Household Expenditure Shares for Africa in ICP 2005: Lessons for ICP 2011

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Price Level Indices for Selected Infrastructure Components based on the International Comparison Program for Africa, 2005

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Abstract:
The economic growth and development of any country are dependent on solid infrastructure and the robustness of systems that have been put in place. Together, these constitute a nation's "engine of growth" and include housing, water, electricity, transportation, communication, and construction. It is postulated that the cost of doing business in Africa is much higher than in other global regions, mainly due to the poor quality of its infrastructure and accessibility constraints. The paper analyzes the distribution of price levels of these economic drivers, since these contribute to the cost of doing business in Africa. For this purpose, price level indices (PLIs) have been computed to provide a comparison of the cost of selected infrastructure components across African countries. The data used were collected from the 2005 round of the International Comparison Program (ICP) in Africa, covering 48 out of a total of 52 countries and 22 major aggregates of the national accounts.

Introduction

The incentive to invest in any economic activity is driven by a range of different motives, including the cost of labor, the available infrastructure (e.g. transportation and ICT), the regulatory and fiscal environment, and other economic considerations. A potential investor will be drawn to those regions or countries that promise to deliver the greatest economic gains. One good measure for making such relative comparisons is the price level index (PLI),[1] which is derived by dividing the purchasing power parity (PPP) index by the corresponding exchange rate. A PLI represents the average percentage by which the prices of goods and services in country X, when converted into country Z's currency at the current exchange rate, exceed or fall below the prices of the same goods and services in country Z. Since the PLI is usually measured in percentages, a PLI of 100 denotes that the price levels in both countries are the same. A PLI that is higher or lower than 100 indicates higher or lower cost respectively. When currencies are converted using market exchange rates, they provide a comparison at a single point in time of relative purchasing power of one currency over another. However, this presents a somewhat distorted picture, since exchange rates are volatile and the comparison does not take into account the price levels. Price level indices are better determinants and can be used to

[1] PPPs and PLIs can also be used by international organizations and companies as equalizing factors for wages and salaries in order to compensate for purchasing power losses or gains experienced by employees working abroad (so-called "correction coefficients"). The IMF, for instance, has used purchasing power parity (PPP) adjusted Gross Domestic Product (GDP) measures in their *World Economic Outlook* (*WEO*) since 1993 and, more recently, as an element of the formula used to guide decisions on the distribution of its members' quotas. PLIs are not intended to rank countries in a strict hierarchy. Rather, they provide an indication of the order of magnitude of the price level in one country in relation to others.

make investment decisions, for example whether to transfer capital from one country to another, or whether to alter the composition of an investment portfolio by switching economic activities, depending on the comparative advantage and economies of scale in one country over another.

According to the paper "Overhauling the Engine of Growth: Infrastructure in Africa" (Foster, 2008), African countries devote around 6 to 8 percent of their GDP to infrastructure. Calderón and Servén (2008) argue that across Africa, infrastructure contributed 99 basis points to per capita economic growth over the period 1990–2005, compared to the contribution made by structural policies, which represented 68 basis points. This infrastructural contribution is almost entirely attributable to advances made in the telecommunications sector. Foster points out that the deterioration in the quantity and quality of energy infrastructure over the same period has had a significant lagging effect on economic growth in a number of African countries.

The paper by Olu Ajakaiye and Mthuli Ncube, titled "Infrastructure and Economic Development in Africa: An overview," argues that the cost of doing business in Sub-Saharan Africa is higher than in any other global region, with infrastructure services making up a disproportionately large part of production and trade costs. Indeed, this viewpoint is support by the World Economic Forum's *Global Competitiveness Report 2010-2011,* which points out that although some African countries such as South Africa and Mauritius have made great strides in their ratings, Sub-Saharan Africa as a whole lags behind the rest of the world in terms of its competitiveness. This is largely attributable to a severe deficit in the quality, quantity, and ease of access to infrastructure services. While other schools of thought suggest that the relationship between infrastructure development and economic development is far from clear-cut, evidence from other studies indicates that good infrastructure is making a major contribution to reducing inequality and improving growth in all regions of the world except Africa. The African continent is hampered by the constraints of poor quality and low level of accessibility in terms of its infrastructure. This negatively impacts the continent's productivity and growth, which acts as a major disincentive to FDI and domestic investment, as well as curtailing international trade.

A working paper published by the African Development Bank, "Infrastructure Deficit and Opportunities in Africa" (AfDB, 2010) highlights the vital role that infrastructure can play in improving a country's competitiveness, and in facilitating domestic and international trade. Poor infrastructure leads to higher delivery costs, which in turn increases the price of goods in both domestic and export markets. Moreover, this needs to be set against the background of the recent fuel and food crises, which led to hikes and volatility in commodity prices, rendering Africa more vulnerable to exogenous shocks and further weakening its competitiveness.

This paper provides a cost comparison for selected infrastructure components across countries using PLIs. It defines the PLI as the ratio of PPP to a corresponding market exchange rate. The PPPs were computed using the African average as the base, i.e. they were normalized with the average for Africa = 1.0. The PLI is not designed to measure inflation from one year to the next. Rather, the PLI is used to compare the cost of selected

infrastructure components (namely housing, water, electricity, transportation, communication, and construction) among 48 African countries, using price data collected from the International Comparison Program (ICP) round of 2005. The infrastructure components have been selected as they represent major drivers of an economy's development.

This paper is structured in two parts; first, it provides a descriptive analysis of each of the selected components of infrastructure, namely housing, water, electricity, transportation, communication, and construction. Further, a Principal Component Analysis (PCA) has been performed to explain the variation of a few uncorrelated linear combinations of the original variables. This was undertaken in order to shed light on the multivariate structure of the infrastructure components and to determine any similarities among countries. However, as the PCA is an exploratory method, the question of whether or not these objectives may be achieved through the use of principal components cannot be ascertained in advance of the analysis of the numerical results. The paper concludes by presenting a summary of results.

Price Level Indices (PLI) Results

The results for price level indices for the selected infrastructure components (housing, water, electricity, transport, communication, and construction) are presented in Table 1 below.

Table 1: Price Level Indices for infrastructure components by country, Africa region (Average = 1.00)

Country	Housing	Water	Electricity	Transport	Communi-cation	Construction
Angola	0.66	4.44	1.20	1.47	1.72	1.24
Benin	0.76	0.97	0.59	0.87	1.62	0.70
Botswana	1.17	1.51	1.27	1.07	0.82	0.94
Burkina Faso	0.70	0.82	0.62	1.12	1.25	0.89
Burundi	0.74	0.38	1.05	0.89	0.38	0.60
Cameroon	1.02	0.89	0.82	0.87	1.54	1.13
Cape Verde	4.47	4.19	1.13	1.12	1.02	1.30
Central African Republic	0.35	0.86	1.01	1.35	1.30	1.19
Chad	0.34	1.24	1.00	1.10	1.60	1.30
Comoros	1.73	1.22	1.73	1.37	1.20	0.82
Congo	1.31	1.61	0.83	1.24	1.63	1.98
Congo, Democratic Republic	1.08	1.08	2.03	1.34	1.70	0.74
Côte d'Ivoire	1.08	1.17	0.70	1.17	1.50	3.03
Djibouti	1.13	0.83	1.51	1.16	0.94	0.91
Egypt	0.92	0.66	2.44	0.40	0.65	0.54

Country	Housing	Water	Electricity	Transport	Communi-cation	Construction
Equatorial Guinea	1.69	…	1.42	1.29	2.06	2.24
Ethiopia	0.65	0.36	0.93	0.49	0.50	0.57
Gabon	2.02	1.99	1.21	1.27	1.62	1.04
Gambia	0.19	0.68	1.03	0.82	0.57	0.83
Ghana	0.15	1.19	0.66	0.86	0.99	0.83
Guinea	0.47	0.77	0.87	0.81	0.79	0.78
Guinea-Bissau	0.58	1.26	1.17	1.06	2.34	0.78
Kenya	0.45	1.39	0.98	0.94	1.34	0.93
Lesotho	0.78	1.47	0.95	1.01	1.34	1.53
Liberia	1.53	3.68	1.20	1.24	1.24	1.22
Madagascar	1.02	0.36	0.69	0.83	0.71	0.67
Malawi	0.53	2.05	1.03	1.10	1.30	0.35
Mali	1.08	0.81	0.82	0.95	1.17	1.09
Mauritania	0.32	1.68	0.95	0.88	1.15	0.84
Mauritius	2.06	0.67	0.54	1.19	0.49	1.09
Morocco	1.63	2.35	0.73	1.00	0.97	1.32
Mozambique	0.49	0.92	0.67	1.16	1.28	1.54
Namibia	1.95	2.27	1.99	1.13	1.21	1.51
Niger	0.66	1.08	0.91	1.02	1.20	0.84
Nigeria	0.52	1.15	1.26	0.79	1.14	1.10
Rwanda	1.31	0.59	0.72	0.88	0.95	0.80
São Tomé and Príncipe	0.87	1.74	1.51	0.96	1.22	1.18
Senegal	0.73	1.52	1.20	0.99	0.74	0.92
Sierra Leone	0.34	1.97	0.86	0.89	1.47	0.61
South Africa	1.78	1.21	1.57	1.08	0.99	1.56
Sudan	0.78	2.45	0.90	0.79	1.03	1.33
Swaziland	1.74	1.80	1.95	1.00	1.13	1.34
Tanzania	0.76	1.75	1.10	0.82	1.21	0.76
Togo	0.45	1.19	0.52	0.99	1.62	1.26
Tunisia	1.57	0.40	0.82	0.98	0.69	0.90
Uganda	0.90	1.36	0.84	0.93	1.37	0.88
Zambia	2.65	0.42	1.13	1.30	2.28	1.09
Zimbabwe	4.85	…	5.54	3.56	2.28	1.28
African Average	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

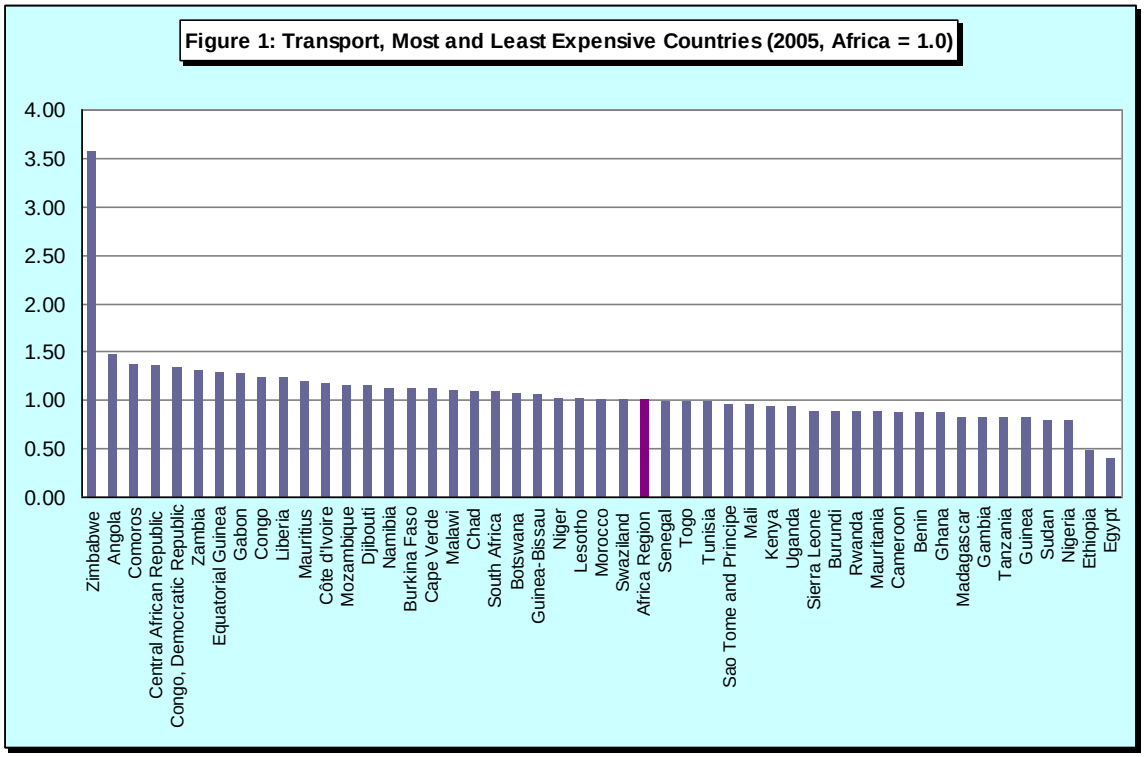
Country	Housing	Water	Electricity	Transport	Communi-cation	Construction
Standard deviation	**0.93**	**0.91**	**0.77**	**0.42**	**0.46**	**0.46**
Coefficient of Variation (%)	**93**	**91**	**77**	**42**	**46**	**46**

Note: Ellipsis (...**) i**ndicates that the data were not submitted**.**

Infrastructure Components

Transportation

This component includes passenger transportation by railroad, road, air, sea and inland waterways, and other purchased transport services. Figure 1 below presents a ranking of countries from the most to the least expensive in terms of transportation price levels. The distribution of PLI varies widely, resulting in a relative variation (coefficient of variation)[2] of 39.4%. This could be attributed to the high cost of air travel on the continent. Poor road and rail networks in many parts of Africa, and between ports and the hinterland, also contribute to high transport costs, hence high PLIs. Fifteen countries in Africa are landlocked; making transportation in these countries more costly compared to those on the coastline. In 22 out of 48 countries (nearly half), the transport PLIs are less than 1.0, ranging from 0.4 (Egypt) to 0.99 (Senegal).



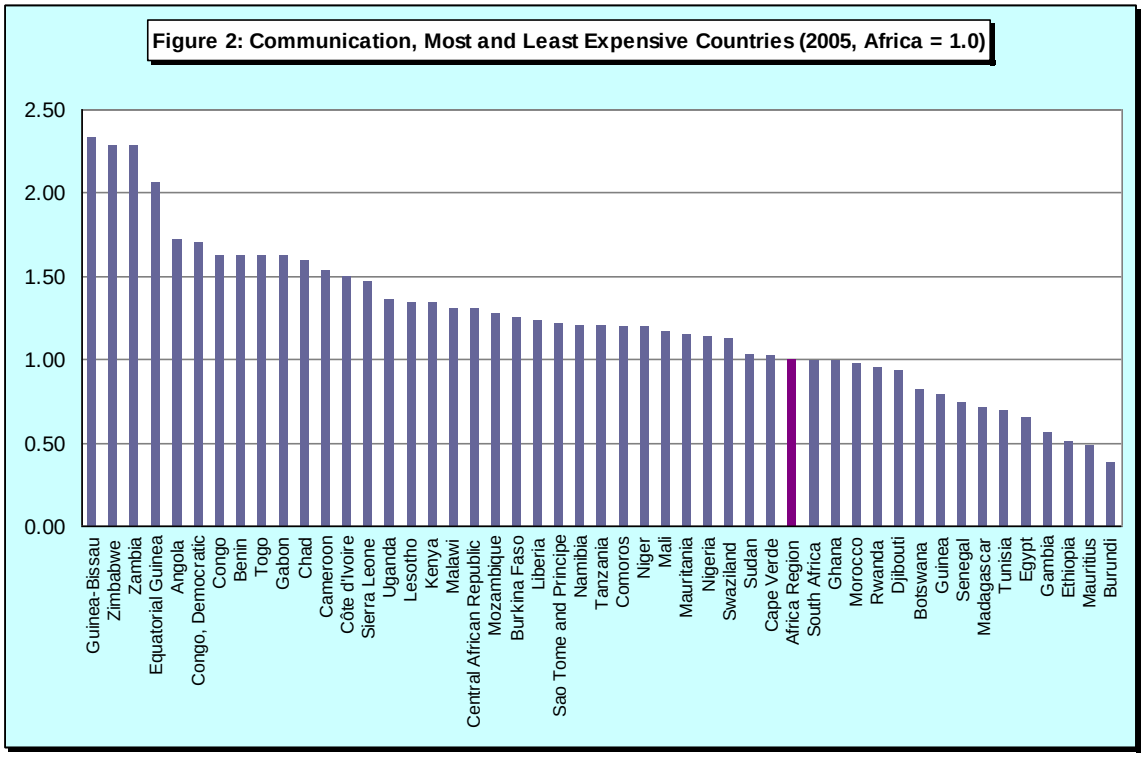
[2] The coefficient of variation is defined as the standard deviation of the PLIs of countries as a percentage of their average PLI. The higher the coefficient, the higher the price dispersion across countries.

According to the prevailing prices in the transportation subsector in 2005, Zimbabwe recorded the highest costs, followed by Angola, Comoros, and the Central African Republic. The countries to emerge with the lowest transportation costs were Egypt, Ethiopia, and Nigeria. The transport PLI for Zimbabwe of over 250% above the African average is an outlier and in part reflects the massive inflation rate the country was experiencing as a result of its economic crisis. Moreover the economic embargo imposed on the country would most likely have contributed to a deterioration of its infrastructure.

As indicated earlier, the PLIs are not intended to rank countries in a strict hierarchy, but rather to provide an indication of the order of magnitude of the price levels in one country relative to others. One counter-intuitive finding is that price levels of neighboring countries are not always of the same order of magnitude.

Communication

Communication includes postal services, telephone (cellphones and landlines), internet, etc. These services facilitate communication both for public and private enterprises within and between countries. Figure 2 below shows the PLI for various services and equipment groups under the communication component. Guinea-Bissau, Zimbabwe, and Zambia are among countries with the highest PLIs, while Burundi, Mauritius, Ethiopia, The Gambia, and Egypt record the lowest PLIs. Guinea-Bissau is the most expensive with a price level index of 2.34, while Burundi is the cheapest at 0.38. The coefficient of variation (CV) is about 37%, depicting a relatively high price variation among countries.

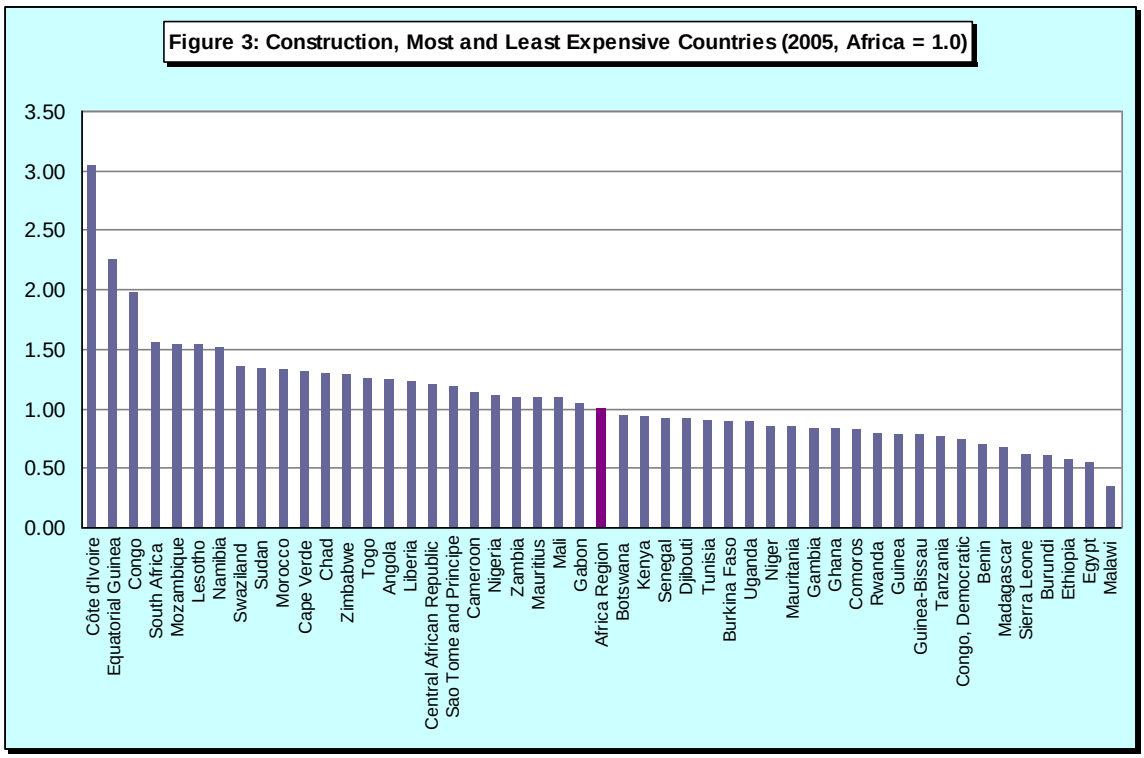


Thirty-four countries (71%) record PLIs for communication above the African average, ranging from 1.02 in Cape Verde to 2.34 in Guinea-Bissau.

Intuitively, one might expect the cost of telecommunication services between neighboring countries or those located in regional economic communities (RECs) to be roughly of the same magnitude. However, this has not proved to be the case for the price data collected from the ICP 2005 round. There seems to be differentiated and fragmented provision of communication services, particularly for telephones, across countries in the region. Furthermore, even when countries share the same service provider, the cost of the service often varies widely. Mobile telephony is one example where charges differ among countries, even when the services are provided by the same service company.

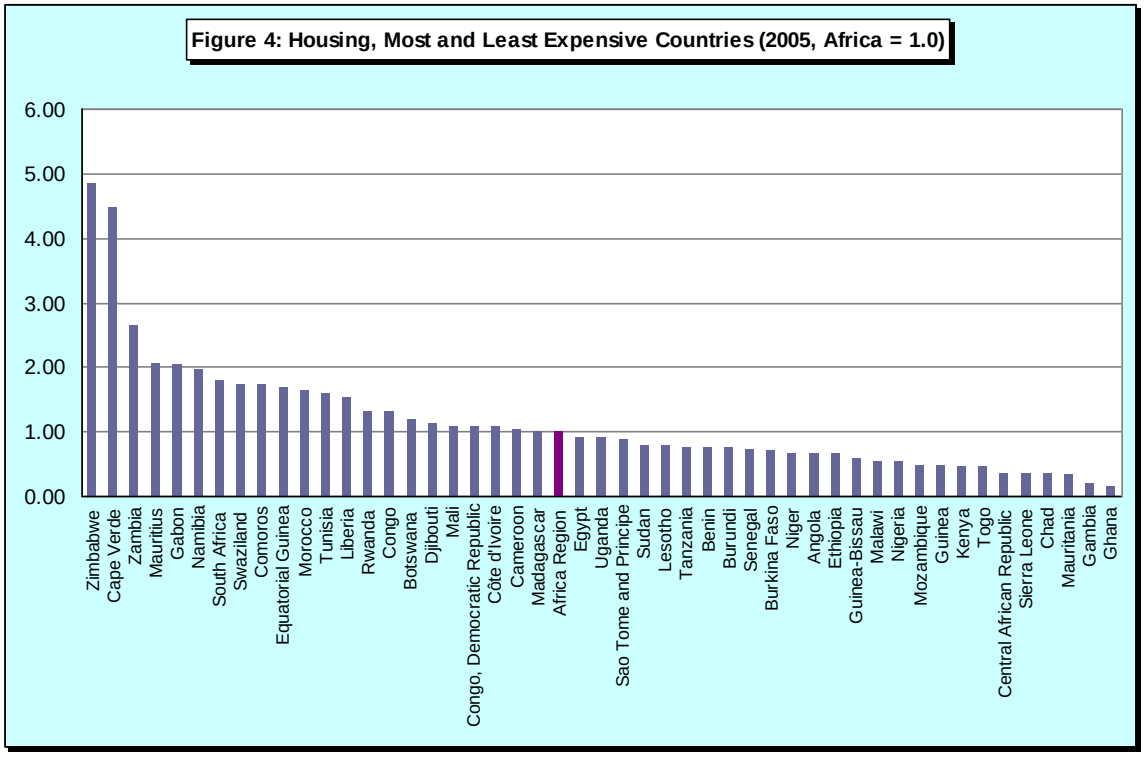
Construction

This includes the construction of residential buildings, nonresidential buildings, and civil engineering works. The PLIs vary widely among countries, representing a variation coefficient of 42.5%, indicating a high price level dispersion. The PLIs for construction were lowest in Malawi, Egypt, Ethiopia, and Burundi; with Malawi being the cheapest at 0.35. The highest PLIs were in Côte d'Ivoire, Equatorial Guinea, Congo Republic, South Africa, and Lesotho. Côte d'Ivoire recorded the highest costs, at 50% above the African average.



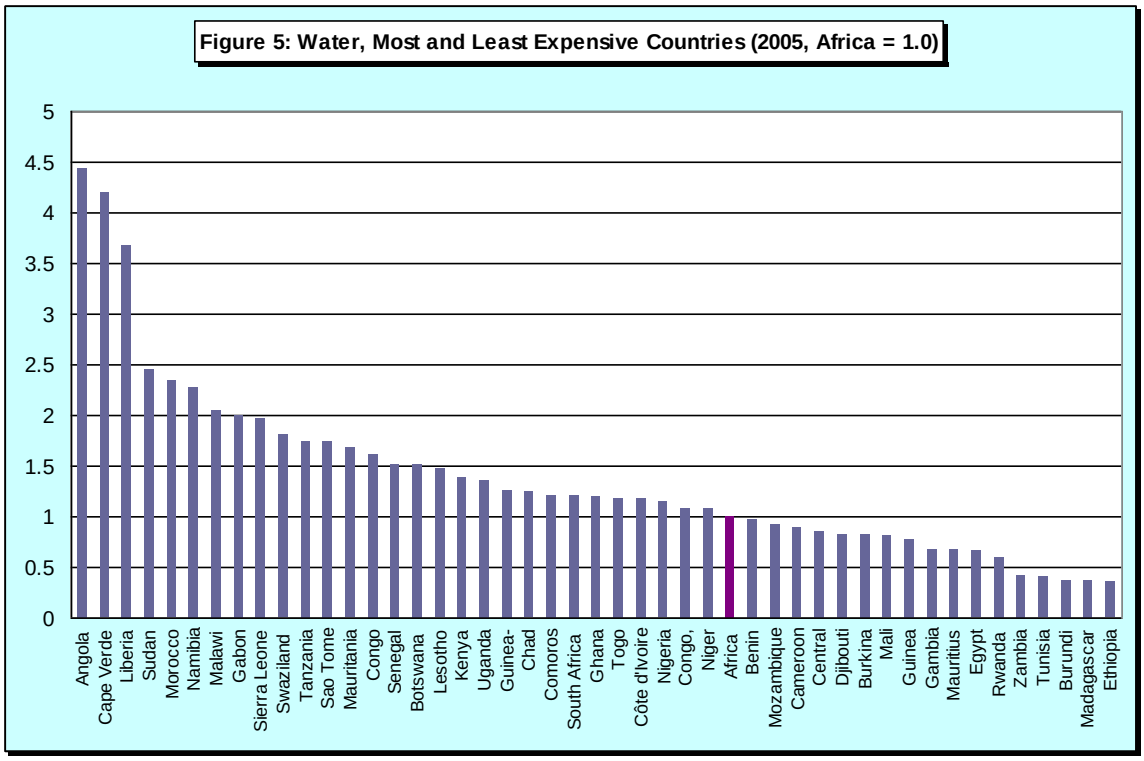
Housing

This component includes actual and imputed rentals for housing and maintenance, plus the cost of repair for dwellings. The distribution of the PLIs for housing is presented in Figure 4 below, indicating that Zimbabwe is by far the most expensive country, followed by Cape Verde, Zambia, and Mauritius. At the other end, Ghana enjoys the lowest housing costs, followed by The Gambia and Mauritania. The variation coefficient for housing PLI is 81.4%, revealing a significantly high variation among countries.



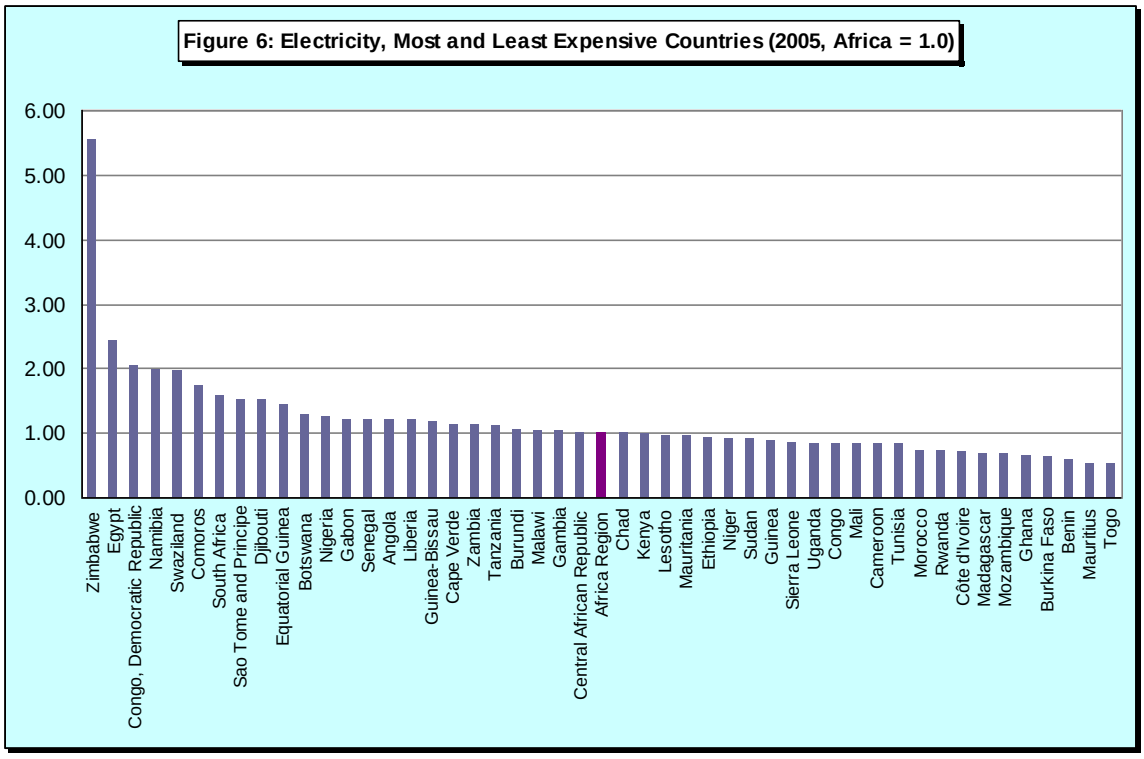
Water

This includes water supply and miscellaneous services, such as sanitation and sewage. The cost of water supply includes associated costs such as the hire of meters, the reading of meters, and standing charges. The cost excludes drinking water sold in bottles or containers, and hot water or steam supplied by distinct heating plants. The distribution of water PLIs is presented in Figure 5 below, indicating high price dispersion across countries, indicated by a coefficient variation of 64.7%. The distribution shows that water is most expensive in Angola, followed by Cape Verde and Liberia, while it is cheapest in Ethiopia, Madagascar, Burundi, Tunisia, and Zambia.



Electricity

The PLI for electricity includes associated costs, such as the hire of meters, the reading of meters, and standing charges. The distribution of electricity in Figure 6 shows a high variation across countries, indicated by a coefficient variation of 64.9%. The cost of electricity in Zimbabwe is by far the most expensive, with prices there some 454% above the African average. The two countries with the next highest costs (though these are far below Zimbabwe) are Egypt and the Democratic Republic of Congo. One might expect the prices in the DRC to be cheaper, given the production potential of the country, however the data collected from the ICP 2005 round refute this. The cheapest electricity costs are found in Togo, Mauritius, and Benin.



Principal Component Analysis and Scatter Plot

A Principal Component Analysis (PCA) for all the infrastructure components under the study (namely, housing, water, electricity, transportation, communication, and construction) was performed to explain the total variation with a few uncorrelated linear combinations of the original variables, called **principal components**. The number of principal components in the analysis is less than or equal to the number of original variables. This transformation is defined in such a way that the first principal component has the highest possible variance among all linear combinations of the original variables, while each succeeding component has the next highest variance possible under the constraint that it be uncorrelated with the preceding components.

The PCA in Table 2 below shows that most of the total variation is explained by the first four principal components (83%), with the first two components accounting for 57%. The correlation coefficients of these components with variables used in the analysis are presented in Table 3. The first number is the correlation coefficient and the second number in parentheses is the observed significance level (OSL) of the null hypothesis of a zero correlation coefficient.

Table 2: Proportion of variation explained by the first four components

Component	Eigen value	Difference	Proportion	Cumulative
Component 1	2.182	0.942	36%	36%
Component 2	1.240	0.351	21%	57%
Component 3	0.889	0.208	15%	72%
Component 4	0.684	---	11%	83%

Table 3: Correlation coefficients of the three principal components with variables

Infrastructure Components	Component 1	Component 2	Component 3	Component 4
Housing	0.57 (<0.0001)	0.52 (0.0002)	-0.39 (0.006)	0.09 (0.527)
Water	0.66 (<0.0001)	0.24 (0.097)	-0.005 (0.973)	-0.66 (<0.0001)
Electricity	0.17 (0.247)	0.76 (<0.0001)	0.45 (0.002)	0.33 (0.023)
Transportation	0.81 (<0.0001)	-0.17 (0.254)	0.13 (0.380)	0.11 (0.468)
Communication	0.59 (<0.0001)	-0.45 (0.001)	0.55 (<0.0001)	0.045 (0.767)
Construction	0.61 (<0.0001)	-0.302 (0.041)	-0.46 (0.0013)	0.34 (0.022)

The first component, which accounts for about 36% of the total variation, is correlated with housing (0.57), water (0.66), transportation (0.81), communication (0.59), and construction (0.61). It may be interpreted as a measure of price levels on all infrastructure components except electricity. Countries with relatively high costs for housing, water, transport, communication, and construction will have large values for this component.

The second component is positively correlated with housing (0.52), electricity (0.76), and negatively correlated with communication (-0.45) and construction (-0.30). Countries that have a high value for this component are characterized by high costs for electricity and housing and low costs for communication and construction.

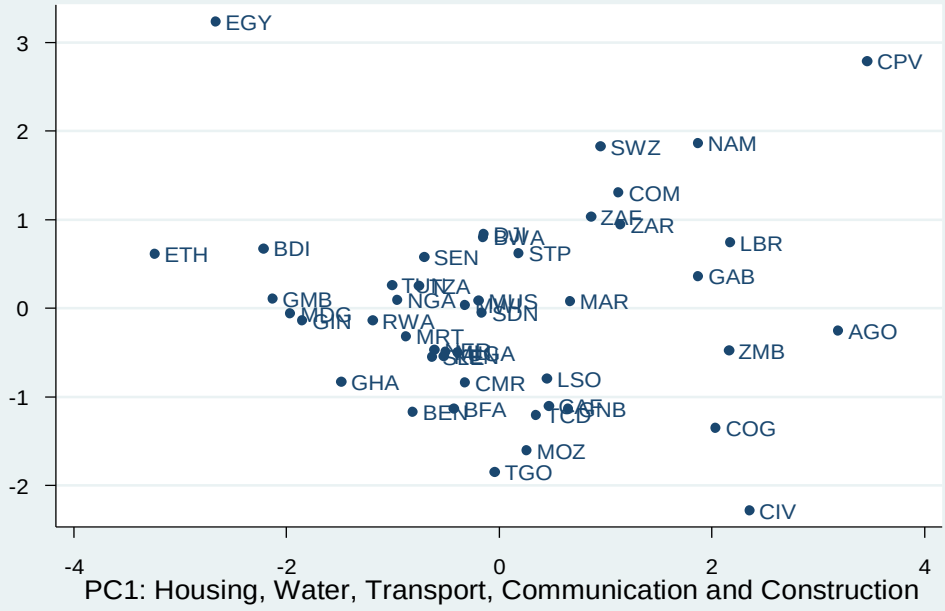
The third component is positively correlated with electricity (0.45) and communication (0.55), and negatively correlated with housing (-0.39) and construction (-0.46). Countries with high values for these components will respectively have high PLIs for electricity and communication, and low PLIs for construction and housing.

The fourth component is positively correlated with electricity (0.33) and construction (0.34) and negatively correlated with water (-0.66). Countries with high values for these components will have relatively high PLIs for electricity and construction and low PLIs for water.

A scatter plot of countries in the plane of the first two principal components is presented in Figure 7 below. From left to right, the plot presents the least expensive to the most expensive countries in terms of all infrastructure components except electricity. From the top down it presents the most expensive countries for electricity and cheapest for

communication to the cheapest for electricity and the most expensive for communication. When the two dimensions are cross-tabulated, there emerges a possible grouping of countries into 15 clusters. Some countries like Egypt, Cape Verde, Angola, and Zambia stand out and constitute single element clusters. Within clusters, countries might be expected to exhibit similarities with respect to all components. However, in some clusters, countries are similar except for one or two components. Country codes are presented in Annex 1.

Figure 7: Countries Projections in the plan of principal components 1 and 2



The 15 possible clusters are:

Cluster 1: Egypt emerges with the lowest costs for communication, construction and transportation; the third lowest cost for water; a low cost for housing; and the highest cost for electricity.

Cluster 2: Cape Verde is the most expensive for housing; the second most expensive for water; 30% above the African average cost for construction; 13% above average cost for electricity; 12% above average cost for transportation; and an average cost for communication.

Cluster 3: Angola has the highest cost for water and transportation; 20% above average cost for electricity; 23% above average cost for construction; 72% above average cost for communication; and a low cost of housing (35% below average).

Cluster 4: Zambia has the highest cost for communication; the second highest costs for transportation and housing; above average cost for electricity, the lowest cost for water; and average cost for construction.

Cluster 5: Namibia and Swaziland have 84%, 103%, 96% and 42.5% above average costs respectively for housing, water, electricity and construction; an above average cost for communication; and an average cost for transportation.

Cluster 6: Côte d'Ivoire and Congo Republic have the highest cost for construction (150% above average); the second lowest cost for electricity; and above average costs for housing (19%), water (39%), transportation (21%), and communication (56%).

Cluster 7: Gabon and Liberia have above average costs for all components, varying from 13% above average for construction up to 183% above average for water. This cluster has 20%, 25%, 43% and 78% above average costs for electricity, transportation, communication, and housing respectively. The costs of water are higher in Liberia.

Cluster 8: Comoros, the Democratic Republic of Congo, and South Africa have average costs for construction, above average costs for water (16%), and high to very high costs for transportation (26%), communication (29%), housing (52%), and electricity (77%).

Cluster 9: Botswana, Djibouti, and São Tomé and Príncipe make up this cluster, which is characterized by average costs for housing, transportation, communication, and construction, but above average costs for water (35%) and electricity (43%). It should be noted that Djibouti is different from the other cluster members in terms of the cost of water.

Cluster 10: Burundi, Ethiopia, The Gambia, Guinea, and Madagascar make up this cluster, which has the lowest costs. It has the lowest cost of communication, second lowest costs for housing, water, transportation, and construction, and a low cost of electricity (about 10% below average). In terms of differentiation within the cluster, the cost of housing in The Gambia is far less than the cluster average, while the cost of water in The Gambia and Guinea are above the average.

Cluster 11: Central African Republic, Chad, Guinea-Bissau, Lesotho, Mozambique, and Togo. This cluster has the lowest cost of housing; a below average cost of electricity; above average costs of transportation (11%), water (15%), construction (26%), and communication (58%).

Cluster 12: Kenya, Mali, Mauritania, Niger, Rwanda, Sierra Leone, and Uganda. This cluster has below average costs of housing (28%), electricity (14%) construction (15%), and transport (8%). It has above average costs of water (26%) and communication (23%). However, the cost of housing in Rwanda is far above the cluster average, while the cost of water in Mauritania and Sierra Leone is also above the average for the cluster.

Cluster 13: Benin, Burkina Faso, Cameroon, and Ghana. This cluster has the lowest cost of electricity, below the regional average costs for housing (35%) and construction (12%); average regional costs for water and transportation; and above average cost for communication (35%). In terms of differentiation within the cluster, the price of housing in Cameroon is 37% above the cluster average, while in Ghana it is 50% below the average.

Cluster 14: Nigeria, Senegal, Tanzania, and Tunisia make up this cluster which has below the regional average costs for housing and transportation (11%), communication (6%) and construction (8%). It has above the regional average costs for electricity (9%) and water (20%). It should be noted that Tunisia's cost of housing is far above (68%) the cluster average, while the cost of water is far below (80%) the cluster average.

Cluster 15: Malawi, Morocco, Mauritius, and Sudan. This cluster is characterized by below the regional average costs for electricity (21%) and communication (6%); average costs of transportation and construction, and above the regional average costs of housing (24%) and water (87%). The cost of housing in Mauritius and Morocco is above the cluster average, while the cost of water in Mauritius is 120% below the cluster average.

Conclusions

The costs of infrastructure components selected for this study (housing, water, electricity, transport, communication, and construction) vary significantly among different countries. One might expect the price levels of these infrastructure components in neighboring countries, or countries within the same regional economic communities, to be roughly of the same magnitude. However, this is refuted by the price data collected from the ICP 2005 round.

The variation among price levels suggests that policy frameworks in different countries, even those within the same regional economic communities, are not fully integrated. In this respect, they seem to be out of alignment with the prevailing rhetoric that supports integration both at subregional and regional levels. Policy frameworks should aim to channel investment toward economic drivers that will accelerate economic transformation, and thus lead to high productivity. The consensus, as espoused by the World Economic Forum,[3] is that the level of productivity determines the rates of return obtained by investments in an economy. By extension, an improvement in productivity should lead to increased trade and foster subregional and regional integration. Some studies have shown that infrastructure is key to providing an enabling environment that will attract foreign direct investment (FDI), which should translate into sustainable economic development. This is more likely to occur in countries where there is a meaningful policy framework which supports infrastructure development.

Country projections in terms of the costs of infrastructure components indicate possible clustering on the basis of similarities. The evidence suggests that the costs of some

[3] World Economic Forum, *Global Competitiveness Report 2010–2011*, p. 4.

components are unexpectedly cheaper in some clusters than in others. This flags the need for further research in order to gain a fuller understanding of the dynamics that could improve the restructuring and framing of evidenced-based policy and economic decisions.

The variation in the price levels of items such energy, communication, and transportation – which are essential factors driving a country's competitiveness – should prompt African governments to direct more investment toward infrastructure. With this in mind, international and multilateral development agencies such as the African Development Bank should continue to prioritize and scale up development funding for subregional and regional infrastructure projects.

There is also a need to define strategies and mechanisms for mobilizing resources and financing infrastructure. Various instruments for financing infrastructure within the framework of public–private partnerships (PPPs) have been considered by Mthuli Ncube in his paper on financing and managing infrastructure in Africa (Ncube, 2010). The paper analyzes different options, which include build-operate-transfer (BOT), build-own-operate-transfer (BOOT), design-bid-build (DBB), design-build-operate-maintain (DBOM), and design-build-finance-operate (DBFO). The feasibility of these proposals at national, subregional, and regional levels should be carefully reviewed and implemented as deemed appropriate to a country's specificities.

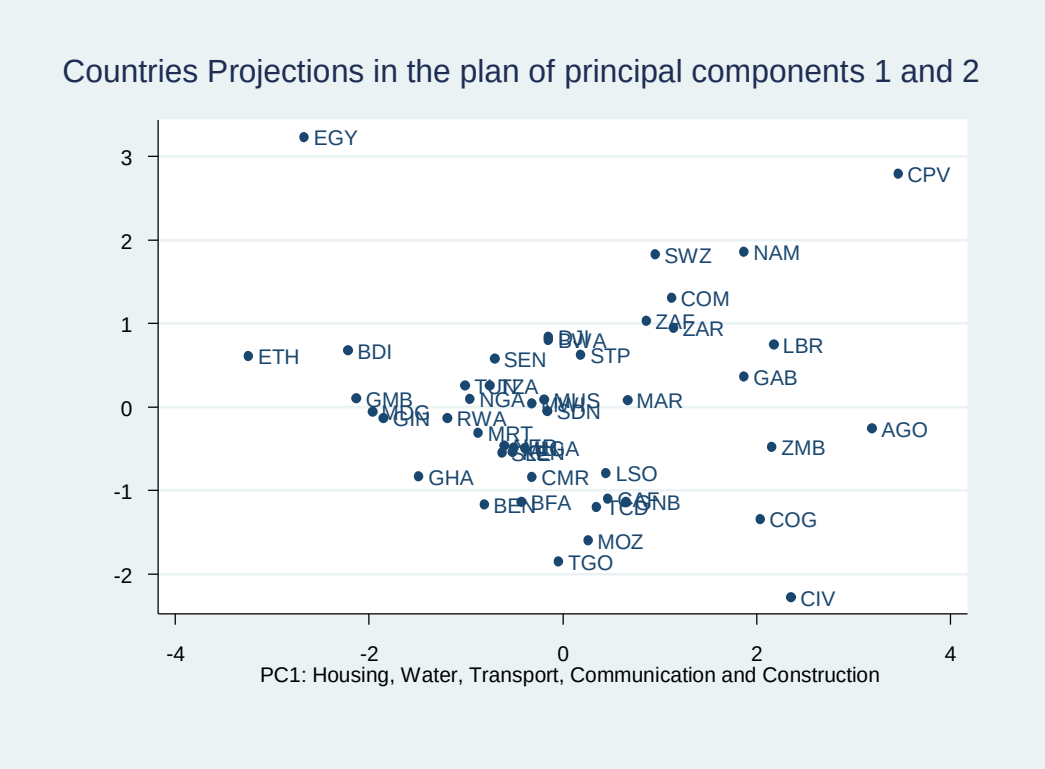
This paper has attempted to reveal the differences in price levels among countries, which may be partly a reflection of existing policies. The paper has also argued the case for a better clustering or grouping approach for countries with similar attributes, to allow an acceptable comparison on the basis of economic similarities within and outside the regional economic communities. It is recommended that this study be repeated by computing price level indices for the period 2006 to 2011, but this time it should include other economic variables. The aspiration is to gain a clearer understanding of the relationships between the observed variations in price levels of infrastructure services. Such a study should help to shed light not only on the relationship between the costs of infrastructure services in different countries, but also on the distortion in prices. Further, it should provide an indication of pace and direction of regional integration efforts aimed at enhancing investment and expanding trade.

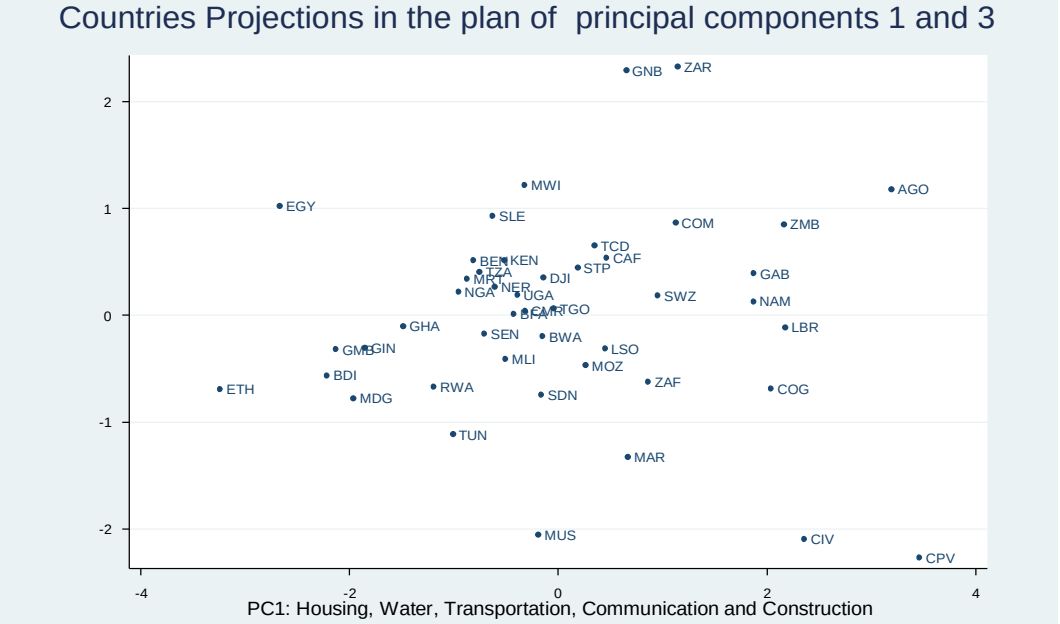
ANNEX 1: Country Codes

Country	Code
Algeria	**DZA**
Angola	**AGO**
Benin	**BEN**
Botswana	**BWA**
Burkina Faso	**BFA**
Burundi	**BDI**
Cameroon	**CMR**
Cape Verde	**CPV**
Central African Republic	**CAF**
Chad	**TCD**
Comoros	**COM**
Congo	**COG**
Congo, Democratic Republic	**ZAR**
Côte d'Ivoire	**CIV**
Djibouti	**DJI**
Egypt	**EGY**
Equatorial Guinea	**GNQ**
Eritrea	**ERI**
Ethiopia	**ETH**
Gabon	**GAB**
Gambia	**GMB**
Ghana	**GHA**
Guinea	**GIN**
Guinea-Bissau	**GNB**
Kenya	**KEN**
Lesotho	**LSO**
Liberia	**LBR**
Libya	**LBY**
Madagascar	**MDG**
Malawi	**MWI**
Mali	**MLI**
Mauritania	**MRT**
Mauritius	**MUS**
Morocco	**MAR**
Mozambique	**MOZ**
Namibia	**NAM**
Niger	**NER**
Nigeria	**NGA**
Rwanda	**RWA**
São Tomé and Príncipe	**STP**
Senegal	**SEN**
Seychelles	**SYC**
Sierra Leone	**SLE**
Somalia	**SOM**
South Africa	**ZAF**
Sudan	**SDN**

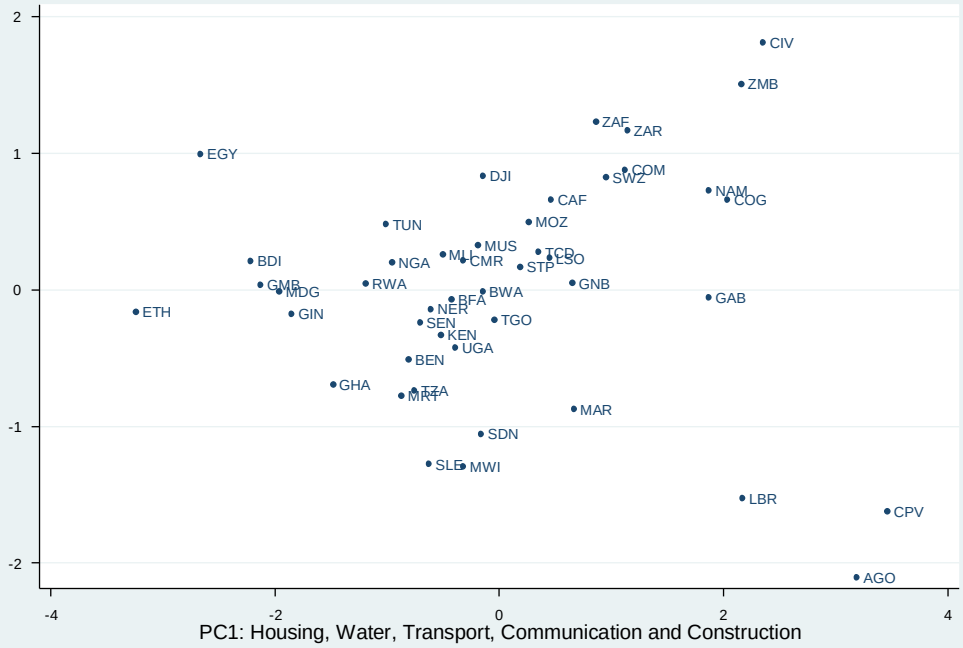
Swaziland	**SWZ**
Tanzania	**TZA**
Togo	**TGO**
Tunisia	**TUN**
Uganda	**UGA**
Zambia	**ZMB**
Zimbabwe	**ZWE**

.ANNEX 2: Country projections in the plans of the first four principal components, which explain about 83% of the total variation





Countries Projections in the plan of principal components 1 and 4

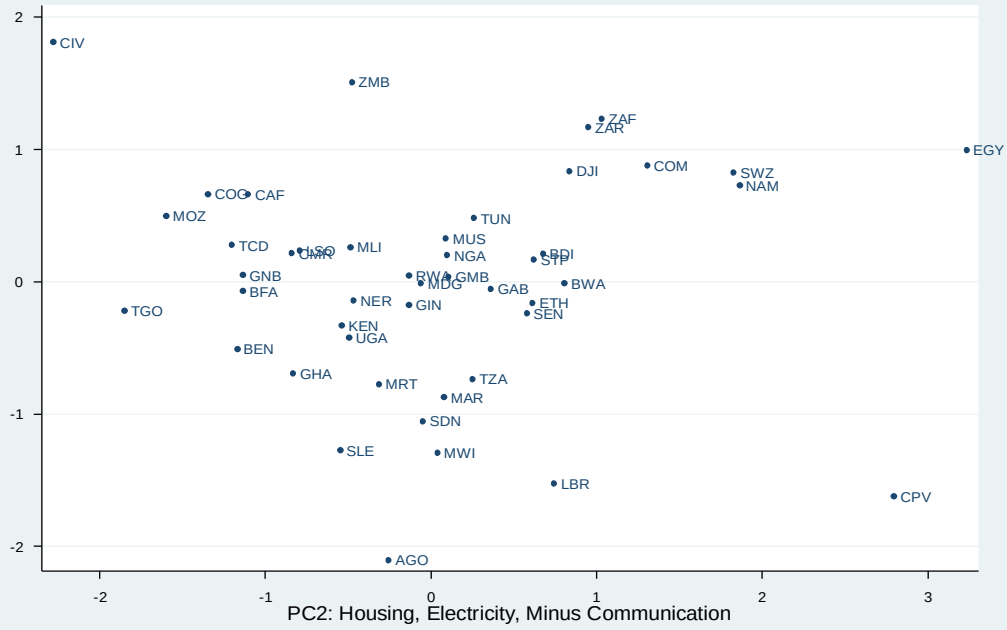


PC1: Housing, Water, Transport, Communication and Construction

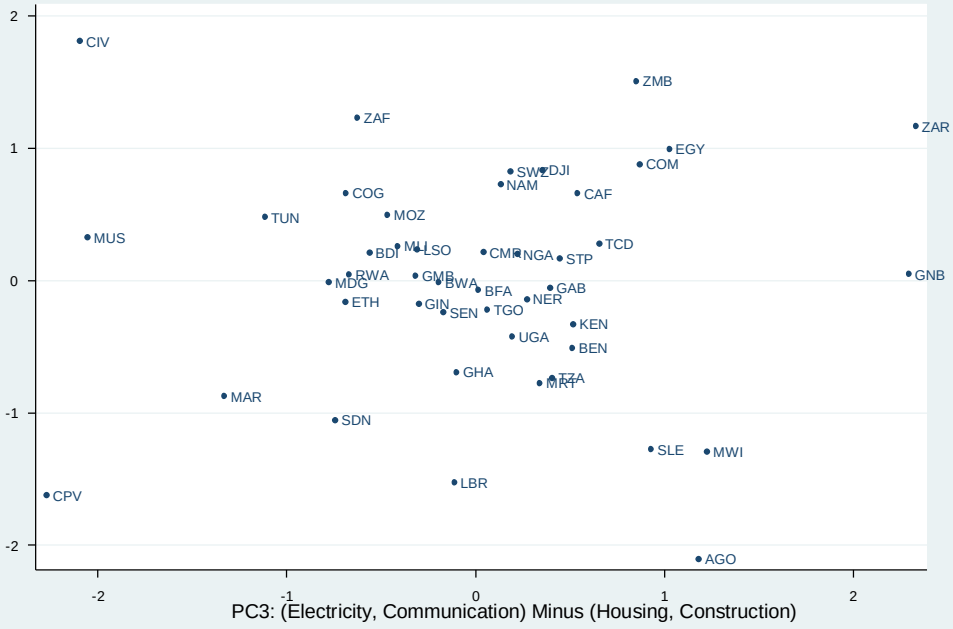
Countries Projections in the plan of principal components 2 and 3

PC2: Housing, Electricity Minus Communication

Countries Projections in the plan of principal components 2 and 4



Countries Projections in the plan of principal components 3 and 4



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