

Africa, services liberalisation and trade in goods:

Examining the missing link

Nora Dihel and Lars Nilsson*

European Commission,
Directorate General for Trade
B-1049 Brussels, Belgium
e-mail: nora.dihel@ec.europa.eu,
e-mail: lars.nilsson@ec.europa.eu

(Work in progress, comments welcome)

Abstract:

Given the important role of services as intermediate inputs in the production in most industries, an inefficient services sector can be costly for the economy as a whole. For example, even if a country were to reduce goods tariffs, distortions would continue to persist should services barriers remain unchanged. This study represents a first attempt to undertake a comprehensive, quantitative cross-country analysis of how manufacturing and services sectors interact in the production process in selected African economies. On this basis, the extent to which this interaction and thus ultimately goods trade itself would be affected by services liberalisation under is looked into.

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1 Introduction

This study examines the structure of production in 15 African countries using the most recently published GTAPv7 input-output tables. It represents a first attempt to undertake a comprehensive, quantitative cross-country analysis of how manufacturing and services sectors interact in the production process in the African economies. While numerous input-output analyses are available for developed and emerging economies, such analyses remain scarce for African countries.

The study aims at informing policy makers about the opportunities and challenges faced by African countries in the area of services with a view to provide empirical evidence that could guide further services negotiations in various fora. For example, the liberalisation of services trade has been omitted from most (if not all) analyses of the impact of the Economic Partnership Agreements (EPAs) between the EU and the African, Caribbean and Pacific (ACP) countries, usually due to lack of reliable data.¹ Given the important role of services as intermediate inputs for many industries a reduction of goods tariff alone (as in the interim EPA agreements) without a parallel liberalisation of services could mean that the potential positive effect of goods liberalisation would not fully materialise.²

While the full EPA concluded with the Cariforum countries³ contains significant commitments from the countries in the services area, in particular in export-oriented and infrastructure sectors key for their development, such as telecommunications, transport, tourism, manufacturing and environmental services,⁴ there are no input-output tables available in the GTAP database allowing for a similar exercise to be carried out on the Cariforum countries.

This paper is organised as follows. Section 2 provides an analysis of the African countries' trade in services over the past ten years and indications of potential future sectoral specialisation within services. Section 3 focuses on the role of services as intermediate inputs and analyses industries' interdependence (magnitude of transactions between industries or backward and forward linkages) and the industry interconnectedness (the number of industry sales or purchases). Section 4 analyses the interaction between services and manufacturing and its impact on output and the effects of services liberalisation (through productivity gains) on the level and composition of

¹ The Commission is pursuing the conclusion of negotiations on full EPAs for all ACP countries where the relevant negotiations have not yet been concluded. There are 49 ACP countries that have either concluded negotiations on an Agreement including a WTO compatible market access arrangement or have duty-free/quota-free access to EU markets under the GSP-EBA arrangement from 1 January 2008.

² In fact, the availability and quality of services can form the basis of comparative advantage in services-intensive manufacturing sectors, and facilitate manufacturing firms to move up the value added ladder.

³ Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, the Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Lucia, Saint Vincent and the Grenadines, Saint Kitts and Nevis, Suriname, and Trinidad and Tobago.

⁴ The agreement also includes supporting provisions for some services sectors in Cariforum such as computer-related services, telecommunications, financial services, international maritime transport, courier services, and, in particular, for the tourism sector.

trade in goods under different assumptions on the elasticity of substitution. Section 5 provides a summary and conclusions.

2 Descriptives

This section presents some analytical indicators related to the services trade of the 15 African countries.⁵ Table 1 shows the annual growth rate and the total growth in imports and exports of services over the 1996-2006 period. In terms of imports, most analysed countries show annual growth rates in the range of 7%-10%, except for Tanzania and Uganda the growth for which has been about 3% and 4%, respectively. Over the period, this implies that the value of services imports have more than doubled in most countries.

As far as services exports are concerned, Nigeria, Botswana Morocco and Uganda stand out with annual growth rates of between 13% and 21%. These figures are on par with what is recorded for e.g. China and India. South Africa and Tanzania show annual growth rates about 9%, while the figure for Egypt, Mauritius and Tunisia are in the range of 5%-6%. Only in the case of Botswana, Malawi, Morocco, Nigeria, Uganda and Tanzania is the annual growth of exports of services greater than imports of services.

Table 1: Growth in Total Services Imports and Exports, 1996-2006 (%)

Country	Imports		Exports	
	Annual growth	Growth 1996-2006	Annual growth	Growth 1996-2006
Botswana	9.4	145.7	16.9	378.4
Egypt	8.7	130.1	5.8	76.0
Madagascar ¹	6.0	68.2	6.3	73.3
Malawi ²	8.2	60.4	10.4	81.1
Mauritius	7.1	99.0	5.8	75.9
Morocco	9.8	154.2	13.8	262.6
Mozambique	9.2	140.3	4.4	54.3
Nigeria ¹	5.0	54.8	21.6	480.0
Senegal ³	7.6	80.0	7.7	80.6
South Africa	9.7	152.0	9.1	139.7
Tanzania	2.9	32.5	9.5	146.7
Tunisia	7.2	99.5	5.1	65.0
Uganda	4.0	48.4	13.1	242.3
Zambia ⁴	7.3	88.1	10.5	146.5
China	16.3	351.5	16.3	351.6
India	19.1	475.2	26.5	952.8
Extra-EU	7.2	99.8	8.2	120.5
World	7.4	104.8	8.0	115.9

Source: IMF, BOP (2008). Notes: ¹ 1996-2005, ² 1996-2002, ³ 1996-2004, ⁴ 1997-2006.

⁵ These were the African countries in the GTAP for which input-output tables were available in early 2008.

Based on the index of revealed comparative advantage (RCA),⁶ Table 2 shows the strong comparative advantages of all the countries in Travel Services, where the indices are close to and above two in practically all cases. For Transport, a comparative advantage can be found for Egypt, Madagascar, Mozambique, Tanzania, Tunisia and Zambia, while all countries – except for Senegal - display comparative disadvantage in the category Other Services exports.

Albeit useful, an RCA index is a crude measure of comparative advantage. For example, it does not take into consideration the presence of trade barriers; and in the case of services trade, since it is based on balance of payments (BOP) data, it does not give any indication of a country's comparative advantage in supplying services through commercial presence or the movement of individual service suppliers.

Table 2: Revealed Comparative Advantages in Services (2006)

Country	Transport	Travel	Other Services
Botswana ¹	0.41	2.52	0.48
Egypt	1.47	1.90	0.34
Madagascar ¹	1.15	1.65	0.57
Mauritius	0.92	2.39	0.35
Morocco	0.67	2.54	0.39
Mozambique	1.25	1.56	0.61
Senegal ²	0.66	1.30	1.00
South Africa	0.54	2.66	0.39
Tanzania	1.01	2.54	0.23
Tunisia	1.26	2.16	0.30
Uganda	0.10	2.95	0.45
Zambia	1.51	1.83	0.36

Source: IMF, BOP (2008). Notes: ¹ 2005, ² 2004

These findings are in most cases corroborated in the quadrant analysis shown in the figures in Annex 1, which presents information on the dynamism of the various countries' services exports in a graphical form. Botswana, Morocco and Tanzania find their services sectors in the right quadrants indicating that they are gaining world market shares. On the other hand, with its services sector to the left in the quadrants, it appears as if Mozambique is among the countries which have performed least well over the period. Travel is generally the most important services sector and is usually found in the lower

⁶ The index of revealed comparative advantage (RCA) can be used to assess a country's export potential. In services the RCA is a measure of services' share in the country's exports (including goods) in relation to the country's share of world trade. If the index is greater than unity it implies that the country is relatively specialised in the service concerned and has a comparative advantage in such exports compared with the world average. Consequently, a value of less than unity indicates a comparative disadvantage. The RCA index is At service category level, it is defined as the ratio of exports of a service category (x_{ij}) to a country's total service exports (X_{it}), divided by the ratio of world exports of this service (x_{wj}) to total world service exports (X_{wt}): $RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt})$.

right-hand quadrant (except for Tunisia, where it is in the lower-left quadrant). Transport services are found in the left quadrants for five of the ten countries and so are Other services in for four countries, while data on this sector is missing in four cases.

3 Cost shares and backward and forward sectoral linkages

This section analyses industries' economic interdependence and interconnectedness in the 15 African countries, thereby documenting the contribution of services to the various industries' costs. This provides a picture of which manufacturing sectors use services relatively more intensively and thus have the potential to be affected to a greater extent by services liberalisation (and a consequent increase in the supply of efficient services).

A first way of illustrating the interaction between industries is based on the magnitude of services cost shares for the 56 sectors included in the input-output tables in the GTAP 7 database. Table 3 shows the contribution of value added and intermediate inputs (differentiating between services, manufacturing and agricultural inputs) in manufacturing output. It shows that value added contributes on average to approximately 30 % of manufacturing output in the analysed countries (minimum of 14 % in Madagascar, around 20 % in Tanzania, Tunisia and Morocco, and around 40 % in Nigeria, Mauritius, Uganda and South Africa).

As for intermediate inputs, services inputs contribute on average to approximately 15 % of manufacturing output. The share of services intermediate inputs is the highest in Tanzania and Zambia (25 %) and lowest in Madagascar, Egypt, Morocco, Nigeria, Uganda and South Africa (between 9 and 13 %). In general, trade and transport services provide the highest share of services intermediate inputs. The share of business services is relatively low in all countries. Similarly, the import shares of all services inputs are fairly low (less than 2 % on average) but varies somewhat across the analysed countries. In Egypt, the import share is more than 5%, in Senegal and Madagascar more than 2.5% and in Tanzania close to 2%. The shares of the rest of the countries are around 1% or lower.

Table 3: Cost structure of manufacturing sectors, shares of total costs 2004 (%)

	Egypt	Morocco	Tunisia	Nigeria	Senegal	Madagascar	Malawi	Mauritius	Mozambique	Tanzania	Uganda	Zambia	Zimbabwe	Botswana	South Africa
	All inputs														
Value added	31.3	23.5	19.6	39.7	30.3	14.8	29.5	42.1	31.2	18.5	35.7	33.8	30.4	33.0	37.5
Agriculture	8.1	8.9	5.9	14.7	9.5	10.2	11.3	10.6	3.1	7.6	15.4	9.8	6.7	8.6	9.3
Manufacturing	41.3	49.2	52.5	27.4	38.8	45.7	38.9	45.3	28.6	35.8	31.5	29.1	38.1	38.1	34.9
Services	11.2	12.6	17.6	11.6	13.5	9.0	15.7	0.8	22.5	25.0	12.9	24.2	7.7	15.9	13.2
Trade	3.3	4.8	14.8	4.7	3.1	1.9	9.6	0.0	11.9	11.4	6.3	12.9	4.2	10.4	4.7
Transport	0.9	2.4	0.8	2.1	2.6	1.8	2.4	0.6	3.2	1.5	3.5	7.6	2.2	0.7	2.9
<i>Business serv.</i>	4.9	2.9	0.5	0.0	5.0	1.4	1.6	0.0	1.0	2.2	1.4	0.6	0.2	1.3	3.9
Other services	2.1	2.5	1.5	4.8	2.8	4.0	2.1	0.2	6.5	9.9	1.7	3.1	1.1	3.5	1.6
	Domestic inputs														
Value added	31.3	23.5	19.6	39.7	30.3	14.8	29.5	42.1	31.2	18.5	35.7	33.8	30.4	33.0	37.5
Agriculture	6.9	3.2	4.3	12.2	1.7	8.5	7.1	7.3	2.4	7.3	13.0	4.1	5.7	5.1	6.3
Manufacturing	12.1	29.6	19.9	11.3	6.6	17.4	7.8	10.8	3.5	11.1	6.9	12.9	12.7	8.4	24.1
Services	6.1	11.7	16.7	10.5	10.9	6.3	14.3	0.2	21.6	23.1	11.8	22.9	7.2	14.8	12.8
Trade	2.7	4.7	14.4	4.5	3.0	0.0	9.6	0.0	11.8	11.2	6.1	12.8	4.0	10.3	4.7
Transport	0.3	2.2	0.6	1.6	2.1	1.6	2.0	0.1	3.0	1.3	3.5	6.5	2.0	0.6	2.7
<i>Business serv.</i>	1.8	2.3	0.4	0.0	3.4	0.9	0.7	0.0	0.8	1.7	0.9	0.6	0.2	1.0	3.8
Other services	1.3	2.4	1.3	4.3	2.4	3.8	2.0	0.0	6.1	8.9	1.3	3.0	1.0	2.9	1.5
	Imported inputs														
Agriculture	1.2	5.7	1.6	2.5	7.8	1.7	4.2	3.3	0.7	0.3	2.3	5.7	1.0	3.5	3.0
Manufacturing	29.2	19.6	32.6	16.1	32.2	28.3	30.8	34.5	25.1	24.7	24.6	16.2	25.3	29.7	10.8
Services	5.1	0.9	0.8	1.1	2.6	2.7	1.4	0.7	0.7	1.9	1.1	1.4	0.5	1.1	0.4
Trade	0.6	0.1	0.4	0.2	0.1	1.9	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.0
Transport	0.6	0.2	0.2	0.5	0.5	0.2	0.3	0.5	0.1	0.1	0.0	1.1	0.2	0.1	0.2
<i>Business serv.</i>	3.1	0.5	0.1	0.0	1.6	0.5	0.8	0.0	0.2	0.5	0.5	0.1	0.0	0.3	0.1
Other services	0.8	0.1	0.2	0.4	0.4	0.1	0.2	0.1	0.3	1.1	0.5	0.1	0.1	0.6	0.1

Source: Authors' calculations based on GTAPv7.

Industries' economic interdependence is measured by backward and forward linkages which assess the magnitude of transactions between industries. The linkages are un-weighted averages of the (GTAP) manufacturing and services sectors. The general assumption is that sectors which have a backward or forward linkage greater than 1 are considered as key sectors.

The basic relationship between gross output, intermediate demand and final demand is given in equation (1):

$$(1) \quad D = (I - A) \cdot Y, \text{ or alternatively: } Y = (I - A)^{-1} \cdot D \text{ (where } (I - A)^{-1} \text{ are denoted } b_{ij}).$$

Where Y is the vector of industry gross output, D the vector of final demand, and A the matrix of technical coefficients, i.e. the share of inputs from industry i in total production of the input using industry j . $(I - A)^{-1}$ is known as the Inverse Leontief Matrix of the input-output-coefficients that describes how many units of one good or service have to be produced at any stage of the value added chain in order to produce one unit of the final demand for goods or services.

Backward linkages measure the impact on supplier industries of a unit increase in the final demand for a particular sector's output. It is meant to show the effect of a one unit rise in final demand for sector j 's output on the other industries in the economy and can be represented mathematically as an index:

$$(2) \quad U_{.j} = \frac{(1/N)b_{.j}}{(1/N^2)\sum_{j=1}^N b_{.j}} = \frac{b_{.j}}{(1/N)\sum_{j=1}^N b_{.j}}, \text{ where } b_{.j} = \sum_{i=1}^N b_{ij}$$

A high backward linkage indicates that an increase in the final demand of one sectors' output will have a large impact on sectors that supply inputs into this sector's production. Construction, Trade (wholesale and retail) and Transport show high backward linkages, roughly around 2, see Table 4. Most countries also register backward linkages greater than 1 in Electricity, gas water and about half of them do so in Financial services and Other business services. Backward linkages for Communication and Recreational and other services appear generally weaker for the whole sample.

The results suggest that rises in the final demand, in particular for Construction, Trade, Transport and Other services will affect the sectors that provide intermediate inputs into the production of these sectors. By contrast, changes in the final demand of e.g. Communication services will impact on other industries to a lesser extent.

In terms of manufacturing (not shown in table), metals (Mozambique and Zambia) and chemicals Morocco, Nigeria and Tunisia) register the highest backwards linkages. Some countries registers backward linkages higher than 1 only in one or two sectors. For example, Botswana registers a backward linkage greater than 1 only in Manufactures nec,

Tanzania only in Chemicals and Wearing apparel and Senegal only in Paper and Petroleum.⁷

Table 4: Backward linkages in services sectors

Sector	Electr. gas water	Constr.	Trade	Transp.	Comm.	Fin. serv.	Oth. bus. serv.	Recr. and oth. s.
Botswana	1.0	2.3	1.2	1.3	0.8	0.9	1.1	0.9
Egypt	1.1	2.1	1.1	1.7	0.8	0.8	1.0	1.3
Madagascar	1.1	2.6	0.6	1.5	0.9	1.6	0.9	0.6
Malawi	1.4	1.1	2.6	1.3	0.9	1.1	0.8	0.9
Mauritius	1.0	2.1	1.0	2.6	1.0	1.1	1.3	0.8
Morocco	0.8	2.0	1.5	1.2	0.6	0.8	1.1	0.7
Mozambique	2.0	2.3	2.3	2.3	1.0	0.9	1.2	0.7
Nigeria	1.2	1.4	2.6	1.2	0.8	0.8	1.5	0.8
Senegal	1.2	1.5	2.8	1.7	0.8	1.0	0.9	0.9
South Africa	1.2	1.6	2.5	1.5	0.7	0.9	1.3	0.5
Tanzania	1.4	2.1	2.1	2.0	0.9	1.0	1.1	0.6
Tunisia	0.9	2.1	2.9	1.3	0.6	0.7	0.9	0.7
Uganda	0.9	4.1	2.5	2.2	0.7	0.7	0.8	0.9
Zambia	1.4	2.2	2.7	2.0	0.9	1.2	1.0	0.8
Zimbabwe	1.6	1.3	1.7	1.5	0.8	1.0	1.0	0.7
Average	1.2	2.1	2.0	1.7	0.8	1.0	1.1	0.8

Source: Authors' calculations based on GTAPv7.

Table 5 shows the countries' *forward linkages* in the services sectors, i.e. the extent to which sectors supply inputs to other sectors. It is meant to show the effect of a one unit rise in final demand for sector i 's output on the other industries in the economy and can be represented mathematically as an index:

$$(3) \quad U_i = \frac{(1/N)b_i}{(1/N^2)\sum_{i=1}^N b_i} = \frac{b_i}{(1/N)\sum_{i=1}^N b_i}, \text{ where } b_i = \sum_{j=1}^N b_{ij}$$

A high forward linkage indicates that the sector is a key sector in terms of supplying inputs to other sectors. In general, Electricity, gas, water, Other business services, Communication and Financial services seem to have the largest forward linkages among services sectors in our sample. By contrast, forward linkages for Construction and Recreational and other services exceed 1 only for about half of the countries and less.

As for manufacturing (not shown in table), manufactures, textiles, chemical, mineral and petroleum products show higher forward linkages. As in the case of the backward

⁷ The exact figures are available from the authors upon request.

linkages, some countries register backward linkages greater than 1 in few sectors only: Malawi (Minerals, Metals), Mozambique (Minerals, Petroleum), Tanzania (Minerals and Wood) and Zimbabwe (Metal).⁸

Table 5: Forward linkages in services sectors

Sector	Electr. gas water	Constr.	Trade	Transp.	Comm.	Fin.serv.	Oth. bus. serv.	Recr. and oth. s.
Botswana	1.4	1.0	1.2	1.1	1.4	0.9	1.3	1.1
Egypt	1.4	0.7	0.9	0.7	0.8	1.1	1.0	0.7
Madagascar	1.6	0.6	0.6	0.9	1.0	1.4	1.2	0.6
Malawi	1.6	0.7	1.1	1.0	1.0	1.6	0.9	0.8
Mauritius	1.3	1.0	0.8	0.8	0.8	1.1	1.2	1.1
Morocco	1.3	0.6	1.1	1.1	1.0	1.4	1.2	1.3
Mozambique	1.0	1.0	1.1	1.5	1.5	1.6	1.1	1.1
Nigeria	1.4	0.9	0.9	1.1	1.4	1.6	0.8	0.8
Senegal	1.4	0.7	1.0	1.1	1.0	1.5	1.3	1.0
South Africa	1.4	0.9	0.9	1.1	1.4	1.3	1.3	0.5
Tanzania	1.5	1.0	1.1	1.3	1.4	1.6	1.3	1.4
Tunisia	1.4	0.6	1.1	0.9	1.4	0.9	0.9	0.6
Uganda	1.3	0.7	1.0	1.1	1.2	1.2	1.3	0.7
Zambia	1.0	1.0	1.2	1.2	1.2	1.6	1.6	1.2
Zimbabwe	1.5	0.8	1.2	1.1	1.2	1.2	1.1	1.1
Average	1.4	0.8	1.0	1.1	1.2	1.3	1.2	0.9

Source: Authors' calculations based on GTAPv7.

Backward and forward linkages assess the magnitude of transactions between industries. They can be complemented with measures of *industry interconnectedness*, which focus on the number of direct and indirect industry sales or purchases and are related to coefficients of variation. To determine the degree of industry interconnectedness, measures of backward and forward concentration, represented mathematically as follows, can be employed:

$$(4) \quad G_{.j}(b_{ij}) = \left[N(1 - \sum_{i=1}^N C_{j,ij})^2 \right]^{1/2}, \text{ where for all } i \text{ and } j: C_{j,ij} = \frac{b_{ij}}{\sum_{i=1}^N b_{ij}} = \frac{b_{ij}}{b_{.j}}$$

$$(5) \quad G_{.i}(b_{ij}) = \left[N(1 - \sum_{j=1}^N C_{i,ij})^2 \right]^{1/2}, \text{ where for all } i \text{ and } j: C_{i,ij} = \frac{b_{ij}}{\sum_{j=1}^N b_{ij}} = \frac{b_{ij}}{b_{.i}}$$

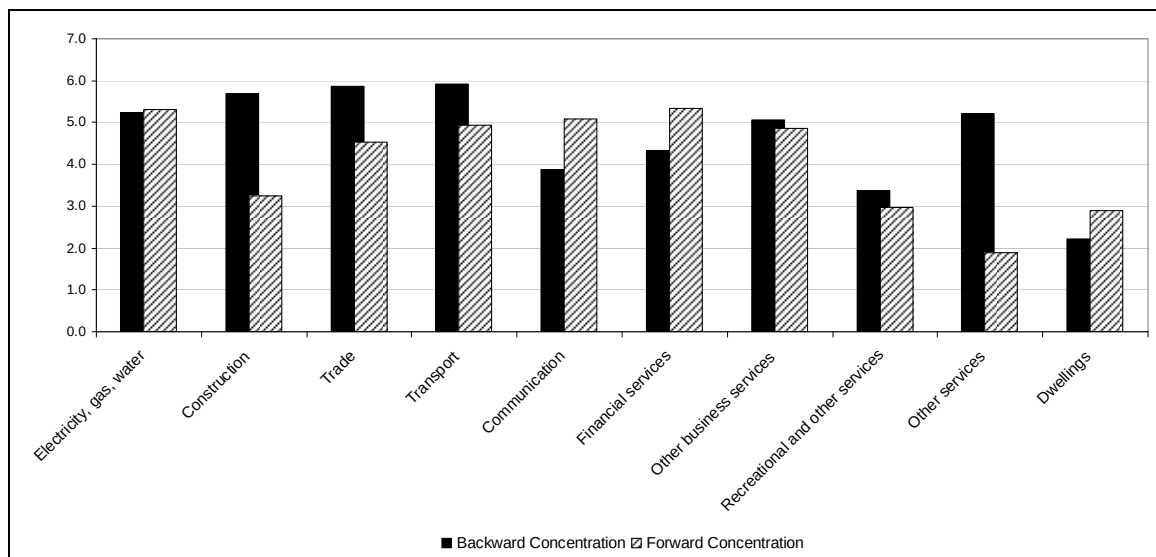
⁸ Ibid.

Sectors with relatively more linkages across sectors can be considered key sectors from a policy perspective because they have a stronger transmission effect through the economy. Figure 1 shows that in the services sector, backward concentration indices are higher than forward concentration indices in six of the ten sectors. High backward concentration indices in services suggest that these sectors draw on inputs from relatively more sectors compared to the case for most sectors with lower indices. Hence, the transmission effect is relatively larger for suppliers of these services.

Even though the average backward concentration is higher than the forward concentration in business services, eleven countries have higher forward concentration indices than backward concentration indices in this sector. This suggests that an increase in final demand of business services will trigger the sector to sell its output to relatively greater number of sectors compared to the majority of the manufacturing sectors in these eleven countries.

In manufacturers (not shown in figure), relatively high backward concentration indices are observable in Textiles (24), Chemicals (30) and Metals (34), while forward concentration indices are highest in Paper (28), Petroleum (29), Minerals (31) and Metals (34).

Figure 1: Average backward and forward concentration indices in the services sectors across countries



Source: Authors' calculations based on GTAPv7.

4 The interaction between services and manufacturing and its impact on output

The effect of a demand increase depends on the interdependencies between manufacturing and services sectors. This section simulates the role of the interaction between services and manufacturing for industry and aggregate output and examines how the output of all industries change if total demand for either all services or manufacturing sectors increases by 10% as described in equation (6):

$$(6) \quad \tilde{Y} = (I - A)^{-1} \cdot \tilde{D}, \text{ where } \tilde{D}' = (1.1 \cdot d_1^2, 1.1 \cdot d_2^2, \dots, 1.1 \cdot d_{ni}^2, d_1^1, d_2^1, \dots, d_{nj}^1)$$

$\tilde{D}$ denotes the vector of change in demand and consists of elements d_j^1 of original demand for all industries, $j \in n_j$, for which demand is assumed to stay constant and of $(1.1 \cdot d_i^2)$ for all industries, $i \in n_i$ for which demand is assumed to change. $\tilde{Y}$ equals derived output.

An increase in final demand for services⁹ by 10% while keeping demand for manufacturing unchanged will raise manufacturing output by slightly more than 1%, services output by about 7.5% and total output by 4.5% on average across the analysed African countries (Figure 2). In contrast, if total demand for manufacturing increases by 10 % while keeping the demand for services constant, output of services will increase by about 1%, output of manufacturing by almost 7% while total output will increase by about 2.5% on average across the sample (Figure 3).

These results reflect a strong dependence of manufacturing firms on inputs from other manufacturing firms, but only a relatively small dependence on services inputs. They also indicate that services are strong users of services intermediate inputs. Comparable results have been obtained in an analysis covering a sample of OECD countries: an increase in total final demand for services (while keeping manufacturing demand constant) lead to an increase in output of 5.5% on average while an increase in final demand for manufacturing (while keeping final demand for services constant) led to an increase in total output of about 3% on average.¹⁰

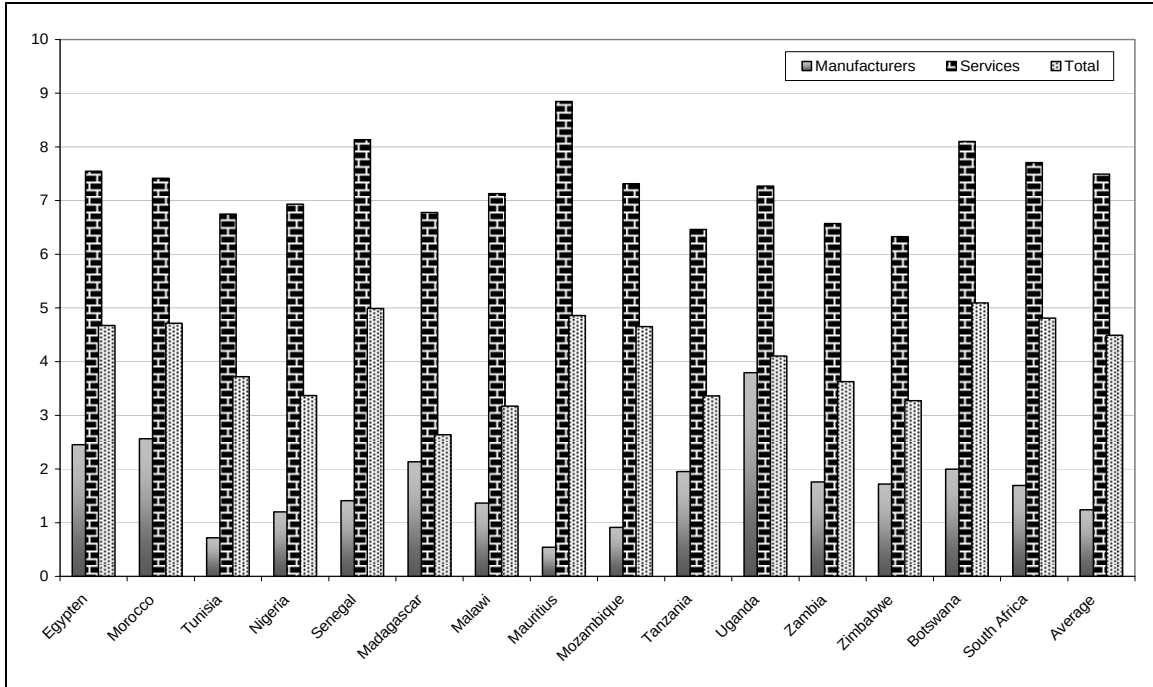
The results can partly be explained by the larger size of the services sector as an input sector compared to the manufacturing sector in some of the countries analysed. Hence, a percentage point increase in output in services will raise total output more than an equivalent increase in manufacturing output.¹¹

⁹ For example, if the share of services and manufacturing in overall demand remains unchanged but manufacturing firms are outsourcing services to specialised service firms.

¹⁰ Pilat and Wölfl (2005).

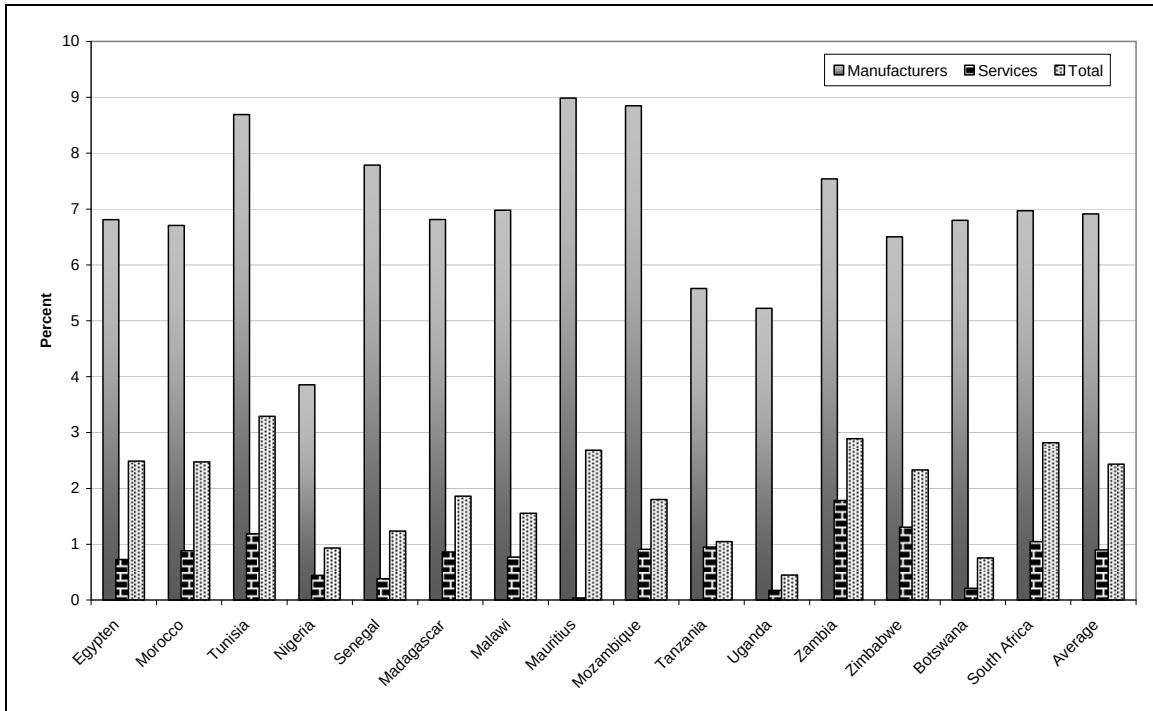
¹¹ This can however not be witnessed in Table 3 in which un-weighted sectoral averages are presented.

Figure 2: Change in output resulting from an increase in demand for services by 10% (2004, %)



Source: Authors' calculations based on GTAPv7.

Figure 3: Change in output resulting from an increase in demand for manufacturers by 10% (2004, %)



Source: Authors' calculations based on GTAPv7.

3.2. Productivity gains in manufacturing from increased variety of business services

Next we proceed with the analysis of the impact of an increase in the variety of business services on manufacturing output in the selected African countries. For that purpose, we follow the approach developed by Feenstra et al (1999) that focuses on the link between increased input variety and productivity.

Suppose that output in two successive points in time s and t is given by the following CES production function:

$$(7) \quad Y_t = f(x_t, I_t) = \left[\sum_{i \in I_t} a_i x_{it}^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)}$$

where $\sigma > 1$ is the elasticity of substitution, x_{it} is the quantity of input i in period t and I_t is the set of available inputs. The corresponding cost of production of unit y_t is:

$$(8) \quad c(p_t, I_t) = \left[\sum_{i \in I_t} b_i p_{it}^{(1-\sigma)} \right]^{1/(1-\sigma)}, \quad b_i = a_i^\sigma, \text{ with } p_{it} \text{ being the prices of inputs.}$$

Total factor productivity (TFP) is defined as the difference between the growth of output and an index of the inputs. The measures of the input index is given by the change in nominal expenditure E_t/E_s deflated by an input price index, where $E_t = \sum_{i \in I_t} p_{it} x_{it}$.

Feenstra et al. (1999) demonstrate that productivity gains from increased input variety can be defined as in equation (9):

$$(9) \quad TFP_{st} = 1/(\sigma - 1) \times \ln \left(\frac{\sum_{i \in I_t} p_{it} x_{it} / \sum_{i \in I} p_{it} x_{it}}{\sum_{i \in I_s} p_{is} x_{is} / \sum_{i \in I} p_{is} x_{is}} \right)$$

If the set of inputs is growing then $N_t > N_s$. The coefficient $1/(\sigma - 1)$ reflects the degree of substitution between new and existing inputs, and is higher when the new inputs are more differentiated from existing ones.

In order to determine the variety of business services and the dispersion between countries we use an index in which we set the number of varieties in South Africa to 100 (we choose this benchmark because South Africa is likely to be one of the most competitive services suppliers in Africa). The number of business services varieties in the other countries of our sample will equal the share of production of business services relative to South Africa times 100. Proceeding like this, we obtain the following indices for the other African countries:

Table 6: Index variety of business services

Egypt	38
Botswana	3
Madagascar	1
Malawi	1
Mauritius	5
Morocco	18
Mozambique	2
Nigeria	11
Senegal	3
Tanzania	2
Tunisia	9
Uganda	1
Zambia	2
Zimbabwe	1
South Africa	100

Source: Own calculations.

To assess the impact of expanding variety by one index unit, we use the cost structure (values and shares) provided in the GTAP 7 database and two assumptions concerning the elasticity of substitution (2 and 5, corresponding to the end of the spectrum values commonly found in the literature¹²). We assume that the individual varieties of business services enter the production and unit-cost function symmetrically. The productivity gains are reported in Table 7a and 7b.

It is worth noting that despite their relatively low shares in the production of most manufacturing sectors in Africa and their weak forward linkages, there are significant gains from expansion of the variety of business services (for instance, Nigeria's productivity in textiles, wearing, chemical sectors could increase by more than 5 percentage points if we assume that the elasticity of substitution is 2 and a significant number of countries more than double productivity in several manufacturing sectors).

¹² See OECD (2006), Decreux and Fontagné (2006), and Markusen, Rutherford and Tarr (2004).

Table 7a: Productivity gains from increased variety in business services

	Egypt		Morocco		Tunisia		Nigeria		Senegal		Madagascar		Malawi		Mauritius	
	Elasticity of substitution															
	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5
Textiles	1.42	0.35	0.00	0.00	0.27	0.07	5.78	1.45	0.61	0.15	0.74	0.19	1.09	0.27	0.00	0.00
Wearing apparel	1.19	0.30	0.00	0.00	0.16	0.04	5.63	1.41	0.63	0.16	0.75	0.19	1.05	0.26	0.00	0.00
Leather	1.25	0.31	0.00	0.00	0.40	0.10	0.00	0.00	0.00	0.00	0.83	0.21	n.a.	n.a.	0.00	0.00
Wood	2.05	0.51	0.00	0.00	0.72	0.18	0.00	0.00	0.66	0.17	0.82	0.21	0.73	0.18	0.00	0.00
Paper	1.49	0.37	0.05	0.01	0.42	0.10	0.00	0.00	0.69	0.17	0.83	0.21	n.a.	n.a.	0.00	0.00
Petroleum	2.14	0.53	0.00	0.00	0.39	0.10	0.00	0.00	0.24	0.06	0.95	0.24	1.06	0.26	n.a.	n.a.
Chemicals	1.34	0.34	0.02	0.01	0.45	0.11	5.04	1.26	0.67	0.17	0.82	0.20	0.72	0.18	0.00	0.00
Minerals	1.50	0.38	0.21	0.05	0.62	0.16	n.a.	n.a.	0.65	0.16	n.a.	n.a.	0.94	0.24	n.a.	n.a.
Ferrous metals	1.26	0.32	0.00	0.00	0.10	0.02	4.59	1.15	0.65	0.16	n.a.	n.a.	0.73	0.18	n.a.	n.a.
Metals	1.70	0.43	0.00	0.00	0.17	0.04	n.a.	n.a.	0.71	0.18	n.a.	n.a.	0.71	0.18	n.a.	n.a.
Metal products	1.27	0.32	0.01	0.00	0.08	0.02	4.48	1.12	0.66	0.16	0.77	0.19	0.71	0.18	n.a.	n.a.
Motorvehicles	1.40	0.35	0.10	0.02	0.45	0.11	0.00	0.00	0.53	0.13	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transport equip.	1.52	0.38	0.10	0.03	0.55	0.14	0.00	0.00	0.66	0.17	n.a.	n.a.	0.66	0.17	n.a.	n.a.
Electronic equip.	2.02	0.50	1.11	0.28	0.36	0.09	n.a.	n.a.	0.75	0.19	n.a.	n.a.	0.62	0.16	0.00	0.00
Machinery	1.80	0.45	0.94	0.23	0.21	0.05	0.00	0.00	0.67	0.17	0.00	0.00	0.66	0.17	0.00	0.00
Other manufact.	2.16	0.54	0.03	0.01	0.13	0.03	n.a.	n.a.	0.62	0.15	0.81	0.20	0.71	0.18	0.07	0.02

Source: Own calculations.

Table 7b: Productivity gains from increased variety in business services

	Mozambique		Tanzania		Uganda		Zambia		Zimbabwe		Botswana		South Africa	
	Elasticity of substitution													
	2	5	2	5	2	5	2	5	2	5	2	5	2	5
Textiles	1.13	0.28	0.95	0.24	0.90	0.22	0.62	0.15	0.68	0.17	0.15	0.04	0.12	0.03
Wearing apparel	1.08	0.27	0.77	0.19	0.75	0.19	0.63	0.16	0.00	0.00	0.16	0.04	0.10	0.02
Leather	n.a.	n.a.	1.12	0.28	0.75	0.19	0.62	0.16	0.00	0.00	0.45	0.11	0.11	0.03
Wood	0.85	0.21	1.07	0.27	1.01	0.25	0.87	0.22	0.49	0.12	0.81	0.20	0.21	0.05
Paper	0.49	0.12	0.73	0.18	0.56	0.14	0.52	0.13	0.35	0.09	0.29	0.07	0.35	0.09
Petroleum	n.a.	n.a.	0.94	0.23	0.00	0.00	0.03	0.01	0.25	0.06	n.a.	n.a.	0.05	0.01
Chemicals	0.82	0.20	0.69	0.17	0.59	0.15	0.63	0.16	0.15	0.04	0.36	0.09	0.13	0.03
Minerals	0.72	0.18	0.89	0.22	0.79	0.20	0.35	0.09	0.59	0.15	0.77	0.19	0.35	0.09
Ferrous metals	0.76	0.19	0.52	0.13	0.72	0.18	0.39	0.10	0.38	0.09	n.a.	n.a.	0.31	0.08
Metals	0.69	0.17	0.20	0.05	0.73	0.18	0.41	0.10	0.08	0.02	0.00	0.00	0.14	0.03
Metal products	0.73	0.18	0.52	0.13	0.73	0.18	0.28	0.07	0.34	0.08	0.19	0.05	0.19	0.05
Motorvehicles	0.00	0.00	0.59	0.15	0.50	0.13	0.00	0.00	0.00	0.00	0.30	0.08	0.12	0.03
Transport equip.	0.00	0.00	0.64	0.16	0.56	0.14	0.42	0.10	0.00	0.00	0.39	0.10	0.11	0.03
Electronic equip.	0.40	0.10	0.60	0.15	0.63	0.16	0.32	0.08	0.00	0.00	0.51	0.13	0.39	0.10
Machinery	0.59	0.15	0.56	0.14	0.61	0.15	0.29	0.07	0.19	0.05	0.52	0.13	0.13	0.03
Other manufact.	0.51	0.13	0.44	0.11	0.91	0.23	0.26	0.07	0.24	0.06	0.56	0.14	0.10	0.03

Source: Own calculations.

5 Summary and conclusions

Despite relatively high growth rates for services export and imports, the African countries display a relatively uniform pattern of specialisation in (low-skilled) labour intensive services and natural-endowment-intensive services. In addition, few African countries are developing a comparative advantage in more sophisticated other business services (based on RCA indices). Similarly, few African countries perform well in dynamic services sectors.

Nevertheless, services play a non-negligible role as input for the production of manufactured goods, contributing on average to approximately 15 % of the latter's output. Trade and transport services are most important in this respect. The share of business services as input is relatively low in all countries. Similarly, the import shares of all services inputs are fairly low (around 2 %) and similar across the analysed countries.

Backward linkages for services and manufacturing are comparable across the analysed African countries. Construction, trade and transport display the strongest backward linkages, suggesting that an increase in the final demand of these sectors will have a large impact on sectors that supply inputs into these sectors' production. In addition to Electricity, gas, water, Other business services, Communication services and Financial services seem to have the strongest forward linkages among services sectors in the 15 countries, suggesting that they are key sectors in supplying inputs to other sectors.

Services are becoming increasingly important for African countries and exhibit significant spill-over effects as demonstrated by the strength and dispersion of the forward and backward linkages presented in this paper. However, many African countries do not have a robust supplier base from which to draw inputs. Therefore, lowering of services trade barriers that will lead to an increase in the variety of available business services has important productivity impacts on manufacturing sectors. Despite low shares in the total cost of manufacturing production, the analysis shows that access to a wider variety of business services significantly improves the productivity of several manufacturing sectors in Africa.

In the context of trade liberalisation (multilateral, regional or bilateral), Africa thus needs to look beyond the liberalisation of goods only when assessing the benefits from liberalisation.

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ANNEX 1:

Explanatory note to the Charts:

The horizontal axis measures the annual change in each country's share of world imports, while the vertical axis reveals the annual growth in world imports. The size of a service sector in a country's export basket is illustrated by the size of the circle. This form of analysis indicates whether a services sector's performance has been dynamic, stagnant or declining during the time period. Services sectors located in the top-right hand quadrant gain market shares while growth in world imports of these services is higher than the growth in world imports of commercial services on average. Conversely, sectors in the bottom left-hand quadrant lose market shares at the same time as the growth in world imports of these services are lower than the average growth in world imports of commercial services. Sectors in the bottom right-hand quadrant gain market shares, but the growth in world imports of these services is lower than the average growth in world imports of commercial services. Finally, sectors in the top left-hand quadrant lose market shares while the growth in world imports of these services is higher the average growth in world imports of commercial services.

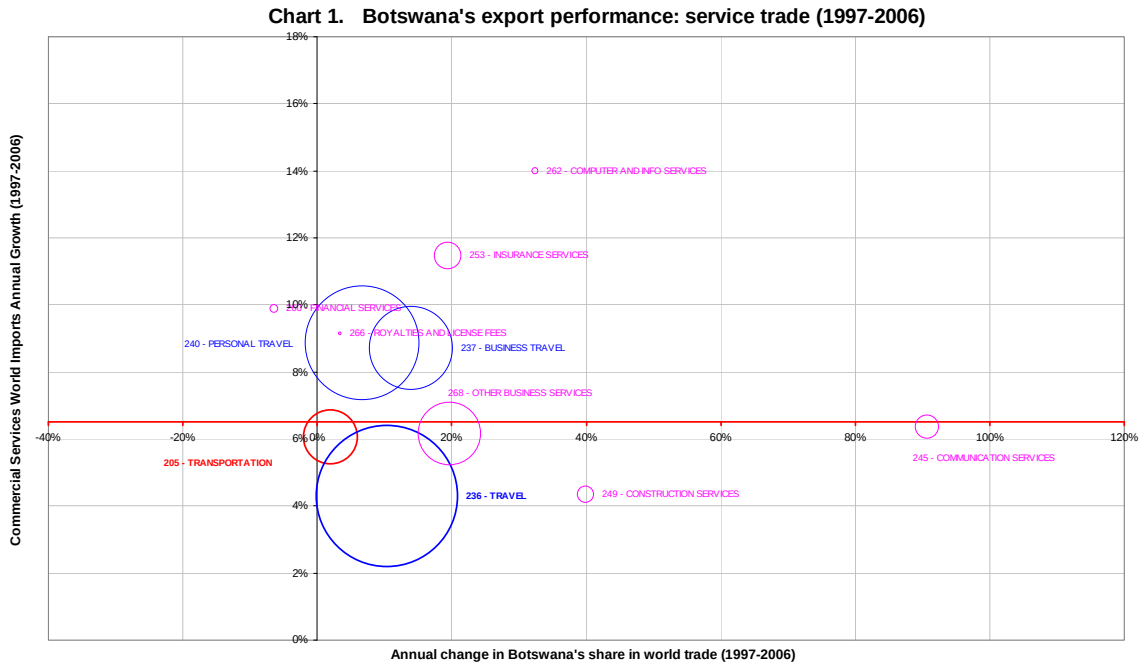


Chart 2. Egypt's export performance: service trade (1997-2006)

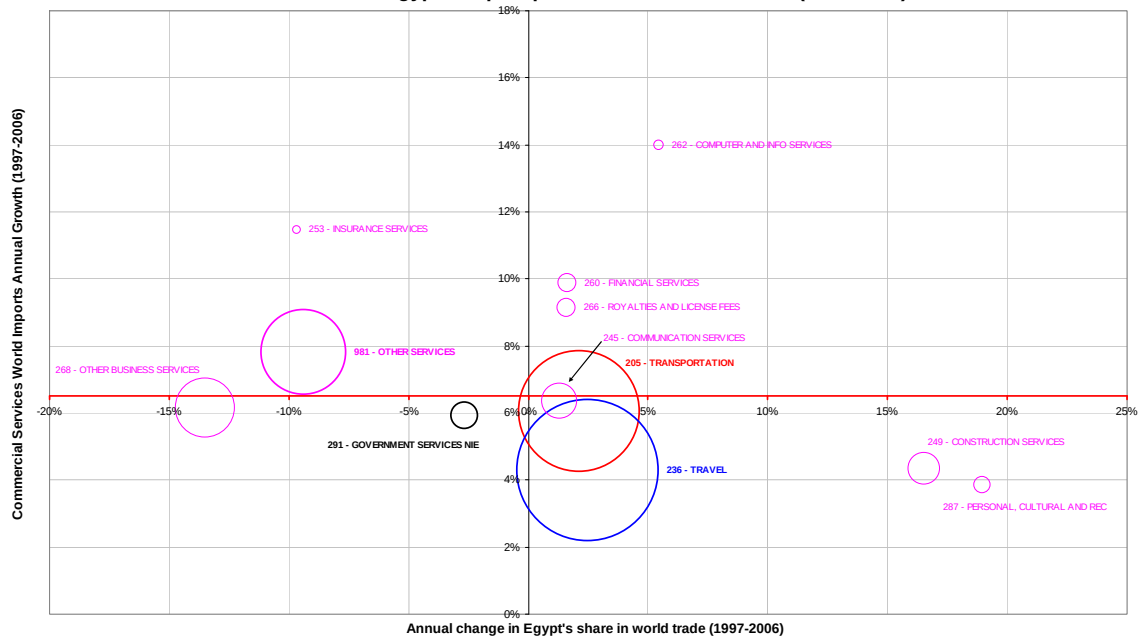


Chart 3. Mauritius's export performance: service trade (1997-2006)

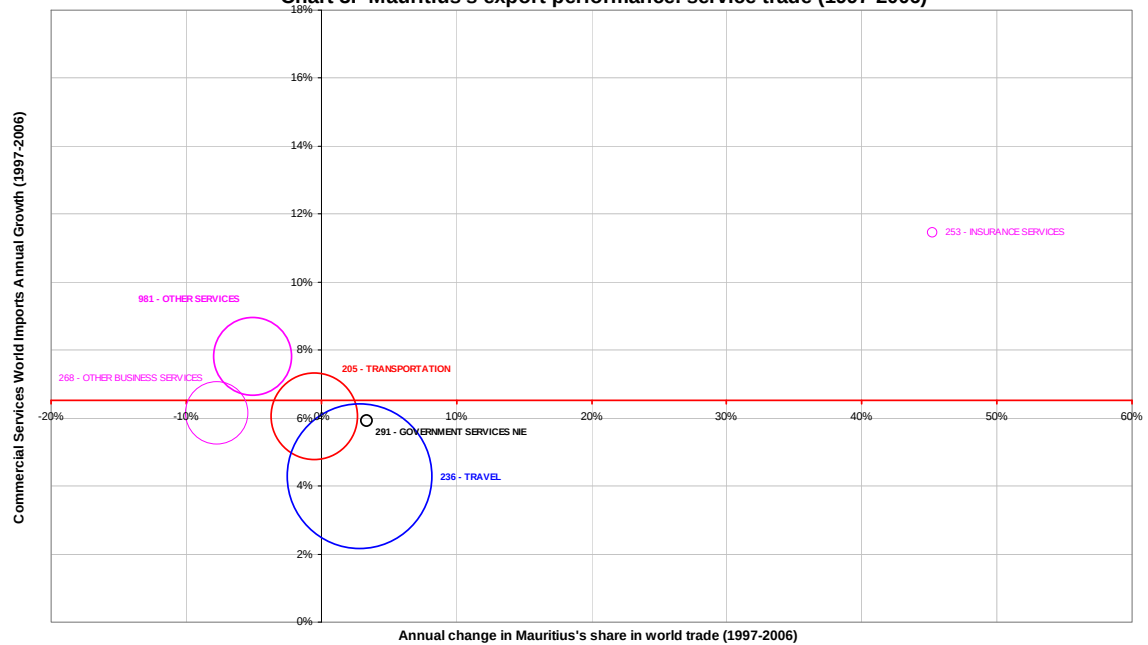


Chart 4. Morocco's export performance: service trade (1997-2006)

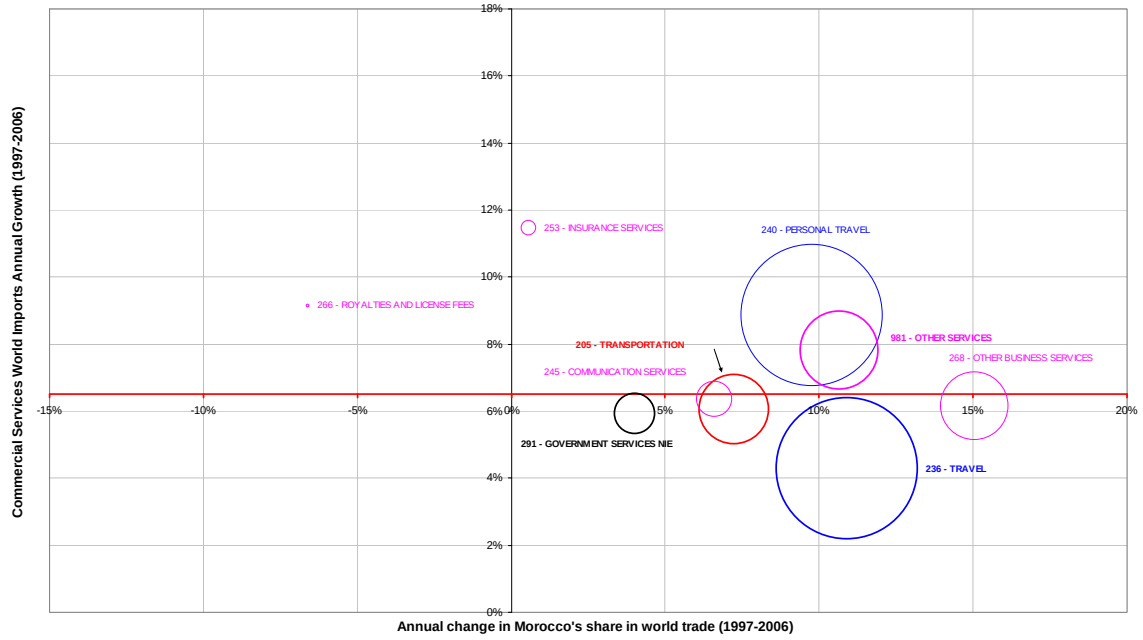


Chart 5. South Africa's export performance: service trade (1997-2006)

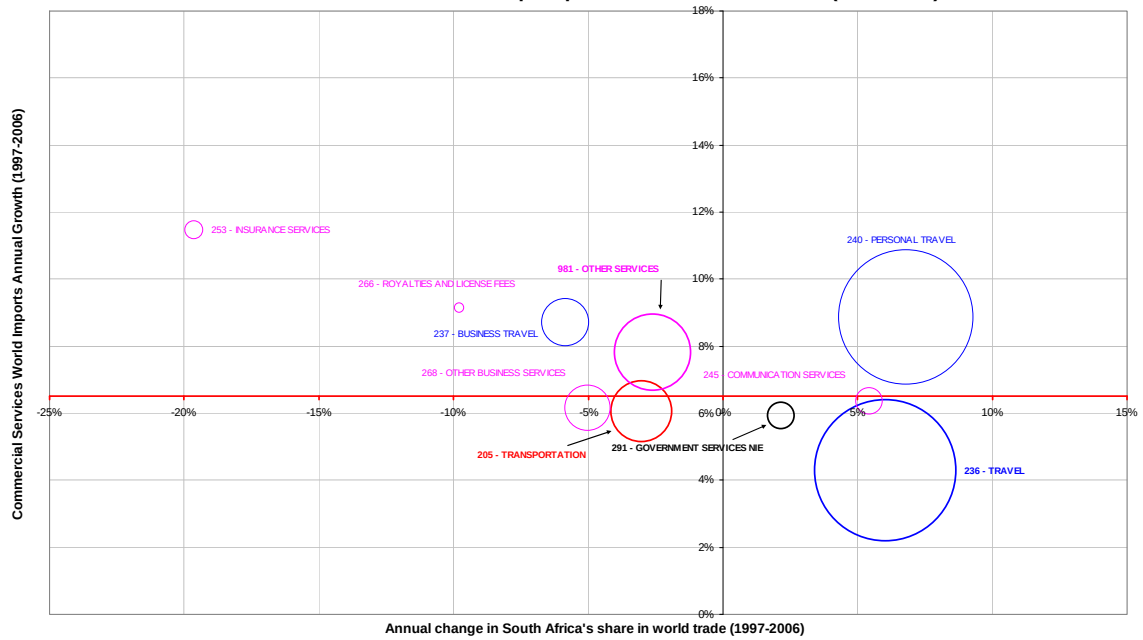


Chart 6. Tanzania's export performance: service trade (1997-2006)

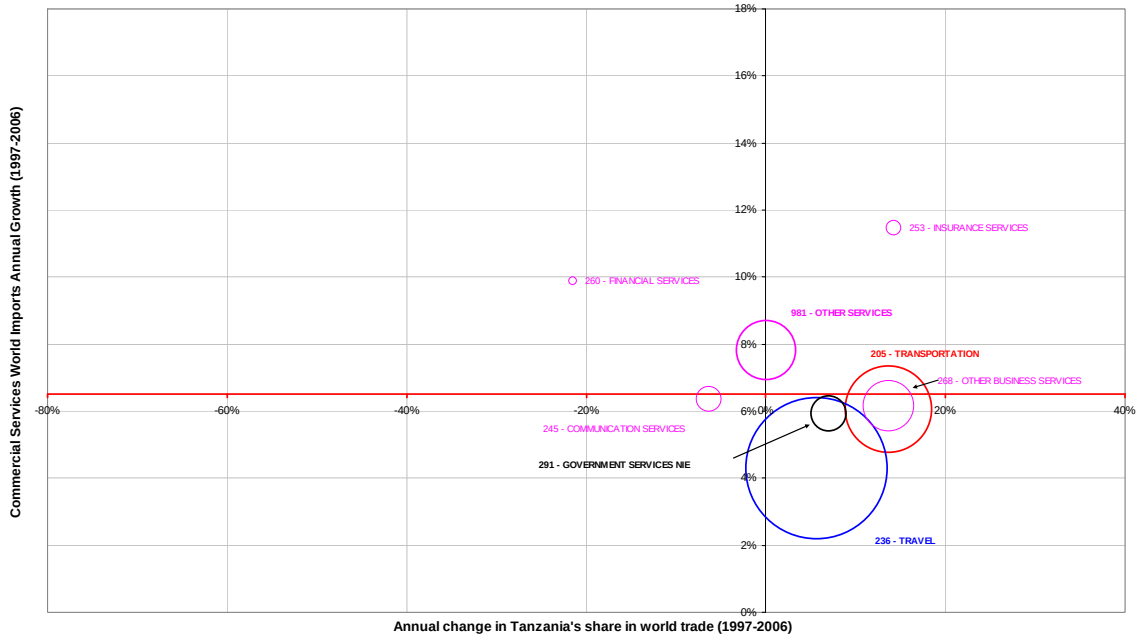


Chart 7. Tunisia's export performance: service trade (1997-2006)

