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HOW IMPORTANT IS INFRASTRUCTURE FOR ACHIEVING PRO-POOR GROWTH?

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How important is infrastructure for achieving pro-poor growth?

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1. Poverty in developing countries is now widely understood to have three main dimensions: lack of income and economic security, lack of access to public services critical to human development (health, water and sanitation, and basic education), and lack of respect by others and of power in society. Gender equity is an important aspect in all three dimensions. A step forward in the efforts to reduce the world's very serious poverty was the Millennium Summit of the United Nations in September 2000 when leaders of 189 countries endorsed common Millennium Development Goals (MDGs). For the first time the world had a shared, dated target for reducing income poverty. And the importance of non-income dimensions of poverty was given equal weight, and explicit, dated objectives adopted. But progress on the ground has been inadequate. The World Bank's last World Development Report indicated some progress towards the target for reduction of income poverty but severe shortfalls from the pace of improvement necessary to meet the health and education targets. The international group of wise people which reported to the World Economic Forum in January on the basis of independent expert-group assessments concluded that, despite many good initiatives, the overall effort that the world was devoting to the MDGs was, for each of them, well under half of what was needed for them to be reached (World Economic Forum 2004).

2. The phrase 'pro-poor growth' began to come into common currency in international development reports and discussions in the middle 1990s when the targets that eventually became the MDGs were first being formulated. Its meaning and measurement were not, however, very clearly conveyed or agreed. While it clearly meant economic growth that was "good for the poor," did it signify any objective additional to the poverty reduction objective (of halving by 2015 the sizeable proportion of people who had been living in 1990 on $1/day or less) incorporated in the first MDG ? Or was it simply another way of expressing that objective?

3. The purpose of this paper is first to review the possible ways of measuring and targeting pro-poor growth that have since been put forward, with a view to clarifying the significance of the concept. Second, the relevance of infrastructure is introduced by summarizing main results of research on the sector's contribution to growth more generally and identifying the mechanisms by which it may contribute to pro-poor growth in particular. Third, we give three vignettes of country growth experience, assessing degree of pro-poorness and the contribution of the infrastructure sectors to this performance, and review comparative country experience with major rural development programmes. Fourth, we distill from these analyses some of the issues that may need to be considered in different circumstances for strengthening infrastructure's contribution to pro-poor growth. The paper ends with comments on the extent to which infrastructure programmes addressed to pro-poor growth might be expected to differ from programmes aimed at supporting simply growth.

1. The Pro-Poor Growth Objective

4. To clarify the objectives that pro-poor growth might be expected to have, researchers have considered three possible interpretations and tested them against changes recorded in countries' income-distribution patterns over the course of multi-year growth episodes. The most ambitious interpretation was that, whatever might be the baseline distribution of income in a country, the poor should receive the same share of incremental income as their share of the population, so that absolute income differentials would diminish[1] (Klasen 2001, White and Anderson 2001). It was found that in less than 5% of the growth episodes covered in a large data-set did the poorest 20 or 40% of the population receive such a share of incremental income. Another idea was to think of possible internationally agreed norms, based on what other countries had been able to achieve, for instance in terms of the share of income going to the poorest quintile. One difficulty with this approach was that it could lead to targeting reduction of the bottom quintile's share in some more egalitarian countries. The more modest objective which has received the widest consideration is at least to avoid the poor's share of incremental income falling below their share of baseline income. This would avoid deterioration of relative differentials but do little to restrain growth of absolute differentials. On the assumption that the poor accounted for either the lowest 20% or 40% of income earners, this objective was found to have been achieved in some 40% of the historical cases.

5. Adopting an approach similar to that of the last alternative just mentioned, several authors (McCulloch and Baulch 1999, Kakwani and Pernia 2000, Pernia 2003) have proposed use of an index, that some have called a Pro-Poor Growth Index, which is the ratio between the observed elasticity of headcount poverty with respect to changes in mean expenditure (i.e., the percent reduction in the poverty group that has been achieved for each percentage point increase in average income of the national population), on the one hand, and the elasticity of headcount poverty (with respect to changes in mean expenditure) that would have applied if income distribution had remained unchanged, on the other. Growth can be considered pro-poor if this index is more than 1. Negative values indicate clearly anti-poor growth, while values between 0 and 1 indicate participation of the poor in the benefits of growth but less than their share of the baseline income distribution. Results can be directly compared between countries with substantially different baseline poverty rates and levels of inequality.

6. A difficulty with this formula as a headline indicator of the extent to which growth is pro-poor is, however, that a country growing unusually fast and achieving an unusually rapid rate of poverty reduction may still score substantially lower than a country with a much lower rate of poverty reduction which nonetheless benefited from some improvement in the overall income distribution pattern. This arises, in fact, even among the few cases included in Table 1 below.

[1] Ravallion 2003 reports an interesting experiment, suggesting that 40% of people may indeed think of inequality principally in absolute rather than relative terms, and he relates this to the divisiveness of current debates about globalization.

7. To overcome this problem, DFID decided earlier this year to adopt as its main indicator of pro-poor growth in a country simply the rate of increase in the mean income of the poor, as suggested in Ravallion and Chen 2003 (DFID 2004). Abstracting from the impossibility in normal circumstance of tracing incomes of individuals (a few of whom may climb well above the poverty level in the course of any period of growth, while others fall into poverty), what this means in practice is comparing the average income of persons below the poverty line at the beginning of the period with the average income of the lowest income earners at the end of the period, cumulated to the same percentage of population as had been accounted for by the poverty group in the base year. While this indicator has none of the built-in properties for targeting improvements in income distribution that were implied by the other concepts discussed, it has the merit of being simpler, readily comparable to other indicators (such as the rate of increase in the mean income of the overall population) for the country in the same period, and more useful for discussions focusing on a country's particular circumstances (including, importantly, the extent to which initial levels of inequality are felt to be inappropriate). It may also help to avoid the danger implicit in the headcount index, of excessive emphasis being given to raising incomes of those close to the poverty line and inadequate attention being paid to improvement of the situations of those further down the income distribution.

8. All of this discussion has been limited to the first, or income, dimension of poverty identified at the outset. Improvement in the participation of the poor in public educational or medical services provided free or at subsidized rates would need to be calculated separately to assess how effectively pro-poor they are. That dimension of poverty is sometimes assimilated conceptually with the third dimension (respect and power) under the generic title of 'empowerment,' in an attempt to capture trends in non-income dimensions of poor people's welfare and the quality of the human assets they have. Especially on these aspects, participatory poverty assessments can provide vital complements to the Household Budget Surveys which generate almost all the income data.

9. The debates of the last few years have thus helped to clarify the value of the concept of pro-poor growth. It is, in large part, a description of main characteristics of what is needed to reach the poverty-reduction MDG. Economic growth, and policies which foster it, are essential. Serious attention also needs to be given to distribution – of the opportunities to participate in growth and to share in its fruits, including the ways in which these may be affected by policies adopted to accelerate growth. Pro-poor growth thus underlines notions of inclusiveness, access to markets and services, and people's influence on public initiatives. These considerations obviously apply in principle to all of the people who are living in poverty and, in this sense, pro-poor growth is also a more comprehensive way than MDG 1 of expressing the poverty reduction objective. An interesting effort has recently been made (Kraay 2004) to decompose, between growth and distribution effects, the changes in key poverty indicators (for the group below the 'dollar-a-day' line) that have actually been achieved in developing countries over fairly long periods (therefore giving more indication than brief growth episodes that the achievement could be sustained). Using all available data of acceptable quality – covering periods averaging ten years in some 40 countries – it was found that distribution

accounted for as much as 30% of the change in the mean income of the poor (compared with only about 10% for the poverty headcount).[2]

2. Infrastructure and Growth

10. Since economic growth is the main source of progress in poverty reduction, the most important contribution from infrastructure is to overall growth, a subject that has received considerable research attention. Extensive econometric work, both cross-country and for 20-year periods within individual countries, has established a generally robust relationship between infrastructure investment and national economic growth. For instance, a thorough cross-section study, using data for some 100 countries and supported by a recent re-run in a modified model, led to the conclusion that putting an additional 1% of GDP into transport and communications investment on a sustained basis would lead to an increase of 0.60 percentage points in the growth rate of per capita GDP (Easterly and Rebelo 1993 and Miller and Tsoukis 2001). A particularly interesting recent country study combines a large 1973-92 data-set for Indian manufacturing with information on state-level growth of road stocks and public generating capacity in an effort to identify the system-wide, indirect effects of infrastructure that are likely to be missed in project cost-benefit analyses (Hulten, Bennathan and Srinivasan 2001). The results indicated that public investment in electricity generation and major roads yielded substantial positive external economies, rising over time and accounting for nearly one half of the Total Factor Productivity residual in the growth equation – i.e., the share of the growth in gross output of the manufacturing sector that could not be explained by the increase in its own capital stock, labour force and consumption of intermediate inputs (including purchases of the infrastructure services).

11. In the last few years evidence has been accumulating that incremental infrastructure investment in developing countries has had the largest effects – or lack of it has been most costly – in two sets of circumstances: in a few countries (especially of middle income) that had been growing fast, and in a larger number of countries or areas that were beginning to move out of low-income stagnation to increasing rates of positive growth. A cross-country study using a data-set on growth of physical stocks of generating capacity and paved roads in 100 countries and estimating an aggregate translog production function permitted comparison of returns (in terms of production contribution) to increments in these two types of facility with returns to general capital investment in each country (Canning and Bennathan 2000). No doubt reflecting the difficulties of keeping infrastructure expansion in line with rapid overall economic growth, several middle-income countries showed returns to incremental infrastructure much above those on general capital. The same was true, but to lesser extent, for many of the lowest-income countries.

[2] White and Anderson 2001 also found that, while growth was the dominant factor overall in explaining increases in the income of the poor, in one quarter of the cases covered by their data-set it accounted for only half the increase. Thus distributional changes had been important for the poor. In more than a quarter of the growth episodes covered, distributional change was more important than overall growth in explaining the increase in the income of the poor.

12. Awareness has also increased of the serious obstacle to growth in landlocked countries or regions that is posed by inadequate transport infrastructure. Recent research shows that the elasticity of developing countries' international trade with respect to transport costs is high, at around –3.0, and that the median landlocked country faces transport costs around 50% higher than the median coastal country; as a consequence it has a trade volume 60% smaller (Limão and Venables 2000). The statistical analysis underlines the particularly high significance of the country's own infrastructure, in addition to that of its transit neighbour. Weak infrastructure has been identified as a major determinant of countries' production structures, especially in Africa and South Asia (Wood and Mayer 2001, Wood 2002) and a significant obstacle to the spread of trade-induced growth within countries, for example in Asia (Carruthers and Bajpai 2002 and Sharma 2000).

13. The positive impact of infrastructure capacity on growth depends, however, not only on investment but also on the efficiency with which it is maintained and operated. Some indications of the significance of this aspect are given by the incorporation, into growth models, of variables based on summary indicators (such as locomotive availability and power system losses) for some of the more centralized services in about 50 countries that were given in the World Bank's 1994 World Development Report. One analysis found that as much as 40% of the more than five percentage-point difference in annual GDP growth rates between the top and bottom quartiles of the 46 countries covered were explained by this variable (Hulten 1996). Another analysis introduced, in addition, a variable reflecting each country's foreign debt stock (Aschauer 1998). The model, based on the same 46 countries 1970-90, indicated that, even in the case of Mexico (which ranked already relatively high on the efficiency index), almost identical impact (increase of about 0.27% in long-run level of output per capita) would result from 1% increases in infrastructure service efficiency or in infrastructure capital stock, with the effects of the latter in fact turning negative if it were financed entirely by additional foreign debt.

14. Thus the performance of trunk infrastructure systems is of at least equal, if not greater, relevance to pro-poor growth than service extensions directly to the poor. These systems have to provide the upstream bulk supplies and transport capacity required to meet the demand from local consumers and enterprises. And they have to achieve the levels of reliability and efficiency which will help attract private investment in the economy more broadly, and generate from the users of their services financial resources sufficient to permit sound maintenance and extensions to keep up with system demand. Performance in these respects will affect the degree to which economic growth can be accompanied by improvements in income distribution.

15. Among the more direct effects of infrastructure operations on poor people, it is worth distinguishing the various mechanisms involved. A first direct contribution of infrastructure operations to welfare of poor people is often in the form of wages paid, which can be quite significant if efficient use is made of labour-intensive techniques of construction and maintenance that can usually be competitive in regions where the

prevailing wage is less than about $4/day. Second, local improvements in infrastructure services, which have tended to receive increased attention from aid agencies in recent years, can have significant direct effects on poor consumers' welfare, much reducing the unit costs they face for lighting and the time that they must spend in fetching water and foraging for firewood.

16. Usually more important than such household welfare improvements in contributing to pro-poor growth are the mechanisms whereby infrastructure services help to enhance the productivity of the poor:

(i) market expansion and improvement (reduction of transaction costs), whether at the small local scale of farm-to-market roads or at the national level of trunk links between poor regions and major centers, stimulating expansions of economic activity that reduce regional disparities;

(ii) reduction of important dimensions of the risks[3] that are inhibiting private investment in manufacturing and agriculture, especially that in small-scale enterprises and rural non-farm activities;

(iii) reduction of the community and household risks from natural and man-made disasters, and health emergencies, which have such serious economic and social consequences for poor people;

(iv) contributing to empowerment, to a degree in the short term (e.g., access to services important for health, and organization of community activities and enterprises[4]), and especially for the long term, by providing inputs – of communication facilities and mobility, energy and water supply – that are essential for the spread of education and health services to strengthen the human capital of the poor.

These are the main routes through which infrastructure services can help to raise the extent of poverty reduction achieved relative to the overall growth rate, and to improve the distribution of the gains that come with growth.

17. Faster progress to realize these potentials depends in many countries on improved macroeconomic policies, an area where growth research of the last fifteen years has

[3] Illustrative of how risks for individual investors cumulate to risks for others is the finding from comparative analysis of India's garment and electronic industries with those of other Asian countries in the 2002 investment climate survey of India: "Comparing garments and electronics with East Asian countries, [Indian] energy costs are about double those in Indonesia, the Philippines and Thailand. This is a really severe problem for SMEs: the typical Indian SME has its own generator, tying up one-sixth of its capital. This stunts the growth of the SME sector, and also makes the country less attractive to large-scale investors, who would like to draw on a dense network of SME suppliers." (World Bank, 2002c)

[4] For instance, rural road and track programmes in the Sierras of Peru initiated creation of small cooperatives which used the skills learned in rural road construction to obtain subsequent maintenance contracts and to diversify into other building work.

contributed to an increasing consensus: policies do have a significant impact on growth, and some, such as large budget deficits and major interference with free trade flows, are demonstrably adverse in their effects (Easterly 2001 and Wacziarg 2002). Infrastructure sector performance has often suffered directly from trade and exchange-rate policies that discourage use of labour-intensive techniques, delay procurement of spare parts and distort trade flows. Weak fiscal policies have caused postponement of road maintenance (at high cost to road users, and to government and society when the road has eventually to be rebuilt) and deferral of infrastructure system expansions, especially those of interest mainly to the poor. In some cases, government-mandated infrastructure pricing policies – mainly subsidizing the non-poor – have led to the build-up of budgetary deficits that crowd out private investment to expand production and employment, and eventually threaten monetary stability (with grave consequences for the poor) – as in Argentina in the late 1980s and to lesser, but still worrying, extent in India's power sector in the last few years (Ferro, Rosenblatt and Stern 2002).

3. Country Experience

18. To bring to life these concepts of Pro-Poor Growth, and Infrastructure's contribution to its realization, I examine various large-scale experiences of economic development in recent decades: first, those of several countries and large Indian states and second, since it is generally recognized as the most important advance that the world has so far achieved in reducing poverty, rural development in major Asian countries

19. Because the object of the country cases was, in the first place, to illustrate application of the Pro-Poor Growth indicators, their selection was largely determined by the choices that researchers in that field had made, in light of the quality and quantity of household budget survey data.[5] Though we desired to focus mainly on Asia and Africa, as being of widest interest to the aid agencies, the sample is somewhat weaker on Africa than would have been desirable. It covers areas of a fair range of population densities (from 65 in Ethiopia to over 500 in Uttar Pradesh per thousand square kilometers), though by chance rather high compared with those of many countries in Sub-Saharan Africa and Latin America. And it has the advantage of being virtually 'random' as far as the infrastructure sector is concerned. In that area, our purpose was to make a first attempt at overall assessment of infrastructure's impact on the poverty reduction achieved, drawing not so much on sectoral reports as on broader macroeconomic work in order to maintain a proper perspective and avoid exaggerating the role of infrastructure. I have used mainly country development reports by the international agencies, especially the World Bank and Asian Development Bank, as well as some products of academic researchers, with particular attention to analyses of the results and implications of household budget surveys carried out.

20. Table 1 lists the states and periods which are discussed in the following pages and gives the values of the main Poverty and Pro-Poor Growth indicators for each. All achieved significant poverty reduction over the periods covered, although at a notably

[5] Including, in several of the cases chosen, panel data covering the same households in successive surveys.

slow pace in the case of Uttar Pradesh. Two of the five states – Andhra Pradesh and Uganda – combined growth with some improvement in income distribution, thus scoring above 1 on the Pro-Poor Growth Index. However, the fastest rate of poverty reduction was achieved in Vietnam, with growth in mean income of the poor averaging 5% p.a. It should be noted that all the figures given in the table relate to national (nutrition-based) poverty lines.

Table 1. Poverty and Pro-Poor Growth Indicators for Selected States in Recent Periods, using National Poverty Lines

	Poverty Headcount (Start-End) % of total population	Annual %age-point reduction	Rate of change, Poverty Gap Ratio	Elasticity of Poverty wrt. change in mean consumpt'n	Pro-Poor Growth Index	Annual Growth-rate, mean income of poor
Andhra P. (1973-89)	56--»32	1.5	-0.6	-1.05	1.06	2.8
Uttar Pradesh (1973-89)	56--»34	1.4	-0.4	-0.82	0.75	2.0
Ethiopia (1994-97)	41--»35	2.0	-7.0	-0.56	0.51	
Uganda (1992-97)	56--»44	2.4	-5.9	-1.21	1.14	4.0
Vietnam (1993-98)	58--»39	3.8	-7.9	-0.91	0.86	5.0

Notes: - Poverty Gap Ratio is the ratio to the Poverty Line income of the average shortfall from it among all those falling below the Line and is therefore an indicator of the depth of poverty. The figure given here is the average annual rate of change between Poverty Gap Ratios at the beginning and end of the periods shown.
- The last three indicators shown are as defined in Section 1.
- Further underlying details and sources are given in Annex Table 1.

Slow Reduction of Poverty in Uttar Pradesh

21. India has succeeded in substantially reducing poverty in recent decades, but progress has differed greatly among the states. The contrast between Andhra Pradesh and Uttar Pradesh encapsulates some of the most relevant issues. The country's long tradition in household budget survey work enables an unusually long, 16-year period to be covered, and valuable perspective results from subsequent research carried out over the last ten years. The case illustrates how infrastructure bottlenecks have seriously impeded the positive effects of macroeconomic policy reforms and how these bottlenecks result from problems of sector management and consequent underinvestment.

22. Uttar Pradesh (UP) is the largest among the states of northern India, where the country's still high poverty has been increasingly concentrated. Its population exceeds that of all but a few of the world's sovereign states. Andhra Pradesh, with its capital at Hyderabad, is one of the poorer among the large states of southern India, throughout which fairly steady progress has been made over the last 30 years in reducing poverty. The table shows that, over the period 1973-89, overall growth was somewhat higher in UP than in Andhra but that poverty reduction was significantly less. Starting the period with identical poverty headcounts of 56%, Andhra succeeded in reducing it to 32% by 1989 – and has gone on to bring it down to some 22% by 2000 – whereas UP, despite its faster overall growth, managed to reduce it only to 34% in 1989 – and 33% by 2000 (with higher rates in some of the intervening years when agriculture was bad).

23. Extensive research on India's experience in reducing poverty, especially by Martin Ravallion and Gaurav Datt, has brought out the causative importance of trends in agricultural productivity, on the one hand, and of achievements in improving people's health and education, on the other (Datt and Ravallion 1998, Ravallion and Datt 2002). Human resource development has been shown to be critical not only to agricultural growth but also to the impact that non-farm (industrial and service-sector) growth can have in effectively reducing poverty. Despite very low levels of human resource development – female literacy at only 4% and infant mortality of 187/1,000 in 1960, for example – UP nonetheless achieved strong agricultural growth in the first part of our period, largely thanks to its having been selected as the springboard for the Green Revolution innovations. Progress was made too in extending health and education services, and the huge initial lag behind Andhra in these respects was substantially reduced. But already by the early 1980s infrastructure was beginning to become a major obstacle to growth, and especially poverty reduction.

24. A recent review of the state's social and economic development (World Bank 2002b) puts the problem in the following terms: "The biggest roadblock, almost literally, to the development of industry and trade in Uttar Pradesh has been the poor quality of local transport infrastructure (roads), water supply and irrigation services…. In UP, inadequate infrastructure in general, and in particular the decreasing availability and reliability of power supply and water for irrigation, have lowered productivity in agriculture and industry, thereby contributing to lower rates of poverty reduction." Slowdown in agricultural growth, and in the diversification that is needed from traditional cereal crops, is attributed to reduced levels of private investment, in turn due to inadequate levels of public investment in areas like roads, power and marketing infrastructure. The unreliability of public power supplies, for instance, has discouraged private investment in irrigation pumps. Such public finance resources as are available have been diverted rather to production subsidies, which generate no positive effects on the demand for labour. Andhra Pradesh has certainly not been free of comparable problems, but it has managed more effectively to reduce them. For instance, the number of villages connected with surfaced roads increased more than 25% in the 1990s, and significant progress has been made in improving availability and quality of electric power and reducing theft. Among all the Indian states, Andhra has been ranked high in recent

independent surveys of both power sector management and overall climate offered to private investors.

25. As regards manufacturing industry, several recent large-scale surveys have identified UP as offering the least attractive investment climate among major states of India, due principally to infrastructure deficiencies and excessive regulatory inspections. One major survey found that firms operating in states offering poor investment climate average 44% less value added per worker than firms in good climate states (Ferro, Rosenblatt and Stern, 2002). Growth of rural non-farm activity, and of small enterprises generally, suffers from the particularly acute public infrastructure deficiencies in rural areas and the more backward regions of the state, and the difficulties and high costs of providing private substitutes. In sum, while a recent study (Datt and Ravallion 2002) analysing the sources of poverty reduction from 1960 to 1994 indicates that growth of non-agricultural output could have nearly two-and-a-half times as much impact on poverty in UP as in Andhra, private investment will not be diverted to the former without a significant improvement in its investment climate, and particularly in infrastructure.

26. The poor performance of infrastructure results partly from prolonged insufficient state investment, mainly attributable to poor general revenue collection, excessive personnel expenditure, and accumulation of obligations to provide operating subsidies to various favoured categories of producer. More important, however, have been deficiencies in the overall management of the infrastructure services themselves. Recovery of costs from users has been inadequate in almost all the services, most notably in electric power. Heavy subsidies on power supplies to agricultural and residential users, exacerbated by leakages in collections, mean that large deficits are run by the State Electricity Board even though industrial consumers are charged prices significantly superior to their competitors in other countries. On an India-wide basis, these power-company deficits amounted to 1.4% of GDP in 2001/02 – despite the fact that tariffs for high-tension industrial users are some 30% above those in Brazil, Thailand and Western Europe and twice China's power tariffs. Little progress has been made in applying the efficiency-increasing restructurings of the electric power industry that have been underway in many other countries over the past decade or two. In most areas of infrastructure, but particularly rural roads (World Bank 2002a), political aspirations to promote poverty reduction are pursued through support for the limited number of new projects that can be afforded but maintenance of works once built is given little attention – so that the costs to the poor from a year's deterioration in service from existing networks may well exceed the benefits obtained by the few who were privileged to live in areas receiving the new works.

Strongly Pro-Poor Growth in Uganda

27. Both the African cases are of countries that emerged at the beginning of the 1990s from a decade or more of dictatorship and economic mismanagement. The new governments faced major tasks of rehabilitation of social and economic infrastructure. They both introduced important fiscal, monetary and exchange-rate reforms, along with trade liberalization. Ethiopia is one of the poorest countries in the world. Uganda

developed in 1996/97 its national Poverty Eradication Action Plan (PEAP) which became part of the inspiration for the World Bank/IMF initiative in 1999 to request their poorer member-countries more generally to prepare Poverty Reduction Strategy Papers (PRSPs).

28. The short periods sandwiched between the household budget surveys which have been analysed saw strong economic growth in both countries. But they contrast strongly in their scores on the Pro-Poor Growth Index, Ethiopia ranking lowest, of all five cases in Table 1, and Uganda highest.

29. Unfortunately neither country has been able to sustain the relatively strong overall records achieved in these years, for a variety of similar reasons: deterioration of terms of trade due to adverse movements in international prices, serious droughts (particularly acute in Ethiopia), and security problems, requiring diversion of resources to military purposes. Overall GDP growth has fallen, recently averaging about 5% p.a. Inequality has increased in Uganda and not improved in Ethiopia. The poverty headcount in Uganda has grown from 34% in 2000 to 38% in 2002, while for Ethiopia government surveys indicate 44% and university data a figure somewhat above 50% (Demeke, Guta and Ferede 2003).

30. The broader macroeconomic research study (Christiaensen, Demery and Paternostro 2003) which covered the mid-1990s experience of these two countries along with that of several other African nations emphasized a number of conclusions from panel surveys[6] in Ethiopia and Uganda which it found particularly relevant to Africa more generally. Among these was an important finding regarding the role of infrastructure:

> "A household's location is key in conditioning the extent to which it will benefit from liberalization measures. Whether the household had access to infrastructure and urban markets was an immensely important factor governing the growth in household income. It explains about half of household consumption growth and poverty reduction in Ethiopia during 1989-95, and it was also quantitatively important for growth in Ugandan household income. So connectedness to markets as captured by access to infrastructure (especially roads, but also electricity) and distance to urban centers is likely to be a major factor in determining how growth in any country transmits its benefits to the population."

The study also highlighted the importance of households' private endowments – more and better qualified labour or land – in determining their ability to respond to policy measures, and the significance of shocks (such as ill health or drought) in limiting that ability.

31. The good response of the Ugandan economy to the policy reforms of the early 1990s owed much to the extensive, if somewhat dilapidated, internal transport

[6] The main panel surveys were undertaken in years slightly different from those covered by the overall statistics presented in Table 1.

infrastructure dating from the pre-dictatorship years as well as the fact that a relatively high proportion of households – more than 20 per cent – produced export crops. Moreover coffee, the main export crop, boomed on the world market until 1996. Poverty among cash crop producers fell by half, and that among the much larger number of food-crop producers by more than a quarter. But progress was much more rapid in the urban areas and the better-connected Central region than in others, especially the East and the North where the poverty headcount was still close to 60% in 1997.

32. Recognizing that good macroeconomic policies were only part of the solution to poverty, Uganda developed its PEAP, emphasizing, in addition to good governance and a sound policy framework for growth, directly increasing the ability of the poor to raise their incomes and directly improving their quality of life. Underlying, and interacting with, the PEAP are sector plans for Education, Health, and Roads, the Plan for the Modernization of Agriculture (PMA), and the Medium Term Competitiveness Strategy (MTCS) focusing on the environment for the private sector.[7] Special attention has also had to be given to measures to reduce the high costs of transport resulting from the country's landlocked situation and amounting to some two-thirds of exporters' value added in the late 1990s (Milner, Morrissey and Rudaheranwa 2000). 1998 saw the creation of the Poverty Action Fund (PAF), to include all government, and most donor, spending on directly poverty-reducing public services, along with requirements for clear specification of outcomes and enhanced monitoring, with civil society involvement. PAF programmes, which are mainly in roads and water, health and education, have, as intended, accounted for an increasing share of government expenditures and have been protected even under recent severe budgetary constraints. Major restructurings of infrastructure and other key services have also been underway to increase effectiveness. For infrastructure, the combined results of all these initiatives has been to provide substantially increased resources – for roads and water alone, for instance, rising from about 1% of GDP in 1998 to 2.5% in 2000 – and, at the same time, impose stronger pressure on the relevant public agencies to perform.

33. Lack of rural 'connectedness' is a dominating feature of the Ethiopian economy. Analysis of the 1994 and 1997 household budget surveys (Bigsten, Kebede, Shimeles and Taddesse 2003) shows that, as in many other countries, the key characteristics at the household level which increased the probability of moving out of poverty were involvement in production of export crops (chat as well as coffee) and education – but the latter only in urban areas in the case of Ethiopia. These opportunities were, however, largely limited to the 17% of the population living in towns and the roughly 30% of country area served by modern road transport (World Bank 2003a). As of the mid-1990s, Ethiopia had a main road density (federal and regional roads) of only 21 kms/1,000 sq. kms., a fraction of the comparable density (classified and district roads) of 128 kms/1,000

[7] Among the problems faced by the private sector, infrastructure deficiencies have loomed large. A 1998 survey of 240 enterprises highlighted problems with electric power, water and roads, as well as telecommunications and public waste disposal. A follow-up analysis attempted to quantify the negative effect that the electricity problem had on private investment levels (Reinikka and Svensson 1999). Deininger and Okidi 2003 identify significant direct effect of the delays in rehabilitation/extension of the electricity sector on the poor, including their possibilities of making good use of education undertaken.

sq. kms. in Uganda. Ethiopia's 2000 household budget survey showed that the *average* distance between a rural household and an all-weather road is 11 kms and to a food market 6 kms.

34. An interesting recent analysis of Ethiopia's growth record and prospects (Easterly 2002) draws attention to the relevance of recent thinking about 'poverty traps' and suggests consideration of a 'big push' approach to get out of the trap. Relevant versions of the 'poverty trap' thesis focus on the weakness of incentives to individuals, institutions and/or entrepreneurs to improve their skills and capabilities if they cannot be confident that others will be simultaneously doing the same, promising competition and markets, which would in turn enable them to benefit from their own investment. The 'big push' suggested is quite different in composition from what was advocated when the concept was invented 60 years ago (Rosenstein-Rodan 1943), now including greater stress on human rights, institutional environment and trade openness. But it would still involve a major element of infrastructure to enable people to escape from production only for local subsistence, and structural change to occur. Renewed efforts have been underway over the past ten years to expand the Ethiopian road network and increase school enrolments but they need to be complemented by the other measures and expanded.

Rolling Back Poverty in Vietnam

35. Vietnam began its Doi Moi (renovation) policies in the late 1980s. Collective farms were gradually dismantled, and their lands distributed to peasant households through long-term leases. Controls on most prices were removed, and many forms of private economic activity legalized. Inflation was brought down, trade barriers reduced or eliminated, and foreign direct investment legalized and encouraged.

36. High growth ensued – nearly 8% p.a. in GDP over the 1990s, and 4.8% in agriculture – and poverty was reduced far more rapidly than in most other countries (to a headcount of 29% by 2002). The effects of the high overall growth greatly outweighed those of some deterioration in income distribution (due mainly to particularly large gains of the top quintile). Benefits were widely spread as indicated by the large reduction in the poverty gap ratio noted in Table 1, and a similar pattern has been maintained in the subsequent period. Due to under-reporting by high income earners and poor coverage of recent migrants into urban areas, the household budget surveys may increasingly understate income inequality. But it is unlikely that corrections for those factors would raise the Gini coefficient – calculated at 0.37 on the basis of the latest 2002 household budget survey (up from 0.32 in 1993) – to the levels indicated by the surveys for our African cases (0.44 for Ethiopia and, most recently, 0.43 for Uganda).

37. The dramatic results of Vietnam's growth-oriented policy reforms clearly owe a lot to the accumulation of human and physical capital in earlier years; the reforms enabled a more productive exploitation of these substantial assets. For instance, the 1993 survey indicated that only 12% of household heads were without schooling, and more than 44% had education beyond primary level, while the primary enrolment rate was 72% even for the children of the poorest quintile. The share of crop-production land irrigated

had risen from 18% in 1961 to 50% by 1990, and the road network was already some 600 kms/1,000 sq kms, almost one-third of it in main (national, provincial and district) roads.

38. High economic growth nonetheless put this infrastructure under heavy pressure, but obvious bottlenecks to the rapid economic growth have been successfully avoided. The government maintained a relatively high rate of investment in infrastructure expansion, some 3.5% of GDP (transport, power, irrigation, water and telecommunications), about half of it in roads alone. Over the 1990s, electricity production tripled to some 20,000 gwh, and road vehicles (especially motor cycles and buses) nearly quadrupled. The road accident rate mounted dramatically and became a serious problem. Most of the infrastructure investment had to be devoted to restoration and strengthening of core facilities, and it was strongly guided by the supreme priority attached to development of exports, initially of agricultural products (especially rice) and subsequently of manufactured goods. Even though one of the weakest aspects of the country's investment climate, compared with main regional competitors, has been perceived to be the quality of its infrastructure, Vietnam has succeeded in attracting substantial export-oriented manufacturing investment, mainly in selected areas where improvements were concentrated, such as the industrial zones near the Hanoi – Hai Phong transport corridor recently studied by GRIPS. A firm survey suggested that nearly 90% of recent Foreign Direct Investment in the area would not have been realized without the concentrated transport improvements (GRIPS Development Forum 2003). And the most recent World Bank review of Vietnam's development notes the large shift to wage employment since 1998, and identifies private-sector job creation as the main driving force behind poverty reduction in this period – by contrast with earlier years when it was agriculture, stimulated by the introduction of appropriate incentives to farmers.

39. Various analyses of the household budget survey results have brought out the considerable significance of infrastructure, and especially roads, in determining how widespread were the benefits of the growth-oriented reforms and the extent to which they reached the poor. A first analysis (Glewwe, Gragnolati and Zaman 2002) of the rural panel data showed that in communes with an upgraded road passing through them income gains were 16% higher than in communes without roads, and that this was the most significant income-increasing factor other than increases in rice yields; presence of roads or other infrastructures significantly increased the chances of escaping poverty and reduced the probability of falling into poverty. Recent exploration (Balisacan, Pernia and Estrada 2003) of how different infrastructure services interacted with growth to enhance welfare of rural households at different income levels found that the services were significant factors for those in the second and third quintiles – those which mostly moved above the poverty line in the period since 1993 – but only indirectly significant, through broader economic growth, for those in the lowest, first quintile.

40. Path-breaking work by Anil Deolalikar in 2001 brought out the fact that those who were in the top quintile of rural income earners by 1998 were also those whose distance from a motorable road had most distinctly improved – and substantially so, from 2.3 kms (as for the top quintile in 1993) to only 0.5 kms in 1998. And he systematically

tested the hypothesis that the impact of local road improvements had been greatest in areas of lower average income. He found strong evidence that this was indeed the case, in terms of impacts on overall incomes and on secondary school enrolment[8], and weaker, but consistent, effects on local agricultural and industrial production and use of public health facilities. Most strikingly, the analysis showed that the presence of a village road in the poorest communities increased the probability of a resident's escaping poverty by 68%.

41. The main implication of this work was to stress the importance of looking for potentially high-return infrastructure projects in backward areas as well as in the more obvious regions with rapidly expanding economy. Somewhat similar findings emerge from preliminary efforts to apply to Vietnam the model developed by IFPRI (see below) for analysis of public expenditures in support of rural development; they indicate higher returns in terms of production, as well as poverty reduction, from incremental expenditures on roads, as against irrigation and education, and particularly in some of the regions with the largest numbers of people still below the poverty line (World Bank 2003b). Government has further increased infrastructure spending and strengthened efforts to include the poor, reducing the number of very poor communes without basic road access from 518 still in 2000 to 269 by 2003, and improving rural people's access to clean water, which is supposed to have attained 56% by 2002.

42. Key challenges in continued reduction of poverty in Vietnam are to extend progress more effectively to the non-Chinese ethnic minorities and to urban migrants. The ethnic minorities, particularly important in the Northern Uplands but also widely distributed throughout most other regions, account for 15% of the population; their poverty headcount fell from 86% in 1993 to 75% in 1998 but seems not to have changed much since. The multiple problems faced by urban migrants have been highlighted by recent Participatory Poverty Assessments. For both groups, relevant infrastructure improvements (with more financial support from higher levels of government than seems to have been provided for some of the works accomplished in the past) are an important part of the solution, but they have to be accompanied by other complementary actions, in particular to make these groups' legal rights more effective, and to provide social services adapted to their needs. An interesting example of the relative ineffectiveness of road alone, in these cases, is provided by recent DFID-sponsored study in Lai Chau province in the Northwest region (GRIPS Development Forum 2003).

Large-Scale Rural Development Programmes

43. Important light on the role of infrastructure, and the nature of dilemmas that can arise between growth and distribution objectives, is provided by extensive research of the last few years on development in rural areas, where developing-country poverty is so heavily concentrated. The International Food Policy Research Institute (IFPRI) has had a major research programme focusing on the effects of different lines of government expenditure in reducing rural poverty. It has developed a system of simultaneous

[8] Primary schools are generally located within the commune itself and do not involve much pupil travel.

equations to capture interlinkages among the different parts of the local economy better than had been done in the past, and has used regional and local data to run the model. The first study (Fan, Hazell and Thorat 1999) was on India (1970-93), the second (Fan, Zhang and Zhang 2002) on China (1978-97), both cases of massive reduction in rural poverty.

44. Both studies show that infrastructure development was critical to the progress made in reducing rural poverty (i.e., the proportion of people falling below the respective national poverty lines). They also identify large differences among different dimensions of infrastructure in their poverty and productivity effects. By totally differentiating their equation systems with respect to each public investment variable in turn, they estimate the relative impact on growth and on poverty, of incremental expenditure, at the ends of the periods studied, on the different lines of activity. The following table makes an approximate conversion of the results into a common currency (US dollars of 2003) to show the estimated potential income and poverty-reduction effects of an additional $1,000 equivalent spending on any of the lines of activity listed, in each of the two countries.

Table 2. Returns to $1,000 Additional Spending on Alternative Activities Undertaken by Government in support of Rural Development, India and China

	-------INDIA-------		----------CHINA----------		
	Agric. GDP	Poor Reduced	Agric. GDP	Rural GDP	Poor Reduced
	($)	(No.)	($)	($)	(No.)
Ag. R&D	13,450	2.3	9,590	9,590	5.6
Irrigation	1,360	0.3	1,880	1,880	1.1
Roads	5,310	3.4	2,120	8,830	2.7
Education	1,390	1.1	3,710	8,680	7.3
Electricity	260	0.1	540	1,260	1.9
Conserv'n.	960	0.6	n.a.	n.a.	n.a.
Anti-pov.	1,090	0.5	n.a.	n.a.	0.9
Health	840	0.7	n.a.	n.a.	n.a.
Telecom	n.a.	n.a.	1,910	6,980	1.8

Notes: - No., under Poor Reduced, means the number of poor people who would be raised above the poverty line for each $1,000 of additional investment in the listed activity.
- Conserv'n. means Soil and Water Conservation works.
- Anti-pov. stands for Anti-Poverty programmes in India and for Poverty Loans in China.

The estimates indicate significant differences between the expenditure lines that could have highest incremental impact on growth and on poverty reduction in each country. In both of them the greatest production increase was estimated to result from increasing spending on agricultural research and development. But greater impact on poverty could have been achieved in India by devoting the funds to road improvements, and in China by putting them into the education sector. However, since the latter two lines of activity also

indicated substantial production impact in the respective countries, and since real programmes would evidently need to include combinations of activity along the different lines, the differences noted cannot be taken as indicative of significant conflict between priorities for growth and priorities for poverty reduction. It is important to note too that one of the reasons for the higher poverty impact generally attributed to spending in China is that the study there fully incorporated non-farm rural activity – with notably large consequences for the GDP impact attributed to spending on roads, electricity and education – whereas the first, Indian study had confined its attention essentially to agriculture.

45. The figures in Table 2 represent aggregates of hugely different situations in different parts of these two large countries. To be fully useful for purposes of investment planning, similar calculations need to be made for much smaller areas within each country. In the case of China, for instance, IFPRI is undertaking a county-level analysis, based on data for more than 2,000 counties (Fan 2003). But some indication of how different the picture can be in different regions is given by the broad breakdown included in the original study, distinguishing between the country's Coastal, Central and Western provinces.

Table 3. Marginal Returns to Public Expenditure of $1,000 on Rural Development: Main Regions of CHINA 1997, based on Province-level data 1970-97

	------Coastal-----		------Central------		------Western-----	
	Rural GDP	Poor Reduced	Rural GDP	Poor Reduced	Rural GDP	Poor Reduced
	($)	(No.)	($)	(No.)	($)	(No.)
Ag. R&D	8,600	1.7	10,020	3.6	**12,690**	**27.4**
Irrigation	**2,390**	0.5	1,750	0.6	1,560	**3.4**
Roads	8,380	0.7	**13,730**	3.0	4,290	**8.9**
Education	**9,750**	2.3	7,780	4.5	5,060	**23.7**
Electricity	**1,520**	0.6	1,350	1.4	610	**5.1**
Telecom	7,120	0.5	**8,540**	1.6	4,130	**7.1**
Pov. Loan		0.7		0.6		**1.2**

The interesting feature of this table is to highlight the substantial differences between the patterns of spending most desirable for poverty reduction as against growth maximization. Within each region, returns to the different lines of spending show the same broad degree of consistency between the two objectives as emerged in the previous table. But the poverty-reduction returns are higher for all lines when the spending is undertaken in Western China while growth returns are normally greater for equivalent spending elsewhere, either in the Central or Coastal provinces. For each line, the highest potential impact that incremental expenditure would have on rural GDP and on reducing the number of poor is shown in bold type simply to highlight this pattern. The difference in implied regional priorities is characteristic particularly of the infrastructure spending lines. Striking too is the greater size of the inter-regional differences in poverty-reduction impact than growth effect.

46. Indonesia is another large country that, over the two decades prior to the East Asian financial crisis of 1997, achieved dramatic reductions in rural poverty – from about 40% of the population in 1976 to 12% in 1996. Restricted by more limited data availability than in the case of India and China, an interesting analysis has nonetheless been carried out, focusing specifically on the reduction of poverty, and the relative role of government programmes, using statistics for the country's 25 provinces (Kwon 2001). The extent of poverty reduction was clearly related to increase of per capita regional GDP (overall growth). Among the large government development programmes undertaken, the greatest impact on poverty (per rupiah spent) resulted from expenditures on transport and the second greatest impact from those on education.

47. Strong contrast was also identified among experiences of different provinces depending on their initial endowment of roads in 1976. Despite starting from a much lower average per capita income level, the six provinces which then had road density above the national average generally achieved much higher rates of income increase and of poverty reduction than the others. This gave rise to an intriguing hypothesis – that higher road density could increase the pace of growth and of poverty reduction, because of the role of roads in helping labour and product markets to function better – potentially linking with some of the modern themes in thinking about endogenous growth, such as knowledge diffusion and productivity-stimulating communities (Easterly 2001). Extensive analysis gave some support to the hypothesis, within the ranges of road density applying in Indonesia in this period.

48. Another important outcome of the IFPRI research programme was a study on India (Fan and Hazell 1999) that pointed to previously neglected regions as promising sites for highest-return investment in agriculture, somewhat parallel to the findings of the earlier-quoted Deolalikar work on Vietnam. The study used district-level data for 1970-95. The districts were classified into three categories: irrigated, high-potential rainfed and low-potential rainfed. Districts were defined as irrigated if more than 25% of the cropped area was irrigated. Rainfed districts were subdivided into high- and low-potential areas according to their agroecological characteristics. An econometric model was estimated to measure the impact of different types of public investment on agricultural production and rural poverty. Table 4 summarizes the findings about the impact on growth and on poverty from a further unit of each type of investment in the different areas, with the highest returns again printed in bold type. The results strongly point to the relatively neglected low-potential rainfed areas that account for 35% of total cropped area in India as now offering the biggest production and poverty-reduction impact (as well as possibly significant environmental gain) from incremental roads, electrification and private irrigation.

49. Several recent studies have documented synergistic effects on incomes from the provision of several infrastructure services together. Analysis of results from a 1994 62-village household survey in Bangladesh indicated that (controlling for factors such as initial household resource endowment) average household consumption was 7% higher in villages with good road access than in those lacking such infrastructure, and 19% higher

when electricity was also available. Consumption specifically of poor households was 15% higher in villages having both services than in those where they were not available (Sen and Khan 2000).

Table 4. Marginal Returns to Public Investment in Rural Development: INDIA 1995, based on District-level data 1970-95 (values converted to 2003 US $)

Investment	Unit	Irrigated Areas		High-potential Rainfed Areas		Low-potential Rainfed Areas	
		Prod'n Increase	Poor Reduced	Prod'n. Increase	Poor Reduced	Prod'n. Increase	Poor Reduced
		($)	(No.)	($)	(No.)	($)	(No.)
HYV	Ha.	2	0	7	0	**21**	**0.1**
Roads	Km.	3,028	1.6	194	3.5	**4,099**	**9.5**
Canal Irr.	Ha.	28	0	**100**	**0.2**	43	0.1
Private Irr.	Ha.	30	0	(67)	(0.2)	**137**	**0.3**
Electrific'n.	Ha.	(16)	0	3	0.1	**38**	**0.1**
Education	Teacher	(11)	0	**17**	**0.2**	3	0

50. Peruvian data from Living Standards Measurement Surveys conducted in 1994 and 1997 indicated substantial increase in coverage of the rural poor by infrastructure services, particularly water. Analysis yielded a statistically significant finding of 28% increase in total consumption of households having both water and electricity services (and 31% when supply available at least 12 hours per day was taken as the definition of water service). This compared with (statistically less well-founded) estimates of 19% increase in total consumption for households having electricity alone, and 3% for water on its own, thus indicating a premium of some 25% in household income impact from having both services (Grootaert and Oh 2001). Indications were that these findings would be valid for poor households (by 1997 more than 20% of those in the lowest quintile had both water and electricity) as much as for those higher up the income scale although the sample was too small to permit valid statistical analysis.

4. Implications for Infrastructure

51. The first, and most important, conclusion to be drawn from these reviews of various countries' experience is that quantity and quality of infrastructure services available are indeed important for the attainment of pro-poor growth. Lack of infrastructure has been a major obstacle to the spread of growth in Uttar Pradesh and Ethiopia, restricting the benefits derived from earlier investments in human development and limiting the impact of improvements introduced in macroeconomic policies. Infrastructure deficiencies have also been the effective constraint to growth in some sectors and regions in Uganda, and government has assigned high priority in its poverty reduction strategy and public investment to infrastructure improvement. Widespread

inherited infrastructure, and substantial continuing investment, have enabled Vietnam to maintain high economic growth and rapid reduction of poverty, but even there the inclusion of people in the growth process has depended significantly on the infrastructure available in their locality. Infrastructure expansion has been a major element in the long-term rural development programmes that have substantially reduced poverty in the larger Asian countries, but the indications are that further expansion, particularly of the road network, has remained a high priority.

52. The evidence from these countries and regions suggests that Pro-Poor Growth, with strong increase of the average income of the poor, will typically require somewhat greater investment in infrastructure than Growth, without particular preference regarding its distribution. This results from the fact that the large majority of the poor reside in rural areas, often far distant from major growth centres. Connecting them to the modern economy, whether in the places where they have been living or in towns and cities to which they move, requires significant investment in infrastructure which might be postponed if poverty reduction were not a priority.[9]

53. Now that a consensus may gradually be forming around a clearer definition of Pro-Poor Growth – growth of the mean income of the poor – it is worth considering whether adoption of this objective would warrant adjustment of traditional infrastructure investment rules – which are based so firmly on the objective of maximizing overall growth. The basic decision rule for optimizing infrastructure investment in a market economy is to build or expand infrastructure to the extent, and at the time, that each investment would yield an economic rate of return approximating the opportunity cost of capital in the country. Investments yielding less are contributing less to growth than could have been obtained from alternative applications of the resources used. Investments yielding more are generally those catching up on a backlog, which it would have been preferable, from the point of view of growth, to avoid in the first place, by investing earlier. While the aim is clear, systematic application is usually difficult. The practical task for governments is to ensure their countries have decision-making practices and structures that will objectively try at least to foresee future trends sufficiently well to avoid projects that turn out to be white elephants, little used, and, equally, the development of black spots and bottlenecks that seriously impede growth of other parts of the economy.

54. While no one, to my knowledge, has suggested adjusting the rule to include in the rate of return only those benefits which accrue to the poor, many have proposed, and sometimes applied, other ways of privileging investments alleged to benefit the poor. One approach, for instance, is to weight the estimates of the benefits accruing to the poor or to include an additional value for the total number of poor people potentially affected,

[9] Some research has also underlined the role of trunk infrastructure (especially transport) investment in structuring the use of space for efficient patterns of urbanization. Although the analysis has been based very largely on efficiency considerations, it also has distributive implications, which add to the case for somewhat higher infrastructure investment when the objective is Pro-Poor Growth. See Henderson, Shalizi and Venables 2000 for the national urbanization pattern, and Willoughby 2001 for structural development of an individual city.

and another is to seek a standing dispensation from economic analysis requirements for certain types of investment. Such an approach is often based partly on the claim that people have certain "rights", to be provided with water, or basic access, or, more recently, basic telecommunication services, at standard low or zero charge, whatever this may cost society.

55. Table 3 above, comparing estimated returns to various types of public investment in the three major regions of China, gave a rather forceful expression of the apparent need for adjustments of this type. Investments in Western China were generally estimated to reduce poverty by a large multiple of what the same type of investment would do in the other regions, even though they would yield only about one-third or one-half as much in terms of GDP increase. This appeared to be a clear conflict of priorities between economic growth and poverty reduction.

56. The difficulty with spending scarce public funds on projects yielding less than the highest return available is that this reduces, directly and indirectly, growth, job-creation, and the revenues from which government will provide subsequent services to the poor. The difficulty with making standard adjustments or dispensations from analysis is that this tends to hide the sacrifice being made.[10] And the difficulty with "rights" of the type described is that they can normally be fulfilled for few in poor societies and thus become objects of corruption or political patronage.

57. For these reasons it seems preferable to continue to promote the traditional mode of analysis, and decision rules as outlined in para 53. Then, in full cognizance of the sacrifice involved, the investment authority will be able to make exceptions by prioritizing certain low-return projects because of the substantial contribution that they will make to improving the situation of the poor. Issues of equity among regions or social classes, instead of predetermining the verdict as often occurs in practice now, will then be taken into account in reaching these decisions, along with the other judgmental considerations crucial in sound interpretation of cost-benefit analyses, such as probabilities, quality of quantification of social and environmental benefits, and potential effects of the investment in inducing or structuring knowledge diffusion and private investment. Cases requiring careful judgments of this nature may be somewhat more frequent in the countries and regions more sparsely inhabited than those which formed the empirical base of this paper.

58. The contribution that the infrastructure sectors have to make to the redoubled effort required to meet the MDGs is thus not a matter of relaxing their traditional investment criteria but rather, on the contrary, one of increased pro-activity and accountability in the application of those criteria. The fundamental insight of DFID's seminal 2002 issues paper, "Making Connections," was to show that departures from economic rationality and efficiency in the infrastructure sectors were having equally

[10] This criticism does not apply of course to very small, relatively standard investments for which it is inefficient to require elaborate review of every individual case if a thorough generic economic analysis can yield simplified guidelines for selecting promising applications of such investment.

serious consequences for the poor with the more conventional types of corruption that had caused DFID to reduce its involvement in these sectors – and that countries needed more help in overcoming these problems. Our country cases indicated many examples of such obstacles to the provision of better service to the poor, which the responsible governments are trying to varying extents to overcome: subsidization of better-off consumers, inadequate maintenance, unreliability of service from existing networks, inadequate provision for system extensions, use of political rather than economic criteria for selection of new investments, less recourse than desirable to efficient labour-intensive techniques of construction, customer-unfriendly monopolistic practices, and traditional corruption in expenditures and bill collections.

59. If infrastructure is to play the role required of it for attainment of the MDGs, I believe the problems besetting it, and limiting the effectiveness of the agencies responsible for its management and regulation, have to be approached broadly, not only by individual projects, however effectively poverty-focused they may be. One possible valuable outcome of the POVNET Infrastructure Initiative would be development and pilot application of a new model of country infrastructure assessment, systematically examining both institutional structures and recent investment patterns against the objectives of pro-poor growth, and identifying potential practical improvements in structures, practices and procedures. One indication of what would need to be covered in the institutional assessment is given in a small paper which the Asian Development Bank Institute published last year (Willoughby 2003).

60. As regards the search for appropriate new investments, the subject needs to be approached within the framework of the basic investment rule sketched in para 53, but recognizing that bottlenecks and black spots of interest to the rich naturally tend to be much more apparent than those of interest to the poor. Our brief reviews of country experience have raised numerous examples of projects of particular interest to poor people, with potentially high economic rates of return, that have received less attention because they are located in out-of-the-way areas, would require unaccustomed cooperation between different bodies, or simply suffer from lack of voice on the part of the poor. The IFPRI findings about the so-called Low-potential Rain-fed Areas in India (Table 4 above) are very relevant here, as are Deolalikar's results on the high economic and social impact of roads in poorer areas in Vietnam. Uganda's Plan for the Modernization of Agriculture highlights the need for coordinated action between infrastructure agencies and new forms of agricultural extension, just as the problems of Ethiopia's regions (para 34) and Vietnam's continuing poor (para 42) require social and political actions in combination with infrastructure improvements. The examples quoted from Bangladesh and Peru (paras 49-50) showed how joint action even between different infrastructure agencies can sometimes significantly increase the economic viability of service provision. All are cases of what I would call 'hidden bottlenecks', to be solved by projects competitive in terms of economic viability with those required to relieve strongly advertised bottlenecks in more prominent parts of a country. And better research (for instance on truly attributable induced effects and TFP increases[11]) and more

[11] Following the example of Yoshino and Nakahigashi 2000.

competitive arrangements for provision of infrastructure could also undoubtedly bring to light, and help activate, additional examples.

61. How far infrastructure investment programmes tailored to Pro-Poor Growth will differ from those aiming only at Growth cannot be fully predicted until infrastructure managers have become the leading agents of Pro-Poor Growth that they need to be. But the evidence from research to date and our small country cases suggests that there will be at least three important differences. Significantly increased effort will be devoted to road improvement and maintenance, both trunk links to heavily populated, landlocked areas and regional farm-to-market roads. More serious attention will be given to resolving water and sanitation problems, reflecting an almost universal demand in participatory poverty assessments – as well as the research evidence on the importance of these services to health outcomes (Leipziger, Fay, Wodon and Yepes 2003). And cost recovery from better-off users of all the main infrastructure services will be greatly increased, to help pay for more adequate maintenance and system extensions. The infrastructure agencies are likely to be able to generate sufficient volume of convincing schemes to attract increased external investment – from aid sources and private investors.

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Annex Table 1. Changes in Poverty and Pro-Poor Growth Indicators for Selected States in Recent Periods

	% change in mean per cap. income (1)	% change in poverty headcount (2)	% change in poverty gap ratio (3)	Headcount elasticity wrt. change mean income (4)	Poverty elasticity explained by changes in Mean (5)	Distrib'n (6)	Pro-Poor Growth Index (7)
Andhra P. (1973-89)	23.2	-24.3	-9.8	-1.05	-0.99	-0.06	1.06
Uttar Prad. (1973-89)	26.6	-21.9	-6.8	-0.82	-1.09	0.27	0.75
Ethiopia (1994-97)	24.8	-13.8	-22.1	-0.56	-1.09	0.53	0.51
Uganda (1992-97)	17.1	-20.7	-33.0	-1.21	-1.06	-0.15	1.14
Vietnam (B)	50.4	-38.3	-48.7	-0.76	-0.89	0.13	0.85
(G) (1993-98)	39.1	-35.5	-44.5	-0.91	(-1.06)	(0.15)	(0.86)

Note that column (4) = col(2)/col(1), and that column (7) = col(4)/col(5).

Sources:

For India: calculated on basis of McCulloch and Baulch 1999.

For Ethiopia and Uganda: Christiaensen, Demery and Paternostro 2004, supplemented, where necessary, by the individual country sources there given.

For Vietnam: line (B) is calculated on basis of Balisacan, Pernia and Estrada 2003 and line (G) from Glewwe, Gragnolati and Zaman 2002. The differences may be due to the first source using mainly the responses of panel participants in the survey only (i.e., households represented in both baseline and final surveys), whereas the second source appears to have used the responses of all participants in each survey. Since the only decomposition done was that in the first source, we have put in parentheses the application of that decomposition to the figures based on the second source.