Urban Growth and Sustainable Socio-Economic Development in Africa

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Abstract

The paper examines the impact of urbanisation on the socio-economic development of Africa countries. We challenge the view that urbanisation, specifically the concentration of urban population in mega-cities, is effective for the economic growth of the country and even desirable. We empirically prove that the relationship between economic growth and urbanisation is not so robust in African countries and that, on the opposite, negative social consequences such as deteriorating access to water and sanitation facilities are associated to urbanisation.

1 Introduction

As of 2008 more than one half of the world population is urban and the share is expect to increase significantly in the very next decades. In the past, South-East Asian countries contributed the most to the this process but more recent data are unveiling the role of African countries. According to the United Nations World Urbanisation prospect, in 2015 Asia accounted for more than a half of the urban population in the world while only 12% of the urban population lived in Africa. However, by 2050 the share of Asian urban population is expected to remain stable while the African one almost to double.

One characterising feature of the urban development in Africa is the geographical concentration of population. In this respect Africa appears to follow the trend already seen in Asia, with a strong concentration on few mega-cities. In Sub-Saharan Africa there is already a significant number of large cities with more than 1 million inhabitants and few cities have reached and surpassed the thresholds of 5 millions and 10 millions. Not surprisingly, these are the cities in which the growth rate of population was the highest, often above 5%.

The economic literature has long emphasised the role of cities in gathering the potential for economic development of countries, primarily through market based mechanisms working with agglomeration economies (Duranton, 2015). The relationship between urbanisation and economic development has proven robust examining the context of western cities, especially cities in the US and Europe, but African cities present marked differences. Differently from western economies, where the economic development follows the positive productivity gap between urban and rural workers (citazione), in African countries urbanisation followed the economic growth that has been, in turn, driven by external factors primarily related to the exploitation of natural resources (citazione gradita). As a consequence, economic growth has not always promoted the industrial transformation at the benefit of the manufacturing and services sectors that can effectively transform the geographical concentration of people into real agglomeration economies and productivity gain (United Nations, 2017).

Driven by the evidence that many highly urbanised countries in Africa have now escaped the low-income status to become middle-income, promoting urbanisation is often indicated as a successful strategy to reach the economic development of African countries (cite reports on ghana and rwanda). Problems related to the negative environmental consequences of urbanisation (CO2 emissions, congestion, waste management) and the insufficient capacity to provide adequate infrastructures and services become secondary with respect to the goal of economic development. Specifically these problems emerge in large cities, simply because they have become far too large that required to benefit the economic growth of the country.

In this work we empirically test the relationship between economic growth and urbanisation in African countries controlling also for the concentration of population in largest cities. We use Millennium Development Goal data on African cities from year 1990 to 2015 and find no evidence that the increase in urban population in a country promotes its economic growth, nor we find evidence that concentration of urban population in the main city is beneficial to this objective. In contrast, using urbanisation to explain the variation in socio-economic indicators reflecting the status of the economy and the deprivation of households, we find evidence that urbanisation is cause of a worsen access to important services such as water and sanitation. The concentration of population in the capital city further contributes to this negative outcome.

In the remaining of the paper we describe the dataset and the empirical approach in section 2. In section 3 we present the empirical results. A discussion of these results concludes the work.

2 Data and Strategy

To investigating whether urbanisation stirs economic growth in Africa we estimate a standard Barro-type (Barro 1991) growth regression 1 on a panel of African countries for which data is available.

$$\log\left(\frac{GDP_{i,t+1}}{GDP_{i,t}}\right) = \alpha_i + \beta_0 \log\left(GDP_{i,t}\right) + \beta_1 urban_{it} + \beta_2 poplargest_{i,t} + \gamma X_{i,t} + \varepsilon_{it}, \tag{1}$$

where the term on the right hand side is the per-capita GDP growth rate measured as the logarithm of the ratio of the GDP per-capita at time $t+1$ over the GDP per-capita at time t in the i^{th} African country (54 on total) . The time index t refers to the years from 1990 to 2015 with a 5-year gap. The independent variables consist of the logarithm of the country level of initial GDP per-capita and a measure of urbanisation, which is given by either the proportion of total population living in urban area or the proportion or urban population living in the country's largest city at time t. The first term is standard in Barro-type regression and tests the hypothesis of convergence predicted by the Solow model (Solow 1956). The second and third terms measure the contribution of urbanisation to the economic growth of a country (Duranton 2015). X'_{it} is a vector of control variables, which includes a measure of the country investment rate, a measure of the country natural resources dependencies and a proxy for human capital, the lower secondary school completion rate. The last term, ε_{it}, corresponds to the idiosyncratic error term.

The second question of this study concerns whether urban expansion promotes the improvement of socio-economic conditions. We try and address this issue estimating the following linear panel regression with fixed effects.

$$performance_{it+1} = \alpha_i + \beta_1 urban_{it} + \beta_2 poplargest_{i,t} + \gamma X_{i,t} + \xi_{it}, \quad (2)$$

where $performance_{it+1}$ corresponds to several measures of socio-economic performance for country i in year $t+1$: GDP per-capita, the proportion of population (both, total and urban) with access to water, the proportion of population (both, total and urban) using improved sanitation facilities and the percentage of urban households living in slums.

For this equation data is yearly for the 54 African countries. The variable $urban_{it}$ returns the proportion of total population living in urban areas and X_{it} represents a vector of control variables. These are the same of equation 1.

Both equation 1 and 2 suffer of specification problems because many of the information conditioning both the level of per-capita income and its growth are not observable in the dataset. As well known, African countries share a common history of past colonisation that resulted, however, in very different institutional and cultural settings today. This information is relevant in our context as it may condition the degree of urbanisation as well. To avoid the estimation bias arising from this mispecification we rely on the inclusion of country-level fixed effects α_i. In the equation 2, in addition, we may experience estimation problems connected to the simultaneity between the explained and the explanatory variables. In this case we use the values of explanatory variables lagged by one period.

We extract data from the World Urbanisation Prospect (United Nations). In particular we keep yearly information on all 54 African countries from 1990 until 2016. Table 1 provides details on the variables used in this study and Table 2 reports their summary statistics with a 5-year gap.

3 Results and Discussion

Table 3 reports the results of equation (1) on the effects of urbanisation on GDP growth.

Table 1: Variable description. Source: World Bank.

Variable	**Description**
GDP	GDP per capita, PPP (constant 2011 USD).
URBPOP	Urban population (% of total).
POPLARGEST	Population in largest city is the percentage of a country's urban population living in that country's largest metropolitan area.
INVRATE	The investment rate is measured as the gross fixed capital formation (% of GDP). It includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.
NATRESDEP	Total natural resources rents (% of GDP).
SECSCHOOL	Lower secondary school completion rate, total (% of the relevant age group).
ACCWAT	The percentage of population with reasonable access (within one km) to an adequate amount of water (20 litres per person) through a household connection, public standpipe well or spring, or rain water system.
ACCWATURB	Improved water source, urban (% of urban population with access).
ACCSAN	The percentage of people using improved sanitation facilities that are not shared with other households and where excreta are safely disposed of in situ or transported and treated offsite. Improved sanitation facilities include flush to piped sewer systems, septic tanks or pit latrines.
ACCSANURB	People using safely managed sanitation services, urban (% of urban population).
SLUMS	The proportion of the urban population living in slum households. A slum household is defined as a group of individuals living under the same roof lacking one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area, and durability of housing.

The four columns report four different versions of equation (1), depending on the measure of urban expansion and the model specification. The outcome variable, the logarithm of the ratio between the country's GDP at time $t+1$ over the GDP at time t, is the same for the four models.

To confirm the Solow's model on economic growth, we expect the coefficients on GDP to be negative, i.e. to have a slower economic growth corresponding to a higher initial GDP level.

Table 2: Summary statistics.

Variable	Statistic	1990	1995	2000	2005	2010	2015
GDP	Mean	3310.99	3241.23	4021.57	4788.18	5357.11	5299.9
	Std. Dev.	3720.14	3818.92	4836.91	6385.08	6970.18	6227.41
	N	49	50	52	52	53	51
URBPOP	Mean	33.41	35.38	37.17	39.11	41.15	43.64
(% pop.)	Std. Dev.	16.47	16.58	16.89	17.22	17.48	17.61
	N	54	54	54	54	54	53
POPLARGEST	Mean	40.29	38.86	38.43	37.95	36.41	35.07
(% urb. pop.)	Std. Dev.	16.78	14.86	15.01	15.87	14.99	14.18
	N	45	45	45	45	45	44
INVRATE	Mean	20.1	20.89	18.65	19.25	23.61	23.5
(% GDP)	Std. Dev.	16.16	21.9	17.2	8.98	8.62	10.79
	N	46	46	47	46	48	48
NATRESDEP	Mean	12.61	14.86	11.21	13.74	14.17	10.75
(% GDP)	Std. Dev.	13.09	15.69	14.24	15.31	13.71	8.37
	N	50	51	50	51	53	52
SECSCHOOL	Mean	20.32	32.97	31.53	37.41	42.91	49.52
(% pop.)	Std. Dev.	17.79	24.01	25.23	28.42	22.46	24.3
	N	23	17	30	28	30	29
ACCWAT	Mean	58.1	61.28	64.75	68.3	71.9	75.65
(% pop.)	Std. Dev.	21.58	19.99	18.38	17.43	16.82	15.39
	N	46	52	53	52	52	51
ACCWATURB	Mean	81.94	81.69	83.55	86.06	88.08	89.76
(% urb. pop.)	Std. Dev.	15.66	15.77	13.49	11.05	10.1	9.74
	N	47	53	53	52	52	51
ACCSAN	Mean			29.08	30.57	31.91	33.03
(% pop.)	Std. Dev.			18.11	19.6	21.42	22.98
	N			8	8	8	8
ACCSANURB	Mean			38.89	39.59	40.4	40.91
(% urb. pop.)	Std. Dev.			22.62	23.71	25.78	27.5
	N			7	7	7	7
SLUMS	Mean	65.47	65.23	62.3	60.38		
(% urb. pop.)	Std. Dev.	23.42	21.85	22.45	21.32		
	N	32	27	28	39		

The model in column 1 of Table 3 measures urbanisation using *URBPOP*, which returns the proportion of population living in an urban area. An increase by 1% in GDP is related with a decrease by 0.18% in GDP growth. An increase by 1% in urban population produces the same 1% acceleration in GDP growth.

In column (2) we measure urbanisation with *POPLARGEST*, which corresponds to the proportion of urban population living in the largest city. In this case, although the coefficient of interest is statistically significant, the coefficient of the logarithm of GDP drops its significance.

Table 3: Estimates of the effects of urban expansion on economic growth.

	(1)	(2)	(3)	(4)
log(GDP)	-0.180**	-0.160*	-0.239***	-0.241***
	(0.074)	(0.084)	(0.087)	(0.074)
URBPOP	0.011**		0.014**	0.001
	(0.005)		(0.006)	(0.005)
POPLARGEST		-0.012**	-0.006	
		(0.006)	(0.006)	
INVRATE	0.002	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
NATRESDEP	0.002	0.003	0.002	0.001
	(0.003)	(0.003)	(0.003)	(0.002)
SECSCHOOL	-0.001	-0.000	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.001)
Time dummies				✓
Intercept	1.007*	1.637**	1.572**	1.810***
	(0.541)	(0.662)	(0.636)	(0.604)
N	112	93	93	112

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Introducing *POPLARGEST* decreases the number of observations. In fact, there is no data available on the urban population living in the largest city for four countries: Botswana, Mauritius, Swatziland and Seychelles.

The model of column (3) of Table 3 measures urbanisation with both urban variables, *URBPOP* and *POPLARGEST*. Here the indicator of initial economic level is statistically significant at the 99% level and its estimate suggests that an increase by 1% in GDP is related with a decrease by 0.24% in GDP growth. Although the coefficient estimate on URBPOP is similar to the fist model, the coefficient of *POPLARGEST* is not statistically significant.

The last model of column (4) of Table 3 indeed removes *POPLARGEST* from the regression equation but adds time dummies for the six years of interest. In this case, although the indicator of GDP remains statistically significant, *URBPOP* loses its significance. Adding year indicators is crucial due to the fact that urbanisation across the years 1990 to 2015 is characterised by a rapid growth of 10 percentage points as shown in the summary Table 2.

To conclude, for African countries, we are not able to find strong evidence

Table 4: Socio-economic effect of urban expansion.

	(1) GDP	(2) ACCWAT	(3) ACCWATURB	(4) ACCSAN	(5) ACCSANPRB	(6) SLUMS
URBPOP	75.843***	0.070	-0.500***	-0.734***	-1.055***	0.577
	(15.868)	(0.108)	(0.101)	(0.117)	(0.107)	(0.385)
POPLARGEST	34.873***	0.068	-0.015	-0.539***	-0.360***	0.082
	(13.047)	(0.089)	(0.083)	(0.141)	(0.130)	(0.385)
INVRATE	-2.809	-0.007	0.103***	-0.248***	-0.060	0.042
	(4.281)	(0.029)	(0.027)	(0.043)	(0.039)	(0.117)
NATRESDEP	-1.200	-0.104***	0.091**	-0.148**	0.054	-0.162
	(5.909)	(0.038)	(0.036)	(0.060)	(0.056)	(0.149)
SECSCHOOL	12.457***	-0.229***	-0.076***	-0.005	-0.029*	-0.341***
	(4.625)	(0.030)	(0.028)	(0.018)	(0.017)	(0.123)
Intercept	-1162.759	65.270***	101.624***	90.988***	100.446***	41.531**
	(917.491)	(5.890)	(5.522)	(6.567)	(6.045)	(20.409)
Time dummies	✓	✓	✓	✓	✓	✓
N	482	460	462	75	75	88
adj. R^2	0.328	0.672	0.357	0.821	0.812	0.123

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

that actually urbanisation has a positive effect on economic growth. Due to the intrinsically different framework of African countries from the occidental setting within which standard economic models are built, we look for different variables that might better explain economic growth in that region.

Equation (2) addresses this issue shifting the attention to socio-economic factors that might be affected by urban expansion in African metropolitan areas. Table 4 reports the estimates of six different models. Although they look at six different socio-economic outcomes, they all have the same control variables and all 26 year dummies for the years from 1990 to 2015.

Column (1) of Table 4 reports the estimates of the model where the outcome is given by the country's GDP level. The results suggest that for 1 point percentage change in urban population, there is an increase of GDP by 75.834 points for the subsequent year. Also the second urbanisation variable generates a statistically significant increase in the GDP level. This model explain the country's GDP behaviour also with the secondary school completion rate. A 1% increase in school completion rate corresponds to an increase in GDP of about 12.5 points.

The proportion of total and urban population with reasonable access to an adequate amount of water (see Table 1 for a more detailed description) are the outcome variables of the models in columns (2) and (3). Whereas the coefficient of URBPOP is not statistically significant in column (2), it is significant at the 99% level in column (3). In the latter model, an increase of 1% in urban population leads to a decrease by 0.5% in access to water for the urban population. Also other variables explain the variation of this model, where 1% increase in investment rate is associated with 0.10% increase in access to water. Similarly, 1% increase in natural resources rent corresponds to a 0.9% increase in the same outcome variable. For all models, from column (2) to column (5), with a connotation of improved social conditions, the variable SECSCHOOL representing human capital has a negative coefficient which remains unexplained.

Columns (4) and (5) provides the estimates of the models with the proportion of total and urban population, respectively, with access to sanitation facilities (see Table 1 for a more detailed description). We find that urbanisation has a detrimental effect on those outcomes. A 1% increase in urban population decreases access to these services by 0.73 and 1.05%, respectively. Similarly, increasing the proportion of urban population that lives in the largest urban area has the effect of decreasing by 0.6% and 0.4% the sanitation facilities access. For these two models, however, the sample is very small suggesting a major loss of information.

The last column (6) reports the estimates of the effect of urbanisation on the proportion of people living in a slum household. The model here fails to describe this relationship since the main coefficient in not statistically significant, the sample is relatively small and, most importantly, the adjusted R^2 is very low with a value of 0.123.

To conclude, the socio-economic models with the form of equation (2) suggest that although urban expansion in Africa increases a country's GDP, it is as well associated with a deterioration of social conditions of the urban population.

References

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