

Urbanization and economic growth: Panel Data evidence from Africa

Abate Arega Getaneh

Abstract— This study addresses the empirical question of whether urbanization can help to explain the recent pace in African economic growth, furthermore, if it can be policy instrument in the region this time around. Utilizing annual data from 35 African countries and dynamic estimation techniques, the researcher provide evidence which suggests that urbanization is statistically significant determinant of economic growth in the region. The researcher applied Generalized Method of Moments to control estimation related problems and robustness checks to scrutinize the sensitivity of the results to alternative strategies and methods. These findings reveal investment to GDP ratio; openness and average years of secondary schools are significant variables although these economies may be able to achieve more by taking steps on their trade and investment ratio. The sign and statistical significance of growth lag shows there is a conditional convergence in Africa. The study concluded that urbanization is an important factor of economic growth for the region, which stipulates that to take urbanization as a policy instrument is enviable for economic growth to take place.

Index Terms— Economic growth, Urbanization, Dynamic panel data analysis, Generalized Method of Moments, Roboustness checks

1 INTRODUCTION

Africa is the second-largest and second-most-populous continent. With about 30.2 million km² (11.7 million sq mile) including adjacent islands, it covers six percent of the Earth's total surface area and 20.4 percent of the total land area. With 1.1 billion people as of 2013, it accounts for about 15% of the world's human population [1].

According to [1], some 72 percent of Africa's urban population currently lives under slum conditions. Economists say urban areas can-and do-spur economic growth. But without improvements in local governance and infrastructure, as well as coordination between local, national, and international groups, many experts caution the region's urban areas will remain impoverished.

[2] argues that urbanization in developing countries like that of Africans is much greater than their level of development would suggest; indeed, he regards it as excessive. He argues that this "excessive" urbanization follows rapid population growth caused by, among other factors, declines in mortality rates; rapid population growth in turn leads to rural crowding and stimulates rural to urban migration.

At the turn of the century, the proportion of Africans living in urban is increasing; urbanization is of even more recent vintage in Africa. Although a few large human settlements predated the advent of European colonialism in the region, it remains the least urbanized region in the world today. However, it is important to note that its rate of urbanization is the highest in the world, and consequently, it is catching up speedily. While it is clear that African countries are experiencing unprecedented rates of urbanization, debate over the causes and effects of urbanization in the region remains heated and often rancorous [3].

The relationship between urbanization and economic growth across various countries in Africa is striking. However, as these economies urbanize and grow, it is difficult to interpret what one can expect from such growth or urbanization. In addition, whether economic growth stimulates urbanization or vice-versa, or does them move together is a prominent question.

The frontier of the literature in this field is, therefore, shifting towards providing answers to the question of why urbanization which was a necessary condition for the development of developed countries underestimated for African economic growth.

Numerous studies have confirmed positive relationship between per capita income and urbanization levels [4] and [5]. Others also have demonstrated positive link between productivity and the agglomeration of economic activity in cities [6], [7] and [8]. One influential contribution in this literature, which is the main focus of this study, is the hypothesis forwarded by [9]. These authors argue that there is close association between urbanization and real per capital income including other economic development indicators; urbanization is one of the most obvious and sticking fact of development process. This is because cities exercise enormous control over national economies. They provide jobs, access to the best cultural, educational and health facilities and they act as hubs for communication and transports which are necessary conditions for economic development of any nation. Cities also cluster massive demand for energy, generate large quantities of waste and concentrate pollution as well as social hardship.

Other studies, on the other extreme, have repeatedly demonstrated the disproportionate contribution of urban areas to national income and product [10]. In a situation whereby,

the proportion of region's population living in cities is rising at an alarming rate without proportionate increase in the economic variables of the cities, the economic development process would suffer. [11] Concluded that, cities of developing countries are faced with the challenges of rapid population increase with unaccompanied economic growth. Cities in these regions are often characterized by crises such as lack of economic dynamism, governance failure, severe infrastructure and service deficiencies, inadequate land administration, poverty and social breakdown. However, urban centers continue to grow, despite the severity of these obstacles which makes urbanization to have a weak relationship with economic development of the developing countries.

This is clearly an important prediction of the above two opposite hypotheses about the relationship between economic growth and urbanization that lend to rigorous empirical analysis using modern econometric methods and data.

Albeit an important question, the empirical evidence on the positive hypothesis of urbanization remains relatively thin in Africa. The evidences provided by [12] and [13] are geared towards their main aims of explaining urbanization respective of their goal. For instance, [12] using panel co-integration techniques found that long-run urbanization has a significant effect on growth. [14] Addressed the theories of modernization, urban bias and economic dependency, using a single cross-national study to test the arguments advanced by these theories. He used a panel data regression analysis to assess the validity of the three perspectives in 61 under developed countries between 1960 and 1980. His result provided some support for each theory and also contradicted previous studies which did not consider several important variables. Others such as [15] and [16] focused on set of countries from developing countries of Asia, Latin and Africa with different perspectives and mission to achieve in their studies which are difficult to summarize.

All of these studies present, however, only cross sectional estimates. Surprisingly, they did not adequately control for endogeneity and causality. Their results might therefore reflect unobserved characteristics which do not vary over time instead of being the consequences of urbanization or might reflect reverse causality. Other authors have examined related issues using larger samples but have not examined urbanization and economic growth using dynamic analysis in Africa directly.

Therefore, in this study, the researcher provides direct evidence on the relationship between urbanization and economic growth in Africa by employing modern panel data techniques, which take full advantage of time series variation available in recent samples. To this end, the study addresses the empirical question of whether urbanization and economic growth can help explain the recent pace in African economic growth, and whether African countries be supposed to encourage urbanization as part of economic devel-

opment strategy.

The empirical approach in this study involves regressing the most important determinants of economic growth-extended from Barro's regression model-average years of secondary schools-for measurement of human capital, openness-trade GDP ratio, government expenditures GDP ratio, investment to GDP ratio, urbanization-urban population to national population ratio and, political variables-proxied by polity which is calculated as autocracy minus democracy as suggested by related literature. The study used annual data in order to maximize sample size and to identify the parameters of interest more precisely.¹ Because of this, it is essential that the researcher allow for dynamics in the behavior of economic determinants, to capture the possibility of partial adjustment towards the steady state. The researcher carried out this by entering a lagged dependent variable on the right hand side, which, in turn, has implication for the choice of estimator. The preferred estimator in these circumstances is dynamic Generalized Method of Moments (GMM) developed by [17], which differences the model to get rid of any country specific time-invariant variable. For comparison purpose the researcher also reported estimates using Pooled Ordinary Least Squire (OLS) estimator and the Fixed Effects (within) estimator, even though in dynamic panels this is biased of down ward and order $1/T$ respectively.

Urbanization and economic growth may have reverse causality as related literature suggests. The researcher therefore takes several steps to ensure that the estimates capture the influence of the exogenous component, urbanization. To begin with, the dynamic GMM estimator that the researcher uses eliminates any endogeneity that may be stochastic due to the correlation of country specific, time-invariant, factors and right hand side regressors. Besides, in the regressions in which the researcher treats urbanization as exogenous, he uses lagged value of urbanization to prevent simultaneity or reverse causality. The reports of results in which the researcher treats all terms as endogenous using additional instruments suggested by literature. The instruments include the lagged dependent variable and other right hand side variables together with their differences (internal instrument).

The findings provide support to the Todaro and Smith hypothesis. Specifically, urbanization, openness, government expenditures GDP ratio, investment GDP ratio and political variables are statistically significant determinants of economic growth in Africa. However, the marginal effects of average years of secondary schools and openness are negatively related to the economic development of Africa. Hence, closed economies can benefit more by opening up their trade. On the other hand, no evidence is found how they close their door for external trade. But he suggests tariffs,

¹ By contrast, [14], who applied the same approach to this study, average out the annual data over five year periods, which resulted in a reduction of his sample size. This could explain most of his variables statistically insignificant.

quotas, which are instruments against trade liberalization, on goods and services. Indeed, there are many beneficiaries from this study such as researchers for further study, government and none government organizations who have concern on urbanization.

The paper is organized as follows. Section two outlines the empirical strategy, which encompasses specifying an appropriate dynamic model and estimation method. Section three describes data sets that are utilized in the estimation of the model. Section four reports and discusses the econometric results, reports robustness checks, makes comparison to related literature, and outlines the main policy implications of the researcher's findings. Finally, section five concludes and recommends some policy implications.

2 EMPIRICAL STRATEGIES

2.1 dynamic empirical models

The empirical specification in this paper is aimed at explaining the impact of development of cities (urbanization) on economic growth of selected African countries utilizing an empirical model that allows the testing of the main hypothesis of interest. Given this aim, the researcher's empirical strategy endeavors to make maximum use of both time and cross-country dimensions of available datasets, which dictates using data at an annual frequency in the estimation.² Using annual data for estimation purposes necessitates making an allowance for the possibility that the annual observations on economic growth may not represent long-run equilibrium values in any given year, because of slow adjustment to changes in other variables. To allow for the possibility of partial adjustment, the researcher specified a dynamic log-linear equation for economic growth which includes a lagged development variable. The empirical model is therefore as follows:

$$\ln Y_{it} = \alpha_t + \theta \ln X_{it} + \beta \ln U_{it} + \lambda_{it} \quad (1)$$

where Y_{it} measures the annual growth rate in real GDP per capita in country i , X_{it} is $1 \times k$ vector of variables identified as the important determinants of country growth rates in country i and at time t ; U_{it} is the interest variable which is urbanization rate in country i and at time t ; α and β and θ ($k \times 1$ vector or parameters to be estimated) are coefficients and:

$$(X_{it} = \beta_0 A_{it} + \beta_1 O_{it} + \beta_2 G_{it} + \beta_3 I_{it} + \beta_4 P_{it})$$

where A is average years of secondary schools, OK is openness, G is government expenditures GDP ratio, I is investment ratio and P is political variables proxied by polity with

² This paper's empirical strategy differs from much of the empirical growth literature, which typically averages out data over five years or ten year horizons, which is aimed at capturing the steady state relationship between the variables on hand. However, averaging out needs not always captures the steady state equilibrium while the smoothing out of time series data removes useful variation from the data, which could help to identify the parameters of interest with more precision.

their one period respected lags);

and λ_{it} is the error term that contains country and time fixed effects:

$$\lambda_{it} = \eta_i + v_t + \varepsilon_{it}$$

Where the λ_{it} is assumed to be independent and identically distribute with mean zero and variance $\sigma^2 v$.

2.2 Hypothesis testing and policy implications

Eq(1) postulates that economic growth is determined by the variables of interest-urbanization-alongside as a set of typical economic growth conditioning variables, which include: human capital captured by average years of secondary schools, terms of trade captured by openness, government consumption to GDP ratio, investment to GDP ratio, and all time invariant country specific factors including geography (sub regions) as well as political economic factors (proxied by polity).

In addition, urbanization is defined as ratio of urban population to total population. More fascinatingly, the paper can have the following dynamic regression model:

$$Y_{it} = \alpha_t + \gamma Y_{it-1} + \theta X_{it} + \beta U_{it} + \lambda_{it} \quad (2)$$

where everything is the same as in (1), but in (2), the researcher included the lagged dependent variable, that summarizes past history of economic growth, to make the model dynamic. So this will be the final reduced form for regression.

The last comment that needs to be made on the interpretation of the estimated coefficients is that the presence of the lagged dependent variable in the model means all the estimated beta coefficients represent short-run effects. The long-run effects can be derived by dividing each beta' by $1 - \gamma$, the coefficient of the lagged dependent variable.

2.3 Dynamic panel GMM estimation

The inclusion of the dependent variable in the empirical model implies that there is correlation between the regressors and the error term since lagged economic growth depends on λ_{it-1} which is a function of the η_i - the country specific effect. Because of this correlation, dynamic panel data estimation of Eq. (1) suffers from the [18] bias, which disappears only if T tends to infinity. The preferred estimator in this case is GMM³ suggested by [17] which basically differences the model to get rid of country specific effects or any time-invariant country specific variable. This also eliminates

³ GMM refers to a class of estimators which are constructed from exploiting the sample moment counterparts of population moment conditions (sometimes known as orthogonality conditions) of the data generating model. GMM is an estimation procedure that allows economic models to be specified while avoiding often unwanted or unnecessary assumptions, such as specifying a particular distribution for the errors. An additional advantage of the GMM estimator is that by differencing, it helps to ensure that all the regressors are stationary.

any endogeneity that may be due to the correlation of these country specific effects and the right hand side regressors.

The moment conditions utilize the orthogonality conditions between the differenced errors and lagged values of the dependent variable. This assumes that the differenced errors is, therefore, MA(1) with unit root. To this end, two procedures to test for first order and second order serial correlation in the disturbances. One should reject the null of the absence of first order serial correlation and not reject the absence of second order serial correlation. A special feature of dynamic panel data GMM estimation is that the number of moment conditions increases with T. Therefore, a Sargan test is performed to test the over-identification restrictions. There is convincing evidence that too many moment conditions introduce bias which increasing efficiency. It is, therefore, suggested that a subset of these moment conditions be used to take advantage of the trade-off between the reduction in bias and the loss in efficiency [18] For example, for the data set used in Table1 with $N = 35$ countries and $T = 26$, the researcher restrict the moment conditions to a maximum of two lags on the dependent variable. This yields a Sargan statistic that is asymptotically distributed as Chi-squared with 24 degrees of freedom, i.e., 35 over identification restrictions.

The benchmark dynamic GMM estimation treats all the variables other than lagged dependent variables as if they were exogenous, in that it assumes they are uncorrelated with the λ_{it} . Thus, the researcher runs therefore lags all the right hand side regressors by one period, which makes this assumption safe. In so far as the λ_{it} are independent of each other and uncorrelated across time-which the researcher tests for-this treatment of the regressors is sufficient to prevent any bias in the estimated coefficients due to simultaneous common shocks to economic growth and the right hand side regressors. It is important to note here, at the risk of repetition, that the differencing of the estimator carries out already removes any correlation that may be due to unchanging common deriving forces, including all time-invariant political economy factors.

The researcher also reports dynamic GMM estimated in which the urbanization terms are treated as endogenous, using also additional instruments suggested by related literature. The trade off that the researcher does face is that the number of moment conditions increases greatly with the additional instruments that are introduced, which may introduce additional bias. For these regressions the researcher therefore restricts the moment conditions to just one lag on the dependent variable, while using the additional instruments. The researcher continues to treat urbanization as exogenous in these runs and he therefore uses its lagged value to avoid any bias due to simultaneous common shocks to economic growth.

3 DATA, MEASUREMENTS AND SOURCES

The researcher utilized panel data set to estimate Eq. (2). 35⁴ countries and 26 years due to data availability but it didn't have limitation on the result. The 35 countries are selected from different regions of Africa and they can represent the economic as well as urbanization of respective regions and from 54 countries 35 are scientifically persuasive. However, no systematic way is followed during selecting the countries rather availability of data is considered. Polity is constructed as democracy minus autocracy and had values from (-10 to 10). Urbanization is constructed as a ratio variable- urban population to national population. So in the analysis either the level or the growth of this variable is used. All the data are from 1985 to 2010 for all countries. Openness is constructed as a trade share and this indicator is defined as the volume of a country's foreign assets and liabilities (% of GDP). At any given point in time, this measure provides a useful summary of a country's history of trade openness. For the researcher's purposes, this is an advantage over flow-based measures like the World Development Indicators (WDI) measure of gross trade flows, which places all the emphasis on the current observations. Government expenditures (which is the public authorities expenditure on goods and services (excluding transfer payments), i.e. consumption and gross fixed capital formation) measured at $\frac{\text{Government expenditures}}{\text{GDP}}$ is deployed in the paper from PWT⁵ (Pen World Table). Investment GDP ratio (Investment is all economic activities which involves the use of resources to produce goods and services) measured $\frac{\text{Investment}}{\text{GDP}}$ and from PWT. Average years of secondary schools (accumulated years of schooling in the employable age as educational attainment) measured average number of years from WDI. Polity (political or governmental organization) measured democracy score minus autocracy scores is from the above both sources.

The data sets are summarized in Table 1. These tables provide the definition and source of all key variables, their units of measurement, means, and standard deviations (overall, between and within countries), and minimum and maximum values. Additionally, they provide the correlation coefficients between all key variables which aid the modeling and help to confirm the choice of instruments.

It can be see that all the variables, including the log values, display considerable variation both between and within countries, justifying the use of panel estimation techniques,

⁴ Algeria, Benin, Botswana, Burundi, Cameroon, Central African Republic, Congo, Dem. Rep., Congo, Republic of, Cote d'Ivoire, Egypt, Gabon, Gambia, The, Ghana, Kenya, Liberia, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe

⁵ PWT is Penn World Table mark 7.1 and WDI is World Development Indicators 2011.

which should allow the identification of the various parameters of interest. Moreover, the correlation coefficients⁶ are within plausible ranges and confirm the choice of both regressors and instruments.

But there is of slight collinearity among average years of secondary schools and urbanization variables but it is below the Rule of Thumb i.e. 0.8. Other results are below 0.5 and this in turn also shows absence of significant collinearity problem between variables. Regarding the sign of individual correlation, the variable government expenditures is the only one negatively related with growth rate of real GDP. This means, there is a negative linear relationship between economic growth and government expenditures. A positive linear relationship is documented between growth rate of real GDP per capita and the remaining independent variables.

4 EMPIRICAL ANALYSES

This section reports the results of estimating Eq. (2) on the data set described above using dynamic GMM estimation and outlines their implications for the hypotheses of interest. It also reports the results of variety of robustness check the sensitivity of the results to different estimation methods and time periods. Finally it carries out tests of the urbanization hypothesis and discusses policy implications.

IJSER

⁶ The other importance of the correlation matrix is to measure the severity of linear relationship among the economic growth explanatory variables. In a nut shell, the reported outcome reveals the absence of the problem of multicollinearity

Table 1 Summary statistics and correlation matrix: economic growth in African countries data set, annual data (1985-2010 observations = 910)

Variable	source	unit of measurement	Mean	Overall Std. Dev.	Between Std. Dev.	Within Std. Dev.	Min	Max
Growth	PWT	Growth rate of real GDP per capita income	0.744398	7.420434	1.876785	7.185916	-70.9	64.2
Urbanization	PWT	Urban population to national population	0.363905	0.1638753	0.160940	0.040814	0.0506	0.864
openness	PWT	Import + Export/ GDP	62.81538	31.13507	25.9645	17.71379	6.69	192
G. expenditure ratio	PWT	Government expenditures/GDP	11.25042	6.6824	6.058746	2.9926	1.11	42.5
Investment ratio	PWT	Investment /GDP	18.86499	11.01657	8.885732	6.676838	1.02	61.7
Ayss1	WDI	Average number of years	1.201604	0.808407	7	3	0.07	3.34
Polity	PWT and WDI	From -10 to 10 as discrete variable	-	-	11.51233	17.52333	-88	10
Countries =35	Algeria, Benin, Botswana, Burundi, Cameroon, Central African Republic, Congo, Dem. Rep., Congo, Republic of, Cote d'Ivoire, Egypt, Gabon, Gambia, The, Ghana, Kenya, Liberia, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe.							
Correlation matrix								
	Growth	Urban ratio growth	Openness	G.expenditure ratio	Investment GDP ratio	Ayss15	Polity	Ur. ratio
Growth	1.000							
Urban ratio growth	0.0201	1.0000						
openness	0.0291	-0.0280	1.0000					
G. expenditures GDP ratio	-0.019	0.0255	-0.2187	1.0000				
Investment GDP ratio	0.1587	0.0874	0.3741	-0.2185	1.0000			
Ayss15	0.0524	0.1354	0.5012	-0.2917	0.3906	1.0000		
Polity	0.2492	-0.0246	0.1072	0.0864	0.2289	0.1411	1.0000	
Urbanization ratio	0.0208	0.2454	0.3575	-0.4213	0.3289	0.7157	0.0713	1.000
								0

4.1 Estimation results

The main results of the paper are presented in Table 2 and 3. The tables contain the estimates of economic growth regressions using the dynamic GMM estimator in which the urbanization terms are treated either in level or growth, in which the difference and system GMM result became efficient and significant. In each case the instruments outline in the previous section are utilized. It is worth emphasizing that the moment conditions utilize lags of the dependent variable in both cases.⁷ Table 4 present the results using

other estimation methods [pooled OLS and FE (Fixed Effects)], to compare the result with the dynamic analysis results.

going straight to the hypothesis of interest, the researcher notes that in the economic growth regressions utilizing both urbanization at level and its growth enter with positive and statistically significant coefficients that is also significant at 1% level. Moreover, the estimated coefficients suggest that the impact of urbanization is economically meaningful. Importantly, the treatment of urbanization terms as endogenous does not change the qualitative nature of the results. Specifically, it does not alter sign or the statis-

growth variable respectively.

⁷ In order to keep the number of moment conditions under control, the maximum number of lags of the dependent variable is restricted to two or one, depending on whether urbanization treated us level or

tical significance of any variables. Only the magnitudes of the coefficients and the level are affected. In particular, the coefficient of urbanization ratio rises from 22.35 to 119.52 and 5% level to 1% in FE and differenced GMM results respectively.

From the regression result below in Table 2, as matter of novelty, the study came up with very interesting evidence for presence of conditional convergence in African countries. Since the coefficient of the first lag of per capita GDP is negative and significant at 1%, it confirms that countries with lower per capita income grew faster than countries with higher per capita income. The result is in line with the theoretical prediction that was dealt in the previous sections as well as the empirical investigations of [2], [19], [20], [21] and others.

The polity variable which captures the political status of a country has a positive and statistically significant effect on per capita income growth. In fact, there is no consensus on the impact of political variables such as democracy and autocracy on growth in the theoretical literature. The GMM output elucidates a 1% increase in polity will lead to a 0.039% long-run significant rise in the growth of African

Citrus paribus, a 1% adjustment in the level of investment ratio, results in a 0.27% change in the growth rate of per

economies. This evidence supports the researcher’s argument that democratic states have a tendency to grow faster than autocratic states as evidenced by [2]. For example, [14], in his argument states that, economic freedoms, in the form of free markets and small governments that focus on the maintenance of property rights, are often thought to encourage economic growth.

This result suggests that, African countries should increase and/or establish the level of trade taxes, quotas, exchange controls and other restrictions which are against trade liberalization. The executed elasticity of openness for Africa is in contrary to the theoretical predictions as well as empirical results of [19], [21], [22] and others. This might be due to the nature of economy in Africa, i.e., since most African countries are in transforming their economies to the industrial level from agriculture, it is not appropriate to compare them from the framework of developed country perspective. The estimated elasticity of investment ratio has the theoretical signs predicted by the Solow growth model. The coefficient of investment ratio variable is positive and significant (at 1%) level, reflecting the importance of investment ratio for developing countries such as Ethiopia.

capita GDP. This result is in line with the vast empirical outcomes of growth models such as [23].

Table 2 The impact of urbanization on economic growth: DGMM regression outcomes

Variables	Coefficient	Standard deviations	t-Statistic	Probability
Growth lag	-0.3166741	0.021011	-15.07	0
Urbanization	119.5205	34.69101	3.45	0.001
Average years of 2ndary schools	-10.63039	5.457245	-1.95	0.059
Investment GDP ratio	0.2717542	0.026777	10.15	0
Government expenditures GDP ratio	-2.273036	0.296418	-7.67	0
Openness	-0.2937805	0.034983	-8.4	0
Polity	0.0397547	0.0161	2.47	0.019
Effects specification				
Cross-section fixed (orthogonal deviations)				
Period fixed (dummy variables)				
	Mean dependent variable	0.744398	S.D. dependent variable	0.2459
	S.E. of regression	0.081007	Sum squared residuals	49261.69
	J-statistic	49.8	Instrument rank	30

Notes:

1. The dependent variable is the growth of per capita GDP. Growth lag is the first lag of growth of per capita GDP.
2. Period specific effects to account the unobserved time specific effects.

3. Standard errors are robust to serial correlation and corrected for heteroskedasticity.
4. On the table ***, **, * indicates the test is significant at 1%, 5% and 10% respectively.
5. The lag of the dependent and independent variables are used as instruments.
6. The researcher has employed STATA (version 12) to estimate the dynamic difference growth GMM regression equation.

By turning one's attention to the main topic of investigation at hand, that is, the relationship between urbanization and economic growth, Table 2 depicts difference GMM estimation results, where the researcher used lagged and difference variables as instruments for country level economic growth rates. The result shows that a strong impact of urbanization on economic growth. Specifically, The GMM estimate of the impact of urbanization on productivity is 119.5 as it is visible in column 2. Moreover, this estimate is highly significant; and it is larger than the pooled OLS estimate reported in Table 4 This suggests that measurement error in urbanization that creates attenuation bias is likely to be more important than reverse causality and omitted variables biases.

Table 3 System GMM one step result

Variables	SGMM
Growth lag	-0.0152 (-0.028)
openness	-0.00457 (-0.0199)
G. expenditure	-0.205** (-0.083)
Investment ratio to GDP	0.205*** (-0.0528)
Averag.yss	-3.975*** (-1.216)
polity	0.120*** (-0.016)
Urban growth	181.5*** (-53.98)
Number of instruments	331
Wald chi2(2)	98.71
Prob > chi2	0
Observations	875
Number of country	35

Notes:

1. The dependent variable is the growth of per capita GDP. Growth lag is the first lag of growth of per capita GDP.
2. Period specific effects to account the unobserved time specific effects.
3. Standard errors are robust to serial correlation and corrected for heteroskedasticity.
4. On the table ***, **, * indicates the test is significant at 1%, 5% and 10% respectively.
5. The lags of the dependent and independent variables are used as instruments.
6. The researcher has employed STATA (version 12) to estimate the dynamic difference growth GMM regression equation

Moreover, akin to the authors, the result confirms the significance of urbanization as a favorable factor of economic growth for Africa countries. Similar to empirical investigations of [9], [12], [13] and [24] the current study confirms the fact that urbanization policy plays a pivotal role in the growth endeavor of African countries. Countries that pursue major and appropriate urbanization policy are very likely to spur their real per capita GDP.

As one can see from the results of system GMM analysis part, Table 3, urbanization growth rather than urban ratio became a significant variable

It is also worth nothing that in all economic growth regressions reported in Table 2 and Table 3 all the diagnostics are satisfactory, irrespective of the treatment of urbanization either in ratio or growth terms. Specifically, the Sargan test does not reject the over-identification restrictions, the absence of first order serial correlation is rejected and the absence of second order serial correlation is not rejected. Moreover, the lagged dependent variable in both cases is significant. Though its coefficient is quite low, suggesting considerable persistence, it's statistically different from unity in both cases. The researcher therefore, concludes that dynamic GMM is pertinent estimator and can consequently be relied upon to carry out statistical inference relating to the hypothesis of interest.

Table 4 Comparison between estimation results

Variables	(1) Pooled OLS	(2) FE	(3) DGMM	(4) SGMM
Growth lag	0.0393 (-0.034)	-0.00421 (-0.0346)	-0.257*** (-0.0121)	-0.0152 (-0.028)
Urbanization ratio/ urban growth for SGMM/	-2.149 (-2.257)	22.35** (-9.806)	76.20*** (-14.93)	181.5*** (-53.98)
Average years of 2ndary schools	0.151 (-0.473)	-1.735 (-1.425)	-5.676*** (-1.75)	-3.975*** (-1.216)
Government expenditure	-0.0415 (-0.0414)	-0.187** (-0.0825)	-0.155* (-0.0852)	-0.205** (-0.083)
Investment ratio to GDP	0.0818*** (-0.0258)	0.0952** (-0.0395)	0.212*** (-0.0544)	0.205*** (-0.028)
Openness	-0.00979 (-0.00936)	0.00245 (-0.0145)	-0.0479** (-0.02)	-0.00457 (-0.016)
Polity	0.0788*** (-0.0126)	0.0750*** (-0.0146)	0.120*** (-0.0168)	0.120*** (-0.016)
Constant	1.381 -1.093	-4.683 -2.857	-	- 98.71
Observations	875	875	875	875
R-squared	0.078	0.063	-	-
Number of country	35	35	35	35
Number of instruments	-	-	305	331
Prob > F	0	0	0.0003	0.028
AB test AR(1) Pr > z	-	-	0.067	-0.004
Hansen test Prob > chi2	-	-	0.842	0.752

Notes
 Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1 (level significance)

As far as the economic growth regressions are concerned, it is important to note that it was necessary to enter a second lags of the dependent variable to capture the richer dynamics of this variable. By and large, the findings from both data sets suggest that average years of secondary schools and trade openness are statistically significant determinants of economic growth, even though the evidences show unexpected signs. The marginal effects of trade openness on economic growth appear to be negatively related to the economic growth. However, the diagnostic statistics in the developing countries

data set cast some doubt on the robustness of these findings, suggesting that they should be treated with a fair degree of caution. The researcher therefore focuses the rest of this paper on checking the robustness of the results on economic growth and analyzing their policy implications.

4.2 Robustness check

A large number of robustness checks were carried out to examine the sensitivity of the results to alternative estimation strategies and methods. Here the researcher only reports a

subset of the checks carried out.

The first set of robustness check involves using an alternative estimation method. To this end he reports above the results of estimating the economic growth equation in the largest of his two samples using the Fixed Effects estimator and pooled OLS estimator in which country and time dummies are included (but are not reported to save space). Below is the result of FE for comparison purpose.

$$\begin{aligned} \ln Y_{it} = & -0.26 \ln Y_{it-1} + 22.35^{**} \ln U_{it} - \\ & (0.45) \quad (0.02) \\ & - 3.18 \ln A_{it} - 0.002 \ln K_{it} - 0.187^{**} \ln G_{it} + 0.095 \ln I_{it} \\ & (0.22) \quad (0.34) \quad (0.04) \quad (0.01) \\ & + 0.075^{***} \ln P_{it} \\ & (0.00) \end{aligned}$$

The F-test for the significance of country dummies is F (7,833) with an observed value of 7.97, which is statistically significant at 1% level.

These results are qualitatively very similar to those obtained using the Dynamic GMM estimator that are reported in Table 2 and 3. Specifically, the coefficient of lagged dependent variable is remarkably close to what is obtained with the GMM estimator except in this case it is insignificant. While some of the other coefficients are smaller than those obtained with the GMM estimator, they have the same sign except openness variable, as is the case with the GMM estimator.

The researcher also estimated the same equation using Fixed Effects IV estimator, with a similar instrument set to that used in Table 3. The qualitative nature of the results, which are not reported here to save space, is very similar to that, obtained using the Dynamic GMM estimator. Specifically, the lagged dependent variable remains negative but insignificant with a coefficient of about -0.26. The political variable (polity) is positive and highly significant, albeit with smaller coefficients.

Polity has a somewhat larger coefficient compared to that obtained with Dynamic GMM and remains highly significant. But openness has larger coefficient compared to dynamic GMM and insignificant.

The researcher therefore concludes that the qualitative nature of the results is somehow robust to alternative estimation methods especially the interest variable, urbanization. However, he does not pursue either of the Fixed Effects estimators any further since they are biased when a lagged dependent variable is present. In the same way, he also performed pooled OLS estimation method as a bench mark and by doing so he checked the sign and magnitudes of the variables. However, as expected the result is highly biased down ward due to its dynamic nature in which it calls for other instrumental variable methods.

Estimation tests

1. test for time fixed effects: $f(34,809)=1.11$ and $pro>f=0.3092$
2. Wald χ^2 in SGMM = 98.7 and $pro \chi^2 = 0.000$
3. ADF test for growth (calculated Z value =42.76)
4. ADF test for urbanization (calculated values =4.42)
5. AB test for zero autocorrelation: order one $pro > z = 0.000$
6. Sargan's test of over identification: $pro > J = 0.000$
7. Pesaran's test of cross sectional independence: $pro = 0.013$
8. Breusch pagan constant variance test: $pro \chi^2 = 0.000$

5 CONCLUSIONS

In this study, the researcher has explored the impact of urbanization on the economic growth of selected African countries. By employing a panel data set of 35 African countries from the period 1985 to 2010, the impact of urbanization on economic growth of those African countries was examined. To achieve this, the researcher used several statistical/econometrical approaches.

Different theoretical models and empirical investigations have demonstrated how urbanization can generate incorrect/correct signals to economic development and thereby result in distortion which is due to unavailability of data and methodological weaknesses. These and other related issues caught the attention of the researcher towards studying African urbanization and its impact on the continent's economic growth. And finally, the researcher was able to draw the following main conclusions.

First, the overall growth of urbanization is highly important and has been shown to be quite robust to the inclusion of potentially relevant covariates in regression as well as in different estimation methods.

Second, there is the presence of conditional convergence in Africa. Therefore, poor countries have the tendency to grow faster than rich countries. Those countries with the lowest growth rates are those who did not urbanize. For this reason, they have poor institutions which repress growth and promote poverty. Nevertheless, all other things being equal, it will not be enough for poor countries simply to urbanize their economies to spur growth rates and reduce poverty.

Third, at least for some times, African countries use import restriction mechanisms such as trade quotas, import taxes tariffs and others trade barriers which are against trade liberalization.

Hence, to increase effectiveness of urbanization to economic growth, policy makers in those countries must give much attention to the integration of their urban policy to rural economy on the way to maintain the positive forward and backward linkage between the two.

Finally, the study suggests that more specific political economy mechanisms and explanations including its qualitative importance called for, not only to guide future empirical work in the area, but also to deepen one's understanding of the political economy aspects of urbanization on economic growth.

REFERENCES

- [830] United Nations (2007) World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2007 Revision, Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, <http://esa.un.org/unup>.
- [2] Barro, R. (1997) Determinants of Economic Growth, MIT Press, Cambridge.
- [3] Moomaw, R. and Shatter, A. (1993) Urbanization as a Factor of Economic Growth: An empirical study, *Journal of Economics*. 19(2): 1-6
- [4] Fay, M. and Opel, C. (2000) Urbanization without growth: A not-so uncommon phenomenon. Policy Research Working Paper, No. 2412: The World Bank.
- [5] Polese, N. (2005) Cities and National Economic Growth: A Reappraisal. Routledge Taylor & Francis Group. *Urban Studies*, (42) 8.
- [6] Gleaser, E. (2000) The Economies of Urban and Regional Growth. Oxford: University Press.
- [7] Krugman, P. (2000) Increasing Return and Economic Geography. *The Journal of Political Economy*, (99).
- [8] Quigley, J. (2007) Urbanization, Agglomeration and economic Development. Paper presented at the World Bank Seminar on Growth and Development, Washington, D.C.
- [9] Todaro, M. and Smith, S. (2003) Economic Development. Singapore: Pearson Education, Inc.
- [10] World Bank (2009) World Development Report 2009: Reshaping Economic Geography. Washington, DC: World Bank.
- [11] Rakodi, C. (2004) African Towns and Cities: Power Houses of Economic Development or Slums of Despair? Paper to "City Future" Conference, University of Illinois, and Chicago.
- [12] McCoskey, S. and Kao, C. (1998) A Panel Data Investigation of the Relationship between Urbanization and Growth, Mimeo Syracuse University
- [13] Bradshaw, Y. (1987) Urbanization and Underdevelopment: A Global Study of Modernization, Urban Bias, and Economic Dependency. *American Sociological Review*. 0(50): 224-239.
- [14] Barro, R. (1997) Determinants of Economic Growth, MIT Press, Cambridge.
- [15] Henderson, J. (2003) The Urbanization Process and Economic Growth: The So What Question. *Journal of Economic Growth*, 8(1): 47-71.
- [16] Bertinelli, L. and Strobl, E. (2003) Urbanization, Urban Concentration and Economic Growth in Developing Countries, CORE Discussion Paper 2003/76, Belgium.
- [17] Arellano and Bond (1991) some tests of specification for panel data: Monte Carlo Evidence and Application to Employment Equations. *Review of Economic studies*, 58, pp. 277-297.
- [18] Baltagi, B. (2005) *Econometric Analysis of Panel Data 3rd Edition*. West Sussex: England.
- [19] Aguirrea A., Caldern, C. (2006) The Real Exchange Rate Misalignments and Economic Performance, Central Bank of Chile Working Paper No. 315, April.
- [20] Toulaboe, D. (2000) Real Exchange Rate Misalignment and Economic Growth in Developing Countries, Fort Hays State University.
- [21] Sallenave A. (2010) Real exchange rate misalignments and economic performance for the G20 countries, Document of Travail Working Paper
- [22] Elbadawi, I. and Soto, R. (2008) Theory and Empirics of Real Exchange Rates in Sub-Saharan Africa and Other Developing Countries, *Journal of Development Economics*.
- [23] Nouira, R. and Sekkat, K. (2010) Desperately Seeking the Positive Impact of Undervaluation on Growth, the Economic Research Forum. Working Paper Series No. 560
- [24] Oluwasola, O. (2007) Social System, Institution and Structures; Urbanization Poverty and Changing of life. Paper presented at the Session of the Foundation for Environmental Development and Education in Nigeria.

ACKNOWLEDGMENT

The author wish to thank Prof. Desta Hamito, Habtamu Ali, Dr. Zerayehu Simie and Mahibere Kidusan, EOTC.

The author is a student in Brescia University, Italy

Department of Economics and management

agayh12@gmail.com