Group Formation and Growth Enhancing Variables: Evidence from Selected WAMZ Countries.

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OUTLINE

- Introduction
- Sub-Regional Characteristics and Some Stylized Facts
- Tests of Cross-section Dependence
- Data and Empirical Results of Growth Enhancing Variables
- Conclusion

1. Introduction

Objectives:

Whether countries which belong to the same geographical area are apparently homogeneous and be pooled together in studying their growth drivers.

If homogeneity does not hold, what other growth enhancing variables drive the growth process for the group of selected WAMZ countries?.

In the literature on accelerating economic growth and group formation, some argue that heterogeneity be considered when determining whether countries which belong to the same region would suggest the same growth process, Cooray, et al. (2013); different political, legal, economic, national policies and interactive forces that drive growth

Luintel, Khan, Arestis and Theodoridis (2008) maintained that panel regression undermines the importance of cross country differences; a constraint often associated with data pooling in the absence of balanced growth.

TABLE 1: ECONOMIC AND SOCIO-POLITICAL CHARACTERISTICS OF THE WEST AFRICAN MONETARY ZONE

	Economic Performance			GDP per capita (constant 2005 US$)			GDP growth	Capital Accumulation	Structure of GDP (in 2011)			2013
PANEL A	GDP growth*	Inflation*	Inflation**	1980-1989	1990-2009	2010-2012	2012	Gross capital formation (% of GDP)#	Agriculture Sector	Industry Sector	Services Sector	Corruption Score (Rank)
Gambia The	3.87	11.43	4.02	439.11	416.79	476.66	6.01	16.49	18.89	13.46	67.65	28 (127)
Ghana	3.77	31.59	15.90	359.35	406.06	542.28	7.91	24.15	25.34	25.56	49.10	46 (63)
Guinea	3.51^	NA	14.75	NA	274.55	303.05	3.94	16.83	22.06	44.84	33.10	24 (150)
Liberia	2.97	93.52	11.25	512.30	102.39	206.49	10.24	16.73	44.52	8.34	47.14	38 (83)
Nigeria	4.48	20.29	7.63	623.30	554.11	814.55	6.53	8.69	30.99	44.29	24.72	25 (144)
Sierra Leone	2.49	29.41	12.88	404.28	305.63	333.77	15.22	13.36	56.69	8.29	35.02	30 (119)

	Trade Openness *	Population Growth Rate (%)				Life expectancy at birth, total (years)		Literacy rate, adult female (% of females ages 15 and above)		Foreign direct investment, net inflows (BoP, current US$)	
PANEL B	Trade (% of GDP)	1980-1989	1990-1999	2000-2012	2012	1980	2011	Gender Gap		2003	2012
Gambia The	80.63	4.09	3.03	3.13	3.19	46	58	25 (2000)	42 (2011)	18,272,720	33,524,674
Ghana	54.00	2.99	2.56	2.48	2.17	52	61	50 (2000)	65 (2010)	136,751,000	3,294,520,000
Guinea	59.34^	2.58	4.03	2.20	2.56	41	56	18 (2003)	12 (2010)	78,966,000	605,400,000
Liberia	101.84	1.55	2.49	3.26	2.79	46	60	32 (1994)	27 (2007)	372,220,000	1,354,100,000
Nigeria	50.64	2.63	2.52	2.64	2.68	46	52	44 (1991)	41 (2008)	2,005,390,033	7,101,031,884
Sierra Leone	47.52	2.52	0.09	3.03	1.91	41	45	37 (2004)	52 (2011)	8,615,050	548,073,515

*average values over the period 1970-2012; ^ average values (1986-2012)
**average values over the period 2008-2012
#average values over the period

PANEL C	Average Years of Schooling									Fiscal Deficit		Number of Military Coups
	1970	1975	1980	1985	1990	1995	2000	2005	2010	Average 2008-2012	Political Independence	
Ghana	3.58	4.27	4.94	5.52	5.89	6.06	6.57	6.80	7.26	-2.26	1957	5 (1981)
Gambia	0.51	0.73	0.97	1.27	1.81	2.45	2.64	3.08	3.58	-8.44	1965	1 (1994)
Guinea	NA	NA	NA	NA	NA	NA	2.4	2.8	3.3	-8.34	1958	2 (2008)
Liberia	1.14	1.66	2.14	2.59	2.91	3.01	3.43	4.16	5.11	-0.64	1847	1 (1980)
Nigeria	1.6	2.1	2.70	3.30	3.90	4.60	5.50	6.10	6.80	-2.6	1960	6 (1993)
Sierra Leone	0.87	1.12	1.40	1.73	2.05	2.38	2.67	3.07	3.42	-4.74	1961	5 (1997)

PANEL D	Growth of Output 2006 - 2011					
Country	2006	2007	2008	2009	2010	2011
The Gambia	6.5	6.3	5.9	4.6	6.1	3.3
Ghana	6.4	6.1	7.2	3.5	6.4	13.6
Guinea	2.5	1.8	4	0.3	2.4	3.6
Liberia	7.8	9.5	7.1	4.6	6.8	6.4
Nigeria	6.1	6.4	5.3	5.6	6.4	7.2
Sierra Leone	7.4	6.4	5.5	4	6	5.3

Tests of Cross-section Dependence

The formal statistical procedures designed to test for cross-sectional dependence in small-T, large-*N* panels are the:

Pesaran (2004) cross-sectional dependence (*CD*) test,

Levene (1960) test

Friedman's (1937) statistic,

Frees (1995) test.

Pesaran's CD test

The Breusch and Pagan (1980) statistic tests the null hypothesis of zero correlation using an LM statistic, which holds for fixed N to $T \to \infty$ and is given by

$$CD_{LM} = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}^2$$

Friedman's Test

The Friedman's test (1937) is nonparametric and based on Spearman's rank correlation coefficient. The Friedman's statistic is given by:

$$R_{ave} = \frac{2}{N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{r}_{ij}$$

Levene Test

Levene (1960) proposed a test statistic which determines whether two or more groups are significantly different. Specifically, the Levene's test [LT] examines if *k* groups have equal variances:

$$LT = \frac{(N-K)\sum_{i=1}^{k} N_i\left(\bar{Z}_i - \bar{Z}_{..}\right)^2}{(k-1)\sum_{i=1}^{k}\sum_{j=1}^{N}\left(Z_{ij} - \bar{Z}_i\right)^2}$$

Frees' Test

Frees' test (1995, 2004) is a power test aimed at detecting false null hypothesis even when there exits plenty of cross-sectional dependence left out in the disturbances.

The test for cross-sectional dependence was analyzed using Stata 12.

The dataset consists of 4 countries, each observed for 17 years (1995-2011) and a panel, declared as strongly balanced.

Only human capital development exhibits homogeneity among the four WAMZ countries.

Table 2: Test of Cross – Sectional Dependence

.xtreg gdp hcd gdpl infla infcf, fe

Fixed-effects (within) regression Number of obs = 68

Group variable: n Number of groups = 4

R-sq: within = 0.2841 Obs per group: min = 17

between = 0.1619 avg = 17.0

overall = 0.1390 max = 17

corr (u_i, xb) = -0.5541 F (4,60) = 5.95

Prob > F = 0.0004

gdp	Coef.	Std. Err.	t	P>l t l	(95% Conf. Intervall)	
hcd	-.0144901	.3257851	-0.04	0.965	-.6661573	.6371771
gdpl	.0045317	.116999	0.04	0.969	-.2295012	.2385646
infla	-2.897832	.6829427	-4.24	0.000	-4.263921	-1.531744
infcf	2.509277	.7972994	3.15	0.003	.9144408	4.104113
_cons	5.42289	3.2303	1.68	0.098	-1.038672	11.88445

sigma_u 2.6991583

sigma_e 4.1202693

rho .30028164 (fraction of variance due to u_i)

F test that all u_i=0: F (3, 60) = 4.36 Prob > F = 0.0076

The assumption implicit in estimating the the Pesaran's *CD* test is that the cross-sectional units are independent. The Pesaran *CD* test is reported as follows:

$$Pesaran's\ test\ of\ cross-sectional\ independence = 12.321, \quad Pr = 0.146$$

From the above result, the *CD* test does not reject the null hypothesis of no cross-sectional dependence. Therefore, we can conclude there is strong evidence against the hypothesis that the sampled WAMZ countries

Variables	The Gambia	Ghana (a)	Ghana (b)	Nigeria	Sierra Leone
Intercept	2.186 (4.201) [0.000]	9.146 (3.363) [0.006]	3.422 (2.293) [0.070]	-3.513 (-3.382) [0.043]	-5.424 (-5.733) [0.000]
GFC	5.890 (4.594) [0.000]	8.836 (3.777) [0.003]			
ODA	-8.114 (-4.696) [0.000]	-6.599 (-3.906) [0.003]	-2.759 (-2.518) [0.063]	-7.821 (-2.379) [0.083]	-2.311 (-2.269) [0.038]
TRAD	4.070 (1.602) [0.122]	3.763 (2.105) [0.059]	-3.598 (-2.325) [0.068]		8.010 (4.698) [0.000]
DEMOC	1.644 (3.766) [0.001]	0.999 (4.200) [0.001]		-8.858 (-2.857) [0.065]	0.282 (1.138) [0.272]
INFLA		0.001 (0.025) [0.980]	0.208 (1.416) [0.216]	-2.338 (-2.579) [0.082]	-1.792 (-2.430) [0.027]
GC			7.001 (3.815) [0.012]	-0.009 (-2.531) [0.085]	6.620 (5.309) [0.000]
FDI			-3.016 (-3.102) [0.027]	-3.730 (-3.412) [0.042]	
M2			5.010 (0.379) [0.720]		9.04 (5.813) [0.000]
K				1.387 (0.631) [0.573]	
DCP					-7.442 (-2.741) [0.014]
ECM	-0.431 (-2.435) [0.025]	-0.663 (-2.628) [0.042]	-0.252 (-2.48) [0.049]	-0.688 (-2.386) [0.054]	-0.517 (-2.413) [0.053]

Table 5: Post Estimation Test

	The Gambia	**Ghana**		**Nigeria**	**Sierra Leone**
		(a)	**(b)**		
EG residual test	-4.064**	-4.814*	-5.012*	-4.211**	-5.261**
BPG *(p-value)*	0.216	0.463	0.408	0.621	0.611
LM test (1) *(p-value)*	0.521	0.536	0.711	0.314	0.406
LM test (2) *(p-value)*	0.428	0.501	0.488	0.269	0.387
JB *(p-value)*	0.146	0.769	0.308	0.117	0.121

Conclusions

The countries share some common characteristics in culture, geographical proximity, lingua-franca and imperialisation with respect to some economic features. On the contrary however, this did not necessarily implied homogeneity as the appropriate statistical test shows.

This may be as a result of differences in institutions and as such, policy needs should be implemented according to country-specific characteristics, but may not necessarily be at the expense of the economic integration exercise.

The integration exercise of the group should thus be undertaken in ‘sequencesation’.

The results also suggests that the selected WAMZ economies should be studied individually while determining their growth enhancing drivers using time series data rather than by longitudinal approach.

The other results suggest that Foreign Aid is highly fungi in the economies of the WAMZ countries. This inhibits domestic tax drive, diversification and competitiveness.

Corruption is a bane to the zone's development

Government consumption expenditure crowd-out private sector in Nigeria. As such small government is plausible.

In overall, to maximize the returns of government spending on growth and avoid the fungibility of foreign aid, fiscal discipline and consolidation is required for the growth process of the WAMZ economies