Chapter **18**

Validation of Machinery and Equipment Goods Data

The survey guidelines for data collection on machinery and equipment goods were released by the Global Office of the International Comparison Program (ICP) in April 2011. The guidelines were updated and the list of items was finalized using the results of pilot surveys. Another important contribution to this survey was the workshop on data validation for non-household sectors held for Asia-Pacific economies in Bangkok, September 22–24, 2011. It was attended by 47 construction and machinery and equipment experts.

Survey data for this category are mainly validated at the national, regional, and global levels, using an approach similar to that adopted for household consumption items after ensuring that prices have been collected for comparable items and the required quantities.

In this validation process, each term and condition for price collection are assessed. Machinery and equipment goods experts verify that prices were collected for the suggested order quantity and that prices, fees, costs, and discounts were reported for one unit, as indicated in the survey guidelines.

This chapter sets the framework for data collection, entry, and validation. It focuses on the two main procedures of data validation for machinery and equipment goods: validation of product specifications and validation of terms and conditions. The chapter refers to the existing guidelines for intra-economy and intereconomy data validation at the regional and global levels.

VALIDATION OF MACHINERY AND EQUIPMENT GOODS SPECIFICATIONS

Any person planning to buy a durable good looks for the item that best fits his or her needs. The biggest challenge is deciding on the right one. To a certain extent, firms and established organizations do the same thing. In practice, an enterprise will have a contract with a provider or past experience with a set of providers from which it will choose the good it wishes to purchase. One would expect, then, that the range of goods from which to pick would be narrower than those available to individuals. However, the probability of having multiple providers of machinery and equipment goods is high. How then can the ICP ensure that the prices collected in the context of the ICP 2011 machinery and equipment goods survey are comparable?

Generally, three steps should be taken when comparing or validating the prices of machinery and equipment goods:

1. Ensure that the items involved are comparable by comparing the specifications of the items priced.

2. Once the comparability of the items is assured, compare the terms and conditions of trade.
3. Compare the observed prices at two levels: the base price and the total unit price. During this last process, the relative value of delivery costs, the nature and amplitude of the tax paid, and the level of rebate or discount negotiated are assessed and compared.

Validating Comparability of Brands of Machinery and Equipment Goods

A credible hypothesis is that firms look around for the best deal before making a decision to invest in a specific machinery and equipment good. Those comparing machinery and equipment goods look at two important features: the brand name and model. Some brands are known to be more durable and cope well with intensive commercial usage. Although there is no unique or specific chart of comparable brands, well-known brands are believed to last longer and offer more after-sale support and longer warranties.

For those comparing investment goods, then, brands are important. The next step is to compare the models, specifications, and features of the products within each brand (or comparable brands) before comparing the prices.

Comparing the Proposed and Observed Models

Models define machinery and equipment goods according to their purpose and functionality. Comparable models within a given brand or among brands serve the same purpose and have the same functionality—that is, they are perfect or very close substitutes. In most cases, comparable models have comparable specifications and features. Therefore, if for two goods the models are (or one of them is) unknown to the experts validating machinery and equipment goods prices, comparing specifications will lead to a comparison of the observed models.

Validating Item Specifications Individually and Collectively

Mathematically, it sounds reasonable to compare specifications before determining the comparability of models or brands. But for the machinery and equipment goods industry, this may not be the right thing to do because expert views are needed to ultimately secure comparability.

Under the structured product description approach, up to 12 specifications are selected to describe machinery and equipment goods. Twelve specifications may be comprehensive enough in most cases, but sometimes that number is just not enough to describe an item perfectly. An alternative approach to comparing the specifications of two items is to compare the proposed and the observed values for each specification. For an item, observed specifications are comparable to the proposed ones if all or the most important specifications are close or identical. Likewise, an observed specification value is comparable to the proposed one if they are close or identical according to the experts.

These steps will help classify observed items as identical, equivalent, or broadly comparable, or, if necessary, noncomparable. If the validation expert comes across a noncomparable item, he or she must exclude the observed price even if the terms and conditions of trade, especially the base and unit prices, are in the range of the comparable ones. After this classification, the expert proceeds to validation of the price parameters.

VALIDATION OF TERMS AND CONDITIONS

Unit Base Price

Because of expanded globalization and targeted competition in this industry, the unit base prices of comparable machinery and equipment goods are within a close range. Generally, if a firm proposes a price for a given good that is too high, the purchaser has the option to import. The most important buyers' decisions are based on comparing the unit base acquisition prices of comparable items available in the economy and imported from the economically closest origin. Therefore the unit base prices of comparable goods are within rather close ranges.

Order Quantity

How do order quantities affect the prices of machinery and equipment goods? There are interesting economic theories and applied models on how total potential demand (sum of order

quantity) marginally affects the unit price of a good in general.[1] In the ICP 2011 machinery and equipment goods survey, most items were priced for one piece. For a few goods, however, an order quantity of 10 or 1,000 was targeted. Experts validating the prices of machinery and equipment goods were asked to ensure that the reported order quantities were in the same range (if not the same quantity) as the listed order quantity.

Delivery Costs

Most items in the ICP's global core list of machinery and equipment goods do not involve delivery costs. But for some, these costs may be important. Some items may require installation costs, which could be high or low. These costs must be reported when they occur to ensure the comparability of the total price of the item. Usually for comparable delivery conditions, delivery and installation costs must be in the same range relative to the unit base price or to the total unit price. This is an important validation parameter.

Nondeductible Taxes

For any amount of taxes reported for this category, the validation process should lead to confirmation that the taxes are nondeductible. In some economies, common taxes such as the value added tax (VAT) are nondeductible; in other economies the VAT is deductible. It is important to guarantee that the reported taxes are truly nondeductible. A hint might be provided by the ratio of nondeductible taxes to the unit base price in comparison with the various levels of enforced enterprise taxes in the economy. But here again, the views of experts are essential to validating this amount.

Discounts

Commonly, machinery and equipment goods are purchased after direct negotiation between the seller and the buyer. Some items may receive a discount up to 10 percent of the unit base price. But this ceiling is not absolute; it depends on the goods to be purchased and the actual practice in the economy. In any case, discounts that appear too high should be investigated. Also, the absence of discounts or the presence of discounts that appear too low may be an issue for items that usually (according to practice and actual data) receive discounts in a given economy.

Other Taxes

Other taxes include a national security levy, customs tax, excise tax, special import and sales taxes, goods and services tax, and any other nondeductible VAT where applicable. Depending on the economy, these taxes may be charged on locally manufactured goods or imported goods. This amount must be checked and documented if it is over 10 percent of the total unit price.

Total Unit Price

Total unit price is the unit base price *plus* the per unit delivery cost *plus* nondeductible taxes *less* the discount. This amount should be checked and documented if it falls outside the boundary of 80–125 percent of the unit base price.

FURTHER VALIDATION STEPS

Similar to the validation process for the household consumption survey, analyses using validation tables such as the Quaranta and Dikhanov make it possible to conduct detailed validation. These analytical tables provide statistical measures such as the coefficient of variation, exchange rate (XR)-ratio, and purchasing power parity (PPP)-ratio. The validation steps listed in chapter 15 for validation of household consumption data should be followed. Temporal validation of the machinery and equipment PPPs for the ICP 2011 round against the ICP 2005 round is recommended as well.

NOTE

1. A practical example is the quantity discounts/economic order quantity approach proposed by Michael Bogner, Chuck Wong, and Bernie Price in September 2002.