11 Work-in-Progress

A fundamental national accounting principle is that production should be measured at the time it occurs and be valued at the prices of that time. Work-in-progress is significant for some activities, particularly construction and agriculture. In practice, measuring work-in-progress can be challenging. This chapter discusses the main concepts of work-in-progress and provides guidance on its application in the quarterly accounts.

Introduction

1 Work-in-progress concerns production that goes beyond one period. Measurement of such production poses the problem that a single process has to be split into separate periods. Because of the shorter accounting period, these difficulties are relatively more significant for quarterly national accounts (QNA) than for annual national accounts (ANA).

2 The general national accounting principle is that production should be measured at the time it takes place and be valued at the prices of that time. In most cases, this treatment presents no problems, because the production process is short and thus output can be measured from the value of the finished product. When the production process transcends a single accounting period, however, production needs to be shown in two or more periods. This production results in output of unfinished products, which is called work-in-progress in both business and national accounting. As stated in the *2008 SNA*, "it would distort economic reality to treat output as if it were all produced at the moment of time when the process of production happens to terminate" (paragraph 6.90). Also, where prices have changed during the production process, the price paid at the end will include holding gains (or possibly losses) that need to be excluded in order to have a correct measure of production.

3 There are many activities in which production cycles go outside a single period. Even with very short processes, there can be work-in-progress. Some activities have quite long production cycles and so work-in-progress is particularly important. These activities include the following:

a. *Agriculture, animal husbandry, forestry, and fishing.* In agriculture, crops may grow over several seasons. Similarly, growing livestock, cultivating timber, cultivating fruit, viticulture, and fish farming are all cases where production occurs over more than one period before the final output is marketed. Also, wool is usually collected only once a year.

b. *Manufacturing.* Ships, submarines, airplanes, and some heavy equipment have long production cycles.

c. *Construction.* The production cycle is often quite lengthy, varying from a few months for a house to many years in the case of a civil engineering project.

d. *Services.* Examples in this category are movies, architectural services, and large sport events.

4 This chapter first explores the general reasons why work on unfinished products is considered output. Subsequently, the principles of measurement and some practical solutions are discussed. Briefly, the solution for measuring of work-in-progress is to use output measures based on quarterly input costs in conjunction with values or markups for the whole process. Where such costs are not available, proxies such as fixed proportions can be used.[1]

5 Recording work-in-progress poses special difficulties for agriculture and related industries, because of the uncertainties intrinsic to the dependence of the

[1] As well as its direct effect on measuring output, work-in-progress also has consequential effects on income accounts, capital accounts, and balance sheets. These effects are discussed in the Annex 11.1.

production process on forces of nature and because of the volatility of prices. Also, because the concept of work-in-progress is not generally applied in the recordkeeping in these industries, its application in national accounts is exposed to criticism denouncing it as artificial.[2] It has been suggested that most of the problems involved in applying work-in-progress concepts to agriculture could be solved through the application of seasonal adjustment, but it should be emphasized that recording work-in-progress and seasonal adjustments are unrelated issues and that recording work-in-progress affects the unadjusted estimates. These issues are discussed in paragraphs 11.38–54.

Why Should Work-in-Progress Be Measured?

6 Inclusion of work-in-progress affects many components of the accounts, but in a consistent way, so that it does not create discrepancies. In addition to the effect on output, there is an equal effect on operating surplus/mixed income and other income aggregates. On the expenditure side, output in the form of work on unfinished products is classified either as fixed capital formation or as changes in inventories of work-in-progress. It is part of fixed capital formation if it consists of construction work done on contract and put in place in stages or if it consists of capital goods produced on own account by their eventual final user. In all other cases, including speculative construction (i.e., without a contract and not for own final use) and most agricultural production, work-in-progress is included in changes in inventories. Financial transactions are unaffected, except in the case of construction work on contract, because resulting changes in estimates on saving are fully absorbed in the estimates on fixed capital formation or changes in inventories for the same institutional unit. In the case of production of a capital good under contract, however, the full effect on saving for the producer will be carried over to the financial account in the form of payments received from installments and other accounts receivable accrued.

[2] Examples can be mentioned in which prices do reflect the value of work-in-progress. One such example is keeping sheep for wool, where the price of sheep reflects the harvestable amount of wool (prices plunge immediately after shearing).

7 Proper recording of work-in-progress has the added advantage of removing production-related holding gains and losses from the estimates, which should also be done in ANA. The potential danger of leaving holding gains and losses in the estimates can be large, especially if inflation is substantial. If production processes do not exceed the accounting period for the ANA, the holding gains and losses involved in work-in-progress risk being ignored in the compilation of these accounts. An important message to the compilers of ANA is that they should also remove holding gains and losses from their estimates on sub-annual production processes, not only to ensure consistency between ANA and QNA, but also to achieve correct ANA estimates.

8 Production is "an activity in which an enterprise uses inputs to produce outputs" (*2008 SNA*, paragraph 6.10). Thus, production is a process that leads to a distinct product, but the recording of inputs and outputs in the accounts is not determined by the time that the finished product becomes available for use. Paragraph 6.90 of the *2008 SNA* explains this further as follows:

> For simplicity, the output of most goods or services is usually recorded when their production is finished. However, when it takes a long time to produce a unit of output, it becomes necessary to recognize that output is being produced continuously and to record it as "work-in-progress."

9 While it is useful to emphasize that production is a process rather than the resulting product, the definitions are circular to the extent that the recognition and measurement of production depend on the meaning of output. In the *2008 SNA*, output does not mean finished products but can be any goods or services that "can be sold on markets or at least be capable of being provided by one unit to another" (*2008 SNA*, paragraph 1.40). For instance, an unfinished construction project and a crop growing in the field both have the quality of having value that can, at least potentially, be provided to another unit, and hence output can be recognized and measured.

10 In the absence of recognition of work on unfinished products as output, inputs would appear in different periods from the corresponding output. As a

result, value added could be negative in some periods and disproportionally large in other periods. Thus, the meaning of value added for the affected periods would be open for debate.[3]

11 An objection is sometimes made that recording work on unfinished products as output brings intransparency to the accounts. That is, it involves unnecessary complexity and artificiality and distorts the view of income generation and saving, because output does not generate money inflows before it is sold. Two arguments counter this view. First, transactions in the national accounts need not necessarily involve actual money flows; well-known examples are barter transactions and wages in kind. Second, one could also argue that disregard of work-in-progress results in artificiality because outlays on production would show up without any apparent link to output.

12 It is sometimes suggested that recording work-in-progress is relevant on the level of individual units, but for the total economy, or even specific industries, aggregation would cancel out the effects of not recording work-in-progress. This would only apply in the situation of very stable period-to-period production processes, however, which is highly unlikely to reflect real conditions, particularly in the context of QNA.

Measurement of Work-in-Progress

Economic Concepts

13 The starting point for the theoretical and practical issues in measurement of production is economic theory. The general principle of valuation in economics is use of the transaction price. In a very few cases, an incomplete project may be marketed, such as when an unfinished building project or a farm with crops in the field changes hands. It is far more common, however, that products are not sold until finished, so transaction prices are generally not available for the unfinished product. It is, therefore, necessary to adopt a convention to value the production in each period.

14 The usual principle to value an item when there is no transaction is the market-equivalent price. The market equivalent is what buyers would be prepared to pay if they wished to obtain the unfinished product or what suppliers would need to be paid to produce it. This value is equivalent to the total input costs for each period plus a markup. Because there is no separate markup for each quarter, the markup must be the ratio of output to costs for the whole production cycle. In other words, the net operating surplus is estimated as earned over the production cycle in proportion to costs in each period.

15 In the rest of this section, the application of the convention of valuing work-in-progress carried out in a certain quarter as input costs plus a markup is discussed in a business and national accounting context. The section also discusses methods to use when data are incomplete and how to account for the effects of changes in prices during the production period.

Business Accounting Treatment of Work-in-Progress

16 Business accountants face the same problem of splitting incomplete production cycles into accounting periods. Estimation of the value of work put in place is part of an accrual accounting system. Businesses seeking to measure their own performance need to value the work put in place to match output with expenses and avoid lumpiness in their accounts. In the absence of observable prices, business accounts must also depend on input costs, with or without some markup.

17 However, there are two areas of difference between business accounting practice and economic concepts. First, business measures of income do not distinguish between holding gains and production, whereas this difference is fundamental in economic analysis. Second, because of the doctrine of prudence in business accounting, work may be valued at less than the expected price (i.e., without a markup or with an underestimated markup), so that profits are not counted fully or at all until they are realized. This delay in recognition of profits causes lumpiness at the completion of the work, but time-series consistency is less important to business accounting.

18 There are three alternative arrangements for work on products with long production cycles:

- own final use,
- contract, and
- speculative basis (i.e., the final client is not known).

[3] Note that negative value added can legitimately occur (such as where the marketable product is small in relation to inputs—for instance, the start-up phase of a business or other loss-making situations). However, it is not desirable that negative value added appears simply because of failure to recognize that a productive process was occurring.

19 For work for own final use, the producer is the final user: for example, an electricity company builds its own generating plant or distribution network. In this situation, there is no transaction price, even on completion. Accordingly, output is measured by the enterprise itself, ideally at a market-equivalent price or, more typically, on the basis of input costs, including capital costs and overhead. If measured from costs, the data are already recorded on an ongoing basis by the producer, and there is no more difficulty in measuring production in each period than there is in measuring the total project.

20 For contract work, there are different possible payment arrangements. A price may be fixed in advance or variable, or paid by installments or at the end of the job. Progress payments are installments that relate to the amount of work done. To the extent that progress payments closely match work done, they already measure output on an ongoing basis. However, if payments are infrequent, delayed, or have a substantial bonus component at the end, they give a misleading time series, and a cost-based measure would provide a better measure of production.

21 For work done on a speculative basis, there are no ongoing receipts and usually the final value of the product is unknown until after completion. This situation is common in manufacturing and construction. In addition, many agricultural products resemble speculative manufacturing or construction, in that there is no sale or identified buyer until after the product is completed. In contrast to manufacturing and construction, however, estimates of work-in-progress are not normally made by farmers in their own accounts.

22 Measures of work-in-progress are often available, particularly from larger and more sophisticated producers. Such estimates have the advantage that the data are transparent and estimation is done at a detailed level with specific information. However, such data are not automatically suitable. For example, progress payments or installments may not match work done because of long lags or because there is a large component of bonus for the completion of the job. Or it may also be too costly to collect business data quarterly: for example, if building work is done by many small operators who are reluctant to complete statistical questionnaires. Or the quarterly data may be too lumpy if the profit is only included at the time of sale. In these circumstances, it is necessary to derive estimates for national accounts by making adjustments to business estimates.

Measurement in a National Accounts Context

23 The *2008 SNA* recommendations on the economic valuation of incomplete products discussed in section "Economic Concepts" are partly compatible with business practices. The *2008 SNA* recommends following the businesses' own estimates if they approximate production, mentioning progress payments on a contract (paragraph 6.112) and capital goods for own final use (paragraph 6.125). When no acceptable quarterly output data are available from businesses, the *2008 SNA* principle is to measure production of incomplete products from costs for each period, raised by a markup that relates to the whole production cycle.

24 Changes in prices during the production cycle affect the measurement of production. When prices are changing, the eventual value at the time of completion will differ from the sum of the value of work-in-progress carried out in the production quarters, because the prices of that kind of product have changed between the time of production and the time of completion. The difference represents holding gains or losses. In order to measure production, price changes between the time of production and the time of sale must be removed from selling prices. These problems can be avoided by compiling constant price estimates first (to put all the flows on a consistent basis) and subsequently deriving the current price estimates on the basis of the constant price estimates. (This deflate-then-reflate method is found in related areas of inventory valuation and capital stock measurement where valuation also includes prices from different periods.)

25 The measure of input costs should be as complete as possible. The input costs should include compensation of employees, intermediate consumption, other taxes less subsidies on production, and costs of using land and capital (rent, consumption of fixed capital, and interest). In cases where owners and unpaid family members are an important source of labor, it is desirable to derive a value for these inputs as well.

In practice, the data on costs may be incomplete and so the markup needs to be adjusted accordingly. Obviously, some of these input costs are part of value added (for instance, compensation of employees) and some are implicitly included in operating surplus/mixed income (for instance, rent and interest). This does not preclude them, however, from being costs of production that must be taken into account when estimating output from the cost side.

26 Allocation of output on the basis of costs does not always apply in full. From the rationale for work-in-progress—namely, allocating output to periods in which production is occurring—it logically follows that no output should be allocated to periods in which there is no ongoing production process, even if there are ongoing costs. This applies in particular to the cost of using land and capital, which may not correspond to the actual production process. For instance, interest on a loan financing a piece of equipment accrues over the period of the loan, no matter whether the equipment is used. An example of a situation in which this may apply is agriculture, where production may stop completely during certain periods. Food-processing industries that are dependent on harvests coming in are also an example. In these cases, it is important to clearly define the production periods (for instance, in Nordic climates, the agricultural production periods may include autumn when land preparation takes place, exclude winter when no activities take place, and commence again in spring with seeding, fertilizing, etc.).

27 Example 11.1 brings together the measurement issues discussed so far. It covers an ex post situation: that is, after the completion of the product when the final price is known. Data on input costs are also available. In the example, the final price and cost data are used to derive a markup ratio for the whole project. The example shows the derivation of output estimates and, from that, the calculation of holding gains.[4]

28 From the example, it is important to note that holding gains are excluded from production measures. Hence, the output is 5,040 in the example, not 5,800. A substantial rate of price increases is assumed, so the holding gains are quite large in the example. It should also be noted that the cost/markup ratio is derived at constant prices (i.e., 4,000/3,000) and not at transaction prices (i.e., 5,800/3,780), because the latter include holding gains. It is also worth noting that the quarterly estimates of output, by definition, follow the same quarterly pattern as the costs. It can be seen that the recognition of work-in-progress results in a less lumpy series for output. It is not a substitute for seasonal adjustment or calculation of a trend-cycle series, however, because the series will still be subject to any seasonality or irregularity in the cost series.

29 Having established the general principles of measurement, we will now consider some of the permutations arising from different data situations. The situations covered include deriving the markup when there are (a) other payment times, (b) quantities available but not values, and (c) forecasts available instead of actual prices for the final product. When markups for a particular period are not available, other sources of markups are considered. Where cost data are not available, the use of a cost profile is proposed.

30 In some cases, payment is not made at the completion of the product. It may be made at the beginning of work or in several installments. An advance payment reflects prices of the beginning of the period. If the price is paid in installments, such as progress payments for construction work, the payments are from several

[4] The examples in this chapter are designed to show concepts and may not be realistic from the point of view of data availability.

Example 11.1 Work-in-Progress: Ex Post Approach

(a) Total Value of Project
(b) Quarterly Costs

Objectives of example:

(a) To illustrate the allocation of a total on the basis of costs
(b) To illustrate the inclusion of holding gains in the total value

Consider a speculative construction project taking place between January and December 2011. It is completed and sold at the end of December 2011 for $5,800. The objective is to produce output estimates for each quarter and exclude holding gains from the output estimates. A high rate of price increases is assumed in order to highlight the effect of holding gains.

Example 11.1 Work-in-Progress: Ex Post Approach *(continued)*

Primary Data

	q1 2011	q2 2011	q3 2011	q4 2011	q1 2012
Output/input price index (average 2010 = 100)	110.0	120.0	130.0	140.0	150.0
Production costs at current prices:					
Intermediate consumption	160	340	530	300	
+ Compensation of employees	300	310	340	400	
+ User costs for use of land and capital, etc.	200	250	300	350	
= Total production costs at current prices	660	900	1,170	1,050	

To simplify the calculations, the same price index is used for inputs and outputs; in principle, separate price measures should be used.

Step 1. Derive value of the project at average 2010 prices

Deflator value at the end of q4 2011 1/2(q4 2011 + q1 2012) = 145.0

Value at average 2010 prices 5,800/1.45 = 4,000

The value of the project at average 2010 prices is estimated by deflating the sales value with a price deflator that reflects changes in prices of similar projects from average 2010 to the end of q4 2011. The price index given measures the average price level in each period of similar construction products relative to their average price in 2010. Assuming a smooth change in prices over time, the deflator value at the end of q4 2011 can be estimated as approximately (140+150)/2 = 145.

Step 2. Derive costs at constant prices

	q1 2011	q2 2011	q3 2011	q4 2011	Total
Production costs at 2010 prices	600	750	900	750	3,000

In Step 2, input estimates at constant prices are derived by deflating the current price values.

Step 3. Derive the output/cost ratio

Output/cost ratio at average 2010 prices, the markup ratio (1.333), is derived as the value of the project by total costs (4,000/3,000).

The output/cost markup ratio is calculated for the project. It has to be derived at constant prices to exclude holding gains.

Step 4. Derive output at constant and current prices

	q1 2011	q2 2011	q3 2011	q4 2011	Total
Output at average 2010 prices	800	1,000	1,200	1,000	4,000
Output at current prices	880	1,200	1,560	1,400	5,040

Quarterly output at 2010 prices is derived by raising the value of costs at 2010 prices by the output/cost ratio. Quarterly output at current prices is derived by reflating the estimates of output at 2010 prices.

Step 5. Derive value of the stock of work-in-progress at current prices

	Value of Work Put in Place Current Prices ($)	Holding Gains in Subsequent Quarters				Value at Time of Sale ($) December 2011
		q1 2011	q2 2011	q3 2011	q4 2011	
q1 2011	880	40	80	80	80	1,160
q2 2011	1,200		50	100	100	1,450
q3 2011	1,560			60	120	1,740
q4 2011	1,400				50	1,450
Total	5,040	40	130	240	350	5,800
		<---------- 760 ---------->				

The derivation of holding gains is shown in this step. In this example, the output price index shows that the prices of similar construction projects increased continuously during 2011. Thus, the prices are higher at the end of each quarter than in the beginning or middle of the quarter. As a result, the total cumulated value of work put in place ($5,040) differs from the project sales value ($5,800), because prices have risen between the time of construction and time of sale: that is, the sales price includes both output and holding gains.

For example, the work put in place in q1 is worth $800 at 2010 prices, but $880 at average q1 prices (i.e., 800 × 1.1), $920 at the end of q1 (i.e., 800 × (1.1 + 1.2)/2), $1,000 at the end of q2 (i.e., 800 × (1.2 + 1.3)/2), $1,080 at the end of q3 (i.e., 800 × (1.3 + 1.4)/2), and $1,160 at the end of q4 (i.e., 800 × (1.4 + 1.5)/2).

different periods and, hence, different price levels. In each case, by converting the payments to constant prices (using the price index of the time of payment), the measurement can be put on a consistent basis and the calculations can be made accordingly. (if progress payments closely match production costs and timing, they should be used directly to estimate output.)

31 In some cases, the data available on the final product are in quantity terms: for instance, a house measured in square meters or a crop in tons. The principles of measurement are the same as in Example 11.1, except that the constant price values are derived by multiplying the volume measure by a price per unit in the base year. Current price values can be derived by multiplying the volume measure by a price per unit in the current period. In the case of some crops, there are special problems in measuring prices in periods between harvests; these issues are discussed in paragraphs 11.38–54 of this chapter.

32 Forecasts may need to be used for incomplete work if the value of the final product is not yet known. While national accountants do not normally use forecasts, unfinished production may require forecasts, and such forecasts are often available. For example, builders often forecast a value of a project at the time of seeking building approval. Also, in many countries, the Ministry of Agriculture (or another government agency) makes forecasts of the output of a certain crop. (These usually are in volume terms, but sometimes also in value terms.) These crop estimates are typically based on an estimate of the acreage under cultivation combined with yield estimates. Estimates of acreage under cultivation could be based on surveys or on aerial and satellite photography; yield estimates could be based on average crop yields and revised on the basis of expert views and trends. It may be surmised that in many agricultural countries, this kind of information is available. In some cases, it may be necessary for the national accounts compilers to make forecasts themselves. While forecast values differ in being more uncertain and more subject to revision, the method for calculation of quarterly output is the same as the ex post situation. Of course, when actual data become available, the data should be revised and the difference between the forecast and actual value assessed for accuracy and signs of bias.

33 When there is no actual or forecast estimate of the finished value, the *2008 SNA* recommends estimation of output on the basis of costs plus an estimate of a markup from another source without elaborating how this markup is to be derived. Possible sources are studies on standard margins used in a particular industry, a previous year's data, or comparable recently completed projects. Example 11.2 demonstrates how such methods could work in practice.

34 The concept and measurement of quarterly production are the same in Examples 11.1 and 11.2. Only the source of the markup ratio is different: in Example 11.1, a markup ratio for the particular project is

Example 11.2 Work-in-Progress: Ex Ante Approach

(a) Quarterly Costs
(b) Markup Ratio

Objective of example: To illustrate the calculation of work on the basis of costs and markup

Primary Data

	q1 2011	q2 2011	q3 2011	q4 2011
Output/input price index (average 2010 = 100)	110.0	120.0		
Production costs at current prices (wages and salaries, raw materials, etc.)	660	900		
Industry standard average markup over costs, 33.3% after excluding holding gains	1.333 (in ratio form)			

Step 1. Derive output at current and constant prices

	q1 2011	q2 2011	q3 2011	q4 2011
Production costs at average 2010 prices	600	750		
Output at average 2010 prices	800	1,000		
Output at current prices	880	1,200		

The data are the same as for the first two quarters in Example 11.1.

Production costs at constant prices are derived by deflating the current price value (e.g., for **2011** q1, 660/110 × 100).

Output at average 2010 prices is derived by multiplying the production costs at 2010 prices by the markup ratio (e.g., for 2011 q1, 600 × 1.333 = 800).

Output at current prices is derived by reflating the constant price value (e.g., for 2011 q1, 800 × 110/100).

Example 11.3 Work-in-Progress: Cost Profile Approach

(a) Estimate of Output Quantities
(b) Cost Profile

Consider a crop that takes four quarters to grow, from preparation of the cultivation area beginning in the first quarter of 2011 to harvesting in the fourth quarter of 2011.

Primary Data

	q1 2011	q2 2011	q3 2011	q4 2011	q1 2012
Output price index (average 2010 = 100)	110.00	112.00	114.00	116.00	118.00
Cost profile	0.20	0.25	0.30	0.25	
Total estimated crop	1,000 tons				
Average value per ton for similar crops in 2010	5.0				

Step 1. Derive total output at constant prices

Value at average 2010 prices 1,000 × 5.0 = 5,000

Step 2. Derive quarterly output at current and constant prices

	q1 2011	q2 2011	q3 2011	q4 2011	Total
Output at average 2010 prices	1,000	1,250	1,500	1,250	5,000
Output at current prices	1,100	1,400	1,710	1,450	5,660

First, the value of the crop at average 2010 prices is estimated by multiplying the physical data on the volume of the crop by the obtained data on average value per ton in 2010: that is, 1,000 × 5 = 5,000.

Second, output estimates at constant prices are derived by distributing the estimated value of the crop at average 2010 prices over the quarters in proportion to the assumed production intensity. For instance, the constant price estimate for q1 2011 is derived as 0.2 × 5,000 = 1,000.

Third, output estimates at current prices are derived by inflating with the output price index. For instance, the estimate for q1 2011 is derived as 1,000 × 1.1 = 1,100.

Note that the harvest value (at end-of-production prices) could be derived as 1,000 × 5 ×(1.16 + 1.18)/2 = 5,850. The difference between the harvest value and the estimate of output at current prices is holding gains (5,850 – 5,660 = 190). (One of the difficulties surrounding the inclusion of agricultural work-in-progress is that output differs from harvest value, which may seem counterintuitive to many users.)

derived in Steps 1–3; in Example 11.2, it is taken from previous data. The estimates made ex ante, as in Example 11.2, would need to be revised when actual prices and volumes became available.[5] The technique shown in Example 11.1 could then be used, so that the markup ratio assumed in advance could be replaced by the actual one. If markup ratios vary substantially from year to year, as is often the case for agriculture, the revisions may be quite large. This danger looms large in situations in which output depends on exogenous factors, as is the case for agriculture and related industries (for instance, if a locust plague necessitates an extraordinary use of pesticides for a certain crop). In such cases, a markup based on a forecast of the annual crop should be preferred to markups based on previous data.

35 Another common data situation is that quarterly cost data are unavailable; in that case, a cost profile can be used instead. Actual data on input costs may not be available because of collection costs or because businesses do not keep separate records of costs for each project. An alternative in such situations is to make an estimate for each quarter's share of total costs: that is, a cost profile. It could be based on statistical observations on input intensities in recent periods or on expert views. Statistical observations could be obtained through small-scale surveys, because cost patterns in industries of concern are often fairly standard between units and also fairly stable. For instance, in agriculture, the cost pattern is strongly dependent on the growth phases of crops, and in construction, the pace of production is strongly dictated by an inherent sequence of activities. If a production process is strongly dictated by physical or biological factors, expert opinions may suffice to establish a cost profile. If stable, the same profile could be used for all periods. If all of this is not available, a very simple production profile, such as an equal distribution over time, could be used as a default. The cost profile should be calculated from the constant price data on production costs.

36 Use of a cost/production profile is shown in Example 11.3. A cost profile is derived from the

[5] In some cases, such as the production of movies, no actual market price is available at the end of the production process and the value has to be derived through an estimate of discounted future receipts. (This estimate is more likely to be effective for aggregates than for an individual movie.) This is further explained in chapter 20 of the *2008 SNA*.

data in Example 11.1—the production cycle lasts four quarters, with 20 percent in q1 (i.e., 600/3,000), 25 percent in q2, 30 percent in q3, and 25 percent in q4. By definition, the cost profile has the same pattern as the resulting production estimate at constant prices.

37 The cost profile method is often used for construction in conjunction with data on building permits. In cases where only volume indicators such as square meters are available, the values are derived by average prices per unit obtained from a benchmark survey or expert assessment. If value data are available, the value concept needs to be identified—current prices or forecast end-of-period prices. The cost profile should take into account the lags between approval, commencement, and completion. It may also account for low work periods such as monsoons and holiday/vacation periods. The expected value should be adjusted for projects that are approved but not implemented. Also, it might be desirable to estimate work-in-progress on individual large projects on a case-by-case basis; compilers of source statistics might be best placed to do this.

Special Issues for Agriculture

38 The general principles of recording production on an ongoing basis also apply to agriculture. The principles of consistency between related transactors, transactions, and stocks of the accounts also apply to agriculture. In some economies, own-account production of biological resources that take longer than one year to mature may be significant. If biological resources are grown for harvest or for slaughter, not recording work-in-progress would result in a misallocation of production across years. If grown for capital formation, not including this production in output as work-in-progress would result in an underestimation of gross domestic product (GDP).[6]

39 Cultivated biological resources encompass a number of types of product and production processes. Production results in different account entries and lengths of time over which production occurs, depending on the products and their intended uses.

40 For tree, crop, and plant resources,

a. If grown for harvest, such as grains, vegetables, and timber grown for harvesting (plantation forestry), growth through the production period should be recorded as output in the production account, change in inventories, and work-in-progress in the capital account. Growth to maturity for timber grown for harvest may take several years.

b. If grown for their repeat products, such as grape vines and trees grown for their fruit, nuts, or sap, growth to maturity should be recorded as output in the production account and gross fixed capital formation in the capital accounts if grown on own account. If not grown on own account, growth should be recorded in output and work-in-progress inventories for specialists who grow such products for sale, such as plant nurseries, unless bound by a contract of sale as explained in paragraph 11.20 of this chapter. Note that this process may take several years. Once the tree, crop, or plant resources have reached maturity, output is measured in terms of the repeat products they produce (grapes, nuts, etc.), and consumption of fixed capital should be recorded for the decline in value of the assets due to their physical deterioration, normal obsolescence, or normal accidental damage.

41 For animal resources, including fish,

a. If grown for slaughter, the treatment is the same as for plant resources grown for harvest. Note that some animals may take more than one year to grow to maturity.

b. If grown for their repeat products, such as breeding animals, dairy cattle, sheep and goats grown for their wool and milk, and working animals for transportation and farm work, the treatment is the same as for plant resources yielding repeat products, including the consideration of whether grown on own account or by specialists. Example 11.4 shows how the work-in-progress principle applies to cattle farming.

c. Consumption of fixed capital should, conceptually, be recorded from when the animals reach maturity until the end of their economic life, at which time the disposal of a fixed asset is recorded.

[6] An incomplete view in the accounts would also occur with production of repeat products being recorded derived from fixed assets that were never recorded.

Example 11.4 Work-in-Progress for Livestock

(a) Compile a perpetual inventory model of the production of live animals
(b) Adjust the output estimate of live animals by weight gain to derive the work-in-progress output

This example relates to raising cattle for meat.

The opening inventory in q1 2011 is 68 head of cattle, including 64 breeding cows and 4 bulls. The farmer maintains the same stock over time. All the breeding females calve once during the year, with a gestation period of three quarters.

For this example, it is assumed that the cows get pregnant at the beginning of q2 and the calves are born at the beginning of q1. On average, each calf weighs 30 kg at birth, so the calf grows by 10 kg each quarter over three quarters prior to birth.

All calves are sold once they are one year old (mid-quarter) and the weight gain for calves is 40 kg per quarter. No animals are purchased or died during the period. The relevant output price for livestock is the farmgate price per kilogram for live weight (LW) of the animals. In 2010, the LW was $5 per kg. The average quarterly price index is given as follows:

Price index	q4 2010	q1 2011	q2 2011	q3 2011	q4 2011	q1 2012	q2 2012	q3 2012	q4 2012	q1 2013
LW price index (average 2010 = 100)	100	102	104	106	108	110	112	114	116	118

Step 1: Produce livestock inventory model

The first step is to calculate a quarterly model of livestock inventory. Given the assumptions, the same number of calves are born and sold in the first quarter every year. As a result, the closing inventory (68) exactly matches the opening inventory.

Livestock Inventory (Number)	q4 2010	q1 2011	q2 2011	q3 2011	q4 2011	q1 2012	q2 2012	q3 2012	q4 2012	q1 2013
Opening Inventory		132	132	132	132	132	132	132	132	132
Born(+)		64	0	0	0	64	0	0	0	64
Sold (–)		64	0	0	0	64	0	0	0	64
Closing Inventory	132	132	132	132	132	132	132	132	132	132

Step 2: Calculate the value of output and changes in stock at 2010 constant prices

To calculate the output value at constant prices, the weight gain of cows and calves in each quarter should be multiplied by the fixed $5 per kg price in 2010. The weight gain of cows is an indirect measure of the growing process of calves. In the SNA, an immature animal should be recorded as gross fixed capital formation (*2008 SNA*, paragraph 10.91). Once the calves are born, their weight gain is treated as changes in inventories. At constant prices, both weight gains should be valued using the fixed price of the base year. Output is derived as the sum of gross fixed capital formation, changes in inventories, plus the sales of calves (which are made in q1 by assumption).

It should be noted that the value of sales in q1 more than compensates the loss in weight of cows and calves due to the start of a new calving cycle. The output estimate is stable during the year, because the output sold in q1 is accounted for in the rest of year by considering the weight gains of cows and calves. It should also be noted that the sales of calves should be recorded as intermediate consumption of the meat processing industry.

Constant Prices ($ '000)	q4 2010	q1 2011	q2 2011	q3 2011	q4 2011	q1 2012	q2 2012	q3 2012	q4 2012	q1 2013
Cows (LW 400 kg × 64 cows × $5)		128.0				128.0				128.0
Cows (LW 405 kg × 64 cows × $5)			129.6				129.6			
Cows (LW 415 kg × 64 cows × $5)				132.8				132.8		
Cows (LW 425 kg × 64 cows × $5)	136.0				136.0				136.0	
Calves (1.5 months old – 50 kg)		16.0				16.0				16.0
Calves (4.5 months old – 90 kg)			28.8				28.8			
Calves (7.5 months old – 130 kg)				41.6				41.6		
Calves (10.5 months old – 170 kg)	54.4				54.4				54.4	
Use closing stock of current quarter less closing stock of previous quarter to value:										
Gross fixed capital formation (Value of weight gain of cows)		(8.0)	1.6	3.2	3.2	(8.0)	1.6	3.2	3.2	(8.0)
Changes in inventories (Value of weight gain of calves)		(38.4)	12.8	12.8	12.8	(38.4)	12.8	12.8	12.8	(38.4)
Sale of calves 12 months (190 kg)		60.8				60.8				60.8
Change in value due to weight gain of cows from one quarter to the next plus weight gain of calves:										
Output value		14.4	14.4	16.0	16.0	14.4	14.4	16.0	16.0	14.4

Example 11.4 Work-in-Progress for Livestock *(continued)*

Step 3: Calculate the value of output and changes in stock at current prices

The value of changes in stock at constant prices derived in Step 2 is converted into current prices using the average price change for the relevant quarter. The gross fixed capital formation and changes in inventories estimates are derived as the difference between the current price value in a quarter and the current price value in the preceding quarter. Holding gains from the previous quarter should be eliminated. The current value of sales is also assumed to follow the LW price index.

For example, the current price value of gross fixed capital formation in q1 2011 is the difference between the current price value of cows in q1 2011 (130.6) and the current price value of cows in q4 2010 revaluated to eliminate holding gains (136.0 × 1.02 = 138.7).

By construction, the output deflator exactly reproduces the changes in the output price index used in the model.

Current Prices ($ '000)	q4 2010	q1 2011	q2 2011	q3 2011	q4 2011	q1 2012	q2 2012	q3 2012	q4 2012	q1 2013
Cows (400 kg, incl. holding gains)		130.6	133.1			140.8	143.4			151.0
Cows (405 kg, incl. holding gains)			134.8	137.4			145.2	147.7		
Cows (415 kg, incl. holding gains)				140.8	143.4			151.4	154.0	
Cows (425 kg, incl. holding gains)	136.0	138.7			146.9	149.6			157.8	160.5
Calves (1.5 months old, incl. holding gains)		16.3	16.6			17.6	17.9			18.9
Calves (4.5 months old, incl. holding gains)			30.0	30.5			32.3	32.8		
Calves (7.5 months old, incl. holding gains)				44.1	44.9			47.4	48.3	
Calves (10.5 months old, incl. holding gains)	54.4	55.5			58.8	59.8			63.1	64.2
The work-in-progress valuation of output is then allocated to gross fixed capital formation and changes in inventories as follows:										
Gross fixed capital formation		(8.1)	1.7	3.4	3.5	(8.8)	1.8	3.7	3.8	(9.5)
Changes in inventories		(39.2)	13.4	13.6	13.9	(42.2)	14.4	14.6	14.8	(45.3)
Sales		62.0				66.9				71.7
Output value		14.7	15.1	17.0	17.4	15.9	16.2	18.3	18.6	16.9
Output deflator (2010q4 = 100)		102.0	104.0	106.0	108.0	110.0	112.0	114.0	116.0	118.0

42 It may be feasible to use one of the methods discussed in the previous section, typically a cost profile in conjunction with actual totals (for previous years) or forecasts (for the current year).

43 However, the degree of uncertainty about the eventual output makes the treatment somewhat more problematic for agriculture and related industries, both for practical and conceptual reasons. This has caused many countries not to apply the work-in-progress concepts in the case of agriculture.

44 Weather is the major component of uncertainty in agriculture. There are variations in temperature, rainfall, and sunlight, with droughts, hurricanes, and floods being the extremes. Also, in some cases, insect or other animal plagues may be important. The degree of uncertainty varies significantly among countries and may affect some products more than others.

45 One aspect of uncertainty is that estimates made before the harvest or completion of production need to be based on forecasts of both volume and price data. This is particularly the case in the QNA, where the emphasis on timeliness implies that the estimates for preharvest quarters will have to be made well in advance of harvest time. If the value is uncertain, there are concerns about potentially large revisions in the national accounts. If growing period to maturity spans several years, the potential impact of these sources of uncertainty on final harvest volumes and prices may be significant. Consequently, the transparency and application of the national accounts revision policy is important, since revisions will be necessary. For some countries, significant revisions are not well understood or well accepted by some users as being an integral and inevitable element of the statistical

process. In these cases, it may be very difficult to convince users of the importance of making estimates of work-in-progress.

46 Another aspect of uncertainty concerns catastrophic events. The treatment of output losses in the national accounts is quite different between normal events and catastrophes. For normal events, the losses are reflected in reduced output, because only the output that materialized is recorded. For catastrophes, output is measured as if nothing happened and the losses are recorded on the other changes in volume of assets account. Recording a crop or growth of animals that never materialized in output because of a catastrophe is counterintuitive.

47 The *2008 SNA* restricts catastrophic events to singular events of a general nature: for example, major earthquakes, volcanic eruptions, tidal waves, exceptionally severe hurricanes, drought, and other natural disasters (paragraph 12.46). Limitation of catastrophic events to singular events of a general nature means, among other things, that losses of crops or animals through frequent floods and droughts should not be regarded as catastrophic losses, no matter how devastating they are for crops under cultivation. The *2008 SNA* definition of catastrophic events leaves room for interpretation, however, which may hamper international comparability and generate anomalous differences over time. For example, higher production would be recorded when floods and droughts are classified as catastrophic than for when they are considered to be in the normal range.

48 A further aspect of uncertainty concerns the prices to assign production in non-harvest periods. This issue of price uncertainty arises in both ex post and, even more, ex ante data. There may be no or only a very limited market for crops or animals in the non-harvest periods, so that the prices are more uncertain and have to be extrapolated (ex ante) or interpolated (ex post). The prices of crops[7] or animals in non-harvest periods may be available but may be misleading to the extent that they also include storage and holding costs or the off-season scarcity of fresh produce. In such cases, the observed prices would not be relevant for valuing the harvest. As a solution, some downward adjustment based on past years' off-season patterns may be derived, or the observed prices could be replaced by interpolation or extrapolation of harvest prices. In addition, prices of subsequent years' crops or animals may be quite unrelated, so estimation of the work-in-progress on the new harvest with prices of the old may be misleading. The supply-and-demand situation often differs considerably among crops, so that the prices may be completely different. For instance, if an abundant crop is followed by a meager one, the price of the second crop at harvest time may jump compared with the price of the first crop. Obviously, in such a case, the current price estimates need to be revised, but the price development of the first crop is not valid for the revision of the quarterly estimates. A relatively simple solution to this problem, ex post, would be to derive new indices relevant for the production quarters of the new crop by an interpolation between the price of the previous crop at harvest time and the price of the present crop at harvest time. Ex ante, forecast price data are required until actual data become available.

49 Consideration of behavioral aspects is relevant to the inclusion of agricultural work-in-progress in national accounts estimates. If the economic agents themselves react to the uncertainty of prices and volumes by behaving as if the work-in-progress carried out were not output (and thus not generating income), then the estimates will not help in understanding economic developments. The consistency of data across transactors, transactions, and stocks becomes important in this regard.

50 By measuring production before the producers do, statisticians may be exposed to the accusation of counting the chickens before they hatch. Unlike many other producers, farmers do not normally record their own work-in-progress. One singular aspect of this would be the imputation of income flows before they are realized, and possibly even in cases in which they are not realized. As a result, the concerns about artificiality and complexity of methods are particularly strong in the case of components of agriculture that are particularly prone to uncertainty. For that reason, in the case of agriculture, recording production simply as the harvest value, in the periods of harvest, may be considered. However, for some production, there may be no harvest, or the harvest becomes a different activity (e.g., growth of grape vines and fruit trees, breeding animals to maturity, or logging of plantation forests). In

[7] If no local prices are available, world-market prices could be considered; however, these prices may not be indicative for local supply in a particular country. The situation may be exacerbated in some countries if the informal sector is dominant in agriculture and market transactions are relatively rare.

which case, GDP will be underestimated unless output as work-in-progress is recorded at the time it occurs.

51 Whether a harvest or work-in-progress approach is used for agriculture, the resulting output series will often be lumpy. In the case of the harvest approach, the output will often be concentrated in one or two quarters, while the others may have little or no output. In the case of the work-in-progress approach, discontinuities will occur between crop years, effectively because of the change in the output/cost markup ratio. With either approach, the lumpiness is the valid and necessary result of the production concept adopted in conjunction with the intrinsic limitations of presenting an annual process in a quarterly form. It would be feasible to smooth out the lumpiness in the series by mathematical techniques, but in the context of nonseasonally adjusted data, this would not be justified by the economic concept of production and would just cover up the issue. Users, however, may prefer the seasonally adjusted or trend-cycle series for some purposes.

52 Because of their special features, quarterly data on agricultural production need to be interpreted carefully. The data are necessarily artificial when a yearly, multiquarter, or multiyear process is split into quarters. If a cost profile is used to implement a work-in-progress approach, the quarter-to-quarter movements are driven by the cost profile used rather than by new information on output. In this case, a pro rata methodology is acceptable and the resulting step effect correctly reflects the change in level of production between growing seasons. These steps should not be removed in the original series through benchmarking techniques as recommended in Chapter 6. However, because the cost profile is a seasonal pattern, it will be removed by the seasonal adjustment process, provided seasonal adjustment of the data is applied, although careful analysis of the process and results will be essential.[8]

[8] If there are zero-production periods, a nonmultiplicative method of seasonal adjustment must be used. See Chapter 7 for a discussion of seasonal adjustment techniques.

53 Techniques of presentation of the data may help users deal with the difficulties associated with measurement of quarterly output from agriculture. In view of the multiple uses of quarterly accounts, there may be alternative solutions to the conceptual and practical problems. In this respect, three recommendations can be made. First, document the methodology carefully so users are able to form their own opinions. Although this will not enhance the accuracy of the figures, it will at least enable a view on whether they are suitable for particular purposes. Second, to serve users who deem the allocations unsuitable or do not care for allocations anyway, specify and quantify the allocations. Third, present the data with sufficient details to allow users to exclude the work-in-progress if they wish.

54 In conclusion, as a general principle, the *2008 SNA* states that agricultural work-in-progress should be included in output. However, the uncertainty and data issues associated with agricultural work-in-progress are often more severe than in other cases, so the decision on whether to include it needs to take into account the circumstances and analytical benefits in each country:

- For agricultural products that have a high degree of uncertainty about the relationship between inputs and the final yield, economic and user views may be more inclined to adopt a treatment like contingent assets. For products that have a very close relationship between inputs and final yield, there is a strong case for recognizing work-in-progress and measuring it realistically.
- A country that is just beginning QNA may be more inclined to adopt an initial method that is simple to explain and implement, with a view to moving to more sophisticated methods at a later stage. This chapter has shown quarterly allocation of annual data as a method that can be implemented simply in any country.

Summary of Key Recommendations

- *In the QNA, work-in-progress should be recorded for economic activities in which the production cycle goes beyond the quarter. Work-in-progress can be particularly important for agriculture, manufacture of ships and airplanes, and construction activities.*
- *Work-in-progress output should be valued at market-equivalent prices. The market equivalent price is what buyers would be prepared to pay if they wished to obtain the unfinished product or what suppliers would need to be paid to produce it. This value is equivalent to the total input costs for each period plus a markup.*
- *The measure of input costs should be as complete as possible. The input costs should include compensation of employees, intermediate consumption, other taxes less subsidies on production, and costs of using land and capital (rent, consumption of fixed capital, and interest). In practice, the data on costs may be incomplete, and so the markup needs to be adjusted accordingly.*
- *As a general principle, the 2008 SNA states that agricultural work-in-progress should be included in output. However, the uncertainty and data issues associated with agricultural work-in-progress are often more severe than in other cases, so the decision on whether to include it needs to take into account the circumstances and analytical benefits in each country.*

Annex 11.1 Recording Work-in-Progress in the *2008 SNA* Sequence of Accounts

1 Although estimation of work-in-progress primarily concerns output, a consistent system such as the national accounts should also consider other transactions that relate to work-in-progress, as well as balances (such as value added). This annex explains which other transactions and balances are affected. A numerical illustration of the effects of work-in-progress on main aggregates in the *2008 SNA* sequence of accounts and balance sheets is provided in Example A11.1. The example demonstrates that significant effects can be found throughout the full sequence of accounts.

2 In the general case, where work-in-progress is not sold until the product is finished, the two initial entries in the accounts are (a) output and (b) changes in inventories (increases) in the case of agriculture, manufacturing, services, and speculative construction, as well as capital formation in the case of own-account capital formation. After the product is finished and sold, two further transactions are recorded: (a) changes in inventories (decreases) and (b) changes in financial assets. In the case of production of a capital good under contract, four entries have to be recorded: (a) output for the producer, (b) fixed capital formation for the user, (c) increase in financial assets for the producer, and (d) decrease in financial assets for the user.

3 In the production account of the producer, besides output, the only entry that is affected by work-in-progress is value added; the other entries—intermediate consumption, taxes and subsidies on production, and consumption of fixed capital—are not. Because inputs are actually made, there is no conceptual problem in allocating them to relevant periods. Value added is derived as a balance and, thus, estimates will result automatically from the measurement of output. Consumption of fixed capital is not an issue in this context because, per axiom, it is assumed to take place on a continuous basis (for a discussion of consumption of fixed capital in a QNA context, see Chapter 4). Taxes and subsidies on production are not affected because these are to be recorded at the time the output is sold, transferred, or used (see *2008 SNA*, paragraph 7.84).

4 In the generation of income account of the producer, the effect on value added in the production account will be carried over to operating surplus/mixed income, because wages as such are not affected by work-in-progress. Similarly, in the allocation of primary income account, the impact on operating surplus/mixed income will directly carry over to the closing balance, primary income, because none of the transactions on this account are affected by work-in-progress. The same applies to transactions on the secondary distribution of income account, in that, again, only the closing balance of this account, disposable income, will be affected.

5 On the use of income account of the producer, the changes in disposable income would be fully absorbed by savings because consumption is not affected. The effect on saving for the producer would, in the case of work undertaken on own account, not carry over to the financial account because increased savings would be absorbed by offsetting changes in inventories or capital formation on the capital accounts for the same institutional unit. In the case of production of a capital good under contract, however, the full effect on savings for the producer will be carried over to the financial account in the form of payments received from installments and other accounts receivable accrued.

6 The other changes in assets accounts can be affected in two ways. First, because prices of the goods in inventories change over time, the resulting holding gains or losses have to be recorded on the revaluation

account. Second, if work-in-progress is lost because of catastrophic events, this has to be recorded on the other changes in volume of assets account.

7 Finally, the balance sheets of the system show the stocks resulting from the changes on the current and accumulation accounts. The output of unfinished products is recorded as inventories of work-in-progress unless it is sold. At the time the product is finished, a reclassification has to be made from inventories of work-in-progress to inventories of finished goods, and at the time the product is eventually sold, this sale will be reflected on the balance sheets through lower inventories, with a concomitant effect on financial assets and liabilities.

Example A11.1 Effects of Work-in-Progress on Main Aggregates in the 2008 SNA Sequence of Accounts and Balance Sheets

(Data in bold refer to treatment *with* work-in-progress)

In this example, the results obtained in Example 11.1 are presented in the format of *2008 SNA* sequence of accounts. The accounts show how, with work-in-progress recorded, each quarter would have had a positive value added; whereas, without work-in-progress recorded, the first three quarters would have had a negative value added and only the fourth would have had a positive value added. The accounts also show that without recording work-in-progress, a holding gain (caused by inflation) would have been included in output and value added. Furthermore, the example demonstrates that the increased saving is fully absorbed by increased inventories, so that the financial transactions (in this example, loans) are unaffected. (This example concerns an economic activity for which no installment payments are made that would affect the financial accounts.)

	Current Accounts			
	Intermediate Consumption		Output	
q1	160	**160**	0	**880**
q2	340	**340**	0	**1,200**
q3	530	**530**	0	**1,560**
q4	300	**300**	5,800	**1,400**
The year	1,330	**1,330**	5,800	**5,040**
	Value Added			
q1	–160	**720**		
q2	–340	**860**		
q3	–530	**1,030**		
q4	5,500	**1,100**		
The year	4,470	**3,710**		
	Compensation of Employees			
q1	300	**300**		
q2	310	**310**		
q3	340	**340**		
q4	400	**400**		
The year	1,350	**1,350**		
	Saving			
q1	–460	**420**		
q2	–650	**550**		
q3	–870	**690**		
q4	5,100	**700**		
The year	3,120	**2,360**		

Capital Transactions, Financial Transactions, and Balance Sheets

	Opening Balance Sheet		Transactions: Additions		Transactions: Withdrawals		Holding Gains		Closing Balance Sheet	
Nonfinancial Assets (Inventories)										
Quarterly Data										
q1	0	**0**	0	**880**	0	**0**	0	**40**	0	**920**
q2	0	**920**	0	**1,200**	0	**0**	0	**130**	0	**2,250**
q3	0	**2,250**	0	**1,560**	0	**0**	0	**240**	0	**4,050**
q4	0	**4,050**	5,800	**1,400**	0	**0**	0	**350**	5,800	**5,800**
Annual Data	0	0	5,800	**5,040**	0	**0**	0	**760**	5,800	**5,800**
Financial Liabilities (Loans)										
Quarterly Data										
q1	0	**0**	460	**460**	0	**0**	0	**0**	460	**460**
q2	460	**460**	650	**650**	0	**0**	0	**0**	1,110	**1,110**
q3	1,110	**1,110**	870	**870**	0	**0**	0	**0**	1,980	**1,980**
q4	1,980	**1,980**	700	**700**	0	**0**	0	**0**	2,680	**2,680**
Annual Data	0	**0**	2,680	**2,680**	0	**0**	0	**0**	2,680	**2,680**
Net worth										
q1	0	**0**	–460	**420**	0	**0**	0	**40**	–460	**460**
q2	–460	**460**	–650	**550**	0	**0**	0	**130**	–1,110	**1,140**
q3	–1,110	**1,140**	–870	**690**	0	**0**	0	**240**	–1,980	**2,070**
q4	–1,980	**2,070**	5,100	**700**	0	**0**	0	**350**	3,120	**3,120**
Annual Data	0	**0**	3,120	**2,360**	0	**0**	0	**760**	3,120	**3,120**

Bibliography

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