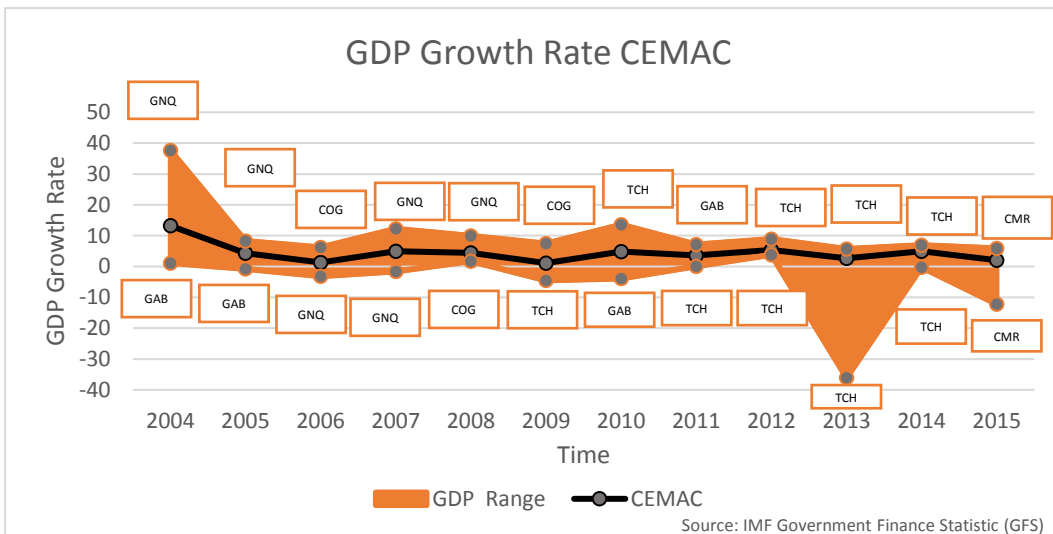
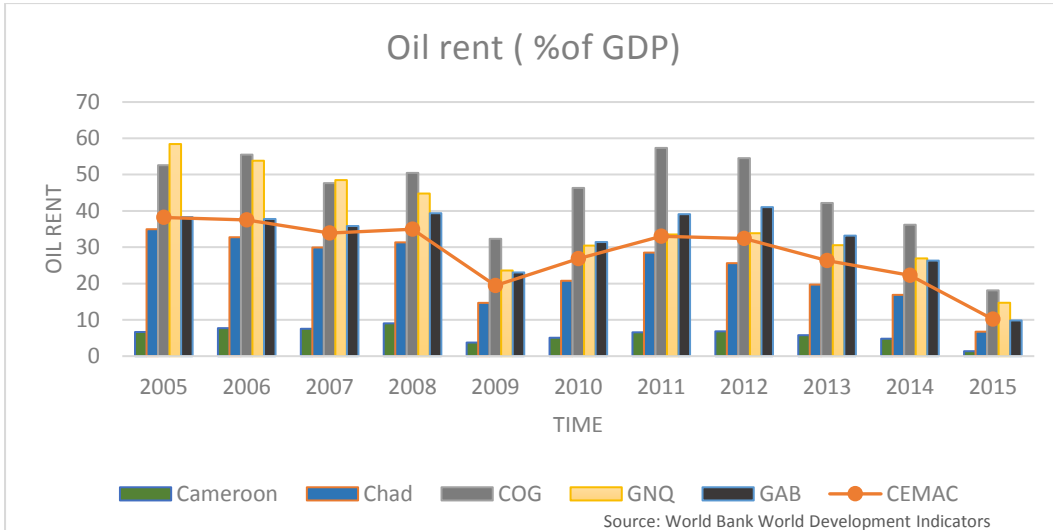
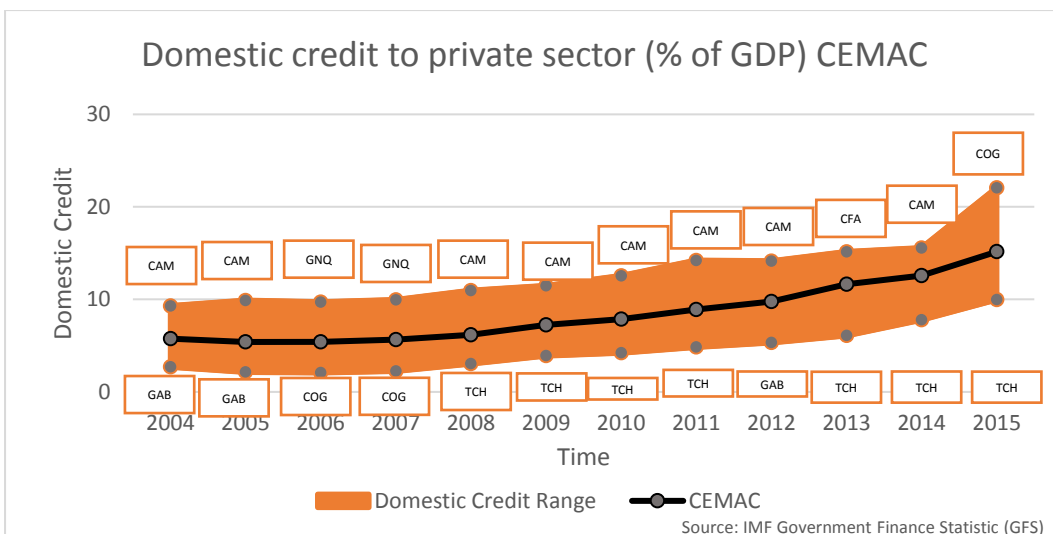
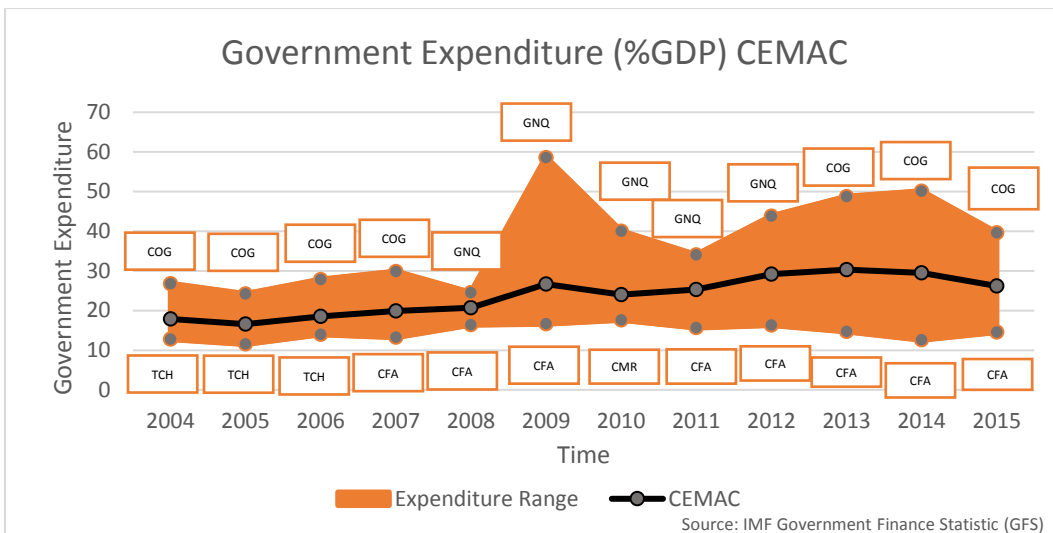
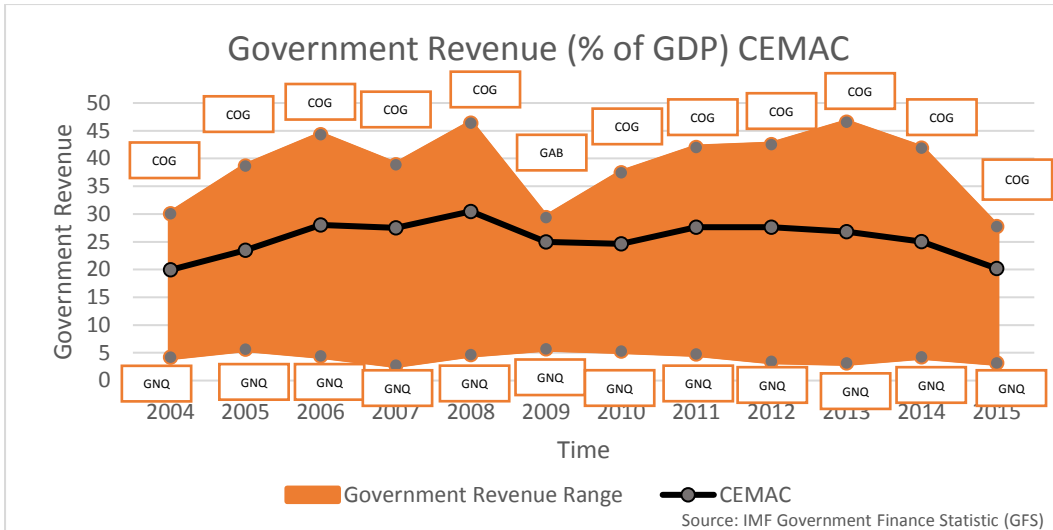


Annexes

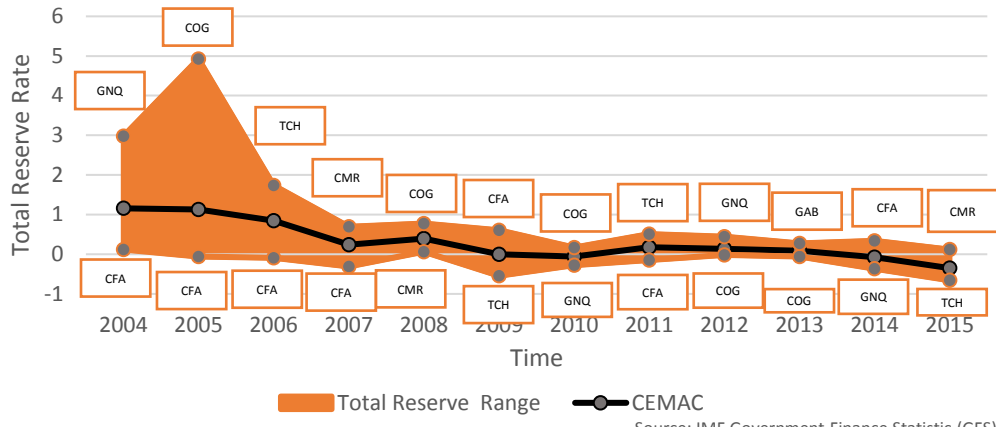
D) Regional Economic outlook

CEMAC Economic Outlook



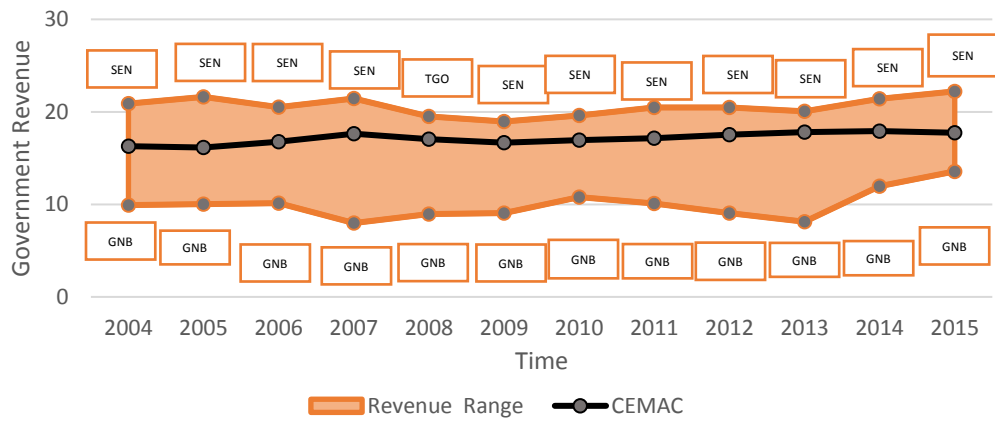


Total Reserve Growth Rate CEMAC



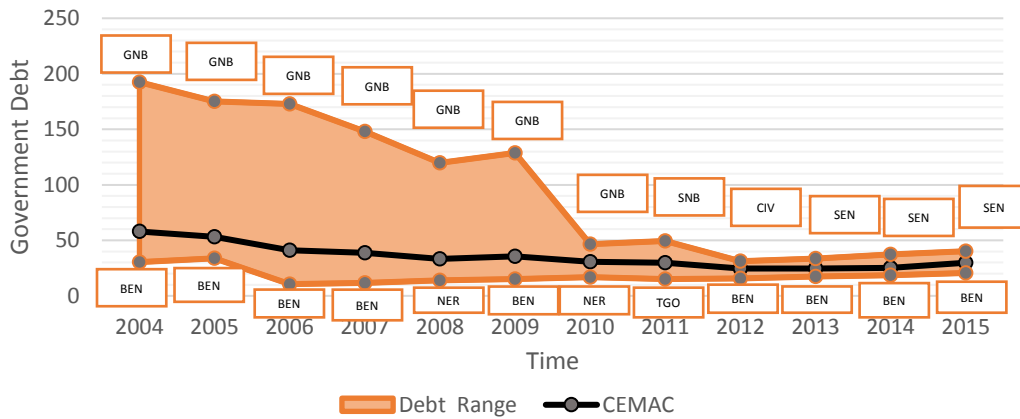
Source: IMF Government Finance Statistic (GFS)

Government Revenue (% of GDP) WAEMU



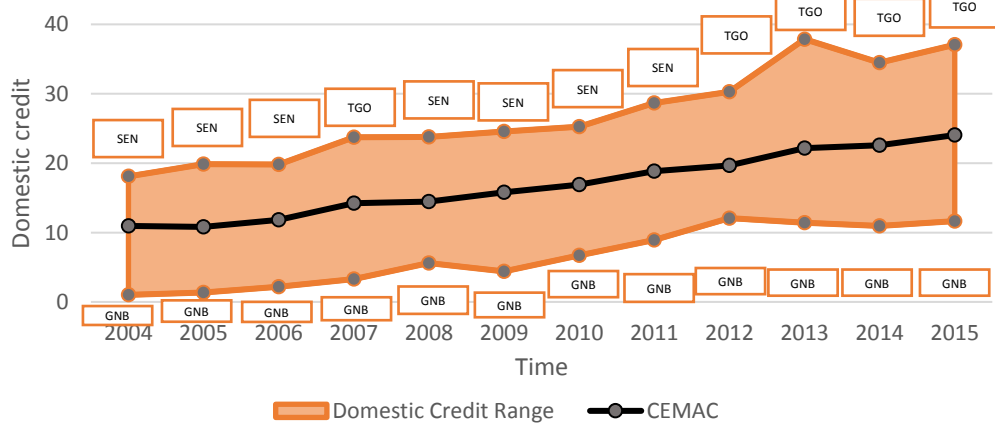
Source: IMF Government Finance Statistic (GFS)

Government Debt (% of GDP) WAEMU



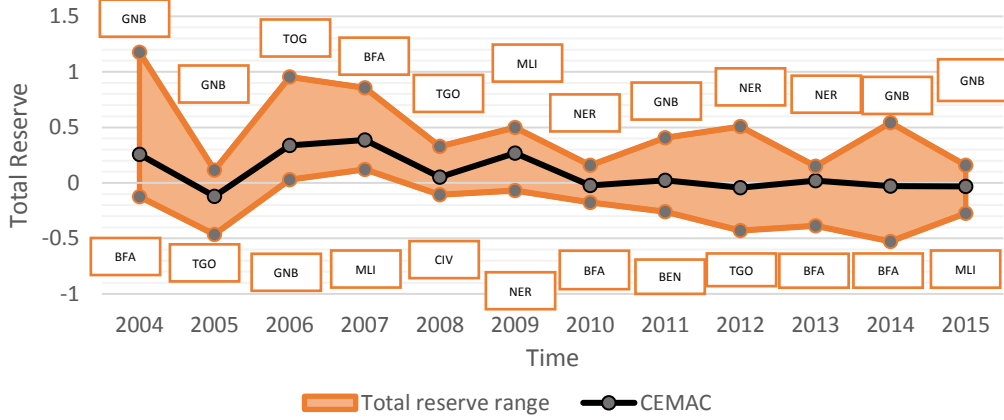
Source: IMF Government Finance Statistic (GFS)

Domestic credit to private sector (% of GDP) WAEMU



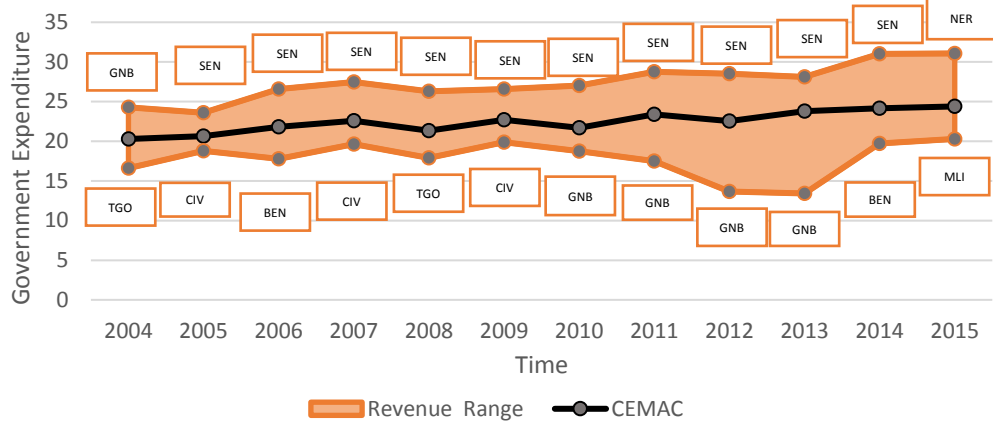
Source: IMF Government Finance Statistic (GFS)

Total Reserve Growth Rate WAEMU



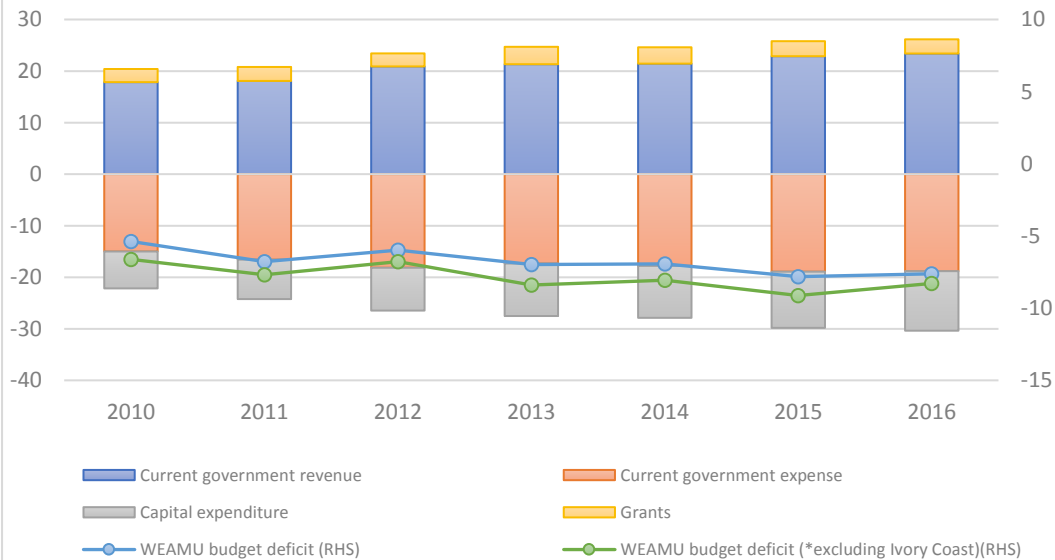
Source: IMF Government Finance Statistic (GFS)

Government Expenditure (% of GDP) WEAMU



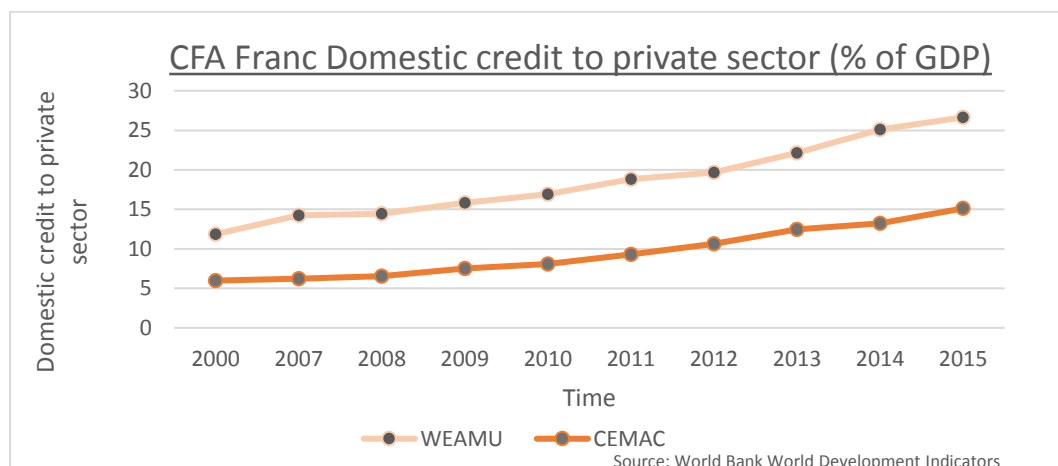
Source: IMF Government Finance Statistic (GFS)

Fiscal Balance (in percentage of GDP) WAEMU



Source: BCEAO

II) Domestic credit to private sector



III) WAEMU Convergence criteria

WAEMU Overall Balance (excluding grants)/GDP

	2010	2011	2012	2013	2014	2015
Côte D'Ivoire	-0.028	-0.047	-0.043	-0.042	-0.048	-0.054
Bénin	-0.030	-0.040	-0.026	-0.041	-0.033	-0.098
Burkina	-0.095	-0.083	-0.098	-0.107	-0.071	-0.067
Mali	-0.054	-0.082	-0.017	-0.068	-0.067	-0.061
Niger	-0.076	-0.074	-0.086	-0.128	-0.164	-0.180
Sénégal	-0.078	-0.093	-0.092	-0.084	-0.088	-0.079
Guinée Bissau	-0.110	-0.090	-0.085	-0.063	-0.138	-0.175
Togo	-0.035	-0.059	-0.087	-0.085	-0.058	-0.099

Source: BCEAO

WAEMU Overall Balance /GDP

	2010	2011	2012	2013	2014	2015
Côte D'Ivoire	-0.019	-0.044	-0.036	-0.026	-0.026	-0.035
Bénin	-0.015	-0.015	-0.005	-0.030	-0.022	-0.092
Burkina	-0.047	-0.027	-0.038	-0.042	-0.022	-0.025
Mali	-0.026	-0.043	-0.014	-0.031	-0.038	-0.025
Niger	-0.026	-0.032	-0.013	-0.031	-0.098	-0.113
Sénégal	-0.052	-0.070	-0.062	-0.057	-0.053	-0.049
Guinée Bissau	0.000	-0.006	-0.029	-0.020	-0.033	-0.095
Togo	0.003	-0.011	-0.061	-0.048	-0.036	-0.073

Source: BCEAO

WAEMU CPI Growth rate

Column1	2010	2011	2012	2013	2014	2015
Côte D'Ivoire	4.89	1.30	2.58	0.46	1.24	0.71
Bénin	2.81	6.74	1.10	-1.08	0.27	-0.84
Burkina	2.76	3.82	0.52	-0.24	0.94	-0.24
Mali	2.97	5.30	-0.58	0.89	1.44	-1.80
Niger	2.95	0.45	2.29	-0.92	1.01	0.16
Sénégal	3.41	1.42	0.71	-1.09	0.15	0.84
Guinée Bissau	5.06	2.13	1.21	-1.51	1.48	1.50
Togo	3.55	2.64	1.76	0.18	1.79	0.85

Source: BCEAO

WAEMU Government Debt (% of GDP)

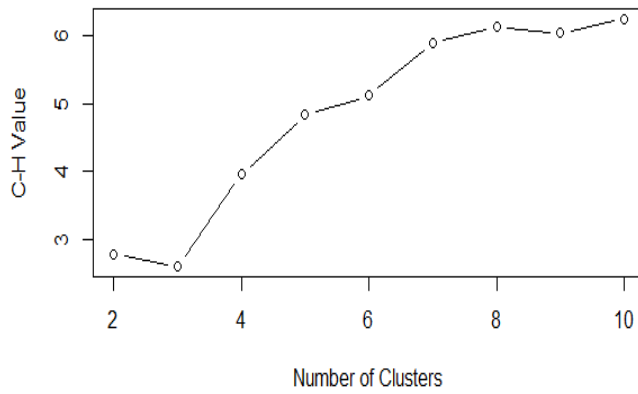
	2010	2011	2012	2013	2014	2015
Benin	17.00137	15.7636	15.73287	17.34114	18.63891	20.56569
Burkina Faso	26.23341	22.76477	23.09689	22.11222	20.19506	23.77438
Cote d'Ivoire	46.46526	49.53978	28.61691	27.11512	25.60185	30.66453
Guinea-Bissau	37.81607	24.36556	27.12085	26.17295	24.728	26.72748
Mali	21.44299	20.07631	21.75342	21.50172	22.74254	28.50746
Niger	16.87952	15.49914	17.06345	18.18151	20.50965	29.39808
Senegal	27.22263	27.8247	31.20549	33.62171	37.29797	40.17602
Togo	19.78629	15.22626	17.92912	20.78162	25.00593	29.50683

Source: BCEAO

IV) Hierarchical clustering

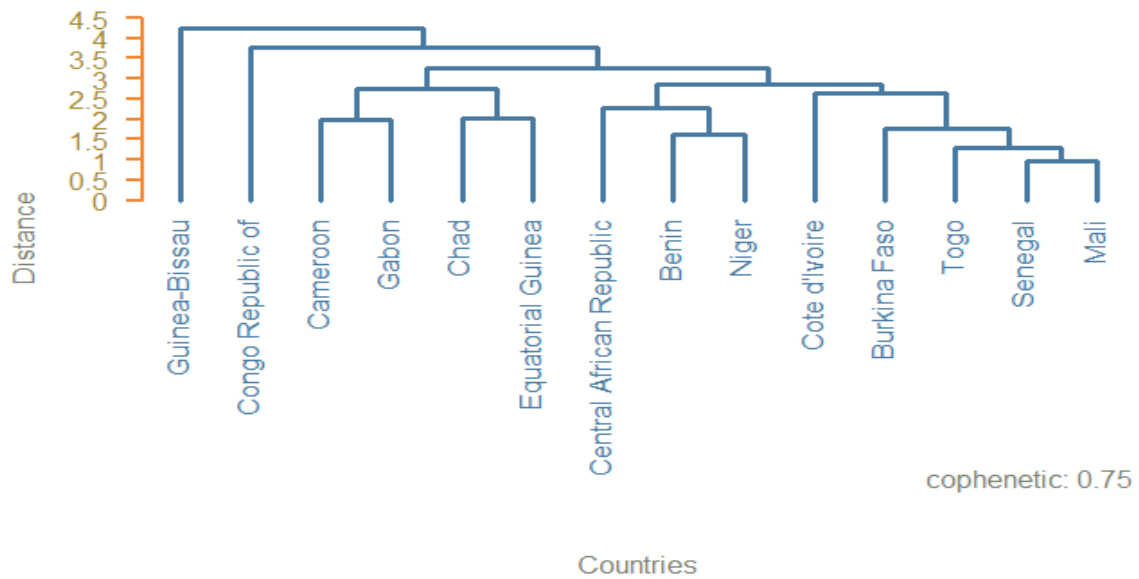
CFA 2004-2015

Calinsky and Harabasz's index value



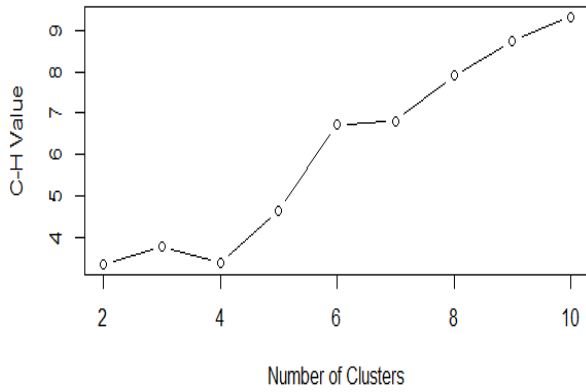
Linkage algorithm	
ward.D	0.55711
Single	0.678899
Centroid	0.746589
Complete	0.637549
MC.Quitty	0.594053
Median	0.620786
Average	0.725363

Dendrogram CFA-2004/2015



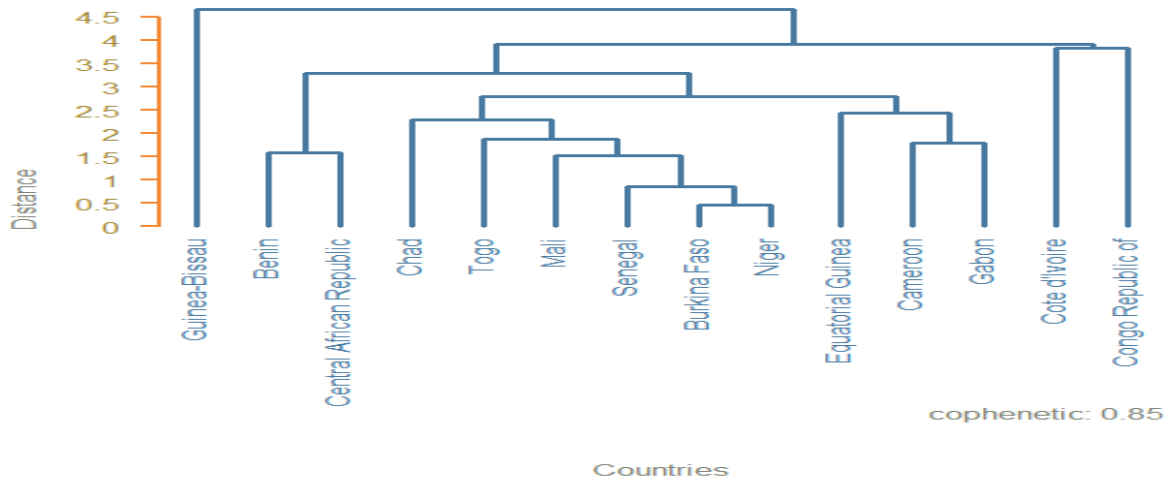
CFA 2004/2008

Calinsky and Harabasz's index value



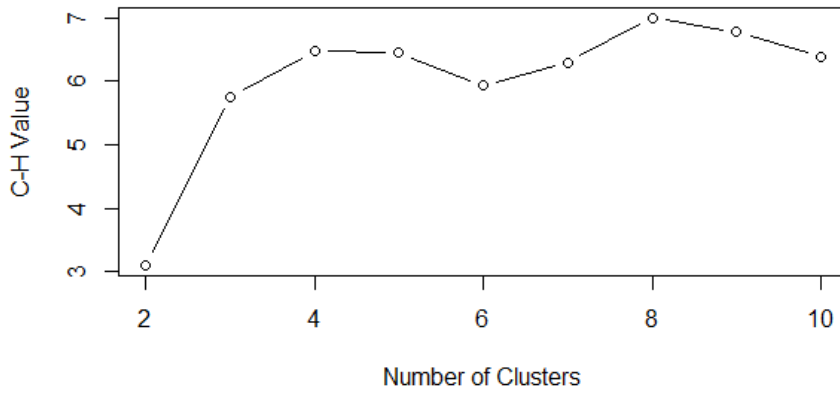
Linkage algorithm	
ward.D	0.684206
Single	0.837260
Centroid	0.842641
Complete	0.704674
MC.Quitty	0.822907
Median	0.831766
Average	0.849508

Dendrogram CFA-2004/2010



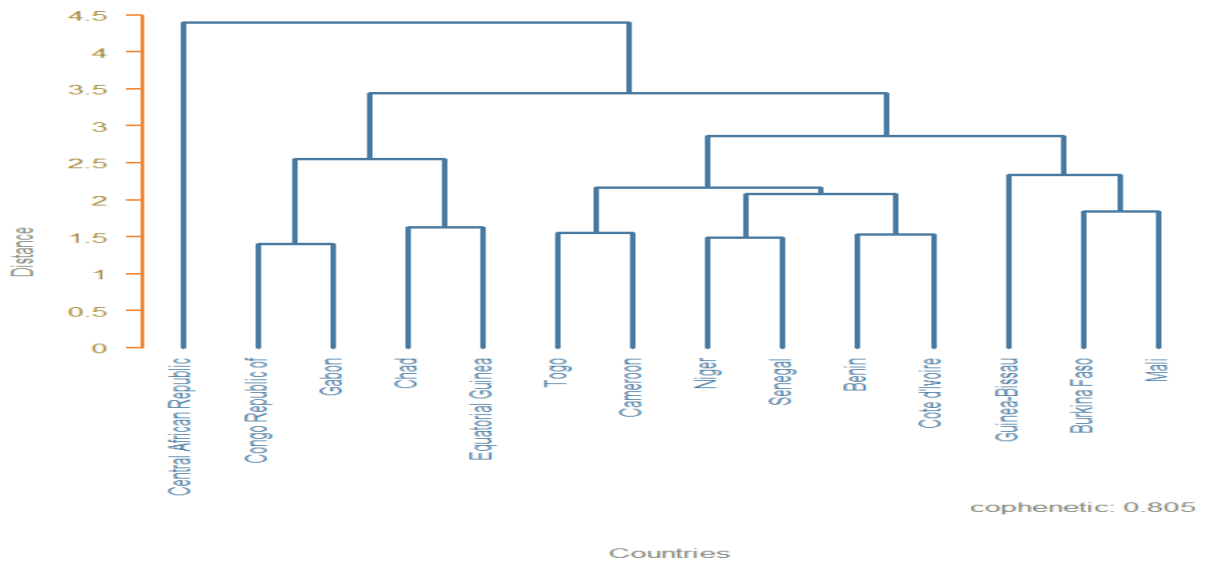
CFA 2010-2015

Calinsky and Harabasz's index value



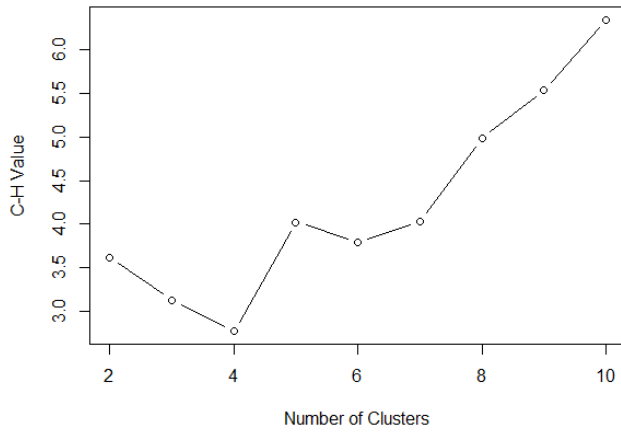
Linkage algorithm	
Ward.D	0.682519
Single	0.631993
Centroid	0.733867
Complete	0.659738
MC.Quitty	0.804195
Median	0.653117
Average	0.804532

Dendrogram CFA-2010/2015



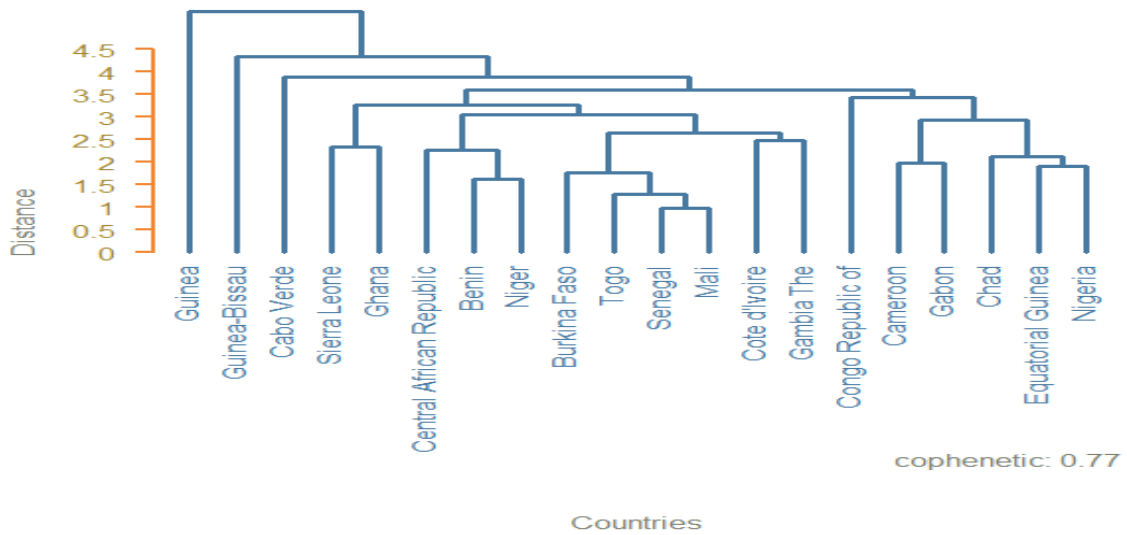
CFA & WAMZ 2004-2015

Calinsky and Harabasz's index value



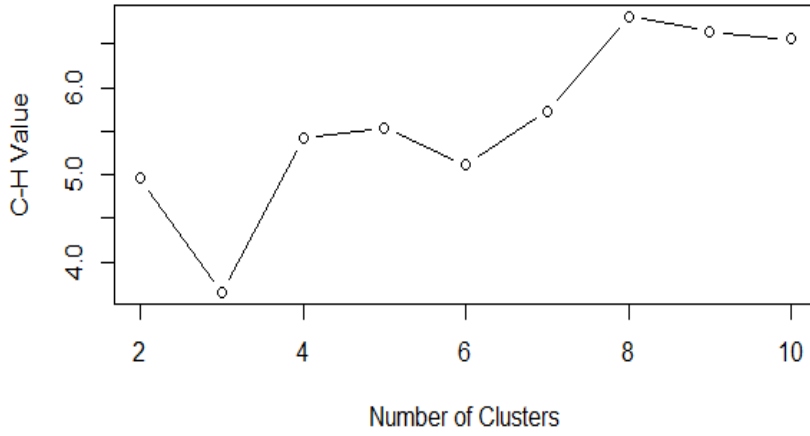
Linkage algorithm	
Ward.D	0.495854
Single	0.689572
Centroid	0.741724
Complete	0.594371
MC.Quitty	0.74717
Median	0.697737
Average	0.768014

Dendrogram CFA & WAMZ-2004/2015



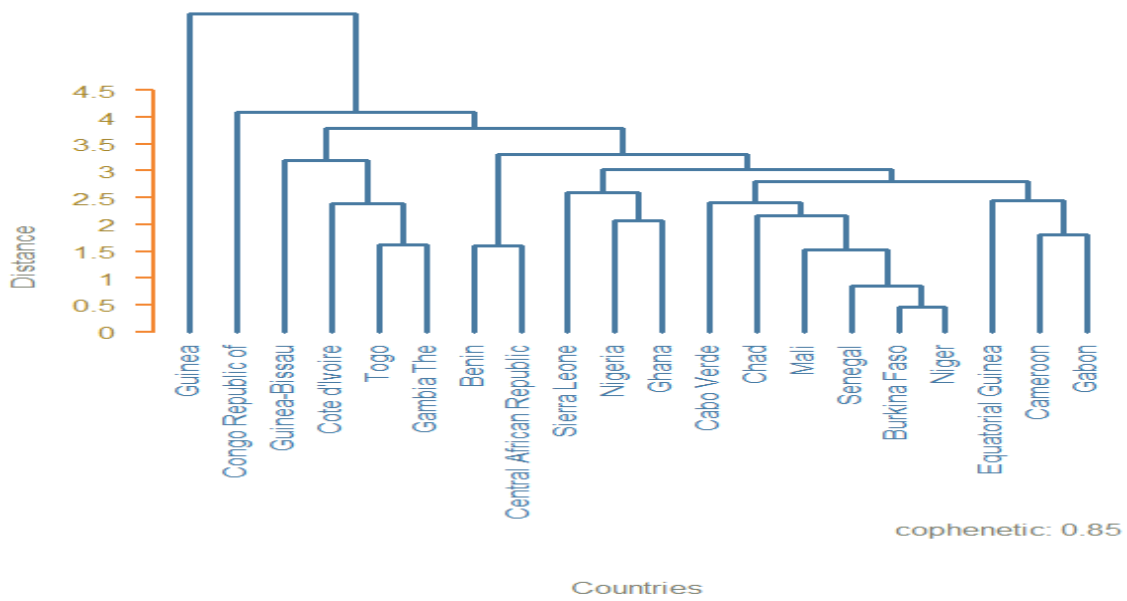
ECOWAZ 2004-2008

Calinsky and Harabasz's index value



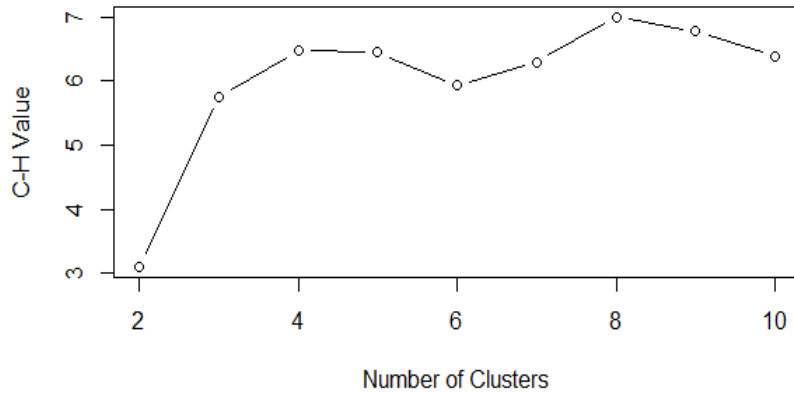
Linkage algorithm	
ward.D	0.604532
Single	0.829438
Centroid	0.695805
Complete	0.695805
MC.Quitty	0.794503
Median	0.803111
Average	0.819923

Dendrogram CFA-WAMZ 2004/2010



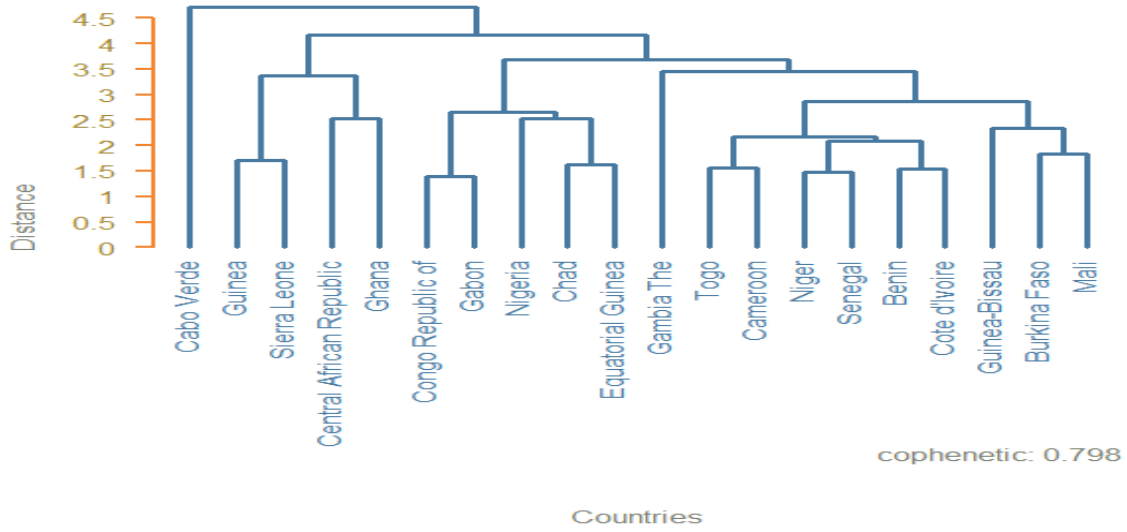
ECOWAZ 2010/2015

Calinsky and Harabasz's index value



Linkage algorithm	
Ward.D	0.656861
Single	0.681588
Centroid	0.755436
Complete	0.767081
MC.Quitty	0.6184
Median	0.735464
Average	0.798208

Dendrogram CFA-WAMZ 2010/2015



V) Fuzzy clustering

CFA countries and their highest membership cluster

Countries	Clusters	Membership
Senegal	1	0.8161704
Togo	1	0.8157984
Mali	1	0.7272501
Burkina Faso	1	0.595723
Cote d'Ivoire	1	0.4512206
Guinea-Bissau	1	0.4311911
Cameroon	1	0.4057491
Niger	2	0.795634
Benin	2	0.6828481
Central African Republic	2	0.6144678
Equatorial Guinea	3	0.8241971
Gabon	3	0.6606644
Congo Republic of	3	0.5256702
Chad	3	0.519928

Fuzzy clustering CFA 2004/2015

Fussy clustering index

Number of clusters	PC	PE	MPC	SIL	SIL.F	XB
2	0.6008268	0.5847654	0.2016536	0.3319734	0.4136934	0.7014565
3	0.5057976	0.8499049	0.2586964	0.3468356	0.4217345	0.6573829
4	0.452315	1.0359191	0.2697534	0.3282273	0.3521316	0.4369039
5	0.478572	1.0682186	0.348215	0.319781	0.3117529	0.2563119
6	0.4701442	1.1379208	0.3641731	0.055674	-0.0492163	0.7118882

CFA Countries Clustering

Countries	Clus 1	Clus 2	Clus 3
Benin	0.19	0.68	0.12
Burkina Faso	0.6	0.21	0.2
Cote d'Ivoire	0.45	0.37	0.17
Guinea-Bissau	0.43	0.4	0.17
Niger	0.15	0.8	0.05
Togo	0.82	0.12	0.06
Senegal	0.82	0.15	0.04
Mali	0.73	0.13	0.14
Cameroon	0.41	0.22	0.38
Central African Republic	0.23	0.61	0.15
Chad	0.28	0.2	0.52
Congo Republic of	0.25	0.22	0.53
Equatorial Guinea	0.1	0.08	0.82
Gabon	0.19	0.15	0.66

CFA countries and their highest membership cluster

Countries	Clusters	Membership coefficient
Senegal	1	0.9395275
Niger	1	0.9173924
Burkina Faso	1	0.8605958
Mali	1	0.5827769
Cameroon	1	0.4635876
Togo	1	0.3870054
Chad	1	0.3630964
Guinea-Bissau	2	0.9953145
Equatorial Guinea	3	0.8486772
Gabon	3	0.633143
Congo Republic of	3	0.3435259
Benin	4	0.8592533
Central African Republic	4	0.7951179
Cote d'Ivoire	5	0.9690475

Fuzzy clustering CFA 2010/2014

Fussy clustering index

Number of clusters	PC	PE	MPC	SIL	SIL.F	XB
2	0.633863	0.5471703	0.267726	0.3334551	0.4554257	0.4935479
3	0.5082287	0.8464409	0.262343	0.3378255	0.4373194	0.5028834
4	0.5267087	0.8981333	0.3689449	0.4095316	0.4366408	0.2789024
5	0.5148868	0.9849298	0.3936085	0.3641389	0.4578152	0.1473556
6	0.5125894	1.0598338	0.4151073	0.314688	0.3305301	0.2432129

CFA Countries Clustering

Countries	Clus 1	Clus 2	Clus 3	Clus 4	Clus 5
Benin	0.64	0.1	0.15	0.06	0.06
Burkina Faso	0.21	0.31	0.27	0.07	0.14
Cote d'Ivoire	0.65	0.14	0.1	0.05	0.06
Guinea-Bissau	0.09	0.78	0.05	0.04	0.04
Niger	0.58	0.17	0.15	0.05	0.05
Togo	0.68	0.11	0.13	0.04	0.04
Senegal	0.31	0.49	0.09	0.06	0.05
Mali	0.12	0.58	0.12	0.05	0.13
Cameroon	0.33	0.11	0.41	0.04	0.11
Central African Republic	0	0	0	1	0
Chad	0.09	0.07	0.59	0.05	0.21
Congo Republic of	0.03	0.04	0.07	0.02	0.84
Equatorial Guinea	0.07	0.04	0.79	0.03	0.07
Gabon	0.03	0.03	0.07	0.02	0.86

CFA countries and their highest membership cluster

Countries	Clusters	Membership coefficient
Senegal	1	0.9395275
Niger	1	0.9173924
Burkina Faso	1	0.8605958
Mali	1	0.5827769
Cameroon	1	0.4635876
Togo	1	0.3870054
Chad	1	0.3630964
Guinea-Bissau	2	0.9953145
Equatorial Guinea	3	0.8486772
Gabon	3	0.633143
Congo Republic of	3	0.3435259
Benin	4	0.8592533
Central African Republic	4	0.7951179
Cote d'Ivoire	5	0.9690475

Fuzzy clustering CFA 2004/2010

Fussy clustering index

Number of clusters	PC	PE	MPC	SIL	SIL.F	XB
2	0.57834	0.60783	0.15668	0.27870	0.51017	1.37220
3	0.52033	0.82709	0.28050	0.30482	0.41288	0.41111
4	0.55257	0.86972	0.40342	0.44563	0.51488	0.17538
5	0.60065	0.83258	0.50082	0.42083	0.45199	0.11331
6	0.58850	0.90818	0.50620	0.29188	0.28983	0.19770

CFA Countries Clustering

Countries	Clus 1	Clus 2	Clus 3	Clus 4	Clus 5
Benin	0.06	0.02	0.04	0.86	0.03
Burkina Faso	0.86	0.02	0.04	0.05	0.03
Cote d'Ivoire	0.01	0.01	0.01	0.01	0.97
Guinea-Bissau	0.00	1.00	0.00	0.00	0.00
Niger	0.92	0.01	0.03	0.03	0.02
Togo	0.39	0.14	0.11	0.15	0.21
Senegal	0.94	0.01	0.02	0.02	0.02
Mali	0.58	0.05	0.13	0.09	0.15
Cameroon	0.46	0.05	0.24	0.18	0.07
Central African Republic	0.07	0.05	0.05	0.80	0.04
Chad	0.36	0.06	0.29	0.16	0.13
Congo Republic of	0.14	0.10	0.34	0.21	0.21
Equatorial Guinea	0.06	0.02	0.85	0.04	0.04
Gabon	0.17	0.04	0.63	0.10	0.05

Fuzzy clustering CFA & WAMZ 2004/2015

CFA & WAMZ countries and their highest membership cluster

Countries	Clusters	Membership coefficient
Equatorial Guinea	1	0.702558
Chad	1	0.599668
Gabon	1	0.584541
Nigeria	1	0.542712
Congo Republic of	1	0.476160
Cameroon	1	0.466748
Ghana	2	0.667960
Central African Republic	2	0.633958
Sierra Leone	2	0.556700
Guinea	2	0.526126
Senegal	3	0.868102
Togo	3	0.796680
Mali	3	0.597392
Cote d'Ivoire	3	0.528675
Burkina Faso	3	0.498232
Niger	3	0.497508
Guinea-Bissau	3	0.474721
Gambia The	3	0.465073
Benin	3	0.392987
Cabo Verde	3	0.353163

Fussy clustering index

Number of clusters	PC	PE	MPC	SIL	SIL.F	XB
2	0.522053	0.670500	0.044106	0.254418	0.351950	5.699998
3	0.437357	0.949941	0.156035	0.337624	0.396323	0.658780
4	0.378447	1.158142	0.171262	0.334186	0.350064	1.293989
5	0.372887	1.265970	0.216108	0.317673	0.349264	0.546138
6	0.347046	1.398436	0.216455	0.227684	0.250015	0.610042

CFA & WAMZ Countries Clustering

Countries	Clus 1	Clus 2	Clus 3
Benin	0.27	0.34	0.39
Burkina Faso	0.29	0.21	0.5
Cote d'Ivoire	0.23	0.24	0.53
Guinea-Bissau	0.21	0.32	0.47
Niger	0.19	0.31	0.50
Togo	0.11	0.10	0.80
Senegal	0.07	0.06	0.87
Mali	0.29	0.11	0.60
Cameroon	0.47	0.17	0.36
Central African Republic	0.16	0.63	0.21
Chad	0.6	0.19	0.21
Congo Republic of	0.48	0.24	0.28
Equatorial Guinea	0.7	0.13	0.16
Gabon	0.58	0.18	0.23
Nigeria	0.54	0.26	0.20
Gambia The	0.23	0.3	0.47
Guinea	0.24	0.53	0.24
Sierra Leone	0.21	0.56	0.23
Ghana	0.15	0.67	0.18
Cabo Verde	0.34	0.31	0.35

Fuzzy clustering CFA & WAMZ 2004/2010

CFA & WAMZ countries and their highest membership cluster

Countries	Clusters	Membership coefficient
Equatorial Guinea	1	0.772886
Gabon	1	0.529161
Congo Republic of	1	0.336951
Central African Republic	2	0.728751
Benin	2	0.698271
Niger	3	0.900173
Senegal	3	0.852020
Burkina Faso	3	0.809102
Mali	3	0.489293
Cameroon	3	0.393249
Cabo Verde	3	0.336243
Chad	3	0.271660
Ghana	4	0.768823
Sierra Leone	4	0.393469
Nigeria	4	0.362644
Guinea	4	0.302268
Gambia The	5	0.877559
Togo	5	0.468016
Cote d'Ivoire	5	0.465267
Guinea-Bissau	5	0.424908

Fussy clustering index

Number of clusters	PC	PE	MPC	SIL	SIL.F	XB
2	0.523907	0.668831	0.047813	0.279966	0.404343	4.239543
3	0.419184	0.975248	0.128776	0.147224	0.443303	1.583820
4	0.411590	1.108630	0.215453	0.247810	0.410013	0.426059
5	0.421723	1.183341	0.277153	0.322443	0.443996	0.321845
6	0.425444	1.247643	0.310533	0.290830	0.358330	0.361096

CFA & WAMZ Countries Clustering

Countries	Clus 1	Clus 2	Clus 3	Clus 4	Clus 5
Benin	0.07	0.70	0.09	0.08	0.07
Burkina Faso	0.03	0.04	0.81	0.07	0.05
Cabo Verde	0.16	0.20	0.34	0.21	0.10
Cameroon	0.22	0.16	0.39	0.14	0.09
Central African Republic	0.05	0.73	0.07	0.08	0.07
Chad	0.26	0.13	0.27	0.21	0.12
Congo Republic of	0.34	0.20	0.13	0.15	0.18
Cote d'Ivoire	0.13	0.12	0.16	0.12	0.47
Equatorial Guinea	0.77	0.05	0.07	0.06	0.04
Gabon	0.53	0.11	0.18	0.11	0.07
Gambia The	0.02	0.03	0.03	0.04	0.88
Ghana	0.04	0.05	0.09	0.77	0.05
Guinea	0.15	0.20	0.16	0.30	0.19
Guinea-Bissau	0.09	0.17	0.17	0.14	0.42
Mali	0.14	0.09	0.49	0.14	0.14
Niger	0.02	0.02	0.90	0.04	0.02
Nigeria	0.28	0.10	0.16	0.36	0.09
Senegal	0.04	0.03	0.85	0.04	0.04
Sierra Leone	0.10	0.25	0.14	0.39	0.11
Togo	0.08	0.11	0.24	0.10	0.47

Fuzzy clustering CFA & WAMZ 2010/2015

CFA & WAMZ countries and their highest membership cluster

Countries	Clusters	Membership coefficient
Chad	1	0.8139837
Gabon	1	0.7253317
Congo Republic of	1	0.6702558
Nigeria	1	0.5422868
Equatorial Guinea	1	0.5360719
Mali	1	0.4326962
Burkina Faso	1	0.4180755
Niger	2	0.7778773
Senegal	2	0.7574215
Togo	2	0.7425177
Cote d'Ivoire	2	0.6726481
Benin	2	0.5891205
Guinea-Bissau	2	0.5453944
Cameroon	2	0.4590522
Gambia The	2	0.402451
Guinea	3	0.7362576
Sierra Leone	3	0.6854263
Ghana	3	0.6771219
Central African Republic	3	0.4517286
Cabo Verde	3	0.3565857

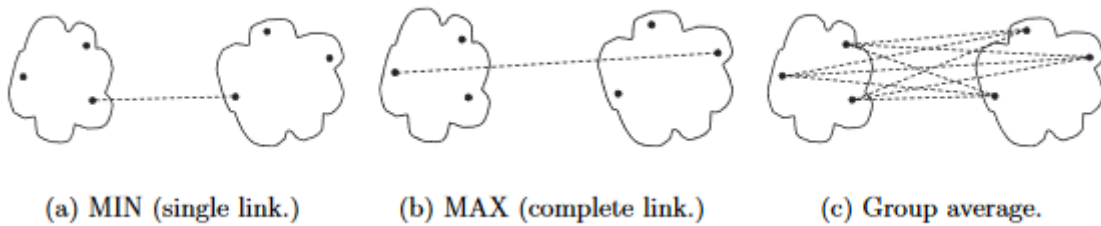
Fussy clustering index

Number of clusters	PC	PE	MPC	SIL	SIL.F	XB
2	0.5473944	0.6439812	0.0947889	0.2925282	0.3588336	1.8168827
3	0.4743188	0.899337	0.2114782	0.3424641	0.4630577	0.4380971
4	0.3979748	1.1268973	0.1972998	0.3418057	0.4215568	0.8931699
5	0.381974	1.2464714	0.2274675	0.2570116	0.4049461	0.5792043
6	0.3860624	1.3177958	0.2632749	0.284351	0.3634714	0.4265364

CFA & WAMZ Countries Clustering

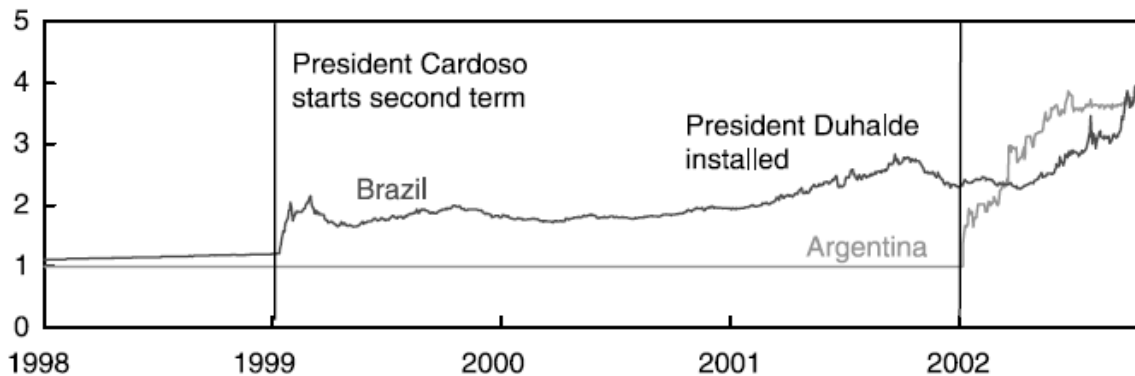
Countries	Clus 1	Clus 2	Clus 3
Benin	0.22	0.59	0.19
Burkina Faso	0.42	0.42	0.17
Cabo Verde	0.32	0.32	0.36
Cameroon	0.38	0.46	0.16
Central African Republic	0.27	0.28	0.45
Chad	0.81	0.1	0.09
Congo Republic of	0.67	0.18	0.15
Cote d'Ivoire	0.16	0.67	0.17
Equatorial Guinea	0.54	0.23	0.23
Gabon	0.73	0.15	0.12
Gambia The	0.24	0.4	0.35
Ghana	0.16	0.16	0.68
Guinea	0.12	0.14	0.74
Guinea-Bissau	0.25	0.55	0.21
Mali	0.43	0.42	0.15
Niger	0.11	0.78	0.11
Nigeria	0.54	0.19	0.27
Senegal	0.12	0.76	0.12
Sierra Leone	0.16	0.15	0.69
Togo	0.13	0.74	0.12

VI) Linkage algorithm



Source: Tan, P.-N., Steinbach, M., & Kumar, V. (2014). Introduction to data

VII) Exchange rate manipulation

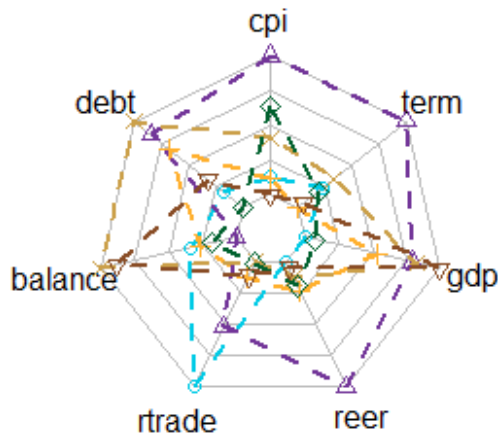


Source: Frieden, J. (2007). Globalization and exchange rate policy

VIII) Radar plots

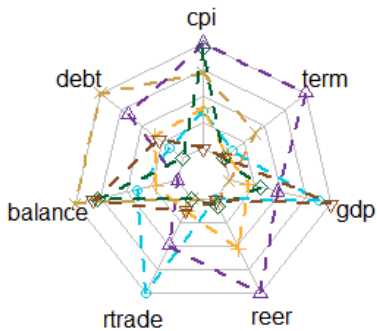
debt	Total debt
balance	Government balance
rtrade	Regional trade intensity
reer	Real exchange rate variability
gdp	Business cycles correlation
term	Term of trade synchronisation
cpi	Inflation

CEMAC 2010/2015



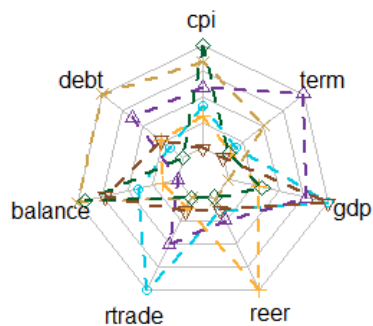
○ Cameroon	× Congo Republic of
△ Central African Republic	◇ Equatorial Guinea
+ Chad	▽ Gabon

CEMAC 2004/2015



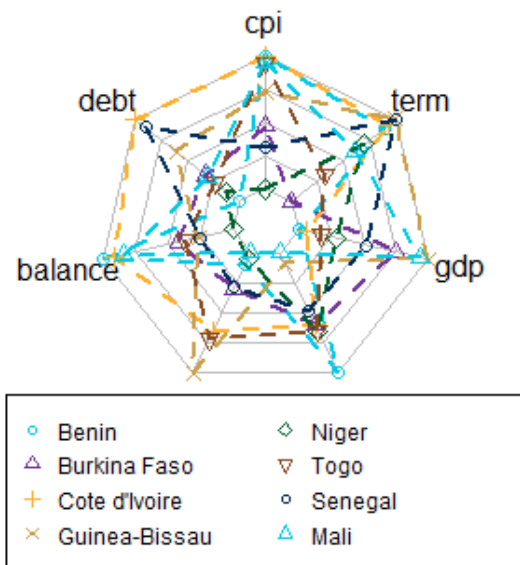
○ Cameroon	× Congo Republic of
△ Central African Republic	◇ Equatorial Guinea
+ Chad	▽ Gabon

CEMAC 2004/2010

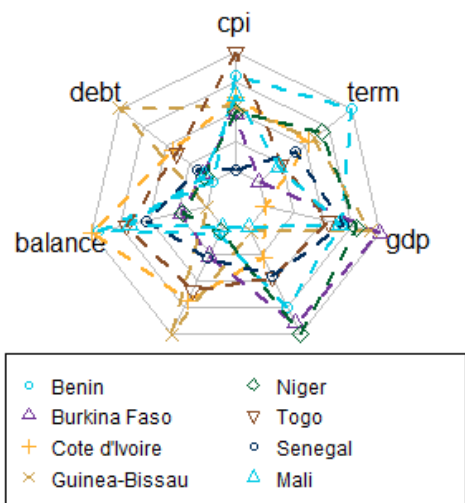


○ Cameroon	× Congo Republic of
△ Central African Republic	◇ Equatorial Guinea
+ Chad	▽ Gabon

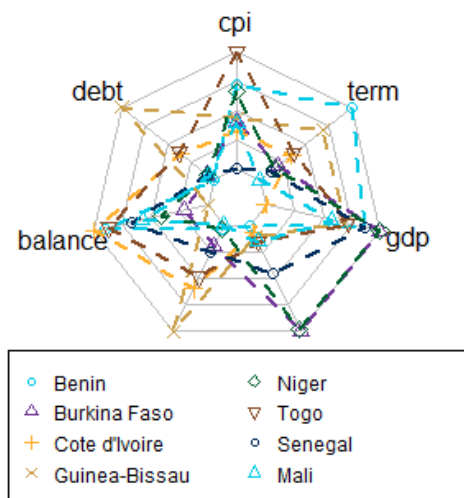
WAEMU 2010/2015



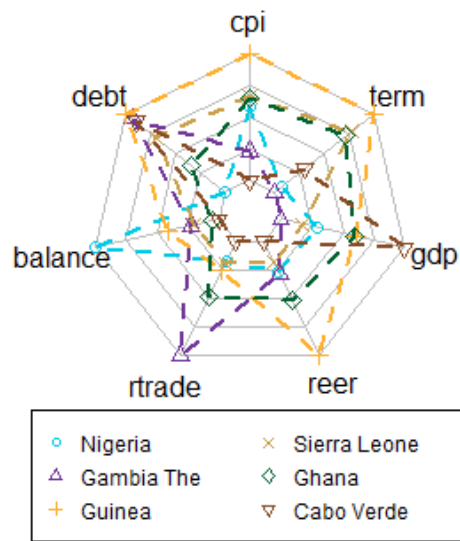
WAEMU 2004/2015



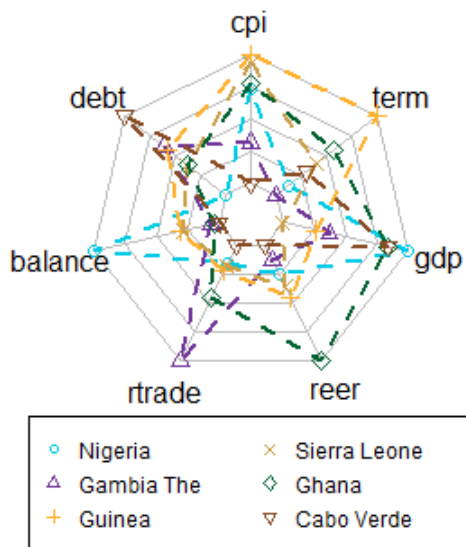
WAEMU 2004/2010



WAMZ 2004/2015



WAMZ 2010/2015



WAMZ 2004/2010

