

OVERVIEW

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END POVERTY DAY EDITION

Reaping Richer Returns

Public Spending Priorities for African
Agriculture Productivity Growth

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Foreword

A vibrant, sustainable and resilient agriculture sector is vital for sub-Saharan Africa's economic future. While productivity of African agriculture has grown, it still lags behind Asia and Latin America, and has not delivered the development dividends needed to significantly reduce poverty in rural areas across Sub-Saharan Africa. Consider this: nearly two-thirds of Africa's population still rely on agriculture to make a living, and for Africa's poorest households, food makes up almost three-quarters of consumption expenditures. As a result of poor agricultural productivity, Africa's growing urban populations are also confronted with higher food prices. In order to make a significant dent on poverty, enhancing the productivity and competitiveness of African agriculture must become a priority.

Clearly, the status quo must change. One key element that can accelerate change and unleash growth is to catalyze a shift toward more effective, efficient and climate resilient public spending in agriculture. This book comes at an opportune time and the research effort was motivated by the confluence of several factors related to public spending on agriculture in Africa.

First is the elevated prominence of this topic in policymaking circles, underscored by the Maputo Declaration of 2003, and, more recently, the Malabo Declaration of 2014, which calls for enhancing investment finance in agriculture as a means to ending hunger and halving poverty by 2025 through inclusive agricultural growth and transformation. Furthermore, assisting countries to develop National Agricultural Investment Programs and to improve the efficiency and quality of expenditures has become a cornerstone of the New Partnership for Africa's Development (NEPAD) and its Comprehensive African Agricultural Development Program (CAADP).

Second, Africa's development partners have been actively supporting this effort and in doing so have accumulated a large and growing body of experience and knowledge that can provide useful lessons. The World Bank, in particular, through a program with the Bill and Melinda Gates Foundation, has been assisting countries to carry out public agricultural spending reviews (AgPERs), and more recently has been developing tools to help mainstream AgPERs as standard instruments for budgeting and policymaking.

Third, as this book well demonstrates, agricultural spending in Sub-Saharan Africa not only significantly lags behind other developing regions, its impact is also vitiated by subsidy programs and transfers that tend to benefit elites to the detriment of poor people and the agricultural sector itself. Shortcomings of the budgeting processes also reduce spending effectiveness. In light of this scenario, addressing the quality of public spending and the efficiency of resource use becomes an even more important issue than simply addressing the level of spending. The rigorous analysis presented in this book provides options for reform with a view to enhancing investment in the sector and eventually development impact.

The evidence shows that the efficient use of public funds has been instrumental in laying the foundations for agricultural productivity growth around the world, providing important lessons for

African policymakers and development partners. Investments in rural public goods, combined with better policies and institutions drive agricultural productivity growth. The dividends from investments to strengthen markets, develop and disseminate improved technologies and expand irrigation can be enormous. Similarly, improvement of the policy environment through trade and regulatory policy complements spending by enhancing incentives for producers and innovators to take advantage of public goods, thereby crowding in private investment. Reforming the design and implementation of these subsidy programs while prioritizing government spending in favor of high-return core public goods and policies could produce significant gains. For this reason, this book argues for a rebalancing of the composition of public agricultural spending in order to reap robust development dividends.

We hope that the findings presented here will resonate with policymakers concerned with agricultural policies, and more specifically with public spending programs that aim to improve the productivity of African agriculture. The target audiences include ministries of agriculture, as well as ministries of finance, planning and rural development, which are concerned with maximizing development impact of public expenditures across different sectors. In addition, the study seeks to reinforce the work of regional initiatives such as CAADP that are working with individual country governments to enhance the efficiency of agricultural budgets and increase investments in agriculture. Ultimately, we hope that the findings will help catalyze growth in Sub-Saharan Africa's agricultural sector for the benefit of all Africans.

Makhtar Diop
Vice President, Africa Region
The World Bank

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Overview

The lack of robust agricultural productivity growth underlies pervasive rural poverty in Sub-Saharan Africa. While many developing countries in other regions have successfully raised their agricultural productivity, Sub-Saharan Africa lags behind. Yet, boosting agricultural productivity in Sub-Saharan Africa would not only raise the incomes of farm households, which make up more than half the region's population, it would also lower food costs for the nonfarm population and promote the development of agro-industry. That in turn would promote broader economic growth by stimulating demand for nonfarm goods and services. Higher productivity would also free up resources such as labor for the growth of other economic sectors. For these reasons, improving agricultural productivity in Sub-Saharan Africa remains an important strategy for reducing poverty, enhancing inclusive growth, and promoting structural transformation in the region.

Investments in rural public goods combined with better policies and institutions have driven agricultural productivity growth around the world. The dividends from investments to strengthen markets, expand irrigation, and develop and adopt improved technologies can be enormous. And improving the policy environment through trade and regulatory policy reforms complements such spending by enhancing the incentives for producers and innovators to take advantage of public goods, thus crowding in private investment. Despite high returns to such investments, Sub-Saharan countries tend to underinvest in them. Rebalancing the composition of public agricultural spending could reap massive payoffs.

Agricultural spending in Sub-Saharan Africa not only lags behind other developing regions on several metrics of volume, it is also vitiated by subsidy programs and transfers that tend to benefit the better off with insignificant gains for agriculture or for the poor. Shortcomings of the budgeting process also reduce spending effectiveness. Therefore, addressing the quality of public spending and the efficiency of resource use is perhaps even more important than addressing the level of spending.

Improving the efficiency of public spending requires managing the political pressures that determine budget allocations. Groups of producers that control a large proportion of national wealth often have the means to influence public policies to their benefit. And political pressures sometimes influence spending towards short gestation projects and programs rather than those that are longer in term but higher in impact. How then to marshal political support for reform and more effective spending? By increasing transparency about the distributional effects of policies, by improving targeting and gradually phasing out subsidies, by using mechanisms to enhance credibility of government commitment to investments with long time horizons, and by packaging and sequencing reforms in ways that reduce opposition.

The lack of robust evaluations, combined with limited access to public information on expenditures and its beneficiaries, reduces the effectiveness of formal accountability mechanisms that might be provided by political checks and balances, a free press, and well-intentioned civil society organizations. Rigorous, evidence-based evaluations and their wide dissemination could reduce this information gap and increase transparency.

Efficient public spending is only one ingredient of a strategy for agricultural transformation, and must be complemented by a host of additional policies. Indeed, in a poor policy environment, even spending in areas that would otherwise deliver high returns will be unproductive or counterproductive. Although these complementary policies and investments are essential, this book is not about them—it is about public spending in and for agriculture. But as we will demonstrate, the efficient use of public funds has laid the foundation for transformation in other parts of the world, and a key objective here is to explore how public agricultural spending can play that role in Sub-Saharan Africa as well.

Enhance agricultural productivity to reduce poverty

Extreme poverty is broad and deep

Extreme poverty is becoming increasingly concentrated in Sub-Saharan Africa, which accounted for 43 percent of global poverty in 2012,¹ and its breadth and depth remain a dominant challenge.² While the region's GDP growth has picked up in recent years, it has mostly been driven by higher production of mineral and hydrocarbon resources. This growth model has not turned out to be an effective engine to drive the twin goals of rapid poverty reduction or boost shared prosperity.³ Even after nearly two decades of economic growth, most Africans continue to earn their livelihoods in the traditional economy. Much more than in any other region, agriculture dominates African economies, accounting for a third of the GDP region wide and employing two-thirds of the labor force, with the poorest countries most heavily reliant on it.

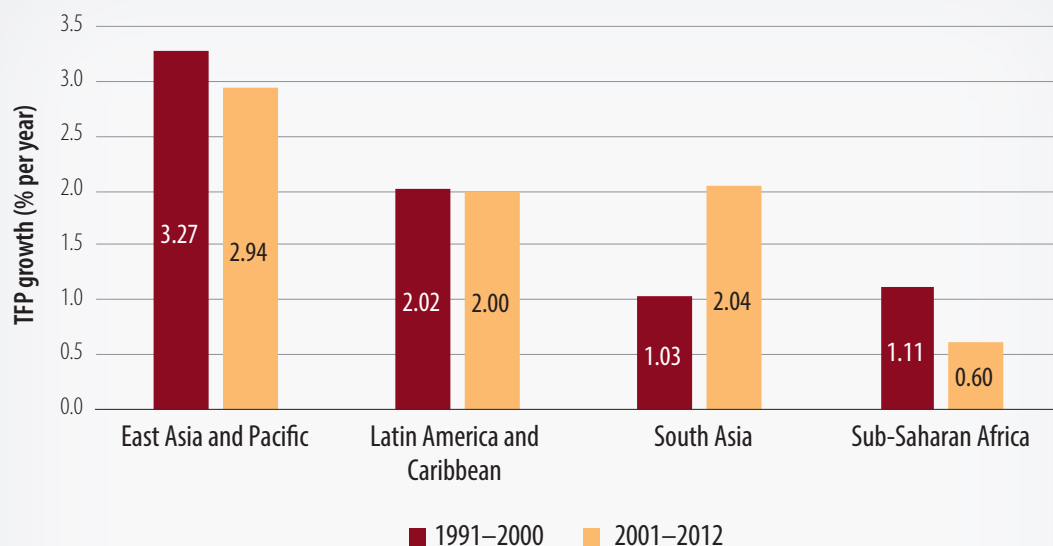
Growth must be revitalized where the poor work

Clearly one element to progress toward the twin goals is to revitalize growth where a large majority of the continent's poor live and work. Evidence indicates that agricultural growth reduces poverty in developing countries by around three times more than growth in other sectors.⁴ Improving agricultural productivity is also critical for fostering structural transformation and managing the urban transition by increasing incomes and enabling people to move out of agriculture.⁵ Investments and policies to foster growth in the rural economy thus emerge as critical for accelerating poverty reduction and fostering inclusive growth in the region.

African agriculture has been growing, but not sustainably

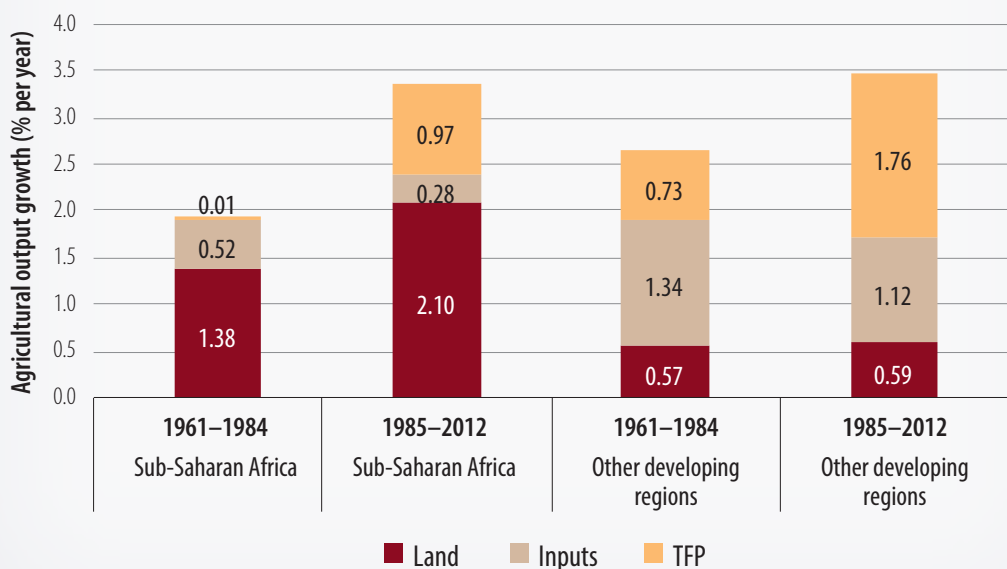
Growth in agricultural production in Africa has undeniably picked up in recent years, and was close to that of other developing regions in 1985–2012 (figure 1). In those other regions, production increases were mainly associated with yield growth due to intensive use of inputs and improved production technologies. In Africa, however, production increases were largely a result of expanding the area under cultivation (figure 2).⁶ Such expansion cannot be sustained indefinitely, even with Africa's relative land abundance.

FIGURE 1. Total factor productivity growth in Africa lags behind other regions—and the gap is widening



Source: USDA Economic Research Service data.

FIGURE 2. Production increases in Africa came largely from expanding the area under cultivation rather than input intensification or total factor productivity growth



Source: USDA Economic Research Service data.

The Green Revolution that boosted yields in other countries largely bypassed Africa. A comparison with Asia and South America over two decades shows Africa in the 1990s with lower total factor productivity growth than its comparators (TFP is a comprehensive measure of overall efficiency in the use of all inputs see Box 1).⁷ And while other regions enjoyed faster growth in the 2000s than in the 1990s, Africa’s rate fell even lower, further magnifying the TFP gap.

Box 1. Measuring Agriculture's Productivity Performance

Total factor productivity (TFP) measures the total conventional resource cost of producing economic outputs. Unlike partial productivity measures (such as labor productivity, as output per worker, and land productivity, as crop yield per hectare), TFP takes into account the contributions of all conventional inputs to production—land, labor, capital, and materials. While growth in labor or land productivity may be attributed to increasing the use of other inputs, growth in TFP reflects improvements in the efficiency of this aggregate bundle of inputs. It is a more complete measure of productivity and more closely associated with technological change. Measuring TFP trends requires detailed information on all the output and input quantities involved in agricultural production, plus information on prices and unit costs. This measurement is an onerous task even for countries with detailed agricultural data, like the United States; for countries in Sub-Saharan Africa, data are incomplete and often of poor quality, and indirect methods are required to derive approximate measures of TFP.

The time is right for boosting the productivity of African agriculture

Although total factor productivity needs to be the primary driver of sustainable agricultural growth, Africa's potential for agricultural prosperity is enhanced by an abundance of vital inputs. Of the world's surface area suitable for the sustainable expansion of production—that is, unprotected, unforested land with low population density—Africa has the largest share by far, accounting for almost 45 percent of the global total. Although some large areas of the continent are arid or semi-arid, the water resources in Africa are also, on average, substantially underused. Only 2.5 percent of renewable water resources in Africa are being used, half the 5 percent rate worldwide.

On the supply side, the prospects are promising to increase both capital and the labor devoted to agricultural production. If the investment climate can be improved, the potential is good for attracting a higher share of global resources. Africa's inward FDI stock in agriculture accounts for a mere 7 percent of the total stock in developing countries, compared with 78 percent for Asia and 15 percent for Latin America and the Caribbean. There is also the prospect of a growing labor force for agriculture. With the creation of jobs in upstream or downstream agribusinesses, this "youth dividend" could drive growth in the sector. But failing to create these jobs would mean rising unemployment or accelerated migration to already-crowded cities.⁸

African markets are growing rapidly

On the demand side, African regional markets are growing rapidly—driven by population, urban, and income growth—and are forecast to reach a trillion dollars by 2030 (figure 3).⁹ The rising demand for food to nourish rapidly growing urban populations has so far been filled mostly with imports. From the 1990s to the 2000s, the balance of trade in food staples was moving from deficit to surplus in Europe

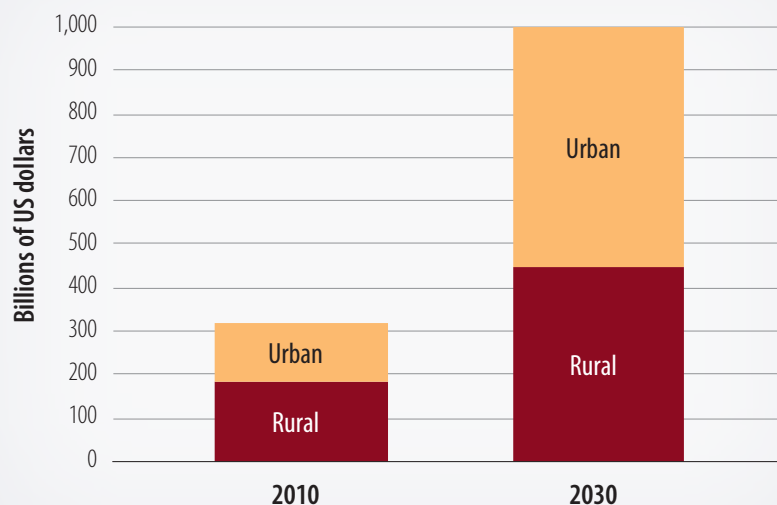
and Central Asia, South Asia, and East Asia and the Pacific. But in Sub-Saharan Africa, the deficits widened.¹⁰ Food trade deficits are understandable in a region such as the Middle East and North Africa, which has limited advantage in food production. But in Sub-Saharan Africa, where all the natural ingredients for efficient production

are in place, the deficits signal that something fundamental is amiss. If not reversed, the consequences of missed opportunities to capture regional markets will only increase over time. But if African agriculture becomes more competitive and regional producers capture these markets, the benefits could be enormous. Taking advantage of these opportunities will need smart policy choices to reduce trade barriers, which currently greatly impede regional trade, as well as smart spending in the public and private sectors to make Africa's production more competitive with imports.

Improving the effectiveness of public investments can boost productivity

A crucial element in enhancing agricultural productivity growth is improving the provision of productive investments through more and better public spending in agriculture. This opportunity has been recognized by African policymakers, and over the past few years, ministries of agriculture and finance have intensified efforts to improve both the quantity (volume) and quality (effectiveness) of public spending. In 2003, African nations launched the Comprehensive Africa Agriculture Development Programme (CAADP), including a commitment to invest 10 percent of national public spending in agriculture, a commitment popularly known as the Maputo Declaration. This target was recently reiterated in the 2014 Malabo Declaration, and CAADP has led the charge to support national teams working on agriculture sector expenditure to conduct basic agriculture public expenditure reviews and related specialized analyses. A cornerstone of CAADP's work and that of its development partners, including the World Bank, has been to assist countries in developing National Agricultural Investment Plans, make progress toward the quantitative goal, and improve the quality of spending.

FIGURE 3. The retail value of food and beverages in Sub-Saharan Africa is set to hit \$1 trillion



Source: World Bank 2013.

Spending choices make a difference

Increasing the volume of public spending in agriculture will be important but not sufficient to kindle agriculture growth and poverty reduction. Actions will also be needed to improve the efficiency and effectiveness of public spending. The expectation that high-quality public spending should bolster growth has strong empirical validation. This book shows significant differences in the rates of return to different categories of agricultural spending. Indeed, many studies find quite low returns to aggregate spending on agriculture. But almost all find high returns to specific types of spending, such as investments in core public goods related to technology generation and diffusion, market linkages, and irrigation infrastructure. The implication is that a large part of the spending in some countries goes to low-return activities, dragging down the overall returns relative to what they could have been if more spending were allocated to the higher return activities. The inevitable conclusion is that choices about how to allocate public agricultural spending matter a lot.

Other complementary policies and investments are necessary as well

Enhanced public spending in agriculture is only one ingredient of a strategy for agricultural transformation. Investments in rural infrastructure, health, and education matter too, and wise investments must be complemented by a host of other policies. Indeed, in a poor policy environment, even spending in areas generally considered high return will be unproductive or counterproductive. But smart use of public funds—not only by agriculture ministries, but by other ministries dealing with hard and soft infrastructure in rural areas—has laid the foundation for transformation in other parts of the world. A key for policymakers and development practitioners is knowing what kinds of spending decisions can yield the biggest bang for the buck in achieving public policy objectives. What are the options to rebalance agricultural public spending and improve the budgeting process to increase the efficiency of limited resources for inclusive growth? Answering this question is the main objective of this book, so that public spending can do for Africa what it has done elsewhere.

Why governments should invest in agriculture

Before discussing “what” African governments should be spending public funds on, it may be useful to briefly understand the “why.” Why should governments be spending on agriculture at all? The rationale for public investments derives from two fundamental sources: economic inefficiencies caused by market failures and from inequalities in the distribution of goods and services (box 2).

Considering pathways to benefits

To guide decisions on areas appropriate for government spending, it helps to consider what kinds of goods and services are necessary to catalyze agricultural growth, and to what extent each is a “public good.” To do this, we conceptualize the beneficial effects of public spending in agriculture along four pathways: generating technology, disseminating knowledge (building human capital), reducing transaction costs, and attracting private capital.¹¹ Each can be identified with particular classes of

BOX 2. Correcting market failures and inequalities

Agricultural production is quintessentially a private enterprise. But production requires public goods and services that the private sector, on both theoretical and practical grounds, cannot provide efficiently. One characteristic of such goods and services is that they are nonexcludable—if provided to one consumer, other potential beneficiaries cannot be kept from enjoying them. A second is that they are nonrivalrous—consumption by one does not reduce the consumption of another. Nonexcludability implies that potential beneficiaries cannot be charged for the good, so the producer cannot capture its full social value. Nonrivalry implies that it is inefficient to charge anything for the good, since the cost of supplying an additional unit (letting another consumer enjoy the benefits) is zero. These characteristics cause social and private returns to diverge, leading to private investments below the social optimum. That is why the public sector needs to play a role in their provision.

spending to provide goods or services that have public good characteristics and that are crucial for fostering robust agriculture productivity growth and poverty reduction in rural contexts.

- To generate knowledge. Technology-advancing effects are associated with public spending on agricultural research and development (R&D) to create basic knowledge, which is both nonexcludable and nonrivalrous. Sometimes the knowledge can be embodied in a commercial product (as with hybrid seeds and chemicals), with benefits that are excludable and rivalrous, but the basic knowledge itself is not. Investments in R&D are among the most important public goods and a critical component of public agricultural spending.
- To disseminate knowledge and build human capital. Human-capital-enhancing effects can be associated with public spending on extension, training, and information services that transfer knowledge and skills to those engaged in agricultural production. These investments create significant positive externalities through demonstration effects and peer-to-peer learning of benefits from adopting new productivity enhancing technology. As agricultural production processes become increasingly knowledge intensive, with higher demand for precise and timely information, such investments become more important.
- To reduce transaction costs. Similarly, transaction-cost-reducing effects can derive from public spending on soft and hard infrastructure that might improve access to input and output markets. Transaction costs are an important determinant of market integration, and investments that lower the costs of searching for and exchanging information—and of bargaining, decision-making, and enforcing contracts—tend to enhance market participation.¹² Investments in rural roads, market information dissemination, and land market development, for example, are important in reducing transaction costs.
- To attract private capital. The crowding-in effects of public agricultural spending on private capital comes about when public and private investments are complements in production. An example is public investment in large infrastructure such as dams and canals, which then make it profitable for farmers to make small on-farm investments in water management and a wider range of production technologies.

Reducing inequality and poverty

Public spending in agriculture is also often justified on equity grounds, especially salient given the concentration of the poor in rural areas, most of whom rely primarily on agriculture (directly or indirectly) for their livelihoods. One argument for fertilizer subsidies is that they could potentially help poor farmers break out of a low-productivity poverty trap. The equity justification for spending, of course, is stronger for programs that can actually be targeted at the poor and for programs that demonstrate a high income multiplier. For instance, impacts of spending on extension are just as progressive as those from several kinds of social spending, and are far superior to spending on subsidies. Also to be recognized is that many programs aimed at rural poverty reduction—either directly (as with rural safety nets) or indirectly (as with programs to support structural transformation by helping the rural poor find jobs in urban areas)—fall outside the scope of this study.

Ensuring productive spending

Not all public spending is productive. This is a clear implication of the low estimated net benefits from total agricultural spending compared with the high benefits of some categories of agricultural spending.¹³ Apparently, where aggregate spending has no measurable impact, the negative effects of ineffective spending overwhelm the positive effects of more effective spending.¹⁴ Public spending may be unproductive or even reduce the productivity of other spending for two basic reasons. First, governments sometimes spend on things that are not public goods. They tend to be inefficient suppliers of private goods, and when they enter these markets, there is a serious risk of displacing the private sector. Second, even when there are clear failures in particular markets, government spending will not necessarily improve the situation. Inherent characteristics of government interventions can sometimes lead to “government failures,” which may exacerbate the original problems caused by the market failures and produce unintended adverse ancillary effects. Empirically though, public spending on public goods has typically been much more productive than public spending on private goods.¹⁵

How much public spending—and for what?

10 percent on agriculture?

In the 2003 Maputo Declaration, African heads of state and government agreed that spending was far too low in agriculture and set a goal of investing 10 percent of their total national spending in agriculture. This goal was reaffirmed in the Malabo Declaration in 2014, and assisting countries to increase the quantity and quality of public agricultural spending has been a major objective of the Comprehensive Africa Agriculture Development Programme. There is also an aspirational goal of increasing agricultural annual growth to 6 percent for Sub-Saharan countries, though growth is not a policy variable under the direct control of governments the way public spending is.

Of course, the optimal distribution among sectors will depend on many country-specific factors (box 3). In particular, the extent that ministries of agriculture (and related ministries) can demonstrate that

their programs are an efficient and high-impact use of public funds, they can make a stronger case to ministries of finance and planning for increasing their budgets. In this sense, enhancing the quality of spending is the first order of business, and this book sees this objective as the priority. Nonetheless, the quantity of spending is a meaningful indicator of government commitment to agriculture, so it is worth considering how Africa stacks up to other regions, and to the Maputo and Malabo targets.

BOX 3. How much of the government budget should be devoted to agriculture?

How much of the government budget should be devoted to agriculture, and how much to other sectors? What is “too little” and what is “enough”? The answers are conceptually straightforward but difficult to put into practice. In principle, to maximize welfare on a given budget, spending should be distributed such that the marginal dollar in each activity yields the same increase in national welfare (however “welfare” is defined). If this were not true—if, for example, an additional dollar devoted to agriculture increased welfare more than the incremental dollar to health spending—overall welfare could be increased by taking a dollar from health and spending it on agriculture.

In a two-sector world (agriculture and nonagriculture), this condition for distributing spending so as to maximize welfare can be expressed as:

$$(1) \quad \frac{dW}{dS_A} = \frac{dW}{dS_{NA}},$$

where W is welfare and S_A and S_{NA} are spending on agriculture and nonagriculture.

Of course, how much welfare is increased by an incremental public dollar spent in agriculture depends on how much that dollar will increase agricultural production, as well as how much the additional production will increase welfare. This optimal allocation condition can be expressed in a ratio of spending in each sector, such that:

$$(2) \quad \frac{S_A}{S_{NA}} = \left(\frac{E_{WA}}{E_{W,NA}} \right) \times \left(\frac{E_{A,S_A}}{E_{NA,S_{NA}}} \right),$$

Where E_{WA} is the elasticity of welfare to agricultural production (and likewise for nonagricultural production), and E_{A,S_A} is the elasticity of agricultural production to public spending in agriculture (and likewise for nonagricultural production).

The optimality condition in equation (2) provides a useful framework for thinking about spending allocations whereby the optimal ratio of public spending in agriculture versus nonagriculture is equal to the ratio of the welfare elasticity of each sector’s production times the ratio of each sector’s elasticity of production with respect to public spending in the sector. The problem in operationalizing this to provide practical guidance to policymakers is that it would require empirical estimation of all these elasticities (in every sector) for a given country. There have been some attempts in cross-country samples to estimate the elasticity of welfare (measured by either national GDP or poverty reduction) with respect to agricultural production, and the elasticity of production with respect to public spending.¹⁶ But there is no strong reason to assume that for any given country, the elasticities would be equal to the global or regional average.

BOX 3. How much of the government budget should be devoted to agriculture?

In the absence of a practical way to rigorously answer the question of how much public spending should be allocated to agriculture, there have been some efforts to provide “rules of thumb,” which may seem intuitive and reasonable. For example, De Ferranti et al. (2005) show that with some special (and quite restrictive) simplifying assumptions, the optimal allocation is such that each sector’s share of spending is its share of national GDP.¹⁷ This index—the share of spending on agriculture relative to agriculture’s share in the economy—is calculated for a number of Latin American countries over time to analyze whether there has been a systematic underallocation or “anti-agricultural bias” in public spending, with the general conclusion of no such bias in that region.

An alternative approach is to examine the experiences of countries that have undergone successful agricultural transformations. Analysis of 12 East and South Asian countries during their periods of high agricultural growth—the “Green Revolution”—shows that, on average, these countries devoted around 10 percent of total public spending to agriculture.¹⁸ Many other factors certainly contributed to success, but public support was an important ingredient. Thus, the Maputo target is similar to what the Asian countries were spending on agriculture in this period. Likewise, the NEPAD target of spending 1 percent of agricultural GDP on research is quite similar to the level that Brazil devoted to its successful research agency, Embrapa, as well as the level of spending on research in some high-income countries.

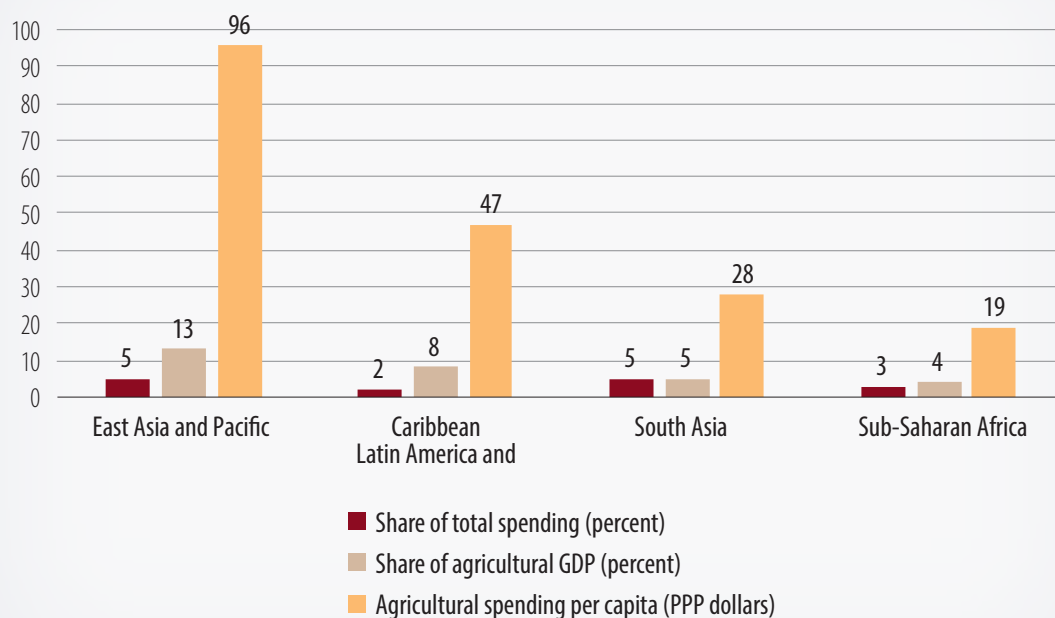
In applying such “rules of thumb,” it is also sensible to make adjustments based on economic reasoning using equation (2). For example, countries differ greatly in the contribution of agriculture to national GDP, and a 1 percent increase in agricultural production will generally result in a smaller percentage increase in overall GDP in a country where agriculture is 10 percent of the economy than in a country where it is 30 percent. That is, the value of η will be smaller in the latter than in the former, and so—all other things equal—the share of spending going to agriculture should be smaller as well. And the elasticity of production with respect to spending (ϵ) will be higher in countries with high agricultural potential (both because of favorable natural endowments and because the overall policy environment is conducive to a positive supply response)—and where the spending is “smarter.” In such countries with a higher value of $E_{A,SA}$, agriculture’s share of spending should be higher.

Source: Correa and Schmidt 2014; De Ferranti et al. 2005; Hazell 2009.

Lagging behind other regions

Public agricultural spending in Africa has lagged behind that in other developing regions on several metrics. Agricultural spending as a share of overall public spending—the metric used in the Maputo Declaration—is substantially lower than that in other regions, particularly East Asia and the Pacific and South Asia (figure 4). In 2014, Burkina Faso, Malawi, Mozambique, and Zimbabwe—had barely met or surpassed the 10 percent target (Malawi and Mozambique consistently surpassed it). Three countries—Niger, Rwanda, and Zambia—were close behind at 9 percent. On another metric—public spending on agriculture as a share of agricultural GDP—spending is also substantially lower in Africa than in other regions. This is also the case on the metric of spending per capita; in Africa, spending per capita was on average \$19, almost a third lower than the next lowest region, South Asia.

FIGURE 4. Public agricultural spending lags behind other regions
(public agricultural spending across regions, 2000–12)



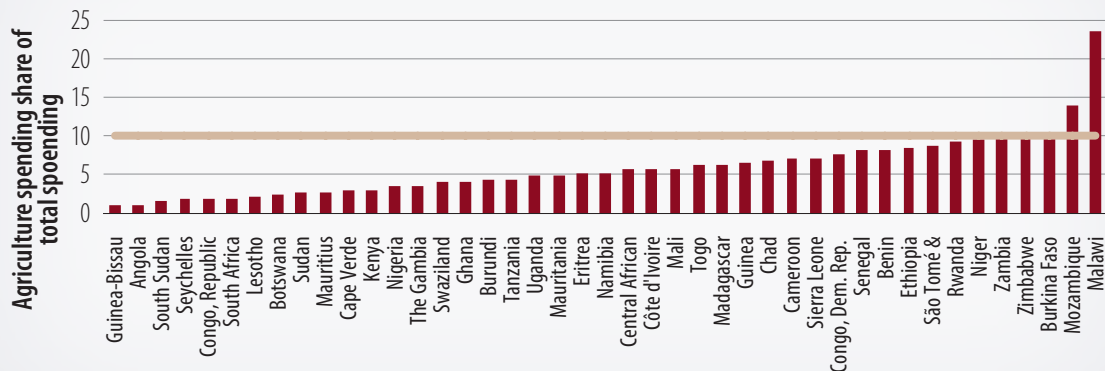
Source: IFPRI Statistics on Public Expenditures for Economic Development database.

Conditions and contexts differ widely—but trends indicate a widespread problem

While almost all countries are spending below the 10 percent target, country conditions and thus spending contexts differ widely across Sub-Saharan Africa (figure 5). For instance, the spending target is arguably less meaningful for such countries as South Africa and Botswana, with relatively small agricultural GDP shares in the overall economy (box 3). An alternative indicator of the public budgetary commitment to agriculture accounts for sector size—the Agriculture Orientation Index (AOI) is agriculture’s share of public spending relative to its share in the economy.¹⁹ An AOI value of 1 would indicate that the government spends a share of its budget on agriculture exactly proportional to agriculture’s contribution to GDP. As with other indicators, this is a blunt tool to measure policy, and only under special assumptions would spending be allocated exactly in proportion to each sector’s contribution to the economy. Still, intuitively, large deviations would at least suggest a deeper enquiry by policymakers.

As it turns out, no country in Africa has an AOI of 1, although some come close (figure 6). There is a strong tendency for the countries with small agricultural sectors to devote proportionately more of the budget to supporting it (higher AOIs). Overall, however, most African countries spend much smaller proportions of the public budget on agriculture than the sector’s share in the economy. Of the 47 countries for which the AOI can be computed, it is less than 0.3 in 31 countries.

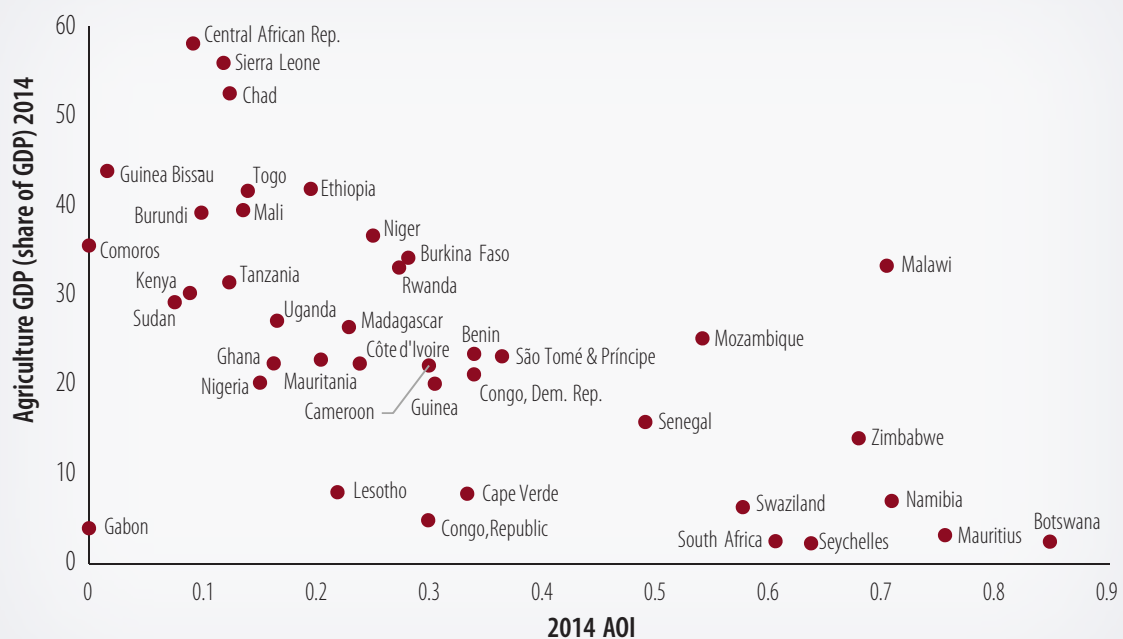
FIGURE 5. Almost all African countries fall short of the 10 percent target of government spending
(public agricultural spending in Sub-Saharan countries, 2014)



Source: IFPRI Regional Strategic Analysis and Knowledge Support System data.

While the numerical goal of 10 percent is somewhat arbitrary and the failure to meet this target is arguably not so worrisome, the AOI also appears to demonstrate underspending in most countries. Even more problematic is the persistent negative trend across three decades in agricultural spending as a share of both agricultural GDP and total public spending in Sub-Saharan Africa. Perhaps even more important than the level of spending is the inefficiency of resource use within the existing budget envelope.

FIGURE 6. No country in Africa spends as much on agriculture as agriculture contributes to the economy



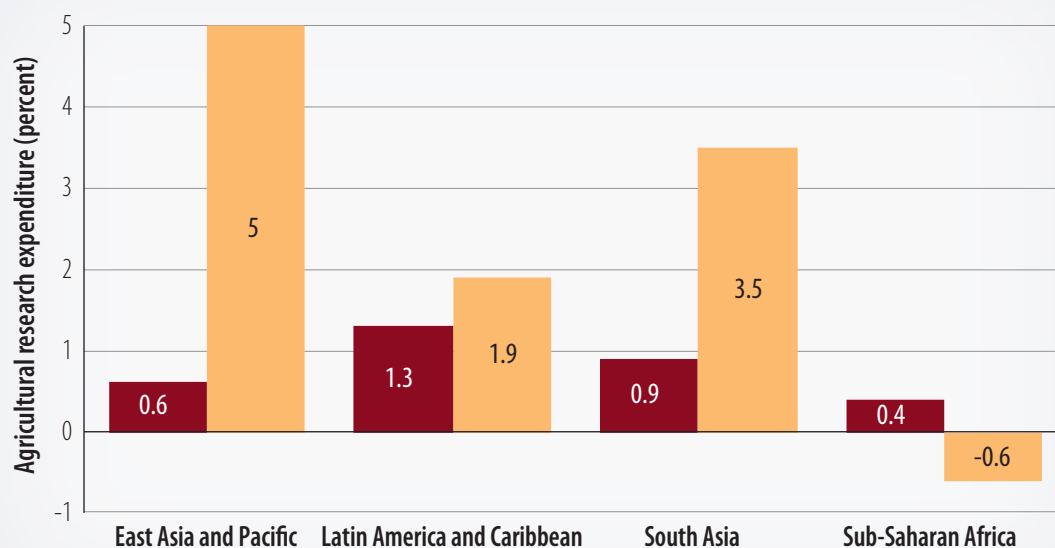
Source: IFPRI Regional Strategic Analysis and Knowledge Support System data.

Within any given overall budget envelope for agricultural public spending, the allocation across different activities needs to be balanced for the highest returns. There is no one-size-fits-all formula for deciding what that optimal allocation should be, and it will differ greatly across countries, depending on country circumstances and political preferences. Even so, it is useful to consider what kinds of expenditures have generally been most productive, and to examine how current composition of spending appears to reflect these lessons—or not. The evidence on returns to different spending categories is a bit lopsided, in the sense that much more research integrating benefits and costs have been done on certain categories of spending such as R&D than on other types of spending. Why? Efforts at data collection in this area have been more systematic, and the specific kind of spending under this rubric is perhaps more homogeneous than other categories as well.

Research has high returns but is severely underfunded

Spending on agricultural R&D is worth an especially close look, given the strong evidence that returns to investments in this area are consistently high around the world. A large sample of studies estimated rates of return averaging 43 percent in developing countries and 34 percent in Sub-Saharan Africa. Yet agricultural R&D capacity in Sub-Saharan Africa has remained low by international norms. Over the last decade, spending on agricultural research constituted about 0.4 percent of agricultural GDP in Sub-Saharan Africa, compared with 1.3 percent in Latin America and the Caribbean, 0.6 percent in East Asia and the Pacific, and 0.9 percent in South Asia (figure 7). In addition, Africa was the only region where agricultural research spending fell on average over this period. These are troubling signs that agricultural research is severely underfunded in Africa.

FIGURE 7. Public agricultural research spending varies across regions 2000–11

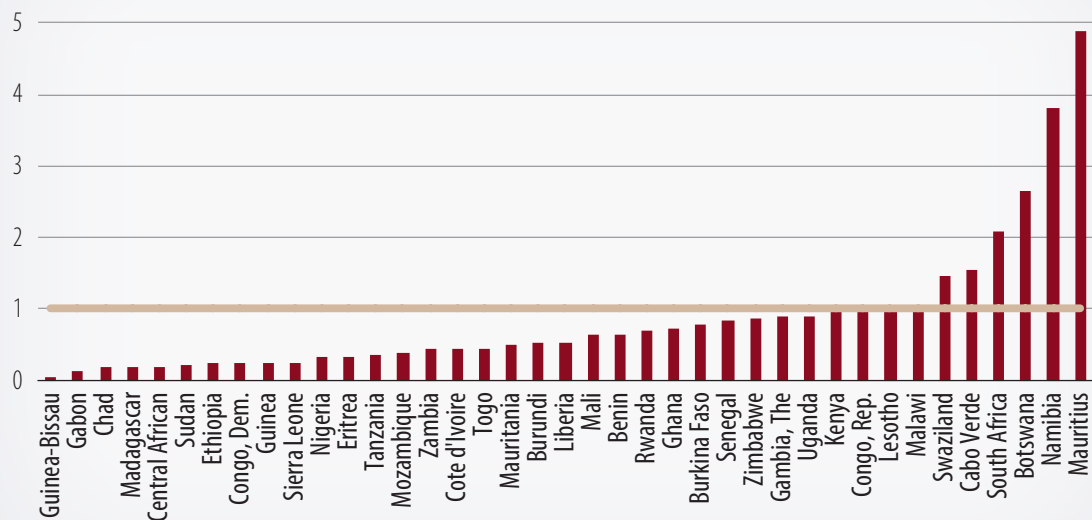


Source: IFPRI Agricultural Science and Technology Indicators data.

Most countries fall short of NEPAD's 1 percent target

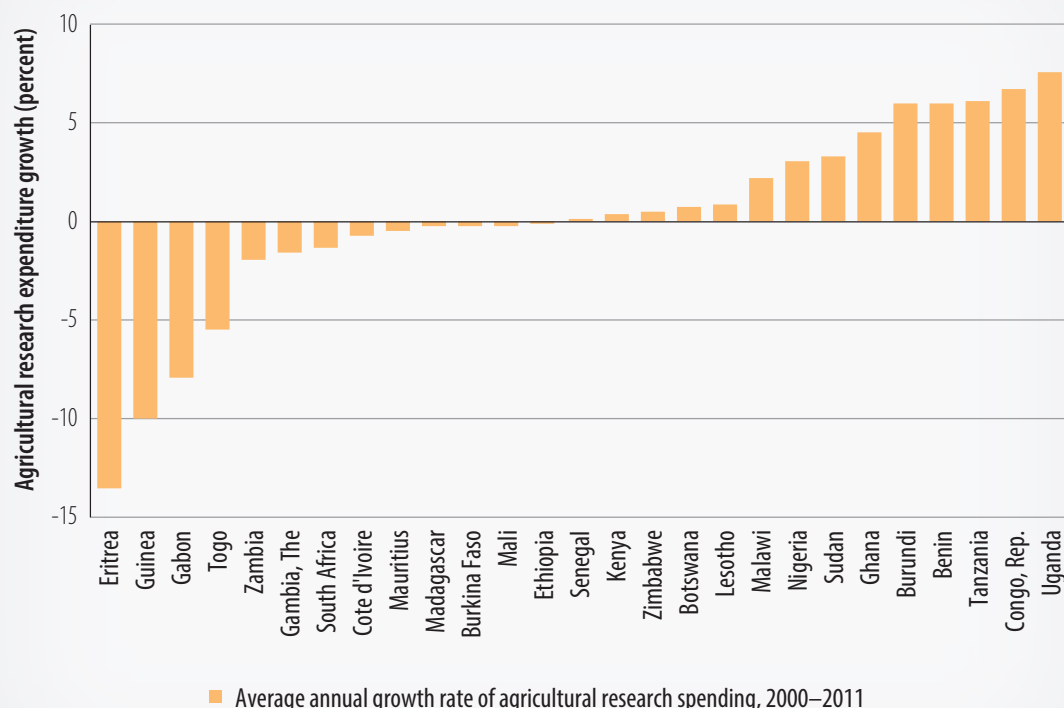
It is not surprising that in 2006, in its commitment to implementing an agriculture-led development agenda, the African Union's New Partnership for Africa's Development (NEPAD) set an additional target to increase public spending on agricultural R&D to at least 1 percent of agricultural GDP, a target that few countries have met (figure 8). As noted earlier, most high-income countries spend around 1 percent of their agricultural GDP on research, as does Brazil, a country widely regarded to have an effective research agency, Embrapa. A closer look at the relative shift in the patterns of spending in agricultural R&D in Sub-Saharan countries over time reveals important cross-country differences and challenges. Over 2000–11, half the Sub-Saharan countries experienced near-zero or negative growth in agricultural R&D spending (figure 9). Despite the well-documented considerable payoffs to agricultural research and the demonstrated political commitment to agricultural R&D in Africa, many Sub-Saharan countries have continued to underinvest in this activity.

FIGURE 8. Only six countries are above 1 percent
(agricultural research spending as a share of agricultural GDP, 2011)



Source: IFPRI Agricultural Science and Technology Indicators data.

FIGURE 9. Half the countries have zero or negative spending growth
(annual growth in agricultural R&D spending, 2000–11)



Source: IFPRI Agricultural Science and Technology Indicators data.

Note: The figure excludes Cape Verde, Central African Republic, Chad, Democratic Republic of Congo, Guinea-Bissau, Liberia, Mauritania, Mozambique, Namibia, Rwanda, Sierra Leone, and Swaziland because time-series data did not date back to 2000.

This, despite the enormous rewards

Spending on research and development (R&D) has driven agriculture's transformation around the world. During periods of rapid growth, Brazil, China, and India invested heavily in agricultural research, with their collective share in developing country public spending on agricultural R&D rising from a third in 1981 to almost half in 2000.²⁰ And investments in national and international agricultural research have been demonstrated to be among the most important determinants of long-term productivity growth in Sub-Saharan Africa as well. For example, the CGIAR Consortium has played an important role in raising agricultural productivity growth in Sub-Saharan Africa. Spending by CGIAR in the region has generated \$6 in benefits for every dollar spent on research in Africa. Returns to national agricultural R&D spending have been lower, but still significant, averaging about \$3 in benefits for every \$1 spent on R&D.

Large countries have earned higher returns to R&D than small countries, but even in small countries, returns were still high enough to justify the investment, particularly around adaptive research (table 1). Moreover, national and international agricultural research efforts in Sub-Saharan Africa are complementary: Countries that have made a greater national investment in agricultural research are better able to adapt and deliver new technologies to farmers emanating from international centers.²¹

African research institutions can learn from Brazil's Embrapa, whose success is attributable to institutional characteristics and policy choices in addition to adequate funding, such as high investment in human capital, effective collaboration with private sector and international research centers, as well as an open innovation system and intellectual property rights to facilitate technology development and diffusion. Other lessons emerging from Africa's own experience in investing in technology generation and dissemination will be useful in shaping future spending decisions in this area.

TABLE 1. Returns to agricultural research in Sub-Saharan Africa

Countries	Returns to agricultural research		
	Benefit–cost ratio	Internal rate of return (%)	IRR (%) without CGIAR
Large countries Nigeria, Sudan, Ethiopia, Kenya, Côte d'Ivoire, Ghana	4.4	43	36
Mid-size countries Uganda, Senegal, Mali, Mozambique, Madagascar	2.6	29	23
Small countries Gabon, Burundi, Gambia, Botswana, Swaziland	1.6	17	13

Source: Fuglie and Rada 2013.

Note: The benefit–cost ratio discounts future benefits at a yearly rate of 10 percent.

Rebalance spending to reap richer returns

Reduce the barriers to disseminating foreign technology and developing domestic technology

An important principle for expenditure policy is that governments cannot afford to be the only, or even the main, developers of new technology. In Africa, governments currently fund more than 90 percent of the ongoing R&D. But with scarce budget resources, countries need to adopt policies to reduce barriers to spill-ins of technology from abroad and to encourage private investment in technology generation. Current requirements for lengthy and expensive tests to register new seed varieties (imported or domestic) in many African countries practically guarantee that African farmers will not benefit from advances in other parts of the world or from private domestic R&D.

These barriers could be reduced by following the practices in such countries as India and South Africa, which allow the introduction of new varieties with no performance testing but which require truth in labeling to protect farmers from false claims.²² This has been particularly effective in South Africa, where farmers benefit from a much higher rate of introducing new varieties than other African

countries, even accounting for the size of the market.²³ Barriers can at least be lowered by mutual recognition of new varieties already registered in neighboring countries, the approach of the EU, and is being pursued in several regional regulatory frameworks in Africa, but progress has been slow. The two approaches are not mutually exclusive and countries could potentially consider unilateral action to reduce barriers while waiting for regional agreements to take shape.²⁴

Invest in land governance

One key public good that is greatly undersupplied across Africa is the legal and institutional framework for land governance. The poor institutional framework is reflected in the low demand for land administration professionals: Ghana, Kenya, and Uganda, for example, all have fewer than 10 land surveyors per million population, compared with 197 in Malaysia and 150 in Sri Lanka.²⁵ These conditions undermine land market development and secure tenure, weakening incentives to make on-farm investments and impeding rural credit market development.

Significant investments will be needed to reverse soil degradation and depletion, so improving land security will be hugely important to create conditions for sustainably boosting productivity. Many Sub-Saharan countries have either legislation in place or initiatives under way to address communal land rights and gender equality, the basis for sound land administration. In addition, they have made a commitment to implement more land policy reforms, primarily second-generation reforms, through a declaration adopted by the African heads of state and government in their July 2009 Summit in Libya, to develop and implement comprehensive land policies, guided by the African Union's *Framework and Guidelines on Land Policy in Africa*.²⁶ Implementing the main elements of a strategy to raise standards of land governance across Africa is estimated to require increased spending of some \$4.3 billion.

Bolster extension

Another crucial element in crafting spending decisions to encourage greater adoption of modern technologies is to improve the effectiveness of extension services. Particularly where information constraints are a major bottleneck in the uptake of modern inputs and production techniques, public funding (although not necessarily provision) of extension can be a cost-effective use of public funds. Moreover, higher returns to investments in agricultural extension are expected if the rate of developing new technologies for Sub-Saharan Africa is increasing, enabling farmers to adjust more quickly to changing circumstances.²⁷

Extension services are coming back on the agenda, and in a few countries now make up substantial shares of the budget. But there is the risk that extension will once again be viewed as ineffective. Attention to extension services peaked in the 1980s and early 1990s, when money was poured into systems that mainly promoted agricultural technology adoption in a centralized, linear, one-size-fits-all method.²⁸ In the late 1990s, when many of these traditional systems were shown to be deficient in their quality and relevance, public spending on extension declined. However, the rapid adoption of digital technologies in rural areas shows promise in reviving some aspects of extension services and consequently improving productivity.²⁹ Innovative models are being implemented in Kenya and

Nigeria. New tools and approaches have helped overcome information problems that hinder market access for many small-scale farmers, promote knowledge and skill development, and stimulate opportunities for agricultural supply chain management.

The balance between R&D and extension has long been an issue, with critics suggesting that many of these extension agents had nothing to extend owing to weak R&D—and that extension systems tended to be the poor relation at the bottom of the funding chain. As a result entire budgets were spent on recurrent items such as salaries, while there was no fuel for vehicles and thus no farm visits.³⁰ In funding the new generation of extension programs, the lessons from the past need to be taken into account to better balance spending across subcategories and make extension more effective, particularly in reaping the benefits from irrigation (box 4).

BOX 4. Africa's potential for increasing irrigation

The irrigated area as a share of total cultivated area is estimated at 6 percent for Africa, compared with 37 percent for Asia and 14 percent for Latin America. Food production in Africa remains almost entirely rainfed, despite highly variable and in many cases insufficient rainfall together with a high incidence of droughts. The potential for profitable irrigation development for Sub-Saharan Africa remains large, given the existing water resources, the high value of irrigated agriculture on the continent, and the large number of rural poor who could benefit from productivity improvements as a result of irrigation.

The returns to many irrigation projects in the past were relatively low in Africa, and the negative externalities high. But recent advances in planning and design techniques have provided the ability to minimize adverse environment and social consequences of large irrigation infrastructure. Recent studies show that irrigated land can be expanded from 13 million hectares to 24 million hectares in economically viable ways, with returns ranging from 17 percent for large-scale irrigation to 43 percent for small-scale irrigation.³¹ Sub-Saharan Africa has significant unexploited potential to develop both large and small-scale irrigation, but economic viability depends on keeping costs down. Although there is significant potential for rehabilitating existing irrigated areas in the region, the expertise, knowledge, and capacity to manage irrigation investments are low.³²

Improve post-harvest practices and market access

Investments in post-harvest processing facilities, access to markets, and accompanying infrastructure and policy reforms that foster commercial agriculture are critical for transforming African agriculture. A large literature on the impacts of investments to improve market access for farmers has found that benefits are significant, come in different forms, and can be realized through several channels. Reduction in transport costs reduces both trade costs and interregional price gaps.³³ The spillover effects are that farmers pay less for their inputs and get more for their outputs, increasing incomes.³⁴

Proximity to rural roads has significant effects on poverty and agricultural productivity overall.³⁵ This is particularly critical in Africa, where less than half of the rural population lives close to an all-season

road. Trader surveys in Benin, Madagascar, and Malawi find that transport costs account for 50–60 percent of total marketing costs.³⁶ In Tanzania, the maize price pass-through from broader markets to farmers was significantly lower even 25 miles away from a paved road.³⁷ Higher profitability from road access also increases the value of farmers' land.³⁸ Not surprisingly, access to markets facilitates economic diversification in rural areas and creates incentives to adopt modern production technologies by farmers.³⁹

Shift government spending from private to public goods

Research from Latin America and the Caribbean finds that it is crucial to shift public spending from providing goods and services to specific groups of producers toward the increased provision of public goods. On average, 51 percent of total government spending in rural areas was on subsidies to private goods during 1985–2001. A reallocation of 10 percentage points of public expenditures from subsidies to public goods would increase per capita agricultural income by about 2.3 percent without increasing total spending.⁴⁰ These findings from cross-country analysis for Latin America are consistent with the analysis for Asia, where spending on rural infrastructure, agricultural research, and dissemination had large poverty alleviation effects (box 5). Governments in Africa and other developing regions have invested heavily in state-owned enterprises (parastatals) to perform commercial functions that generally are carried out more efficiently by the private sector, crowding out private investment and dragging down overall sectoral performance. While this situation has improved over time, state-owned enterprises are still more involved than they should be in the agriculture sector, particularly in marketing inputs and outputs.

BOX 5. Reform policies and invest well: Lessons from Asia's agricultural transformation

Many parts of Asia have achieved impressive gains in agricultural productivity and poverty reduction over the past half-century. By contrast, sustained productivity growth remains elusive in most of Africa. What can African policymakers learn from Asia's experience? Conditions naturally differ in many respects between Africa and Asia, but it is instructive to understand the mix of public investments and policies of many Asian countries, and their relative importance in driving growth and reducing poverty. Spending on productive investments related to the development and diffusion of technological improvements, greater connectivity in rural areas, and irrigation development did the most to reduce poverty.

In India, the relative performance of subsidies evolved over time, with somewhat higher returns in the early years of the Green Revolution but declining rapidly thereafter. Fertilizer, power, and irrigation subsidies were among the least significant contributors over the four decades.

The findings of these studies provide potentially important implications for enhancing agricultural growth and poverty reduction in Africa. There are strong reasons to believe that the policy reforms and investments that generated high payoffs in Asia can drive growth and reduce poverty in most of Africa as well.

Target spending to reduce poverty

The scope is considerable for crafting investments to magnify their pro-poor impacts. Rural roads and irrigation infrastructure can be geographically targeted at areas where there are concentrations of poor. Research can be aimed at crops, livestock, and technologies that are likely to be most useful to the poor rather than, say, for example, plantation export crops. Efforts to connect farmers to markets can be focused on smallholders. Country studies in Uganda and Tanzania indicate that such investments can have a large payoff in both economic growth and poverty reduction (box 6).

BOX 6. Impacts of policy options to raise agricultural productivity in Sub-Saharan Africa

Recent research has quantified the potential improvement in productivity from policy reforms and several kinds of spending on agriculture or in rural areas. While comprehensive development of Africa's agricultural sector requires investments across multiple areas, a TFP decomposition shows that productivity improvements in Africa have been led by investments in development of new technologies, wider adoption of new technologies (proxied by farmer education), and policy reforms to strengthen economic incentives to farmers (box table 1).

BOX TABLE 1. Drivers of agriculture productivity in Sub-Saharan Africa

	Contribution to cumulative TFP growth
Agriculture research and development	51 percent
Improvement in agriculture's terms of trade with market and trade policy reform	20 percent
Reduction in conflict	18 percent
Increase in farmer education	8 percent
HIV/AIDS therapy to adult population infected	2 percent

Source: Fuglie 2013; Fan et al. 2008, 2012.

These must be conscious decisions in the design and targeting of spending programs. Of course, this kind of pro-poor targeting has limits, since the investments will benefit the landless poor only indirectly, for instance. As far as we know, there are no comprehensive cross-country studies on the extent to which current spending policies are taking advantage of opportunities to target in this way. Anecdotal evidence suggests that decisions are being made this way (for example, almost all World Bank projects to improve market linkages are aimed at smallholders), but there undoubtedly is room for improvement.

Address emerging priorities arising from climate change

Public spending policy will need to remain flexible to cope with future challenges, and for agriculture, probably none is more urgent than climate change. It is a threat for agriculture across the world, but the lack of resilience of poor farmers makes it particularly serious in Sub-Saharan Africa. Projections show yield decreases in the near term of 5 percent, potentially growing to 15–20 percent across all crops and Sub-Saharan regions by the end of the century. Agriculture is also an important contributor to greenhouse emissions, particularly from deforestation, and Africa is the only region where the majority of production increases have come from expanding cultivated areas, generally at the expense of forests. In Africa, as around the world, a more climate-resilient agriculture is needed to achieve the triple win of enhancing agricultural productivity, mitigating emissions of greenhouse gases, and helping farmers adapt to climate change.

Most investments to mitigate climate change (low-carbon growth) and adapt to it (resilience building) will need to be made by farmers and other private agents. But proactive government policies, planning, and investments will be required to provide information, incentives, and an enabling environment to encourage communities, households, and the private sector to change their behaviors and investment choices. Many climate-resilient investments will not be very different from productive investment choices, even not taking climate change into account. Building resilience has overall benefits in any case, but their value is amplified by the changes that will occur with global warming.

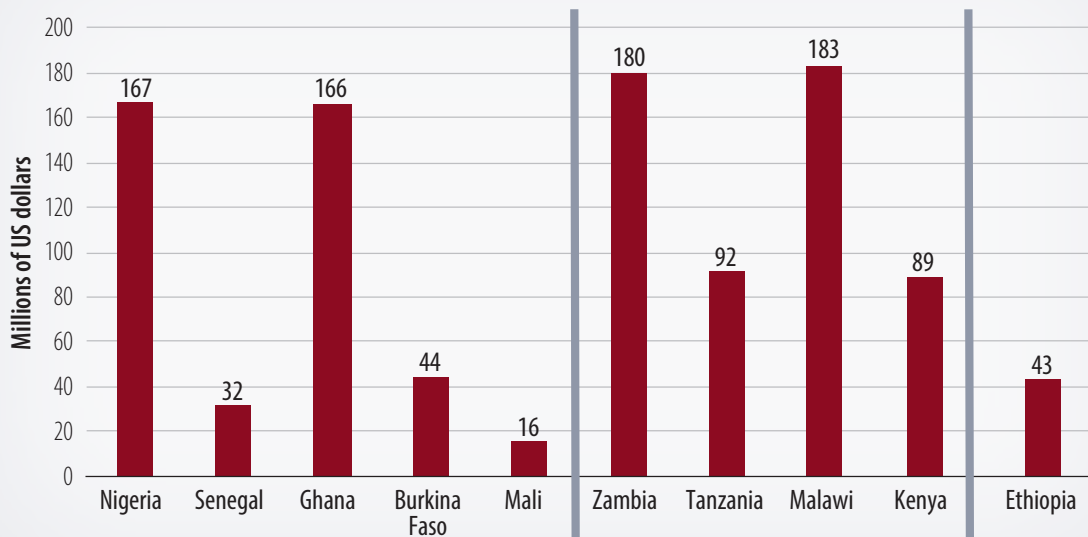
For public spending priorities, climate-smart agriculture entails using landscape-scale approaches to invest in managing climate risks through developing drought or flood-resistant technologies, understanding and planning for transitions to new adapted cropping and livestock systems and livelihood options, and reducing greenhouse gas emissions from livestock practices and land use changes that cause deforestation and losses of biomass and soil carbon. Increasing resilience, restoring degraded lands, and managing ecosystem services better will play key roles in all of these. Efforts to craft budgetary and policy choices to create a more climate-smart agriculture will have to cope with special challenges rooted in many uncertainties, distributional issues, and long-term nature of the problem. To help meet these challenges, public expenditure reviews will need to do a better job than in the past of incorporating considerations of climate change.

Redress the current excessive focus on unproductive fertilizer subsidies

Subsidies are resurging

The resurgence of input subsidy programs in Africa has arguably been the region's most important policy development for public agricultural spending in recent years. Ten African governments spend roughly \$1.2 billion annually on input subsidies alone (figure 10), primarily on fertilizers. These programs were almost phased out in the 1990s, during a period of structural adjustment in Africa, but

FIGURE 10. The 10 largest African governments spend \$1.2 billion a year on input subsidies alone



they have made a strong comeback due partly to residual support for subsidies among African leaders, even while pressured to phase them out, and partly to the uncertainties about food supply during the 2007/2008 global food and fertilizer price instability. Input subsidies continue to be vastly popular among African politicians as a highly demonstrable way to support their constituents.

Because fertilizer use is supposedly suboptimal

The economic rationale for fertilizer subsidies comes mainly from the motivation that, because of credit and information constraints, fertilizer use is suboptimal in most of Africa. The subsidies could overcome these problems by reducing the costs that farmers incur and the barriers of affordability, access, and learning. This justification is often based on the fact that fertilizer is used much less intensively in Africa than in other regions, particularly Asia, and that fertilizer use in demonstration plots provides high returns.

Even so, there are reasons to question the assumption of suboptimal use. Experimental evidence from farmer-managed fields indicates response rates that are considerably lower than on researcher-managed fields. On the demonstration plots, crops are grown under conditions much closer to optimal than in most farmers' fields, with better soil and more plentiful water. But in much of Africa, water management is scarce, and soil has been degraded, greatly reducing the responsiveness of crops to higher chemical fertilizer use.⁴¹ Facile comparisons of average fertilizer application rates between Africa and Asia suggesting that higher application rates in Africa would produce results comparable to those in Asia can be highly misleading. Indeed, policy discussions of low productivity in Africa tend to overemphasize fertilizer use and underemphasize the poor farming practices and rainfed conditions that limit African farmers' ability to use fertilizer as profitably as in other regions.⁴²

In any case, the evidence from the high agricultural growth periods in South Asia shows that fertilizer subsidies played little or no role in substantially boosting productivity.⁴³ Studies in four Asian countries—Bangladesh, India, Indonesia, and Pakistan—conclude that fertilizer subsidies were not significant in farmers’ adoption of technology. They instead identify technology research, irrigation expansion, and other investments such as roads as the main drivers.⁴⁴ At the height of the green revolution, farmers in three of the four countries (not in Bangladesh) were net-taxed for fertilizer (that is, domestic prices for fertilizers were higher than the world market price), indicating that it was profitability and not subsidies that drove technology adoption during the Green Revolution.⁴⁵

But the returns to subsidies are low and variable

Evidence has recently been accumulating on some of the largest input subsidy programs in Sub-Saharan Africa—Ethiopia, Ghana, Kenya, Malawi, Nigeria, Tanzania, and Zambia—based on farm-level surveys.⁴⁶ The analysis points to several conclusions with important policy implications:

- Crop response rates of smallholder farmers are highly variable and usually low because of the inability to use fertilizer efficiently and profitably due to low water availability and poor soil, to chronically late deliveries of fertilizer, to poor management practices, and to insufficient complementary inputs to enable farmers to obtain higher rates of fertilizer efficiency.
- The increment in total fertilizer use is smaller than is distributed through the program because even with “smart” subsidies, the crowding out of commercial fertilizer sales, as well as outright diversion and theft, remain major problems.
- Subsidies are unlikely to address their multiple objectives effectively. It is often argued that subsidizing fertilizer is desirable both to boost agricultural production and to help poor farmers. Yet there is strong evidence that most of the benefits do not go to poor farmers (targeting is regressive with respect to asset wealth and landholding size), and the gains in overall food production have been transitory and much smaller than the costs (table 2).

TABLE 2. Benefits are low in relation to costs—and go to richer farmers
(summary evidence of impacts from farm and household studies)

Country	Characteristics of recipient households acquiring subsidized fertilizer	Financial benefit–cost ratio	Economic benefit–cost ratio
Malawi	Households with larger landholding and asset wealth get more	0.62	0.80
Zambia	Households with more land get slightly more	0.56	0.92
Kenya	Households with higher landholding receive more subsidized fertilizer	0.79	1.09

Note: Ratios are estimated based on five-year estimated response rates. The ratios reported here use baseline calculations, making adjustments to the average partial effect of 1 kilogram of subsidized fertilizer on total smallholder fertilizer use, as suggested by Chirwa and Dorward (2013), and Jayne et al. (2015). Costs are those of the fertilizer only, while reported yields were those observed using both the fertilizer and seeds. For this reason, the benefits overestimate the benefits of fertilizer use alone, and the benefit–cost ratios could be considered upper bounds of the ratio for subsidized fertilizer.

Add alternative and complementary investments to the policy mix

In areas where fertilizer or other modern production technologies are actually underused, many policy levers are available to encourage greater uptake. The optimal choice of instruments depends to a large extent on the constraint. If the main bottleneck is that farmers have few choices of appropriate input technologies for the main agro-ecological systems in a country, the best solution may be to focus on regulatory reform to encourage spillovers from abroad and investment in domestic research. If the problem is a lack of information on the part of farmers, extension may be the best policy lever. If one of the underlying causes for low fertilizer use is insufficient cash flow for farmers to buy inputs, efficiently promoting the emergence and growth of rural credit markets (including support for land market development) would address this. Much can be done using innovative ways of doing banking and taking advantage of new applications of information technologies.

A number of countries have recently implemented changes to improve the efficiency and effectiveness of their input subsidy programs. Countries have replaced public with private procurement and delivery mechanisms, and even put in place electronic delivery systems for subsidies (as in Nigeria). These appear to be steps in the right direction. Notwithstanding the large body of evidence that even “smart” input subsidies have seldom produced benefits commensurate with their fiscal costs, they remain politically attractive. Where subsidies continue to be used, they should at least be reduced to a modest amount in national agriculture budgets, with a clear exit strategy, and combined with complementary expenditures. In the longer term, no program will sustainably raise fertilizer use until it becomes profitable for farmers to buy fertilizer on commercial markets after they graduate from the subsidy program. This brings back the issue of complementary investments. Creating demand will require lowering the farmgate prices of fertilizers in Africa, where they are high relative to other regions. This has clear implications for government spending priorities: Spending needs to be aimed at streamlining logistics and reducing costs and risks in fertilizer supply chains.⁴⁷ Much of this investment is most appropriate for the private sector, but governments can support the effort by improving the infrastructure for fertilizer distribution, by reducing regulatory barriers, and improving profitability by reducing transport costs.

Also required is enhancing research and extension, and investing in soil analysis and mapping, to improve soil fertility management to raise fertilizer response rates.⁴⁸ Input promotion during the high agricultural productivity periods in Asia and South America, for example, addressed systemic constraints to productivity through integrated investments in new technologies, extension support, water management, and market linkages. Countries in Sub-Saharan Africa could get a bigger impact within the existing expenditure envelope by moving away from a heavy focus on fertilizer subsidies toward integrative investments. Reforming the design and implementation of these subsidy programs while rebalancing government spending in favor of high-return core public goods and policies could produce massive dividends.

Budget for greater impact

In addition to the overall level of spending and its composition, a third dimension of a strategy to maximize impacts of public spending in agriculture is ensuring that the budgetary process supports efficient implementation. There is considerable variance in budget preparation and execution capacity among countries, but there is undoubtedly scope for improvement, as reflected from the analysis of 20 existing agriculture public expenditure reviews sponsored by a joint World Bank–Gates Foundation program, examined as background for this book.

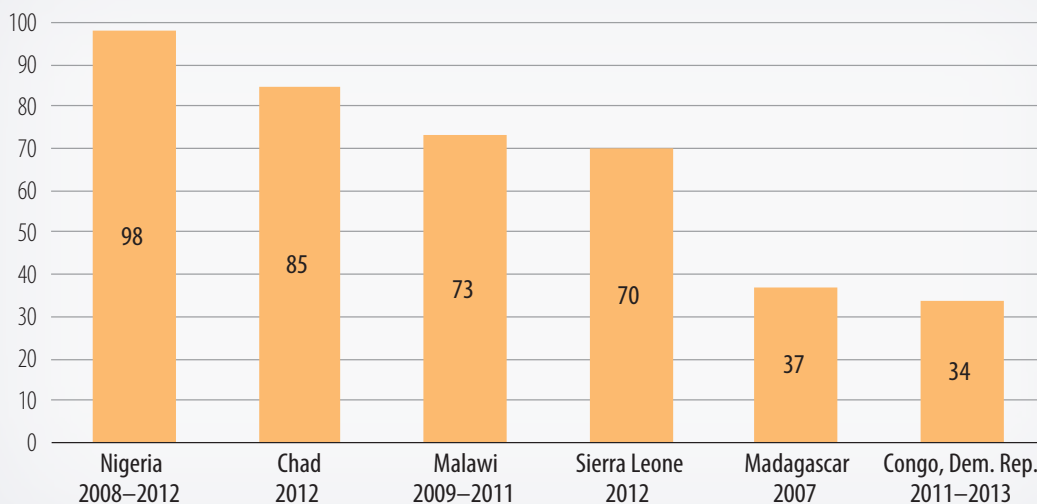
Start from a solid foundation

Budgeting needs to start from a stronger foundation of sector strategies and national agricultural investment plans, few of which currently provide much guidance on budget preparation. The investment plans need to give more detailed and quantitative guidance on translating recommendations to spending priorities, and adjustments from the most recent implementation period need to be accompanied by a monitorable results framework.

Improve budget execution

In many countries, the rate of budget execution is dismal (figure 11). Improving budget execution rates is essential for demonstrating that the sector can make good use of additional public resources, and for persuading ministries of finance that their budgets must be increased. The focus ought to be on improving the implementation of development expenditures, the predictability of releases from ministries of finance, the procurement planning and implementation system, and the budget information management systems to inform within-year budget implementation—so that resources are used effectively.

FIGURE 11. Execution rates of total agricultural budgets can be dismal (*percent*)



Source: Team calculations.

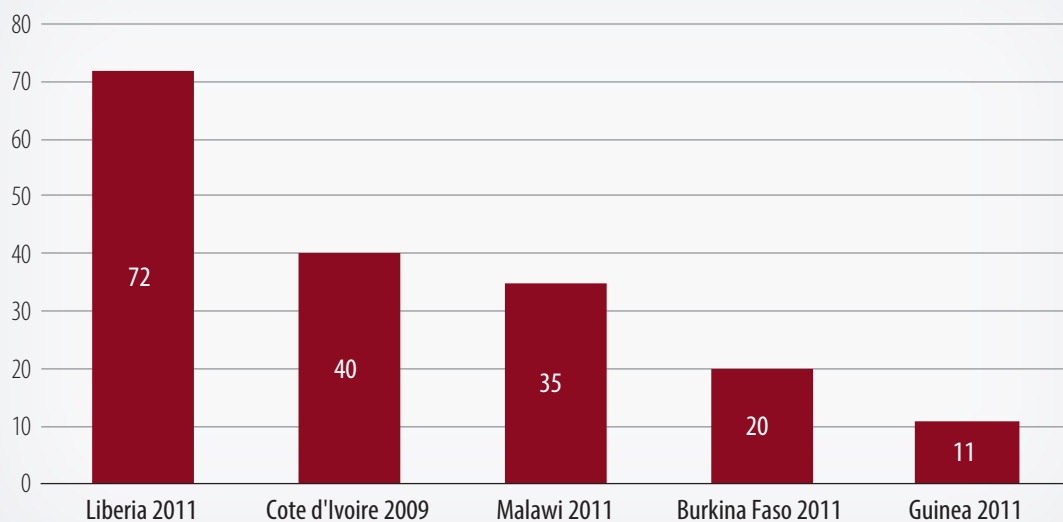
Strengthen monitoring and evaluation

Countries need to strengthen M&E capacity as part of accountability systems that shift resources toward effective spending. Ministries of agriculture need more resources and staff doing M&E and in exchange to be held accountable for demonstrating that budgets are effectively spent. And the ministries of finance need to increase recurrent spending for this purpose. And budget analysis capacity has to be established in the sector ministries for expenditure monitoring and adjustment within the budget year. Budget information systems appear to be improving with the expanded roll-out of computerized systems by ministries of finance and accountant-general offices.

Capture off-budget financing—and make flows to state-owned enterprises more transparent

Ministries of finance need to put in place budget information systems that, in some form, capture off-budget external partner financing of projects that deliver public goods and services, which in some countries is a significant share of the budget (figure 12). Two fiscal management reforms that can significantly improve the technical efficiency of expenditure management are implementing a treasury single account system and a centralized civil service information system.

FIGURE 12. Off-budget shares of public agricultural spending can be substantial (percent)



Source: Team calculations.

Shift to program budgeting and build local capacity

Two other aspects of budget processes are likely to grow in priority, but require attention over several years to build the capacity for improving the quality of budget outcomes.

- The first is a shift to program budgeting, as some countries have committed to do. Backward-looking reconfiguration of sector public spending by program categories to provide the recent history of composition and trends helps benchmark the programs and the specifics of their expenditure foundation.
- The second is decentralization and deconcentration in countries that are moving from political commitment to implementation in both the administration and the fiscal management of government functions. This flags the importance of building expenditure implementation capacity at the local level, and in the case of decentralization, of expenditure planning capacity as well. Where implementation momentum is accelerating, budget information systems and information sharing need to be developed across the different levels of government, including often geographically remote sector agencies and institutes, to enable budget planning that leverages potential synergies and avoids duplication in sector spending.

Boost key categories of recurrent spending and administration

Some countries seem to be underfunding certain categories of recurrent expenditures, resulting in a ratio of recurrent spending to investments that is low and declining. It is perhaps understandable that politically attuned ministers are reluctant to divert budget resources from front-line activities of direct constituency benefit to unglamorous back-office functions. But in some countries, despite a significant scale-up of public spending on the sector, there has been no or little increase in these core administrative functions, which can provide the sorts of information essential to steering the endeavor based on evidence.

Examples of public functions that involve mainly recurrent expenditures and appear to be underfunded are maintenance, core budget planning and implementation, monitoring and evaluation, and sector regulatory functions. Maintenance is a category of recurrent spending that seems to be systematically short-changed. Some countries seem not to be adequately funding recurrent goods and services that are necessary to maintain capital investments, and their continued neglect risks negative outcomes for sector performance. Underfunding budget planning, monitoring, and evaluation capacity in ministries reduces the quality and impact of public spending on agriculture. Inadequate support to undertake project M&E reduces the ability to track results and make adjustments to improve impacts or reorient approaches. Most countries that have had rapid investment growth have also allowed a decline in the ratio of M&E budgets (nonwage goods and service spending) to investment budgets. Recurrent budget planning is typically conducted as an incremental adjustment to prior year levels. Yet significant policy shifts, such as expanding reliance on private markets for input provision, do not appear to be accompanied by funding regulatory capacity for input quality in markets, a recurrent function. One example is Nigeria, which has a minimal nonwage recurrent budget, despite having carried out a major policy shift to develop private input markets.

Manage the political economy

High-return categories of spending are often underfunded

Some categories of spending that have been shown to have significant positive effects on productivity and welfare are often underfunded, and others that generally show unfavorable results often capture large shares of the budget. Explaining such discrepancies between impact and prominence in the public budget requires understanding how the public resource allocation process is shaped by agents' incentive structures, the characteristics of the investments, and the broader governance environment in which agents operate. Budget decisions will always be politically influenced, but understanding the sources of bias are likely to drive inefficient or ineffective policies can help avoid those outcomes.

Move beyond the status quo

Many African countries have long pursued policies of implicit or explicit agricultural taxation, creating a pro-urban, anti-agricultural bias.⁴⁹ One explanation is that rural populations exhibit greater difficulty of organizing collective action among dispersed populations that lack easy means of communication.⁵⁰ But if the difficulty of organizing collective action can be overcome, there is also strength in numbers.⁵¹ One way to at least partially offset this natural disadvantage of rural populations is to improve the information base of key actors so that they better understand the effects of alternative policy choices. Policy processes exhibit a status quo bias, such that policies that have outlived their usefulness often are not discontinued. Governments tend to favor the status quo because those who benefit from the current state are usually the ones with the power to have ensured enactment of those policies in the first place.⁵² And their political support for current policies is increased by those who have altered their behavior to become beneficiaries after policies were put in place.⁵³

Visibility guides spending

Different classes of spending influence how politically attractive they are. Types of spending with highly visible results that are easily attributable are more attractive. Visible infrastructure investments and direct cash or in-kind transfers are more easily connected to the efforts and spending decisions of public officials. These can even be conveniently advertised—for example, through labels on the fertilizer voucher ticket indicating who is responsible for subsidizing the fertilizer—thus serving as an effective tool for patronage.⁵⁴ In contrast, if a farmer observes that the quality of information provided by a new agricultural extension officer has improved, it may be difficult for her to ascertain whether that is because the new extension officer is more motivated, or whether the agricultural ministry has done a better job in selecting, training, and incentivizing extension officers. The greater visibility (and therefore attributability) of large-scale irrigation schemes in Mozambique has made them more attractive than small schemes, despite the weaker agricultural performance of the large ones.⁵⁵

Time lags in investment

Goods and services with a long lag between the time when resources are allocated and the time when the benefits become available are less politically attractive for several reasons. A longer lag tends to break the perceptible link between politicians' decisions and public officials' resource allocations, and politicians may have a short time horizon for their tenure in office. Given the substantial time lag between investing in research and reaping its rewards—usually decades, not years—agricultural research requires a long-term commitment for sufficient sustained funding. Long research cycles rarely coincide with short election cycles, shifting political agendas, and changes in government budget allocations. The inability to extract short-term political credit acts as a disincentive for policymakers to commit to long-term agricultural R&D investments, thus jeopardizing future research planning and outputs.

Given low investments by governments, agricultural research in many Sub-Saharan countries is highly dependent on donor funding, which by nature is mostly short term and ad hoc, often causing major fluctuations in a country's yearly agricultural investments. In contrast to the long gestation to realize benefits of investing in research, public spending to subsidize agricultural inputs usually requires a span of only a few months from the time of the investment until the subsidized fertilizer reaches farmers. In Malawi, the time span from the spending being incurred to the fertilizers being received by farmers ranged from one to six months,⁵⁶ and in Ghana, the equivalent time span was about four months.⁵⁷

Monitor corruption

Areas of public spending involving large infrastructure or capital investments create opportunities for rent seeking opportunities. Underperformance of irrigation infrastructures in countries beset with corruption has been observed with gains that can be extracted in a context of insecurity about access to functioning irrigation systems.⁵⁸

From top-down to more participatory budgeting institutions

Institutional mechanisms to make spending more pro-poor have a mixed record and vary in their strengths and vulnerabilities. In some African countries, the potential benefits of participatory budgeting have been vitiated by a top-down process closely managed by the party in power, as in Mozambique.⁵⁹ The benefit has also been constrained by earmarking transfers from the federal government, as in Kenya and Uganda,⁶⁰ or by high administrative and maintenance costs, as in Uganda.⁶¹ Where spending decisions are decentralized, concrete mechanisms to strengthen electoral accountability need to be put in place to ensure local administrators are responsive to the needs of individuals and not only to local elite groups. This must be matched by building local officials' public management capacity, and to improving citizens' information base on the actions as well as the

performance of local governments. The inefficiencies and poor targeting of subsidies can be at least reduced through operational features that improve the clarity and reduce the ambiguity of eligibility criteria, paired with an increase of transparency and information about which localities, and within localities which households, are eligible to receive the transfers.

Overcome inertia in policymaking

Too often, countries fail to adopt and implement policies that are known to be necessary for sustained economic development. In addition, for reasons described above, there is significant inertia in policymaking. How, then, can change occur?

Be ready to take advantage of opportunities for reform

Major past reform programs have been necessitated by the realization that more of the same is not fiscally sustainable. External (oil and other commodity) shocks have often exposed inefficient and unsustainable policies.⁶² Much of the restructuring and privatizing of marketing boards in Africa came about when they became fiscally unsustainable, partially because of movements in the international prices of the commodities.⁶³ Severe budgetary constraints have often disturbed the political equilibria that supported those policies and opened space for reforms, often with the strategic and financial support of external actors such as international financial institutions. These reforms involved profound changes in agricultural policies, including major shifts in public spending programs. Among them was a reduction in input subsidies, common in the 1980s and 1990s. But as economic recovery progressed, some of the same programs and policies (including input subsidies) re-emerged, albeit in improved versions, because they remained politically attractive.⁶⁴ The lesson here is not that reforms must always await the advent of shocks, but that reformers ought to be ready with plans and evidence to influence reforms and be alert to opportunities that may arise.

Consider compensating losers

Improvements in the quality of spending have sometimes been greatly facilitated by partially compensating losers. Mexico's, Romania's, and Turkey's comprehensive reforms that reduced agriculture subsidies and privatized state-owned enterprises greatly improved the efficiency of spending and ushered in rapid sectoral growth. They were accompanied by area-based cash payments (much more efficient and less costly to the government than the policies they replaced), without which these reforms likely would not have been politically feasible to enact or sustain.

Find ways to commit to long-gestation policies with high returns

Other forces can be harnessed to facilitate policy reform. As noted earlier, two major barriers to reform are the lack of understanding by the citizenry of the distributional effects of policies (which also reduces attributability of positive impacts) and the difficulty that politicians have in making a credible

commitment to policies with long gestations.⁶⁵ Farmer cooperatives and other producer organizations can help identify beneficial policies, disseminate this information to their members, and then lobby for their enactment. Democratization increases the opportunity for the formation of member-driven groups that can be effective in promoting policy change as opposed to the top-down organizations. Other agents of civil society in a country (press, local NGOs, and even competing parties) can also increase the transparency of policy and the availability of information. Rigorous impact evaluations of projects and programs hold promise for revealing the distributional and welfare effects of spending policies, and their wide dissemination would go a long way toward increasing public understanding.

Enhance credibility by committing to an external agent

This is an important principle underlying international trade treaties. The sweeping agricultural reform program in Mexico, for example, was motivated by the determination to join the North American Free Trade Agreement and the consequent need to firmly “lock in” the policies that would make this possible. In a similar vein, regional agreements and institutions in Africa, such as the Comprehensive Africa Agriculture Development Program, can play this role if commitments are taken seriously. CAADP’s peer reviews of National Agricultural Investment Plans and the Joint Sector Review process with an emphasis on “mutual accountability” mechanisms could potentially enhance credibility. As noted earlier, the fungibility of resources makes it difficult for donors and development partners to have a significant influence over the size and composition of agricultural budgets through the mechanism of funding individual projects. But with agricultural public expenditure reviews becoming more common, they provide a tool to get a comprehensive view of the entire budget, identify shifts in overall spending patterns, increase transparency, and facilitate more effective input into budget planning and implementation.

Improve the efficiency of spending

Irrespective of spending targets, the evidence in this book shows that countries in Sub-Saharan Africa have consistently lagged behind countries in other developing regions in the quantity of public agricultural spending. Even so, raising the volume of spending requires political consensus—among development partners, government decisionmakers (particularly ministries of finance), and above all electorates—that money invested in agriculture will be well spent. Measures to raise the efficiency of existing spending in agriculture—and demonstrating that it has a high impact on growth and poverty reduction—will make the case for higher levels of spending much more persuasive. The conclusions and recommendations in this book try to give policymakers options for doing just this.

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Endnotes

- 1 Hereafter “Africa” for simplicity.
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- 3 Ferreira, Leite, and Ravallion 2010; Ivanic and Martin 2014.
- 4 Christiaensen and Kaminski 2014.
- 5 Gollin, Lagakos, and Waugh 2014.
- 6 Deininger et al. 2011.
- 7 Fuglie 2015.
- 8 Brooks et al. 2013.
- 9 World Bank 2013a.
- 10 World Bank 2012a.
- 11 Benin, McBride, and Mogues 2016.
- 12 Sadoulet and de Janvry 1995.
- 13 Fan et al. 2008; Mogues 2011; Benin et al. 2012.
- 14 Devarajan et al. 1996.
- 15 Lopez and Galinato 2007.
- 16 For example, see De Ferranti et al. (2005) with a focus on Latin America.
- 17 For agriculture, this would mean that the Agriculture Orientation Index (AOI) discussed below is equal to 1.
- 18 The figures were 15.4% (1972); 10.5% (1975); 12.4% (1980); 10.9% (1985) and 9.6% (1990).
- 19 $AOI = [(Ag\ PE / Total\ PE)] / (Ag\ GDP / GDP)]$.
- 20 Alston et al. 2000; Pardey et al. 2007.
- 21 Fuglie and Rada 2015.
- 22 Gisselquist, Nash, and Pray 2002.
- 23 Pray et al. 2011.
- 24 Keyser 2013.
- 25 Byamugisha 2013.
- 26 African Union, UN Economic Commission for Africa, and African Development Bank 2009.
- 27 Fuglie 2015.
- 28 Davis 2015.
- 29 Deichmann, Goyal, Mishra 2016.
- 30 Thirtle and van Zyl 1994.
- 31 You et al. 2011.
- 32 Rosegrant et al. 2009.
- 33 Casaburi et al. 2013.
- 34 Khandker et al. 2006; Minten and Kyle 1999; Chamberlin et al. 2007; Stifel and Minten 2008.
- 35 Dercon et al. 2008; Bosker and Garretsen 2012.
- 36 World Bank 2008.
- 37 Delgado et al. 2005.
- 38 Jacoby 2000; Donaldson 2013.
- 39 Gachassin et al. 2010; Mu and van de Walle 2007.
- 40 Lopez and Galinato 2007; Valdes 2008.
- 41 Christaenson and Kaminski 2015.
- 42 Jayne et al. 2015.
- 43 Gautam 2015; Fan et al. 2008.
- 44 Smith and Urey 2002; Rashid et al. 2013.
- 45 Rashid et al. 2013.
- 46 Most empirical work refers to the fertilizer components of these programs. While many programs distributed packets of fertilizer and seeds together, the cost of fertilizer was 10–14 times the cost of seeds.
- 47 Jayne et al. 2003.
- 48 Dreshcel et al. 2001; Tittone and Giller 2012.
- 49 Krueger, Schiff, and Valdes 1988; Anderson 2009.
- 50 Olson 1985; Olson 1965.
- 51 Acemoğlu and Robinson 2001.
- 52 Fernandez and Rodrik 1991.
- 53 Coate and Morris 1999.
- 54 Keefer and Khemani 2005; Chinsinga 2011.
- 55 Mogues and do Rosario 2015.
- 56 Dorward, Chirwa, and Slater 2010.
- 57 Banful 2011.
- 58 Wade 1982; Walter and Wolff 2002.
- 59 Nylen 2014.
- 60 Ranis 2012.
- 61 Francis and James 2003.
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- 63 Akiyama et al. 2001.
- 64 Jayne et al. 2013.
- 65 Keefer and Khemani 2003.

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