

# Disaggregation and Un-embedment for Improving Japan's Capital Measurement: Micro Evidence and An Application

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This paper provides three properties in the recent revisions for measuring capital formation and stock matrices in the Japan's System of National Accounts (JSNA), based on the newly developed micro data on capital acquisition and disposal. JSNA experienced the comprehensive revision incorporating the new estimation framework based on the perpetual inventory method (PIM) with detailed assets, which also include the extended boundary of asset to adopt the 2008SNA. This estimation revision was conducted using the micro-evidence derived from the Survey on Capital Expenditures and Disposals (CED), which was newly designed and conducted annually from 2006 in Japan. As the survey is very rich in detailed information with about 600 asset types by 37 industries, it enables us to pursue more precise measurement of some parameters in capital stock estimation. The key concept of the revision is "disaggregation," that is to keep the detailed asset classification as much as possible in the process of the estimation, and the micro-evidence of CED plays important roles along the concept. First, it is introduced that responses about disposed assets obtained from the survey provide useful information to estimate a fixed capital formation matrix, which describes the gross fixed capital formation by type of asset and by sector. Because of the limited availability of the investment data by the type of assets from the demand side statistics, usually the product input data for capital formation from the supply side statistics are complementarily used in stock estimation. However, using the information of the disposed assets derived from the survey as to what type of asset has been used in production process of each industry, it is now possible to estimate the matrix more in detail.

Second, the responses about major repair and installation of equipment attached to a building provide another useful information which clearly shows that breaking down the production process of the building construction is necessary in order to achieve more accurate capital measurement. Constructing production is usually measured by the total cost of input including built-in machines or equipment and the cost is directly accumulated as capital formation. However, the survey responses clearly show that built-in machines and equipment are often replaced during the service life of buildings. Therefore the embedded machines and interior equipment should better be taken off from the building structures and be separately accumulated

as another capital stock with different depreciation rates and valuation. Third, the highlights of the survey is that rich information about the disposed assets enables us to estimate the asset service lives (ASL), the rates of depreciation, and the declining balance rates (DBR) based on a finely-defined classification of assets in Japan. Compared to other countries', the Japan's rates of geometric depreciation are broadly similar to the estimates by Statistics Canada, but considerably higher than those used in the U.S. BEA. Comparing the rates by type of asset, there are some interesting findings: the ASLs of computers are longer and the rates of depreciation for commercial buildings are higher in Japan than those in the two countries. In addition, the rates of depreciation for some types of assets, such as automobiles, are significantly diverse among different uses, which suggests that it may be necessary to consider a new classification of asset beyond the conventional classification by product.