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The Economic Geography of Regional Integration in Africa

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CREPOL
November 2018

Table of abbreviations

AU	African Union
ASEAN	Association of Southeast Asian Nations
CEN-SAD	Community of Sahel-Saharan States
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EU	European Union
EPA	Economic Partnership Agreements
IGAD	Intergovernmental Authority on Development
MERCOSUR	Mercado Comun del Sur (Southern Common Market)
NAFTA	North America Free Trade Agreement (renamed United States-Mexico-Canada Agreement)
SADC	Southern Africa Development Community

Introduction

Factors usually included in models attempting to explain economic growth of countries do not include geography as a determinant. One possible rationale for this omission is that geographical characteristics of a territory are considered part of its endowments, positive or negative. Furthermore, a country's geographical features are viewed as constant and unchangeable or very costly to modify. However, the resulting omission of geography from growth models can be revisited in the context of regional integration arrangements on the grounds that change could affect the geographical dimensions of a country's markets or alter its trading routes. If such transformations are sizable then they will impact economic growth and the model will require inclusion of geography in it. One avenue of inquiry, if geography matters, is the search for policy instruments related to it that are likely to help boost economic performance.

A question that arises from the transformability of geography is whether it can be measured and how it would play a role in the production function and process of income formation and distribution. In such a case what would be the process leading to these changes. For a given regional integration member country, one key aspect of geography is the modification of the integrated territory in a manner that can provide benefits contributing to the welfare of its residents. Do such benefits exist and how do they motivate the decision of countries to enter into one geographical form of regional integration rather than others.

The remainder of the study is organized as follows. A theoretical model of economic growth of individual countries is proposed in the next section. The model is subjected to empirical verification with a variable that captures geography included. Then a number of key issues that relate regional integration and geography are discussed. They include regional integration policies and the cost of geography-related distance, gradual harmonization of production function in the geographical region and its impact on economic convergence, the characteristics of regionally integrated countries that are contiguous compared to countries that are geographically dispersed and the impact of external geography on member countries. A summary of the main results concludes the study.

The theoretical model

Seck (2018) proposes a model of aggregate income determination for a small open economy that uses import tariffs and faces fixed international prices. It is stated as follows:

$$Y = wL + rK + X[(p + t) - a(w,r,x)] + \alpha tm \qquad (1)$$

Where,
Y = aggregate income
L = supply of labour
K = supply of capital
r and w are factor prices for capital and labor respectively
X = production vector
p = level of prices
t = import tariff
a(w,r,x) = average cost that reflects the average cost and the production level in each sector

α = diagonal matrix that captures the wedge t that creates income for domestic agents given that α = 1 for a tariff or other barrier that generates domestic rent income, or α = 0 where there is no rent.
m = net imports

The different components of total income are:
wL + rK is total factor income, wL is labor income and rK is capital income
X[(p + t) – a(w,r,x)] is the level of profit in the economy
αtm = income accruing from import rent.

This model makes no mention of the geographical position of the country which means that location is not a determinant of its economic performance. As a result, if the empirical evidence shows a significant causal relationship between a variable related to geography and aggregate income, then it will support the independence between the determinants of GDP portrayed in eq. 1 and geography on the one hand, and the impact of geography on aggregate income on the other hand. Such an augmented model would be of significant relevance for many African countries that have the peculiar situation of being landlocked for instance. Note that the surface area of a country is an ambiguous geographical indicator because some African countries are mostly covered with desert land, which reduces their useful economic area considerably, except where there are important mining resources in the desert areas.

The empirical evidence

In order to test empirically if geography is a determinant of aggregate income, eq. 1 is estimated with a cross section regression covering 44 Sub-Saharan countries – see Appendix for the list of countries in the sample - over the 50 years covering the period 1967 – 2016. The 50 year averages are computed for all the variables in the model. A dummy variable is added to indicate if the country is landlocked.

The dependent variable is measured by the rate of GDP growth. The ratio of Gross Fixed Capital Formation over GDP is the proxy for capital (K) in eq, 1 Total population measures labor (L). The variable TradeOpen is the sum of imports and exports divided by GDP and denotes the degree of openness of the economy. The level of prices is proxied by inflation. The variable Initial perCap GDP is the initial level of per capita income set in 1980 and Landlocked shows if the country is landlocked or not. These last two variables aim to capture human geography and physical geography and will help determine if the model depicted by eq. 1 is exhaustive and rejects the hypothesis that geography is a determinant of economic growth.

Table 1: Cross section regression of the determinants of GDP growth (period: 1967 – 2016

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Explanatory variable	Coefficient	t. value
Constant	0.9383	1.53*
GFCF	0.1248	6.36***
TradeOpen	0.1754	2.34**
Inflation	-0.0018	-1.28
Population	0.00001	1.51*
Initial perCap GDP	-0.0001	-0.50
Landlocked	-0.7702	-1.75**
Number of obs.	44	
Adjusted R^2	0.66	
Probability F	0.00	

Note: *** denotes significance level of 99%, ** at the 95% level and * at the 90% level.
Source of data: World Development Indicators, World Bank

Table 1 reports the result of the cross section regression of GDP growth on a number of determinants measured based on eq. 1 and two indicators of geography. Overall, the empirical model is highly significant with an adjusted R^2 of .66 and a F probability equal to zero. Two results of the individual explanatory variables are noteworthy. First, Gross Fixed Capital Formation (GFCF) and TradeOpen (Trade Openness) are significant with the right positive sign. Inflation, Initial per Capita GDP and Population are either not significant or weakly significant. Second, the explanatory variable Landlocked has the right negative sign although it is not included in the theoretical model depicted in eq. 1. This result supports the view that the geographical position of a country matters and that countries that are landlocked suffer from such a position irrespective of other economic factors that affect economic growth.

While not all possible measures of geography are not included in the model specification, one that is included, Landlocked, has proved to be significant. It is argued that, for the purpose of the foregoing analysis, all the geographic dimensions of a country can be subsumed under the notion of economic distance. Economic distance refers to the cost of cross border shipping or delivery of goods and services over and above the average cost incurred if the transaction is carried out within the country's borders. For instance, a country that is landlocked would face, as part of its economic distance, the cost of transport of its imports or exports from its border to the nearest sea port. Consequently, in addition to achieving the two determinants of economic growth, namely investment and trade openness, one of the roles of regional integration is to minimize economic distance for its member countries.

Regional Integration policies and economic distance

 A key policy issue is to identify ways to reduce economic distance through regional integration initiatives that benefit all or some member countries. Among channels of transmission economic distance can materialize through changes in the size of consumption markets for integrated countries or in the scale of production resulting from the pooled productive capacities. For the sake of brevity, three classes of economic distance reduction are examined. The first strategy consists in selection of geographical location that facilitates pooling of production across national borders. This can be achieved if, for example, raw cotton harvest of neighboring countries is collected from either side of the border and processed in a single factory located in one of the countries, thus enhancing its volume of production. Another case could be the smelting of iron ore mined from sites located in different countries in a single steel factory. The proximity of the various sources of raw material with the single factory would result in reduction of the economic distance. In addition to reduction of economic distance this strategy helps increase the share of the value added in the value chain that stays in the regionally integrated area.

A second regional integration strategy aimed at reducing economic distance resides in building infrastructure to minimize the cost and speed up transport of passengers and merchandise. The economic importance of infrastructure building is well documented but some key issues remain partially unresolved. First, African regional integration bodies are considerably behind in their own infrastructure building relative to the set objectives but ongoing programs do not show evidence of the will to remedy that situation which hinders achievement of the goals that they set for themselves. Second, countries do not always agree on the right itinerary of the road and rail systems between access to the sea ports, outward-oriented, and maximizing the internal exchanges between member countries, inward-oriented. Finally, most countries have not yet arrived at the right mix between public and private financing and may consider domestic infrastructure building a priority over regional programs.

The third strategy of reduction of economic distance is provision of immaterial services that do not require delivery-induced costs. The recent upsurge in Internet-based services provides large opportunities in a variety of areas such as education, financial services and medical services. However, the easiness of service provision also exposes member states to international competition originating outside the integrated region, which may translate regional integration into integration to the word economy. One of the benefits of integration through provision of immaterial services is that it reduces the economic distance in other sectors wherever it renders movement less pressing or unnecessary as in medical services or education. However, the novelty of such exchanges underscores the need to enact cross border rules and regulations that will help facilitate development of immaterial markets.

Regional production function and economic convergence

One of the arguments of eq. 1 is $wL + rK$, the contributions of labor and capital, w and r being their respective factor prices. It can be argued that w and r will be diverse across the geographical area of the regionally integrated zone. Given free movement of capital and labor, it is expected that, under competition, there will be a tendency over time for them to equalize in all parts of the region, a process facilitated by uniformity of education standards and the high degree of information content embedded in capital. Consequently the productivity of capital

will tend to harmonize across the geographical area faster than that of labor but the latter will also follow.

This adjustment process may take time depending on the actual degree of integration, government regulation and the capacity of trade unions to negotiate new contracts but will, in the end, result in gradual increase in the level of wages. Considering that the unit price of labor is lower in the poorer countries where education standards are also lower, the process will benefit them first and give rise to catching up and convergence of household incomes towards those of the more advanced countries. At this stage, there will be a single production function in the geographical area of the regional integration and capital and labor will no longer seek to move from one area to another for reasons of factor price differences.

Geographical contiguity or dispersion of regional integration members

There are two types of regional integration arrangements in Africa that differ in their geographical characteristics. The first one includes arrangements between countries that are contiguous i.e. it is possible to travel to all member states on land without entering the territory of a non-member country. Examples include ECOWAS, ECCAS, EAC, SADC and IGAD. The second type comprises geographically dispersed countries. Three notable cases are COMESA and CEN-SAD. Following is an examination of the key features of both types of arrangement.

Integration of contiguous countries implies lower economic distance and lends itself to investment in land-based infrastructure. It may facilitate a stronger sense of supra-national identity given the continuity of the land mass and the presence of people with similar ethnic affiliations in two or more countries. It is easier for contiguous countries to collectively undertake large projects such as electric power dams or transshipment seaports. Given the low economic distance around the border areas, contiguity facilitates existence of small firms and informal sector activities which are important providers of employment.

In the African context, countries that are members of a regional integration arrangement and are geographically dispersed are likely to have more pronounced differences in levels of development and technological progress. This may give rise to transfer of knowledge from richer members to poorer members. The higher cost of internal trade between members provides a stronger incentive to lessen economic distance which also promotes adoption of more modern sectoral activities such as Internet-based immaterial trade. The disparity in levels of development may reinforce altruistic behavior such as solidarity which in turn, strengthens the overall regional integration agenda and fosters compliance of individual countries with regional policies and rules. Therefore, it may be logical for African countries to simultaneously participate in both types of arrangements to take advantage of their respective benefits which are arguably substantial and complementary and helps explain why most countries that are members of a contiguous arrangement are also members of an arrangement between geographically dispersed regional integration groupings.

External geography and regional integration

One of the salient trends in the world economy is the formation of geographical groupings operating under a diversity of integrative arrangements. These groupings include the European

Union, the ASEAN, the NAFTA, MERCOSUR, the African Regional Economic Commissions (RECs), etc. The resulting rise in agreements between groupings reduces the number of international partners which leads, to a large extent, to loss of sovereignty for individual countries in favor of the groupings. The Economic Partnership Agreements (EPA) between the European Union and African countries is one such example. One major consequence of this collaboration between geographical areas is harmonization of the standards of quality in international trade e.g. phytosanitary rules on agricultural exports. Another consequence is the growing incidence of geographical product mandates put in place by multinational companies that integrates whole regions as a single market and enhances uniformity of product characteristics.

With respect to external trade contiguous countries that are integrated can achieve economies of scale by saving money on shipment costs and servicing large foreign markets that would otherwise be unattainable for single exporting countries. They can also use a strategy of hub and spokes by jointly creating large seaports or container terminals with economies of scale in building infrastructure and enhanced efficiency in terminal operations. Through external trade and inbound foreign direct investment integrated countries can better seize opportunities for technological diffusion and knowledge transfer.

Conclusion

The key question that is investigated is whether geography plays a role in the economic growth of Sub-Saharan African (SSA) countries. A theoretical model of growth is tested empirically with the addition of the dummy variable Landlock as a measure of geography. The underlying rationale is that if the model is accurate and exhaustive Landlock would not be a significant determinant of economic growth. The cross section regression of the 50 year average of GDP growth of 44 SSA countries on a number of variables averaged over the same period shows that the model is significant with a high degree of explanatory power with an R^2 of .66. However the variable Landlock is also significant and justifies use of the notion of economic distance as a negative determinant of growth in SSA.

A number of strategies related to regional integration are examined to lessen the cost associated with economic distance. They consist in pooling productive processing capacity near the common borders of two or more countries to source primary input from all neighboring regions. A second strategy resides in building regional infrastructure that helps reduce the cost of transport of passengers and merchandise. The third strategy seeks to avoid the cost of economic distance by developing the sector of immaterial services. One of the aspects that results from regional integration is the trend towards a homogeneous production function and growing convergence of wages and levels of incomes in all the geographical regions of the zone.

Comparison of the characteristics of contiguous regional groupings with groupings of countries that are geographically dispersed has revealed that contiguity lends itself to building of common infrastructure projects given the lower economic distance, fosters supra-national identity and facilitates development of small business and informal sector around the border areas. Countries that are geographically dispersed are more likely to have different levels of technological development and engage in knowledge transfer from richer to poorer members of the zone. The higher cost related to economic distance will encourage emergence of

immaterial trade. The disparity in levels of development will foster altruism and solidarity which reinforces compliance with regional policies and rules. Therefore, countries may find it advantageous to participate simultaneously in both types of regional integration schemes to take advantage of their respective benefits.

The recent rise in regionally integrated zones around the world has translated into a shift in sovereignty from individual countries to groupings. This is increasingly resulting in harmonization of region-wide standards of quality and an evolution towards enhanced geographical product mandates put in place by multinational companies. External geography can lead countries that are integrated to undertake large seaport infrastructure to lessen economic distance and improve port operations. Increased capacity through economies of scale may foster additional inbound foreign direct investment leading to more technological diffusion and knowledge transfer.

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Table 1. Statistics of GDP GROWTH of SSA Countries (1967-2016)

	Country Name	Average
1	Angola	4.752
2	Benin	3.669
3	Botswana	8.595
4	Burkina Faso	4.591
5	Burundi	2.618
6	Cameroon	3.786
7	Cabo Verde	6.610
8	Central African Republic	1.197
9	Chad	3.976
10	Comoros	2.353
11	Congo, Dem. Rep.	1.206
12	Congo, Rep.	4.424
13	Cote d'Ivoire	3.503
14	Equatorial Guinea	15.825
15	Eritrea	3.784
16	Ethiopia	5.647
17	Gabon	3.960
18	Gambia, The	3.802
19	Ghana	3.803
20	Guinea	3.920
21	Guinea-Bissau	2.706
22	Kenya	4.663
23	Lesotho	4.764
24	Liberia	1.756
25	Madagascar	2.015
26	Malawi	4.101
27	Mali	4.143
28	Mauritius	4.560
29	Mozambique	5.610
30	Namibia	3.496
31	Niger	2.330
32	Nigeria	4.166
33	Rwanda	5.239
34	Sao Tome and Principe	4.972
35	Senegal	3.020
36	Seychelles	4.492
37	Sierra Leone	2.572
38	South Africa	2.703
39	Swaziland	5.221
40	Tanzania	5.323
41	Togo	3.132

42	Uganda	5.844
43	Zambia	3.209
44	Zimbabwe	2.926

Source of data: World Development Indicators, WB