Agricultural R&D investment, poverty and economic growth

in sub-Saharan Africa: Prospects and needs to 205

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ABSTRACT

This paper looks at past trends of agricultural R&D allocation in developing countries, projects future performance of agriculture in these regions based in past investment and determines the optimal allocation of R&D investment across regions to maximize global welfare using a dynamic linear programming model of global agriculture. Results suggest that present allocation of agricultural R&D in SSA is highly inefficient and substantial gains could be obtained by increasing investment in East Africa in the next twenty years. At the global level, differences between efficient and present investment allocation are smaller than those observed within SSA due to the importance of China as an innovator in agriculture.

Keywords: agriculture, growth, optimization, poverty, R&D investment

JEL Codes: C61, O13, O32, O57, Q16, Q18

1. **Introduction**

Stagnation in world food production and declining yield growth rates in main food crops threaten world food security. Among the several factors leading to these concerns, a major force is the long-run stagnation or even decline in public research in many poor countries and within the Consultative Group on International Agricultural Research (CGIAR). In the 1990s, total agricultural R&D spending in developing countries increased from $3.3 billion (1992) to $3.9 billion (2000), or by 2.1 percent annually. This spending was largely driven by Asia, where annual spending increased by 3.5 percent. In Africa, agricultural R&D expenditure grew by a slower rate of 1.9 percent per year, showing also a large variability across countries (ASTI, 2010). Data for recent years show little improvement in Sub-Saharan Africa (SSA) with an average growth rate of 2 percent for the period 2000-2008 and a wide variation between countries (standard deviation of 6).

Given the importance of public agricultural R&D investment to sustain long run productivity growth in developing countries, this study analyzes future implications of past R&D investment in SSA and analyzes patterns of investment allocation that could improve performance of the agricultural sector in the coming decades. More specifically, the study focuses on the following questions: What are the growth consequences of past low agricultural R&D investment for Sub-Saharan Africa in terms of agricultural growth and food availability? If development agencies were to double present investment in agricultural R&D in SSA, how should this investment be allocated to maximize regional welfare?

Our analysis is based on a linear dynamic global multi-region model of agricultural production that includes 41 countries and regions in Africa, Latin America, Asia and high income countries. Output growth in the agricultural-food sector depends on agricultural productivity, which is a function of agricultural R&D investment. Exports and imports take place between countries and the global market and the model includes an equation relating poverty headcount to agricultural and market equilibrium equations for each country. To simulate how much investment is required and how it can be allocated among different regions to maximize income and poverty reduction, we use a linear dynamic programming model (DLP) to solve a social planner's problem to optimally allocate R&D investment across developing regions, and within SSA.

The DLP model is dynamic and nonrecursive and it is solved to maximize the optimal growth path to the year 2050 simulating different scenarios. In the first scenario we look at future growth implications of SSA's R&D investment of the last 15 years. This scenario is the reference scenario and shows economic growth and poverty if SSA countries maintain present levels of R&D investment. A second scenario compares the impact of doubling R&D investment of all SSA countries against the first scenario, looking at the optimal allocation of R&D between African regions. The final scenario analyzes optimal allocation of R&D investment among all developing regions. The amount of R&D going into each country is defined endogenously by the model with total available R&D being the exogenous variable. Data are from FAOSTAT, World Development Indicators, POVCALNET of the World Bank and ASTI. Key parameters of the model (agricultural GDP- R&D elasticities and poverty-GDP elasticities) will be estimated for countries and regions in SSA.

2. Methodology

The DLP model used to analyze the impact of agricultural R&D investment in developing countries combines the advantage of being simple with features that are particularly useful for the analysis of optimal allocation of investment. These models have been extensively used since the early years of development economics for both macro and micro economic analysis.[1] One of the main virtues of this approach is its flexibility as it allows the specification of inequality constraints to reflect particular features of an economy. On the other hand, the many possible variations of this type of models can be represented by a core structure that includes an objective function, constraints and non-negativity conditions.

The particular model used in this study is a DLP model that uses some features of input-output models as discussed in Dervis et al. (1982, chapter2) and the model in Chenery and Macewan (1979) in the Harrod-Domar tradition where the behavior of the model is given by three equations (Dervis et al., 1982 pp 32):

$$C_{i,t+1} \geq (1+p_i) * C_{i,t} \quad (1)$$

$$Y_{i,t} \leq yb_i + 1/k_i * K_{i,t} \quad (2)$$

$$M_{i,t} + Y_{i,t} \geq C_{i,t} + E_{i,t} \quad (3)$$

Equation (1) states that consumption grows at rate ***p*** during the planning period. Equation (2) links output growth to capital stock (Ks) and to a fix coefficient (k), the incremental output-capital ratio. Finally, equation (3) relates supply and demand establishing that total supply of a good (domestic production plus imports) should be greater or equal than total demand (consumption, investment and exports). The model is dynamic and nonrecursive and can feature multiple sectors, regions and T time periods, and is solved to maximize the discounted sum of aggregate consumption over the T years, and the value of the capital stock left at the end of the planning period.

This general framework of the DLP model is adapted here to the analysis of global agricultural R&D investment in the long run. The key behavioral equation is equation (2), representing the growth mechanism of the agricultural sector. In the long run, agricultural growth depends on technical change canalized through R&D investment which is the only factor in the production function. The assumption made here is that R&D is in the long run, the engine of growth of agricultural production.

In this context, equation (2) relates agricultural output in region ***i*** to the stock of R&D in the same region through the coefficient ***k*** which is derived from estimated R&D output elasticities for different regions. R&D stock is built by annual flows of R&D investment and is defined as the weighted sum of annual R&D investment in the previous 15 periods, assuming that there is a time lag between investment and its effect on output. $I_{i,t}$ in equation (4) represents R&D investment in region **i** and year t, while the value of weights β is defined so as to increase between t-1 and t-5, contributing with the highest weight

[1] Main concepts in this section are extracted from Dervis, de Melo and Robinson (1982), chapters 2 to 4.

between year t-6 and t-10 and to decrease until zero contribution in year t-15, following a symmetric pattern.

$$K_{i,t} = \sum_{k=1}^{15} \left(\beta_{t-k} * I_{i,t-k} \right) \quad (4)$$

Total annual investment $I_{i,t}$ has two components (equation 5). The first component ($s_{i,t}$) is domestic investment which is assumed to occur at constant historical growth rates for each region. The second component ($F_{i,t}$) is R&D investment eventually allocated to a particular region from an exogenous source (development aid). This component will be discussed further in the simulations in section 4.

$$I_{i,t} = s_{i,t} + F_{i,t} \quad (5)$$

The total amount of available investment to be allocated every year between regions is fixed:

$$WF_t \geq \sum_i F_{i,t} \quad (6)$$

Exports in the model are assumed to be exogenous, while agricultural imports are endogenous and a function of output growth (equation 7).

$$M_{i,t} \geq mb_i + my_i * \left(Y_{i,t} - yb_i \right) \quad (7)$$

where mb_i are imports by region ***i*** in the base year, yb_i is agricultural output in the base year and my_i is a parameter that transforms changes in output into imports. Equation (8) imposes equilibrium in the global market:

$$\sum_i e_{i,t} - \sum_i M_{i,t} = 0 \quad (8)$$

The objective function in the model maximizes the discounted sum of the world's aggregate consumption (all regions) over the T years of the planning period, plus the value of the terminal capital stock. The parameter ρ is the social rate of time preferences and is constant over time

$$Max \ \sum_{i=1}^{N} \sum_{t=1}^{T} \left(\frac{1}{1+\rho_i} \right)^t C_{i,t} + \sum_{i=1}^{N} V_{i,T+1} K_{i,T+1} \quad (8)$$

The model links total number of poor (***P***) at the national level to agricultural production through equation (9):

$$P_{i,t} = np_{i,t} + ny_i * \left(Y_{i,t} - yb_i \right)$$

3. Data, parameters and scenarios

The model includes 41 countries and regions (see table in Appendix) and data to benchmark the model was obtained from different sources, including FAOSTAT, World Development Indicators, Penn World Tables and COMTRADE. Data on R&D spending is from ASTI (2011) database and publications (Bientema and Stads, 2008 and 2011). The model relies on two key parameters: the output elasticity with respect to R&D investment and the poverty elasticity with respect to output. Nin-Pratt and Fan (2010) summarize some of the evidence on the value of these parameters. The highest values for the output–R&D elasticities are found in Asia, and in particular in China, which values appear to be the most robust estimates from the literature. There are only three R&D elasticities for Africa, and they appear to be too low. No elasticity values were found in the literature for Latin America.

Data availability for the poverty–output elasticity is also very limited; fewer papers look at this issue than at internal rate of return (IRR) and output–R&D elasticities. The main reference for the elasticity values is the paper by Thirtle, Lin, and Piesse (2003), which estimates the impact of research-led agricultural productivity growth on poverty reduction in Africa, Asia, and Latin America.

Given the limited information available on the value of these parameters, we estimate output-R&D and output-poverty elasticities with the same data used to benchmark the model and run simulations. Table 1 shows results of output-R&D estimates using panel data, running separate regressions for the different regions. The results obtained are within those referred in the literature. A similar exercise was conducted to estimate poverty elasticities using panel data, figures on the number of poor and agricultural output per capita of rural population. Asia and Latin America show similar values for the poverty elasticities and much larger than those obtained for SSA (Table 2).

TABLE 1 about here

TABLE 2 about here

The model as described above was used to run two different groups of simulation scenarios. The first group focuses on SSA, while a second group of scenarios analyzes R&D allocation at a global level for developing countries. The baseline scenario assumes that research investment will continue to grow at the historical rate in all regions (1994–2008). We compare this scenario with two other scenarios: A first scenario doubles total agricultural R&D investment in SSA but still allocates this increased investment across countries following the same investment patterns of 1994-2008. A second scenario also doubles R&D investment but this new investment is then optimally allocated between SSA regions for the period 2010-2050 using the DLP model. The same exercise is repeated at the global level comparing the baseline and the doubling-investment scenario to the allocation that maximizes global welfare.

4. Growth and poverty implications of R&D investment in the 1990s and 2000s

In the first scenario we look at implications of SSA's R&D investment of the last 15 years and the lagged effect of these investments in the coming years. Figure 1 shows the evolution of the shares of SSA countries and regions in total regional agricultural R&D investment. According to the investment efforts made by different countries in the past 15 years, the model projects a stable share of Nigeria as the largest regional investor and a growing participation of Ethiopia and Ghana, displacing Kenya and South Africa, countries that will see reduced shares in regional R&D investment in the coming.

FIGURE 1 about here

The impact of past investment in agricultural R&D on several performance indicators of the SSA economies is presented in Table 3. The table shows that Ethiopia is projected to be the best performing country in the region, with the highest per capita growth rate of agricultural production, the highest poverty reduction rate, and a significant expansion of agricultural imports. Central Africa region (including Angola), Tanzania, Uganda, Ghana, Kenya and South Africa also show high growth rates of agricultural output per capita (bigger than 2 percent) and remarkable rates of poverty reduction. On the other hand, agricultural output per capita in Sudan, the Sahel region, Madagascar and other Southern African countries will remain virtually stagnated, with growth rates close to zero, and with high incidence of poverty compared to the best performing countries.

TABLE 1 about here

Within each region we observe very different levels of reduction in the incidence of poverty (Figure 2). Sustained agricultural growth in the best performing countries as projected by the model, results in a significant reduction in the incidence of poverty. Ethiopia, South Africa, Central Africa, Kenya, Tanzania, Uganda, Ghana and Cote d'Ivoire will be able to reduce the poverty headcount to less than 10 percent in the next 40 years, figures comparable to those in some of the fast growing or middle income countries in Asia and Latin America.

FIGURE 2 about here

The differences observed in performance in agricultural production between countries will have significant impact on the regional distribution of the total number of poor (Figure 3). At present (2010-2011), 53 percent of the total number of poor in SSA live in four regions/countries: Nigeria, Sahel, Tanzania and Ethiopia. In 30 years, Ethiopia and Tanzania will be off this list and poverty will be further concentrated in Nigeria and the Sahel (50 percent of the total number of poor in SSA). Other regions increasing their share of the number of poor are Rest of Southern and Eastern African countries, Sudan and Madagascar.

FIGURE 3 about here

Despite the good performance of some of SSA's largest countries, the projected number of poor people in 2050 does not differ much from present figures. This evolution is depicted in Figure 4. The number of poor is projected to drop from 360 to 300 million in the initial years but remains stable at around 300 hundred million for the rest of the period. In sum, present patterns and levels of agricultural R&D investment in SSA will result in substantial improvements in agricultural growth and poverty incidence in the best performing countries. However, poverty incidence and total number of poor in the region will remain high, with poverty concentrating in poor performing regions. How might these results change if in a scenario where total R&D investment in the region doubles with respect to present levels? We explore this scenario in the next section.

FIGURE 4 about here

5. The impact of doubling agricultural R&D investment in SSA

How much do present levels of R&D investment limit regional possibilities to accelerate growth and reduce poverty in SSA? In this section we compare the impact of doubling annual R&D in SSA from the estimated 1,800 million 2005 PPP dollars at present to 3,600 million by presenting two contrasting scenarios. The first scenario is that of doubling total R&D investment in SSA and allocating this investment across countries according to the present share of each country in total regional investment. The only change in this scenario with respect to the base scenario is the level of investment; investment allocation across countries remains exactly the same as before. As in the first scenario, the second scenario doubles total R&D investment levels in SSA, but instead of allocating investment across countries according to historical shares, it allocates it to maximize total regional welfare.

Figure 5A shows how R&D investment is allocated by the model between countries to maximize regional welfare for the period 2011-2050 while Figure 6 helps to visualize regional priorities for R&D investment by showing the evolution of the share of major SSA sub-regions in allocated R&D. The optimal allocation gives priority to investment in Ethiopia at the beginning of the period, with 30 percent of total regional R&D going to this country, displacing Nigeria as the country that historically shows the highest investment. However, priority given to Ethiopia in the first 15 years of the projected period will be gradually shifting to Nigeria, which by the end of the period receives 50 percent of total R&D investment.

FIGURE 5 about here

According to results in Figure 5B, the optimal allocation of R&D investment implies giving priority to investment in East Africa and gradually switching this priority to coastal West Africa by the end of the period. The Sahel and Southern Africa on the other hand, need to keep a sustained investment effort during the whole period.

How does R&D allocation affect performance of agricultural production in SSA? Figure 7 presents the evolution of agricultural output per capita contrasting growth in the case of efficient allocation to that allocated according to present country shares in total regional investment and projected output per capita in the baseline. Contrast between the efficiency scenario and the other two scenarios is remarkable. It is also remarkable the small difference between the baseline and the scenario that doubles R&D investment with inefficient allocation. As poverty levels in the model are a function of agricultural output, similar impacts to those in production can be observed in the number of poor in the different scenarios.

FIGURE 6 about here

6. Efficient global allocation of agricultural R&D investment among developing countries

In this section we look at efficient agricultural R&D investment at a global level among developing countries. Figure 7 shows the projected contributions of different developing regions as the result of doubling present total investment from approximately 16 to 32 billion of 2005 PPP dollars while allocating this investment among countries according to historical investment in different regions. These shares are compared with those from R&D allocation across regions that maximize global welfare

(Figure 8). Although allocation of investment differs between the two scenarios, the differences are not as striking as in the case of SSA. The main difference between scenarios is in the path followed by China. A global efficient allocation requires higher investment going to SSA and Middle East-North Africa and later to Latin America, reducing China's share. Investment allocated to China increases again in the second half of the period and by the end of this period China's share in global R&D investment is similar to the one it showed in the previous scenario.

FIGURE 7 about here

FIGURE 8 about here

7. Conclusions

This paper analyzes the effect of agricultural R&D investment on growth and poverty alleviation in developing regions to simulate how much investment is required and how it can be allocated among different regions to maximize agricultural output gains and poverty reduction. To do so, it solves a social planner's problem by means of a DLP model that allocates R&D investment across developing regions maximizing welfare. A first conclusion to be drawn from our results is the importance of efficiently targeting agricultural R&D investment allocation across regions. Second, relative differences between present and socially optimal allocation appear to be larger within SSA than for developing countries globally. One possible explanation to this results from the large share of China's share in global agricultural R&D investment. This is revealed by the similar path followed by China's share in global R&D investment in both the efficient and baseline scenarios, or in other words, there is not much to change in terms of R&D allocation at the global level as China is already playing a leading role in agricultural R&D investment among developing countries.

The analysis for SSA shows rather different results than those obtained at the global level, as present R&D investment allocation differs significantly from the optimal social allocation. Evidence from simulations using the DLP model suggests that higher priority should be given to investment in East Africa in the coming years increasing the share of this region in SSA's R&D investment and gradually increasing investment in Coastal West Africa towards the end of the period (2030 to 2050). Projected future trends in agriculture growth resulting from past efforts in R&D investment imply that countries like Ethiopia, Ghana, and Tanzania, could achieve substantial growth in agriculture and poverty reduction. On the other hand, lagging regions like the Sahel are likely to perform poorly in the future, with no growth in agricultural output per capita, and contributing with a larger share to the total number of poor in SSA.

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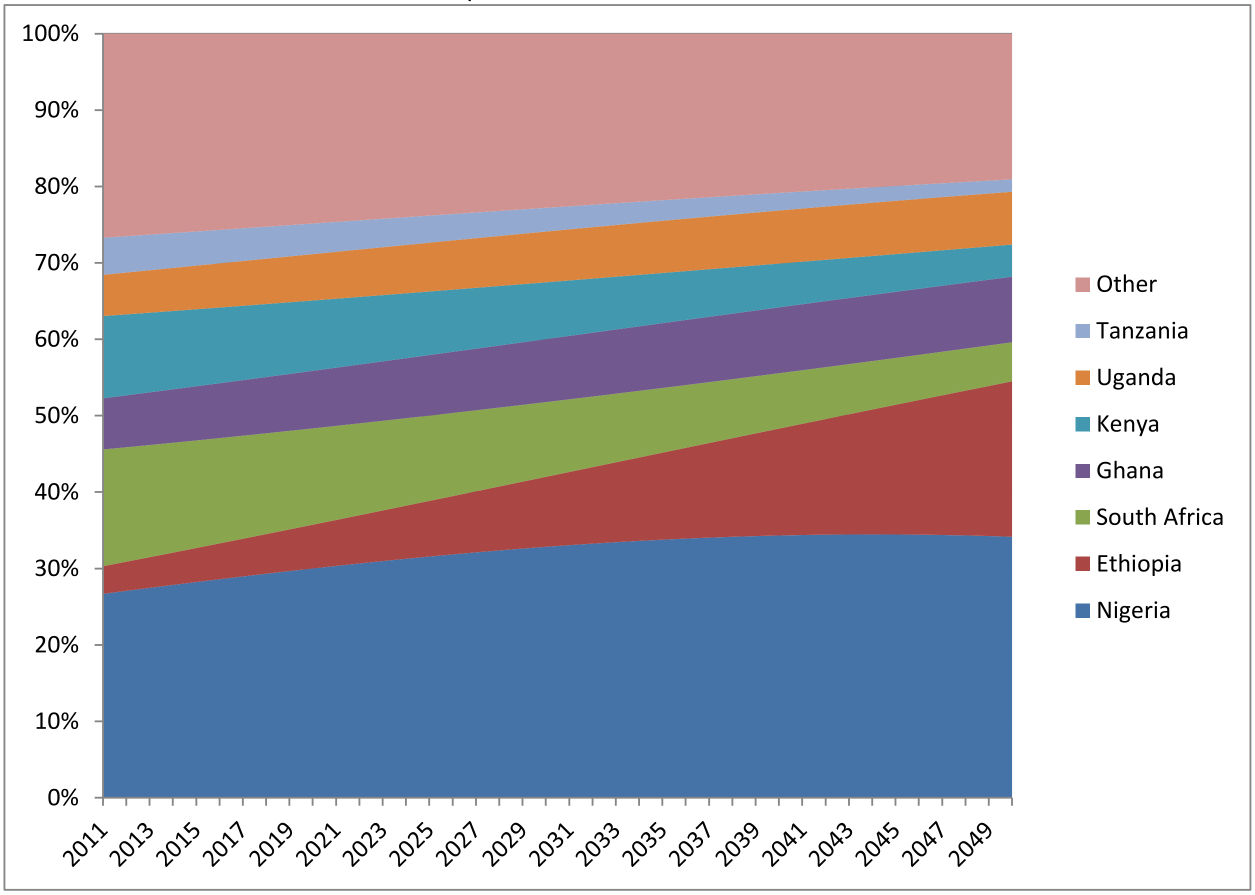
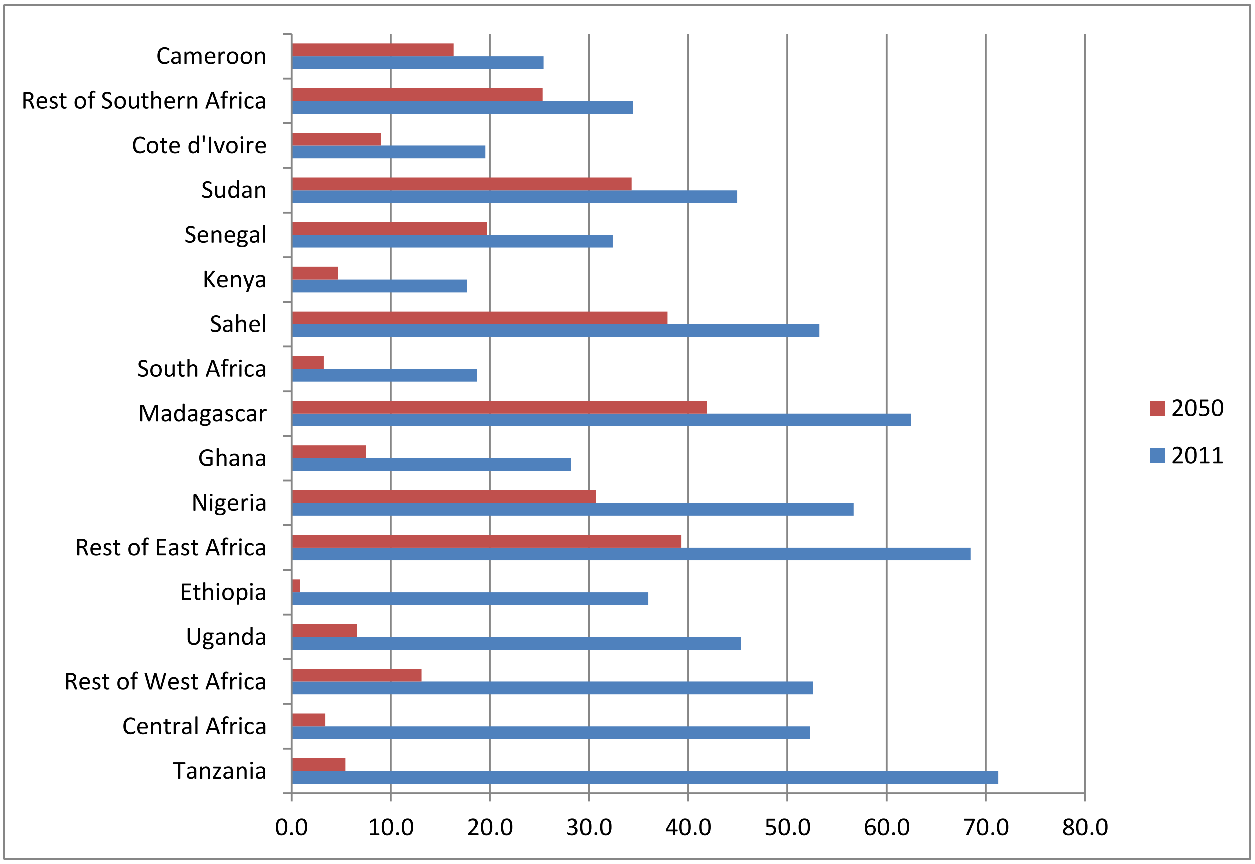
Figure 1. Projected evolution of the contribution of different countries and regions to total R&D investment in Sub-Saharan Africa with present R&D investment rates



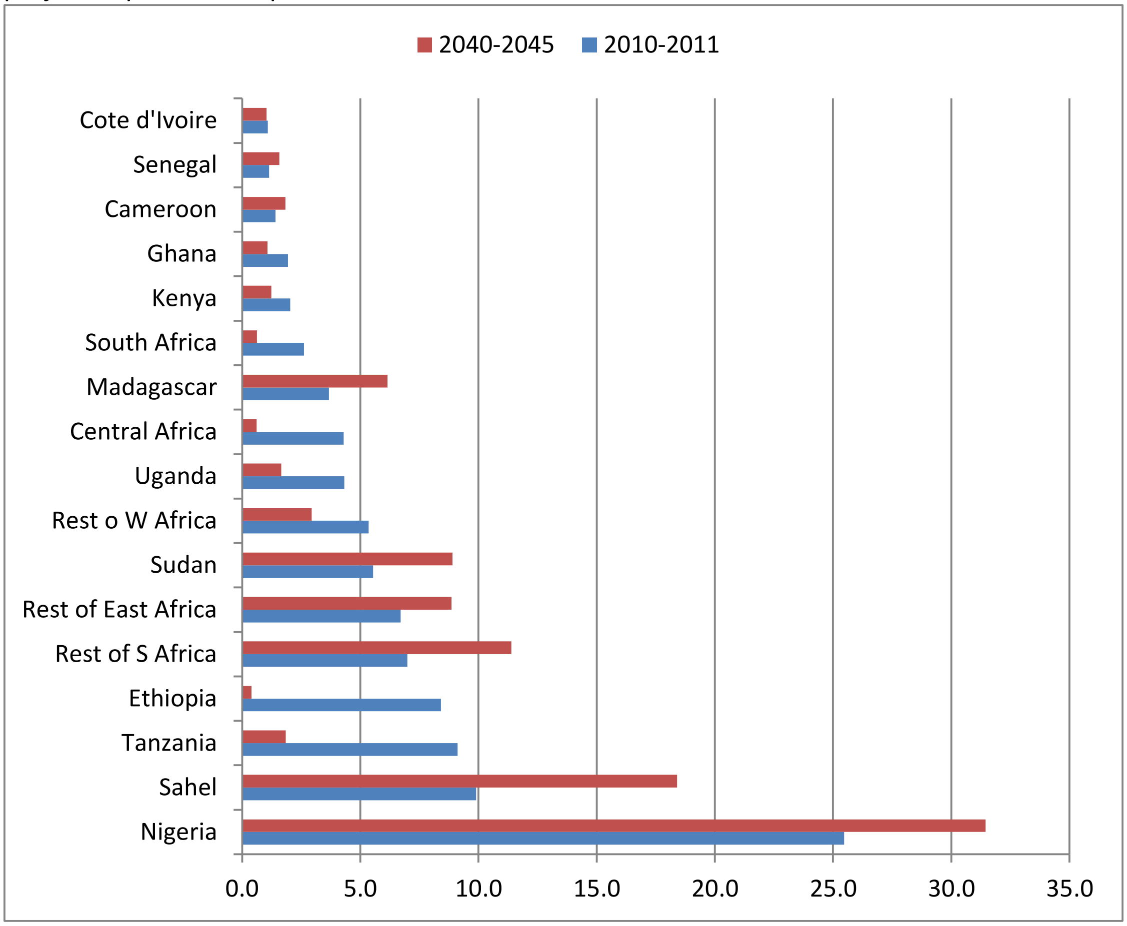
Source: Author based on model simulations

Figure 2 Comparison between the incidence of poverty at the beginning and end of the projected period with present R&D investment rates (percentage of total population)



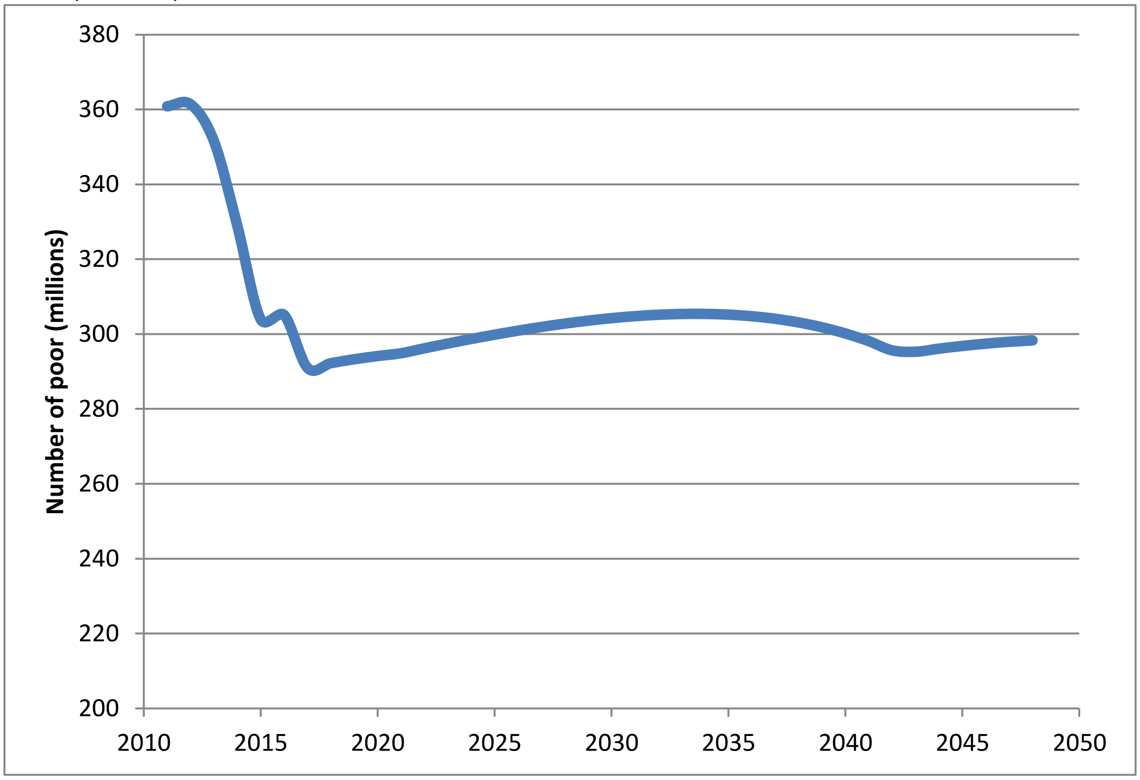
Source: Author based on model simulations

Figure 3. Country share in total number of poor in Sub-Saharan Africa at the beginning and end of the projected period with present R&D investment rates



Source: Author based on model simulations

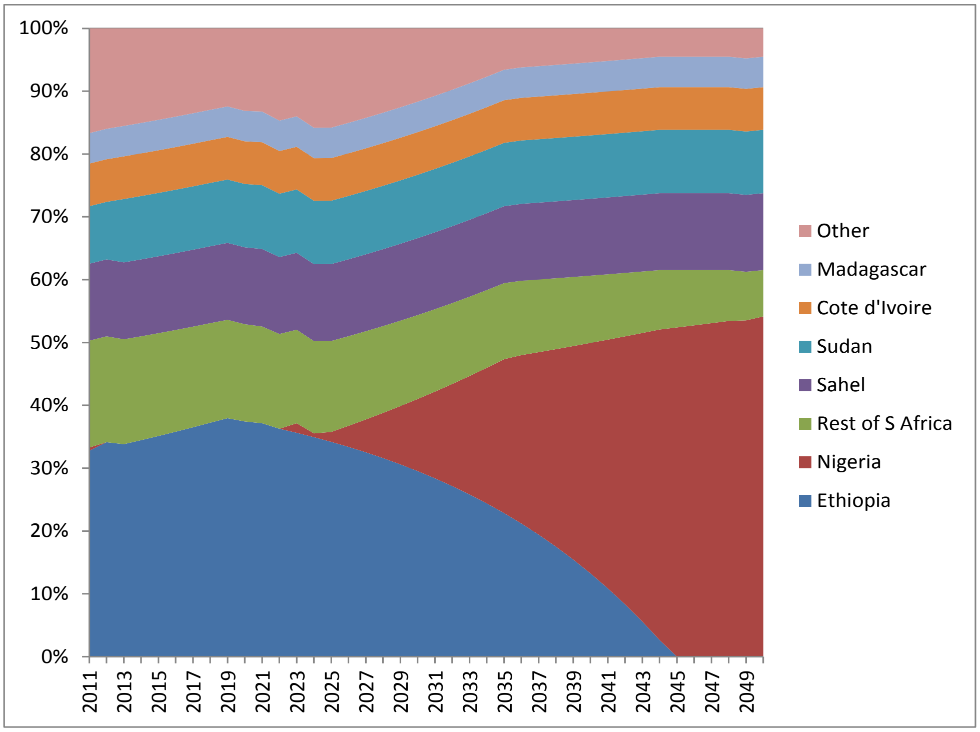
Figure 4 Projected evolution of the total number of poor in SSA period with present R&D investment rates (millions)



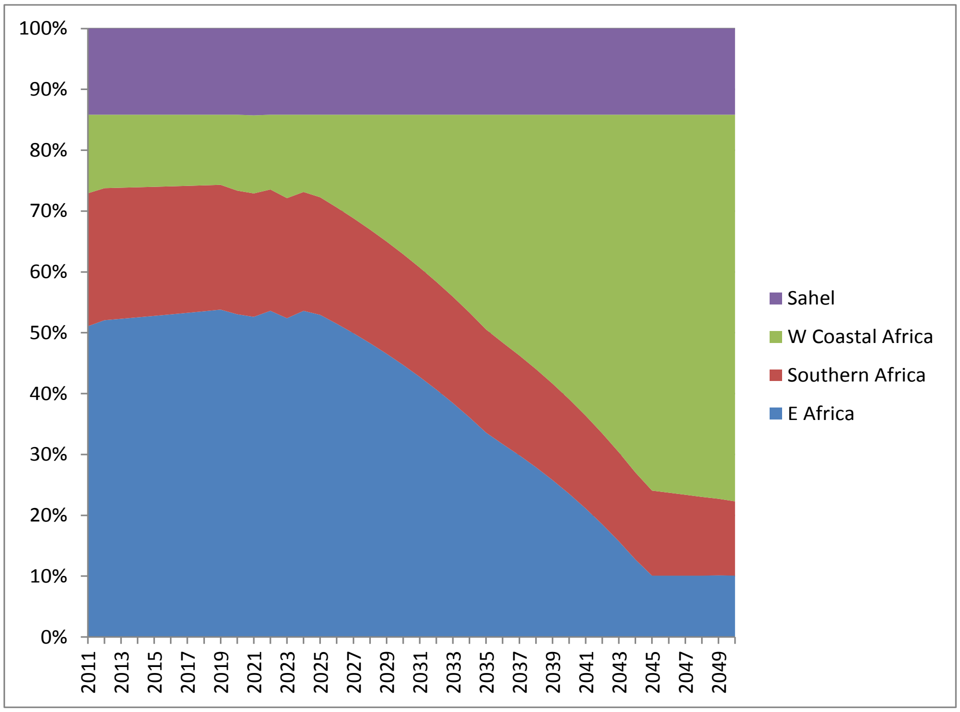
Source: Author based on model simulations

Figure 5. Allocation of R&D investment that maximizes welfare in SSA at the country and regional levels

A) Countries

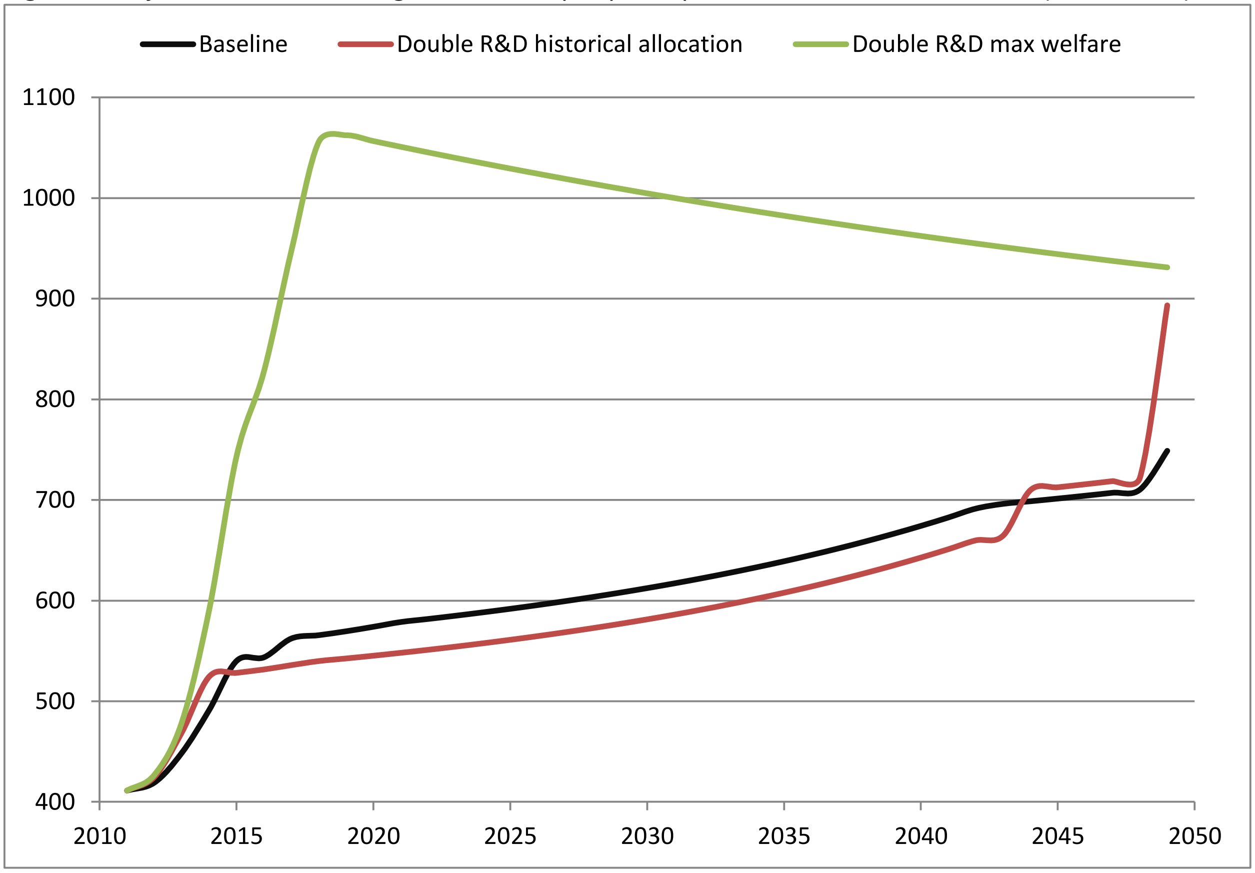


B) Regions in Sub-Saharan Africa



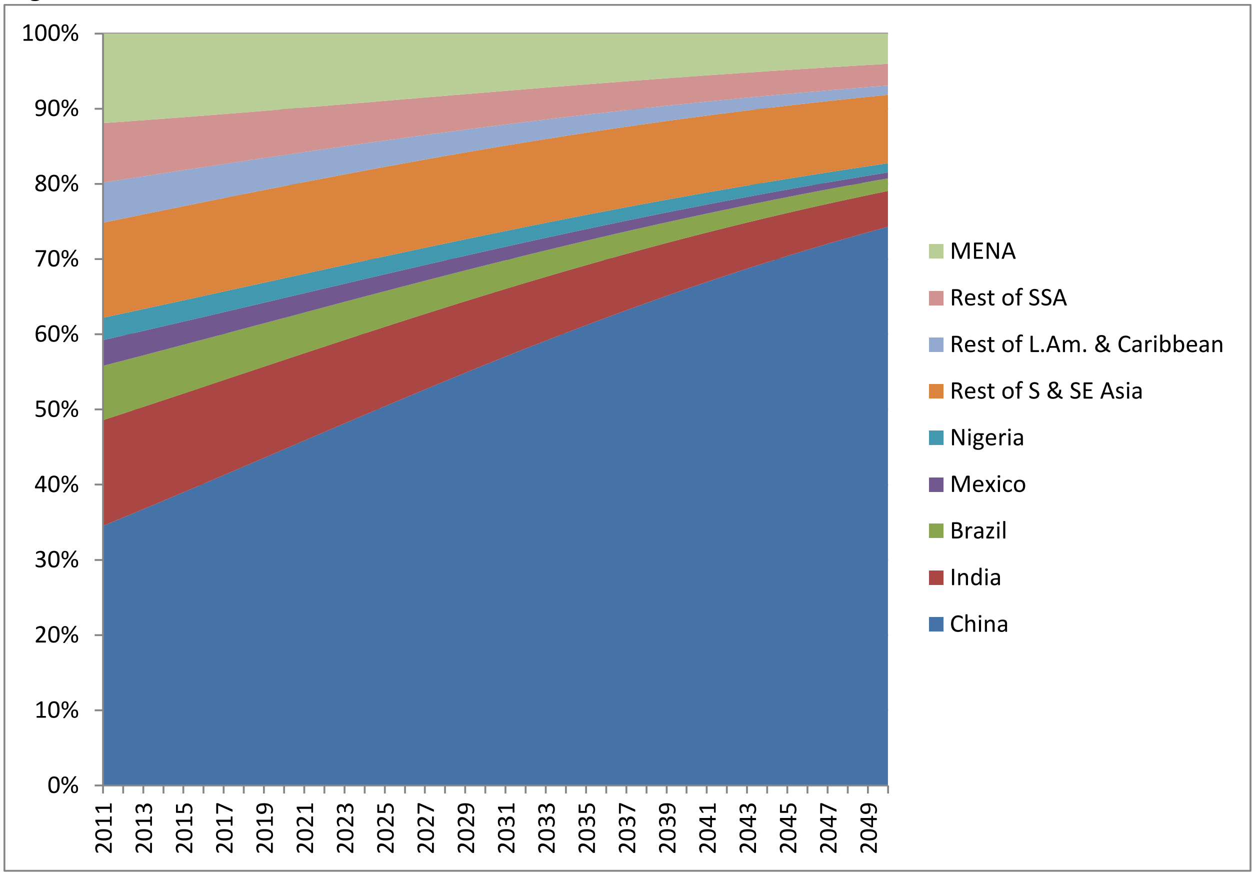
Source: Author based on model simulations

Figure 6 Projected evolution of agricultural output per capita under different scenarios (2005 PPP $)



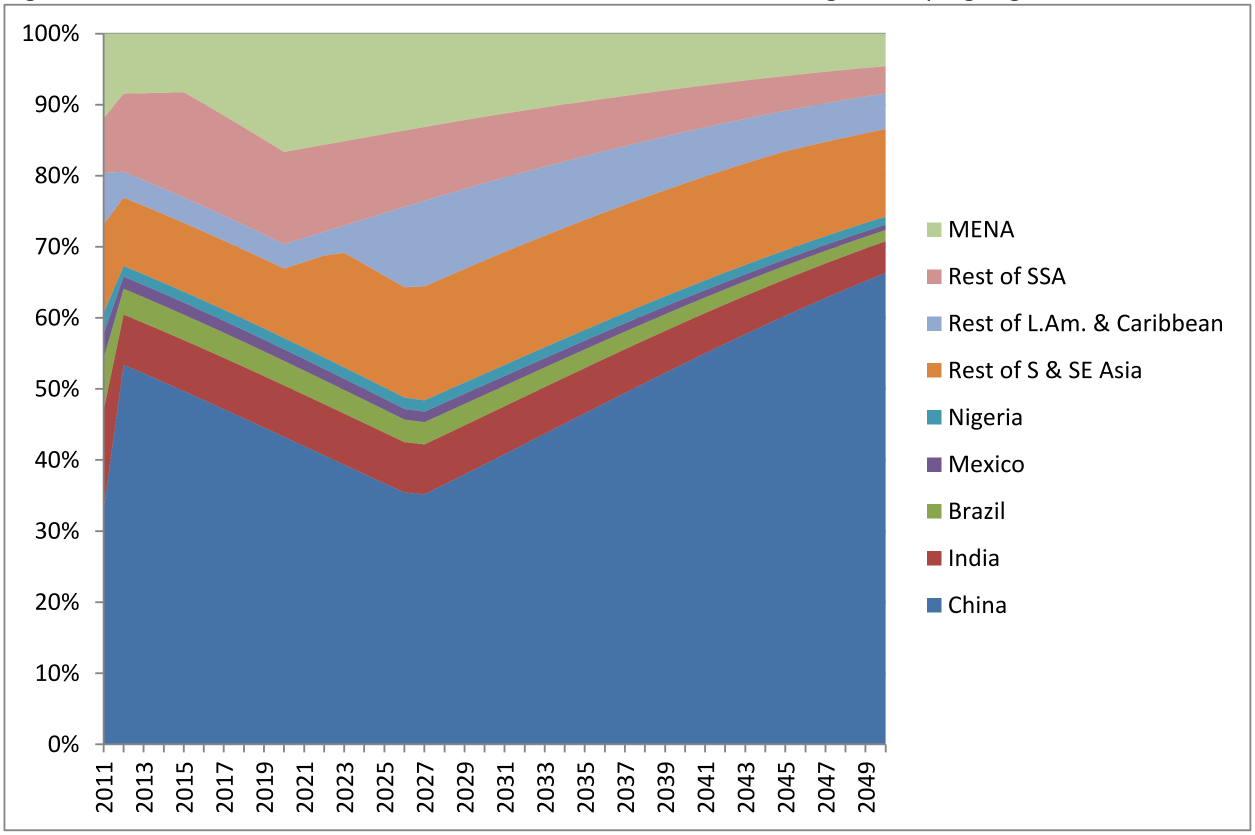
Source: Author based on model simulations

Figure 7 Projected contributions to total R&D investment in developing countries as the result of doubling present total investment and allocating it according to historical investment in different regions



Source: Author based on model simulations

Figure 8. Allocation of R&D investment that maximizes welfare among developing regions 2010-2050



Source: Author based on model simulations

Table 1. Estimated coefficients of a production function including R&D stock as a factor using panel data and fixed effects

	East and SE Asia		LAC		S. Asia		SSA	
R&D	0.146	***	0.074	***	0.116	***	0.017	*
Labor	-1.839	***	0.342	***	0.772	***	0.363	***
Fertilizer	0.445	***	0.15	***	0.03		0.02	***
Livestock	0.277	***	0.643	***	0.255	***	0.423	***
Tractors	-0.067	*	0.0162		0.029	*	0.117	***
Ag. Area	0.396	*	-0.191	**	0.142		1.41	***
Constant	24.209	***	6.187	***	2.464		-7.2052	***

legend: * p<.1; ** p<.05; *** p<.01
Source: Author estimates based on data from FAOSTAT and ASTI.

Table 2. . Estimated poverty elasticities a panel data of agricultural output per capita of rural population and figures on number of poor by country in different regions

VARIABLES	Asia	Latin America	SSA
log Agricultural output/ rural population	-0.601***	-0.685*	-0.220*
	-0.166	-0.373	-0.113
Constant	8.872***	7.035***	6.388***
	-0.52	-1.491	-0.338
Observations	133	154	339
R-squared	0.103	0.069	0.029
Number of countries	15	19	39

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author estimation using data from POVCALNET(2011) and FAOSTAT(2011).

Table 3 Projected annual changes to 2050 in different indicators for SSA regions in a scenario where agricultural R&D investment is allocated across sub-regions according to actual investments during the period 1994-2008 (percentage)

	Total output	Output per capita	Imports per capita	Poverty headcount
Nigeria	3.33	0.97	-0.70	-1.87
Ghana	4.36	2.29	0.10	-6.77
Cote d'Ivoire	3.56	1.55	-0.13	-2.75
Cameroon	2.68	0.73	-0.32	-1.42
Senegal	3.06	0.72	-1.71	-1.54
Sahel	2.81	0.03	-1.45	-1.03
Ethiopia	4.31	2.52	6.59	-17.34
Sudan	2.08	0.01	-0.80	-0.84
Kenya	4.63	2.18	0.52	-6.12
Uganda	5.05	2.16	0.74	-7.12
Tanzania	5.15	2.22	2.32	-10.13
Rest of E Africa	3.18	0.79	-0.23	-1.64
South Africa	3.21	2.47	0.58	-7.78
Madagascar	2.91	0.28	0.41	-1.20
Rest of W Africa	4.23	1.96	-0.40	-4.53
Central Africa	4.55	2.27	-0.77	-10.52
Rest of Southern Africa	2.32	0.07	-1.32	-0.93

Source: Author based in model simulations

Table 4 Projected annual changes to 2050 in different indicators in a scenario where agricultural R&D investment is allocated across sub-regions to maximize total welfare in SSA (percentage)

	Total output	Output per capita	Imports per capita	Poverty headcount
Nigeria	4.80	2.41	3.87	-20.25
Ghana	4.53	2.46	19.12	-14.24
Cote d'Ivoire	4.50	2.47	13.95	-12.86
Cameroon	4.46	2.47	4.03	-13.42
Senegal	4.79	2.42	-2.40	-13.25
Sahel	5.23	2.38	-0.23	-18.54
Ethiopia	4.31	2.52	6.27	-17.34
Sudan	4.59	2.47	0.57	-16.68
Kenya	4.85	2.40	5.74	-14.65
Uganda	5.20	2.31	6.25	-16.73
Tanzania	5.19	2.27	6.45	-18.42
Rest of E Africa	4.83	2.41	1.98	-17.35
South Africa	3.30	2.56	15.15	-13.84
Madagascar	5.08	2.38	3.70	-16.21
Rest of W Africa	4.67	2.40	3.26	-16.72
Central Africa	4.59	2.31	1.35	-16.23
Rest of Southern Africa	4.74	2.44	5.56	-17.33

Source: Author based on model simulations

APPENDIX

Table A1. Country mapping of the 41 regions included in the DLP model

	Region/Country	Included countries
East Africa	Ethiopia	Ethiopia
	Kenya	Kenya
	Sudan	Sudan
	Tanzania	Tanzania
	Uganda	Uganda
	Rest of East Africa	Burundi, Djibouti, Eritrea, Rwanda, Somalia
Southern Africa	South Africa	South Africa
	Madagascar	Madagascar
	Rest of Southern Africa	Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Zambia, Zimbabwe
West & Central Africa	Central Africa	Angola, Central African Rep., Congo, Gabon
	Cameroon	Cameroon
	Cote d'Ivoire	Cote d'Ivoire
	DRC	Democratic Rep. Of the Congo
	Ghana	Ghana
	Nigeria	Nigeria
	Sahel	Burkina Faso, Chad, Gambia, Guinea-Bissau, Mali, Mauritania, Niger
	Senegal	Senegal
	Rest of W. Africa	Benin, Cape Verde, Eq. Guinea, Guinea, Liberia, Sierra Leone, Togo
South and SE Asia	India	India
	Bangladesh	Bangladesh
	Pakistan	Pakistan
	China	China
	Indonesia	Indonesia
	Rest of East Asia	Cambodia, Democratic Rep. Of Korea, Lao, Malaysia, Philippines, Korea, Singapore, Vietnam
Latin America and the Caribbean	Andean countries	Bolivia, Colombia, Ecuador, Peru, Venezuela
	Southern Cone	Argentina, Chile, Paraguay, Uruguay
	Brazil	Brazil

	Central America	Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama
	Caribbean	Cuba, Dominican Rep., Guyana, Haiti, Jamaica, Suriname, Trinidad & Tobago
	Mexico	Mexico
Middle East & North Africa	Egypt	Egypt
	Middle East	Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirtes, Yemen
	North Africa	Algeria, Libya, Morocco, Tunisia
High Income	Australia-Nzealand	Australia & New Zealand
	Japan	Japan
	Europe	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK.
	US-Canada	USA, Canada
Other	Former USSR & E.Europe	Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Rep., Czechoslovakia, Estonia, Georgia, Hungary, Kazakhstan, Latvia, Lithuania, Montenegro, Polan, Moldova, Romania, Russia, Serbia, Montenegro, Slovakia, Slovenia, Tajikistan, Macedonia, Turkmenistan, Ukraine, Uzbekistan, Yugoslav SFR,
	Rest of the World	American Samoa, Antigua & Barbuda, Aruba, Bahamas, Barbados, Bermuda, British Virgin Islands, Brunei, Cayman Islands, Comoros, Cook Islands, Cyprus, Dominica, Falkland Islands, Faroe Islands, Fiji, French Polynesia, Grenada, Guam, Maldives, Malta, Mauritius, Mongolia, Nauru, Netherlands Antilles, New Caledonia, Niue, Norfolk Island, Papua New Guinea, S.Kitts & Nevis, S. Lucia, S. Pierre & Miquelon, S. Vincent and the Grenadines, Samoa, S. Tome & Principe, Seychelles, Solomon Islands, Timor-Leste, Tonga, Tuvalu, Vanuatu