

## Chapter 4 - Production Monitoring Indicators

A range of different indicators are used to measure industrial production in the monthly branch surveys. Historically, production was measured based on quantities alone. To better reflect the specific characteristics of certain sectors, other indicators have been introduced over time, such as production in value terms and hours worked.

At the time of the 2010 re-basing, the UN's recommendations on the methods to be used in monitoring economic activities were incorporated as far as possible. For many branches, production in value terms is recommended. Production in value terms is measured by invoicing. This provides a good approximation of production in value terms in cases where there is no gap between production and sales. On the other hand, if there is a time lag (for example in the event of large stocks or when the production process is very long without intermediate invoicing), quantity indicators are generally recommended.

In the case of very long production cycles, such as shipbuilding, production can be measured based on hours worked, which are then corrected for a productivity trend.

### 1- The Different Production Indicators

Several types of indicators can be used depending on the products monitored:

- quantity produced;
- quantity delivered;
- invoicing;
- hours worked;
- consumption of raw materials.

#### 1.1- Quantities Produced

This indicator is often used for relatively homogeneous productions. It can vary widely. The indicator covers all production (as defined in economic models M2 to M5; see Chapter 2). In some cases, for statistical reasons, production excludes purchasers (model M2).

##### Summary: Quantities Produced

- What is being observed?
  - number of parts, tons, litres... produced.
- Where? When?
  - at the end of the production chain;
  - between production and storage or delivery.
- Measurement imperfections:
  - the increasing variety of production;
  - “quality” effects;
  - unrecorded work in progress in the case of long processes.

#### 1.2- Quantities Delivered or Invoiced

In some branches, it is impossible to collect data on the quantities produced<sup>24</sup>, with the only available data being the quantities delivered. 53 series in the 2010 base are monitored in terms of quantities delivered.

The “quantities delivered” indicator provides a satisfactory approximation of changes in production provided the stock of finished products remains relatively stable over time. As with quantities produced, quantities delivered correspond to diverse economic models, sometimes including the purchasers. Reporting manufacturers may indicate, at the same time as deliveries of products leaving their own workshops, deliveries of similar products

<sup>24</sup>For example, due to difficulties related to the information systems of the enterprises surveyed.

that they have purchased from other manufacturers without having manufactured them. In addition, the delivery declaration may be delayed in relation to the factory exit since it is linked to the transfer of ownership to the customer or to embarkation on a ship.

**Summary: Delivered Quantities**

- What is being observed?
  - number of parts, tons, litres... delivered.
- Where? When?
  - on delivery.
- Measurement imperfections:
  - in the event of significant variations in product stocks;
  - of variable delivery times;
  - the increasing variety of production;
  - “quality” effects;
  - variation of work-in-progress.

### **1.3- Deflated Invoicing**

At the time of the transition to the 2010 base year, the number of series followed in deflated invoicing increased significantly compared to the 2005 base year, in line with UN recommendations. Invoicing (excluding taxes) is one of the easiest variables to use with companies through branch surveys. A summary of monthly invoicing is generally carried out by type of product by accounting departments within companies.

Deflated invoicing of production prices is an approximation of the quantities delivered. However, there may still be discrepancies with the delivered quantities on account of discrepancies in accounting entries. Invoicing can peak at the end of the year while deliveries are carried out at a more consistent rate throughout the year. In order for deflated invoicing to be used as a production indicator, stocks must remain stable over time.

Invoices may, like quantities, concern all economic models, including products resold in the same condition as they are, excluding or not purchasers depending on the sector.

Invoices are, unlike quantity indices, value indicators that can be applied to a set of heterogeneous products. In addition, they incorporate “range effects” and “quality effects”. The range effect can play a role in the case of products of the same generation in production at the same time. This occurs, for example, in cases where the share in the production of high-end products increases at the expense of the share of low-end products. The “quality” effect corresponds to the replacement over time of products of one generation by products of the next generation, with generally increased performance (technological products being one example).

#### The choice of deflators for the series monitored in invoicing

Deflated invoicing indicators require the use of producer price indices consistent with the boundaries of the series in value terms. Industrial producer prices for the French and foreign markets are the indicators usually used to deflate invoicing for industrial products. The price measure is established at base prices, excluding VAT, product taxes and subsidies on non-deducted products.

At a level below CPF4, IPI series and producer price index series may not always be linked in a simple way. In addition, some products are not covered by industrial producer price indices.

**Summary: Invoicing**

- What is being observed?
  - Invoices in euros from legal units.
- Where? When?
  - In the accounting department, at the same rate as entry into the accounts.
- Measurement imperfections:
  - in the event of significant variations in product stocks;
  - more generally, the discrepancies between production and invoicing;
  - risks around the consistency between the value index and the price index.

## **1.4- Productive Hours Worked**

21 series in manufacturing series and three in construction are monitored in terms of hours worked. These series represent just under 10% of the manufacturing IPI with 2010 as the base year (in value added) and the entire construction index. The series monitored in terms of hours worked mainly concern the production of capital goods (such as shipbuilding) and the repair and installation of machinery and equipment.

The number of productive hours worked is used to track products with a long production cycle. For products with a long production cycle, the number of hours worked generally reflects actual activity more accurately than other indicators. It is important to ensure that the hourly data collected as part of the monthly branch surveys correspond to productive hours actually incorporated into the production process, excluding ancillary and overhead costs and also excluding paid hours not worked (leave). Productive hours must include the hours of any interim production staff employed.

### **Summary: Hours Worked**

- What is being observed?
  - hours worked.
- Where? When?
  - during the production process.
- What is missed:
  - productivity cycle;
  - difficulty in accurately measuring productivity trends over the recent period.

### Correcting the number of hours according to the productivity trend

Measuring production by productive hours worked presupposes that productivity remains stable. If this is not the case, the hours worked indicator must be associated with labour productivity indicator based on the following equation:

$$Production = Productive\ hours\ worked \times productivity$$

The trend observed for productivity over the past years is extrapolated to the period under review.

## **2- Changes in Production Indicators between the 2005 and 2010 Bases**

For many branches, the UN recommends using value production indicators. For these sectors, the transition to invoicing monitoring was considered, if producer price indices in industry were available and if there were no problems related to volatile stock variations. For example, the UN advises monitoring the automotive industry in value terms; the invoicing indicator is not used in this industry because of the significant variations in stock. The change in the distribution of monitoring methods between the 2005 and 2010 base years is detailed in Table 1. Before the implementation of the first wave of the new annual re-basing in March 2019, the distribution of monitoring methods with base year 2015 was identical to the 2010 base year. It has since changed slightly (see Table 1) with a slight increase in the proportion of series monitored in invoicing terms. This distribution should change again with the implementation of the second wave of annual re-basing in March 2020.

Table 1: Monitoring Indicators for the Current IPI and in Comparison with the 2005 and 2010 Base Years (Excluding Construction)

Monitoring Indicator	Base Year 2015 (After Implementation of the 1 <sup>st</sup> Wave of Annual Re-Basing in March 2019)			Base year 2010			Base year 2005		
	Number of series	Distribution of the number of series (%)	Distribution of VA (%)	Number of series	Distribution of the number of series (%)	Distribution of VA (%)	Number of series	Distribution of the number of series (%)	Distribution of VA (%)
Quantities	314	59.6	54.8	319	61.7	52.9	436	74	62.5
Invoicing	190	36.1	38.3	177	34.2	39.8	129	21.9	30
Hours	23	4.4	6.9	21	4.1	7.4	24	4.1	7.5
<b>Total</b>	<b>527</b>	<b>100.0</b>	<b>100.0</b>	<b>517</b>	<b>100</b>	<b>100</b>	<b>589</b>	<b>100</b>	<b>100</b>