

A Global View of Infrastructure and Its Financing

Infrastructure (comprising energy, telecommunications, transportation, water supply, and sanitation) plays an important role in urban land development, and it influences city and country productivity. Data on the amount of infrastructure stocks at the national (but, alas, not the metropolitan) level are available for many developing and high-income countries and support several results summarized here.

The amount of infrastructure stocks per capita across countries is strongly related to per capita income levels—when country incomes double, infrastructure stocks nearly double as well. However, country infrastructure stocks have essentially no association with a country's level of urbanization once country income is taken into account. This seems surprising because cities have large amounts of infrastructure. But they also have dense populations that use the infrastructure intensively, so per capita urban infrastructure stocks are similar to national levels.

The composition of infrastructure stocks also varies systematically with per capita income. Roads have the largest share of infrastructure stocks in the lowest income countries, with water systems second and electric power systems a close third. As country incomes increase, the infrastructure related to electric power systems increases more rapidly than income levels. Infrastructure for water and sewer systems increases less rapidly, and for roads the change is in proportion to income. As a result, in high-income countries electric power systems are the largest component of infrastructure, followed by roads, whereas water, sanitation, and telephone systems comprise only a modest share of their infrastructure.

Based on recent rates of economic growth, and using the existing relations between infrastructure and per capita income, developing countries are likely to need to spend about 5 percent of their GDP on infrastructure (3 percent for expansion and 2 percent for maintenance)—currently about \$750 billion annually—to maintain existing ratios between infrastructure and GDP. For high-income countries, total spending would be lower, at 1.7 percent of GDP (about evenly divided between investment and maintenance)—currently about \$700 billion annually. Countries growing faster than average need to invest a higher share of their



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GDP so that infrastructure stocks can keep up with economic growth.

In some countries, improving the efficiency of service production from existing infrastructure is an alternative to new investment. For example, average electricity losses across countries range as high as 25 percent, and leakage and unbilled water can exceed 30 percent. Reducing such high losses can forestall the need for additional

capacity. Somewhat surprisingly, performance within countries across sectors varies greatly—efficient performance by a country in one infrastructure sector is uncorrelated with performance in other sectors.

What sources will provide these investment funds, particularly for developing countries? Foreign assistance and development bank financing of infrastructure in developing countries currently total about \$40 billion annually, and that figure has more than tripled since 1990 in current dollars. Private investment in infrastructure in developing countries has recently reached \$160 billion annually and has grown eight-fold since 1990, also in current dollars. Foreign assistance is directed mainly at energy, transport, and water and sanitation systems, with virtually no funding for telecommunications.

In contrast, more than half of private funding goes to telecommunications (particularly mobile telephony), followed by energy. Telecommunications and energy draw more private investment in developing countries because their tariff revenues cover a large share of operating costs, whereas tariff revenues and user fees cover a much smaller share of costs for transport and water and sanitation. Private investment in infrastructure was concentrated in Latin America and East Asia in the 1990s but has spread more evenly across global regions in the 2000s.

Despite the growth in international funding, large and growing metropolitan areas in developing countries still need to raise significant sums to finance infrastructure investments. This will involve raising tariffs charged to users, increasing taxes (particularly property taxes) on properties whose value is enhanced by infrastructure investments, and establishing municipal bond markets such as the one being developed in South Africa.