, the characteristic of most of SADC members, this later fact is very important as it is a pro-poor strategy, so the question is will Madagascar benefit from the FTA within SADC like the Rest of SADC as a whole ?

When focusing on the opening South African market to all SADC goods, (through a removal of tariff), Madagascar which trade with South Africa looks negligible compared to bilateral trade between South Africa and other SADC members like Zimbabwe, Malawi, Mozambique, will loose. On the contrary to what will happen to Mozambique, Malawi and Zimbabwe, the export of Madagascar to South Africa will decrease. Because of the following principle : the more a country export to the reporter the more it gains in term of trade diversion, a part of export of Madagascar will shift in beneficiary of other SADC members. That will be the case of some commodity like : other fruit cooked, boiled, or not ; leather, cotton made pants, pants with sling and short; or cotton made t-shirt and undershirt. All of these commodities are produced by unskilled labour intensive manufactures. Thus there is a doubt that the benefit of unskilled labour intensive manufactures we fund from GTAP simulation will also be verified in case of Madagascar. Given the fact that, all competitors of Madagascar within SADC have relevant trade with South Africa, one wonders if Madagascar is not paying now its weak link to Southern Africa, especially with South Africa. As a conclusion, if Madagascar wants to win, it should first promote its exportation (rapidly before the FTA is established), especially with goods in which it has a comparative advantage in order to stay competitive when regional trade is liberalized.

References

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Appendix 1

GTAP Modelling of FTA within SADC

Closure for simulation of 21*10 GTAP modelling

```
exogenous
pop
psaveslack pfactwld
profitslack incomeslack endwslack tradslack
ams atm atf ats atd
aosec aoreg avasec avareg
afcom afsec afreg afecom afesec afereg
aoall afall afeall
au dppriv dpgov dpsave
to tp tm tms tx txs
qo(ENDW_COMM,REG)
cgdslack
DTRANS
prop
rms rm rxs rx ;
Rest endogenous;
! Managed Float
swap DTBALR("bwa") = dpsave("bwa");
swap DTBALR("xsc") = dpsave("xsc");
swap DTBALR("sad") = dpsave("sad");
swap DTBALR("xaf") = dpsave("xaf");
swap DTBALR("xwo") = dpsave("xwo");
! Unemployment in unsklab
swap qo("unsklab","bwa") = pfactreal("unsklab","bwa");
swap qo("unsklab","xsc") = pfactreal("unsklab","xsc");
swap qo("unsklab","sad") = pfactreal("unsklab","sad");
swap qo("unsklab","xaf") = pfactreal("unsklab","xaf");
swap qo("unsklab","xwo") = pfactreal("unsklab","xwo");
```

Text file of cmfstart in the 21*10 GTAP modelling with restriction in the FTA

```
! This is the default CMFSTART file which RunGTAP uses when
! a version has no CMFSTART file of its own
iz1 = no ;
NDS = yes; ! no displays
Extrapolation accuracy file = YES ;
CPU = yes;
xset NSAD_COMM # sugar textile milk # (grain, sug, milk, text, vtran) ;
XSUBSET NSAD_COMM is subset of TRAD_COMM;
XSET SADC_COMM = TRAD_COMM - NSAD_COMM;
```

Closure of the modelling of restricted FTA within SADC with the 21*10 GTAP version

```
shock tms(SADC_COMM,"xsc","sad")=target% 0 from file tms.shk;
```

shock tms(SADC_COMM,"sad","xsc")=target% 0 from file tms.shk;
shock tms(SADC_COMM,"bwa","sad")=target% 0 from file tms.shk;
shock tms(SADC_COMM,"sad","bwa")=target% 0 from file tms.shk;

shock tms(SADC_COMM,"sad","sad")=target% 0 from file tms.shk;

Appendix 2

WITS SIMULATION

Explaining reduction of export for country benefiting tariff reduction:

All the following calculation derives from a previous work done by Olivier JAMMES and Marcelo OLARREAGA in explaining SMART. The main difference in their work and this one is on the number of beneficiary of the tariff reduction. In their paper, O. JAMMES and M. OLARREAGA demonstrate trade diversion and trade creation in case of tariff reduction for one supplier only while in our case there are more than one suppliers. The difference mentioned earlier between the two papers is basically in formulating the trade diversion. But the main target of the present paper is to explain why it is possible that a beneficiary of a tariff reduction may record a reduction of its export instead of increasing.

Assumption :

- 1) Partial equilibrium, no income effect,
- 2) Export supplies are perfectly elastic : world prices of each variety are given.
- 3) Additive utility function

$$U = \sum_b u_b(m_b) + n$$

Where n is the consumption of the composite numéraire good, m_b is the consumption of the aggregate import good b ; U_b is the sub-utility of good b, The fact that the utility is additive ensures that there are no substitution effects across goods b, and the linearity on the composite and numéraire good n ensures that there are no income effects.

Trade diversion

The assumption is as following, when we are on the curve of iso-utility, (of the consumer) there may be a change in distribution of import on goods b by origin.

Let us assume that for commodity b, there is p countries suppliers, so total demand M_b of the representative consumer on commodity b is a sum of demands $m_{b,i}$ on commodity b from country i :

$$M_b = \sum_{i=1}^p m_{b,i}$$

When there is no change on demand of commodity b, i.e when we are on the iso-utility curve then we get

$$dM_b \equiv \sum_{i=1}^p dm_{b,i} = 0 \quad (1)$$

This equation means that demand for some countries rises meanwhile for others it decreases but at a whole there is not a change in total supply, so substitution appears by origins.

The substitution of commodity b from origin i to origin j can be described with the following equation elasticity of partial substitution

$$\frac{d \log(m_{b,i} / m_{b,j})}{d \log(P_{b,i} / P_{b,j})} = \sigma_{ij}^b \leq 0 \quad (2)$$

which is equivalent to

$$\frac{dm_{b,i}}{m_{b,i}} - \frac{dm_{b,j}}{m_{b,j}} = \sigma_{ij}^b \cdot \left(\frac{dP_{b,i}}{P_{b,i}} - \frac{dP_{b,j}}{P_{b,j}} \right) \quad (2')$$

where $m_{b,i}$, $m_{b,j}$, $dm_{b,i}$, $dm_{b,j}$, $P_{b,i}$ et $P_{b,j}$ represent respectively demands on commodity b from countries i and j, change on those demands and importing price on commodity b from countries i and j.

There exist $p(p-1)/2$ equations of this form, as p is the number of countries suppliers of commodity b.

The determination of $dm_{b,i}$ is obtained from solving the system of equation (S)

$$\frac{dm_{b,i}}{m_{b,i}} - \frac{dm_{b,j}}{m_{b,j}} = \sigma_{ij}^b \cdot \left(\frac{dP_{b,i}}{P_{b,i}} - \frac{dP_{b,j}}{P_{b,j}} \right) \text{ for each pair } i,j$$

$$\text{and } \sum_{i=1}^p dm_{b,i} = 0$$

σ_{ij}^b should be independent from i, j as

$$-\left(\frac{dm_{b,i}}{m_{b,i}} - \frac{dm_{b,j}}{m_{b,j}} \right) = -\sigma_{ij}^b \cdot \left(\frac{dP_{b,i}}{P_{b,i}} - \frac{dP_{b,j}}{P_{b,j}} \right)$$

The former relation is equivalent to

$$\frac{dm_{b,j}}{m_{b,j}} - \frac{dm_{b,i}}{m_{b,i}} = \sigma_{ij}^b \cdot \left(\frac{dP_{b,j}}{P_{b,j}} - \frac{dP_{b,i}}{P_{b,i}} \right)$$

$$\text{but according to (2')} \text{ we have } \frac{dm_{b,j}}{m_{b,j}} - \frac{dm_{b,i}}{m_{b,i}} = \sigma_{ji}^b \cdot \left(\frac{dP_{b,j}}{P_{b,j}} - \frac{dP_{b,i}}{P_{b,i}} \right)$$

thus,

$$\sigma_{ij}^b = \sigma_{ji}^b$$

The same equation (2') formulated on one hand for the pair i,k and the sum of two equivalents equations, the first for the couple i,j and the second for the couple j,k give us first the following equality, then the property here after,

$$\frac{dm_{b,i}}{m_{b,i}} - \frac{dm_{b,k}}{m_{b,k}} = \sigma_{ij}^b \cdot \frac{dP_{b,i}}{P_{b,i}} - \sigma_{jk}^b \cdot \frac{dP_{b,k}}{P_{b,k}} + (\sigma_{jk}^b - \sigma_{ij}^b) \cdot \frac{dP_{b,j}}{P_{b,j}}$$

$$(\sigma_{jk}^b - \sigma_{ij}^b) = 0$$

and

$$\sigma_{ij}^b = \sigma_{ik}^b$$

Invariance of σ^b between i and j, means that we can substitute the commodity b imported from country i either by its equivalent from country j or country k. Without this condition, the system of equation (S) has no solution.

Finally, the system of equation (S) can be rewritten as (S') followed :

$$\begin{aligned} \frac{dm_{b,2}}{m_{b,2}} - \frac{dm_{b,1}}{m_{b,1}} &= \sigma^b \cdot \left(\frac{dP_{b,2}}{P_{b,2}} - \frac{dP_{b,1}}{P_{b,1}} \right) \\ &\vdots \\ \frac{dm_{b,k}}{m_{b,k}} - \frac{dm_{b,1}}{m_{b,1}} &= \sigma^b \cdot \left(\frac{dP_{b,k}}{P_{b,k}} - \frac{dP_{b,1}}{P_{b,1}} \right) (e_k) \\ &\vdots \\ \frac{dm_{b,p}}{m_{b,p}} - \frac{dm_{b,1}}{m_{b,1}} &= \sigma^b \cdot \left(\frac{dP_{b,p}}{P_{b,p}} - \frac{dP_{b,1}}{P_{b,1}} \right) \end{aligned}$$

and

$$dm_{b,1} + dm_{b,2} + \dots + dm_{b,p} = 0 \quad (1)$$

A such system of p linear equations of p unknown has always one and only one solution as its determinant is equal to p, thus from equation e_k , $dm_{b,k}$ can be expressed as a function of $dm_{b,1}$, the relative change of price and the elasticity of partial

$$\text{substitution } dm_{b,k} = \frac{m_{b,k}}{m_{b,1}} \cdot dm_{b,1} + m_{b,k} \cdot \sigma^b \cdot \left(\frac{dP_{b,k}}{P_{b,k}} - \frac{dP_{b,1}}{P_{b,1}} \right).$$

when replacing all $dm_{b,k}$ in equation (1) we obtain

$$\frac{M_b}{m_{b,1}} \cdot dm_{b,1} + \sigma^b \cdot \sum_{i \neq 1} m_{b,i} \cdot \left(\frac{dP_{b,i}}{P_{b,i}} - \frac{dP_{b,1}}{P_{b,1}} \right) = 0$$

$$\text{and } dm_{b,1} = \frac{m_{b,1}}{M_b} \cdot \sigma^b \cdot \sum_{i \neq 1} m_{b,i} \cdot \left(\frac{dP_{b,1}}{P_{b,1}} - \frac{dP_{b,i}}{P_{b,i}} \right)$$

so for all k we obtain :

$$dm_{b,k} = \frac{m_{b,k}}{M_b} \cdot \sigma^b \cdot \sum_{i \neq k} m_{b,i} \cdot \left(\frac{dP_{b,k}}{P_{b,k}} - \frac{dP_{b,i}}{P_{b,i}} \right) (e'_k)$$

The interest of having e'_k formula is it permits to know how a tariff reduction decided by a reporter in beneficiary to a group of country can result in trade diversion on the detriment of a partner k, in other words, $dm_{b,k}$ is negative.

For elasticity of partial substitution σ^b which is by essence negative, $dm_{b,k} \leq 0$ is equivalent to

$$\sum_{i \neq k} m_{b,i} \cdot \left(\frac{dP_{b,k}}{P_{b,k}} - \frac{dP_{b,i}}{P_{b,i}} \right) \geq 0$$

or

$\frac{dP_{b,k}}{P_{b,k}} \geq \sum_{i \neq k} \frac{m_{b,i}}{M_{b,k}} \cdot \frac{dP_{b,i}}{P_{b,i}}$ (c) where $M_{b,k} = \sum_{i \neq k} m_{b,i}$ represent the total import of commodity b from countries excluding k.

Let $\bar{\tau}_{b,k} = \sum_{i \neq k} \frac{m_{b,i}}{M_{b,k}} \cdot \left(-\frac{dP_{b,i}}{P_{b,i}}\right)$, the weighted average for group of countries excluding k of magnitude relative reduction of price due to tariff reduction implemented by the reporter, if magnitude (i.e. $-\frac{dP_{b,k}}{P_{b,k}}$) of tariff reduction record by country k for commodity b, is not enough relevant, and does not exceed $\bar{\tau}_{b,k}$ (which is then a threshold), thus it is sure that demand of commodity b from country k (we do not yet take in account here the trade creation) will decrease.

Trade creation

Trade creation should verify different principle : the Armington assumption for export, the negative relation between demand and price, and the relation between price at world market and price at domestic market (of importer).

This one is the relation describing demand and price through elasticity of demand,

$$\frac{d \log m_{b,k}}{d \log P_{b,k}} = \varepsilon_{b,k} \leq 0, (3)$$

and following the relation between export and price according to the Armington assumption

$$\frac{d \log x_{b,k}}{d \log P_{b,k}^e} = \mu_{b,k} \geq 0 (4), \text{ where } \mu_{b,k} \text{ and } P_{b,k}^e \text{ are respectively elasticity of exportation and the price at exportation of}$$

good b in partner k. If $P_{b,k}$ is the price of good b in the reporter market, we have the following relation between the two prices :

$$P_{b,k} = P_{b,k}^e \cdot (1 + t_{b,k}) (5) \text{ where } t_{b,k} \text{ represents duty to be paid for good b imported from country k.}$$

After differentiating (5) we have : $d \log P_{b,k}^e = d \log P_{b,k} - d \log(1 + t_{b,k})$, Substituting (4) in to this later equation yields:

$$d \log x_{b,k} = \mu_{b,k} \cdot [d \log P_{b,k} - d \log(1 + t_{b,k})]$$

but given the fact that $x_{b,k} = m_{b,k}$, i.e exportation of good b from country k to the reporter is equal to import of good b of the reporter from country k, we have first:

$d \log x_{b,k} = d \log m_{b,k}$, then when expressing $d \log P_{b,k}$ in function of $\varepsilon_{b,k}$ and $d \log m_{b,k}$ we obtain the relation

$$d \log m_{b,k} = \mu_{b,k} \cdot \left[\frac{d \log m_{b,k}}{\varepsilon_{b,k}} - d \log(1 + t_{b,k}) \right]$$

$$\text{thus } d \log m_{b,k} = \frac{\varepsilon_{b,k}}{(1 - \frac{\varepsilon_{b,k}}{\mu_{b,k}})} \cdot d \log(1 + t_{b,k})$$

From this equation, we can rewrite the Trade creation equation of exportation of good b from country k as :

$$TC_{b,k} = \frac{\varepsilon_{b,k} \cdot m_{b,k}}{\mu_{b,k}} \cdot \frac{dt_{b,k}}{(1+t_{b,k})} \quad (6)$$

So the more the flow of import is relevant the more trade creation is important. So for everything equal, trade creation will be more important with the country of which importation is more relevant

$$dm_{b,k} = \frac{m_{b,k}}{M_b} \cdot \sigma^b \cdot \sum_{i \neq k} m_{b,i} \cdot \left(\frac{dP_{b,k}}{P_{b,k}} - \frac{dP_{b,i}}{P_{b,i}} \right) \quad (e'_k)$$

From the identities (6) and (e'_k) one obtains the total effect of export from country k to the reporter for each good b,

$$TE_{b,k} = TC_{b,k} + dm_{b,k}$$

$$TE_{b,k} = \frac{\varepsilon_{b,k} \cdot m_{b,k}}{\mu_{b,k}} \cdot \frac{dt_{b,k}}{(1+t_{b,k})} + \frac{m_{b,k}}{M_b} \cdot \sigma^b \cdot \sum_{i \neq k} m_{b,i} \cdot \left(\frac{dP_{b,k}}{P_{b,k}} - \frac{dP_{b,i}}{P_{b,i}} \right)$$

but given the fact that $P_{b,k} = P_{b,k}^e \cdot (1+t_{b,k})$ and that $P_{b,k}^e$ is independent of k, we have for each k and good b :

$$\frac{dP_{b,k}}{P_{b,k}} = \frac{dP_b^e}{P_b^e} + \frac{dt_{b,k}}{(1+t_{b,k})} \quad \text{thus}$$

$$TE_{b,k} = \frac{\varepsilon_{b,k} \cdot m_{b,k}}{\mu_{b,k}} \cdot \frac{dt_{b,k}}{(1+t_{b,k})} + \frac{m_{b,k}}{M_b} \cdot \sigma^b \cdot \sum_{i \neq k} m_{b,i} \cdot \left[\frac{dt_{b,k}}{(1+t_{b,k})} - \frac{dt_{b,i}}{(1+t_{b,i})} \right]$$

Finally,

$$TE_{b,k} = m_{b,k} \cdot \left\{ \left(\frac{\sigma^b \cdot M_{b,k}}{M_b} + \frac{\varepsilon_{b,k}}{\left(1 - \frac{\varepsilon_{b,k}}{\mu_{b,k}}\right)} \right) \cdot \frac{dt_{b,k}}{(1+t_{b,k})} - \frac{M_{b,k} \sigma^b}{M_b} \cdot \sum_{i \neq k} \frac{m_{b,i}}{M_{b,k}} \cdot \frac{dt_{b,i}}{(1+t_{b,i})} \right\} \quad (7)$$

with $M_{b,k} = \sum_{i \neq k} m_{b,i}$, total import of good b from all partners excluding k.

So total effect is a function of :

- elasticity of substitution of import between two suppliers ;
- elasticity of exportation of good b (for the partner) ;
- the share of importation from country k ;
- the relative reduction of tariff, and the average weighted (by import flow) of relative reduction of tariff of the competitors.

Total effect is positive or negative according to these factors. It is negative in the following case :

$$\frac{dt_{b,k}}{(1+t_{b,k})} \geq \left[\frac{\frac{M_{b,k} \cdot \sigma^b}{M_b}}{\left(\frac{M_{b,k} \cdot \sigma^b}{M_b} + \frac{\varepsilon_{b,k}}{\left(1 - \frac{\varepsilon_{b,k}}{\mu_{b,k}}\right)}\right)} \right] \cdot \sum_{i \neq k} \frac{m_{b,i}}{M_{b,k}} \cdot \frac{dt_{b,i}}{(1+t_{b,i})} \quad (8)$$

Let's

$\theta_{b,k} = \sum_{i \neq k} \frac{m_{b,i}}{M_{b,k}} \cdot \frac{-dt_{b,i}}{(1+t_{b,i})}$ be the average weighted (by import) of relative reduction of tariff of the suppliers competitors of k, and $\eta_{b,k}$ the coefficient in bracket in right hand of the relation (8), the this latter is equivalent to :

$$\frac{-dt_{b,k}}{(1+t_{b,k})} \leq \eta_{b,k} \cdot \theta_{b,k} , (8')$$

So when tariff reduction is less than a threshold, it does not ensure an increasing of export. Our calculation shows that not every partner will record an increasing of export when there are many beneficiary of a preferential tariff agreement.