# Estimating the value of a Country's built assets: investment-based exposure modelling for global risk assessment

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In order to quantify disaster risk, there is a demand and need for determining consistent and reliable economic value of built assets at national or sub national level exposed to natural hazards. The value of the built stock in the context of a city or a country is critical for risk modelling applications as it allows for the upper bound in potential losses to be established. Under the World Bank probabilistic disaster risk assessment - Country Disaster Risk Profiles (CDRP) Program and rapid post-disaster loss analyses in CATDAT, key methodologies have been developed that quantify the asset exposure of a country. In this study, we assess the complementary methods determining value of building stock through capital investment data vs aggregated ground up values based on built area and unit cost of construction analyses.

Different approaches to modelling exposure around the world, have resulted in estimated values of built assets of some countries differing by order(s) of magnitude. Using the aforementioned methodology of comparing investment data based capital stock and bottom-up unit cost of construction values per square meter of assets; a suitable range of capital stock estimates for built assets have been created. A blind test format was undertaken to compare the two types of approaches from top-down (investment) and bottom-up (construction cost per unit),

In many cases, census data, demographic, engineering and construction cost data are key for bottom-up calculations from previous years. Similarly for the top-down investment approach, distributed GFCF (Gross Fixed Capital Formation) data is also required. Over the past few years, numerous studies have been undertaken through the World Bank Caribbean and Central America disaster risk assessment program adopting this methodology initially developed by Gunasekera et al. (2015). The range of values of the building stock is tested for around 15 countries. In addition, three types of costs - Reconstruction cost (building back to the standard required by building codes); Replacement cost (gross capital stock) and Book value (net capital stock – depreciated value of assets) are discussed and the differences in methodologies assessed.

We then examine historical costs (reconstruction and replacement) and losses (book value) of natural disasters versus this upper bound of capital stock in various locations to examine the impact of a reasonable capital stock estimate. It is found that some historic loss estimates in publications are not reasonable given the value of assets at the time of the event.

This has applications for quantitative disaster risk assessment and development of country disaster risk profiles, economic analyses and benchmarking upper loss limits of built assets damaged due to natural hazards.