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ECONOMIC PAPERS

Jörg Peters

Infrastructure and Poverty in Sub-Saharan Africa – A Review

RWI #628

Imprint

Ruhr Economic Papers

Published by

Ruhr-Universität Bochum (RUB), Department of Economics
Universitätsstr. 150, 44801 Bochum, Germany

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Ruhr Economic Papers #628

Responsible Editor: Manuel Frondel

ISSN 1864-4872 (online) – ISBN 978-3-86788-730-4

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Bibliografische Informationen der Deutschen Nationalbibliothek

Die Deutsche Bibliothek verzeichnet diese Publikation in der deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über: *http://dnb.d-nb.de* abrufbar.

http://dx.doi.org/10.4419/86788730
ISSN 1864-4872 (online)
ISBN 978-3-86788-730-4

Jörg Peters[1]

Infrastructure and Poverty in Sub-Saharan Africa – A Review

Abstract

This paper reviews the book "Infrastructure and Poverty in Sub-Saharan Africa" by Antonio Estache and Quentin Wodon. The authors summarize the political debate on infrastructure policy in Africa in a very compelling and knowledgeable way and make a convincing case for pro-poor subsidies. Yet, this review points out two reservations: The evidence on the welfare enhancing benefits of infrastructure investments is less conclusive than suggested in the book. The book also misses out on the recent technological developments that enable the provision of decentralized services, which might render classical network based infrastructure partly redundant in the future.

JEL Classification: H54, O13, O18, L91, L95, L96

Keywords: Electrification; road infrastructure; water and sanitation; telecommunication

August 2016

1 Jörg Peters, RWI and University of the Witwatersrand, Johannesburg. – *Peters gratefully acknowledges the support of a special grant (Sondertatbestand) from the German Federal Ministry for Economic Affairs and Energy and the Ministry of Innovation, Science, and Research of the State of North Rhine-Westphalia. Maximiliane Sievert provided valuable comments.* – *All correspondence to: Jörg Peters, RWI, Hohenzollernstr. 1-3, 45128 Essen, Germany, e-mail: peters@rwi-essen.de*

Infrastructure and Poverty in Sub-Saharan Africa – A Review

Since the 1960s and 1970s, the international community has dedicated a considerable amount of its lending portfolios and technical assistance capacities to investments into infrastructure such as roads, electricity, and water networks. In spite of these continuous efforts, billions of people worldwide are still lacking access to electricity, clean water, sanitation, and quality roads. At the same time, the lack of infrastructure access is often said to be a major barrier to sustainable human development.

This is the background to Antonio Estache's and Quentin Wodon's book *Infrastructure and Poverty in Sub-Saharan Africa*, which outlines the past, the presence and the potential future of infrastructure policy in Africa. The book has three main parts: First, it presents a selection of evidence on the relationship between infrastructure access and economic and social development. Second, the authors put themselves in the shoes of the households in Africa: Why do households need infrastructure? Can they afford paying for it? What if they have access but quality is miserable? And third, the book provides a very critical review of the sector reforms implemented in many African countries in the 1990s and 2000s. Based on this retrospective, the authors take a cautious look ahead and outline some potentially promising paths for the future of infrastructure policy. Right from the outset the authors' conviction that infrastructure investments are in fact an indispensable ingredient of the fight against poverty becomes apparent. At the same time, they nevertheless provide a striking estimate of the enormous costs this entails: closing the infrastructure gap requires no less than 100 billion USD per year, corresponding to 15 percent of the continent's total GDP.[1]

[1] This estimate is taken from the Africa Infrastructure Country Diagnostic (AICD), an African Development Bank knowledge program.

The book's merit is the comprehensive summary of most important aspects of infrastructure policy in Africa. The instructive description of the policy reforms that have been implemented in the recent decades reveals the extensive practical experience the authors have. They knowledgably describe the attempts to break up and unbundle the powerful but rather inefficient institutions in African infrastructure sectors. Many developing countries have implemented sector reforms ranging from the creation of independent regulatory agencies to intense privatization processes. The authors conclude that while some positive effects are perceivable, they are generally modest and the high hopes that had been associated with these reforms could not be fulfilled. In a nutshell, Estache and Wodon show that there is no magic bullet to improve the sector's institutional effectiveness. Also their discussion of current and potential future financing sources is well founded and informative. The authors are no partisans of the Jeffrey Sachs paradigm that development can be simply purchased through more money and acknowledge the limited institutional capacity in Africa to absorb more aid.

Even more captivating is the way in which the authors bring in the target group's perspective, i.e. those mostly poor people who currently live without access to the infrastructure networks. This might sound self-evident, but it is an often overlooked angle in debates on how to shape infrastructure policy. Most importantly, the book raises questions about whether the poorer strata can afford the contributions to connection costs that are expected from them in many cases. Here, the authors point to the regressive character of many current subsidy schemes and make a case for pro-poor end-user subsidies. This adds a good portion of realism to the debate that is oftentimes loaded with ideological solutions, not least the hope to let market mechanisms solve the problem.

There are however two weak aspects about the book: First, the evidence the authors present to underpin the contribution of infrastructure to poverty alleviation is not convincing. Their own data analysis and the discussion of evidence in the literature

does not exhibit much awareness of the endogeneity problem that is inherent to all causal analysis and infrastructure evaluation in particular. Most of what the authors show is just correlation. For various reasons, however, it is quite plausible to suspect that people and regions with access are better-off and thus a correlative analysis is severely biased.

This potential flaw of infrastructure evaluations was already emphasized early in the debate, see for example Hansen et al. (2011) and Ravallion (2007). There is actually a growing body of literature that accounts for this identification problem using rigorous evaluation techniques. It is somewhat unfortunate that this has not been included, for example in a simple systematic review. Just to name a few examples: Banerjee et al. (2012), Donaldson (2010), and Jedwab and Moradi (2016) evaluate the effects of railroads. Waddington and Snilstveit (2009) provide a synthetic review of studies on water, sanitation, and hygiene interventions to reduce diarrhea among children. Different types of water and sanitation interventions are studied in Dickinson et al. (2015), Duflo et al. (2015), and Gross and Günther (2014). A review of the evidence on electricity access can be found in Peters and Sievert (2016).[2] Overall, the picture in this literature is much less clear than suggested by Estache and Wodon. One might nonetheless argue that infrastructure is needed to enable good living standards, but this would be a rather normative argument than a positivistic one (as for example reflected in the new Sustainable Development Goals that call for access to modern energy as a goal in itself).

Moreover, the data and much of the secondary literature the authors use are relatively old, mostly from the early 2000s. This might be problematic because the infrastructure world has changed quite considerably in the last decade. As an example, it is almost

[2] Some of the studies were obviously published after the release of the book in 2014, but in most cases at least discussion papers had already been available several years before. While much of the rigorous evidence is coming from Asia and generalization to Africa has to be done with some care, it would have been nonetheless informative to substantiate (or challenge) the claim of infrastructure's importance for development.

bizarre from today's perspective that the authors refer to landline telephones when they talk about telecommunication, given that mobile phone access has reached nowadays almost full coverage, even in remote areas (see Yonazi et al. 2012).[3]

This last point is related to the second shortcoming of the book: it misses out the question of whether classical network based infrastructure is actually still needed today in developing countries. The rapid dissemination of mobile telecommunication services is the most obvious example. Also for electricity, decentralized sources can technically replace grid-based provision and in particular if demand is as low as in most parts of rural Africa, solar technologies are even more economical.[4] For water and sanitation, decentralized options and solutions (e.g., household water treatment technology) have long existed due to their obvious cost advantages in many settings, though they typically do not generate benefits as reliably as properly-maintained piped water and sewage systems and clean water infrastructure (see Whittington et al. 2009). Recent debates about drones even indicate that transportation might be detached from networks somewhere in the future (see Economist 2016). While the last example clearly sounds like science fiction, it might become real within the amortization periods of infrastructure investments that easily span 20 or 30 years.

This technological evolution, obviously, is a huge opportunity for developing countries. Estache and Wodon describe in a very persuasive way that institutions in the infrastructure sector are often weak in Africa. The authors are also not naïve about the odds to direct the required flow of investment funds to Africa, which probably neither public sources nor private investors are able to provide. The discussion of alternative funding sources the authors provide is inspiring (sovereign bonds, diaspora), but probably also more driven by hope than by persuasion. Decentralized technologies are not the panacea to solve these problems, but because they are

[3] While this is somehow symptomatic for the up-to-dateness problem the book here and there has, it is effectively no big deal, since the electricity and water and sanitation sectors receive most of the book's attention anyhow.

[4] See Alstone et al. (2015), Grimm et al. (2015) and Lenz et al. (2016).

detached from the natural monopoly often inherent to physical networks they will certainly change the nature of pro-poor policies and potentially also facilitate them because of lower access costs.

To summarize, it seems the authors are personally convinced that infrastructure investments also in the classical sense are an effective strategy to foster sustainable development. This viewpoint is intuitively comprehensible, not least because the economic development of the nowadays industrialized world would have been unimaginable without network based infrastructure. However, for developing countries the ambiguous empirical evidence, high investment costs, and new decentralized technologies call for a continuous and case-by-case based cost-benefit trade-off. Yet, if these reservations are borne in mind, *Infrastructure and Poverty in Sub-Saharan Africa* does much to shape a realistic view on infrastructure policy in Africa. The authors' analysis has not lost relevance despite the caveats raised and is clearly a worthwhile reading to improve the understanding of this politically and economically complex sector.

References

Alstone, Peter, Dimitry Gershenson, and Daniel M. Kammen. 2015. **"**Decentralized energy systems for clean electricity access." *Nature Climate Change*, 5(4): 305-14.

Banerjee, Abhijit, Esther Duflo, and Nancy Qian. 2012**. "**On the road: Access to transportation infrastructure and economic growth in China." *National Bureau of Economic Research*. Working Paper Series No. 17897.

Dickinson, Katherine L., Sumeet R. Patil, Subhrendu K. Pattanayak,, Christine Poulos, and Jui-Hen Yang. 2015. "Nature's Call: Impacts of Sanitation Choices in Orissa, India." *Economic Development and Cultural Change*, 64(1): 1-29.

Donaldson, Dave. 2010. "Railroads of the Raj: Estimating the impact of transportation infrastructure." *National Bureau of Economic Research*. Working Paper No. 16487 [forthcoming in the American Economic Review].

Duflo, Esther, Michael Greenstone, Raymond Guiteras, and Thomas Clasen. 2015. "Toilets can work: Short and medium run health impacts of addressing complementarities and externalities in water and sanitation." *National Bureau of Economic Research*. Working Paper No. 21521.

Economist. 2016. "Medical drones in Africa – Help from from above." *The Economist*, July 2nd, 2016.

Grimm, M., Munyehirwe, A., Peters, J., & Sievert, M. 2015. "A first step up the energy ladder? Low cost solar kits and household's welfare in rural Rwanda. Low Cost Solar Kits and Household's Welfare in Rural Rwanda" (April 15, 2015). *Ruhr Economic Paper #554*. RWI.

Gross, Elena and Isabel Günther. 2014. "Why do households invest in sanitation in rural Benin: Health, wealth, or prestige?" *Water Resources Research*, 50(10): 8314-329.

Hansen, Henrik, Ole Winckler Andersen, and Howard White. 2011. "Impact evaluation of infrastructure interventions." *Journal of Development Effectiveness*, 3(1): 1-8.

Jedwab, Remi, and Alexander Moradi. 2016. "The permanent effects of transportation revolutions in poor countries: evidence from Africa." *Review of Economics and Statistics*, 98(2): 268-84.

Lenz, Luciane, Anicet Munyehirwe, Jörg Peters and Maximiliane Sievert. 2016. "Does Large Scale Infrastructure Investment Alleviate Poverty? Impacts of Rwanda's Electricity Access Roll-Out Program." *World Development*, forthcoming.

Peters, Jörg and Maximiliane Sievert. 2016. **"**Impacts of rural electrification revisited – The African context." *Journal of Development Effectiveness*, forthcoming.

Ravallion, Martin. 2007. ""Achieving Child-Health-Related Millennium Development Goals: The Role of Infrastructure"—A Comment." *World Development*, 35(5): 920-28.

Waddington, Hugh, and Birte Snilstveit. 2009. "Effectiveness and sustainability of water, sanitation, and hygiene interventions in combating diarrhoea." *Journal of development effectiveness*, 1(3): 295-335.

Whittington, Dale W., Michael Hanemann, Claudia Sadoff and Marc Jeuland. 2009. "The Challenge of Improving Water and Sanitation Services in Less Developed Countries." *Foundations and Trends in Microeconomics*, 4(6–7): 469-609.

Yonazi, Enock, Tim Kelly, Naomi Halewood, and Colin Blackman. 2012. *The transformational use of information and communication technologies in Africa*. World Bank: Washington, DC, USA.