

Macroeconomic Analysis

Elissaios Papyrakis and Luca Tasciotti

Nairobi, 20 July 2017

Outline

- Objectives of macroeconomic analysis
- Methodology
- Main results and policy implications.

Objectives

- The purpose of the macroeconomic analysis is to estimate changes in trade volumes (exports/imports) during the pre and post ISPM 15 implementation periods across multiple commodity sectors.
- The sign and magnitude of the effect will be the focus of our empirical analysis.

Macro: Methodology

Gravity models

- The gravity equation provides an appropriate framework for analysing ISPM 15 effects through bilateral trade flows.
- $(V_{ij})_{kt} = b_0 + b_1 \text{Income}_{ijt} + b_2 \text{ISPM}_{15 it} + b_3 X_{ij} + \varepsilon_{ij}$
- V_{ij} – value of trade in product k from African country i to trade partner country j
- Income_{ijt} – real GDP of both trade partners i and j
- X_{ij} – geographical distance between trade partners i and j and other control variables

Macro: Methodology

Gravity models

- A massive dataset covering approximately 86 sectors since 1992, for both imports and exports
- 86 sectors x 2 categories (imports/exports) x 4 SSA county case-studies = 700 models to be estimated
- In total appx 60,000,000 data cells (values)
- The results regarding key exports/imports of more interest – we will also provide a distribution of the (size of the) effect of the ISPM15 intervention across all sectors



year[1] 2010

	reporter	reporteriso	partnercode	partner	partneriso	commodityc-e	commodity
1	Kenya	KEN	4	Afghanistan	AFG	3	Fish crustaceans molluscs aquatic
2	Kenya	KEN	4	Afghanistan	AFG	5	Products of ar
3	Kenya	KEN	4	Afghanistan	AFG	6	Live trees plants bulbs roots
4	Kenya	KEN	4	Afghanistan	AFG	6	Live trees plants bulbs roots
5	Kenya	KEN	4	Afghanistan	AFG	6	Live trees plants bulbs roots
6	Kenya	KEN	4	Afghanistan	AFG	6	Live trees plants bulbs roots
7	Kenya	KEN	4	Afghanistan	AFG	6	Live trees plants bulbs roots
8	Kenya	KEN	4	Afghanistan	AFG	6	Live trees plants bulbs roots
9	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
10	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
11	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
12	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
13	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
14	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
15	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
16	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
17	Kenya	KEN	4	Afghanistan	AFG	7	Edible vegetables and certain r
18	Kenya	KEN	4	Afghanistan	AFG	8	Edible fruit, nuts, peel of citru
19	Kenya	KEN	4	Afghanistan	AFG	8	Edible fruit, nuts, peel of citru
20	Kenya	KEN	4	Afghanistan	AFG	8	Edible fruit, nuts, peel of citru
21	Kenya	KEN	4	Afghanistan	AFG	8	Edible fruit, nuts, peel of citru
22	Kenya	KEN	4	Afghanistan	AFG	8	Edible fruit, nuts, peel of citru
23	Kenya	KEN	4	Afghanistan	AFG	9	Coffee tea
24	Kenya	KEN	4	Afghanistan	AFG	9	Coffee tea
25	Kenya	KEN	4	Afghanistan	AFG	9	Coffee, tea,
26	Kenya	KEN	4	Afghanistan	AFG	9	Coffee, tea,
27	Kenya	KEN	4	Afghanistan	AFG	9	Coffee, tea,
28	Kenya	KEN	4	Afghanistan	AFG	9	Coffee, tea,
29	Kenya	KEN	4	Afghanistan	AFG	9	Coffee, tea,
30	Kenya	KEN	4	Afghanistan	AFG	9	Coffee, tea,

Variables

- Filter variables here
- | Variable | Label |
|---|------------------|
| <input checked="" type="checkbox"/> year | Year |
| <input checked="" type="checkbox"/> tradeflow... | Trade Flow Co... |
| <input checked="" type="checkbox"/> tradeflow | Trade Flow |
| <input checked="" type="checkbox"/> reporterco... | Reporter Code |
| <input checked="" type="checkbox"/> reporter | Reporter |
| <input checked="" type="checkbox"/> reporteriso | Reporter ISO |
| <input checked="" type="checkbox"/> partnerco... | Partner Code |
| <input checked="" type="checkbox"/> partner | Partner |
| <input checked="" type="checkbox"/> partneriso | Partner ISO |
| <input checked="" type="checkbox"/> commodit... | Commodity C... |
| <input checked="" type="checkbox"/> commodity | Commodity |

Properties

Variables	
Name	year
Label	Year
Type	float
Format	%8.0g
Value Label	
Notes	

Data

Filename	kenya 3 v13.dta
Label	
Notes	
Variables	3,261
Observations	86,425
Size	1,945.88M
Memory	2,336M
Sorted by	id year

TABLE A1. Kenyan Exports of Coffee, Tea and Spices

Dependent variable:	FE (1)	FE (2)	RE (3)
Constant	-14.49	-5.04	-13.54
<i>Income</i>	0.57*** (0.17)	0.37* (0.21)	0.58*** (0.11)
<i>ISPM₁₅</i>	0.17 (0.13)	0.39*** (0.15)	0.28*** (0.10)
<i>ISPM₁₅ (partner)</i>		0.26 (0.21)	0.19* (0.11)
<i>Transparency</i>		0.42** (0.21)	0.34* (0.21)
<i>Borders</i>			3.30*** (1.21)
<i>Language</i>			0.13 (0.51)
<i>Distance</i>			-0.31 (0.40)
<i>Colony</i>			3.65*** (0.65)
<i>R² overall (within; between)</i>	0.23 (0.06; 0.22)	0.19 (0.07; 0.19)	0.28 (0.07; 0.25)
<i>Countries</i>	143	140	129
<i>N</i>	1174	926	893

Note: Robust standard errors of coefficients in parentheses. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance.

Kenya

In years of ISPM15 participation, **exports of coffee/tea** increase by 39%.

This is after controlling for the size of economies and corruption level of trade partner.

TABLE A1. Kenyan Exports of Coffee, Tea and Spices

Dependent variable:	FE (1)	FE (2)	RE (3)
Constant	-14.49	-5.04	-13.54
<i>Income</i>	0.57*** (0.17)	0.37* (0.21)	0.58*** (0.11)
<i>ISPM₁₅</i>	0.17 (0.13)	0.39*** (0.15)	0.28*** (0.10)
<i>ISPM₁₅ (partner)</i>		0.26 (0.21)	0.19* (0.11)
<i>Transparency</i>		0.42** (0.21)	0.34* (0.21)
<i>Borders</i>			3.30*** (1.21)
<i>Language</i>			0.13 (0.51)
<i>Distance</i>			-0.31 (0.40)
<i>Colony</i>			3.65*** (0.65)
<i>R² overall (within; between)</i>	0.23 (0.06; 0.22)	0.19 (0.07; 0.19)	0.28 (0.07; 0.25)
<i>Countries</i>	143	140	129
<i>N</i>	1174	926	893

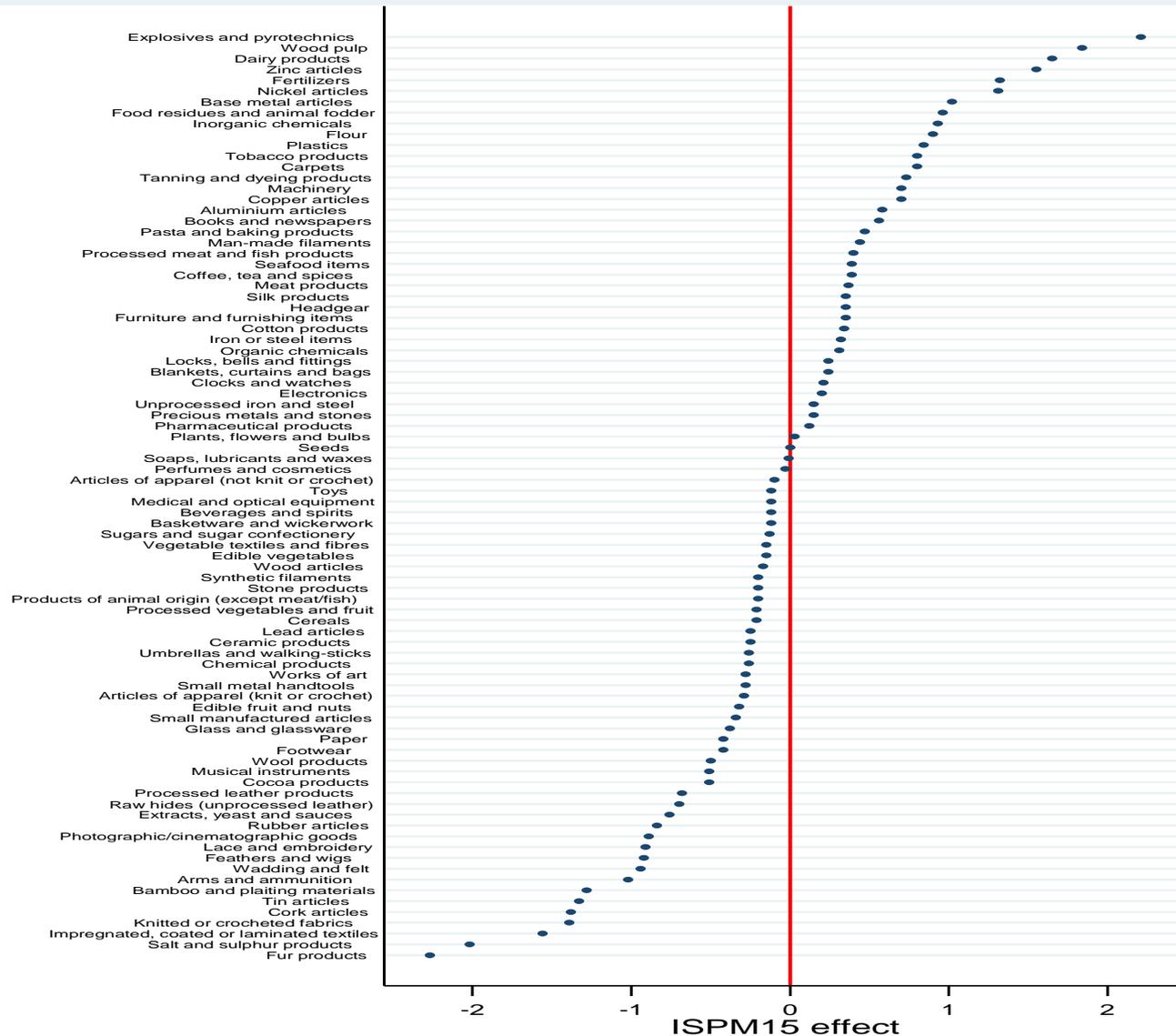
Kenya

This model allows us to check also for the importance of **time-invariant factors**.

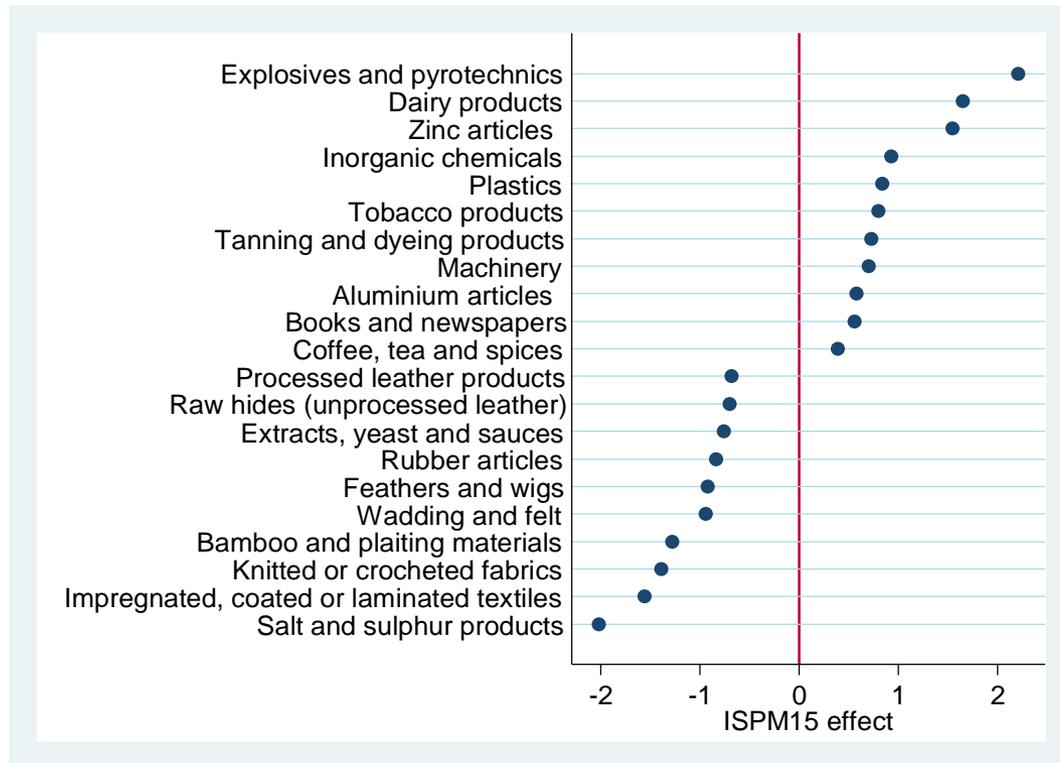
E.g., negative sign for distance between partners and positive sign for colonial ties.

Note: Robust standard errors of coefficients in parentheses. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance.

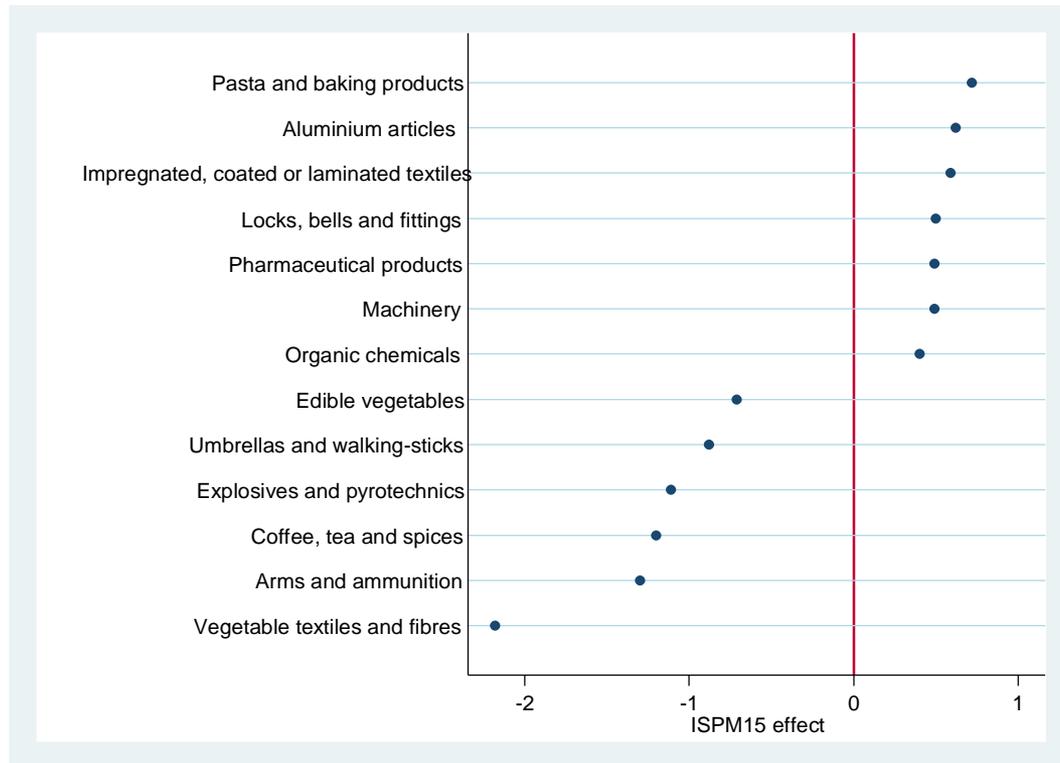
ISPM15 effects – Kenya (Exports)



ISPM15 effects – Kenya (Exports), only statistically significant effects included



ISPM15 effects – Kenya (Imports), only statistically significant effects included



ISPM15 effects – Kenya (Exports), changes in export values

Table 9. Change in Export Values per Sector (in million US\$)

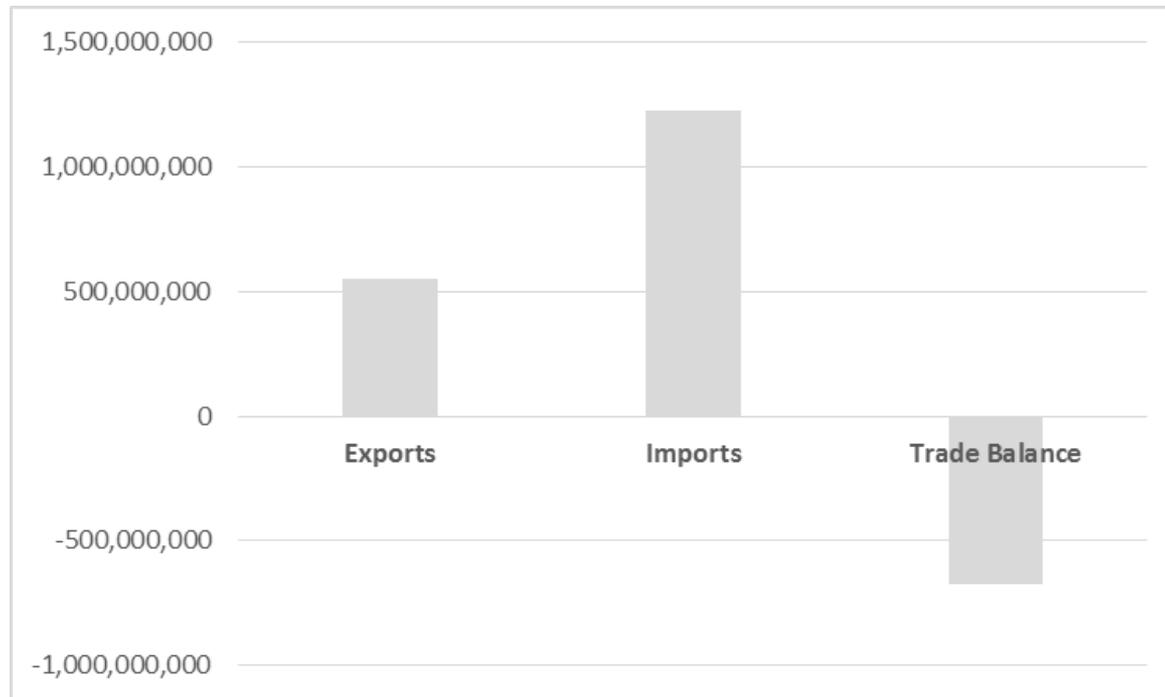
Salt and sulphur products	-343.40
Raw hides (unprocessed leather)	-70.00
Bamboo and plaiting materials	-48.64
Extracts, yeast and sauces	-22.80
Rubber articles	-15.96
Feathers and wigs	-10.12
Wadding and felt	-3.76
Processed leather products	-1.36
Impregnated, coated or laminated textiles	-0.66
Knitted or crocheted fabrics	-0.53
Zinc articles	1.86
Explosives and pyrotechnics	2.87
Tanning and dyeing products	16.79
Books and newspapers	19.04
Dairy products	21.45
Aluminium articles	31.90
Machinery	36.40
Inorganic chemicals	120.90
Tobacco products	128.00
Plastics	142.80
Coffee, tea and spices	546.00

ISPM15 effects – Kenya (Imports), changes in import values

Table 10. Change in Import Values per Sector (in million US\$)

Edible vegetables	-34.79
Coffee, tea and spices	-26.40
Explosives and pyrotechnics	-11.10
Arms and ammunition	-10.66
Vegetable textiles and fibres	-3.71
Umbrellas and walking-sticks	-1.58
Impregnated, coated or laminated textiles	6.49
Locks, bells and fittings	25.50
Pasta and baking products	36.00
Organic chemicals	64.00
Aluminium articles	80.60
Pharmaceutical products	220.50
Machinery	882.00

ISPM15 effects – Kenya Trade Balance



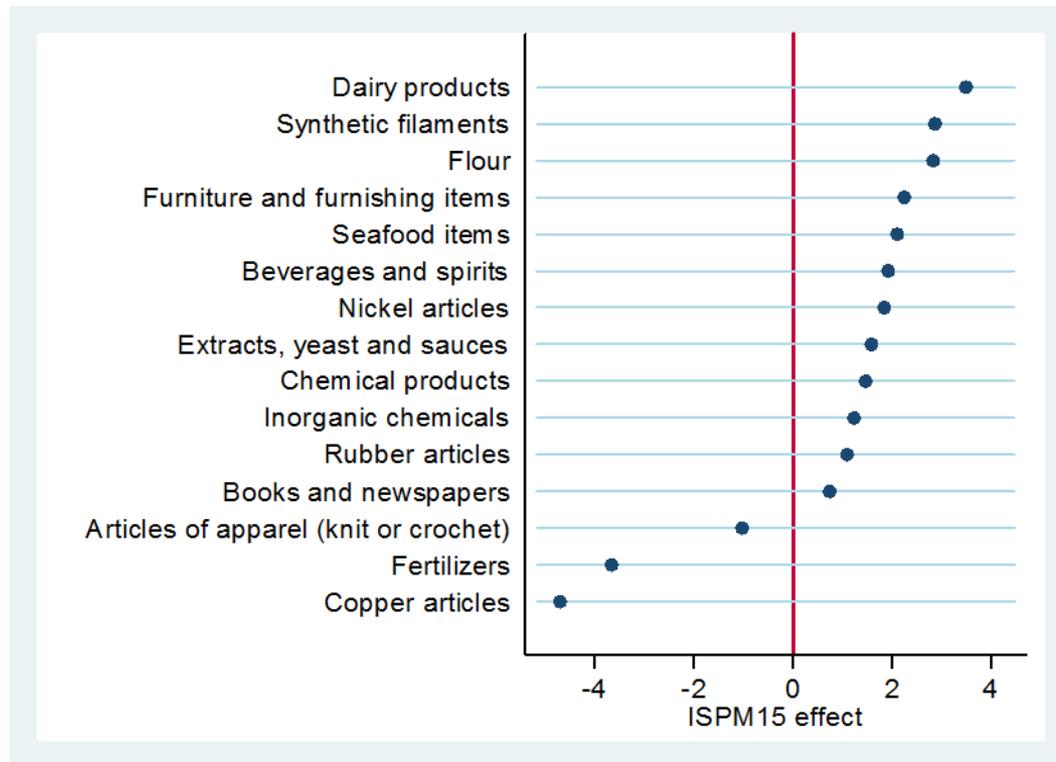
Key Findings (Kenya)

- Approximately half of the sectors experienced an increase in export volumes. The largest statistically-significant increases in the aftermath of ISPM 15 adoption have been in explosives and pyrotechnics (+221%) and dairy products (+165%), while the largest decreases in salt and sulphur products (-202%) and impregnated, coated or laminated textiles (-156%)
- Approximately half of the sectors experienced an increase in import volumes. The largest increases in the aftermath of ISPM 15 adoption have been in pasta and baking products (+72%) and aluminium articles (+62%), while the largest decreases in vegetable textiles and fibres (-218%) and arms and ammunition (-130%)
- Overall, exports increased by \$551,000,000, while imports increased by \$1,226,850,000. As a result of this, the trade balance decreased by \$675,850,000

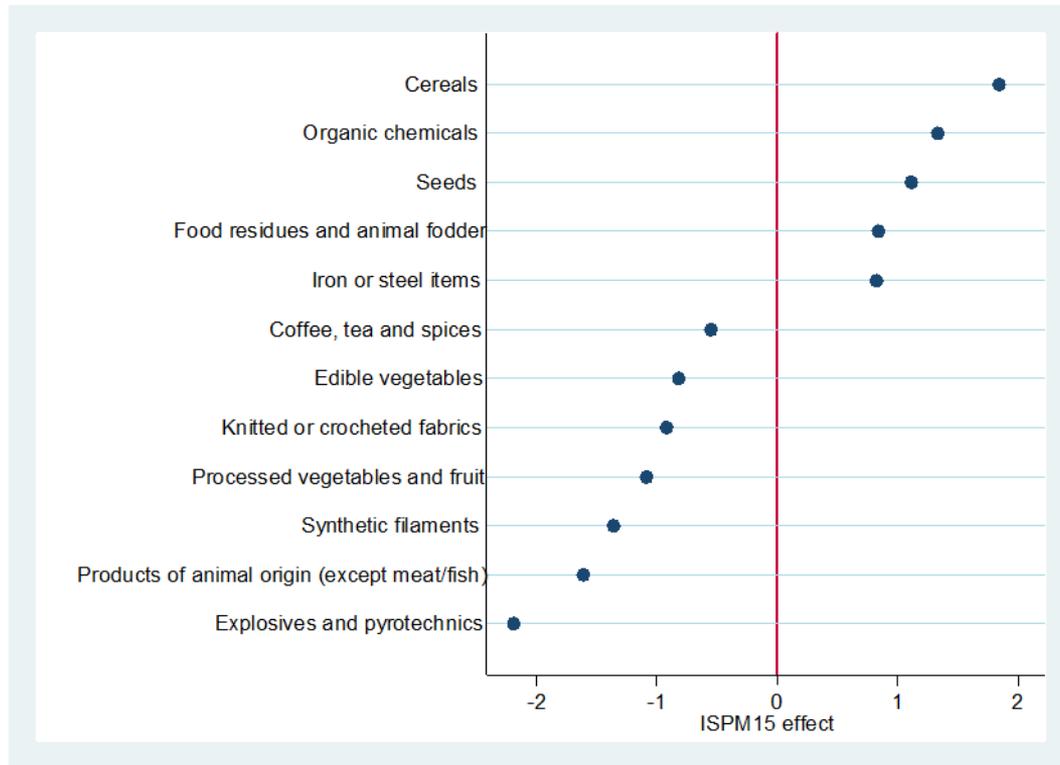
Policy Implications (Kenya)

- Given the unequal distribution of effects across sectors, the Kenyan authorities need to pay attention to those sectors that experienced an economic contraction in the aftermath of the ISPM 15 implementation
- In Kenya, the ISPM 15 adoption appears to be associated with an overall increase in both exports and imports. Overall, exports increased by \$551,000,000, while imports increased by much more \$1,226,850,000. As a result of this, the trade balance decreased by \$675,850,000. This is an issue of concern, given that Kenya has been running an overall trade deficit in the last 5 years.

ISPM15 effects – Botswana (Exports), only statistically significant effects included



ISPM15 effects – Botswana (Imports), only statistically significant effects included



ISPM15 effects – Botswana (Exports), changes in export values

Table 15. Change in Export Values per Sector (in million US\$)

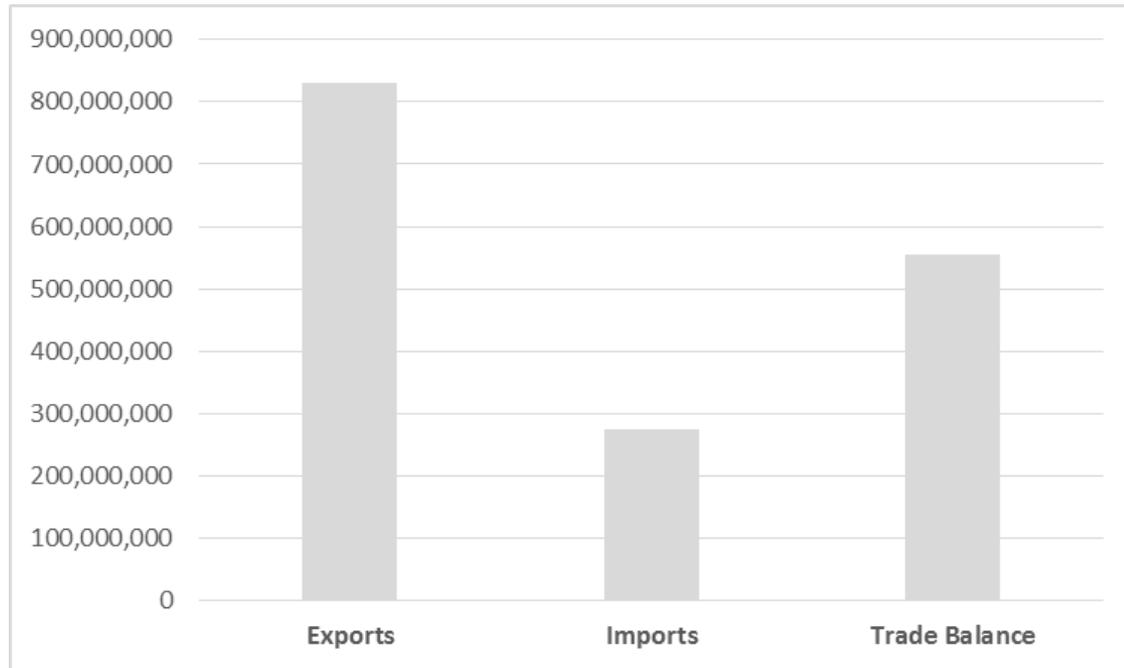
Copper articles	-20.17
Articles of apparel (knit or crochet)	-6.73
Fertilizers	-0.07
Seafood items	0.14
Extracts, yeast and sauces	0.57
Chemical products	0.61
Rubber articles	1.20
Dairy products	1.29
Synthetic filaments	1.79
Books and newspapers	3.77
Flour	8.49
Beverages and spirits	9.02
Furniture and furnishing items	9.90
Inorganic chemicals	44.64
Nickel articles	777.00

ISPM15 effects – Botswana (Imports), changes in import values

Table 16. Change in Import Values per Sector (in million US\$)

Processed vegetables and fruit	-58.86
Edible vegetables	-35.26
Explosives and pyrotechnics	-26.28
Coffee, tea and spices	-14.30
Synthetic filaments	-4.76
Knitted or crocheted fabrics	-2.12
Products of animal origin (except meat/fish)	-0.95
Seeds	6.22
Organic chemicals	14.63
Food residues and animal fodder	26.88
Iron or steel items	131.20
Cereals	239.20

ISPM15 effects – Botswana Trade Balance



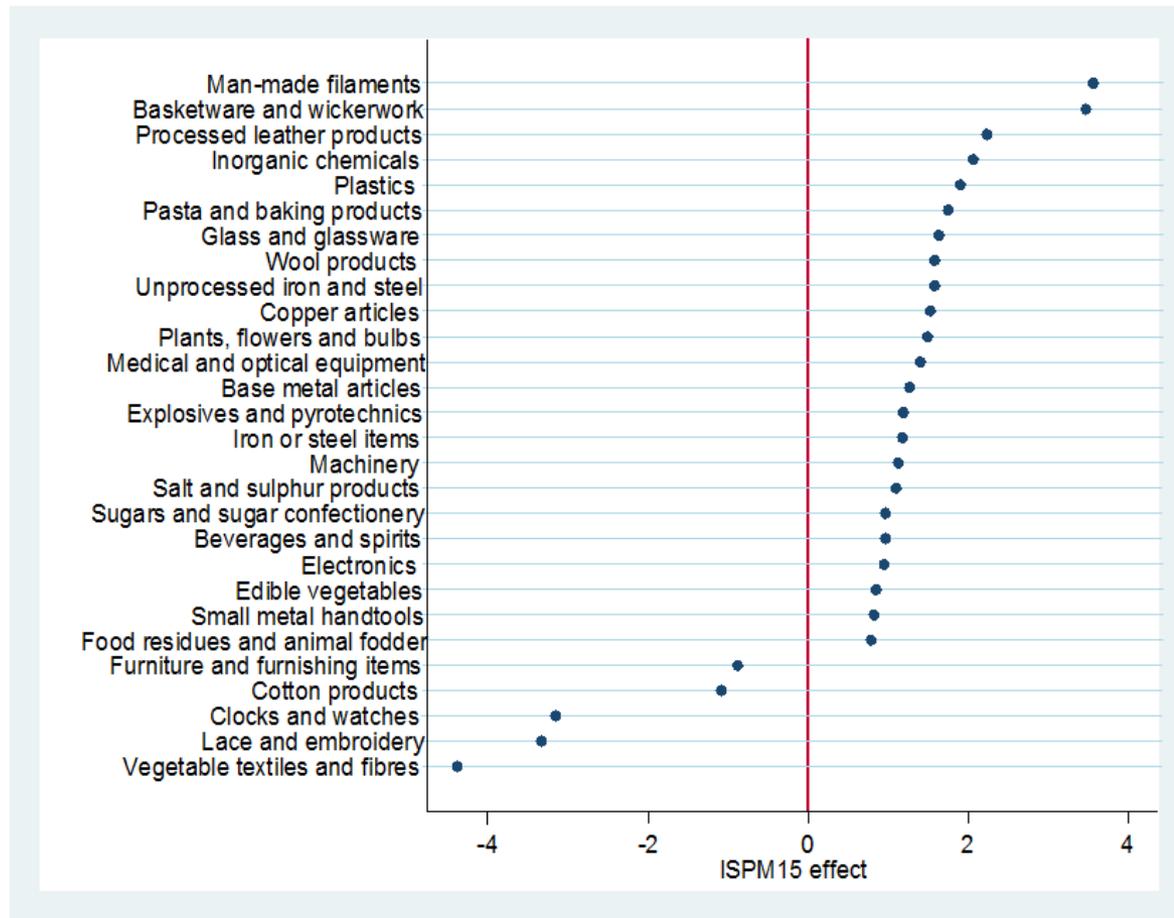
Key Findings (Botswana)

- The vast majority of sectors experienced an increase in export volumes. The largest increases in the aftermath of ISPM 15 adoption have been in dairy products (+349%) and synthetic filaments (+287%), while the largest decreases in copper articles (-469%) and fertilizers (-366%). The decrease in the value of exports of copper articles could have also been facilitated by the fluctuations in copper prices in global markets.
- Approximately half of the sectors experienced an increase in import volumes. The largest increases in the aftermath of ISPM 15 adoption have been in cereals (+184%) and organic chemicals (+133%), while the largest decreases in explosives and pyrotechnics (-219%) and products of animal origin (-161%).
- Overall, exports increased by \$831,457,000, while imports increased by \$275,596,000. As a result of this, the trade balance improved by \$555,861,000

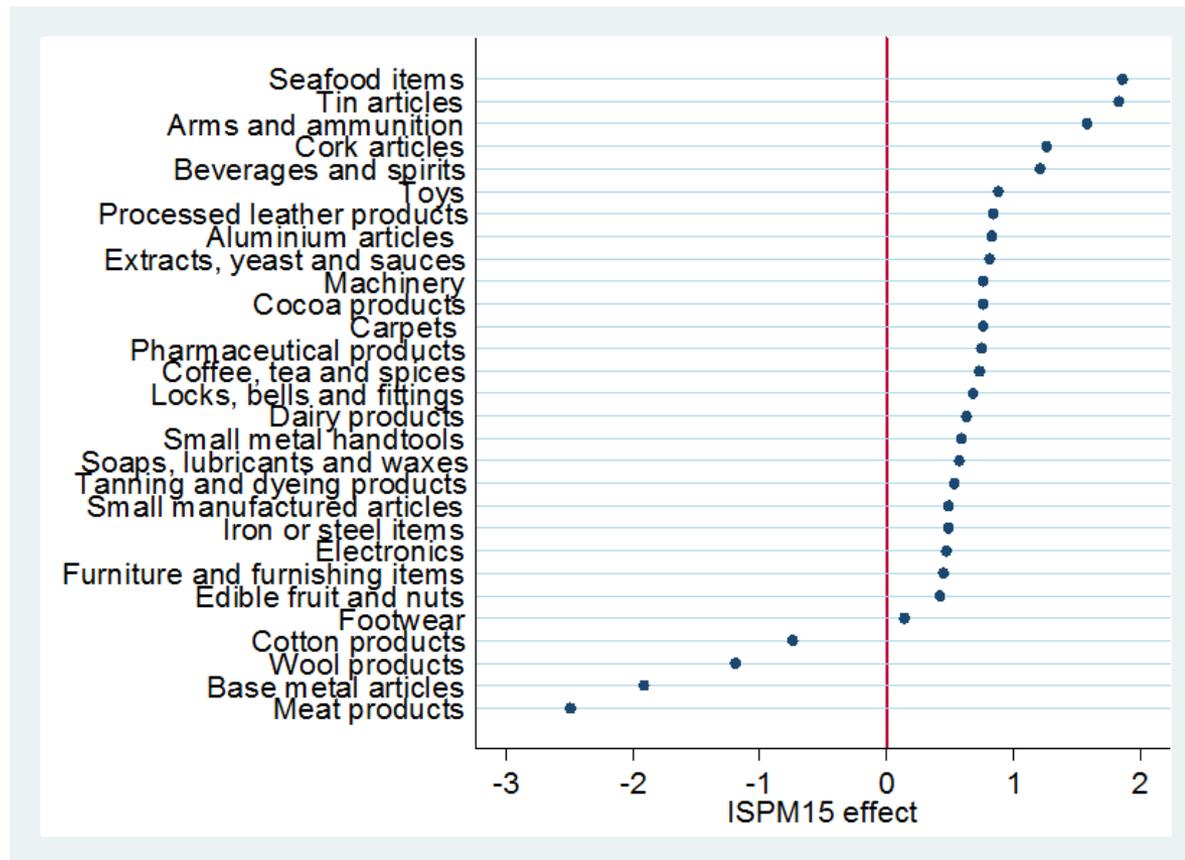
Policy Implications (Botswana)

- Given the unequal distribution of effects across sectors, the authorities need to pay attention to those sectors that experienced an economic contraction in the aftermath of the ISPM 15 implementation
- In Botswana, the ISPM 15 adoption appears to be associated with an overall increase in both exports and imports. Overall, exports increased by \$831,457,000, while imports increased by less, namely \$275,596,000. As a result of this, the trade balance improved by \$555,861,000. This is quite encouraging, given that Botswana has been running an overall trade deficit until recently (2015).

ISPM15 effects – Cameroon (Exports), only statistically significant effects included



ISPM15 effects – Cameroon (Imports), only statistically significant effects included



ISPM15 effects – Cameroon (Exports), changes in export values

Table 21. Change in Export Values per Sector (in million US\$)

Cotton products	-163.50
Furniture and furnishing items	-0.81
Lace and embroidery	-0.03
Clocks and watches	-0.02
Paper	0.00
Man-made filaments	0.01
Processed leather products	0.04
Food residues and animal fodder	0.04
Copper articles	0.05
Basketware and wickerwork	0.14
Base metal articles	0.46
Plants, flowers and bulbs	1.19
Edible vegetables	1.28
Explosives and pyrotechnics	2.62
Small metal handtools	2.71
Electronics	5.04
Pasta and baking products	6.83
Salt and sulphur products	13.20
Medical and optical equipment	13.30
Sugars and sugar confectionery	13.58
Beverages and spirits	13.58
Iron or steel items	18.88
Plastics	19.00
Glass and glassware	24.60
Unprocessed iron and steel	56.88
Machinery	58.76
Inorganic chemicals	61.80

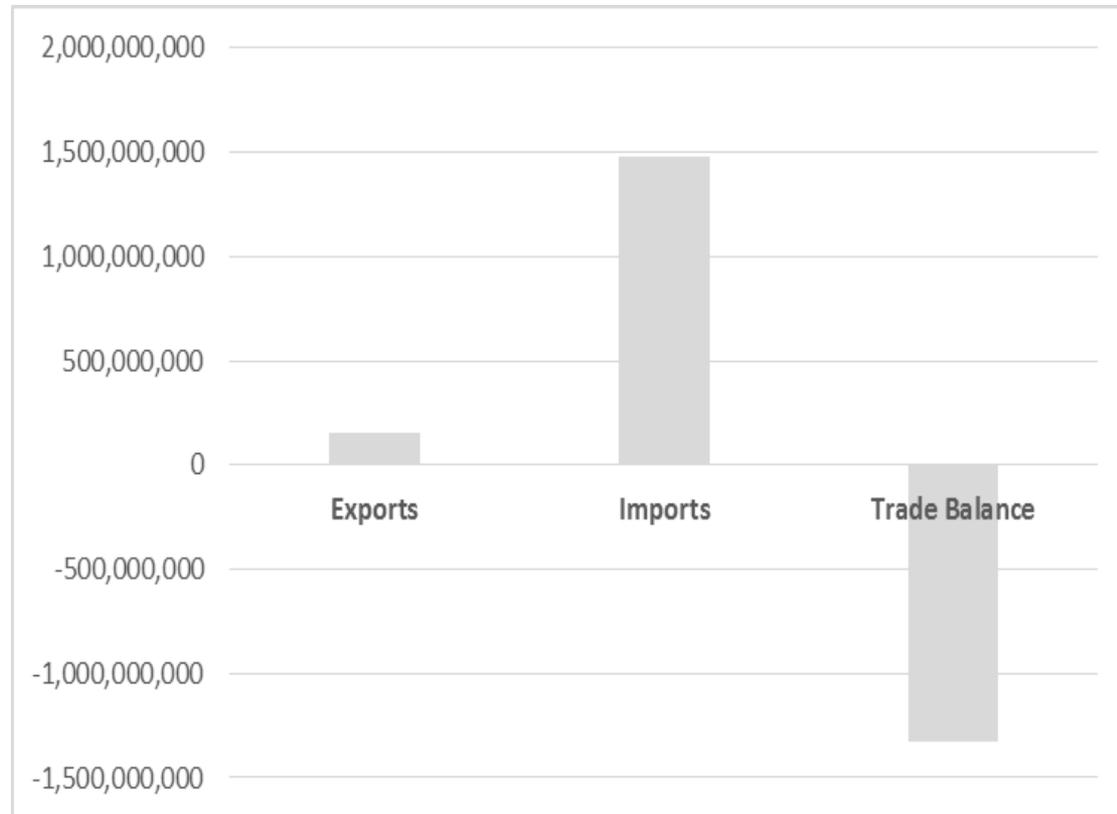
ISPM15 effects – Cameroon (Imports), changes in import values

Table 22. Change in Import Values per Sector (in million US\$)

Meat products	-21.66
Cotton products	-6.59
Base metal articles	-1.38
Wool products	-0.03
Cork articles	0.05
Tin articles	0.05
Coffee, tea and spices	1.61
Edible fruit and nuts	1.97
Cocoa products	2.28
Carpets	2.43
Small manufactured articles	4.31
Footwear	4.76
Toys	5.28
Processed leather products	7.56
Tanning and dyeing products	10.07
Arms and ammunition	10.27
Soaps, lubricants and waxes	13.11
Small metal handtools	13.57
Furniture and furnishing items	18.00
Aluminium articles	18.26
Locks, bells and fittings	20.40
Extracts, yeast and sauces	30.78
Dairy products	36.54
Iron or steel items	78.40
Beverages and spirits	79.86
Pharmaceutical products	135.00
Electronics	164.50
Machinery	402.80
Seafood items	446.40

ISPM15 effects – Cameroon

Trade Balance



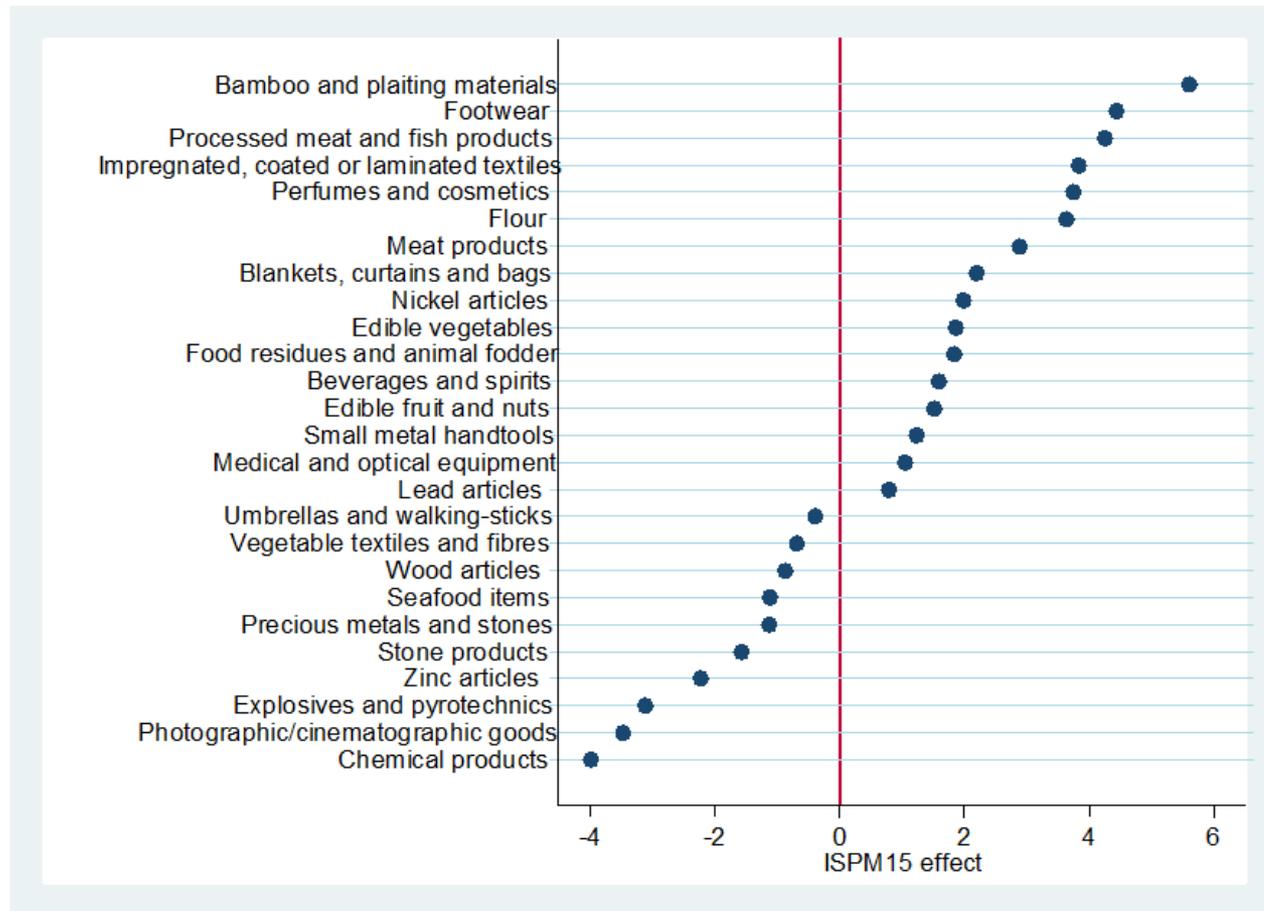
Key Findings (Cameroon)

- The majority of sectors experienced an increase in export volumes. The largest increases in the aftermath of ISPM 15 adoption have been in man-made filaments (+356%) and basketware and wickerwork (+347%), while the largest decreases in vegetable textiles and fibres (-439%) and lace and embroidery (-333%).
- The vast majority of the sectors experienced an increase in import volumes. The largest increases in the aftermath of ISPM 15 adoption have been in seafood items (+186%) and tin articles (+183%), while the largest decreases in meat products (-249%) and base metal articles (-191%).
- Overall, exports increased by \$149,612,000, while imports increased by \$1,478,612,000. As a result of this, the trade balance deteriorated by \$1,329,000,000.

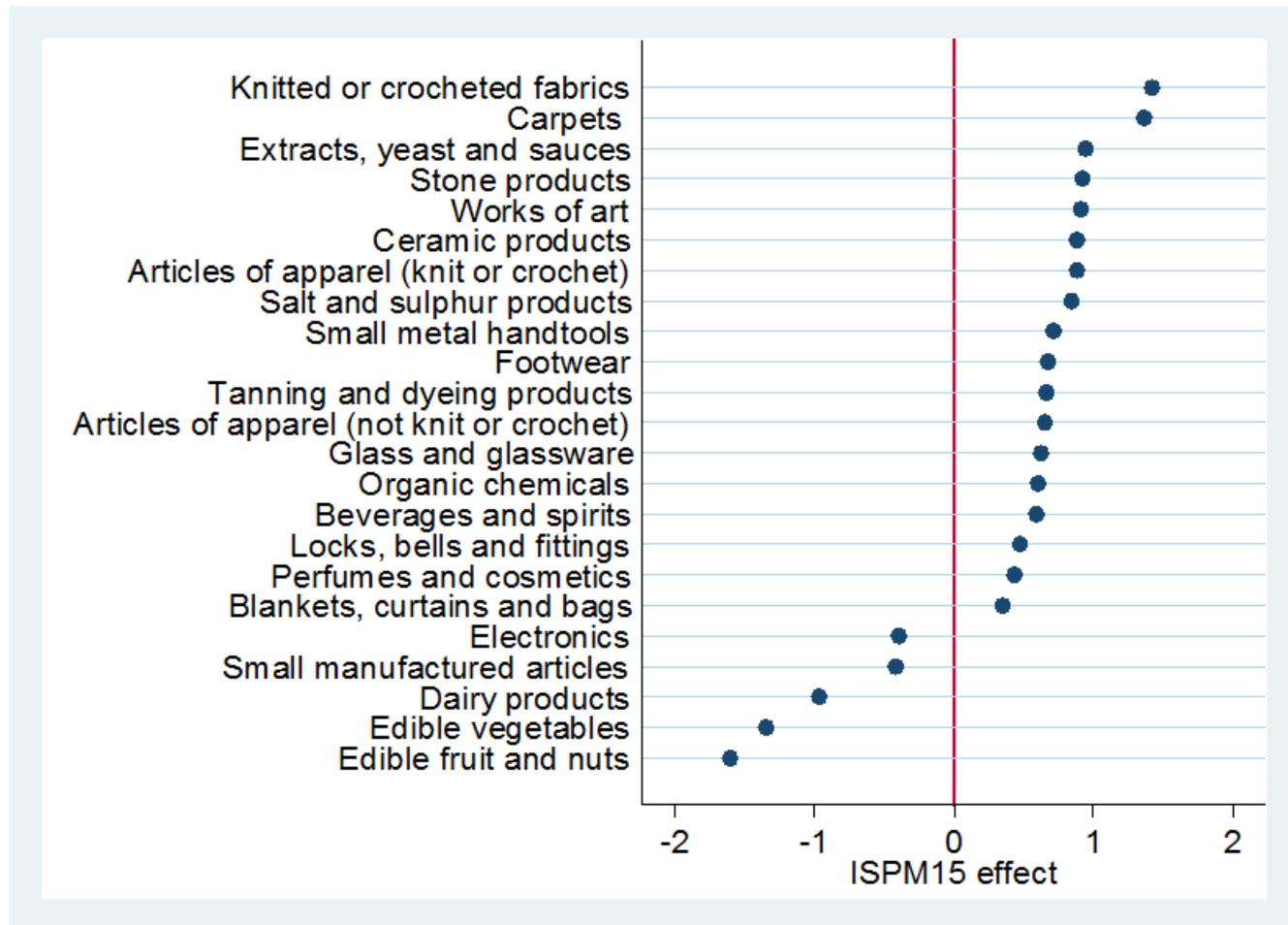
Policy Implications (Cameroon)

- Given the unequal distribution of effects across sectors, the authorities need to pay attention to those sectors that experienced an economic contraction in the aftermath of the ISPM 15 implementation
- In Cameroon, the ISPM 15 adoption appears to be associated with an overall increase in both exports and imports. Overall, exports increased by \$149,612,000, while imports increased by much more, namely \$1,478,612,000. As a result of this, the trade balance deteriorated by \$1,329,000,000. This is an issue of concern, given that Cameroon has been running an overall trade deficit since 2008.

ISPM15 effects – Mozambique (Exports), only statistically significant effects included



ISPM15 effects – Mozambique (Imports), only statistically significant effects included



ISPM15 effects – Mozambique (Exports), changes in export values

Table 27. Change in Export Values per Sector (in million US\$)

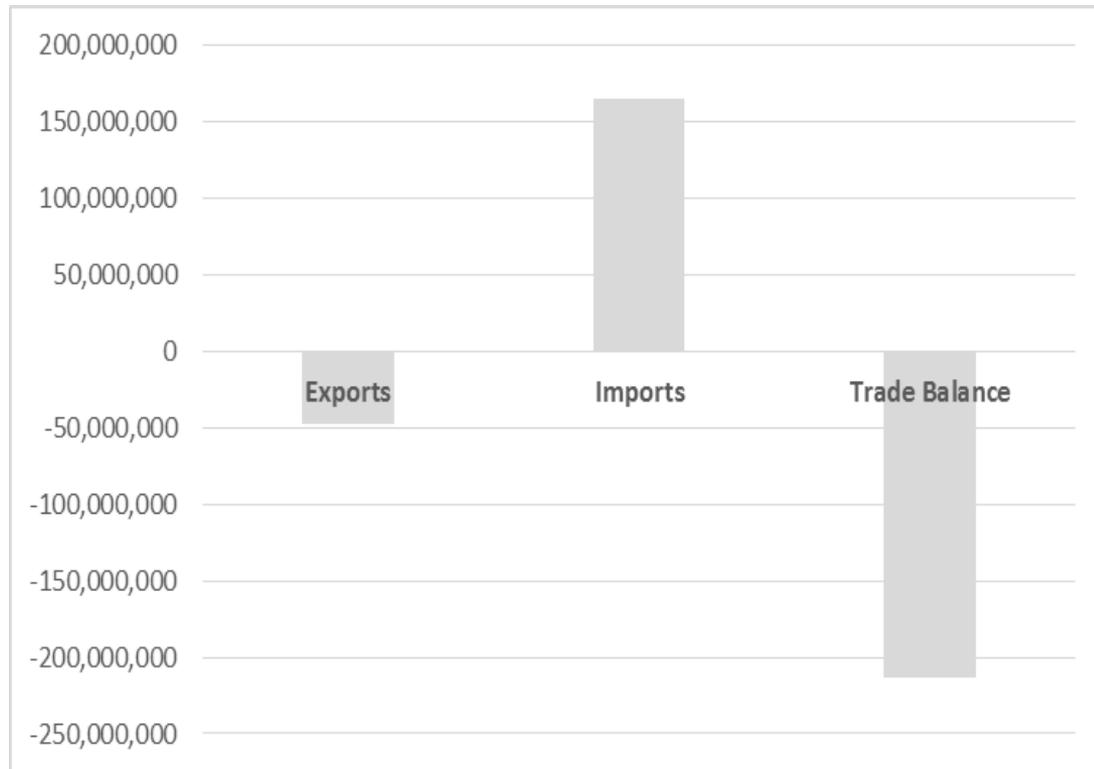
Chemical products	-211.47
Seafood items	-47.04
Wood articles	-43.50
Precious metals and stones	-1.36
Vegetable textiles and fibres	-0.76
Explosives and pyrotechnics	-0.41
Zinc articles	-0.06
Stone products	-0.02
Umbrellas and walking-sticks	0.00
Impregnated, coated or laminated textiles	0.04
Processed meat and fish products	0.05
Meat products	0.16
Footwear	0.29
Lead articles	1.66
Blankets, curtains and bags	1.80
Perfumes and cosmetics	2.10
Small metal handtools	5.29
Beverages and spirits	8.27
Flour	16.74
Food residues and animal fodder	20.24
Edible vegetables	48.36
Medical and optical equipment	67.20
Edible fruit and nuts	85.12

ISPM15 effects – Mozambique (Imports), changes in import values

Table 28. Change in Import Values per Sector (in million US\$)

Electronics	-216.00
Dairy products	-45.59
Edible vegetables	-27.00
Edible fruit and nuts	-13.20
Small manufactured articles	-8.82
Works of art	0.18
Knitted or crocheted fabrics	0.75
Carpets	2.99
Organic chemicals	9.60
Locks, bells and fittings	10.34
Articles of apparel (not knit or crochet)	13.00
Articles of apparel (knit or crochet)	16.72
Perfumes and cosmetics	18.06
Footwear	19.43
Tanning and dyeing products	20.46
Stone products	23.92
Glass and glassware	25.42
Small metal handtools	26.98
Blankets, curtains and bags	29.75
Extracts, yeast and sauces	36.66
Beverages and spirits	46.61
Ceramic products	49.28
Salt and sulphur products	126.00

ISPM15 effects – Mozambique Trade Balance



Key Findings (Mozambique)

- The majority of sectors experienced an increase in export volumes. The largest increases in the aftermath of ISPM 15 adoption have been in bamboo and plaiting materials (+561%) and footwear (+444%), while the largest decreases in chemical products (-399%) and photographic/cinematographic goods (-347%).
- The vast majority of the sectors experienced an increase in import volumes. The largest increases in the aftermath of ISPM 15 adoption have been in knitted or crocheted fabrics (+142%) and carpets (+136%), while the largest decreases in fruit and nuts (-1.61%) and edible vegetables (-135%).
- Overall, exports decreased by \$47,287,000, while imports increased by \$165,542,000. As a result of this, the trade balance deteriorated by \$212,829,000.

Policy Implications (Mozambique)

- Given the unequal distribution of effects across sectors, the authorities need to pay attention to those sectors that experienced an economic contraction in the aftermath of the ISPM 15 implementation
- In Mozambique, the ISPM 15 adoption appears to be associated with a decrease in overall exports and an increase in overall imports. Overall, exports decreased by \$47,287,000, while imports increased by \$165,542,000. As a result of this, the trade balance deteriorated by \$212,829,000. This is an issue of concern, given that Mozambique has been running an overall trade deficit since 2008.

Regional policy implications

- The regional analysis has allowed us to discern some visible differences in export/import trends when comparing the pre and post ISPM 15 periods.
- In Kenya, half of the export sectors experienced an increase in export volumes – this is in contrast with Botswana, Cameroon and Mozambique where the majority of the export sectors experienced an increase.
- In Kenya and Botswana, half of the import sectors experienced an increase in import volumes – this is in contrast with Cameroon and Mozambique where the majority of the import sectors experienced an increase.
- In Kenya and Cameroon, overall imports increased by far more than exports, resulting hence in a decrease of the trade balance – Mozambique also experienced a deterioration of its trade balance, but this was a result of both a decline in overall exports as well as increase in total imports. In contrast, in Botswana overall exports increased by far more than imports, resulting hence in an improvement of the trade balance.

Thank you for your attention

Contact details

papyrakis@iss.nl

lt20@soas.ac.uk