Regional Price Transmission in Southern African Maize Markets

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Selected Paper prepared for presentation at the International Agricultural Trade Research Consortium's (IATRC's) 2015 Annual Meeting: Trade and Societal Well-Being, December 13-15, 2015, Clearwater Beach, FL.

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International Agricultural Trade Research Consortium

15 December 2015

Clearwater Beach. Florida

Food and Agricultural Policy Research Institute
FAPRI
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BFAP

ReNAPRI

A regional perspective on analysing the impact of agricultural policies

- Institute for Social and Economic Research, University of Kinshasa; **Democratic Republic of Congo**;
- Tegemeo Institute of Agricultural Policy and Development, Egerton University – **Kenya**
- Centre for Agricultural Research and Development, Bunda College, **Malawi**;
- CEPPAG, University of Eduardo Mondlane**, Mozambique**
- Bureau for Food and Agricultural Policy (BFAP)- University of Pretoria & Stellenbosch, **South Africa**;
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- Indaba Agriculture Policy Research Institute (IAPRI), **Zambia**
- Department of Agriculture Economics Makarere University, **Uganda**
- Department of Agriculture Economics and Extension, University of Zimbabwe, **Zimbabwe**

Presentation Overview

1) Background & Context
   - Overview of maize markets in the region
   - Trade flows and prices
   - Policy Environment

2) Previous work on price transmission in region

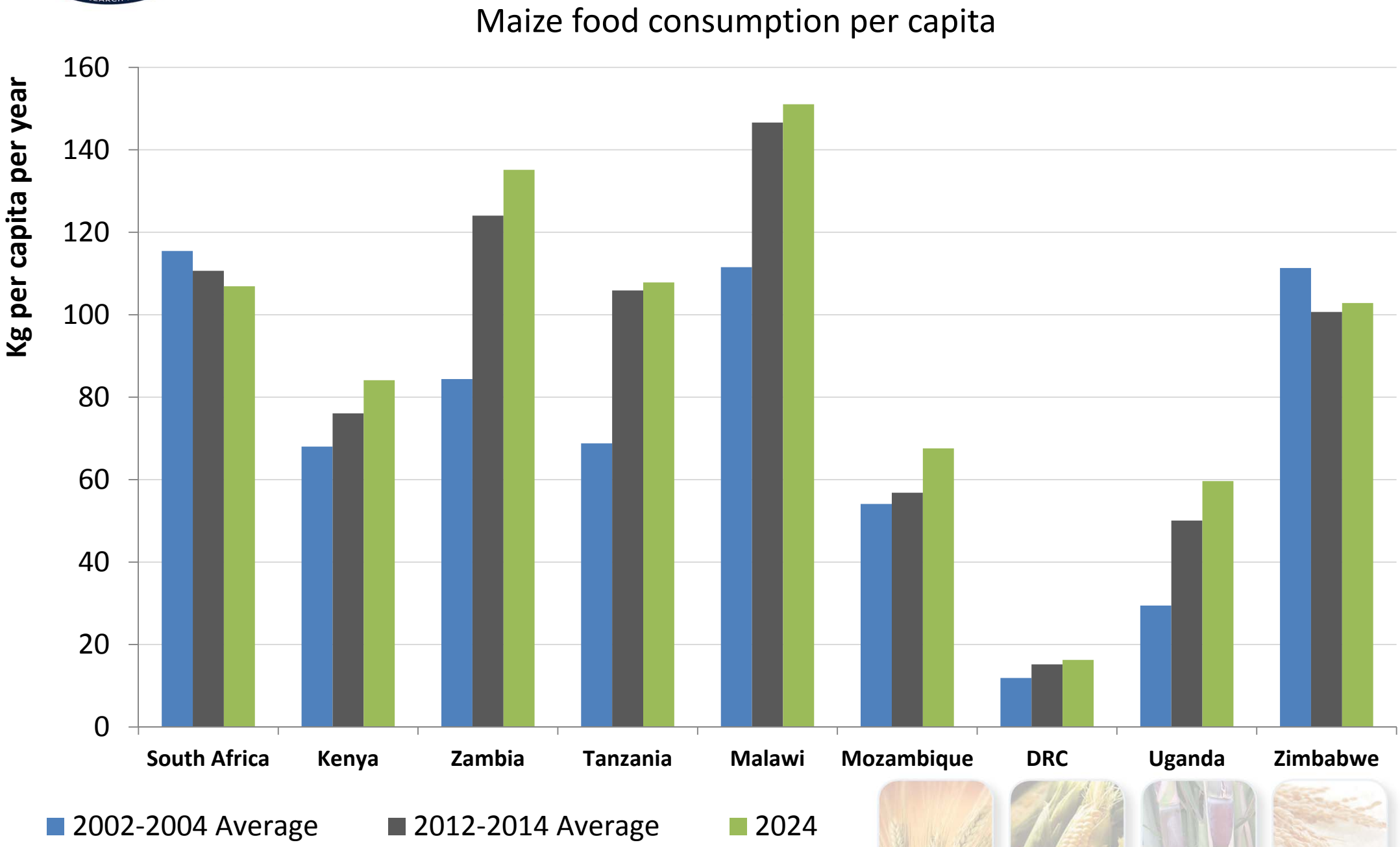
3) Methodology and some preliminary empirical results

4) Concluding remarks and way forward

Maize in the region

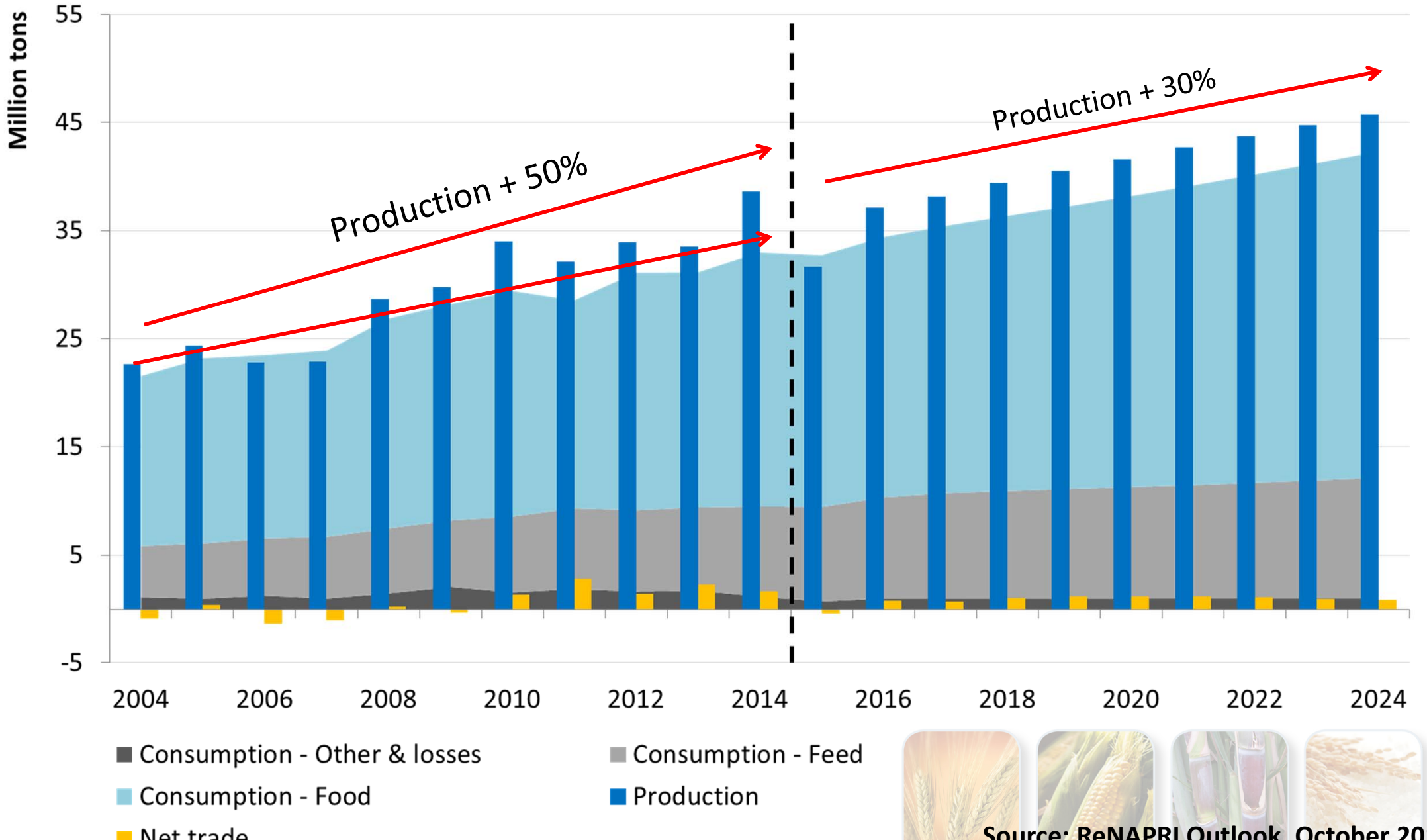
- Basic food staple to bulk of the population – association with food security
- Dominant crop planted in the region
- Government intervention in markets is common – efforts to insure availability and affordability
- Non-GM white maize less freely available in global market – differentiated product?

Regional Maize Consumption



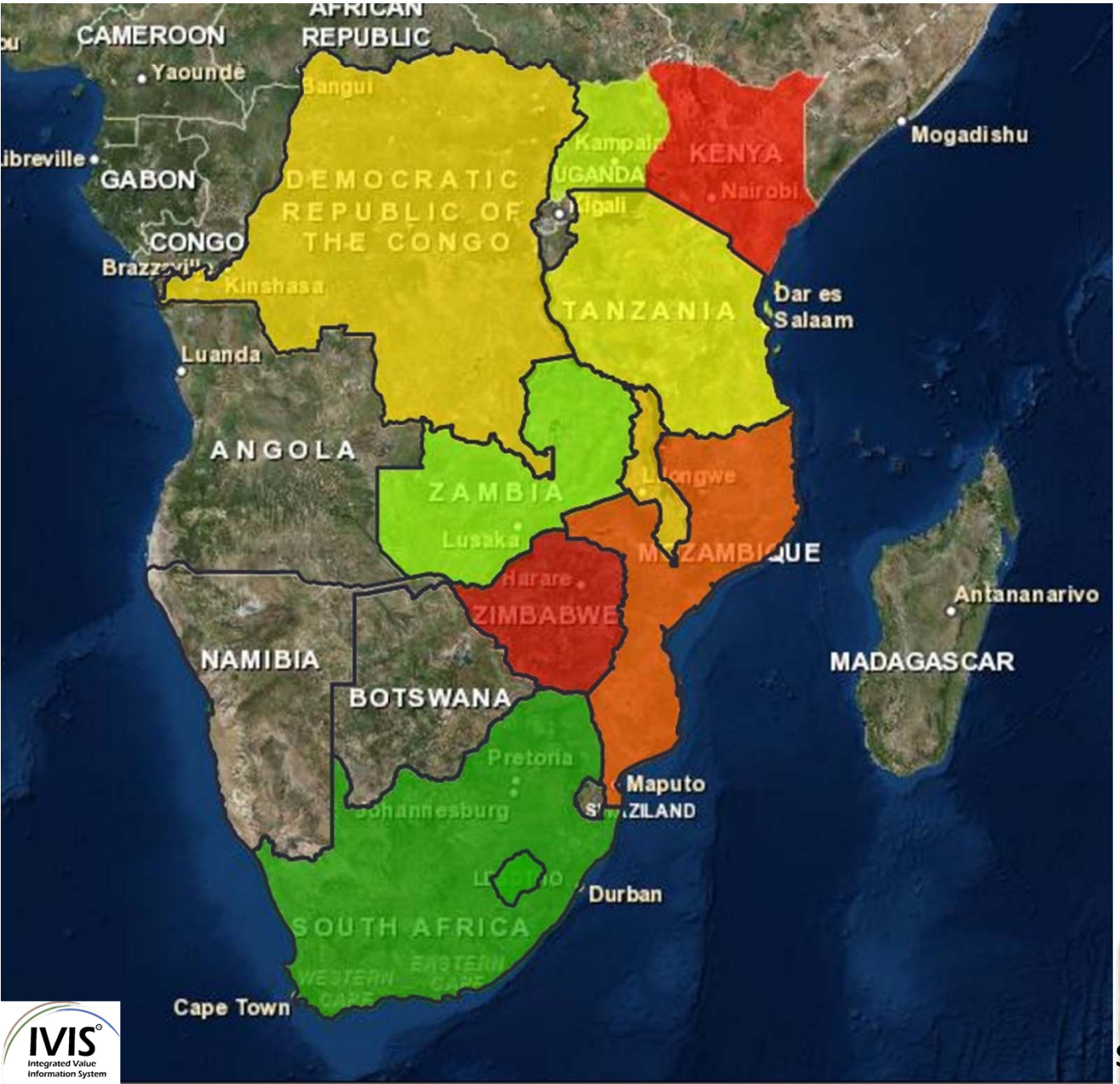
Source: ReNAPRI Outlook, October 2015

Maize – Regional Overview



Source: ReNAPRI Outlook, October 2015

Maize trade in the region: 2012-2014



Consistent Exports:

South Africa

Zambia

Uganda

Consistent Imports:

Zimbabwe

Kenya

DRC

Mozambique**

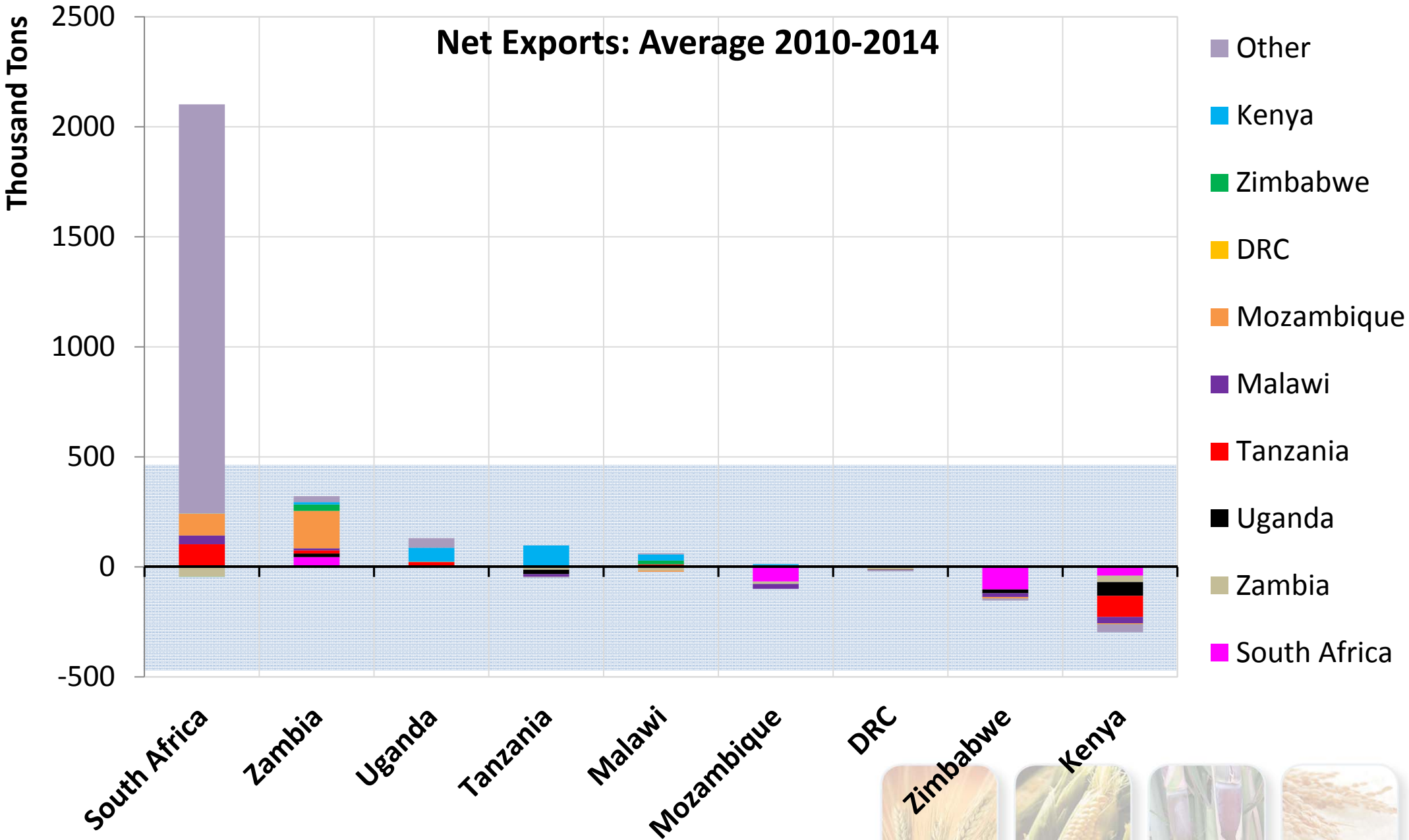
Generally Self Sufficient:

Tanzania

Malawi

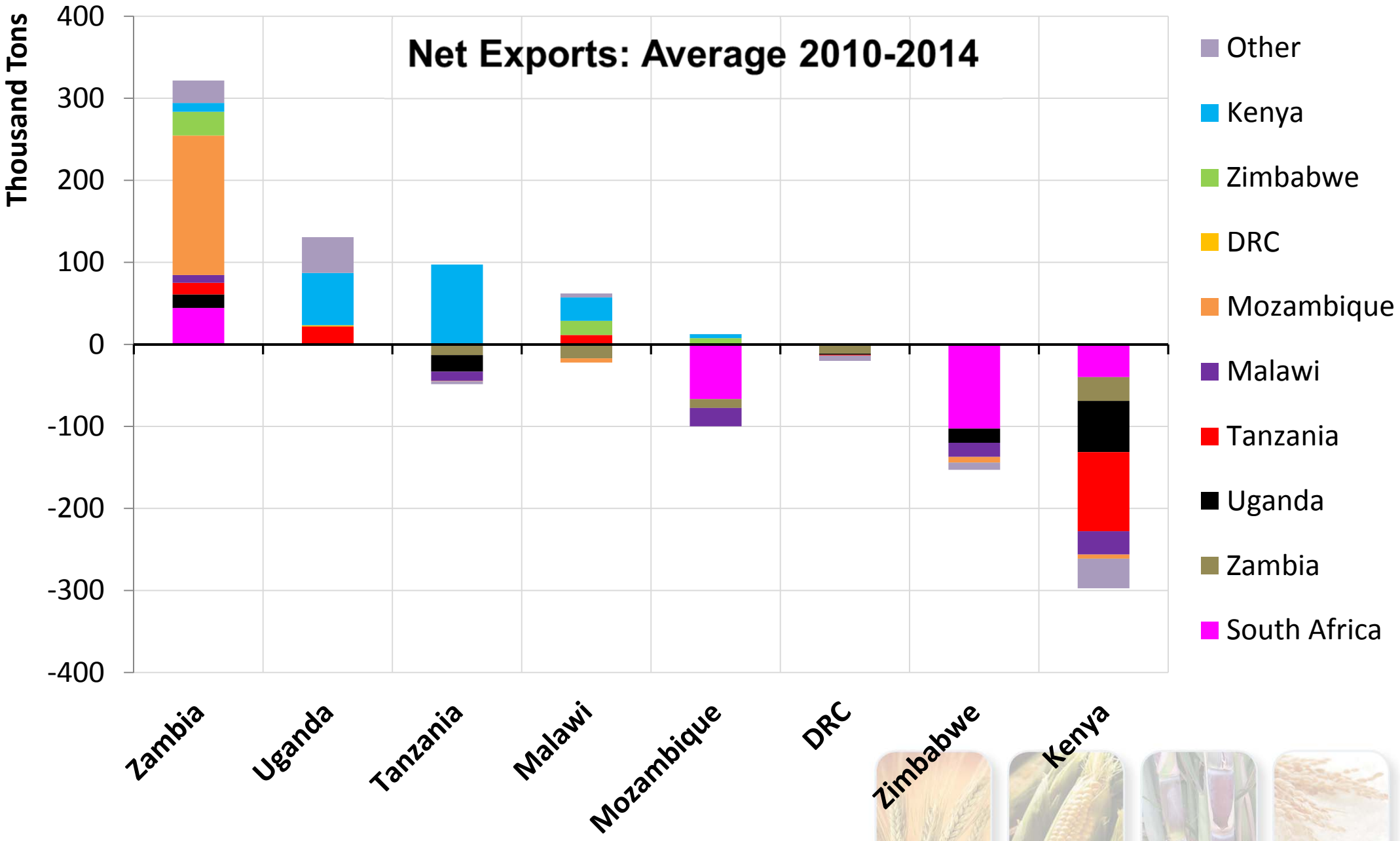
Source: ITC Trademap, FEWSNET, ReNAPRI, IVIS

Regional trade-flow



Source: ITC Trademap, FEWSNET, ReNAPRI

Regional trade-flow

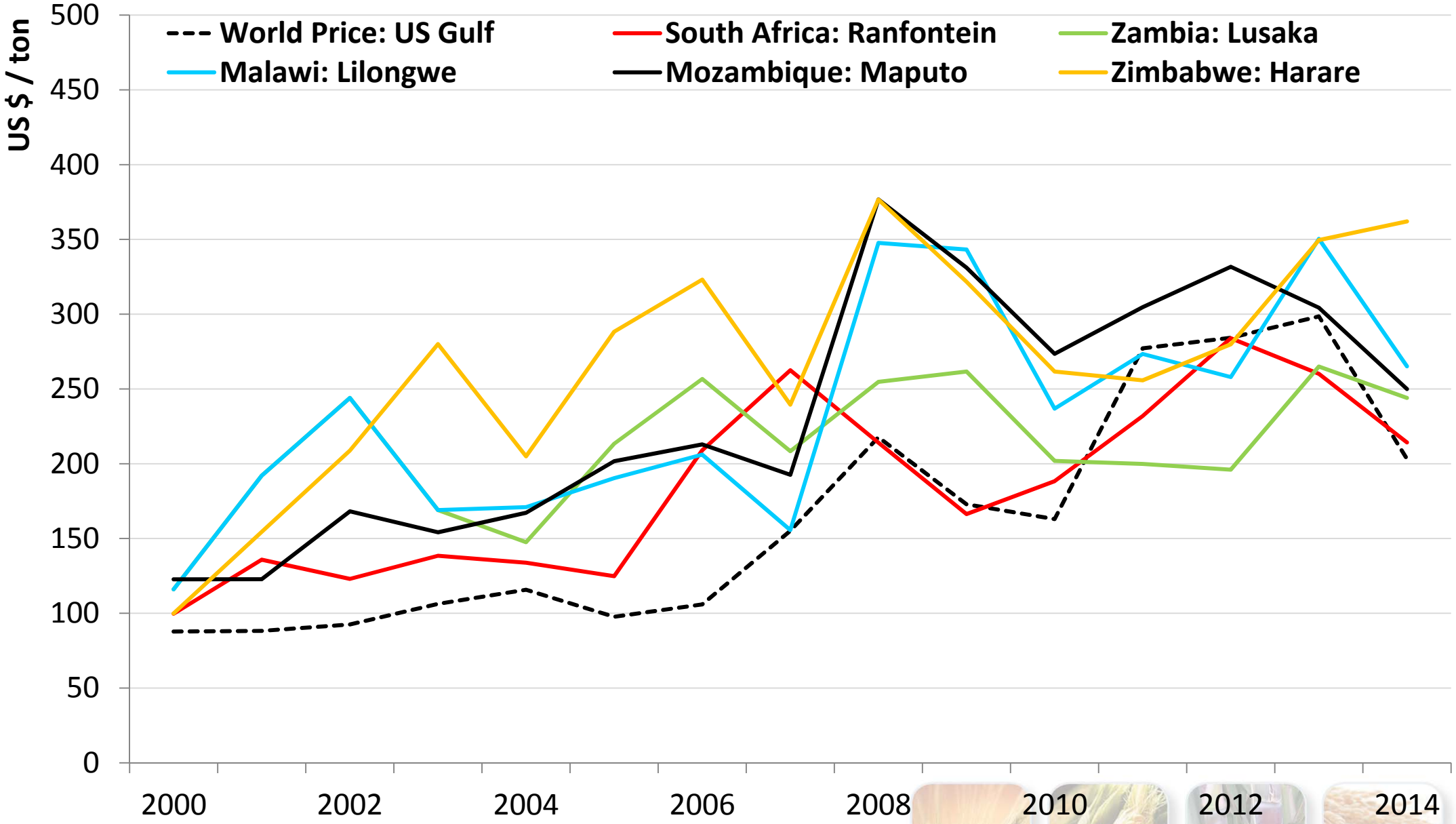


Source: ITC Trademap, FEWSNET, ReNAPRI

Policy: History of intervention

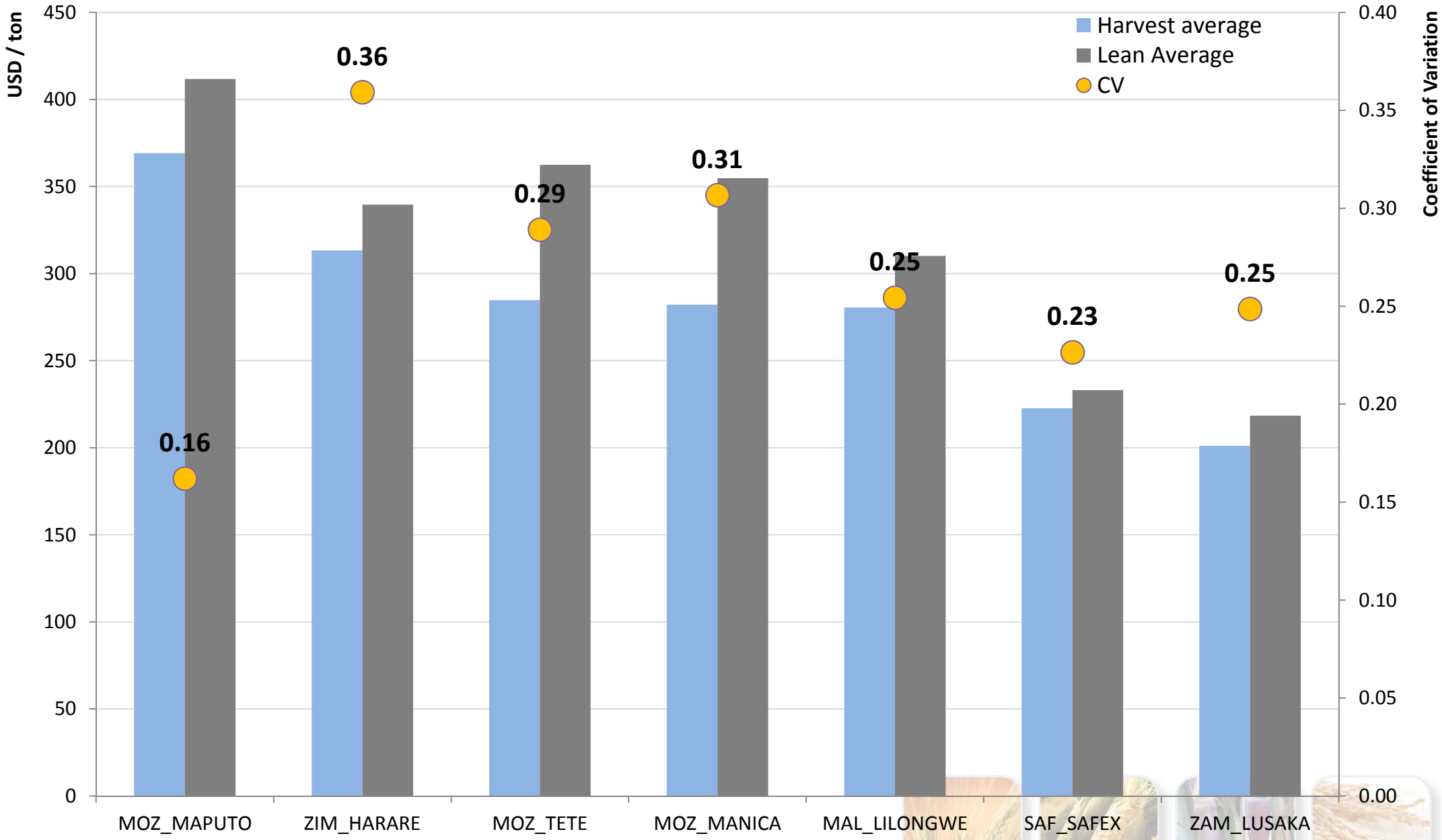
- Government actively partaking in market – not always at market related prices – strategic reserves?
  - Zambia, Kenya, Malawi
- Export controls during periods of perceived shortage
  - Zambia, Malawi, Tanzania
- Input Support Programs
  - Malawi, Zambia, Tanzania, Kenya

Relative prices in the region



Source: FEWSNET, FAO GIEWS, ReNAPRI

Relative prices and volatility



Source: FEWSNET, FAO GIEWS, ReNAPRI

Problem

- Government interventions are said to be targeted at stabilisation of domestic prices of a politically sensitive crop
  - Countries experiencing the greatest instability are those most actively intervening in their markets (Chapoto & Jayne, 2009)
- Role of intra-regional trade implies a cross country impact of such policies
  - Quantification of country specific policy impacts on prices in the rest of the region requires an understanding of price formation and the extent to which prices are transmitted between different markets in the region

Price transmission approach

- Price transmission (or price co-integration) refers to the co-movement shown by prices of the same good in different locations

- Such models are used to assess competitive market equilibrium or market efficiency, a price based indicator that holds on the conditions of spatial equilibrium;

- Some benefits:
  - Use of price data only;
  - Allows for short and long run dynamics' analysis;
  - Allows for relaxing assumptions of linearity and symmetric adjustment.

Limitations…

- Frequent reliance on the price data only;
- Transaction and transportation costs are assumed to be equal to zero or set as a fixed proportion of the prices used – transport costs known to be high in Africa;
- Price vs. market integration;
- Price transmission parameters summarize overall effects that might affect prices in different markets. Further research is needed to study separate roles of different factors.

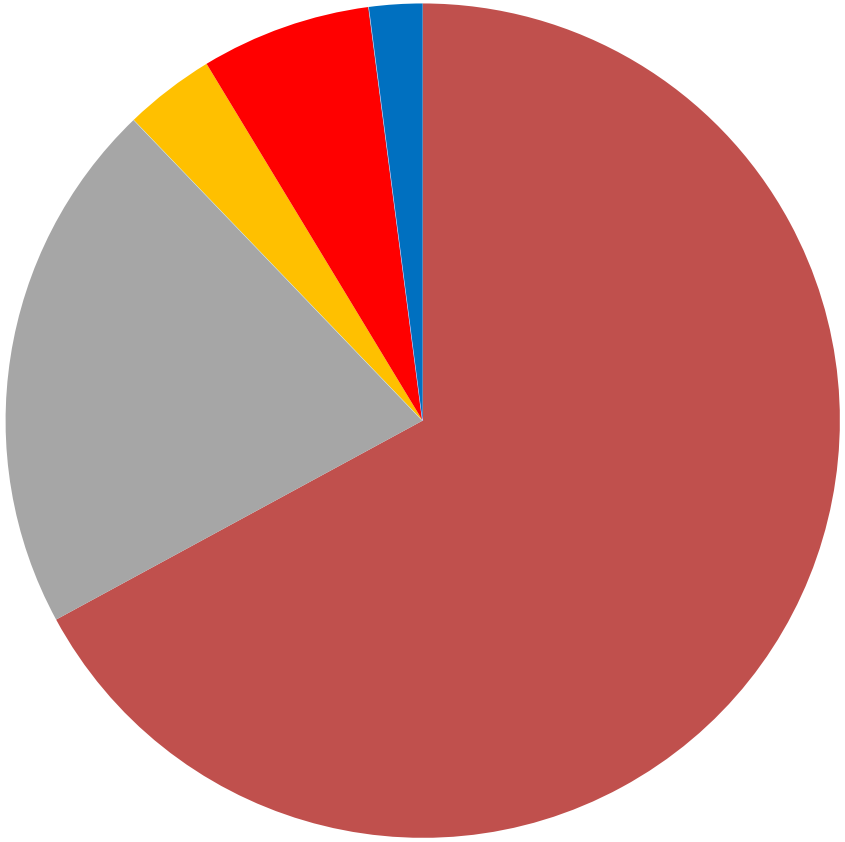
Price transmission – what do we know about the region?

Conforti (2004)	Transmission from world prices to domestic prices was much poorer in Africa compared to Asia and South America
Minot (2010)	Of 62 markets examined in Africa, only 13 showed long run relationships with world prices - only 6 with statistically significant long term transmission elasticities Of all maize markets tested, only 10% of domestic maize prices significantly correlated to world prices
Traub, Meyers, Jayne & Meyer (2010)	Under a high import regime, co-integration between South Africa and Mozambique, under a low import regime, there was no evidence of co-integration
Jayne & Meyers (2012)	Framework that allows multiple equilibria and multiple speeds of adjustment with regime separation dependant on the magnitude of trade-flows as opposed to the magnitude of price differentials Co-integration in low import regime, possible co-integration in the medium import regime and no co-integration in the high import regime
Burke and Meyer (2014)	Markets linked by relatively unregulated informal trade are not subject to the same kind of multiple trading regimes that limit price transmission and hinder adjustment in markets subject to heavy government intervention

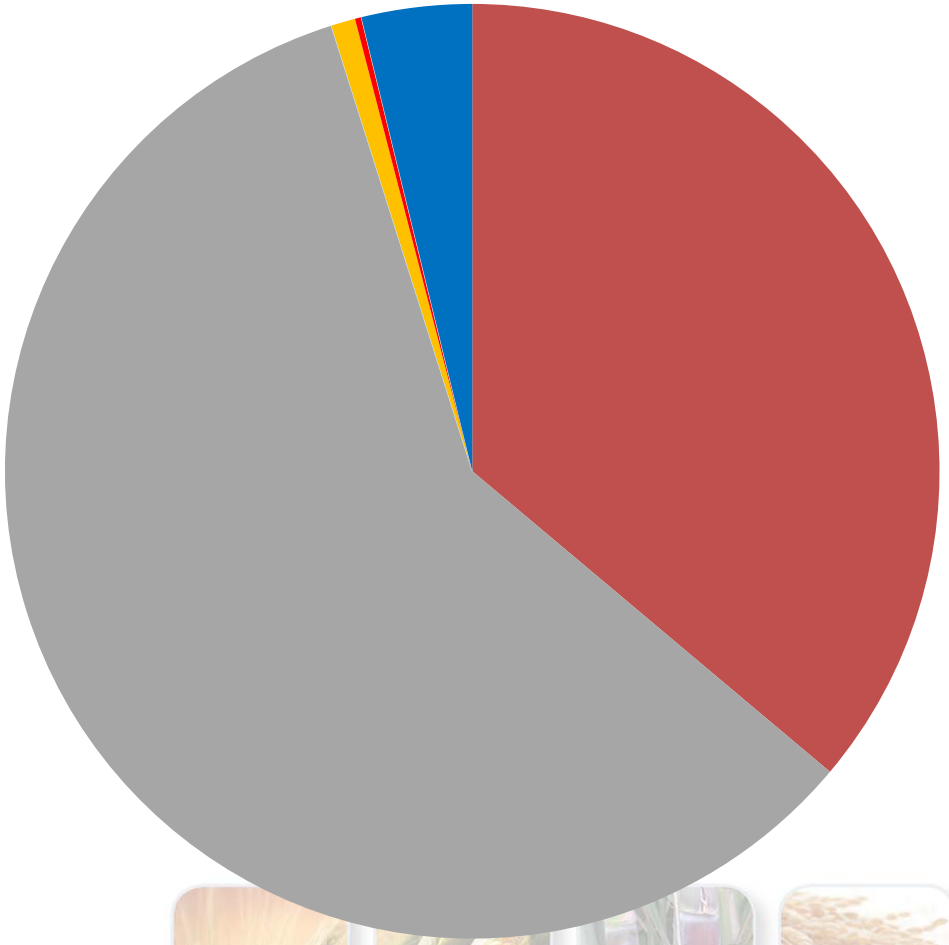
Trade-flows have changed

Zimbabwe maize imports

2007-2008



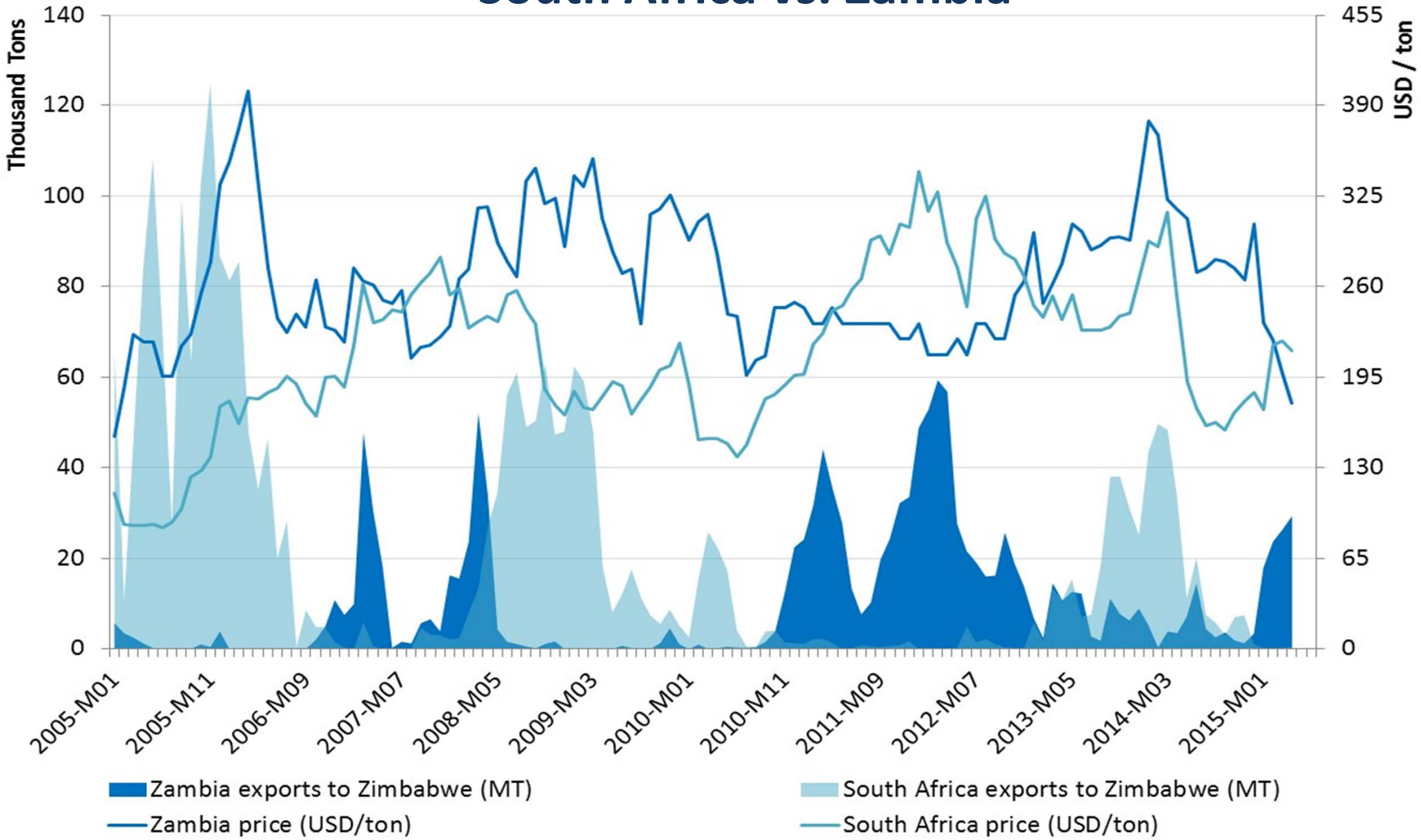
2012-2014



South Africa Zambia Tanzania Mozambique Malawi Uganda Kenya DRC Other

Zimbabwe Maize Imports

South Africa vs. Zambia



Transportation costs

Tanzania

For imported grain crops in Sub-Saharan Africa – cost of transportation (sea & land) may represent more than half of the final price (Minot, 2010)

Zambia

Transport Costs & Maize Area

Moving Rates

Lusaka –> Beira: USD 130

Lusaka -> Harare: USD 68

Lusaka -> Durban: USD 170

Randfontein -> Harare: USD 120

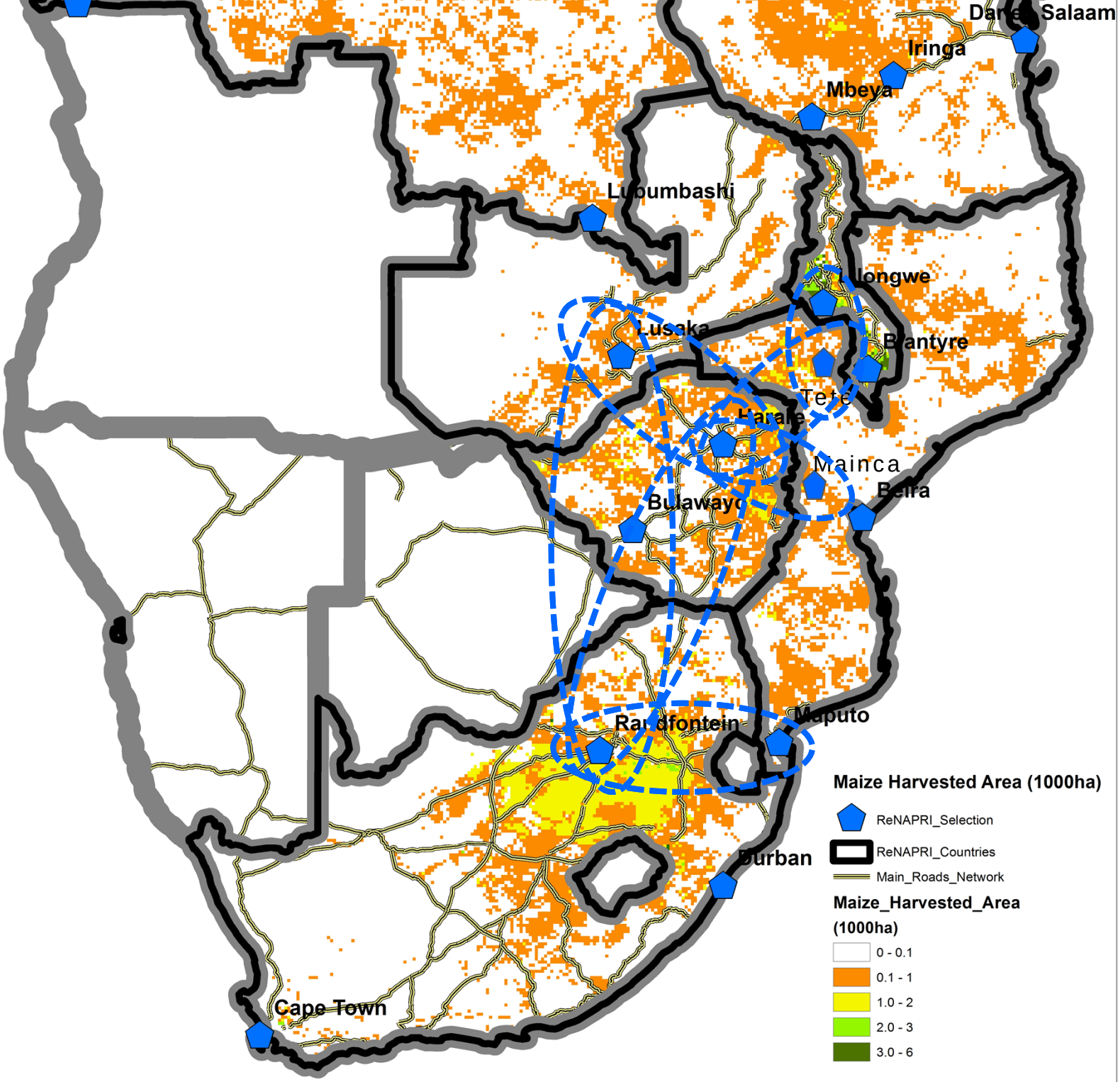
Randfontein -> Maputo: USD 70

Beira -> Harare: USD 75

Beira -> Lilongwe: USD 94

Lilongwe -> Harare: USD 60

Durban -> Harare: USD 145



Contribution of this study

- Wider Regional Coverage in Southern Africa
  - South Africa, Zambia, Zimbabwe, Malawi, Mozambique
  - Updated data considers Zambia's shift to an exporter
- Trade-flows considered as explanatory / threshold variable
  - Formal and informal trade included
- Multiple markets considered within relevant countries

Methods used (Current progress)

- Unit-root tests (levels and differences):
  - Augmented Dickey-Fuller (ADF)
  - Philips-Perron (PP) tests
  - Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test

- Co-integration tests using Engle and Granger (1987) method

Results to date

Pairs of series	Engel and Granger Procedure		
	ADF	PP	KPSS
Zambia (Lusaka) – South Africa	-3.15*	-3.22*	0.19
Malawi (Lilongwe) – Mozambique (Tete)	-5.52**	-5.48**	0.09
Zimbabwe (Harare) - Mozambique (Manica)	-2.98	-3.92**	0.13
Zambia (Lusaka) – Zimbabwe (Harare)	-3.24*	-3.40**	0.26
Mozambique (Tete) – Zimbabwe (Harare)	-6.81**	-6.77**	0.18
Mozambique (Maputo) – South Africa	-3.11*	-2.73	0.48**
Zimbabwe (Harare) - South Africa	- 2.26	-2.77	0.35*

Asterisks denote levels of significance (* for 10 percent, ** for 5 percent). The 5% and 10% critical values for tests with a drift are -3.37 and -3.07 respectively. The 5% and 10% critical values for the KPSS test in levels are 0.463 and 0.347 respectively.

Going forward

- Rate of price adjustment & direction of causality
  - Single equation error correction model to measure speed of adjustment and short run price transmission between relevant series
- Account for non-linearity
  - Identification of different trade regimes (Jayne & Meyers, 2012), with trade-flow as transition variable between regimes
  - Consideration of trade-flows between country pair or from third markets
- Additional markets?

Concluding remarks

- Intra-regional trade-flow, both formal and informal is an important consideration within the region, as trade from outside the region remains limited
- Transportation costs in the region are extremely high leading to significant price differentials and volatile markets
- Few maize markets in the region reflect long run co-integration with world market
- Market integration within the regions has generally non-linear and different regimes should be considered
- Implications for structure of quantitative policy analysis tools
- Price transmission within country important consideration going forward…

Thank you!

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