What's New in the IMF Investment and Capital Stock Dataset:
Estimating the stock of public capital in 170 countries[1] (May 2021 update)

What is in the dataset?

Public investment can play a central role in the post-pandemic recovery (October 2020 Fiscal Monitor). Moreover, the COVID-19 pandemic has exposed the risks of underinvestment in health and digital infrastructure. As part of the IMF's work on public investment, the Fiscal Affairs Department (FAD) has compiled a comprehensive dataset on public, private, and public-private-partnerships (PPP) investment flows for around 170 countries. The dataset also includes estimates of real public capital stocks between 1960 and 2019. This note provides a brief overview of data sources, methods, and main trends, and is accompanied by the 2021 update of the [Investment and Capital Stock Dataset](#) (since last release in August 2019), and a detailed [Manual and FAQ](#) of the dataset construction.

Why is it important to have a stock series?

It is important to look at both public capital stock and the annual flows of public investment. First, public investment is a key input in the creation of a network of physical assets over time, including economic infrastructure (such as roads, airports, and electric utilities) and social infrastructure (such as schools, hospitals, and prisons). It is the volume of the existing network not only additions to it that provide productive services. In theoretical models of economic growth, the capital stock is a direct input factor in the production function, contributing to higher productivity growth and over time, higher living standards. Second, infrastructure assets are subject to wear and tear, or "depreciation." This requires the estimation of the stock of public capital, net of depreciation. As for PPPs, while they are

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increasingly being used to finance investment projects in infrastructure, comprehensive information on the PPP stock of capital is lacking, and generally difficult to estimate.

How is the capital stock typically measured?

Estimating measures of public capital stocks comparable across countries is a complicated task. Ideally, these stock series would be directly observed and measured, but this is not the case in practice. Some countries estimate their level of capital stock based on detailed information and assumptions at the asset level and a variant of the perpetual inventory method. But since methodologies differ these estimates are not directly comparable across countries.[2] As for internationally comparable data, there are some estimates in the literature—e.g. Kamps (2006) and Gupta and others (2014)—but they only cover a subset of countries.[3]

How do we estimate the capital stock?

The perpetual inventory method is used to construct capital stocks series for 170 countries. Specifically, several sources of data are used to compile a comprehensive series for public, private, and PPP investments.[4] The investment flow data are then transformed into "real cost" (constant 2017 USD) using purchasing power parities from the International Comparison Program (ICP). After making assumptions on depreciation rates and on the initial capital stock, based on the academic literature, the net "real cost" stocks (constant 2017 USD) is estimated. The depreciation rates are time varying and depend on each country's income grouping, while the initial capital stock is derived using a synthetic time series approach. The main advantage of our approach is that it relies on a unified and standardized framework making our estimates comparable across countries, while the drawback is that the estimates do not take into account detailed asset-level investment information.[5]

What has changed since the last data publication?

Since the 2019 vintage, the main changes to the dataset reflect updates in the raw data sources from the Organization of Economic Cooperation and Development (OECD), Eurostat, Penn World Tables (PWT), IMF World Economic Outlook (WEO), World Bank, European Investment Bank (EIB). The new PWT Version 10.0 includes the following changes affecting

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[2] For example, the United States Bureau of Economic Analysis' estimates of the capital stock are based on the perpetual inventory estimation method, rather than direct measurement.

[3] The estimates for public capital stock series are for 22 OECD countries in Kamps (2006), and 71 middle- and low-income countries in Gupta and others (2014). The Penn World Tables produces internationally comparable data on the aggregate capital stock but does not provide the breakdown by public, private, and PPPs.

[4] These are: The Organization for Economic Cooperation and Development OECD Economic Outlook, Eurostat, the Penn World Tables, The IMF World Economic Outlook WEO, The World Bank, and the European Investment Bank

[5] For the detailed methodology, please refer to the Manual and FAQ.

the capital stock estimates: (i) the incorporation of new purchasing power parities data for a range of countries; (ii) the revision of investment price deflators for a number of countries, and (iii) the incorporation of revised and extended National Accounts data, covering the period up to 2019.

Main trends in the capital stock series

Below is a summary of the main trends over time and across group of countries resulting from the recent update of the dataset.

1. Public capital stock per capita or per employee remains unequal across countries

Figure 1 shows the global distribution of 2019 public capital stock per capita, in constant 2017 USD. While the real value of the accumulated public capital stock has risen steadily on a per capita basis across countries (nearly tripled since 1960), it remains highly unequal, with a picture closely mirroring the global distribution of GDP per capita.

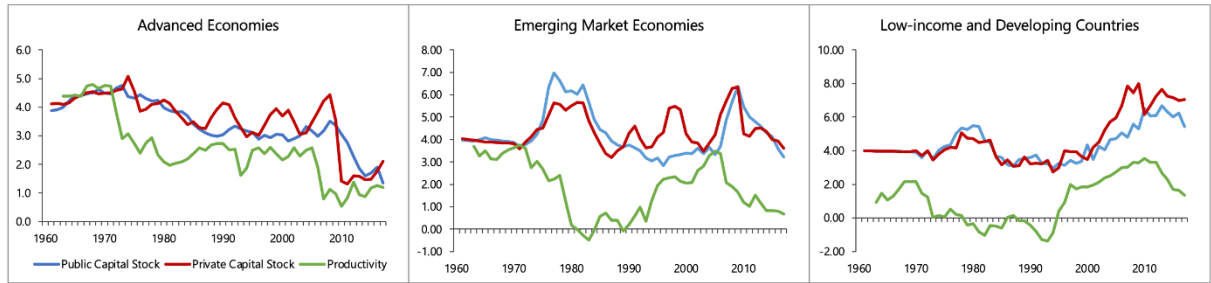Figure 1. Public Capital Stock per Capita, 2019
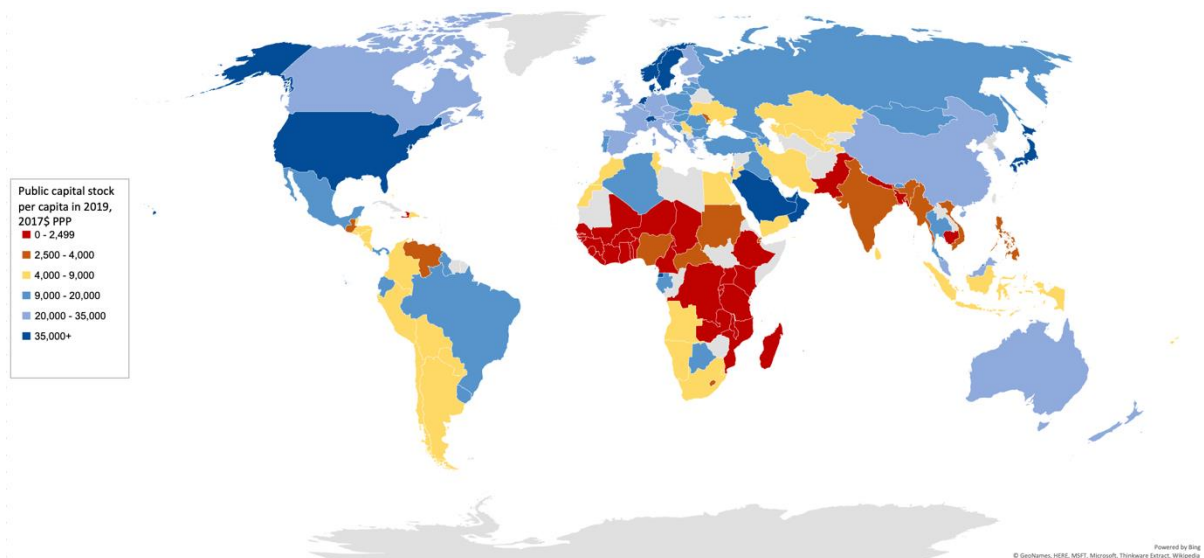
2. Real public capital stock growth remains low in AEs, and is the highest among LIDCs

Figure 2 plots the average annual growth rates in real public capital stock, real private capital stock, and real labor productivity (defined as real GDP divided by employment and in 5-year averages) across three WEO country groupings: Advanced Economies (AEs), Emerging Market Economies (EMEs), and Low-income Developing Countries (LIDCs).

Real public capital growth varies significantly across the three groups. In AEs, growth has been on a declining trajectory from a high of 4.8 percent in 1973, with an exceptionally sharp decline after the global financial crisis, to as low as 1.4 percent in 2017, on the account of

declining public investment flows. In EMEs, growth has fallen from a high of 7.0 percent in 1977 to the average of 4.0 percent since 2010. Finally, in LIDCs real public capital growth remains highest at around 6 percent in the past decade, although it has since started to decline.

Figure 2. Growth Rates in Real Public Capital Stock, 1960-2019 (percent)

3. Real public capital stock growth is highly correlated with real labor productivity growth and real GDP growth

As shown in Figure 2, the trend in the growth rates of real public capital is highly correlated with labor productivity growth especially in AEs and LIDCs. Figure 3 depicts a positive correlation between long-term real GDP growth rates (between 1960-2019) and long-term real public capital stock growth rates. Obviously, this should not be interpreted as the causal impact of public capital on growth as real private capital stock growth rates also correlate with GDP growth and labor productivity (Figure 2). However, public capital stock remains an important factor in the trajectory of economic growth.

Figure 3. Long-Term Real GDP and Private Capital Growth Rates, 1960-2019
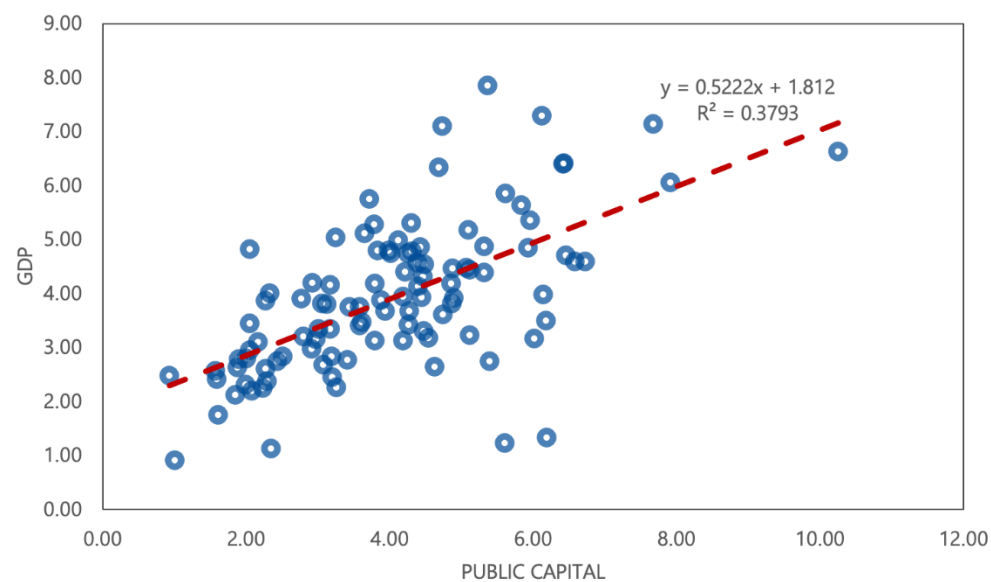
4. PPP investment flows remain highest in low-income countries on average, but have fallen since the financial crisis in all countries

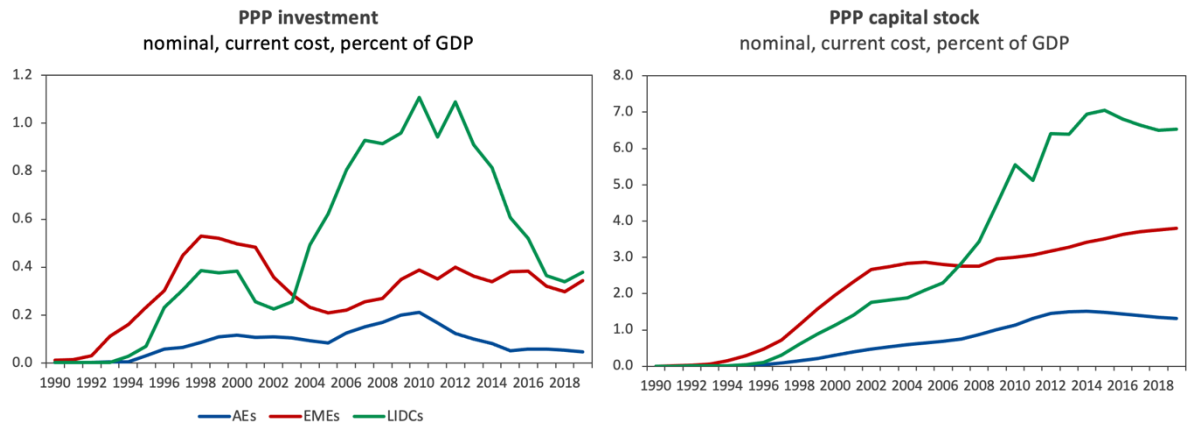Figure 4. PPP Investments and Capital Stock, Current Cost (Percent of GDP)

Figure 4 plots PPP investments and the associated capital stock (current cost, as a share of GDP) in AEs, EMEs, and LIDCs from 1990 until 2019. These investments cover spending on various infrastructure services, including energy, water, transport, and telecoms. PPP investments have risen over time in all country groups since 1990 and are the highest in LIDCs (peaked at over 1 percent of GDP in 2010). However, they have since declined in both AEs and LIDCs, and remained stagnant in EMEs after the global financial crisis. Consequently, the PPP capital stock as a share of GDP has tapered off, although it remains highest among LIDCs at an approximately average 7 percent of GDP.

Conclusion and future releases of the dataset

This dataset is a comprehensive source of information that can be used to analyze cross-country and trend variations in different sectoral sources of investment and capital stock (public, private, public-private). The dataset can be used for future research on the links between public and private capital and growth as well as links between public capital (input) and infrastructure outcomes (output).

New vintages of the Investment and Capital Stock Dataset will be published periodically, reflecting updates in the raw data sources, as well as continuous methodological improvements.

References

Gupta, S., A. Kangur, C. Papageorgiou, and A. Wane. 2014. "Efficiency-Adjusted Public Capital and Growth," *World Economic Development,* Vol. 57, Issue C: pp. 164–78.

Kamps, C. .2006. "New Estimates of Government Net Capital Stocks for 22 OECD Countries, 1960–2001," *Staff Papers*, International Monetary Fund, Vol. 53, No. 1, pp. 120–50.