Journal of Urban Economics 71 (2012) 26–36

Contents lists available at SciVerse ScienceDirect

Journal of Urban Economics

www.elsevier.com/locate/jue

Economic growth, size of the agricultural sector, and urbanization in Africa

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ARTICLE INFO

Article history:
Received 28 February 2011
Revised 21 August 2011
Available online 30 August 2011

JEL classification:
O0
R0
O1
O4
R3

Keywords:
Economic growth
Sectoral shocks
Urbanization

ABSTRACT

This paper uses variations in international commodity prices and rainfall to construct instrumental variables estimates of the within-country effect that changes in the size of the agricultural sector and GDP per capita growth have on the urbanization rate. For a panel of 41 African countries during the period 1960–2007, the paper's three main findings are that: (i) decreases in the share of agricultural value added lead to a significant increase in the urbanization rate; (ii) conditional on changes in the share of agricultural value added GDP per capita growth does not significantly affect the urbanization rate; (iii) increases in the urbanization rate had a significant negative average effect on GDP per capita growth.

1. Introduction

The effects that economic growth has on the urbanization rate is a central issue at the intersection of development and urban economics. A key challenge in this literature is obtaining an estimate of the causal effect that economic growth has on the urbanization rate. This task is complicated by the endogenous response of economic growth to changes in the urbanization rate as changes in the urban population share affect the relative supply of labor and the relative demand for public good provision. Attempts have been made to address this simultaneity problem using lagged variables as instruments in a panel fixed effects estimation framework (see Davis and Henderson, 2003). However, as is well recognized in the panel data literature lagged variables are not a panacea if there are significant anticipation effects or if there is substantial measurement error in the explanatory variables.[1]

This paper seeks to make an empirical contribution to the debate on the causal effect that economic growth has on the urbanization rate by using rainfall and international commodity price shocks as instruments for economic growth and the agricultural value added share. The paper does this for a panel of 41 African countries during the period 1960–2007. Increases in the international prices for exported agricultural commodities and improved rainfall conditions significantly increase the share of agricultural value added as well as real GDP per capita growth in African countries. Increases in the international prices for exported natural resource commodities also significantly increase GDP per capita growth but decrease the share of agricultural value added.

The significant response of GDP per capita growth and the share of agricultural value added in African countries to these plausibly exogenous shocks provides a unique opportunity to construct instrumental variables estimates. The strength of the instrumental variables estimates is that, in contrast to least squares estimates, they identify the causal effect that variations in GDP per capita growth and the size of the agricultural sector have on the urbanization rate. From a policy perspective, the paper's focus on African countries is also justified as there is a fierce policy debate on the causes and consequences of urbanization in developing countries, in particular for countries located in Africa (see for example Fay and Opal, 2000). In addition, the fact that economic growth in Africa has been much slower than in other regions which experienced similar increases in their urbanization rate over the past half century (e.g. Asia or Latin America),[2] makes it interesting to explore whether the dismal growth performance of African countries is a consequence or a cause of rapid urbanization. Another interesting

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[1] Moreover, lagged variables will not necessarily mitigate omitted variables bias.

[2] According to WDI (2010) data, during the 1960–2007 period, the average annual increase in the urbanization rate was approximately 1.9% for South Asia, 1.0% for East Asia and the Pacific, 0.8% for Latin America, and 2.1% for Africa.

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doi:10.1016/j.jue.2011.08.004

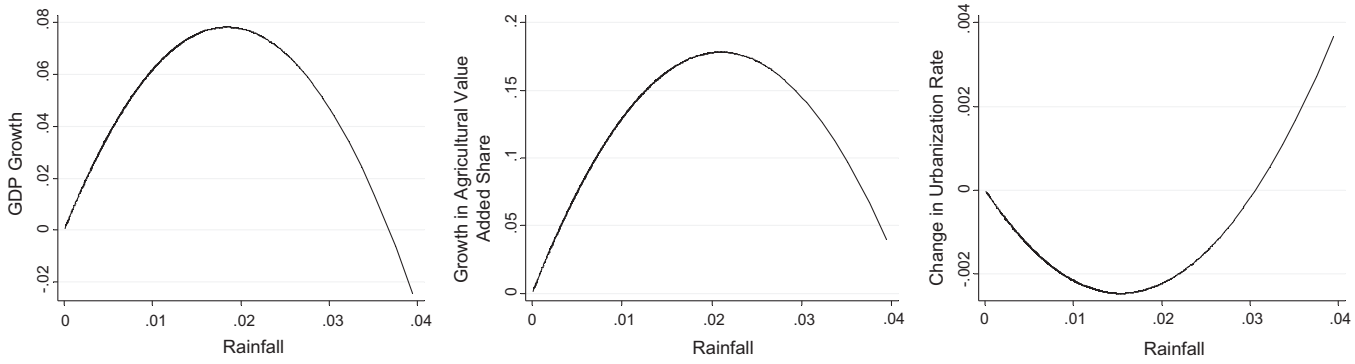

Fig. 1. Predicted effects of rainfall on economic growth, agricultural value added share, and urbanization. *Note*: The left-hand-side figure plots the predicted effects that rainfall has on economic growth based on the estimates shown in column (1) of Table 4. The figure in the middle plots the predicted effects that rainfall has on the agricultural value added share based on the estimates shown in column (2) of Table 4. The right-hand-side figure plots the predicted effects that rainfall has on the urbanization rate based on the estimates shown in column (2) of Table 3.

stylized fact that makes focus on African countries of particular interest is that the relative economic size of the agricultural sector decreased by over half a percent per annum while real GDP per capita increased by less than one percent per annum over the sample period.

The paper's first main finding is that within-country decreases in the share of agricultural value added lead to significant within-country increases in the urbanization rate. Controlling for country and year fixed effects, an instrumental variables regression yields that a one standard deviation decrease in the share of agricultural value added increases the urbanization rate within 1 year by about 0.5 standard deviations, and by about 0.8 standard deviations when cumulated over a 5-year period. Changes in the agricultural value added share imply a change in the relative economic size of the agricultural sector. The change in the relative economic size of the agricultural sector implies in turn a change in the income generated in non-agricultural/urban areas relative to the income generated in agricultural/rural areas. Such a change in relative incomes provides a strong incentive for income maximizing individuals to move from rural to urban areas. The paper's first main finding is thus consistent with models of rural–urban migration that predict changes in the relative income prospects of cities to be a key driving force of the urbanization process.[3]

The paper's second main finding is that conditional on the agricultural value added share economic growth does not have a significant average effect on the urbanization rate. This result derives from a two-stage least squares regression where both GDP per capita growth and the agricultural value added share are instrumented by commodity price shocks and rainfall. The two-stage least squares estimate on real GDP per capita growth in this regression is quantitatively small and statistically insignificant while the estimate on the agricultural value added share is quantitatively large and highly significant. The paper's second main result therefore suggests that, beyond changes in the size of the agricultural sector, GDP per capita growth has only minor effects on the urbanization rate (see Fig. 1).

The development economics literature has argued that as income per capita of low income economies increases the relative size of the agricultural sector decreases (see for example Echevarria, 1997; Laitner, 2000). In a regression that includes both, GDP per capita growth and the change in the agricultural value added share, the effect that economic growth has on the urbanization rate through the effect on the relative size of the agricultural sector is shut down. The paper shows that unconditional on the agricultural value added share GDP per capita growth does have a significant positive average effect on the urbanization rate. An instrumental variables regression yields that unconditional on the agricultural value added share, a one standard deviation increase in GDP per capita growth increased the urbanization rate by about 0.3 standard deviations. The paper's findings are therefore not at odds with the empirical urbanization literature that has been concerned about the endogeneity of city size to workers' income.[4]

The paper's findings are also relevant for the literature on the determinants of urbanization in several other aspects. First, they show that plausibly exogenous shocks which differentially affect the relative economic size of the rural sector have a significant effect on the rural–urban migration decision. Second, the instrumental variables estimates identify a key channel through which economic growth affects urbanization: the sector shift out of agriculture. Third, the estimates provide a quantitative benchmark against which to compare predictions from general equilibrium models.[5]

The paper's empirical results also shed light on the question of how urbanization affects economic growth. Given the instrumental variables estimates of the effect that economic growth has on urbanization, it is possible to obtain an endogeneity adjusted estimate of the effect that urbanization has on economic growth. This can be done by using a two-step estimation procedure that adjusts for the effect that economic growth has on the urbanization rate. The main finding from this two-step approach is that increases in the urbanization rate had a significant negative average effect on GDP per capita growth of African countries: a one standard deviation increase in the urbanization rate led to a significant decrease in real GDP per capita growth of about 0.4 standard deviations. When measured by the change in average incomes, a change in the population share from the rural to the urban sector had therefore a significant negative average effect on economic growth. The paper provides an explanation for this result by documenting that urbanization had a particularly large negative effect on economic growth in African countries characterized by strong ethnic divisions, low initial income per capita, and high primacy rates.

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 discusses the estimation strategy. Section 4 presents the main empirical results. Section 5 concludes.

[3] See for example the classic model of rural-urban migration of Harris and Todaro (1970) or the models of Brueckner (1990) and Becker and Morrison (1999), among others.

[4] See for example Glaeser and Mare (2001), Costa and Kahn (2001), Rosenthal and Strange (2008) or Combes et al. (2010).

[5] Predictions from general equilibrium models on the effects that income has on urbanization are naturally about a within-country relationship. The paper's fixed effects estimates are computed from within-country variation of the data and therefore are well suited for comparison to the quantitative predictions of parameterized general equilibrium models.