Measuring the efficiency effect of integration in the South African Development Community
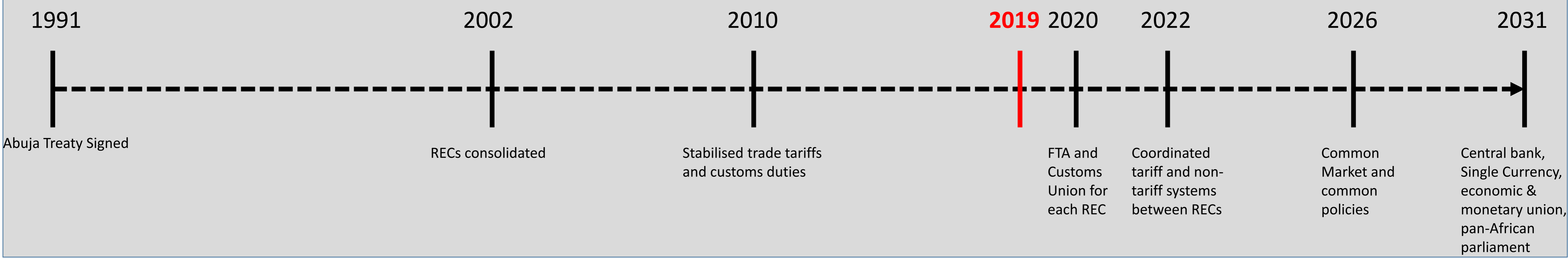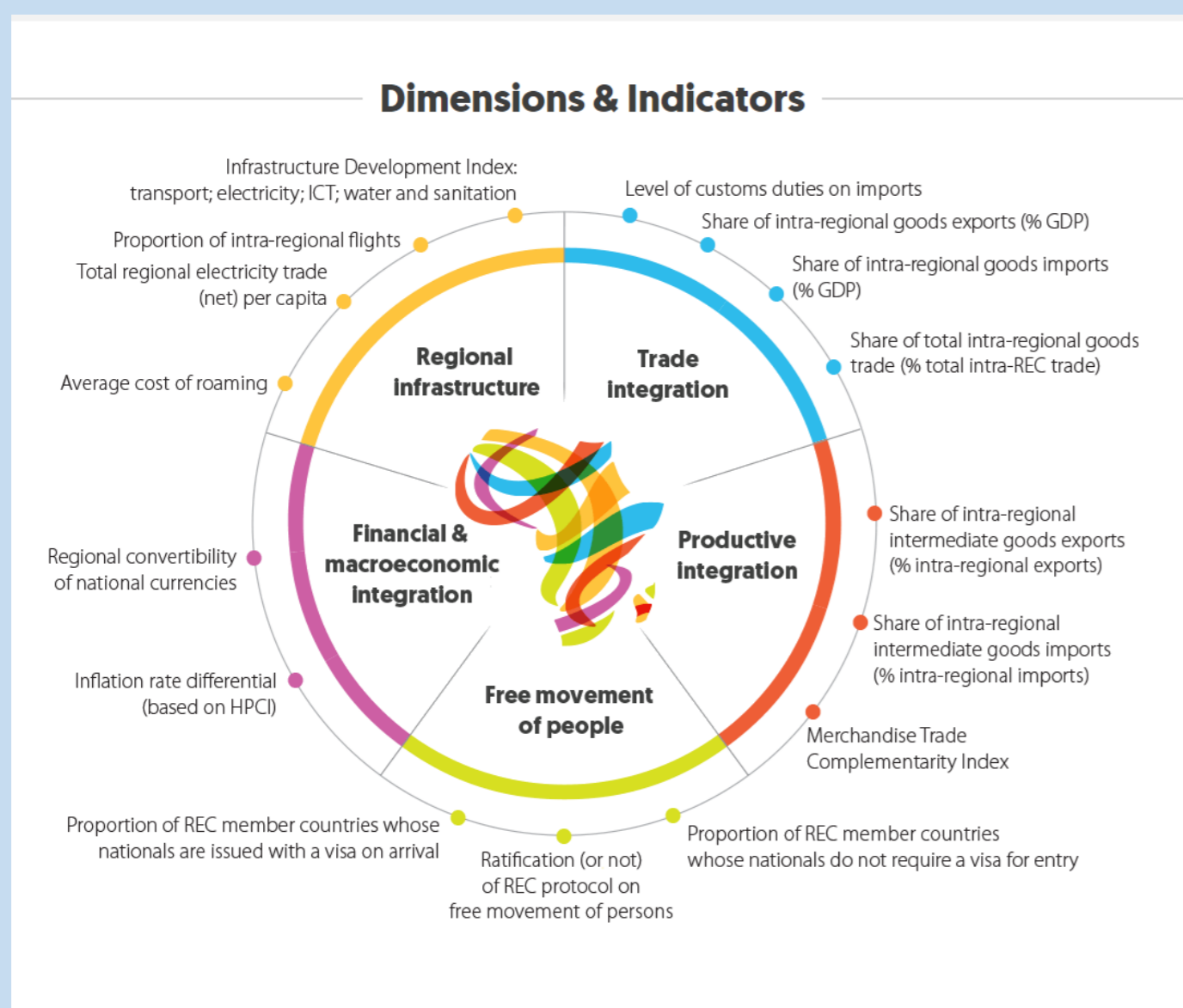
Timeline for Integration in Africa

1991	2002	2010	**2019**	2020	2022	2026	2031
Abuja Treaty Signed	RECs consolidated	Stabilised trade tariffs and customs duties		FTA and Customs Union for each REC	Coordinated tariff and non-tariff systems between RECs	Common Market and common policies	Central bank, Single Currency, economic & monetary union, pan-African parliament

1. The SADC is an REC with very different members

Figure 1: Population and GDP in the SADC

Figure 3: SADC Government Debt-GDP Ratio (%)

Figure 2: Political Freedom and Corruption Scores 2017-2018

SADC Development Indicators

2. How UNECA, AU, AfDB measure integration

Dimensions & Indicators

3. The resulting scores

Figure 9: SADC Average Efficiency Scores (2010-2013)

South Africa 0.961, Swaziland 0.957, Mauritius 0.949, Seychelles 0.947, Namibia 0.935, Madagascar 0.933, Botswana 0.844, Tanzania 0.777, Mozambique 0.765, DRC, Angola, Zambia, Zimbabwe, Malawi, Lesotho

4. Stochastic frontier
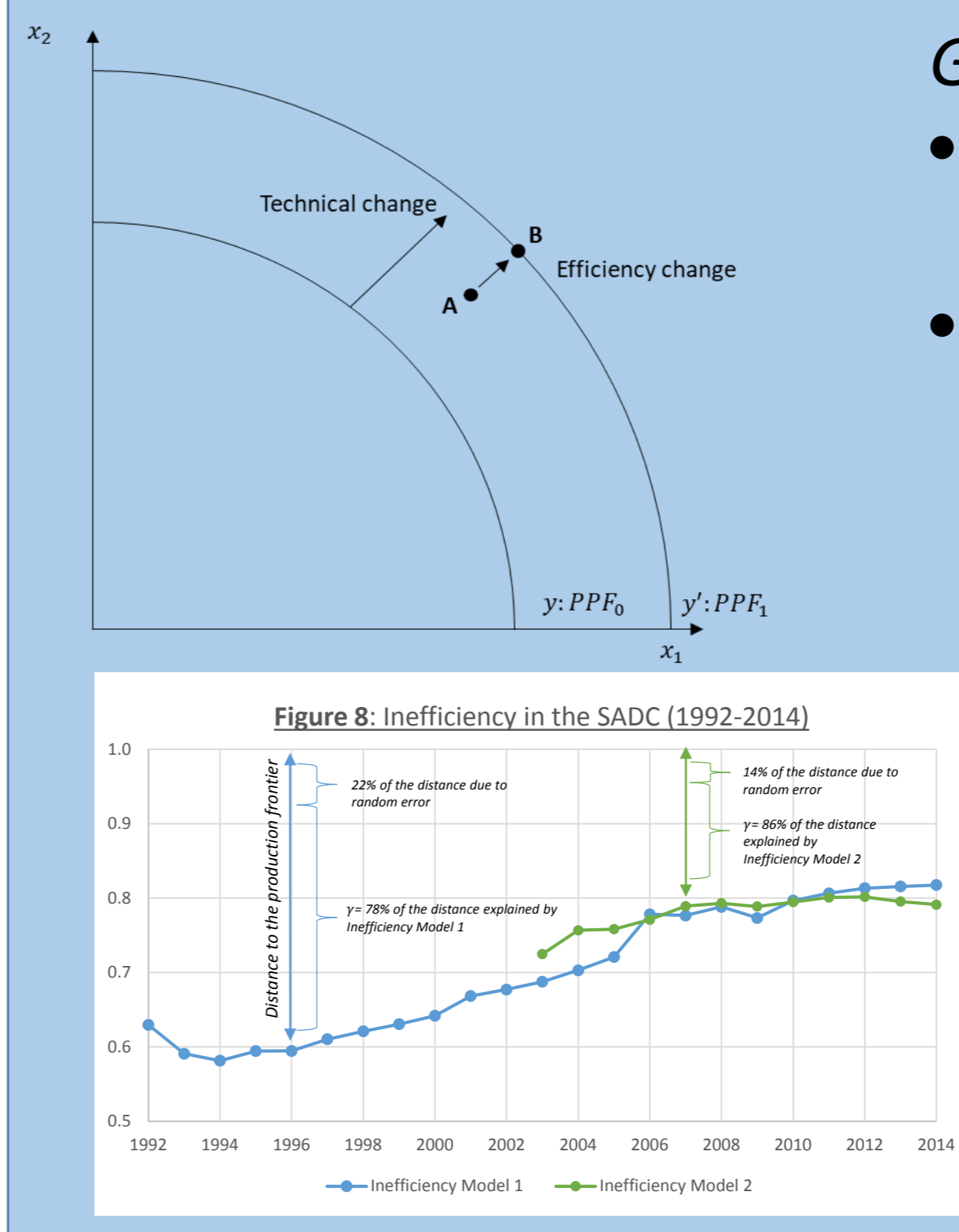
GDP can expand in two ways:
- *More efficient use of current resources*
- *Technological improvements to existing resources*

Figure 8: Inefficiency in the SADC (1992-2014)

The stochastic frontier model breaks down inefficiency into an error component and a range of explanatory variables; one of these variables is integration

5. Results and Insights

Table 5: Production and Inefficiency Models			
Production Function			
Variable	Estimate	Std. Error	t-ratio	p-value
Intercept	14.82752	0.97712	15.17	<0.001***
l_{it}	-1.63239	0.30167	-5.41	<0.001***
k_{it}	1.62048	0.18958	8.54	<0.001***
$0.5l_{it}^2$	0.03929	0.04036	0.97	0.330
$0.5k_{it}^2$	0.21703	0.01991	10.89	<0.001***
$l_{it}k_{it}$	0.00029	0.00064	0.46	<0.001***
t	-0.13058	0.03107	-4.20	0.092*
t^2	0.01347	0.00801	1.68	0.644
Inefficiency Model (1)	1992-2014			
Intercept	0.79008	0.29983	2.635	0.008***
FDI	-0.04591	0.01610	-2.851	0.004***
Elec.Access	-0.01258	0.00512	-2.456	0.014**
Agri.ValueAdded	0.00436	0.00158	2.750	0.006***
M2	-0.01605	0.00892	-1.7995	0.072*
ResourceRents	0.02064	0.01430	1.443	0.148
Trade Openness	0.00415	0.00541	0.766	0.443
Time	-0.01782	0.01303	-1.367	0.171
σ^2	0.18138	0.03379	5.367	<0.001***
γ	0.78272	0.01372	56.019	<0.001***
Log Likelihood Value:	117.94	Mean efficiency:	0.70356	
Inefficiency Model (2)	2003-2014			
Intercept	0.33431	0.13084	2.555	0.011**
FDI	-0.09981	0.03220	-3.099	0.002***
Elec.Access	-0.07405	0.01077	-6.871	<0.001***
Agri.ValueAdded	0.00831597	0.00370	2.241	0.024**
M2	-0.00956	0.00637	-1.500	0.134
Resolving Insolvency	0.04787	0.02515	1.903	0.057*
Government Debt	0.05312	0.01995	2.661	0.008***
Time	0.05312653	0.01995	2.661	0.053**
σ^2	0.08748290	0.02065	4.236	<0.001***
γ	0.86948032	0.01363	71.081	<0.001***
Log Likelihood Value:	95.92	Mean efficiency:	0.78038	

Different models were tested against each other using likelihood ratio tests

Table 6: Inefficiency with integration			
Inefficiency Model (3)	2010-2013			
Variable	Estimate	Std. Error	t-ratio	p-value
Intercept	0.85776	0.71528	1.1992	0.2304521
FDI	-0.01529	0.00429	-3.5592	<0.001***
Elec.Access	-0.02425	0.00417	-5.8168	<0.001***
Agri.ValueAdded	0.01868	0.00896	2.0841	0.037***
M2	-0.00869	0.00364	-2.3873	0.016973**
Resolving Insolvency	0.09489	0.08928	1.0629	0.2878469
Government Debt	0.01686	0.00729	2.3125	0.021**
ARII	-1.71156	0.95696	-1.7885	0.073*
Time	0.05103	0.11443	0.4459	0.656
σ^2	0.05143	0.00782	6.5763	<0.001***
γ (inefficiency explained by the model)	0.84750	0.46053	1.8402	0.06573*
Log Likelihood Value:	57.27672			
Mean efficiency:	0.80626			

The final model showed integration reduces inefficiency (p<0.1)