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## Data Note

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Southern African Customs Union Trade Statistics:  
Similarities and discrepancies in the TIPS SADC trade,  
ITC Trade Map and the UN Comtrade data sets.

**Date:** June 2011

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## Introduction

Evidence based policy making is critical for developing sound and relevant government policies. The process of evidence based policy making by definition allows one to monitor specific variables to determine the efficacy of a government intervention. Accurate data and sound data analysis are needed to achieve particular objectives.

In the year of the centenary of the Southern African Customs Union (SACU), the SACU revenue sharing formula is being revised in a manner that is politically sustainable and justifiable to the citizens of SACU. The type and quality of the data used to assess the impact of changes and to guide the choice of alternative formulas will play a critical role.

The objective of this note is to illustrate the existence of large disparities in the trade data. The note also seeks to highlight the extent to which trade datasets are incomplete in the case of SACU countries. More specifically, the focus of this note will be on comparing the SACU trade data available from three sources;

- The **TIPS SADC data base** was constructed by TIPS through making use of its regional network of in-country government sources attached to various statistical authorities;
- The **ITC Trade Map data** is based on UN Comtrade with quarterly and monthly data originating from national as well as from regional sources. Data access on the ITC Trade Map is limited to a few years (currently the available trade data series begins in 2001 and progresses to the most recent data available)
- The **UN Comtrade database** is an internet subscription service that supplies international trade data, as reported by the countries and is maintained by *United Nations* Commodity Trade Statistics Division. UN COMTRADE does provide free data; although there is a strict limitation to 1 000 records<sup>1</sup> per day. In both ITC Trade Maps and UN Comtrade, data that is not available from the reporting country is reconstructed on the basis of data reported by partner countries, giving rise to mirror statistics.
- Special attention will also be paid to an additional dataset for South Africa, the **Quantec database**, because of its popularity amongst South African policy researchers. The Quantec database is an internet subscription service that makes available economic data collections that cover macroeconomic, regional socio-economic, industry and international trade data. It is a database that focuses only on South Africa, and collects data on South African statistics. The trade data is sourced from the South African Revenue Service.

The note contains four main sections:

1. The first section gives a brief description of the characteristics of the trade data available for SACU and will focus on the three aforementioned sources.
2. The second section will focus on discrepancies in total trade values reported by two databases, between a reporting SACU member and the corresponding SACU partners..
3. The third section looks at the statistical significance of the data differences making use of the Wilcoxon Matched-Pairs Signed-Ranks test (Wilcoxon-MPSR test).
4. The fourth and final section looks at the results from the statistical analysis

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<sup>1</sup> The term record relates to a singular trade value corresponding to a particular reporter's trade with a given partner in a particular year or period.

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# 1. Trade Data Characteristics

We begin by considering which data are available in each of the data sets. Table 1 shows the nature of the data that is available for each of the four SACU countries. Table 2 reveals the nature of the trade data available for South Africa, from the databases.

The purpose of these tables is to assess the level and depth of data available for these SACU countries and give an indication of the data that trade policy researchers have available to them. The table also shows the HS level of disaggregation that one can get from these databases as well currency, the availability of export and re-export<sup>2</sup> data and the nature of the data (actual *vis-à-vis* mirror statistics).

From the length of the time series, it is apparent that the depth of the data available for the period is severely limited with countries such as Lesotho that have at most 7 years of trade data available, while South Africa has a series as long as 22 years (see Table 2).

**Table 1: Data characteristics\***

Botswana Export and Import Data Characteristics			
Database	ITC	TIPS SADC	UN Comtrade
Series length	2001-2007 (7 years)	1999-2006 (8 years)	2000-2008 (9 years)
Nature of data	Actual data supplemented by mirror data	Actual data	Actual data
Nomenclature	HS 98; HS 08	HS92, HS02	HS96
Frequency of data	Annual	Annual	Annual
Re-export data	Not available	Not available	Available
Currency	Current US\$ and BWP (thousands)	Current US\$ and BWP	Current US\$ and BWP
Level of disaggregation	Product cluster at 2, 4, 6, and 10 digit level of disaggregation	Product cluster at 2, 4 and 6 digit level of disaggregation	Product cluster at 2, 4 and 6 digit level of disaggregation
Lesotho Export and Import Data Characteristics			
Database	ITC	TIPS SADC	UN Comtrade
Series length	2001-2007 (7 years)	1999-2003 (5 years)	2000-2004 (5 years)
Nature of data	Mirror data	Actual data	Actual data
Nomenclature	HS 98; HS 08	HS92, HS02	HS96
Frequency of data	Annual	Annual	Annual
Re-export data	Not available	Not available	Available

<sup>2</sup> Re-exports are foreign goods exported in the same state as previously imported, from the free circulation area, premises for inward processing or industrial free zones, directly to the rest of the world and from premises for customs warehousing or commercial free zones, to the rest of the world. Re-exports do not undergo any value-added processes and as such are not counted as a nation's exports.

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Currency	Current US\$ and ZAR (thousands)	Current US\$ and LSL	Current US\$ and LSL
Level of disaggregation	Product cluster at 2, 4, 6, and 10	Product cluster at 2, 4, and 6	Product cluster at 2, 4, and 6
<b>Namibia Export and Import Data Characteristics</b>			
<b>Database</b>	<b>ITC</b>	<b>TIPS SADC</b>	<b>UN Comtrade</b>
Series length	2001-2008 (8 years)	1998-2006 (9 years)	2000-2008 (9 years)
Nature of data	Actual data supplemented by mirror data	Actual data	Actual data
Re-export data	Not available	Not available	Available
Nomenclature	HS 98; HS 08	HS92, HS02	HS96
Frequency of data	Annual	Annual	Annual
Currency	Current US\$ and NA\$ (thousands)	Current US\$ and N\$	Current US\$ and NA\$
Level of disaggregation	Product cluster at 2, 4, 6, and 10	Product cluster at 2, 4, and 6	Product cluster at 2,4,and 6
<b>Swaziland Export and Import Data Characteristics</b>			
<b>Database</b>	<b>ITC</b>	<b>TIPS SADC</b>	<b>UN Comtrade</b>
Series length	2001-2007 (8 years)	2000-2004 (5 years)	2000-2007 (8 years)
Nature of data	Actual data supplemented by mirror data	Actual data	Actual data
Nomenclature	HS 98; HS 08	HS92, HS02	HS96
Frequency of data	Annual	Annual	Annual
Re-export data	Not available	Not available	Available
Currency	Current US\$ and ZAR (thousands)	Current US\$ and SZL	Current US\$ and SZL
Level of disaggregation	Product cluster at 2,4,6, and10	Product cluster at 2,4,and 6	Product cluster at 2,4,and 6

Notes: \* BWP-Botswana Pula; LSL: Lesotho Loti; NA\$: Namibian dollar; ZAR: South Africa Rand; and SZL: Swaziland Lilangeni; Sources: ITC Trade Map, UN Comtrade databases and TIPS SADC trade database.

The Quantec database has the longest time series trade data of the four databases in the South African case. In addition Quantec has trade data reported monthly as well as by province. The comparison across the four databases on South African trade data is shown in Table 2.

Table 2: South Africa trade Data characteristics

South Africa Export and Import Data Characteristics				
Database	ITC	TIPS SADC	UN Comtrade	Quantec
Series length	2001-2007 (8 years)	1992-2006 (15 years)	2000-2007 (8 years)	1988-2009 (22 years)
Nature of data	Actual data	Actual data	Actual data	Actual data
Nomenclature		HS92, HS02	HS96	HS92, HS02; SITC
Frequency of data	Annual	Annual	Annual	Monthly, annual
Re-export data	Not available	Not available,	Available	Not available,
Currency	Current US\$ and ZAR (thousands)	Current US\$ and ZAR	Current US\$ and ZAR	Current US\$ and ZAR
Level of disaggregation	Product cluster at 2,4,6, and10	Product cluster at 2,4, 6 and 8 digit	Product cluster at 2,4,and 6	Product cluster at 2,4,and 6

Source: Ibid

In what follows we set out the differences in the trade data in the databases in the manner described by equation one.

$$\text{Percentage difference} = \left\{ \frac{(i - j)}{j} \right\} \times 100 \quad 1$$

Where  $i$  represents an entry from database  $i$  and similarly  $j$  represents an entry from data base  $j$

## 2. Similarities and discrepancies in Trade data: Country level analysis

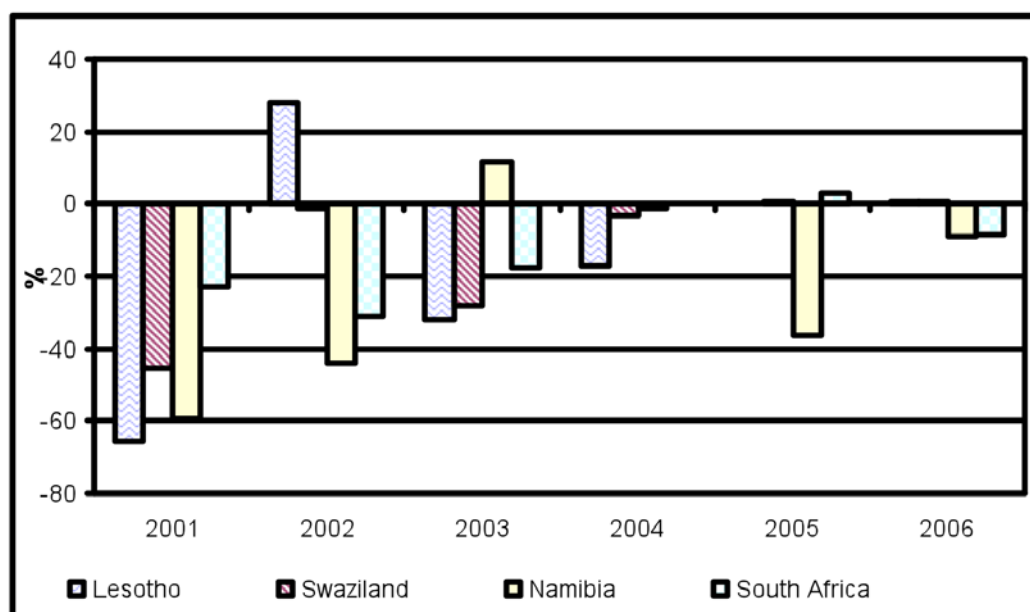
This section will focus on trade data value discrepancies in total export and import values reported by two databases, between a reporting SACU member and the corresponding SACU partners. The measure of difference used in this note is the difference between the sources as a percentage of either the ITC Trade Map data or UN Comtrade data. In instances where a comparison between the ITC Trade Map data or UN Comtrade data; the difference was calculated for the data sources, the ITC Trade Map data was used as a denominator.

### 2.1 Botswana

#### 2.1.1 TIPS SADC vs ITC Trade Map

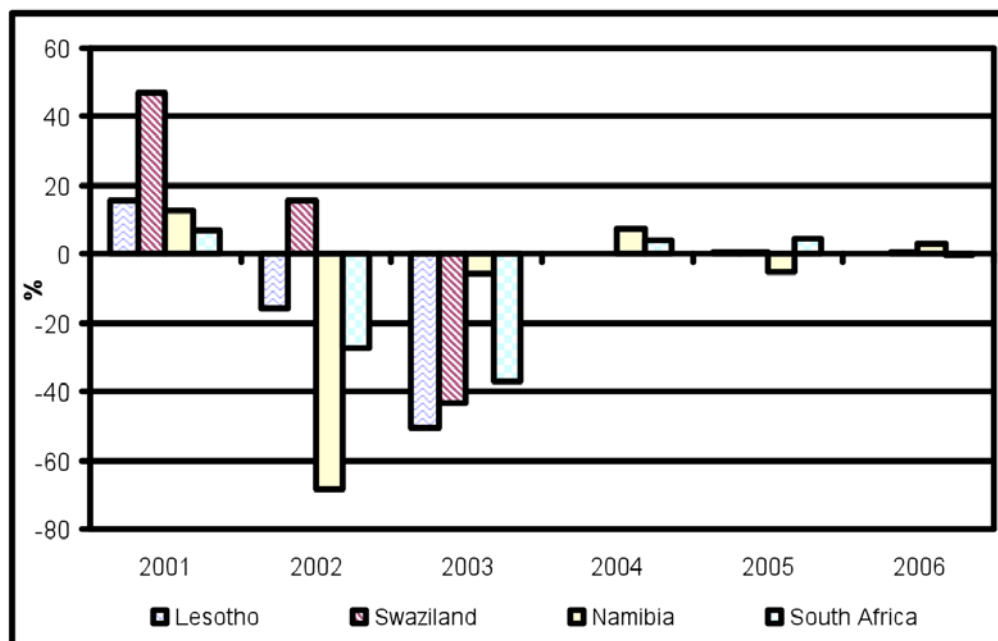
The largest discrepancies in export values between the TIPS SADC and ITC Trade Map databases are observed for Botswana and Lesotho total export data, with the largest difference greater than 60 % of the ITC Trade Map values in 2001. The differences are small, however, for 2004-2006 data, with the exception of the figures for Botswana-Namibia total exports. With regards to export data it can be said that the TIPS SADC database reports values for Botswana that are significantly lower than the ITC Trade Map values (see Figure 1).

Figure 1: Differences in Botswana Total Export Figures from TIPS SADC & ITC databases



Sources: TIPS SADC trade database & ITC Trade Map databases

Figure 2: Differences in Botswana Total Import Figures from TIPS SADC & ITC databases

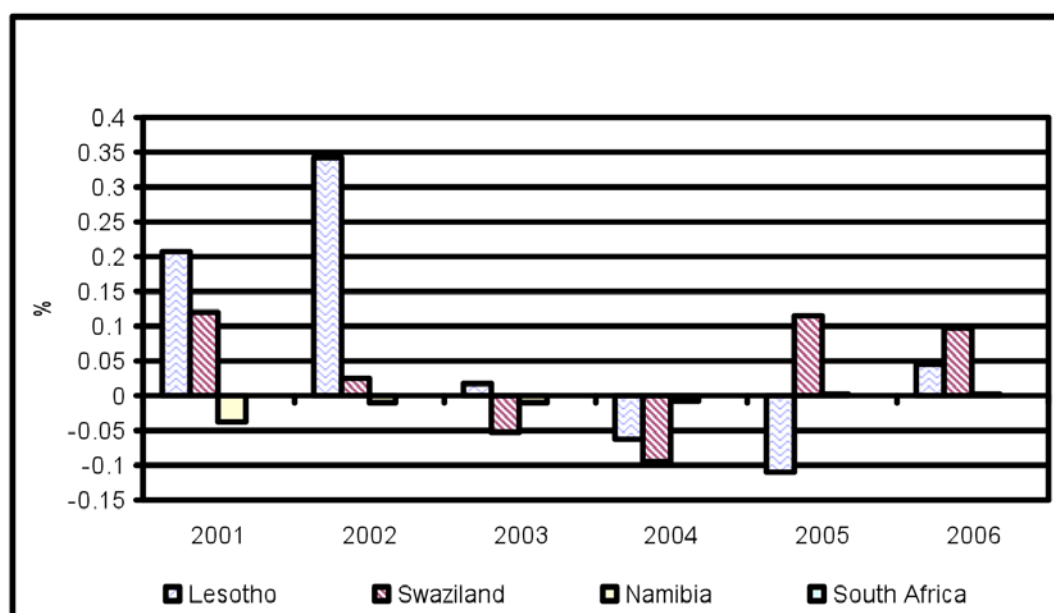


Sources: TIPS SADC trade database & ITC Trade Map databases

### 2.1.2 ITC Trade Map vs UN Comtrade

The largest source of discrepancy in export values between the UN Comtrade and ITC Trade Map databases is around Botswana and Lesotho total export data with a discrepancy of 0.35%. The range of discrepancy was narrow (the difference ranging from US\$25 to US\$460), and is most likely due to the rounding off figures in the ITC Trade Map database as shown in Figure 3.

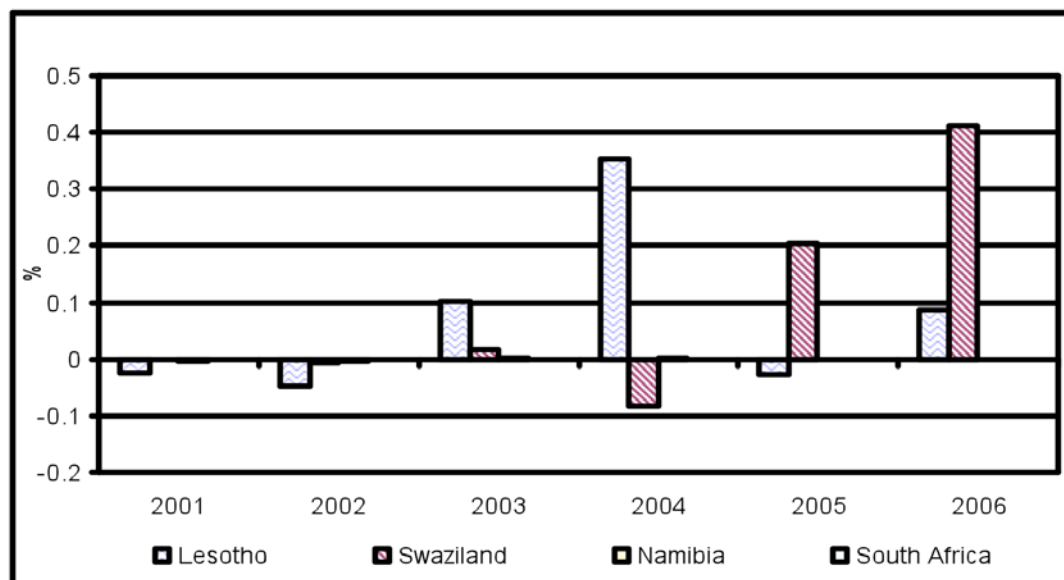
Figure 3: Differences in Botswana Export Figures from ITC & UN Comtrade databases



Sources: TIPS SADC trade database & ITC Trade Map databases

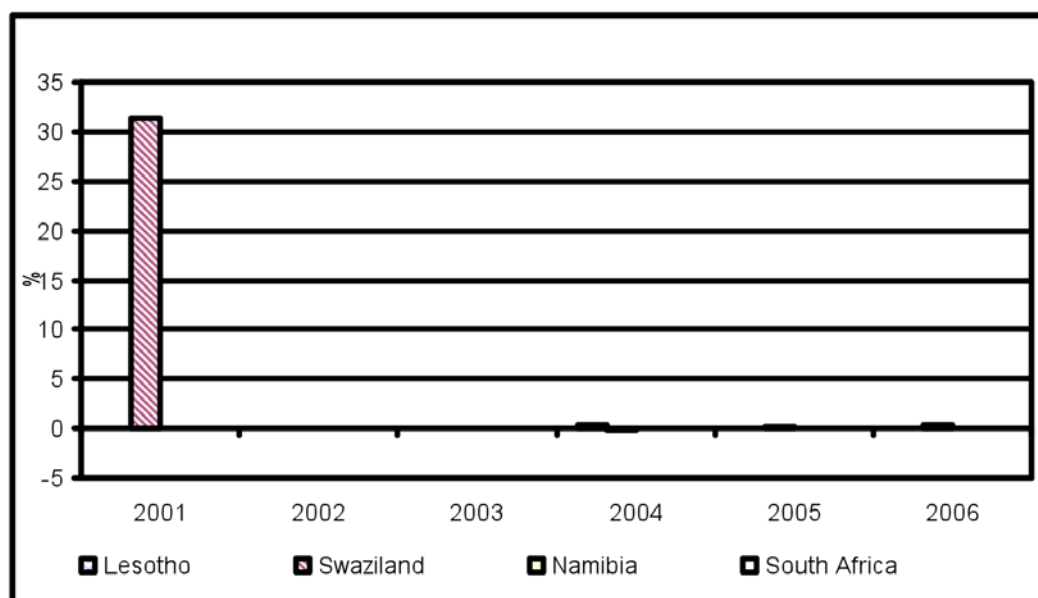
Botswana's reported import figures between the ITC Trade Map and UN Comtrade database are virtually identical, and are mainly a result of rounding off. The major discrepancy arises only in the case of Swaziland and Botswana trade figures. The ITC Trade Map reports the value of imports from Swaziland to Botswana as US\$ 1000, while UN Comtrade records the value as US\$ 1313, giving rise to a 31.3% difference. For ease of display, this value has been removed in order to reveal the trends in Botswana- Swaziland imports that would otherwise be hidden as a result of the relative larger 31.8 percentage points difference (see Figure 4).

Figure 4: Differences in Botswana Total Import Figures from ITC Trade Map & UN Comtrade



Source: ITC Trade Map & UN Comtrade databases

Figure 5: Differences in Botswana Total Import Figures from ITC Trade Map & UN Comtrade (including the Swaziland Outlier)



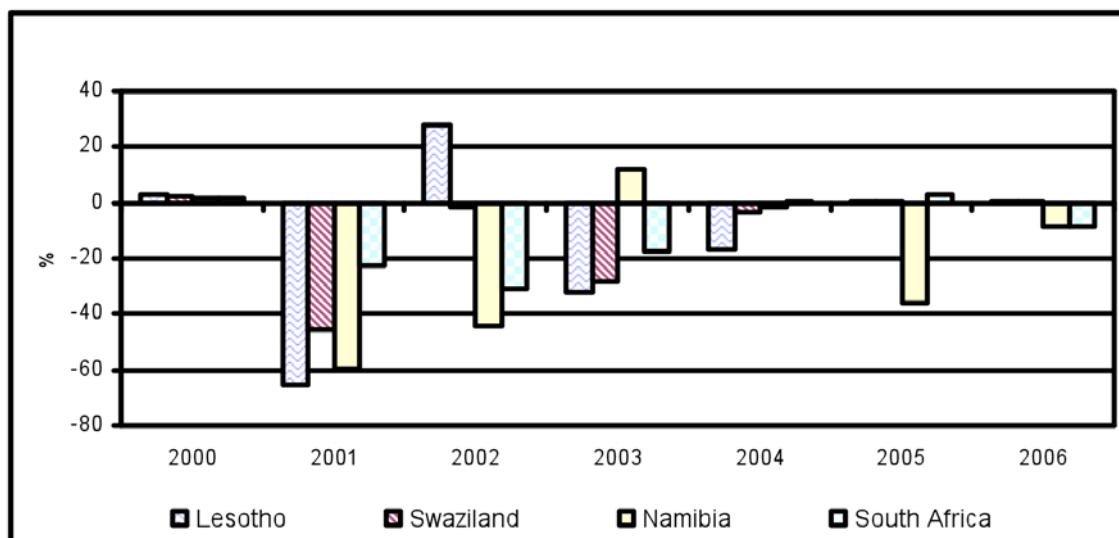
Source: ITC Trade Map Trade Map & UN Comtrade databases



### 2.1.3 TIPS SADC vs UN Comtrade

The largest discrepancies in export values between the TIPS SADC and UN Comtrade databases are around Botswana and Lesotho total export data, with the largest difference greater than 60 % of the ITC Trade Map values in 2001. This is expected as there was virtually no difference in the UN Comtrade and ITC Trade Map data, the only difference is the inclusion of 2000 as both these databases had figures for this series.

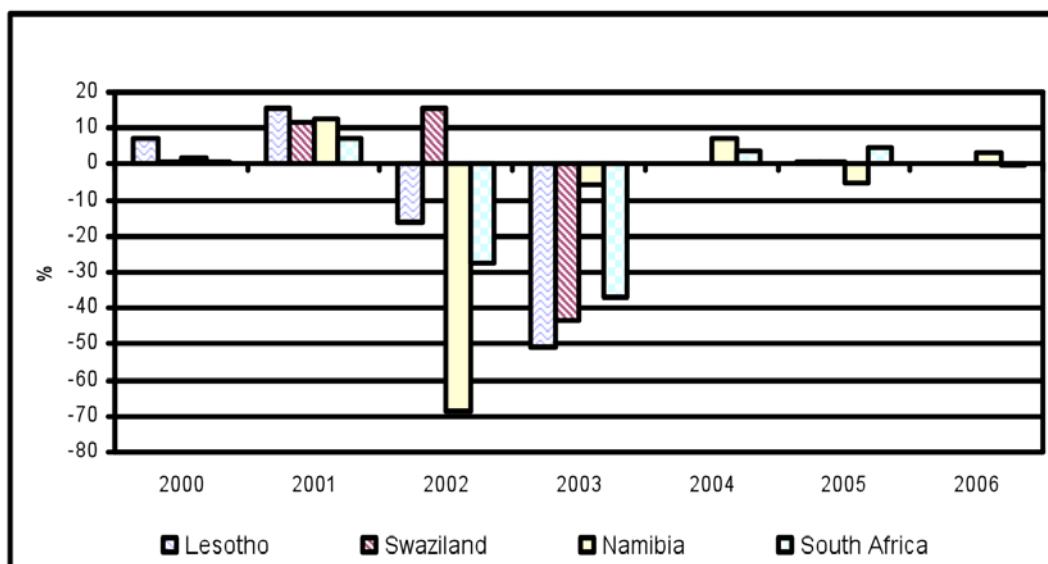
Figure 6: Differences in Botswana Total Export Figures from TIPS SADC & UN Comtrade databases



Sources: TIPS SADC & UN Comtrade database

As in the previous case the figures reported by the TIPS SADC and UN Comtrade data seem virtually identical to those of the TIPS SADC and ITC Trade Map, because of the little difference in the UN Comtrade and ITC Trade Map data.

Figure 7: Differences in Botswana Export Figures from TIPS SADC & UN Comtrade databases



Source: TIPS SADC & UN Comtrade databases

### Summary of Discrepancies in Botswana's trade data

The largest discrepancies in export values between the TIPS SADC and ITC Trade Map databases are observed for Botswana and Lesotho total export data, with the largest difference greater than 60 % of the ITC Trade Map values in 2001.

The largest source of discrepancy in export values between the UN Comtrade and ITC Trade Map databases is the Botswana and Lesotho total export data with a discrepancy of 0.35%.

Botswana's reported import figures between the ITC Trade Map and UN Comtrade database are virtually identical, and are mainly a result of rounding off.

The largest discrepancies in export values between the TIPS SADC and UN Comtrade databases are around the Botswana and Lesotho total export data, with the largest difference greater than 60 % of the ITC Trade Map values in 2001.

On the whole it is difficult to say that there is consistency in the discrepancies.

## 2.2 Lesotho

As shown in Table 1, Lesotho has the most scant data available in all the three databases. Across all the database series, comparisons are only possible for 2001, 2002 and 2003 as this is the only period with comparable data. Within this period there are also a number of problems:

- Firstly, the TIPS SADC trade databases as well as UN Comtrade database do *not show reports of exports to Namibia from Lesotho throughout the comparable period*.
- Secondly, the *SADC trade database reports no imports from South Africa in the period in question*.
- And finally, the most problematic of all is the use of mirror statistics reported from the ITC Trade Map database<sup>3</sup>, throughout the ITC Trade Map Lesotho trade data series. While a deliberate effort was made to avoid the use of mirror statistics, there were instances where this was unavoidable; and the Lesotho case is one such example, the only available data on the ITC Trade Map database were mirror statistics.

Mirror statistics are a second-best solution; the best being nationally reported data. According to Guo (2010) the major disadvantages with mirror statistics are the following. Firstly, mirror statistics exclude trade with other non-reporting countries<sup>4</sup>. Secondly, is the fact that mirror statistics do not reveal the presence of trans-shipments and this could potentially hide the actual source of the traded product. Finally, mirror statistics invert the reporting standards by valuing exports in c.i.f. (value that includes transport costs and insurance) terms and imports in f.o.b. (value of the product that excludes transport costs and insurance).

### 2.2.1 TIPS SADC vs ITC Trade Map

It appears that the ITC Trade Map database seems to have reported export value data that are significantly lower than those of the SADC trade database (Table 3). The Lesotho-South Africa trade data is the source of the greatest disparity, ranging from US\$ 417,370 to US\$ 149,461,097.3.

<sup>3</sup> According to Guo (2010), when conducting analyses on trade flows between countries or regions, one would expect that data recorded by country X as exports to country Y match the data recorded by country Y as imports from country X. Unfortunately, this is rarely the case. Several reasons can be attributed to such asymmetry in trade statistics, for example: different valuations for imports (c.i.f.) and exports (f.o.b); different trade recording systems for imports and exports, general versus special trade; differences in definitions of trade partners; differences in thresholds for recording international trade which, by extension, mean differences in the definition of trade in small transactions; other differences include timing of measurement (recording by customs) differing; allocation of product classification to goods or misattribution; smuggling and the like. For a detailed discussion on the inconsistencies between import and export data see Guo (2010) and (Tsigas *et al.* 1992).

<sup>4</sup> As a result, mirror statistics barely cover South-South trade and hence cannot be considered a suitable source for any assessment of intra-African trade.

Table 3: TIPS SADC and ITC Trade Map Difference across exports from and imports by Lesotho<sup>5</sup> (US \$ and %)

Exports	2001		2002		2003	
	TIPS- ITC	%	TIPS- ITC	%	TIPS- ITC	%
Botswana	-22,785.5	-7.23	-289,000.0	NA*	-256,025.3	-80.8
Namibia	-1,000.0	NA	0.0	NA	-17,000.0	NA
South Africa	149,461,097.3	NA	150,123,059.7	85297.2	91,821,405.7	417,370
Swaziland	177,102.7	805.01	-29,000.0	NA	-36,000.0	NA
<b>Imports</b>						
Botswana	1,515,531.3	913.0	525,988.3	NA	-256,937.9	-100
Namibia	88,260.2	308.0	-1,000.0	61180.9	8,968.7	22,616.3
South Africa	574,002,826.1	NA	612,808,804.0	NA	908,651,406.0	NA
Swaziland	-16,000	NA	-96,000.0	NA	-100,000.0	NA

\* These figures could not be calculated because either one of the figures from the datasets had a zero value.

Sources: TIPS SADC & ITC Trade Map databases

## 2.2.2 ITC Trade Map vs UN Comtrade

The differences between UN Comtrade and ITC Trade Map data are quite pronounced, as shown in Table 4. The source of the discrepancy could be as a result of the fact that the ITC Trade Map data are mirror statistics and not actual figures.

Table 4: UN Comtrade and ITC Trade Map Difference across exports from and imports by Lesotho

Exports	2001		2002		2003		2004	
	UNC- ITC	%	UNC- ITC	%	UNC- ITC	%	UNC- ITC	%
Botswana	-25,258	-8.0	N/A	NA	-255,337	-80.5	3,431,005	4,575
Namibia	-1,000	N/A	N/A	NA	-17,000	N/A	-22,000	N/A
South Africa	148,282,496	N/A	86,025	85,297	92,858,086	422,082	170,244,076	102,556
Swaziland	175,555	798.0	N/A	NA	-36,000	N/A	-749,000	N/A
<b>Imports</b>								
Botswana	1,524,899	918.6	530,645	525	-256,915	-98.8	-145,000	N/A
Namibia	88,907	493.9	-1,000	N/A	9,066	226	-81,000	N/A
South Africa	577,415,936	N/A	616,702,784	N/A	915,488,043	N/A	1,094,354,963	N/A
Swaziland	-16,000	N/A	-96,000	N/A	-100,000	N/A	0.0	N/A

Sources: TIPS SADC Vs UN Comtrade database

<sup>5</sup> Unless otherwise stated all the figures reported in this document are in US \$.

### 2.2.3 TIPS SADC vs UN Comtrade

The difference between the TIPS SADC and UN Comtrade had relatively minor discrepancies, particularly in the export data, with the differences ranging from R688 to US\$1,281,404. The differences in value of export figures were marked and ranged from US\$3,413,110 to US\$530,345,356. Table 5 reveals the differences in the values of trade as reported by the two databases.

Table 5: TIPS SADC and UN Comtrade database Difference across exports from and imports by Lesotho

Exports	2001		2002		2003		2004	
	TIPS-UNC	%	TIPS-UNC	%	TIPS-UNC	%	TIPS-UNC	%
Botswana	-1,590.7	-0.2	2,472.5	0.9	0.0	N/A	-688.3	-1.1
Namibia	0.0	N/A	0.0	N/A	0.0	N/A	0.0	N/A
South Africa	-211,630.6	-0.2	1,178,601.3	0.8	-1,281,404.3	-0.8	-1,036,680.3	-1.1
Swaziland	0.0	N/A	1,547.7	0.8	0.0	N/A	0.0	N/A
<b>Imports</b>								
Botswana	126,507.7	1.2	-9,367.7	-0.6	-4,656.7	-0.7	-22.9	-0.7
Namibia	1,013.9	0.5	-646.8	-0.6	0.0	N/A	-97.3	-0.7
South Africa	530,345,356.2	8.9	-3,413,109.9	-0.6	-3,893,980.0	-0.6	-6,836,637.3	-0.7
Swaziland	20,797.1	9.1	0.0	N/A	0.0	N/A	0.0	N/A

Source: TIPS SADC and UN Comtrade

#### Summary of Discrepancies in Lesotho's trade data

It appears that the ITC Trade Map database seems to have reported export value data that are significantly lower than those of the SADC trade database.

The differences between UN Comtrade and ITC Trade Map data are quite pronounced, and could be a result of the fact that the ITC Trade Map data are mirror statistics and not actual figures.

The difference between the TIPS SADC and UN Comtrade had relatively minor discrepancies, particularly in the Export data.

## 2.3 Namibia

### 2.3.1 TIPS SADC vs ITC Trade Map

Namibia-South Africa total trade data gave the source of the greatest disparity between the TIPS SADC and the ITC Trade Map databases. The average difference was roughly US\$24 million, and the range of the discrepancy was from US\$ 549 000 to US\$14 million.

With regards to imports, Namibia-South Africa trade data was also the source of the greatest disparity, with an average discrepancy of US\$ 701 million. The range of the discrepancy began as low as US\$ 994 million to a peak of R 2.31 billion. Table 6 gives the difference in the values in the two databases as a percentage of the ITC Trade Map value.

Table 6: TIPS SADC & ITC Trade Map Difference in Namibia's Exports and imports value

Exports	2001	2002	2003	2004	2005	2006
Botswana	-2.3%	-0.6%	-1.0%	-0.2%	0.1%	0.3%
Lesotho	-3.2%	46.1%	-0.9%	-0.5%	0.2%	-0.4%
South Africa	-33.8%	-1.2%	-1.6%	-0.1%	0.1%	1.0%
Swaziland	-3.1%	0.2%	-1.6%	-0.1%	0.1%	0.4%
<b>Imports</b>						
Botswana	-2.3%	-0.7%	-0.7%	-0.4%	0.4%	0.6%
Lesotho	33.6%	N/A	-3.3%	-1.0%	-0.5%	2.9%
South Africa	53675.0%	51983.0%	60505.2%	37604.4%	38079.2%	34256.7%
Swaziland	-1.3%	1.5%	-1.8%	-0.4%	0.4%	0.6%

Sources: TIPS SADC and ITC Trade Map databases

### 2.3.2 ITC Trade Map vs UN Comtrade

As in the previous scenario, the largest source of discrepancy in trade data values between the UN Comtrade and ITC Trade Map databases were the import and export figures for Namibia-South Africa trade that averaged a little over US\$ 700 million. The discrepancies fell in the range of US\$ 1 billion to US\$ 2 billion. The import figures were almost identical, with the largest discrepancy being around the South Africa – Namibia trade values averaging US\$146. The discrepancies between trade values range between US\$24 to US\$485.

Table 7 gives the difference in the values in the two databases as a percentage of the ITC Trade Map value.

Table 7: UN Comtrade & ITC Trade Map Difference in Namibia Trade Values

Exports	2001	2002	2003	2004	2005	2006
Botswana	-0.01%	-0.01%	0.00%	0.00%	-0.00%	0.00%
Lesotho	-0.13%	44.00%	0.78%	-0.31%	0.10%	0.06%
South Africa	0.00%	0.00%	-0.00%	-0.00%	0.00%	0.00%
Swaziland	-0.03%	0.73%	-0.00%	0.11%	-0.03%	-0.01%
<b>Imports</b>						
Botswana	-0.01%	-0.02%	0.02%	-0.00%	0.01%	0.00%
Lesotho	19.80%	N/A	-1.60%	-0.63%	-0.82%	2.25%
South Africa	57506.13%	52843.56%	61635.14%	37740.40%	37942.89%	34052.45%
Swaziland	-0.89%	-0.86%	-0.05%	-0.01%	0.00%	-0.00%

Sources : TIPS SADC vs UN Comtrade database

### 2.3.3 TIPS SADC vs UN Comtrade

The export figures from the two datasets, had inconsistencies that ranged from US\$ 548,731.26 to US\$ 146,306,953.92, and the largest contradiction arose from the Namibia-South Africa reported trade figures, with an average difference of US\$20,958, 673.86. A similar story is told by the Import data, where Namibia – South Africa trade figures were found to be the greatest source of contradiction between the two datasets, with a range starting at US\$ 5,386,669 and ending at US\$ 88,845,887, with an average difference of US\$ 13.5 million.

Table 8: TIPS SADC &amp; UN Comtrade Difference in Namibia Trade Values

Exports	2000	2001	2002	2003	2004	2005	2006
Botswana	-0.2%	-2.4%	-0.6%	-1.0%	-0.2%	0.1%	0.3%
Lesotho	-0.4%	-3.1%	1.5%	-1.6%	-0.2%	0.1%	-0.5%
South Africa	-0.3%	-33.8%	-1.2%	-1.6%	-0.1%	0.1%	1.0%
Swaziland	1.5%	-3.1%	0.2%	-1.6%	-0.2%	0.1%	0.4%
<b>Imports</b>							
Botswana	0.16%	-2.3%	-0.7%	-0.7%	-0.4%	0.4%	0.6%
Lesotho	N/A	11.5%	N/A	-1.7%	-0.4%	0.4%	0.6%
South Africa	-0.44%	-6.7%	-1.6%	-1.9%	-0.4%	0.4%	0.6%
Swaziland	-0.31%	-0.4%	2.4%	-1.7%	-0.4%	0.4%	0.6%

Source: TIPS SADC vs UN Comtrade database.

#### Summary of Discrepancies in Namibia's trade data

In the Namibia trade data the largest differences amongst the 3 databases arose from Namibia-South Africa total trade data. The discrepancies were not consistent in a particular direction with the exception of the TIPS-UN COMTRADE reported data. In this instance UN COMTRADE data is slightly but consistently less than that of the TIPS data, although most of the inconsistencies arose around import figures.

## 2.4 Swaziland

Of the five SACU countries Swaziland has been found to be one of the countries with the limited data that is available. Of the three database series, the years spanning from 2001 to 2004 are the only years for which a comparison of trade values is possible.

### 2.4.1 TIPS SADC vs ITC Trade Map

Discrepancies in the Swaziland export data were driven mainly by the difference in the Swaziland-South Africa trade figures, with differences that range from US\$ 18,982,803.41 to US\$ 375,586,375.55, with an average difference of US\$ 167 million. The ITC Trade Map database seems to have reported import figures that are significantly lower than those from the SADC trade database, as revealed by the differences in the figures reported in the two databases, (see Table 9). The Swaziland-South Africa trade data is the source of the greatest disparity in import trade data, ranging from roughly US\$ 12 million to US\$ 244 million and the average disparity was found to be US\$ 117 million.

Table 9: TIPS SADC &amp; ITC Trade Map Difference in Swaziland Exports and imports

Exports	2001	2002	2003	2004
Botswana	10.6%	26.1%	0.7%	147.1%
Lesotho	19.1%	3.4%	-1.5%	N/A
Namibia	17.5%	4.8%	-0.7%	-95.1%
South Africa	39.5%	9.7%	-1.6%	41.4%
<b>Imports</b>				

Botswana	11.9%	1.6%	1.7%	-82.0%
Lesotho	50.0%	-2.5%	0.1%	-97.9%
Namibia	53.6%	20940.1%	-1.4%	-85.5%
South Africa	31.3%	10.5%	-1.0%	-8.6%

Source: TIPS SADC & ITC Trade Map Trade Map

### 2.4.2 ITC Trade Map vs UN Comtrade

Discrepancies between the UN Comtrade and ITC Trade Map with regards to Swaziland trade data are apparent in the first three years of the trade figures, the differences are very pronounced. However the differences virtually disappear in the 2004-2006 period. In imports, the largest source of discrepancy was the Swaziland - South Africa differences that range from US\$ 40 million to US \$80 million in the first three years. In the last half of the comparable period (2004-2006), the trade data values then converge from US\$ 1,000 to US\$ 33,000. Similarly, the largest source of contradiction in the two data sources in Export figures arose from the Swaziland-South Africa data. In the first three years of the comparable period, the difference ranges from US\$ 100 million to US \$661 million and falls to a range of US\$ 82 to US\$ 42 000. Table 10 shows the difference as a percentage of the ITC Trade Map data.

Table 10: UN Comtrade & ITC Trade Map Difference in Swaziland Trade Values

Exports	2001	2002	2003	2004	2005	2006
Botswana	N/A	241.1%	-55.9%	0.5%	0.0%	0.0%
Lesotho	N/A	54.%	8,439.3%	N/A	-0.0%	-0.0%
Namibia	-10.8%	-6.0%	6,530.3%	0.0%	0.0%	0.0%
South Africa	-19.2%	-68.8%	-55.9%	0.0%	0.0%	0.0%
Imports						
Botswana	3,203.0%	8,260.%	14,082.3%	0.0%	0.0%	0.0%
Lesotho	2,939.6%	1,798.%	361.3%	N/A	N/A	0.0%
Namibia	5,779.6%	6,244.4%	1,361.9%	-0.0%	-0.0%	-0.0%
South Africa	-5.2%	10.2%	-3.7%	0.0%	0.0%	0.0%

Source: TIPS SADC vs UN Comtrade database

### 2.4.3 TIPS SADC vs UN Comtrade

Swaziland-South Africa Imports and Exports data were the greatest source of disparity between corresponding data in the TIPS SADC & UN Comtrade databases. Imports figures had a range difference of US\$ 2,408,121.48 to US\$ 285,155,501.65 with an average difference of US\$ 92,387,630.77. Export figures had a range difference of US\$ 3,508,020.95 to US\$ 642,685,541.58 with an average difference of US\$ 369,996,785.02. **Table 11** reveals differences between the ITC Trade Map and TIPS SADC database data, as a percentage of the ITC Trade Map figures.

Table 11: TIPS SADC &amp; UN Comtrade Difference in Swaziland Trade Values

	2000	2001	2002	2003	2004	2005	2006
<b>Exports</b>							
Botswana	3.45%	N/A	-63.0%	128.3%	146.0%	3.5%	N/A
Lesotho	1.67%	N/A	-32.9%	-98.9%	N/A	1.7%	N/A
Namibia	1.04%	31.70%	11.6%	-98.5%	-95.1%	1.0%	31.7%
South Africa	0.66%	72.46%	251.2%	123.2%	41.4%	0.7%	72.5%
		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
<b>Imports</b>							
Botswana	13.2%	-96.6%	-98.8%	-99.3%	-82.0%	13.2%	-96.6%
Lesotho	6.0%	-95.1%	-94.9%	-78.3%	N/A	6.0%	-95.1%
Namibia	0.7%	-97.4%	231.6%	-93.3%	-85.5%	0.7%	-97.4%
South Africa	0.6%	38.5%	0.3%	2.9%	-8.6%	0.6%	38.5%

Source: TIPS SADC vs UN Comtrade database

### Summary of Discrepancies in Swaziland's trade data

Discrepancies in the Swaziland trade data (both imports and exports) from the TIPS SADC and the ITC Trade Map database were driven mainly by the difference in the Swaziland-South Africa trade figures. The ITC Trade Map database seems to have reported import figures that are significantly less than that of the SADC trade database.

Discrepancies between the UN Comtrade and ITC Trade Map with regards to Swaziland trade data are apparent in the first three years of the trade figures, the differences are very pronounced. However the differences virtually disappear in the years 2004-2006.

Swaziland-South Africa Import and Export data were the greatest source of disparity between corresponding data in the TIPS SADC & UN Comtrade databases.

## 2.5 South Africa

The approach taken for South Africa will be a little different to the rest because of the availability of a subscription data source that is a favorite amongst policy makers that is the Quantec database which collects a range of statistical time series data on different policy relevant indicators. As such an analysis of this nature would be incomplete if this database is excluded as it is a preferred trade data source.

South Africa trade data has the longest series in the SADC trade database, although the import records with any of the countries in the SACU post 2002 are not shown on the database. This also applies to the ITC Trade Map database that does not have a record of South Africa's trade figures with the SACU countries. **Disturbingly, the ITC Trade Map database does not report South Africa's export figures to any of the SACU countries in the period in question.**



### 2.5.1 TIPS SADC vs Quantec Data

The TIPS database and Quantec data were exactly identical, and had no differences between them. It follows that the differences between the TIPS database and the ITC Trade Map/ UN COMTRADE will yield the same differences. In the interests of avoiding cluttering the data note and repetition, a detailed write up of this group has been excluded. It is necessary though for the reader to bear in mind that the differences between the TIPS database and the ITC Trade Map as well as UN COMTRADE database in the South Africa case are the same as that for the Quantec database.

### 2.5.2 TIPS SADC vs ITC Trade Map

The TIPS and the ITC Trade Map data had a relatively narrow range of discrepancies for the most part of the comparable period, (see Table 12).

**Table 12: TIPS SADC & ITC Trade Map Difference in South Africa exports and imports**

Imports	2001	2002	2003	2004	2005	2006
Botswana	-0.1%	1.6%	-1.1%	8.3%	0.1%	0.4%
Lesotho	N/A	-0.0%	-2.5%	0.4%	0.2%	2.6%
Namibia	-58.9%	-0.9%	-0.9%	-0.5%	0.1%	0.4%
Swaziland	-0.2%	-0.1%	-0.1%	-8.7%	-0.8%	0.3%

Source: TIPS SADC & ITC Trade Map Trade Map

### 2.5.3 ITC Trade Map vs UN Comtrade

With the exception of Swaziland data in 2004 with a difference of 8.4 percent, the difference between the UN Comtrade and the ITC Trade Map database was very narrow, in the majority of the incident was below 1 percent (see Table 13).

**Table 13: UN Comtrade & ITC Trade Map Difference in South Africa Trade Values**

Imports	2001	2002	2003	2004	2005	2006
Botswana	0.7%	0.9%	0.0%	0.1%	0.0%	0.0%
Lesotho	N/A%	0.1%	-1.4%	0.3%	0.1%	2.2%
Namibia	-0.5%	0.2%	-0.1%	-0.2%	0.0%	0.0%
Swaziland	0.6%	0.0%	-0.1%	-8.4%	-0.9%	-0.1%

Source: TIPS SADC vs UN Comtrade database

### 2.5.4 TIPS SADC vs UN Comtrade

The TIPS and the UN Comtrade database seemed to have similar reported figures as shown in Table 14, except for a few instances (the Namibia 2001 figures being the most striking with the SADC trade database reporting close to 60 percent less than that reported by the UN Comtrade database).

**Table 14: TIPS SADC & UN Comtrade Difference in South Africa Trade Values**

Imports	2000	2001	2002	2003	2004	2005	2006
Botswana	2.9	-0.8	0.7	-1.1	8.2	0.1	0.4
Lesotho	0.3	N/A	-0.2	-1.1	0.2	0.1	0.4
Namibia	0.6	-58.7	-1.1	-0.8	-0.3	0.1	0.4
South Africa	0.3	-0.8	-0.1	-0.1	-0.3	0.0	0.4

Source: TIPS SADC vs UN Comtrade database.

#### Summary of Discrepancies in South Africa's trade data

The TIPS and the ITC Trade Map data had a relatively narrow range of discrepancies for the most part of the comparable period.

In the case of the ITC Trade Map and UN Comtrade, the difference between the UN Comtrade and the ITC Trade Map database was very narrow, with the exception of South Africa - Swaziland data in 2004.

The TIPS and the UN Comtrade database seemed to have similar reported figures, except for a few instances. The most notable discrepancy was the 2001 South Africa-Namibia import figures being the most striking with the SADC trade database reporting close to 60 percent less than that reported by the UN Comtrade database.

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### 3. Statistical Analysis and Results

This part of the data analysis exercise seeks to test the accuracy of the overall trade figures, and the data reported by each of the databases are considered to be matched observations as the data are linked (in essence it is the same imports/exports shipments reported by different bodies). Usually studies that gather matched/pair observations are interested in the difference in each pair. A non-parametric test was employed because the data was found not to conform to the underlying assumptions for a parametric test<sup>6</sup>.

In the instance that matched data does not meet any of the assumptions for the parametric tests, the non-parametric substitute is the Wilcoxon Matched-Pairs Signed-Ranks test (Wilcoxon-MPSR test) as presented by Rubio & Folchi (2005). The Wilcoxon-MPSR test can be used to determine the statistical significance of the differences between the data reported by the three databases, (UN Comtrade, ITC Trade Map and TIPS SADC trade data base), and if they are, whether the differences are systematic in any direction.

The Wilcoxon-MPSR null hypothesis states: 'There is no systematic difference within pairs', while the alternative states: 'There is a systematic difference (either one-sided or two-sided)'. The Wilcoxon-MPSR works by ranking the magnitude of the difference, (disregarding zero values). Then the sum of the positive ranks ( $R_+$ ) and that of the negative ranks ( $R_-$ ) are calculated. In the case of a two-tail test, whichever is the smaller of the  $R_+$  and  $R_-$  is assigned the name  $T$ . This  $T$  is the test statistic compared to the critical values in the fitting statistical table. In the case of a one-tailed test,  $T$  will take on the value of  $R_+$  or  $R_-$ , as specified by the alternative hypothesis.

The Wilcoxon-MPSR strength, its ability to overcome the violation of normality assumption, is also the tests' weakness in that it does not make use of all the information provided by the data, seeing as it relies exclusively on the order and makes no use of the quantitative value of the variance (Friedman, 1937). In spite of this, the Wilcoxon-MPSR test is a very powerful test. If the data conforms to all the assumptions of the Wilcoxon-MPSR<sup>7</sup>, the aforementioned has approximately 95 percent of the power of the parametric alternative (Rubio & Folchi, 2005).

The null hypothesis used for this test was  $H_0$ : *There is no systematic difference between the trade data found in database X and that found in database Y.* The alternative was in the form:  $H_1$ : *Database X records are different (smaller or greater) than that recorded in database y.*

Table 15 gives the results of the Wilcoxon Matched-Pairs Signed-Ranks test.

**Table 15: Summary of the Results of the Wilcoxon Matched-Pairs Signed-Ranks test**

Country	Database comparisons	Prob $z >  z $
Botswana	UN Comtrade VS ITC Trade Map exports	0.208
	UN Comtrade VS ITC Trade Map imports	0.0538*
	UN Comtrade VS SADC TIPS exports	0.024**
	UN Comtrade VS SADC TIPS imports	0.9090
	ITC Trade Map VS SADC TIPS Exports	0.026**
	ITC Trade Map VS SADC TIPS Exports	0.9317

<sup>6</sup> In order to make inferences, parametric tests require the data to follow a normal distribution (Rubio & Folchi 2005), a requirement that this dataset failed to meet.

<sup>7</sup> According to Lowry (1999) the assumptions of the Wilcoxon test, are: (a) that the paired values of  $X_A$  and  $X_B$  are randomly and independently drawn (i.e., each pair is drawn independently of all other pairs); (b) that the measured variable (e.g., a subject's probability estimate) is intrinsically continuous, capable in principle, if not in practice, of producing measures carried out to the  $n$ th decimal place; and (c) that the measures of  $X_A$  and  $X_B$  have the properties of at least an ordinal scale of measurement, so that it is meaningful to speak of "greater than," "less than," and "equal to."

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Country	Database comparisons	Prob $z >  z $
Lesotho	UN Comtrade VS ITC Trade Map exports	0.9063
	UN Comtrade VS ITC Trade Map imports	0.1823
	UN Comtrade VS SADC TIPS exports	0.006**
	UN Comtrade VS SADC TIPS imports	0.9090
	ITC Trade Map VS SADC TIPS Exports	0.906
	ITC Trade Map VS SADC TIPS Exports	0.1823
Namibia	UN Comtrade VS ITC Trade Map exports	0.6579
	UN Comtrade VS ITC Trade Map imports	0.1793
	UN Comtrade VS SADC TIPS exports	0.1300
	UN Comtrade VS SADC TIPS imports	0.9090
	ITC Trade Map VS SADC TIPS Exports	0.1615
	ITC Trade Map VS SADC TIPS Exports	0.1823
South Africa	UN Comtrade VS ITC Trade Map exports	
	UN Comtrade VS ITC Trade Map imports	0.6272
	UN Comtrade VS SADC TIPS exports	0.0049**
	UN Comtrade VS SADC TIPS imports	0.9090
	ITC Trade Map VS SADC TIPS Exports	0.0049**
	ITC Trade Map VS SADC TIPS Exports	0.6682
Swaziland	UN Comtrade VS ITC Trade Map exports	0.6579
	UN Comtrade VS ITC Trade Map imports	0.1788
	UN Comtrade VS SADC TIPS exports	0.1961
	UN Comtrade VS SADC TIPS imports	0.3011
	ITC Trade Map VS SADC TIPS Exports	0.0557*
	ITC Trade Map VS SADC TIPS Exports	0.0229**

NB:\* Result holds at  $p=0.11$  but reject at  $p=0.05$ ; \*\*Result holds at  $p=0.1$  and  $p=0.05$  but reject at  $P=0.01$ . See the appendix for detailed result tables.

The Wilcoxon MPSR found compelling evidence that the differences in the trade data recorded in the following databases were statistically significant:

- Swaziland ITC Trade Map vs SADC TIPS exports
- South Africa ITC Trade Map vs SADC TIPS exports
- South Africa UN Comtrade vs SADC TIPS exports
- Lesotho UN Comtrade vs SADC TIPS exports
- Botswana ITC Trade Map vs SADC TIPS exports
- Botswana UN Comtrade vs ITC Trade Map imports
- Botswana UN Comtrade vs SADC TIPS exports

In all the other instances it appears that there is no systematic difference in the trade data.

## 4. Conclusion

The objective of this data note was to reveal the incomplete conflicting data that is available and is used by trade policy researchers to inform the decisions made by policy makers regarding trade policy for SACU countries, especially in light of the renegotiation of the SACU RSF. This note reveals the problems that may bias the results of a model used to forecast the impact of any trade policy changes.

In order to improve the quality of the decisions made, SACU (and perhaps the entire SADC region), there is need to invest more in improving the available trade data. This could be achieved, by making changes at the capturing level through improving the data handling capabilities of all the customs officials that collect data at the various borders throughout the region ensuring that data is entered correctly from the initial phase.

Improvement can also be attained through further simplifying the data entry process by way of harmonizing data collection procedures by customs officials in their respective countries. Consistent reporting of accurate data to International databases would also go a long way in making sure that data is up to date with little discrepancy between sources.

A regional intervention would comprise the setting up and maintaining a regional trade database, managed by an impartial regional body that is representative of all SACU member states, (a similar initiative is the Common Market for East and Southern Africa trade Database). For this project to work, the importance of an accurate trade database must be understood by the respective governments, and with that understanding an accompanying level of financial and human resource commitment from senior government officials is required by all member states. This way, all the member states directly report the trade figures to the regional entity that manages the database, and ensures that the data is a true reflection of trade patterns within the region.

There is need for more resources to be channelled towards improving trade data collection by Southern African states as a number of key policies are hinged on calculations that are flawed not by their method but by misleading information. In addition to this, consistent reporting needs to be encouraged amongst member states as this information is crucial for the development of clear road maps to regional economic prosperity.

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## Appendix 1: Results

H0: there is no statistic difference between the data from Database X and Database y

H1: there is a statistically significant difference between database X and database Y

Two tail Test : Test statistic: T=R- ( in bold results below)

Rejection region  $Z > -Z$

Botswana

Exports				Imports			
UN COMTRADE VS ITC Trade Map				UN COMTRADE VS ITC Trade Map			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	14	194	150	Positive	13	271.5	150
Negative	10	106	150	Negative	11	82.5	150
Zero	0	0	0	Zero	0	0	0
All	24	300	300	All	24	300	300
Ho: UN COMTRADE = ITC Trade Map				Ho: UN COMTRADE = ITC Trade Map			
Z = 1.257 Prob z> z  =0.208			No Reject **	Z = 1.929 Prob z> z  =0.0538			Reject *
UN COMTRADE VS SADC TIPS				UN COMTRADE VS SADC TIPS			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	16	229	150	Positive	9	146	150
Negative	8	71	150	Negative	15	154	150
Zero	0	0	0	Zero	0	0	0
All	24	300	300	All	24	300	300
Ho: UN COMTRADE = SADC TIPS				Ho: UN COMTRADE = SADC TIPS			
Z = 2.257 Prob z> z  =0.024			Reject **	Z = -0.114 Prob z> z  =0.9090			No Reject **
ITC Trade Map VS SADC TIPS				ITC Trade Map VS SADC TIPS			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	16	228	150	Positive	10	147	150
Negative	8	72	150	Negative	14	153	150
Zero	0	0	0	Zero	0	0	0
All	24	300	300	All	24	300	300
Z = 2.229 Prob z> z  =0.026			Reject **	Z = -0.086 Prob z> z  =0.9317			No Reject **

H0: there is no statistic difference between the data from Database X and Database y

TRADE AND INDUSTRIAL POLICY STRATEGIES: Data Note

H1: there is a statistically significant difference between database X and database Y

Two tail Test : Test statistic:  $T=R-$  ( in bold results below)

Rejection region  $Z > Z$

Lesotho

Exports

Imports

UN COMTRADE VS ITC Trade Map

UN COMTRADE VS ITC Trade Map

Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	4	40	38.5	Positive	7	56	39
Negative	7	37	38.8	Negative	5	22	39
Zero	1	1	1	Zero	0	0	0
All	12	78	78	All	12	78	78

Ho: UN COMTRADE = ITC Trade Map

Ho: UN COMTRADE = ITC Trade Map

$Z = 0.118$  Prob  $z > |z| = 0.9063$

No Reject \*\*

$Z = 1.134$  Prob  $z > |z| = 0.1823$

No Reject \*\*

UN COMTRADE VS SADC TIPS

UN COMTRADE VS SADC TIPS

Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	3	29	28.5	Positive	8	68	34
Negative	3	28	28.5	Negative	0	0	34
Zero	6	21	21	Zero	4	10	10
All	12	78	78	All	12	78	78

Ho: UN COMTRADE = SADC TIPS

Ho: UN COMTRADE = SADC TIPS

$Z = 7.731$  Prob  $z > |z| = 0.006$

Reject \*\*

$Z = -0.114$  Prob  $z > |z| = 0.9090$

No Reject \*\*

ITC Trade Map VS SADC TIPS

ITC Trade Map VS SADC TIPS

Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	7	37	38.5	Positive	5	22	39
Negative	4	40	38.5	Negative	7	56	39
Zero	1	1	1	Zero	0	0	0
All	12	78	78	All	12	78	78

$Z = -0.118$  Prob  $z > |z| = 0.906$

Reject \*\*

$Z = -1.1334$  Prob  $z > |z| = 0.1823$

No Reject \*\*



TRADE AND INDUSTRIAL POLICY STRATEGIES: Data Note

H0: there is no statistic difference between the data from Database X and Database y

H1: there is a statistically significant difference between database X and database Y

Two tail Test : Test statistic:  $T=R$ - ( in bold results below)

Rejection region  $Z > -Z$

Namibia

Exports				Imports			
UN COMTRADE VS ITC Trade Map				UN COMTRADE VS ITC Trade Map			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	12	165.5	150	Positive	12	196.5	145.9
Negative	12	134.5	150	Negative	11	102.5	149.5
Zero	0	0	0	Zero	1	1	1
All	24	300	300	All	24	300	300
Ho: UN COMTRADE = ITC Trade Map				Ho: UN COMTRADE = ITC Trade Map			
Z = 0.443 Prob $z >  z  = 0.6579$			No Reject **	Z = 1.343 Prob $z >  z  = 0.1793$			No Reject **
UN COMTRADE VS SADC TIPS				UN COMTRADE VS SADC TIPS			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	15	203	150	Positive	13	181	149.5
Negative	9	97	150	Negative	10	118	149.5
Zero	0	0	1	Zero	1	1	1
All	24	300	300	All	24	300	300
Ho: UN COMTRADE = SADC TIPS				Ho: UN COMTRADE = SADC TIPS			
Z = 1.154 Prob $z >  z  = 0.1300$			No Reject **	Z = -0.114 Prob $z >  z  = 0.9090$			No Reject **
ITC Trade Map VS SADC TIPS				ITC Trade Map VS SADC TIPS			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	9	101	150	Positive	13	201	149.5
Negative	15	199	150	Negative	10	98	149.5
Zero	0	0	0	Zero	1	1	0
All	24	300	300	All	12	300	300
Z = -1.400 Prob $z >  z  = 0.1615$			No Reject *	Z = -1.1334 Prob $z >  z  = 0.1823$			No Reject **

TRADE AND INDUSTRIAL POLICY STRATEGIES: Data Note

H0: there is no statistic difference between the data from Database X and Database y

H1: there is a statistically significant difference between database X and database Y

Two tail Test : Test statistic:  $T=R-$  ( in bold results below)

Rejection region  $Z > -Z$

South Africa

Exports

Imports

UN COMTRADE VS ITC Trade Map

UN COMTRADE VS ITC Trade Map

Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive				Positive	14	167	150
Negative				Negative	10	133	150
Zero				Zero	0	0	0
All				All	24	300	300

Ho: UN COMTRADE = ITC Trade Map

Ho: UN COMTRADE = ITC Trade Map

$Z = 0.443$  Prob  $z > |z| =$

$Z = 0.486$  Prob  $z > |z| = 0.6272$

No Reject \*\*

UN COMTRADE VS SADC TIPS

UN COMTRADE VS SADC TIPS

Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	0	0	82	Positive	13	146	150
Negative	8	164	82	Negative	11	154	150
Zero	16	136	136	Zero	0	0	0
All	24	300	300	All	24	300	300

Ho: UN COMTRADE = SADC TIPS

Ho: UN COMTRADE = SADC TIPS

$Z = -2.811$  Prob  $z > |z| = 0.0049$

Reject \*\*

$Z = -0.114$  Prob  $z > |z| = 0.9090$

No Reject \*\*

ITC Trade Map VS SADC TIPS

ITC Trade Map VS SADC TIPS

Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	0	0	82	Positive	13	135	150
Negative	8	164	82	Negative	11	165	150
Zero	16	136	136	Zero	0	0	0
All	24	300	300	All	24	300	300

$Z = -2.811$  Prob  $z > |z| = 0.0049$

Reject \*\*

$Z = -0.429$  Prob  $z > |z| = 0.6682$

No Reject \*\*

TRADE AND INDUSTRIAL POLICY STRATEGIES: Data Note

H0: there is no statistic difference between the data from Database X and Database y

H1: there is a statistically significant difference between database X and database Y

Two tail Test : Test statistic:  $T=R$ - ( in bold results below)

Rejection region  $Z > -Z$

Swaziland

Exports				Imports			
UN COMTRADE VS ITC Trade Map				UN COMTRADE VS ITC Trade Map			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	7	52	67.5	Positive	11	94	68
Negative	8	83	67.5	Negative	5	42	68
Zero	1	1	1	Zero	0	0	0
All	16	136	136	All	16	136	136
Ho: UN COMTRADE = ITC Trade Map				Ho: UN COMTRADE = ITC Trade Map			
Z = 0.443 Prob z> z  =0.6579			No Reject **	Z = 1.344 Prob z> z  =0.1788			No Reject **
UN COMTRADE VS SADC TIPS				UN COMTRADE VS SADC TIPS			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	5	43	68	Positive	11	88	68
Negative	11	93	68	Negative	5	48	68
Zero	0	0	0	Zero	0	0	0
All	16	136	136	All	16	136	136
Ho: UN COMTRADE = SADC TIPS				Ho: UN COMTRADE = SADC TIPS			
Z = -1.293 Prob z> z  =0.1961			No Reject **	Z = 1.034 Prob z> z  =0.3011			No Reject **
ITC Trade Map VS SADC TIPS				ITC Trade Map VS SADC TIPS			
Sign	obs	Sum ranks	Expected	Sign	obs	Sum ranks	Expected
Positive	4	31	68	Positive	3	24	68
Negative	12	105	68	Negative	13	112	68
Zero	0	0	0	Zero	0	0	0
All	16	136	136	All	16	136	136
Z = -7.913 Prob z> z  =0.0557			Reject **	Z = -2.275 Prob z> z  =0.0229			Reject **

NB:\* Result holds at  $p=0.01$  but reject at  $p=0.05$ ; \*\*Result holds at  $p=0.1$  but reject at  $p=0.05$  and  $P=0.01$