

## 5. Channelling public investment towards higher returns

Public investment in agriculture is required to foster more and better private investment and to ensure that it is economically and socially beneficial. Public goods for agriculture, such as R&D, education and rural infrastructure, are a fundamental part of the enabling environment described in earlier chapters and they are essential for agricultural growth and poverty reduction. However, governments everywhere face financial constraints and competing demands, so they must make difficult choices in allocating public resources. Which public investments have the highest returns in terms of agricultural growth and poverty reduction?

Evidence shows that investment in public goods have much higher returns than other expenditures such as general subsidies, but what constitutes a public good is not always clear-cut and may differ by context. Even though some types of investment are known to yield high economic and social returns, they are not always given the highest priority in budget allocations. Understanding the impact of different types of public investment and expenditure on agricultural performance and poverty alleviation can help guide public investment towards higher returns.

### Returns on public investment in and for agriculture<sup>24</sup>

Early studies of the impact of aggregate agricultural expenditures on growth and poverty reduction found diverging results. One of the earliest studies in this field (Diakosavas, 1990) found that government expenditure on agriculture had a strongly positive effect on sector performance, but a comparative analysis of data for 100 countries failed to find a statistically significant effect of agricultural spending on growth in per capita GDP (Easterly and Rebelo, 1993).

More recent studies have highlighted that the type of expenditure matters. Public expenditures on agriculture, education and roads contribute strongly to agricultural growth across regions, although to different degrees; and, within agriculture, the impact of research expenditures on productivity is stronger than non-research expenditures (Fan and Saurkar, 2006). Investment in research, often associated with extension, is consistently found to be the most important source of productivity growth in agriculture (Fischer, Byerlee and Edmeades, 2009).

Also country studies in several regions have found positive relationships between government expenditure on agriculture and growth in agricultural and total GDP, while confirming that the type of expenditure matters. In Rwanda, for example, 1 dollar of additional government expenditures on agricultural research increases agricultural GDP by 3 dollars, but the effects were larger for staples such as maize, cassava, pulses and poultry than for export crops (Diao *et al.*, 2010). In India, expenditures aimed at improving productivity in livestock had greater returns and were more effective in mitigating poverty than general public investment in agriculture (Dastagiri, 2010).

The substantial literature on public investment in agricultural research and development (R&D) shows that it has been one of the most effective forms of public investment over the past 40 years. Because R&D drives technical change and productivity growth in agriculture, it raises farm incomes and reduces prices for consumers. The benefits multiply throughout the economy as the extra income is used to purchase other goods and services, which in turn create incomes for their providers. The welfare effects are large and diffuse, benefiting many people who are far removed from agriculture, so they are not always recognized as stemming directly from agricultural research (Alston *et al.*, 2000; Fan, Hazell and Thorat, 2000; Evenson, 2001; Hazell and Haddad, 2001; Fan and Rao, 2003).

<sup>24</sup> This section is based on a background paper prepared by IFPRI staff members. See Mogues, *et al.*, 2012.

In a review of 375 applied research programmes and 81 extension programmes, Evenson (2001) found that in four-fifths of the applied research programmes and three-quarters of the extension programmes the reported rates of return were greater than 20 per cent and that in many they exceeded 40 percent. Alston *et al.*, (2000) reviewed 292 studies covering 1953 to 1997 and found average rates of return on agricultural research of 60 percent in developing countries. In an update of that study, Alston (2010) found the global rate of return to R&D to have been consistently high.

Recent country level studies support the findings of these comprehensive reviews. For example, research in Thailand is estimated to have a significant positive impact on TFP and a marginal rate of return of 30 per cent (Suphannachart and Warr, 2011). Analysis of an extension service in Uganda reveals rates of return of between 8 and 36 per cent (Benin *et al.*, 2011).

Ensuring enhanced expenditures on agricultural R&D is clearly a priority. As discussed in Chapter 2, higher-income countries have significant private R&D expenditures, but in developing countries most R&D efforts are publicly funded. Public-private partnerships constitute an innovative approach to involving the private sector both in R&D efforts as well as in the provision of other public goods (Box 22).

### Returns to complementary investments for agriculture

Investment in rural public goods such as education, rural infrastructure, health and social protection measures can generate important benefits for the agriculture sector and for its contribution to economic growth and poverty alleviation. Rural public goods are complementary; investing in one often enhances investment in the other. Evidence also shows that agricultural productivity and poverty reduction are compatible goals; investing in rural public goods tends to have high payoffs for both.

Studies have compared the impact on both agricultural performance and poverty of public spending on agriculture with that of other forms of expenditure. Figures 24 and 25 summarize results for such analysis undertaken in four developing countries: China (Fan, Zhang and Zhang, 2004), India (Fan, Hazell and Thorat, 2000), Thailand (Fan, Yu and Jitsuchon, 2008)

and Uganda (Fan and Zhang, 2008). The impact of public investment on the value of agricultural production was consistently the highest for agricultural research and development.

After agricultural R&D, the ranking of returns to other investment areas differs by country, suggesting that public investment priorities depend on local conditions, but rural infrastructure and road development are often ranked among the top sources of overall economic growth in rural areas (Fan, Hazell and Thorat, 2000; Fan, Zhang and Zhang, 2004; Mogue, 2011). In Ethiopia, access to all-weather roads reduced poverty by 6.9 percent and increased consumption growth by 16.3 percent (Dercon *et al.*, 2009). Mogue (2011) found that returns to public investment in road infrastructure in Ethiopia were by far the highest of all categories. In Uganda, the marginal returns to public spending on feeder roads on agriculture output and poverty reduction was three to four times larger than the returns to public spending on larger roads (Fan and Zhang (2008).

Public goods in rural areas also tend to be complementary. For example, in Bangladesh, villages with better infrastructure benefited more from agricultural research than villages with poorer infrastructure; they used more irrigation, improved seed and fertilizer, paid lower fertilizer prices, earned higher wages and had significantly higher production increases (Ahmed and Hossain, 1990). In Viet Nam, rural roads fostered the development of local markets and raised primary school completion rates, improving incentives for agricultural investment as well as investment in human capital (Mu and van de Walle, 2007).

In a classic assessment of international cross-country evidence, Antle (1983) found that lack of transportation and communication infrastructure posed severe constraints to aggregate agricultural productivity in developing countries, suggesting that investment in these areas would have high payoffs for agriculture. This conclusion was supported by results from India (Binswanger, Khandker and Rosenzweig, 1993), Colombia and Thailand (Kessides, 1993; Binswanger, 1983), and Nepal (Jacoby, 2000). Other more recent studies have confirmed the positive impact of investment in transport and communications infrastructure on agricultural growth; a cross-country comparison found that a 1 percent increase in government spending

## BOX 22

**Public-private partnerships**

Public-private partnerships have received increasing attention as a way to involve the private sector in supplying goods and services with some degree of public goods characteristics and for bringing together private and public investors to promote agricultural development, poverty reduction and food security. For example, in May 2012 the Grow Africa Investment Forum emphasized the need for the formation of new agricultural partnerships between the public sector, private sector and communities.

Public-private partnerships are generally defined as the participation by the private sector in an economic activity in which the parties involved share costs, risks and benefits but where, if left to the free market alone, such private activity would not occur due to low private returns to investment or the high level of risk involved (Warner, Kahan and Lehel, 2008). Several examples of such partnerships are found in farm-to-market roads, water for irrigation, wholesale markets and trading centres, agro-processing facilities and information and communications technology. Each type of public-private partnership offers specific

benefits and challenges. Public-private partnerships specifically for sustainable agricultural development can also include a variant known as “hybrid value chains” (Drayton and Budinich, 2010; Ferroni and Castle, 2011), which are multi-partner structures that bring together private companies with entities such as non-governmental organizations, university research institutes and foundations. Another type of public-private partnerships involves collaboration among public and private entities for undertaking research, developing new technologies and creating new products to benefit resource-poor farmers and marginalized groups in developing countries (Spielman, Hartwich and von Grebmer, 2007).

**Effective strategies for use in agricultural development**

Many new examples of public-private partnerships have developed over the last several years; such partnerships have been forged to undertake projects in areas such as agricultural productivity, biofortification, technical and investment assistance and export strategy. Major examples include

in these areas raised agricultural GDP growth by 0.01 to 0.14 percent (Benin, Nin-Pratt and Randriamamonjy, 2007).

Different types of public investment in rural areas also have strong poverty-reducing impacts (Figure 25). The rankings are slightly different from those for agricultural productivity but agricultural R&D, education, roads and electrification rank highly in all countries for both goals. The implication is that agricultural growth and poverty-reduction objectives are strongly compatible objectives; investment in rural public goods tends to have positive impacts on both.

**Returns over time to investment in agriculture**

Returns to many types of agricultural spending have declined over time, but returns to investment in agricultural R&D have remained high. In India, returns to expenditures on

agricultural credit subsidies were fairly high in the 1960s and 1970s, but they declined sharply over time while the returns to agricultural R&D have remained high for decades (Figure 26) (Fan, Gulati and Thorat, 2008). A comprehensive review of R&D and extension found that internal rates of return were as high in the 1990s as they were in the 1960s (Evenson, 2001). Likewise, for Thai crop production, public spending on research was a positive and significant determinant of TFP growth from 1970–2006 (Suphannachart and Warr, 2011).

In the long run, returns to spending on agricultural subsidies have fallen behind those for R&D, roads, education and irrigation infrastructure. In India, the overall poverty-reducing impact of agricultural expenditures has declined as a result of the declining share of agriculture in the economy and the increase of the proportion of agricultural expenditure given in the form of subsidies (Jha, 2007).

the Southern Agriculture Growth Corridor of the United Republic of Tanzania, the HarvestPlus Challenge Program as well as those currently facilitated by the creation of such organizations as the Ghana Commercial Agriculture Project and, in Nepal, the Agro Enterprise Centre.

Common elements of success attributed to these public-private partnerships generally include project plans with clearly-defined objectives, roles and responsibilities, milestones, risk management and mitigation strategies, as well as the provision of in-kind rather than cash only contributions from private sector partners. Effective and efficient definition of and implementation of local government policies is also crucial (Spielman, Hartwich and von Grebmer, 2007). The HarvestPlus Challenge Program is trying to implement these success factors in its current multi-partnership effort.<sup>1</sup>

### Challenges

Spielman, Hartwich and von Grebmer (2007) present the results of a study<sup>2</sup> examining how public-private partnerships in agricultural research stimulate greater investment in pro-poor innovation in

developing country agriculture. Challenges arise through the creation of hidden transaction costs despite the overcoming of the prohibitive costs of conducting research or deploying products independently. Although not easily quantifiable (see also Warner, Kahan and Lehel, 2008) these can pose significant barriers to success. In addition, it was shown that few of these partnership projects have the adequate risk management or mitigation strategies in place. Other concerns such as internal conflict resolution and legal and financial strategies, if not clearly defined, also tend to threaten the value produced in these public-private partnerships.

<sup>1</sup> This is a multi-partner collaboration in biofortification supported by the Syngenta Foundation for Sustainable Agriculture, which focuses on improving the nutritional value of staple foods. Although still in the development phase until 2013, it has released one crop already available in Uganda and Mozambique (Ferroni and Castle, 2011).

<sup>2</sup> The study examines 75 projects undertaken by the Consultative Group on International Agricultural Research (CGIAR) in partnership with various types of private firms operating on national, regional and international levels.

The effects of public expenditures on poverty reduction also tend to decline over time (Figure 26). Furthermore, the poverty-reduction impact of public subsidies for fertilizer, irrigation, power and credit are consistently well below that of public spending on R&D, education and roads. Although subsidy expenditures are frequently rationalized based on equity and poverty considerations, these results indicate that investment in public goods is clearly more effective in this regard.

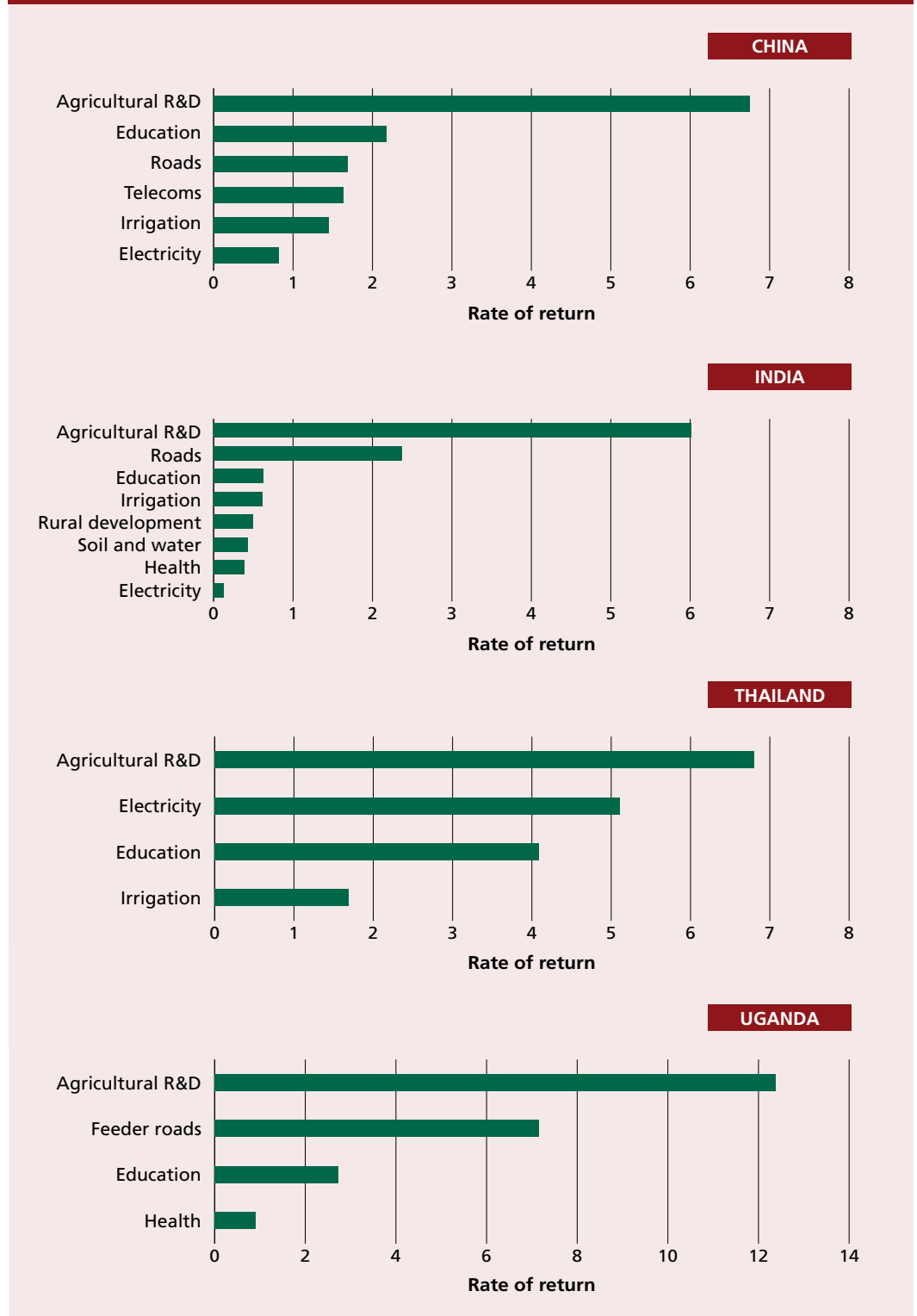
### Returns to investment in more-favoured versus less-favoured regions

Returns to public investment in agriculture are likely to differ according to location. A long-standing policy debate concerns whether it is better to invest public resources in more-favoured areas with higher agro-ecological potential, or in less-favoured areas, where poor populations tend to be concentrated.

Regions that are well-endowed with favourable agro-ecological conditions and easy access to markets seem like the obvious place when aiming to raise agricultural productivity. Investing in these more-favoured, high-potential regions may also be an effective strategy for reducing poverty because it offers “spillover” and “multiplier” benefits to residents of more remote regions who may migrate to take advantage of employment and income opportunities in the more-favoured region (Palmer-Jones and Sen, 2003).

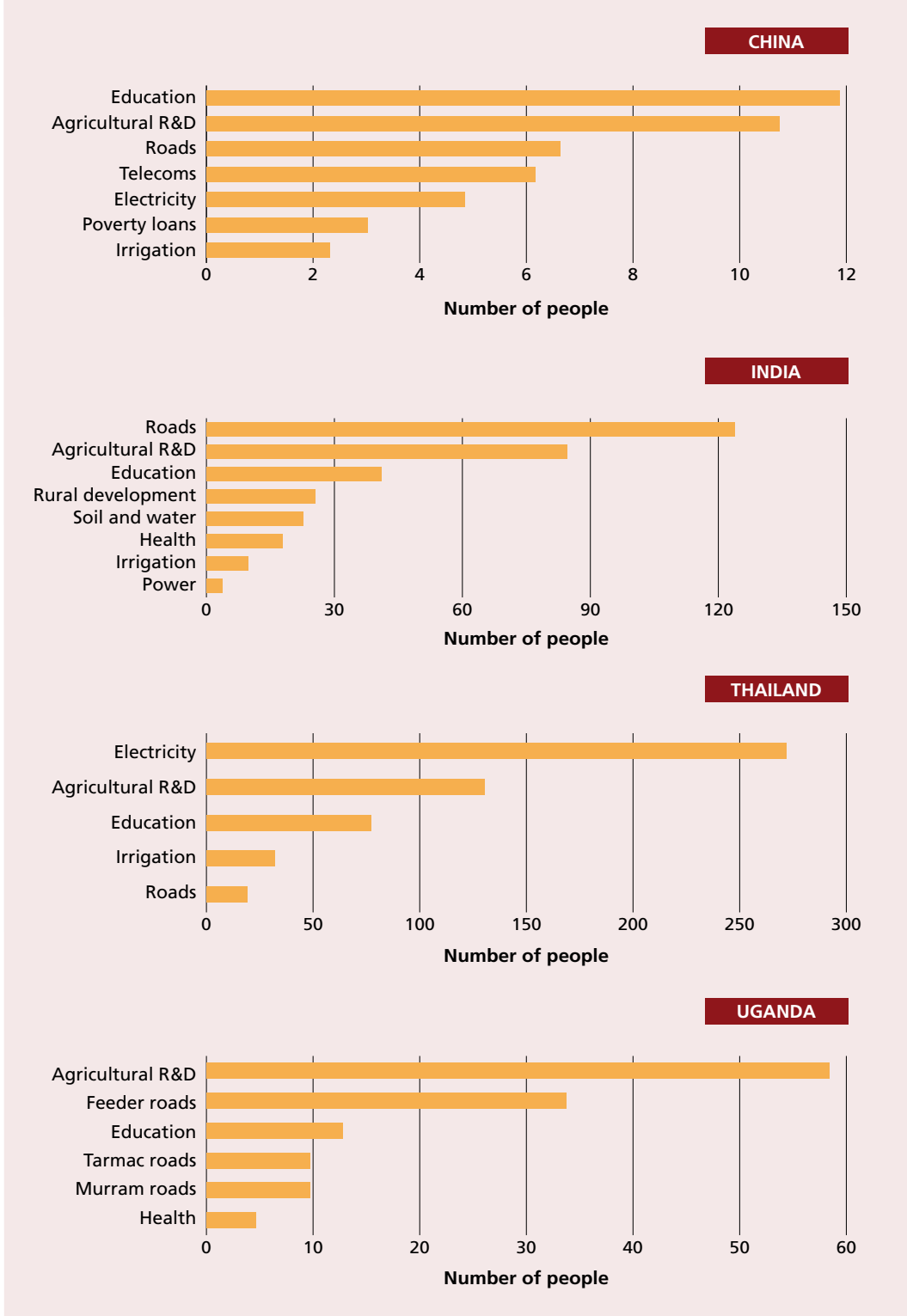
On the other hand, targeting less favourably endowed agro-ecological regions may yield higher returns, at least in terms of poverty reduction, because the marginal costs of achieving further gains in well-endowed regions increase over time after the easy gains have been achieved (Ruben and Pender, 2004). Only few empirical studies have addressed the issue of returns to investment in more-

**FIGURE 24**  
Returns to public spending in terms of agricultural performance



*Notes:* The magnitudes are returns to one monetary unit of different types of public spending in terms of increased agricultural production or productivity measured in the same monetary unit. The agricultural performance variable is measured slightly differently in each country: agricultural GDP in China, agricultural total factor productivity in India, and agricultural labour productivity in Thailand and Uganda.  
*Sources:* Fan, Zhang and Zhang, 2004; Fan, Hazell and Thorat, 2000; Fan, Yu and Jitsuchon, 2008; Fan and Zhang, 2008.

**FIGURE 25**  
Returns to public spending in terms of poverty reduction



Notes: The magnitudes are the reductions in the number of poor people per monetary unit spent in each area of expenditure. The respective monetary units are: one million baht in Thailand (i.e. reduction of number of poor people per one million baht spent in different sectors); one million rupees in India; 10 000 yuan in China; and one million Ugandan shillings in Uganda.

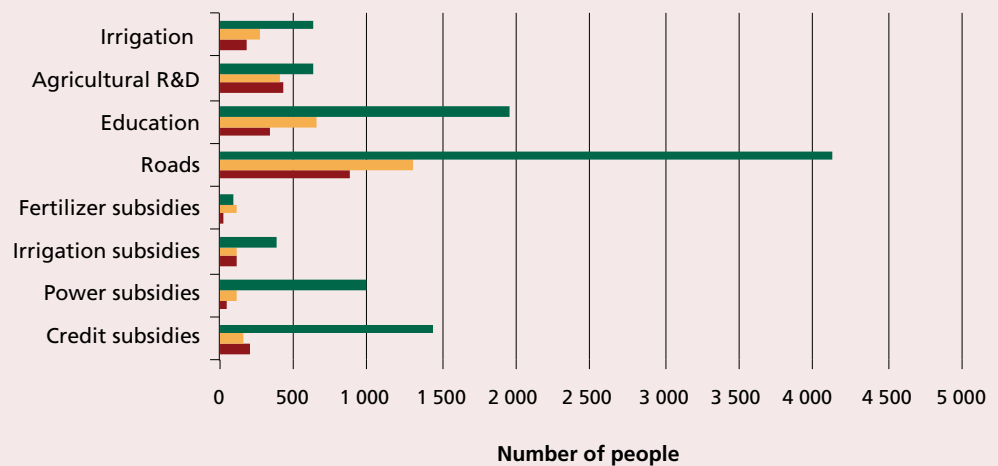
Sources: Fan, Zhang and Zhang, 2004; Fan, Hazell and Thorat, 2000; Fan, Yu and Jitsuchon, 2008; Fan and Zhang, 2008.

**FIGURE 26**  
**Historical impact of various types of public investment and subsidies on agricultural performance and poverty in India**

**A - Impact on agricultural performance**



**B - Reduction in the number of poor**



1960s-70s

1980s

1990s

*Notes:* The magnitudes in panel A are returns to one monetary unit of different types of public spending in terms of (the same) monetary unit of agricultural GDP. Panel B shows the reduction in the population size of the poor for a one million rupee increase in different types of public spending.

*Source:* Fan, Gulati and Thorat, 2008.

favoured versus less-favoured regions. While they vary in terms of the criteria used to define the regions and in how they account for spillovers and labour migration between regions, the results suggest that public investment in less-favoured regions may have higher returns both in terms of agricultural performance and poverty reduction.

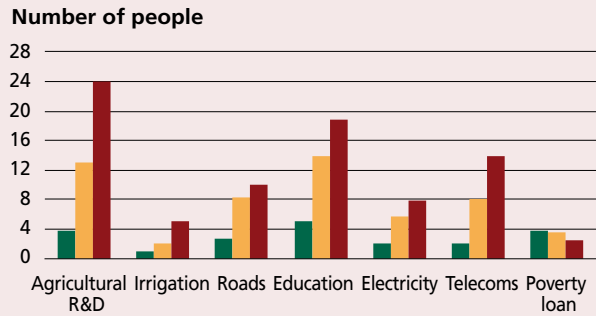
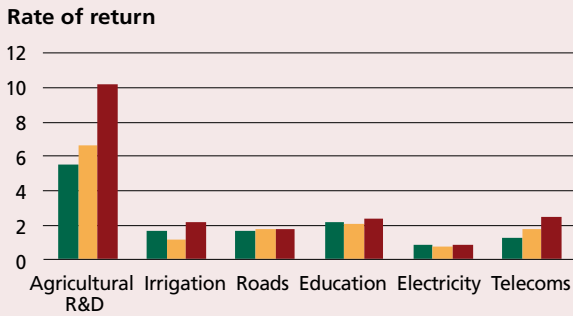
For example, results from countrywide studies for India (Fan, Hazell and Haque, 2000), China (Fan, Zhang and Zhang, 2004), and Uganda (Fan and Zhang, 2008) indicate that investment in less-favoured regions may have higher payoffs. These results are summarized in Figure 27; note that the distinction between high-potential and

**FIGURE 27**  
Returns to various investment types in high-potential versus less-favoured lands

**AGRICULTURAL PERFORMANCE**

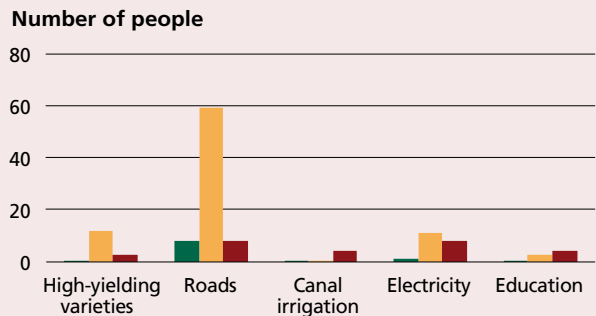
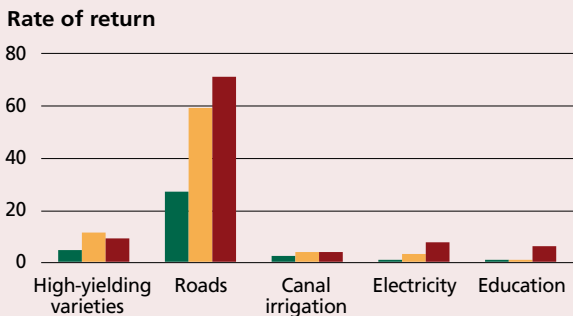
**POVERTY REDUCTION**

**CHINA**



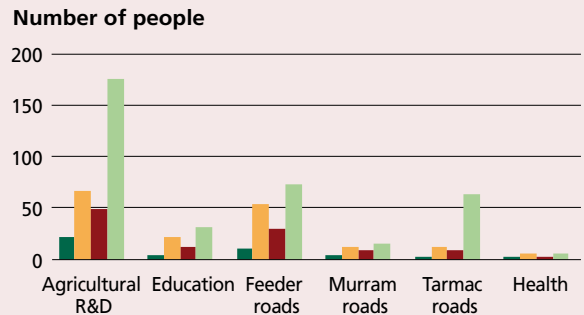
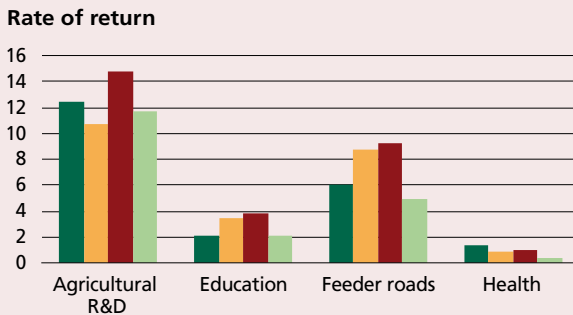
Coastal Central Western

**INDIA**



Irrigated Rainfed, high quality Rainfed, low quality

**UGANDA**



Central East West North

Notes: The magnitudes in the left panel are returns to one monetary unit of different types of public spending in terms of the value of agricultural production or productivity expressed in the same monetary unit. The agricultural performance variable is measured slightly differently in each country: agricultural GDP in China, agricultural total factor productivity in India, and agricultural labour productivity in Uganda. The magnitudes in the right panel are the reductions in the population size of the poor per monetary unit spent in each area of spending. The respective monetary units are: one million rupees in India; 10 000 yuan in China; and one million Ugandan shillings in Uganda.

Source: Fan, Zhang and Zhang, 2004; Fan, Hazell and Haque, 2000; Fan and Zhang, 2008.



less-favoured areas differs for the three countries, but in the graphic the more-favoured areas are found to the left and the less-favoured areas to the right.

In China, investment clearly had the highest returns in the least-favoured western region, both in terms of agricultural performance and poverty reduction. Surprisingly, a targeted poverty-loan programme was less effective in reducing poverty in this region than investments in basic public goods. Similar results were found in India, where public investment generated higher returns both for agricultural productivity and poverty reduction in the less-favoured rain-fed areas. The evidence from Uganda shows that investment in public goods such as R&D, education and roads clearly had a stronger poverty-reducing impact in the less-favoured northern region.

Similar results were found by Dong (2000), who looked at ten Chinese villages with different resource endowments and varying levels of development. The villages were categorized into 3 types from more- to less-favoured, according to resource endowment, market access, infrastructure, soil quality and vulnerability to natural disasters. Public investment and social service expenditures had much higher returns in terms of increased household revenues in the less-favoured Type III villages (Table 12).

Whether and to what extent to target public investment in agriculture to more-favoured or to less-favoured areas remains an empirical question. The answer will likely depend on local circumstances, incidence of poverty, current investment

levels and the potential for spillovers and labour migration between the regions. Nevertheless, the limited evidence presented above suggests the existence of situations of underinvestment in less-favoured areas, where redirecting agricultural investment to these areas could generate higher returns both in terms of agricultural performance and poverty alleviation. It underlines the importance of careful geographic targeting of public investment.

### Returns to expenditures on input subsidies

In spite of evidence of high returns on investment in public goods in and for agriculture, in practice significant amounts of government expenditures both in developing and developed countries are devoted to current expenditures in the form of subsidies. Such expenditures may be less cost-effective because they divert scarce public resources from investment in the provision of important public goods with longer-term impacts, but the case is not always clear-cut.

In certain circumstances, subsidies may have some public good attributes, with benefits (positive externalities) to a wider population beyond the immediate beneficiaries. Indeed, the rationale for subsidies on agricultural inputs such as fertilizer and seed is often pinned on such arguments. The use of improved agricultural technologies can have economic and social benefits beyond the farm, including the mitigation of negative externalities such as

**TABLE 12**  
Impact of public spending on household revenues in China, by agro-ecological zone

VILLAGE TYPE	PUBLIC INVESTMENT	SOCIAL SERVICE EXPENDITURE
<i>(Estimated marginal rate of return)</i>		
Type I	1.1	1.5
Type II	2.0	2.7
Type III	7.4	8.2
<b>All households</b>	<b>3.9</b>	<b>4.6</b>

*Notes:* Household returns are measured as gross revenue of household operations, including both agricultural and non-agricultural activities. Wage employment and other income generating activities outside of household production are excluded. The marginal rates of return are estimated by multiplying gross revenue by the regression coefficients and dividing the product by 100. Public investment includes maintenance of village irrigation networks and roads. Social services include mechanized ploughing, crop protection, threshing, technical guidance, subsidizing farm inputs, marketing assistance, and other non-agricultural services such as installing drinking water, enhancing access to electricity and providing educational services (schools, libraries and day-care).

*Source:* Dong, 2000.

depletion of soil fertility and the expansion of farming into marginal areas. The balance of the evidence on the relative returns to fertilizer subsidies versus investment in more clearly recognized public goods suggests that subsidies may be over-used.

Although returns to subsidies for fertilizers and other inputs appear to decline over time, (Fan, Gulati and Thorat, 2008), their use has increased rapidly in many countries in recent years. Subsidies often rise with a country's fiscal capacity (Byerlee, de Janvry and Sadoulet, 2009). In India, agricultural subsidies rose from 40 percent of agricultural public expenditures in 1975 to 75 percent in 2002, and by 2002/03 accounted for 6 percent of agricultural GDP (World Bank, 2007a). In Indonesia, fertilizer subsidies accounted for 30 percent of total agricultural development spending by 1988-90, although investments in research, extension and irrigation infrastructure were more important drivers of output growth during the previous two decades (Rosegrant, Kasryno and Perez, 1998).

Several countries have initiated fertilizer subsidy programmes in recent years. In Zambia, by 2005, about 37 percent of the agriculture budget was spent on fertilizer subsidies while irrigation development and other rural infrastructure received only 3 percent and agricultural R&D only 0.5 percent (World Bank, 2007a). The budgeted cost of the programme quadrupled from 2002/03 to 2008/09 (World Bank, 2010b), and evidence shows that it has crowded out private suppliers in areas where they had been active (Xu *et al.*, 2009).

Malawi also re-introduced universal fertilizer subsidies in 2005/06, and by 2008/09 up to 1.5 million households were expected to receive vouchers for a total of 182 300 tonnes of subsidized fertilizer. The programme successfully raised maize output, but absorbed 16 percent of Malawi's total government budget in 2008/09 and, because fertilizer is distributed by a state company, displaced private sector participation (Wiggins and Brooks, 2010).

There is a significant amount of research on the returns to public expenditures on a range of public goods, but little attention has been devoted to the impact of the overall composition of public expenditures and their breakdown into public and private goods. While the distinction between public and

private goods is not always rigidly defined, the allocation of public funds to subsidies for goods such as agricultural inputs that primarily benefit private individuals can divert funds away from public goods and other socially beneficial expenditures. The allocation of public resources to subsidies may thus have significant implications both in terms of economic efficiency and social equity.

Evidence on the efficiency and equity implications of the structure of rural expenditures was analysed for 15 countries in Latin America and the Caribbean for 1985-2001 by López and Galinato (2006). They classified public expenditures as either public goods or subsidies. The share of subsidies in rural expenditure in this time period ranged from less than 10 percent to almost 90 percent (Table 13).<sup>25</sup>

López and Galinato (2006) found that the overall level of government expenditures in rural areas had a positive and highly significant impact on per capita agricultural GDP, but the composition of government expenditure in terms of subsidies was much more important. Increasing the share of subsidies, while keeping total expenditures constant, significantly reduced per capita agricultural GDP. According to their estimates, just reallocating 10 percent of rural public expenditures from subsidies to public goods would increase per capita agricultural incomes by 5 percent. Also, increasing overall public expenditure on agriculture would have positive growth effects, but they are smaller than those deriving from reallocating within a given overall budget. The key policy message emerging from this analysis is that governments can increase agricultural GDP just by shifting agricultural expenditures from subsidies to public goods.

Additional analysis by Allcott, Lederman and López (2006), based partly on the same dataset, looked at the determinants of the level and composition of rural public expenditures and of agricultural growth. They found that historical wealth inequality was a key determinant, together with other political and institutional factors such as government accountability, civil society

<sup>25</sup> Note that these results are not comparable with those reported in Box 5 because they come from different sources and use different definitions of public goods.

**TABLE 13**  
Share of subsidies and public goods in rural government expenditures in Latin America and the Caribbean, selected countries

COUNTRY	SUBSIDIES AS SHARE OF RURAL SPENDING	PUBLIC GOODS AS SHARE OF RURAL SPENDING
(Percentage)		
Argentina	59	41
Brazil	87	13
Costa Rica	48	52
Dominican Republic	80	21
Ecuador	69	31
Guatemala	27	73
Honduras	9	91
Jamaica	58	42
Mexico	66	34
Nicaragua	37	63
Panama	51	49
Paraguay	32	68
Peru	64	37
Uruguay	19	82
Venezuela	54	46

Note: The shares are annual averages for the years 1985 to 2001.

Source: López and Galinato, 2006.

participation, transparency and ethno-linguistic fractionalization. Indeed, higher levels of inequality tended to increase both the overall government allocation to rural areas and the share of subsidies within overall agricultural expenditures. However, the authors emphasized the need for further data collection and analysis to determine whether their conclusions would hold outside the region.

### Political economy of public investment in agriculture<sup>26</sup>

If returns to public investment are so high, why don't governments invest more? And if returns to public investment are higher than returns to subsidies, why do governments continue to subsidize? The analysis just reported by Allcott, Lederman and López (2006) pointed to the role of wealth distribution, along with other political and institutional factors, as determinants of

the structure of rural public expenditure. The question of how public expenditure policies relating to agriculture are actually determined is important for understanding how to improve public investment.

A fundamental difference between private and public investments decisions is that, while the former are motivated by expectations of private returns, the latter should in principle be motivated by expected social returns. In reality, for a number of reasons, the motivations of decision-makers may not coincide with the wider social benefits expected from the investment. Public expenditure and investment patterns can be affected by factors such as pressures by interest groups, corruption or even the characteristics of agricultural investments themselves. For instance, some agricultural investments may have very long pay-off periods and their impacts may not always be clearly identified, so politicians – who are interested in remaining in office – may not get much credit. Factors as these, as well as governance in general, can have a major impact on how public funds for agricultural expenditures and investment are used.

<sup>26</sup> This section is based on a background paper prepared by an IFPRI staff member.(see Mogues, 2012).

Government investment may not always lead to expected results because of excessive costs, low rates of return of the asset resulting from the investment or misuse of the asset, once created. Many factors can reduce the efficacy of government investment: bribery can increase the cost of an investment; governments may simply be ineffective in controlling costs; aid financing may lead to the choice of more expensive projects; and decisions may be subject to patronage or political considerations (Pritchett, 1996). One source of misuse of an asset created through public investment can be the lack of provision of funding for operating expenses and maintenance of the asset. The efficacy of government investment, measured as the difference between public expenditures and the value of the assets generated, is closely associated with indicators of good governance and policies (Pritchett, 1996).

### Interest groups and collective action

Interest groups can be a strong influence on public expenditure and investment decisions in agriculture. A rich body of evidence has pointed to the ways that agricultural policies in developing countries have tended to favour a small number of larger-scale farmers (see Birner and Resnick, 2010 for a brief overview). Historically, in developing countries, public investment, pricing policies and other measures have benefited the urban population at the expense of rural dwellers and agricultural households (Lipton, 1977). These phenomena have been explained through the characteristics of interest groups, which affect their ability to press for public policies, including investments, subsidies and other public interventions, that are favourable to them (Becker, 1983).

The effectiveness with which different interest groups can influence politicians through collective action depends on several factors (Olson, 1965). Some of these tend to put farmers at a disadvantage relative to urban dwellers. The spatial dispersion of farmers and inferior access to transportation and communication infrastructure makes coordination and mutual monitoring of actions more difficult than for urban citizens (Olson, 1985). Also their larger number in many developing countries puts farmers at

a disadvantage relative to urban dwellers. Indeed, for any given level of spatial concentration and access to transport and communication infrastructure, it is harder to coordinate among larger than among smaller groups (Olson, 1965).

A group's influence also depends critically on their financial wealth. This, along with the greater ease of coordination among small groups, explains why a few large farmers can influence public expenditure patterns when wealth and land are highly concentrated (see analysis by Allcott, Lederman and López [2006] cited above). This underlines the importance of increasing the social capital of smaller farmers through producers' associations.

Another significant phenomenon in policy processes involving interest groups is the existence of a status quo bias among policy-makers. Often policies that have outlived their usefulness fail to be discontinued. An example is agricultural input subsidies, which are rarely removed even after they have outlived or failed to meet their initial efficiency-enhancing or equity objectives. Those who benefit from the current state are usually the ones with the requisite power to have ensured policy enactment in the first place (Fernandez and Rodrik, 1991) and who may even see their lobbying power increasing after the policy is already instituted (Coate and Morris, 1999).

### Attribution and time lags in benefits

For a policy-maker responsible for decisions on public expenditures, recognition by beneficiaries is likely to be a significant motivation. The ease with which citizens can attribute credit or responsibility to a policy-maker for specific subsidies or investments and their outcomes can therefore have a major influence on the prioritization of public expenditures.

Visible infrastructure projects, such as a school building, or direct transfers are more easily identifiable and attributable to concrete decisions by politicians and officials than, for example, improving the quality of extension services or investing in research and development. The recent surge in large-scale input subsidy programmes can be explained in part by the ease with which impacts can be identified and attributed to the responsible public officials.

The long time lag required before many public investments yield a return makes attribution more difficult. The longer the lag, the more difficult the attribution and the less incentive public officials have to undertake the investment. This is particularly relevant for investment in R&D, which generally has high returns but also a large time lag between the outlays and the benefits. This may represent one of the causes underlying the apparent and systematic underinvestment in R&D discussed above.

The seriousness of the attribution problem also depends on the quality and volume of information and on the level of education of the beneficiaries of the public expenditures. Better -educated citizens with more access to information, mediated for instance by civil society organizations, are better able to make correct attributions. Improving education levels as well as information flows is therefore important for improving the prioritization of public expenditures and investment.

#### Corruption and rent seeking

Corruption and rent-seeking behaviour can lead to socially sub-optimal patterns of expenditure and investment. Large infrastructure projects easily lend themselves to rent-seeking behaviour by public officials. Evidence from cross-country analysis shows that in low-income countries, the incidence of corruption increases with the share of spending on large-scale capital projects and decreases with the share of social sector spending (de la Croix and Delavallade, 2009).

In countries with high levels of corruption this phenomenon may introduce a bias in favour of large-scale capital projects over other forms of investment or public expenditure. In addition, the pervasiveness of corruption which generates the bias toward large-scale projects is also likely to make those investments less productive than in countries with better governance. Agricultural R&D investments are relatively less prone to rent-seeking and corruptive practices, although there are recorded instances of corruption; for example commodity boards have diverted money from farm levies on farmers that was intended to fund public agricultural research institutes (Omuru and Kingwell, 2006).

#### Governance and agricultural investment

The governance environment – of which corruption is but one dimension – is increasingly seen as an important determinant of public expenditure allocations, including those for investment in agriculture. Evidence of this causal link supports the strong correlation found between indicators of good governance and the accumulation of on-farm capital stock reported in Figure 16 in Chapter 3.

Deacon (2003) found strong empirical evidence that systems of governance affect the provision of public goods.<sup>27</sup> He found that dictatorial governments consistently underprovided public goods relative to democratic and inclusive governments. He also found that income levels positively affected public goods provision, but that the provision of public goods responded more strongly to income growth in democracies than in dictatorial governments. At the local government level, as well, evidence shows that the share of public investment in total public expenditures of village governments is higher when the village leader is elected rather than appointed (Zhang *et al.*, 2004).

The efficacy of public spending on health and education in achieving the desired outcomes also depends on the quality of governance; such spending in countries with high levels of corruption and inefficient bureaucracy was less effective than in countries with better governance (Rajkumar and Swaroop (2008). Household data from Uganda showed that there was a threshold level of security below which public investment in infrastructure and education had little impact on growth (Zhang, 2004).

Empirical evidence points to a link between different aspects of governance and the provision of public goods by government. The question arises: what are the implications for agriculture and which aspects of governance matter the most for agricultural investment and the provision of public goods? Resnick and Birner (2006) in an overview of empirical evidence on the links between good governance and pro-poor growth discussed the “definitional ambiguity” of governance

<sup>27</sup> Public goods considered were: access to safe water and sanitation, road density, school enrolment and levels of lead in gasoline as an indicator of environmental protection.

and the multiplicity of indicators involved in much of the discussion and the empirical analysis. They pointed to the need for a better understanding of “which aspects of governance are conducive to growth and which determine whether the poor are capable of participating in the growth process” (Resnick and Birner, 2006, p. 38). A similar understanding would seem just as relevant to the specific issue of governance and agricultural investment.

### Planning public investment in agriculture

Ensuring more effective public investment in and for agriculture is a major challenge. It involves improving the process of policy-making affecting investment and strengthening planning and budget processes for public investment. The challenge is particularly severe in the low-income and

lower-middle-income countries, where agriculture, and especially smallholders, generally plays a central role in economic development and poverty reduction and where resources for investment are more constrained.

There is increasing attention to the need for improving budget processes (see for instance World Bank, 2011e). However, there is also a need to look at policies affecting private investment and at public investment in and for agriculture in an integrated way. Appropriate policies can enhance the returns to both private and public investment. Appropriate public investment can also enhance returns to private investment and improve incentives to invest, but an inappropriate policy framework can significantly reduce their impact and lead to substantial waste of public resources. Many countries are currently making concrete efforts to guide and improve investment in agriculture by developing country investment plans (Boxes 23 and 24).

#### BOX 23

#### The Comprehensive Africa Agriculture Development Programme (CAADP)

The Maputo Declaration on Agriculture and Food Security in Africa, adopted in 2003, represents a formal recognition by African countries that the sector is crucial to economic growth and poverty reduction and that greater resources should be devoted to it. In the declaration, the signatory countries committed to a set of principles for promoting agricultural development as well as a clear commitment to specific targets, in particular to allocate at least 10 percent of their national budget to agriculture and to achieve 6 percent annual agricultural growth.

The principles are made operational by the Comprehensive Africa Agriculture Development Programme (CAADP), which provides a common policy framework for agriculture development in Africa. The process involves Country Roundtables to engage with stakeholders, the generation of evidence-based analysis, the development of the investment programmes, assessment and learning

from process and practice. These consultations and stocktaking help to distil a consensus among stakeholders about priorities and culminate in the signing of a “Compact”, which outlines the country’s agenda for agricultural growth, poverty reduction and food and nutrition security. It also specifies responsibilities for the various parties and outlines implementation mechanisms, including coordination and oversight and mobilisation of funding.

The investment plan is then formulated and subjected to a technical review by independent experts to ensure consistency with CAADP principles and objectives, the adoption of best practices,<sup>1</sup> alignment with Compact commitments and operational feasibility of investment programmes. The technical review process is also a condition for qualifying for GAFSP funding (see Box 8 on page 35).

Finally, the High Level Business Meeting is convened by government with participation from national stakeholder

(CONT.)

## BOX 23 (CONT.)

groups, the CAADP core institutions at national, regional and continental levels, donors and other possible funders. The purpose is to validate and endorse the Investment Plan and confirm implementation readiness and funding commitments as well as agreeing on modalities for implementation.

By March of 2012, 27 countries had signed Compacts, all with Investment Plans ready or being processed, and 19 countries had held the Business Meeting.

Although many challenges remain, there are real benefits to the process. On the positive side, CAADP is helping to foster dialogue and harmonization of agricultural policy-making at the international level. A review of the CAADP framework in Ghana, Kenya and Uganda found that it has been effective at the global and continental levels but that the country-level process was still weak, especially in terms of country ownership, stakeholder participation, use of evidence in decision-making and alignment of policies (Zimmermann *et al.*, 2009). In some cases, funding deadlines (imposed for example by the GAFSP) effectively short-circuited the process of consultations, the evidence-based decision-making, the peer review, etc. Donors also did not, at least initially, see the value added in the CAADP process and have generally been slow to respond.

In Rwanda, where CAADP is considered to have been most influential, the government had already previously formulated the Strategic Plan for Agriculture Transformation II (PSTA II), prepared in collaboration with external experts, focusing on identifying potential

returns to investment in staple foods and the necessary policy support. The PSTA II was subsequently aligned with the CAADP framework and formed the basis for Rwanda's Investment Plan. The CAADP Secretariat provided technical assistance to identify and cost the PSTA II programmes and sub-programmes. The CAADP-led Business Meeting, i.e. discussion with donors, led to some changes in expenditure priorities. The process has led to more government support and substantial donor pledges, with 80 percent of PSTA II funding now in place.<sup>2</sup>

As Rwanda's PSTA II is a continuation and up-scaling of activities started during the initial PSTA in 2004, it is the only country where sufficient time has elapsed to allow for a tentative assessment of experience with CAADP and investment planning. There have been substantial increases in land use for key staples such as maize, Irish potato, rice and wheat, in part assisted by the mechanization programme, as well as increased adoption of new planting materials and use of fertilizer. Yield increases have been appreciable for all crops.

<sup>1</sup> As suggested in the pillar framework documents, which are a key aspect of the CAADP process and have been developed under the leadership of the Pillar Lead Institutions (see NEPAD, 2010a for more details on the pillars and pillar lead institutions).

<sup>2</sup> On the other hand, the Togo investment plan is funded to the tune of about 10 percent.

Source: Based on Government of Rwanda (2009), NEPAD (2010a), NEPAD (2010b) and NEPAD (2010c).

### Key messages

- Public investment in agriculture is strongly supportive of agricultural growth and poverty reduction, but the type of spending matters. Investments in agricultural R&D, rural infrastructure, and education have much higher returns than spending on subsidies for agricultural inputs such as fertilizer.

Although the distinction between investment in public goods and subsidies for private goods is not always clear-cut, the evidence from a large number of countries and over a period of 50 years is clear: investing in public goods yields higher returns for agricultural growth and poverty reduction than input subsidies.

- Investments in a broad range of rural public goods are complementary to

## BOX 24

**The Bangladesh Country Investment Plan**

Many low- and middle-income countries in addition to African countries have adopted plans for investment in agriculture.

Bangladesh's Country Investment Plan (CIP) – A Road Map toward Investment in Agriculture Food Security and Nutrition – is an example of such an investment planning process.<sup>1</sup> The CIP grew out of the National Food Policy (NFP, approved in 2006) and the related Plan of Action (2008–15) and is built around the three dimensions of food security: availability, access and utilization.

The investment planning process was led by the Government of Bangladesh and involved a wide range of Ministries, Agencies and Departments – with technical, financial and policy support provided by FAO, the United States Department of Agriculture (USAID) and IFPRI. The process involved wide consultations with key ministries, private sector representatives, NGOs, Development Partners and a large number of stakeholders, especially farmers and their organizations.

An important focus of the process has always been the alignment of priorities, thus allowing government agencies and donors to work more effectively towards common goals in line with the principles of the Paris declaration on aid effectiveness (2005). The planning was given impetus by the L'Aquila Food Security Initiative and the US Feed the Future Initiative<sup>2</sup>.

Broadly, the Investment Plan aims to: (i) plan and implement investment priorities in a coordinated way; (ii) increase convergence of budget and external

sources of funding, and; (iii) mobilize additional resources. Proposed investments relate to strengthening physical, institutional and human capacities in the field of agriculture, water management, fisheries, livestock, agricultural marketing, food management, safety nets, nutrition and food safety.

At a practical level, investment needs are assessed by the various departments that are mandated to contribute to achieving the stated food security goals. Once formulated the projects fall into the government pipeline. The plan incorporates over 400 projects in different areas derived from the NFP Plan of Action (2008–15).

An important aspect of the process is that of monitoring and reviewing the plan. For example, following approval of the first version of the CIP in June 2010, a review process, again involving widespread consultations, was launched in December. An updated version of the CIP was completed in 2011. The intention is for future monitoring and reviewing to generate a successively more refined, more accurately cost assessed, as well as prioritized CIP. In this sense the CIP is thought of as a living document.

<sup>1</sup> The process followed in Bangladesh is very close in spirit and in practice to the CAADP process advocated by NEPAD.

<sup>2</sup> Feed the Future is the United States Government's global hunger and food security initiative. Led by USAID and drawing on the resources and expertise of agencies across the Government, this Presidential Initiative is aimed at helping countries transform their own agricultural sectors to grow enough food sustainably to feed their people.

investments that directly target the agricultural sector; investment in rural roads, for example, tends to improve market access for agricultural producers and encourage private investment in the sector. The relative impact of alternative investments varies by country, suggesting that priorities for investment must be locally determined, but returns to investment in public goods in rural areas are mutually reinforcing.

- Some evidence suggests that investing in less-favoured areas may reduce poverty more effectively than continuing to invest in high-potential areas where significant progress has already been made, but circumstances vary across countries and over time and will depend on the extent to which the impact of investment spreads across regions through technology spillovers, labour migration and economic multipliers.



- In spite of the extensive body of evidence documenting high economic and social returns to investment in public goods that directly and indirectly support agriculture, government budget allocations do not always reflect this priority, and actual spending does not always reflect budget allocations. A number of political economy factors are to blame, including collective action by powerful interest groups, difficulties in

attributing responsibility for successful investment activities that have long lead times and diffuse benefits (as for many agricultural and rural public goods) and poor governance and corruption. Strengthening rural institutions and promoting transparency in decision-making can improve the performance of governments and donors in ensuring that scarce public resources are allocated to the most socially beneficial outcomes.