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Gregory K. Ingram and Marianne Fay[1]

Perceptions of infrastructure's role in economic development and of desired modes for infrastructure provision have evolved over recent decades. In the mid-twentieth century, infrastructure was seen as a key determinant of economic development – the 'commanding heights' of the economy – and market failures in infrastructure provision were thought to be endemic. Accordingly, public sector involvement in infrastructure became pervasive and was advocated by many development agencies. In the 1980s and 1990s, poor performance of public infrastructure agencies, concerns about government failure, and large investment needs stimulated interest in private participation in infrastructure. Concurrently, many development agencies turned their attention much more to investments in education, the environment and health. The results from private participation in infrastructure have been mixed, and a more balanced and country-specific approach is emerging with renewed interest in infrastructure from development agencies. Meanwhile, research on the links between infrastructure and development has benefited from improvements in both data and technique. Within this evolving context, this chapter addresses three questions: How does infrastructure relate to development? How can infrastructure services best be delivered? What are the key barriers to progress?

Infrastructure is imprecisely defined by development economists and originally encompassed elements of social overhead capital. In this chapter, physical or economic infrastructure includes: public utilities (power, telecommunications, piped water, sanitation and sewerage, solid waste collection and disposal, and piped gas); public works (roads, major dams, and canals for irrigation and drainage); and other transport (urban and inter-urban railways, urban transport, ports and waterways, and airports). Many of these activities have in common technical features such as economies of scale and economic features such as externalities and aspects of public goods. Developing economies include low-income economies (per capita gross national product below $765 in 2003) and middle-income economies (per capita gross national product equal or more than $765 but less than $9386 in 2004) (World Bank, 2005a).

Special characteristics of infrastructure

Infrastructure services range across the spectrum of public and private goods, but many have two key aspects of private goods: they are rival in consumption (services consumed by a user reduce the supply available to others) and excludable (usage can be prevented). This is the case for most public utilities, ports, airports and railways wherein use depends on gaining access to a facility or network, and consumption can be metered and/or charged for. Users of these services can and do impose congestion costs on other users, and negative externalities (pollution, noise) on non-users. Roads are more likely to be public goods, especially uncongested rural roads. Congestion makes urban roads rival, and – if users cannot be excluded – urban roads are common property goods (rival but not excludable), as is also generally the case for groundwater extraction. Electronic tolling systems can make road use excludable. Toll roads exclude users and charge for usage, making them club goods (excludable but not rival) as long as they are uncongested.

Some elements of infrastructure – particularly public utilities and transport systems – have economies of scale related to the networks used to supply services. Since a network is usually dedicated to carry a single good (for example, water), and it is uneconomic to convert it to another use or to move it once it is constructed, network investments are largely sunk costs. Flows on the network must be coordinated for efficient operation. Networks often exhibit economies of scale because of technical reasons (for example, flow resistance decreases as pipe diameter increases) or network effects (for example, adding users to a phone system benefits all users). Scale economies and the high cost of constructing the networks make them natural monopolies. The spatial reach of network natural monopolies varies by sector and is typically exhausted at the municipal level for water supply, but can extend to the national or regional level for a high-voltage electrical grid. When network costs are high and unrecoverable, it is difficult for other suppliers to contest the market for network services.

In many countries public utility and transport services became the domain of vertically integrated monopolies whose existence was justified by economies of scale that only occur in the underlying delivery networks. However, network-based economies of scale do not imply the absence of all competition or the need for vertically integrated monopolies. Many activities associated with network operation can be unbundled and provided competitively. For example, having a single national high-voltage grid does not require common ownership of electricity generating plants, which can compete to provide power over the grid. Similarly, truckers can compete to provide services over a common road network. In addition,

some infrastructure sectors compete with each other, as when road-based transport competes with rail-based transport. Many infrastructure reforms implemented in developing countries since the mid-1990s have unbundled large monopolies, for example by separating long-distance from local phone service provision, power generation from distribution, port operations from port ownership, or natural gas production from distribution.

Appropriate technology may differ across users or change over time. Service technology may vary with household ability to pay (for example, standpipes versus house connections for water supply) or circumstances (for example, network-based power may be uneconomic in remote rural villages). In addition, technical characteristics of infrastructure sectors often change over time. In telecommunications, the advent of microwave and satellite transmission has removed the need for long-distance cable networks, and cellular service has reduced dependence on local networks. In power generation, combined cycle gas turbines have greatly reduced the minimum efficient size of power generators. In transport, electronic sensors have reduced the cost of collecting vehicle tolls. Accordingly, while infrastructure sectors have some common features, technology within a sector may differ by user group, and sectors differ dramatically in their technical and related economic characteristics – both of which change over time.

Regulation is needed when competition is absent. When competition is not possible in providing network services, regulatory oversight is necessary. Experience has shown that regulation is a costly and imperfect business requiring good information and trained staff – inputs that are scarce in many developing countries. Yet many developing countries have put regulatory capacity in place since the mid-1990s. For example, three out of four African countries have an independent regulatory agency for the telecom sector and one out of three for the electricity sector (World Bank, 2005c). Countries have experimented with a variety of regulatory approaches, including price caps, benchmark comparisons and rate-of-return limits. Experience has been mixed, and earlier optimism about implementing regulation has proven to be naive (Gomez-Ibanez, 2003; Kessides, 2004; Guasch, 2005). Regulation continues to be a special challenge in developing countries.

Why does infrastructure matter?

Good data are now available on physical stocks of infrastructure by sector across developing countries and over time (Canning, 1998; Calderón and Servén, 2004b), and per capita infrastructure stocks are strongly related to per capita gross domestic product (GDP). Analyses of expansion paths yield simple elasticities of per capita sectoral stocks with per capita GDP of 0.6 for roads, 1.2 for paved roads, 1.2 for power generation and 1.4 for

phone service (Canning, 1998). These differing sectoral elasticities reflect the systematic change in the composition of infrastructure between low- and middle-income countries. In low-income countries basic services such as water, irrigation and transport comprise most infrastructure, while in middle-income countries telecommunications and especially electric power become more important. Aggregate infrastructure stocks are roughly unit-elastic with GDP (World Bank, 1994). Within countries, there is some evidence that infrastructure investment is higher in richer than poorer regions (Banerjee, 2004).

While these expansion paths are averages, the relation between infrastructure stocks and GDP per capita has been used to identify countries that are outliers. For example, Latin American countries made modest investments in infrastructure starting in the mid-1990s and now have less than the average aggregate stocks for their income levels (World Bank, 2005b). Less than average stocks are also reported for sub-Saharan African countries for all sectors except telephone service where widespread availability of cellular service has moved African countries above the sectoral average for their income level (World Bank, 2005c). Country-specific deviations from cross-country averages do not have unambiguous normative content, but they are often used as a diagnostic tool in the exploration of cross-sectoral investment priorities.

Income growth is related to infrastructure level and investment. Aschauer's (1989) seminal analysis of the relation between overall infrastructure, investment and economic growth found that infrastructure capital increased investment and made a large contribution to total factor productivity in the USA. Subsequent work found his estimates overstated infrastructure's economic impact and were sensitive to econometric technique and the level of aggregation (Holtz-Eakin, 1994; Baltagi and Pinnoi, 1995; Cashin, 1995). Gramlich (1994) provides an overview. More recent work using cross-country panel data from developing countries addresses simultaneity issues and finds significant contributions of infrastructure to economic growth. Returns to infrastructure are likely the highest at early development stages when basic networks are still incomplete. Returns to infrastructure tend to fall as economies reach maturity. Canning (1999) finds above-average returns to telephone networks and average returns for power generation and transport networks. Canning and Bennathan (2000) find complementarity across infrastructure sectors with diminishing returns when one sector's capacity is increased in isolation, implying an optimal mix of capital stocks across sectors. Controlling for endogeneity of infrastructure accumulation, Calderón and Servén (2003) find positive and significant output contributions from telecommunications, transport and power.

Growth is also related to infrastructure efficiency and service quality, so analysis of infrastructure stocks alone is incomplete. The efficiency and quality of infrastructure services vary across countries. For example, distribution losses in power delivery vary from 5 percent to 30 percent, and unaccounted-for-water ranges from 12 to 45 percent across developing countries. Hulten (1996) finds that differences in the efficiency of use of infrastructure stocks explain a quarter of the growth difference between Africa and East Asia and 40 percent of the growth difference between low- and high-growth developing countries. Using panel data from 1960 to 2000 for 100 countries, Calderón and Servén (2004a) find that both infrastructure quantity and quality affect economic growth – where quality is measured in terms of frequency of service interruptions, faults per phone line, and so on. Moreover, the efficiency and quality of service provision is not closely related to a country's GDP per capita. Organizational effectiveness, adequate maintenance and sufficient operating revenues are important determinants of the efficiency of service provision that countries can control, and better management of infrastructure stocks can substitute for increased investment when efficiency is low.

Infrastructure helps reduce poverty. Households in the lowest income quintile are much less likely to be served by infrastructure than those in the highest quintile. Rural households are much less likely to receive services than urban households. In sub-Saharan Africa the urban–rural service gap is 46 percentage points for grid electricity, 29 for improved water, 26 for improved sanitation and 9 for telephone service. Extending infrastructure to the poor gives them access to productive opportunities, services, education and health care. Improving the communication and transport access of farmers to markets improves their economic condition and enhances diversification outside of agriculture (Jacoby, 2002). Providing the level of infrastructure enjoyed by the highest income quintile to those in the lowest quintile would reduce child mortality by 8 percent and stunting by 14 percent (Fay et al., 2005). Improved transport obviously facilitates access to health care, and the access of health care workers to rural clinics. Some impacts are less obvious. For example, access to piped water promotes attendance of girls at school because they need not fetch water; electric lights allow more time for study; clean water improves health and reduces school absences (Brenneman, 2002).

Infrastructure is linked to income inequality. Studies at the macro level have broadened their focus beyond growth to include the relation between infrastructure and the distribution of income. Their results reinforce the micro-level linkages between infrastructure and poverty. Calderón and Servén (2004a) find that infrastructure access and quality have a significant

impact on overall inequality. For example, they find that an improvement of one standard deviation in the infrastructure stock reduces the Gini coefficient for income by 0.06 points (the average Gini for developing countries with available data is 0.41).

In developing countries, firms are large users of infrastructure services, using half as intermediate inputs while households consume the balance (Prud'homme, 2004). Good infrastructure makes firms more productive and more competitive internationally. This is demonstrated at the macro level where infrastructure performance influences total factor productivity (Krugman, 1994) and infrastructure stimulates private investment (Taylor, 2001), and by long-standing micro-level studies of infrastructure use by enterprises (Lee and Anas, 1992). It is also supported by interviews with managers and investors used to develop indices of competitiveness and investment climate (World Economic Forum, 2004; International Institute for Management Development, 2005; World Bank, 2005d). In Latin American and Middle Eastern countries, 55 percent of firm managers consider infrastructure to be a major or severe obstacle to the operation and growth of their business (World Bank, 2004). High logistics costs impede exports and raise costs in many countries. Indirect costs are 10 to 12 percent of total production costs in strong export performers. In sub-Saharan Africa they run as high as 20 to 30 percent of production costs, and half are infrastructure-related, with transport costs in Africa being twice as high as those in South and East Asia (Ndulu, 2004).

What is the recent progress on infrastructure service delivery?

Infrastructure provision has increased significantly in developing countries. The leader by far is telecommunication where teledensity increased sixteenfold between 1980 and 2003 (Table 21.1). This reflects the explosion of mobile coverage (from zero in 1980 to 136 lines per 1000 persons in 2003 in developing countries), but fixed-line coverage also increased substantially (from 16 to 112 lines per 1000 people). Telecommunication is now the infrastructure sector with the narrowest divide between rich and poor countries, although teledensity remains much lower in the developing world. Road density in low- and middle-income countries increased by about 180 percent from 0.027 km/km^2 in 1980 to 0.049 km/km^2 in 2001, mostly due to a doubling in coverage in East Asia, South Asia, the Middle East and North Africa (MENA) (Ingram and Liu, 1999). Electricity-generating capacity increased by 56 percent in developing countries (from 0.18 to 0.28 kW per person). Again, this was driven by increases in East Asia (where capacity per person almost tripled) and South Asia and MENA (where it doubled), while Latin America's capacity per capita actually declined and sub-Saharan Africa's stagnated.

Table 21.1 Access to utilities and roads

	Telephone mainlines (per 1000 people)		Mobile phones (per 1000 people)		Paved road density (km per km^2)		Electricity generating capacity (KW per person)	
	1980	2003	1980	2003	1980	2001	1980	2001
All developing countries	15.55	111.74	0.00	135.97	0.027	0.049	0.18	0.28
High income	317.11	549.90	0.03	698.29	0.225	0.285	–	–
East Asia & Pacific	3.02	161.36	0.00	195.38	0.024	0.052	0.07	0.25
Europe & Central Asia	64.42	228.06	0.00	300.75	–	0.052	–	0.95
Latin America & Caribbean	39.86	169.76	0.00	246.35	0.015	0.021	0.26	0.25
Middle East & North Africa	17.79	133.34	0.00	84.77	0.017	0.037	0.16	0.34
South Asia	2.91	38.88	0.00	22.53	0.157	0.380	0.04	0.10
Sub-Saharan Africa	8.13	10.67	0.00	51.27	0.008	0.013	0.08	0.10

Source: World Bank (2005a) for phone data; Calderón and Servén (2004a) for road and electricity data.

Households' access to services has also improved, but more modestly. Although data on access to clean water and sanitation is poor and uneven in coverage, overall access to clean water improved modestly from 71 percent to 79 percent between 1990 and 2002, with large variations in coverage (Table 21.2). Sanitation coverage remains below 50 percent, varying from a mere 35 or 36 percent in sub-Saharan Africa and South Asia to a high of 82 percent in Eastern Europe and Central Asia. Historical data on access to electricity is not available, but coverage is estimated at close to 55 percent in 2000. The substantial regional variations are not well explained by differences in urbanization (urban electricity coverage is quasi universal): the MENA region has the highest electricity access rate despite being substantially less urbanized than Latin America.

Evidence on improvements in the quality of services is more limited. Data on performance are only widely available for telecommunications and electricity. They show a substantial improvement for telephones but no clear changes for electricity (Table 21.3). Telephone faults declined from an average of 97 per 100 mainlines in 1990–95 to 65 in 1996–2003. This average masks large variations across regions from 35 in Latin America and MENA

Table 21.2 Access to water, sanitation and electricity

	Improved sanitation facilities (% of population with access)		Improved water source (% of population with access)		Electricity
	1990	2002	1990	2002	2000
All developing countries	36.75	49.62	71.49	79.40	54.69
High income	99*	99*	99*	99.42	98*
East Asia & Pacific	29.74	48.70	70.98	77.60	62.50
Europe & Central Asia	86.36	81.95	–	91.32	–
Latin America & Caribbean	68.09	74.48	82.22	88.87	78.49
Middle East & North Africa	69.36	74.80	87.11	87.79	89.18
South Asia	16.50	34.59	69.79	83.73	32.62
Sub-Saharan Africa	32.31	36.03	48.81	58.16	24.02

Note: *: estimated.

Source: World Bank (2005a).

to 130 for East and South Asia. The greatest improvements occurred in MENA while performance declined in East Asia and the Pacific. Transmission and distribution losses worsened somewhat for developing countries to nearly 18 percent of electricity output. East Asia is the only region with a noticeable improvement.

Overall, developing countries still have far to go in stocks, service and quality. Despite major improvements, stocks and coverage of infrastructure remain a fraction of what they are in developed countries: one-fifth for teledensity and one-sixth for road density. Overall, reliability remains problematic: one-fifth of managers responding to an investment climate survey considered electricity as a major constraint to doing business in developing countries.

What are the key barriers to progress?

Pricing of services rarely covers costs, except for telecommunications, and performance varies systematically by region and subsector, with water having the least cost recovery (World Bank, 2005b). In telecommunications, cross-subsidization from long-distance to local service is still common. Electricity tariffs are normally below costs. Latin America's are about 75 percent of Organisation for Economic Co-operation and Development (OECD) tariff levels and do not cover full costs. Other regions' power tariffs range from a third to a half of OECD levels. Cost recovery in water supply typically lags

Table 21.3 Performance indicators vary substantially across the developing world

	Electricity (% of managers surveyed ranking this as a major constraint)	Telephone faults (per 100 mainlines)		Electric power transmission and distribution losses (% of output)	
	(2001 to 2003 whichever available)	Average 1990–95	Average 1996–2003	Average 1990–99	Average 2000–02
East Asia & Pacific	22.58	114.38	129.51	15.31	12.35
Europe & Central Asia	9.81	65.74	40.24	16.87	17.73
Latin America & Caribbean	26.23	52.62	36.49	17.50	18.07
Middle East & North Africa	–	68.62	34.02	13.75	15.27
South Asia	36.72	176.36	135.14	20.82	22.34
Sub-Saharan Africa	49.99	127.87	78.09	17.50	19.00
All developing countries	21.60	96.59	65.33	16.82	17.54

Source: World Bank (2005a).

behind power, with Latin America's water tariffs at 40 percent of OECD levels and Africa and South Asia with the weakest cost recovery. The fiscal cost of subsidies can be dramatic. In Mexico, congressionally set electricity tariffs result in a public subsidy that amounts to 1 percent of GDP.

The subsidies predominantly go to the better-off. While often advocated to reduce poverty, subsidies for infrastructure (normally from government budgets) are rarely targeted by income level and are generally available to all service users. Data from Central America suggests that in El Salvador, 70 percent of electricity subsidies benefit the non-poor; 95 percent of households in Guatemala and 85 percent in Honduras benefit from social tariffs in electricity. Attempts at targeting subsidies towards the poor by offering low prices to a first (small) block of consumption can be reasonably effective in the case of electricity, where consumption is fairly closely related to income. For water the relation to income is weaker, and effective targeting requires either connection subsidies (which favor the poor as the rich tend already to be connected) or the use of existing data to identify needy families. Connection subsidies tend also to be an effective means of

helping the poor for power and gas. Since the poor receive no consumption or service subsidy benefits when they are not connected, subsidies for connection to the network (rather than for service consumption) are likely to be much more pro-poor (Komives et al., 2005).

Improper pricing constrains service and promotes inefficient consumption. When prices do not cover costs, all customers are subsidized and service expansion increases losses to service providers. Reluctance to set prices to cover costs, or to raise prices to keep up with inflation, has been an important impediment to private investment in infrastructure, and is one of the stumbling blocks to private sector participation in many countries. It also constrains public investment because increased public investment entails larger public operating subsidies in the face of growing expenditure needs in the social sectors. Finally, when services are priced below costs, customers will overconsume the service – producing inefficiencies in consumption that can be even more costly than inefficiencies in service production. For example, economic studies indicate that an increase in the price of electricity of 10 percent reduces demand by 5 percent (Berndt and Wood, 1975). Having power prices cover only half of costs increases demand substantially and leads to additional investment in generating capacity that then does not pay for itself. This impedes financing – both private and public.

Decentralization or devolution has had advantages and disadvantages. While the extent of change varies by region, decentralization of responsibility for infrastructure has increased in most countries. In Latin America, where decentralization is most advanced, it has presented challenges for reform. Although decentralization generally improves knowledge of local needs and priorities, many municipalities lack needed technical expertise for efficient service provision. Decentralization often also leads to policy and regulatory incoherence between municipalities, particularly in services (such as water supply and sanitation) where networks are local and not national. Decentralization also increases transaction costs for private investors, who must negotiate with individual municipalities rather than with a national or state entity.

Private sector investment in developing-country infrastructure grew nearly fivefold from $20 billion in 1993 to a peak of $100 billion in 1997. It has since declined to around $45 billion (World Bank, 2003). The source of private infrastructure investment is changing. In sub-Saharan Africa from 1998 to 2003, 38 percent of private investment funds were from other developing countries in the region (principally South Africa) and nearly 20 percent from domestic investors (World Bank, 2005c). This differs from earlier periods when private investment was mostly from developed countries.

Private sector investment has been concentrated in a few countries and sectors. The Latin American region received roughly half of the $786 billion of private investment in infrastructure from 1990 to 2003, and half of these funds financed privatizations (World Bank, 2005b). Sub-Saharan Africa received less than 10 percent of this global total, and half of those funds went to one country, South Africa. The top four recipients in the African region (South Africa, Nigeria, Mozambique and Côte d'Ivoire) received 70 percent of the Africa regional total (World Bank, 2005c). Overall, the top ten recipients globally received 62 percent of total private investment in infrastructure from 1990 to 2003 (World Bank, 2003). Globally, telecoms received 42 percent of private capital flows to infrastructure in developing countries. In Africa, its share is 70 percent.

While private investment in infrastructure was growing in the 1990s, overseas development assistance (ODA) to infrastructure declined. For example, in sub-Saharan Africa annual ODA commitments for infrastructure were $5 billion in 1989 and fell to $2.4 billion in 2003 (World Bank, 2005c). Relative to private investment, ODA for infrastructure is more evenly distributed across countries and sectors. ODA infrastructure funding is only recovering in 2005 nearly a decade after private investment flows peaked.

The performance of private investment in infrastructure has been good, but below unrealistically high expectations. While public support for private investment in infrastructure has declined in most countries, the actual performance of private participation exceeds public perceptions (Birdsall and Nellis, 2002; Estache and Rossi, 2004). Private provision of services has expanded greatly. In Latin America in 1990, private companies provided only 3 percent of telephone and electricity connections. By 2003 their share was 86 percent for telephones and 60 percent for electricity connections (World Bank, 2005b). In Africa by 2003, half of the countries had private participation in telephone service and 40 percent in power generation. In most cases, private providers have improved efficiency, coverage and service quality. The poor have benefited mainly from increased coverage. Concessions have not made excessive profits, especially given their risks: 40 percent are unlikely to earn any profit (Sirtaine et al., 2005; Estache and Pinglo, 2004), although nearly all telephone concessions earn profits. There have been a few well-publicized failures, and a large share of concession agreements have been renegotiated. In Latin America, 30 percent of concessions have been renegotiated, including three out of four in water and sanitation (Guasch et al., 2003). Cost recovery for private providers has been a persistent problem in all sectors except telecom, and governments have tended not to enforce service payments.

Private investment did not fill the gap left by declining public investment and ODA in some regions. Reliable data across developing countries on public sector investment in infrastructure does not exist, but the available evidence shows a consistent decline since 1995 in some regions. For example, African central government expenditure on infrastructure fell from 4.2 percent of GDP in the mid-1980s to 1.6 percent in the late 1990s (World Bank, 2005c). These estimates are suggestive but only partial as they exclude state-owned enterprises and sub-national governments. Consistent estimates compiled for the Latin American region show that public investment in infrastructure declined from 3.5 percent of GDP in the mid-1980s to 1.7 percent in 2001. However, in many East Asian countries such as China, Thailand and Vietnam, total annual infrastructure investment has exceeded 7 percent of GDP, and the bulk of these funds represent public investment (Asian Development Bank, 2005). In these countries, infrastructure stocks have grown in proportion to GDP, and public investment in infrastructure has expanded over time.

Regulatory issues also remain unresolved in many countries. Independent regulators need to discipline private participants and protect consumers – and also protect investors from arbitrary intervention from governments when sunk costs are high, as is often the case with infrastructure. In fact, many regulators are insufficiently independent of governments to fulfill this latter role. Moreover, greater regulatory autonomy is associated with better quality and efficiency of service provision by private providers (Andres et al., 2006). Regulatory risk raises the cost of private capital (as much as 2 to 6 percent in Latin America (Guasch and Spiller, 1999). While many developing countries now have regulatory bodies, their establishment often followed rather than led the initiation of private participation. Experience has shown that regulatory independence is important for effective private participation in infrastructure, and that it is difficult to attain quickly.

Current thinking on regulatory practices is now much more pragmatic. It is clear that regulatory arrangements need to be adapted to the country context. For example, price cap regulation – which limits the prices firms may charge, not their profits – may be the best model theoretically, because it promotes efficiency. But in Latin America it has not worked well. Price caps entail more risk for operators (as profits are not guaranteed), raising the cost of capital. And they have proved much more susceptible to renegotiation and to the effects of external shocks (Guasch et al., 2003). Traditional rate-of-return or hybrid regulatory regimes may therefore be preferable in Latin America and other developing regions. In addition, it is now clear that the difficulty of building independent, effective and competent regulatory agencies was seriously underestimated.

Conclusion

Private participation in infrastructure was oversold in the 1990s. Many expected private involvement in infrastructure to fill financing gaps, improve efficiency of service provision and extend service coverage. The objective evidence indicates that it achieved gains in all of those areas, but not to the extent expected. Private investment flows have subsided well below past peaks, but they are still substantial and likely to be sustainable at current levels. However, private participation (and particularly private investment) is concentrated in a few sectors: telecoms and to a lesser extent electric power, with little activity in transport. In water supply, the major involvement has been in managing concessions and not in providing investment funds. Private participation is also concentrated in a few countries, even when the share of investment is compared to the share of GDP. The sector that has seen the most private participation across countries is telecom – the best-performing sector in having tariff revenue cover costs.

Governments have a continuing but new role in infrastructure. Many have been moving away from the old model of direct provision of infrastructure services through vertically integrated state enterprises to a model with more unbundling of services and a more businesslike approach. Hopes that private investors would finance infrastructure have been replaced by the realization that services must be paid for by customers, taxpayers or foreign aid agencies – whether the service providers are public or private. The need for regulation – whether service provision is public or private – is also more widely understood. Countries are beginning to adopt a hybrid approach. This involves facilitating private participation in specific sectors such as telecom, port facilities and power generation where private interest and activity continues. And it involves more use of concessions in water supply and attempts to increase efficiency in transport through corporatization and the use of special financing mechanisms, such as road funds, that give users a voice in ensuring that revenues are efficiently spent.

The key issues going forward include restoring investor confidence in emerging markets in general and in infrastructure in particular. This will require developing appropriate risk-mitigation instruments so that each party bears that risk it is best able to manage, and improving cost recovery for operators – either by increasing prices so that the user pays for services (engendering user efficiency) or by having governments shoulder their responsibilities for social tariffs. More generally, most countries could benefit from more efficient targeting so that the poor are better protected while the cost remains affordable. Finally, it is now clear that many infrastructure services will remain publicly managed in many countries. Improved performance gains will therefore require reviving programs to improve public sector efficiency.

Note

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