Draft Chapter 8
Measuring Production Abroad (Global Production)
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1. Introduction

1. One of the more notable characteristics of globalization has been the rapid expansion of multinational enterprises around the globe and the resulting fragmentation of production — global production. This global dispersion and specialization of production is reflected in the activities of both affiliated and non-affiliated firms, seeking to take advantage of (among other things) lower production costs abroad. For example, sending production abroad — offshoring — has assumed increasing importance. This presents some new challenges to national accountants, especially in terms of measuring domestic production and associated international trade flows, in a consistent and internationally comparable fashion. This chapter is concerned with such measurement issues.

2. Measurement depends on what is and what is not manufacturing, services and trade, under different production arrangements. It also depends on an understanding what the associated data needs are and how these can be met, while preserving accuracy and managing response burden.

3. Measuring global production presents many challenges and some choices. Mainly, consideration needs to be given to what components of global production can be reasonably measured and whether these components can be woven into a coherent and integrated framework such as the SNA. Related to this point, some attention should likely be given to the standard analytical macroeconomic questions as well as the interpretability and uses of the core national accounts.

4. Some of these issues have been touched on in earlier chapters, but will be re-examined briefly in this chapter, with respect to measurement. This chapter is organized as follows: The second section will provide some background on the measurement issues, framed by the typology of Chapter 1. The third section presents a summary of existing guidance on global production, and will necessarily link to what is covered under merchandising and goods for processing in Chapters 6 and 7, respectively. Section four will deal with current conceptual and measurement challenges, and section five will provide generic guidance on measurement proposals and proposed approaches to challenges. The Appendix will provide more specific guidance on measurement, outlining a likely strategy for Canada.
2. Background

Some preliminaries
5. As discussed in *The Impact of Globalization on National Accounts*, global manufacturing is
the practice of outsourcing — in this case, offshoring — much or even all production. Merchanting
involves foreign trade in goods produced abroad. The associated activities of firms engaged in these
production arrangement then involve either the provision of goods or the provision of services, and a
significant measurement challenge is associated with what these firms are doing — that is, whether
they are fundamentally manufacturers or something else.

6. Global production involves enterprises — affiliated or otherwise — with operations or
production engagements in more than one economy. Such arrangements may be undertaken by simple
or complex enterprises — the latter often, but not necessarily, an MNE. It may be that in many
economies these are typically larger complex enterprises that are, or are associated with, MNEs.

Typology and data needs
7. Making use of the terminology of Chapter 1, this section outlines the basic measurement
challenges and data needs by type of case. These cases are the basis of conceptual-measurement
issues are discussed throughout the chapter. Further, the data needs by production typology type are
consolidated in Section 5 in order to standardize the data requirements across the standard sources of
production-trade information.

Basic concepts
8. The lead or principal enterprise typically runs/manages the production process and initiates the
global production arrangement. The principal enterprise can be the enterprise in the domestic
economy, or it can be one of the global firms that the domestic economy firm is interacting with. The
notion of the domestic economy firm is important in the context of measurement, since it will be the
focus (along with other information) of the domestic economy compilers. Notably these globally-
engaged business entities will often be complex enterprises and/or associated with multinational
enterprises, which adds further dimensions discussed later in the chapter.

9. The principal enterprise may conduct R&D as well as design products and oversee their
manufacture, while not itself engaging in much or even any of the physical or other production. For
example, global manufacturers could perform corporate activities such as sending partly manufactured
goods for processing, merchanting, and the transfer of rights in IPPs and the flows arising from their
use. Depending on the jurisdiction and collection vehicle, different terms can be used to describe
processing in different reference materials. These include: Processing, outsourcing, customs work,
subcontracting, or contract manufacturing.

Production types and approach (see Table 1, Chapter 1)

Processing abroad: Transformation of materials owned by the domestic principal
(*Case A*, Chapter 1)

10. This is the relatively straightforward case of offshoring - the principal firm in the domestic
economy purchasing some processing services from either an affiliated or unaffiliated firm abroad as
part of its production activities. It is assumed (i) that the principal firm owns the intermediate inputs\(^1\) and the intellectual property and (ii) that the product is marketed and sold by the principal firm (owns the output and receives the revenue), though the second assumption is not necessary.

11. The basic data needs to measure activity of the principal are as follows:
   - Adjusted trade in goods to (i) remove the merchandise trade exports (for the goods being sent abroad for processing) and (ii) to remove the merchandise trade imports (for the goods being returned to the domestic economy following processing);
   - Estimation of the net trade in services (imports) associated with the purchase of foreign processing services;
   - Intellectual property products; and, potential transactions in intellectual property products;
   - Changes in inventories held abroad;
   - Sales domestic or foreign (exports of goods) of processed products; if exports, either from domestic economy or from processing country.

12. In addition, statistical agencies should strive to ensure that their treatment and figures line up with that recorded in counterpart processing countries - that is to try and ensure (various means) that counterpart countries in this activity record the same entries. The flipside of this is measuring that activity of domestic processing service providers to non-resident firms, which includes the following basic data needs:
   - Adjusted trade in goods to (i) to remove the merchandise trade imports (for the goods being sent from abroad for domestic processing) and (ii) to remove the merchandise trade exports (for the goods being returned to the foreign domestic economy following processing);
   - Estimation of the net trade in services (exports) associated with the purchase of foreign processing services.

13. The above adjustments can involve a combination of the use of customs data, manufacturing surveys, trade in services surveys and other sources.

**Merchanting (Case B, Chapter 1)**

14. This is the basic case of merchanting. The principal firm in the domestic economy is not a manufacturer but is in the distributive trade sector (likely a wholesaler). Therefore, the principal does not supply any technology or intermediate inputs; rather it takes ownership of a product that was produced by a manufacturer abroad and resells it in another country. The goods do not physically enter the principal’s economy but the principal receives the income from the final sales. The supplier/manufacturer in the foreign economy would show the intellectual property associated with production as well as the production and export of goods.

15. The basic data needs to measure activity of the principal are as follows:
   - Estimates of negative exports for the principal equivalent to the related foreign supplier’s merchandise exports, in the instance that the goods do not enter the principal’s economy; or,

\(^1\) These refer to both raw materials and semi-processed goods that are the material inputs to physical manufacturing processes.
- Ensure that the principal’s imports match the related foreign supplier’s merchandise exports, in the instance that the goods do enter the principal’s economy;
- The full value of the goods as domestic economy exports (supplier’s exports plus principal’s margin) once they are re-sold abroad by the principal.
- Changes in inventories held abroad;

16. The above adjustments can involve a combination of the use of customs data, manufacturing surveys, trade in services surveys and other sources.

Factoryless production (Case C, Chapter 1)

Option 1

17. This is a more complicated case of a production chain that can be seen as a baseline example of factoryless production. The principal in the domestic economy provides and maintains ownership of the technology and know-how (i.e., intellectual property products) to the foreign supplier as part of the production process, but does not provide the material inputs to the supplier. However, the product is manufactured on contract specifically for the principal who markets and sells the product.

18. In this case, using the existing standard of ownership of inputs, the foreign supplier is a manufacturer and the principal is in the distributive trade sector. That said the principal controls the (arguably) essential part of the production process and the delivery of the final product\(^2\). If we consider the principal to be in the trade sector, data needs for the domestic economy principal firm are parallel to those in the case of merchanting above, where he produces services equal to the margin on the final goods sold abroad\(^3\); and the data needs for the foreign supplier of the goods follow those of the processing case above.

Option 2

19. On the other hand, if we consider the domestic economy principal to be a manufacturer, because it owns the material inputs and/or it has other ownership and control claims, additional efforts would be required to understand the degree of ownership and control of the production process. This could involve additional questions or assumptions linked to the foreign direct investment relationship in the case the principal is a parent enterprise transaction with a subsidiary or affiliate. In this case, data needs revert to Case A (above).

Fragmenting part of the production of services (Case D and Case E, Chapter 1)

20. This case outlines trade in services, albeit with a degree of foreign subcontracting of services both by the domestic economy principal and the foreign supplier. These activities should be captured in surveys of international trade in commercial services (SITCS)

Including IPPs

21. The principal in the domestic economy supplies the technology, offshores part of the production process and owns the final output. In this case, the data needs are straightforward and should be captured in surveys of international trade in services:

\(^2\) This differs in principle from the simple example of merchanting, because (i) of the principal’s ownership of intellectual property that is fundamental to the production of the product and (ii) that the physical form of the goods could be changed before it is sold to the final buyer.

\(^3\) The margin in this case will likely reflect higher returns than those of a typical wholesaler given the higher risk assumed by the principal owning the IPP.
Imports of services on the part of the domestic principal from the foreign supplier; and these should be matched to the exports of services from the foreign economy;
- Intellectual property products; and, potential transactions in intellectual property products;
- If the domestic principal later sells the finished product abroad, the total value of the exports (foreign supplier value plus domestic principal’s value added) is reflected in trade in services

Excluding IPPs
22. This is the same as above, but without any intellectual property considerations.

Subcontracting production of services (Case F, Chapter 1)

23. This is very similar in terms of data needs to the case of fragmenting part of the production of services (excluding IPPs) except that the domestic principal does not significantly transform the products prior to sales abroad. Data needs are the same.

Direct investment enterprise not directly engaged in goods-services production (Cases G and H, Chapter 1)

24. While all of the above examples can involve affiliated enterprises, this is a case of a domestic entity that is not the principal and only provides management services to a global production process. If there are cross-border transactions, these would be in services and should be covered in existing surveys of international trade in commercial services. There is one other possible need for information, related to ownership structures and the role of the domestic entity in the production process involving affiliates.

Final observation

25. Sorting out the industry classifications and trade flows data with domestic survey results will largely result in correctly matching production estimates. In this context, a major challenge is all countries utilize largely harmonized industry-commodity classification systems and follow SNA 2008 and BPM6 to compile cross-border production arrangements in order to have the same measures of the products being produced and traded.

3. Treatment of global production issues in international standards

Some preliminaries

26. Chapter 1 outlines the complexities associated with fragmented global production. Of note, and also covered in Chapter 2, is Case C: Factoryless production. It is suggested in these chapters that factors other than ownership of material inputs should be considered in assessing whether an entity is a manufacturer or not. These other considerations are ownership of intellectual property products that are essential to production (design and technology), control of the production process and ownership of the output. Chapters 1 and 2 argue that these other factors are potentially more important than ownership of material inputs – and suggest that the latter concept appears somewhat antiquated in a globalized economy. Notably, this appears to be the emerging view among statisticians currently researching global production.

27. International standards have generally acknowledged the importance of globalization on today’s economies and have attempted to provide some guidance on global production, including global manufacturing and related non-manufacturing activities. That said the international manuals
have less to say specifically about global production than is the case for the treatment of the related international activities of goods for processing and merchanting. The upshot of this situation is that international guidance is somewhat lacking in terms of clarity. This situation leaves a fair bit interpretation on the part of compilers, and can lead to inconsistent data internationally.

28. With respect to global manufacturing, some direction and developments on how to define, classify and measure goods sent abroad for processing and merchanting can be found in the System of National Accounts Manual 2008 (2008 SNA), Balance of Payments and International Investment Position, Sixth Edition (BPM6), International Standard Industrial Classification of All Economic Activities Revision 4 (ISIC 4), North American Industry Classification System 2012 (NAICS 2012), and The Impact of Globalization on National Accounts (GNA) released by the United Nations in 2011. As mentioned earlier, for the purpose of this chapter, discussion will be focused on global production activities only, but will necessarily touch on other related aspects.

Industrial classification related to global manufacturing

a) International Standard Industrial Classification of All Economic Activities

29. The International Standard Industrial Classification of All Economic Activities (ISIC) provides the internationally accepted standard for categorizing producing units within an economy, which allows for data comparison at the national and international levels. ISIC is not the only industrial classification standard in use in jurisdictions around the world, but it is fair to say that most industrial classifications tend to converge with ISIC.

30. ISIC was designed primarily to provide a classification for grouping activities (rather than enterprises or firms), and the primary focus for the ISIC classification system is the kind of activity in which establishments or other statistical entities are engaged. The main criteria employed in delineating the divisions, groups and classes of ISIC are: (a) the character of the goods and services produced; (b) the uses to which the goods and services are put; and (c) the inputs, the process and technology of production.

ISIC 4

31. To address the ongoing and growing global statistical challenges, more specifications have been added to the outsourcing activities in the latest ISIC Revision 4 in 2008 (ISIC4). There is recognition that the principal may enter into an arrangement with a contractor to outsource fully, or in part, the actual physical production in the case of manufacturing. Both parties may be located in the same economic territory or in different economic territories; however, the actual location does not affect the classification of either one of these units.

32. If the complete production process is outsourced, the principal is considered providing the contractor with the technical specifications of the manufacturing activity to be carried out on the input materials. The input materials (raw materials or intermediate goods) can either be provided (owned) by the principal or not. This acknowledges the realities and complexities of modern day global production. However, if the transformation process is completely outsourced, a principal should be classified to manufacturing if and only if it owns the input materials to the production process—and therefore owns the final output (ISIC Rev. 4, page 30).

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33. This is clear enough, although the conclusion of the link to the ownership of the final outputs is arguably too restrictive under the myriad of modern global production arrangements and the role that affiliated entities assume. Determining the economic owner of the material inputs and outputs at each stage of the production process is essential for identifying the kind of economic activity of the principal and the supplier. However, the criterion for classification of a unit based solely on ownership of material inputs may not be sufficient in the case of ‘factoryless’ producers.

34. The ISIC4 classification based on ownership of material inputs is consistent with the ownership principle — that is, international transactions take place when a change in economic ownership takes place between a resident in one economy with a non-resident. However, this general principle does not necessarily translate into something that is necessarily straightforward to apply in practice.

35. In any case, this recommendation is seemingly being interpreted by many or most statisticians as follows: That the ownership of material inputs is the key criterion for classifying a firm undertaking outsourcing activities as a manufacturer. Physical production location doesn’t seem to be a consideration, and location can be either within or outside of the principal’s economic territory. If the unit does not own inputs, it will be considered as buying the completed goods from the contractor with the intention to re-sell it and thus be treated as a merchant, likely classified to the distributive trades (wholesaling-retailing) sector. It is important to note that ISIC is a widely referred to standard, and that compilers in many countries adhere to ISIC4 or have adopted a variant that is closely based on ISIC4.

36. The principal difference between ISIC4 and the 2008 SNA is that, ‘It (ISIC) does not draw distinctions according to kind of ownership of a producing unit, type of legal organization or mode of operation because such criteria do not relate to the characteristics of the activity itself ... Therefore, a strict link between ISIC and the Classification of Institutional Sectors in SNA does not exist’ (ISIC Rev.4, page 9). This situation is not an easy one for national accountants to deal with.

b) North American Industry Classification System

37. As a result of the North American Free Trade Agreement which came into force on Jan. 1, 1994, the North American Industry Classification System (NAICS) was developed. NAICS is an industry classification system with coherent and unified industrial structure definitions, which was developed and launched jointly by statistical agencies in Canada, Mexico and the United States to facilitate the comparable analysis of the three economies. The conceptual framework of NAICS is updated every five years by the three countries to ensure its industry classification can reflect the latest economic development and trends. ISIC4 was considered to have greatly improved its comparability with NAICS.

NAICS 2012

38. NAICS was recently updated, resulting in version NAICS 2012. As part of the background research, the U.S. Economic Classification Policy Committee (ECPC) of the Office of Management and Budget (OMB) launched a public consultation in an attempt to clarify the production function during the global outsourcing process. As a result, the ECPC recommended explicit guidance to

5 This refers to the Economic Classification Policy Committee (ECPC) Recommendation for Classification of Outsourcing in North American Industry Classification System (NAICS) Revisions for 2012.

6 The study revealed that ‘the rapid growth of global competition and outsourcing has complicated the application of the production function classification principle to units that control intellectual property and perform underlying
classify factoryless goods producers (FGPs) in the manufacturing sector for NAICS 2012; and, the classification of FGPs was introduced within existing sub-industries that include the integrated manufacturers (i.e., standard manufacturers) and the manufacturing service providers.

39. By definition, FGP ‘outsources all of the transformation steps that traditionally have been considered manufacturing, but undertakes all of the entrepreneurial steps and arranges for all required capital, labor, and material inputs required to make a good’.7 Compared to the traditional manufacturer, it shares the same characteristics of owning the intellectual property or design of the final manufactured product, as well as owning and selling the final product. Notably FGP differs from a traditional manufacturer in that it may or may not own the input materials; in addition, it neither (legally) owns production facilities, nor performs transformation processes.

40. Most importantly, ECPC argued that ‘Classification of an establishment should not change simply because they have the market power to shift the timing of payment for the inputs from the front of the process to the end of the process or because critical shortages of transformation capacity provide outsized negotiating power to a manufacturing service provider’.8 By focusing on the entrepreneurial aspects of the process (and therefore ownership of the goods being produced) rather than ownership of materials, the ECPC eliminates the aforementioned ISIC ownership of materials issues’. FGP was included in 2012 NAICS9, but it may take considerable time to implement measures associated with FGP.

c) Degree of outsourcing

41. Both ISIC4 and NAICS reference factoryless goods producers as 100% outsourced. In reality, this assumption may not well fit the majority of what compilers think of as factoryless producers. Such firms may operate with a mixture of domestic outsourcing, offshoring to affiliates or non-affiliates, as well as some small degree of manufacturing within the firm. This issue may require further elaboration in the standards.

National accounting standards and global manufacturing


42. BPM6 defines international processing and merchanting, and it provides consistent recommendations on cross-border flows that focus on the change in ownership principle. The treatment of goods sent abroad for processing and merchanting are reviewed in depth in chapters 7 and 5, respectively.


8 ‘If the definition of ownership required physical possession, the ability to substitute between input sources in different countries to obtain the lowest cost could change sector classification in NAICS if the inputs were sent directly from the producer in country B to a manufacturing service provider in country C. The establishment that arranged for the production in country A would never take physical possession of the materials’. Need reference.

43. BPM6 suggests ‘goods intended for sale but not actually sold when the goods cross the frontier should be recorded only at the time economic ownership changes. Goods may move between a parent and its branch abroad. In that case, possibilities exist that either the goods have changed economic ownership or they may have been sent for processing. The correct statistical treatment is to identify which location assumes the risks and rewards of ownership most strongly’ (BPM6 3.46). The risk and rewards can, in most cases, likely be attributable to the principal enterprise — the enterprise that controls the production process and likely owns (in a legal and/or economic sense) the technology associated with the production process. This notion seems to align more closely with NAICS 2012 than with ISIC4. That said the notion of risks and rewards is admittedly difficult to quantify and to measure.

44. The same ownership change principle applies to merchanting; however, one clarification was made in terms of the type of goods that can be classified under merchanting. ‘If the physical form of the goods is changed during the period the goods are owned, as a result of manufacturing services performed by other entities, then the goods transactions are recorded under general merchandise rather than merchanting’ (BPM6 10.64).

45. On the other hand, with BPM6, a processor could include the cost of materials in the manufacturing service fee when it bills the processing, assembly or packaging services performed for the goods owned by the others (BPM6 10.64); this condition is not clearly spelled out in SNA08. Virtual manufacturing was also mentioned in BPM6; nevertheless, no detailed text was available to articulate this concept.

b) The 2008 System of National Accounts

46. SNA08 also provides some recommendations on how to treat goods sent abroad for processing and merchanting, given the degree of harmonization between BPM and SNA standards. It also emphasizes that the goods sent abroad for processing be recorded on change of economic ownership basis as opposed to the physical flow approach endorsed in SNA93. This better reflects the economics of globalized production. The new reality is one where:
   - Inside the global firm: Multinational enterprises are spread much more widely across the globe with affiliates” activities contributing to the fragmentation of global production;
   - Outside the global firm: Other large corporations, often multinational enterprises, are purchasing production services from unaffiliated entities in various parts of the world.

Processing

47. SNA08 did, in concert with the concept of outsourcing-offshoring (processing), insert a few paragraphs that relate to global production. SNA08 underlines what was said in BPM6 that the principle of change of ownership is central to the determination of the timing of recording of transactions in financial and nonfinancial assets (including transactions in goods). SNA08 goes on to say in that products should only be recorded as being delivered to another unit if there is a change of ownership or, in the case where both producing units belong to the same enterprise, the producing units taking delivery also assumes responsibility for subsequent risks and rewards of production such as deciding how much to process, what price to charge and when to sell.” (SNA08 28.15).

48. In general terms, it can be inferred that a unit can be classified as a ‘global manufacturer’ when it has substantial inputs in the form of R&D and intellectual property embedded in the goods sent abroad. In addition, it could decide production quantity, marketing, and the retailing strategy around the globe. This also tends to be more in line with NAICS 2012. With respect to virtual manufacturing where the physical processes are outsourced to other units, ‘its operations should be
recognized as being in the territory by virtue of the registration or legal domicile of those operations in that territory’ (SNA08 26.30 and 26.41).

49. The term “economic ownership” better reflects the underlying reality economic accounts are attempting to measure (discussed in Chapter 2). It has been used to articulate income and investment flows, but the narrow argument based on ownership of inputs may be difficult to measure with any degree of reasonable accuracy.

50. If an international transaction has no ownership change, the fee paid to the processing unit should be recorded as the import of processing services by the country owning the goods and an export of processing services by the country providing it. Notably, ‘when goods are sent abroad for processing without a change of ownership, some inventories may be held outside the national territory but national prices should be applied to them to derive their corresponding volumes’ (SNA08 28.15). This is the case when processing overlaps two reference periods. SNA08 could have provided additional guidance on the issue of inventories held abroad, as it is not covered in the chapter on the capital account.

Merchanting

51. In terms of merchanting in which the same goods are purchased and sold abroad directly without entering the owner’s economic boundary, the margin (i.e., difference between acquisition and sale) is recorded as the value of the owner’s exports should the transaction take place in the same accounting period. More specifically, there is a requirement to impute a negative export in the owner’s country (equal to his acquisition of finished goods) to net from total exports of the owner, such that total worldwide exports (processor + owner’s margin) is equal to total worldwide imports.

52. If the transactions occur in different time periods, the acquisition is recorded as a negative export with an increase in inventories of goods for resale, even though those goods are held abroad. When the goods are sold in later periods, the exports recorded for their sale are offset by a withdrawal from inventories (SNA08 14.73). Again, SNA08 could have provided additional guidance on the issue of inventories held abroad in the chapter on the capital account.

4. Current conceptual and measurement problems

Existing statistical systems

53. Most countries’ statistical systems have not yet implemented goods for processing or merchanting, and need to (i) review existing data sources in the context of measurement strategies and (ii) possibly establish new data sources to measure these increasing economic activities. Manufacturing statistics may or may not adequately capture processing arrangements that are cross-border. Wholesale and retail trade surveys may also have challenges with cross-border activity. Inventories held abroad may or may not be covered implicitly or explicitly in business surveys.

54. International trade in services surveys would likely not currently cover processing services associated with goods (other than repairs). The upshot of this is that survey frames would need to be updated in most cases to cover goods producers. Trade in services surveys may capture some activity related to intellectual property products (IPPs). However, as noted in Chapter 3, coverage is expected to be an issue; and, flows for the use of IPPs could be accounted for as services or property income depending on the global production arrangement.

55. In the case of merchandise trade statistics, goods crossing the borders under processing arrangements follow the established physical flow approach; and, this carries over into the national
accounts and international accounts statistics on trade in goods. This has two implications. First, trade in goods must be converted to follow the ownership change principle. Second, this situation gives rise to inconsistencies in the current system between trade and production. Manufacturing statistics may partly reflect cross-border processing services and trade data fully includes the gross values associated with the physical movement of goods. This makes it increasingly difficult to construct supply-use tables and balance the sub-annual national accounts estimates. For those countries with produce inter-regional trade estimates, this problem can be exacerbated.

56. In the national accounts, is important in the context of global manufacturing to adjust trade in order to accurately reflect the change in ownership principle. And it is clear that the industrial classification of the involved businesses play a role in classifying cross-border activities. While the international standards is reasonably clear in the case of goods for processing and merchanting, they are seemingly less clear when it comes to cases involving the line between merchanting (trade sector, wholesaling/retailing) and processing (manufacturing).

Measurement challenges arising from conceptual issues

57. Ambiguities in international guidance are sometimes regarded as useful in international standards, as a certain amount of flexibility may be desirable for compilers. These can allow countries to interpret the standards and adapt them in their implementation plans to more properly reflect the realities of their economies. In cases that involve cross-border trade, however, ambiguities are problematic and lead to international comparability/consistency problems.

58. The line between merchanting and processing is underlined by the construct of factoryless producers, discussed below. This discussion distinguishes between arrangements with affiliates and non-affiliates. However, as Chapter 1 notes (paragraph 22), it can be the case that the difference between an unaffiliated and an affiliated contract manufacturer is unclear when it comes to the high degree of control that a principal may exert on the production process.

a) Ownership of material inputs

59. ISIC4 determines the treatment of factoryless production based strictly on the ownership of material inputs. As noted above and in Chapters 1 and 2, this may not be a good reflection of the complex global manufacturing arrangements that exist currently. Ownership is typically understood as economic ownership, but there can be important distinctions between economic and legal ownership of material inputs in a global production-supply chain (see Chapter 2).

Non-affiliated enterprises

60. In the case of processing arrangements between non-affiliates, it may be that ownership of material inputs is sufficient to determine the industrial classification of the principal enterprise. For example, in a traditional processing arrangement, it is likely that the principal would own the material inputs; and, from a measurement perspective, the compiler may (most often) assume that this is the case.

61. However, it may well be that the principal’s processing contract is such that it specifies that the foreign processor acquire the material inputs. This may be relatively common in certain industries, such as the garment industry. Here the supplier-processor would likely have a market advantage in acquiring large volumes of materials (e.g., cotton) to produce clothing on own account and/or for a variety of firms purchasing its garment processing services.
62. In any case, compilers could have substantial difficulty in determining ownership of material inputs, particularly for those held abroad. It may then be necessary to simplistically assume that in most industries those purchasers of processing services own the material inputs, unless compilers’ knowledge of the processing arrangement suggests otherwise. This would allow for exceptions, such as in the garment industry noted above. International comparability would dictate that compilers would have to agree on any exceptions.

**Affiliated enterprises**

63. In the case of affiliated enterprises, with the parent (ultimate or majority owner) assuming the role of the principal enterprise, there is no reason to assume that ownership of material inputs has any special economic significance. It may be that the principal sometimes owns the goods at all stages of manufacturing, sometimes buys the finished products for resale elsewhere and sometimes buys them at an intermediate stage (GNA810). It may be impossible for compilers to accurately distinguish between these cases.

64. It should also be noted that in the case of affiliates, it can be argued that parent enterprises (most certainly ultimate or majority owners) effectively (i) own the material inputs to production (at least in an economic sense) as noted in ISIC4 and (ii) generally meet all or most of the other ownership and production control criteria raised by NAICS2012. This would be especially true in the case of majority-owned foreign affiliates providing processing services.

65. Therefore, the parent enterprise’s foreign direct investment relationship with majority-owned affiliates involved in supplying processing services can provide some clarity on the economic ownership of the material inputs to production as well as simplify measurement challenges. While the processing affiliate might have legal ownership of the material inputs, it is clear through the FDI relationship that the parent has an ownership interest and claim on these material inputs as much as it has a vested interest in the activities of the foreign affiliate. This rationale provides “an interpretation” on the ISIC4 criterion.

b) **Other industrial classification criteria**

66. NAICS 2012 recommends that these additional criteria should be considered in determining industrial classification in the context of global production. *Case C* in Chapter 1 illustrates this through (i) the ownership of intellectual property products that are essential to production (design and technology), (ii) the control of the production process and (iii) the ownership of the output. In many cases some or most of these considerations would be reflected in the principal enterprise. SNA08 and BPM6 also broaden the classification considerations by underlining the importance of which unit undertakes the risks and assumes the rewards from the processing activities – this would typically be the principal enterprise.

**Non-affiliated enterprises**

67. In the case of processing arrangements between non-affiliates, the contracts typically specify the commitments of each party. The processor must supply the products by a certain date and at a pre-determined price. This means that it undertakes a certain amount of risk associated with material shortages (if it supplies the material inputs), labour cost fluctuations and interruptions and opportunity costs associated with potential product price increase in the face of a fixed price contract. Nevertheless, the supplier enters into these arrangements as it stands to benefit in terms of increased earnings.

68. The principal would normally claim the lion’s share of the rewards and arguably most of the risk. It would most often supply the specifications and the technology to the supplier; and, it would
most often supply the material inputs. It may then to some extent, or to a large extent, control the production process. Offshoring would have reduced its production costs and increased its net earnings from the final sale of the product. However, unlike the supplier, it incurs market risk — that is, that the risk that the demand for the product declines and prices fall before it can get the product to market.

69. In these instances, with more than one industrial classification criteria, compilers may have to decide on what the most important ones are. Of course, this assumes that compilers have some information on these criteria that they can leverage for decision-making purposes. One could set up a scenario involving a decision process in order to classify a purchaser of processing services related to inputs to the production process on the one hand and control of the production process and ownership of product on the other hand. An example of a decision-making process could be:

- The purchaser of processing services owns the material inputs and/or the intellectual property products and technology10; and, if not,
- The purchaser of processing services controls the production process and owns the final product; and, if not,
- The purchaser of processing services is not a manufacturer in the domestic economy

70. In any case, compilers could have substantial difficulty in determining industrial classification based on 3-4 criteria that are not ranked. It may then be necessary to assume that, in most instances, purchasers of processing services are the principals with the majority of the risks and rewards in the arrangement. International comparability would dictate that compilers would have to agree on any practical rules followed.

**Affiliated enterprises**

71. In the case of affiliated enterprises, the decision might be more straightforward by nature. With the parent company (ultimate or majority owned) assuming the role of the principal enterprise, there is no reason to assume that most or all of the industrial classification criteria are not present. And it is reasonably clear that parent companies undertake the bulk of the risks and rewards in both processing and other activities of their subordinate foreign direct investment enterprises.

72. In this instance a simple rule can be adopted: If the purchaser of foreign processing services is a parent company (ultimate or otherwise) acquiring services primarily from foreign affiliates, then the industrial classification criteria are largely met. As a result, the parent company (principal enterprise) in the processing arrangement resides in the manufacturing industry in the domestic economy. However, this would require additional information on processing with affiliates and non-affiliates.

**c) A digression on changing corporate structures**

73. In the discussion above and noted in other chapters, reference to the direct investment relationship – especially narrowed to majority-owned foreign affiliates – could be of substantial benefit in sorting out ownership and control of production arrangements.

74. However, this benefit comes with a caveat. As stated in the introduction and reflected in other chapters, globalized production is a reflection of the ownership structure of MNEs. A characteristic of business is that it adapts on an ongoing basis to maintain competitive advantages as well as for other corporate strategies. This change translates into evolving

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10 Chapter 1 argued that ownership of IPP or outputs might also be a sufficient condition.
structures of MNEs, and is reflected in not inconsequential mergers and acquisitions activity. Therefore, an additional measurement challenge with respect to classification of factoryless producers becomes one of changing organizational structures – mergers and acquisition (M&As).

75. M&AS can change the dimensions of processing arrangements, typically towards increased offshoring and increasingly varied partner countries by following the upward trend of globalization; and, can change the structure of the offshoring arrangements on a frequent basis. In many economies M&A activity is a significant portion of average quarterly foreign direct investment (FDI) flows. This means that, in most of these cases, the perspective on production arrangements may be evolving on an ongoing basis. What was once a domestic parent enterprise with ownership of IIP, control over the production process and ownership of material inputs may end up post-M&A just another subsidiary in an enlarged MNE undertaking part of a global production process. The upshot is that a factoryless manufacturer may become something else as a result of a corporate restructuring, or vice-versa. This reality can translate into a significant undertaking in terms of adjusting economic flows for M&A activity.

\[
\text{d) Degree of outsourcing with respect to factoryless manufacturing}
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76. The majority of outsourcing of manufacturing activities occurs between the extreme cases of traditional manufacturers (no outsourcing) and factoryless manufacturers. Factoryless goods producers are taken in the industrial classification standards to be those firms with 100% outsourcing/offshoring. This would appear to be too simplistic of an assumption.

77. In reality, there may be a great many factoryless producers that do not strictly fit this requirement; and it is reasonable to assume that outsourcing arrangements can be quite complex. For example, some firms may have 90% of its manufacturing outsourced, with very little manufacturing capacity in the domestic economy; and, the 10% that is undertaken domestically may or may not be outsourced to a domestic affiliate or to a non-affiliate.

78. Practically speaking, this situation may leave the classification of such entities up to the individual country compilers. This, in turn, can lead to inconsistent statistics across countries, with respect to global production.

\[
\text{Data quality issues associated with global production}
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\[
\text{a) Business realities versus economic measures}
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79. The above-noted industrial classification criteria are relevant considerations. Manufacturing is tied to the products produced – that is, an enterprise is a manufacturer of widgets if it produces mainly widgets. Manufacturers have for many years produced products such as widgets both on their own account as well as on contract, which reflects other firms’ outsourcing work and activities and the manufacturers in question undertaking processing for others.
80. In the past, outsourcing activity may have reflected both unused capacity of the manufacturer as well as organizational change (e.g., vertical integration) and specialization among firms - the beginning of fragmented production arrangements. Ownership of the material inputs was a relevant yardstick to determine (i) whether products were produced on own account or on contract and (ii) also to help determine whether an enterprise is in manufacturing or not. This yardstick remains in the international standards\textsuperscript{11}, where manufacturing is tied to products and ownership of material inputs.

81. Offshoring is likely driven by a somewhat different set of considerations, of which many suggest that relatively cheap labour and other types of reduced costs are the main factors. In the case of an enterprise which offshores ALL of its manufacturing to a non-affiliate or affiliate, but controls the intellectual capital and production process as well as owns the final products, it is increasingly argued that this enterprise is a manufacturer — a factoryless producer (one that purchases manufacturing services as part of its production). With large MNE operations spread across the globe, it is likely that ownership of material inputs is not as relevant factor as it used to be in determining whether an entity is a manufacturer or not. There is no logical reason to believe that such a restrictive criterion (ownership of material inputs) is a necessary requirement to classify a corporate entity as a manufacturer.

The future: Increasing the number of business units in manufacturing?

82. If we accept the argument directly above, many more business units would be classified to manufacturing that is currently the case. Some would argue that this would not be appropriate in terms of measuring domestic economic activities.

83. An example might help illustrate this point. If a domestic economy compiler approached the parent company of a fashion name brand clothing company (say, in the U.S. or in Western Europe) which outsourced all of its physical production to non-affiliates (say, in Asia) and asked what business it was in, the response would likely be a manufacturer of fashion clothing. This would be in spite of the fact that the parent company unit operating in the domestic economy might only have research, management services, marketing and sales activities; and, because of these domestic activities, is not currently classified to manufacturing in domestic economy statistics. The globally consolidated parent MNE may well be a manufacturer; however, in the domestically-consolidated local economy level it performs functions quite different than physical transformation of products – it provides services to the globally-consolidated MNE.

84. Therefore, if we accept a broader set of industrial classification criteria in the case of factoryless producers, an increasing amount of business units would be re-classified from services industries to the manufacturing industry in domestic economy statistics. At issue in the case of global manufacturing is the fundamental question of what we are trying to measure in production:
- Domestic activities as traditionally related to labour and capital employed; or,
- The global activities of MNEs that “belong” to the parent enterprise operating in the domestic economy, which may have little to do with labour and capital employed in the domestic economy.

85. While both may be related to control and ownership of inputs, capital and intellectual property products, it is not clear how cross-border inter-company ownership (typically an enterprise concept)

\textsuperscript{11} And, as Chapter 2 notes it is consistent with business accounting. Notably, business accounting has tended to lag national accounting in many respects (e.g., valuation of assets and liabilities).
relates to production activity (typically an establishment-based measure). International standards have little to offer on this issue, which is noted below under relevance considerations.

86. In national accounting, production is a domestic concept and industrial classifications have thus far been linked to domestic activities. That said the question must be raised about what domestic production is trying to measure in the context of global production of activities of MNEs.

b) Distortions in existing measures

Trade statistics
87. Trade statistics in the national accounts are not fully based on ownership change in the case of cross-border processing services on goods, but remain based on the physical flow of commodities. This implies that the line between goods and services is murky, such that trade flows likely do not line up with business survey transactions. It also implies that trade flows are overstated, and can be misleading for policy-analytic purposes.

88. In some countries partial adjustments related to processing, or what appears to be processing, might not be (i) offset or (ii) measured in the same way in estimates of trade in services. Therefore, in the case where some degree of processing is reflected in trade in goods and possibly not mirrored or accounted for in trade in services, trade flows and countries’ trade balances can be miss-stated.

89. Lastly, when comparing international trade compiled with customs data (gross trade flows) as opposed to other methods (transactions-based data sources, which tend to be net), problems like the global imbalances on trade flows can be exacerbated.

Supply-use tables
90. There is a general incoherence in the system with respect to processing, based on the limitations of the current data sources. This exists because business surveys would generally capture processing services while merchandise trade records the full value of the materials crossing the border.

91. Domestic firms would record the receipt of processing fees under “custom work” while merchandise trade records the value of the materials as imports and the full value of processed goods as exports (i.e., the sum of the costs of the materials and the custom work fees). This then would require some adjustments on the part of compilers. For example, to achieve coherence of the data in the supply-use tables, (i) the intermediate inputs of the processing industry would have to be grossed up by the value of the imported materials while the value of custom work would be replaced by the value of the exported products. This method of what SNA08 and BPM6 refer to as of imputing a change in ownership would be most often based on an examination of the specific cases where firms show both custom work receipts and export revenues. However, such a process is likely less than systematic, and likely some share of processing is missed.

92. For the case where a domestic firm is the purchaser of processing services, the costs of the products exported (sent abroad for processing) as well as the custom work payments are recorded as current expenditures. Upon their return, the processed products are recorded as imports in merchandise trade and valued at the total cost of the unprocessed materials and custom work fees. Following their sale (domestic or foreign), the processed products will appear as realized revenues by the domestic firm.

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12 Adjustments would more likely be based on large cases, and investigated by looking at things like destination of shipments in manufacturing and using details by firm in merchandise trade.
93. Thus, from the supply-use perspective, the source data are providing a double count of both the demand for the materials and the supply of the processed products. To the extent that inventories are used as a balancing item, some related implicit commodity balancing adjustments might end up in inventories. And, to the extent that production-based GDP measures are benchmarked annually to GDP measures associated with income arising from production or final expenditures on production, inventories in the goods and services accounts could reflect some degree of these commodity balancing adjustments.

c) Relevance considerations associated with new measures

94. Ultimately, a new statistical treatment for global supply/value/production chains across enterprises/industries and economies should lead to improved economic analysis. This is the case, as new measures are an attempt at reflecting the economic realities associated with global production. There may also be instances where the new measures can adversely affect certain types of economic analysis.

Industry classifications and economic analysis

95. Factoryless goods producers (FGPs), however we classify them for, measurement purposes, are a type of company with different business arrangements; and, they exist across a number of manufacturing sub-industries. In other words, these producers will be embedded in the sub-industry details of the manufacturing sector.

96. Measures related to labour productivity and capital intensity should remain as relevant as before, but FGPs would not generate employment in manufacturing nor would they have much in the way of domestic capital associated with manufacturing. This would have adverse impacts on the relevance of measures of labour productivity and multi-factor productivity.

97. Statistical programs are encouraged not only to illustrate the concept of integrated manufacturers, manufacturing service providers, and factoryless goods providers, but also to identify the different relationships among variables such as employment, shipments, and cost of materials for the three types of manufacturers.

98. At a minimum, we would want to establish an FGP flag such that we can monitor the nature of FGPs in the domestic economy, improve sampling strategies, as well as be able to construct manufacturing aggregates with and without FGPs. Ideally, it might be advisable to treat factoryless manufacturers as a separate industry that analysts can include or exclude depending on the nature of the analysis.

Business Inventories

99. Inventory changes are important elements of macroeconomics and business cycle analysis. Accumulations and draw-downs of inventories represent the differences between current period production and domestic and foreign demand.

100. The context of global production brings a new dimension to inventories. While it is unlikely that firms engaged in domestic processing services would report inventories associated with this activity, domestic firms purchasing processing services abroad may have claims on associated inventories held abroad\(^\text{13}\). This raises the issue of whether inventories owned by a domestic firm, but produced abroad and held abroad, constitute additions or subtractions from inventories related to

\(^\text{13}\) These stocks may or may not be getting reported in current domestic data sources, depending on the collection vehicles.
domestic production. SNA08 Capital Account (Chapter 10) is silent on this issue, but later references to global production imply that they should be.

101. A further issue relates to inventories of domestic firms engaged in merchanting that are stored abroad, when foreign acquisitions and foreign sales take place in different accounting periods. These would be foreign inventories of domestic units and part of the domestic merchanting units’ inventories; and, these may or may not be getting reported in domestic data sources. At issue is that these inventories have no relation to current period domestic manufacturing of goods, though they (i) “nominally” cross the border as goods and (ii) are related to production activities (gross output in the form of sales) of the domestic merchanting unit. SNA08 suggests that timing differences between purchases and sales be recorded as domestic inventory accumulations-withdrawals, though a clear reference to merchanting would have been useful SNA08 Chapter 10.

102. In any case, this takes the measures beyond the standard macroeconomic concept of inventory changes. As such, it would be advisable to articulate inventories held abroad (arising from negative exports) separately.

d) Consistency in statistics

103. The new treatments for processing services and merchanting will drive a larger wedge between merchandise trade statistics and SNA-BOP trade in goods. As a result, it will be increasingly advisable for statisticians to provide users with a reconciliation statement between the two measures.

104. A major issue under global production is how to ensure that trade and domestic production measures are consistent across economies. This is a difficult undertaking. However, a best practice in this regard would be bilateral data confrontation between major trading partners with published results. This would help users in their analyses of country results.

5. Proposed solutions/approaches

General considerations

Phased in approach

105. Prior to conversion to the new standards and taking into account the complexities of measuring global production, it may be advisable to generate parallel estimates. Estimates on a new change of ownership basis, can be released as provisional estimates for a short period of time during which compilers can assess (i) the accuracy-reliability of these data and (ii) the impact(s) on the trade and production data. This would also provide some time to assess the impacts on global trade measures through bilateral data comparisons (especially with key trading partners) as well as the analysis of the effects on global imbalances.

Incidence

106. A first step towards measurement is to research the issue – that is, obtain a sense of the incidence of processing, merchanting and FGPs in the domestic economy, something that can vary widely from country to country. Indeed, progress to date on these two issues has come from jurisdictions where the incidence and impacts are quite significant – most notably, Hongkong and mainland China.

107. Typically offshoring is significant in specific industries and in/with select countries and there may be more than enough public information and other evidence as well as, in some cases, data to develop a general profile of this activity. In many economies, firms engaged in global manufacturing
and merchanting will be large entities, typically represented in a “take-all” part of business surveys. In some jurisdictions, processing may be significant and merchanting insignificant. In smaller economies, or economies that are relatively specialized (in terms of having a limited number of large industries), it may be possible to obtain a very good sense of the incidence of offshoring activities. If the industrial structure is dominated by resources sectors or agricultural sectors, the effects of offshoring will likely be much less, than in the case an economy that is heavily engaged in manufacturing.

108. In addition to a priori information, using existing surveys to profile firms’ activities with qualitative questions up front can be beneficial, and more will be said about this later. Incidence in the case of surveys would shed some light on the need to modify surveys\textsuperscript{14}. Another approach could be via a program focussed on large business units that facilitates respondent dialogue and feedback\textsuperscript{15}, where such programs exist.

109. It is expected that at least a partial list of major firms engaged in offshoring can be developed in most countries; and, from such economic intelligence, it may be possible to quantify the extent and nature of this activity. At the same time, it may be possible to note the inclusion and coverage of large and complex MNEs and their components (parents or affiliates) in offshoring activities. If affiliates are significantly involved with parents in offshoring activities, establishing the geography as well as a consistent approach will be relatively easier.

110. Armed with this information, compilers can then frame the overall task and set out a work plan that reflects their particular economic reality in terms of production and trade. This can lead to a more efficient strategy towards measuring global production, by narrowing the scope of the project to (at least initially) focus on the key sectors/players. Further, compilers will be in a much better position to make some initial practical decisions with respect to contentious issues, such as ownership of inputs or control of the production process when it comes time to make decisions about the issues surrounding factoryless production.

Strategy

111. Given that merchanting and goods for processing relate to different data collection vehicles and that global production involves diverse activities of affiliated or non-affiliated firms organized and operating across different industries and jurisdictions, an integrated approach to measurement would be the ideal one.

112. The strategy would ideally be two-fold. First, approach this from the perspective of the need to leverage several sources of information in a harmonized fashion, including: Manufacturing surveys, merchandise trade statistics (for those countries that use a customs-based system), international trade in services surveys as well as enterprise financial statistics surveys, alongside foreign direct investment surveys and foreign affiliate statistics; and use a supply-use framework (input-output tables) to confront estimates that are generated. Second, minimize the need for new surveys or substantially longer questionnaires, but not necessarily new activities related to existing data sources (e.g., record linkages). This does not imply that new data sources/surveys will not need to be developed or, at minimum, existing sources modified. This reflects that fact that global production is part of the core SNA-BOP statistics.

\textsuperscript{14} In addition, there is a fair bit of academic research related to aspects of global production (often country-specific) that would be useful to review.

\textsuperscript{15} These programs are typically focussed on data quality issues and in the interests of reducing respondent burden.
113. This strategy will be relatively easier for centralized statistical agencies, where surveys, administrative data, business registers, and national and international accounts are housed together. But even in these cases, accurately measuring global manufacturing will be a challenge. For jurisdictions where data production of implicated statistics is spread across two or more agencies, increased co-operation among agencies – statistical; agencies, central banks, customs agencies, etc. – will become a necessity.

114. In concert with this, increased cooperation among compilers in various countries — especially between major trading partners — would be required.

Measurement considerations

115. From this point, this section of Chapter 8 provides a generic description of potential sources of information towards the accurate measurement of global production and its related activities. Please refer to the Appendix for additional specifics for Canada.

Business registers and industrial classification

116. Given the need to link enterprise and establishment surveys with each other as well, integrated business registers will provide a significant advantage. In particular, it would be an advantage for a centralized business register to have an international flag — an indicator of international activity. Such a flag would facilitate maintenance of international and domestic survey frames as well as enhance survey sampling, in the context of the measurement of global production in the domestic economy.

Industry classifications

117. From the above discussion on industrial classifications, it is clear that clarification as well as a high degree of harmonization across industrial classifications is desirable in order to promote international comparability; and, where there are remaining significant differences that these be understood and taken into account — especially in country bilateral comparisons.

Commodity classification systems

118. Similarly, there are different commodity classifications used for different purposes across countries and economic regions. The United Nations Central Product Classification (CPC), the North American Product Classification (NAPCS), the harmonized systems common to customs-based international trade statistics (HS system) and the Input-Output Commodity Classification (IOCC) are four examples. Whatever commodity classifications are in use within and across countries it is important that differences that these be understood and taken into account. Ideally, some degree of harmonization at some level of aggregation would greatly facilitate incorporating change of ownership adjustments by commodity across international trade and production statistics. In some countries and economic regions commodity classifications are more or less harmonized. For many/most countries it is expected that product classifications employed across surveys and administrative data are largely harmonized, otherwise work such as building supply-use tables from business surveys would be quite challenging.

Statistical units

119. In order to manage response burden we wish to leverage all possible sources of information, it will be important to have an understanding of the statistical units covered across surveys or in administrative data. Similarly, an understanding of statistical units across sources of data will be

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16 In Canada, for example, NAPCS used in trade statistics is to a very large extent harmonized with the IOCC used in the supply-use tables.
important for data confrontation purposes, as well as for undertaking the more complex work of using record linkages to derive certain statistics related to global production. Statistical units can include:

- **The establishment.** This is typically the production unit and can also be the legal entity in the case of simple corporations. However, in complex corporations – especially MNEs – it may not be able to adequately/accurately answer questions about ownership of intermediate inputs.

- **The legal entity.** This might be the production unit in the case of simple corporations. In the case of complex corporations, it likely is not the production unit and may cover several establishments. It is the unit that is reflected in taxation statistics. It may also be the equivalent of the statistical enterprise.

- **The statistical enterprise.** This unit sits atop of domestic complex corporations, as the domestic parent. It may also be the global parent, but should supply data that are domestically-consolidated as opposed to globally consolidated. More specifically, it covers domestically-booked activities and financial positions.

- **The global multinational enterprise (MNE).** This is not covered in domestic surveys or administrative data. It may be available from public sources, and might be useful in a number of cases in sorting out issues associated with global production.

**Data sources and methods**

**a) Manufacturing surveys**

**Processing services**

120. Manufacturing surveys are typically directed at establishments of legal entities, with annual and sub-annual cycles. Keeping in mind that not all firms are engaged in international processing, there should be an assurance that (i) the survey frame is comprehensive and includes such firms and (ii) the sample size is sufficient and with an effective sampling strategy. In the case of the frame, a priori information or company profiling can be of assistance in identifying large companies engaged in processing. Such companies would ideally be in the take-all portion of the sample. At the very least, they should be in the take-all portion of the annual survey, if such a survey is used to supplement and benchmark the quarterly survey.

121. On manufacturing surveys, there needs to be a means to identify total revenues and expenses associated with (i) manufacturing on own account and (ii) manufacturing on behalf of others. Since outsourcing (often referred to as custom work on surveys) has been around for some time, it is likely that most manufacturing-based surveys would have this basic split. It is important to ensure that the manufacturing survey covers all custom work activity, whether purchased or sold by the manufacturer, such that the international portion of outsourcing is included. While this is likely to be the case, it can be that the wording associated with custom work is cumbersome and possibly not clear to respondents and might benefit from a review.

122. If we assume that overall definition of processing activities is not an issue, the next priority is to ensure that on both revenues and expenses associated with the international portion outsourcing can be identified. This provides the basic measure of such activities, for both acquired and supplied processing services. Identification of the international portion of custom work is likely to be absent in the case of a number of current manufacturing surveys in various countries, and it suggests that content reviews may be required. In addition to the questions related to international processing, it is advisable to add a question on inventories of material inputs or unfinished goods held abroad to cover the instance where processing extends over more than one time period.
123. Manufacturers tend to specialize in specific commodities, and it may be possible to estimate reasonably accurately the product details (at some aggregate level of classification, at least) that are associated with offshoring without materially increasing response burden. Further, companies that generate certain products may have an activity code on a centralized business register, which could be of assistance.

124. These steps will ensure collection of the basic information with respect to total international processing activities arising from the survey data; and, that we have these estimates by establishment or legal entity, depending on the basis of the unit of measurement in the survey. The commodity detail noted in the paragraph above is required to link to the international trade in goods (adjusted merchandise trade data) and services data for basic measures of cross-border processing, as well as to other information in more complex cases.

125. The above the basic case of goods for cross-border processing in the manufacturing sector, in terms of the total transactions and the goods details. It also supplies some elementary information associated with the more complex cases involving offshoring. These data, however, need to be reconciled with the merchandise trade data in all cases, and with other datasets in the more complex cases.

Factoryless goods producers

126. In the case of factoryless goods producers (FGPs), it may also be necessary to add qualitative questions to manufacturing surveys on any or all of the following:

- **Outward processing (expenses)** — Does your firm (i) control the production process, and/or (ii) own the intellectual property products in use, and/or (iii) own the final output associated with goods sent abroad for processing, or (iv) all of the above
- **Inward processing (revenues)** — Does your firm own the material inputs on goods sent to it for processing

127. There are challenges with these questions, however. Given that the manufacturing survey most likely covers establishments or legal entities as statistical units, and that these are typically part of a larger domestic enterprise, the respondents may not know the answer to some, most or all of these qualitative questions. Further, given that the respondent firms may be undertaking processing arrangements with foreign affiliates that are part of a larger MNE, they may not know the answers. The worst case scenario would be one where a significant number of inaccurate responses from respondents to these qualitative questions are used as the basis to classify FGPs. The upshot of this is that it may be preferable to use enterprise surveys for these questions or employ some other means of determining ownership and control of production arrangements that involve cross-border processing.

b) Wholesale/retail trade surveys

128. Merchanting activities may be relatively small in some economies or focussed in specific businesses – typically, establishments or legal entities – and on specific commodities. As a first step, it may be advisable to profile the wholesalers or distributors that are engaged in the ‘buying and selling foreign goods abroad’ type of business activities. It is unlikely that the relevant qualitative
questions are currently used in many distributive trades (wholesaling or retailing) surveys (DTS). After an idea of the incidence is established, any survey issues, especially related to coverage can be addressed.

129. With respect to coverage, merchanting may or may not be captured in DTS annual / sub-annual surveys. It may be that respondents are asked to report total sales, and that they include sales from goods purchased abroad or from inventories held abroad; or, it may be that collection vehicles specify sales of domestically produced goods. In either case, merchanting activities may or may not be included in total revenues.

130. DTS surveys would be unlikely to have explicit questions related to merchanting, ideally on sub-annual surveys. These surveys would have to be adjusted to specifically capture merchanting activities. In particular, surveys of wholesale and retail entities (establishments or legal entities) would require some additional questions in order to ensure measurement of total income as well as to be able to make additional balance of payments trade in goods adjustments to imports and exports. Such questions could be aggregate questions — that is, with no commodity detail — related to the value sources and dispositions of goods sold:

Goods purchased domestically included in:
- domestic sales
- sales abroad

Goods purchased from abroad for:
- domestic sales
- sales abroad

131. A further challenge is how to reflect the inventories of firms engaged in merchanting that are stored abroad, when foreign acquisitions and foreign sales take place in different accounting periods. As with sales, such inventories may or may not be accounted for. In order to compile this information, a few further aggregate questions could be added along the lines of:

   Inventories of goods held abroad
   - opening balance
   - closing balance

c) International trade in services surveys and related services surveys

Processing and merchanting

132. International trade in commercial services surveys are typically enterprise-based surveys, with details by industry and by geography (countries and regions). Coverage can be a challenge for such surveys, as firms engaged in international service transactions are not easy to identify, and because surveys associated with international trade in commercial services (SITCS) are smaller in terms of coverage that other business surveys that cover total domestic activity. Links to a centralized business register with a flag for international activity, or the profiling activity used in other surveys, can help to keep the SITCS survey frame up to date and assist with the sampling strategy. A quarterly survey may be supplemented with a more detailed (in particular for geography) annual survey, which may be used to benchmark the sub-annual surveys.

133. For the most part, it is likely safe to assume that current international trade in commercial services surveys in most countries are not geared to measure certain aspects of global production, in particular with respect to the services associated with goods that cross the border for processing. One
challenge when it comes to global production is to ensure that such surveys adequately cover firms engaged in goods processing as well as merchanting.

134. It may be necessary to plan an upgrade of the SITCS survey frame, sampling methodology and content. In doing so, it will be essential to ensure adequate coverage of both service and goods producing industries as both can be engaged in international processing and merchanting. Any profiling related to the cross-border dimension undertaken in the case of the manufacturing surveys and distributive trade’s surveys as well as their survey frames would be useful in this regard. So would the existence of an international flag on a centralized business register.

135. In terms of content, the SITCS questionnaire content would have to cover both merchanting and processing services. In the case of goods processing if this cannot be accomplished without response burden concerns, then this component of trade in services may have to rely on manufacturing surveys and/or adjustments to merchandise trade data to estimate these components of global production. Similarly in the case of merchanting, the industries (wholesale and retail trade) where merchanting is prevalent are likely to have a low coverage on SITCS surveys. In this instance trades surveys may have to be relied upon to generate merchanting estimates.

136. Content may also have to be expanded to cover processing with affiliates, information which is not common to other surveys. This information can be useful in terms of determining ownership in the more complex cases associated with processing, such as factoryless goods producers if a general set of rules is used. However, activities with affiliates may be available from other sources.

Factoryless goods producers

137. In the case of factoryless goods producers (FGPs), it may also be necessary to add qualitative questions on any or all of the following in the case of processing services such as discussed above under manufacturing surveys. As an enterprise survey SITCS might be better placed to provide more accurate results to these qualitative questions. However, if coverage of processing remains a major challenge in SITCS, this would not be worth the effort. That said, except for a question on processing with affiliates, it might be best to leave the qualitative questions to the manufacturing surveys as noted above.

138. In the case of the question on processing activities with affiliates, it might be useful to request some quantitative information tied to basic geographical breakdowns — that is, with respect to key trading partner countries or economic regions.

d) Merchandise trade statistics

139. Ultimately the collection of offshore processing and other global activities will be of limited use unless they can be effectively tied to merchandise trade data, so as to properly adjust for global production in the national accounts and international accounts. However, in almost all countries, merchandise crossing the border related to the demand or supply of processing services is still included in trade in goods. Trade in goods is fundamentally based on merchandise trade statistics. Merchandise trade statistics measure cross-border flows on the basis of the physical flow of goods, and follow the manual *International Merchandise Trade Statistics: Concepts and Definitions*. The main feature of this system is that it records all goods crossing the border whether they are domestic purposes or for re-export. Given this focus on physical flow, merchandise trade statistics are somewhat narrow in scope.
140. At present, in many countries, customs information\(^\text{17}\) that form the basis of merchandise trade statistics are adjusted to standard SNA-BOP concepts when estimating trade in goods in the national accounts and international accounts. These adjustments, sometimes referred to as national accounts or BOP adjustments, can include coverage, timing, valuation and country attribution (origin-shipment) adjustments. The change of ownership basis for goods under processing arrangements becomes a further (BPM6) adjustment to convert merchandise trade statistics to SNA-BOP trade in goods.

141. A principal objective is to remove the grossed up merchandise trade flows (imports and exports) and replace these with the net flow of trade in services associated with cross-border processing. More generically, the goal is to measure trade in goods on a change of ownership basis; and ideally, this would dovetail with the approach outlined above for business surveys. This would “correct” trade in goods to align with manufacturing surveys that provide a key data source for use in input-output tables.

**Additional customs detail**

142. Merchandise can cross the borders for reasons other than trade, including trade shows, repairs and processing. Some or many of this merchandise may qualify for exemptions from normal customs duties (exempt or partially exempt\(^\text{18}\)). Under these circumstances, it is expected that customs’ records would identify such merchandise. For example, re-exports may be widely available in the customs information. It is quite possible in some countries that available customs information is not fully utilized in the merchandise trade statistics. Some of this information may already exist on available customs fields that are not fully captured or ignored for merchandise trade purposes; and, other information may be captured and analyzed by the agency responsible for customs data.

143. In other words, existing but non-tabulated/analysed fields might be able to provide important information for adjustment purposes. This might involve additional efforts by compilers as well as negotiations with customs agencies for access to additional/all records on customs documents.

144. The desired additional information from customs records would include:
- the values and commodity codes of the merchandise that is determined to have been sent abroad for processing services, the processing fees paid on these goods, and where the work is undertaken and where the processed goods are destined, etc.
- the values and commodity codes of goods sent for repairs as well as the fees paid for this service, and where the work is undertaken.
- the values and commodity codes of other merchandise crossing the border on a temporary basis, with a breakdown of the purposes of these flows to ensure complete coverage items with no ownership change.
- the dates of departure and return of all temporarily shipped merchandise.

145. The commodity detail that would be associated with any of these categories of temporarily shipped merchandise would then form the basis of a SNA-BOP change in ownership adjustment for trade in goods. Some detail will be discarded from estimates of trade in goods (e.g., merchandise shipped for trade show purposes) and some would be adjusted out of trade in goods (e.g., merchandise crossing the border for processing services).

\(^{17}\) Data developed from custom administrative records are typically referred to as customs-based trade statistics.

\(^{18}\) For example, exempt on the original goods value, but are required to pay duties on the value added i.e. processing fee component.
146. In the basic example of processing, exports related to outward processing would have to be removed in the period in which they were sent abroad as well as for the period in which they returned; and, the difference in the values of this merchandise would be the foreign margin on processing services (to be treated as an import of services). Similarly, imports related to inward processing would have to be removed in the period in which they were sent to the domestic economy as well as for the period in which they returned to the foreign economy; and, the difference in the values of this merchandise would be the domestic margin on processing services (to be treated as an export of services).

147. These adjusted out items would form the basis of other SNA-BOP adjustments. As noted above, they could form the source information of net additions to imports and exports of International trade in services, goods processing, if SITCS are unable to capture this activity. Alternatively, they could be used for data confrontation/imputation purposes. For example, even if processing is incorporated in trade in services surveys, it is likely that the coverage of this activity in merchandise trade statistics would be superior to that of services surveys. In addition, the net amounts, should tie into the revenues and expenses from cross-border manufacturing surveys in any given period. The commodity detail associated with these adjustments would be essential to balancing commodities in the input-output tables, and for this some degree of harmonization across commodity classifications would be desirable.

148. All of this could be enhanced with the existence of importer-exporter registers associated with merchandise trade statistics. This would facilitate data confrontation with other surveys.

**Importer-exporter registers**

149. Importer-exporter registers allow for the identification of detailed commodity trade back to the trading establishments. Some countries have developed importer-exporter registers, which link the merchandise trade by commodity to the firms engaged in this activity. Further, in some cases, the importer-exporter registers are linked to a centralized business register. The names of the importer-exporter firms can be invaluable in terms of linking trade to the related business surveys — especially manufacturing surveys and trade in services surveys, in the case of cross-border processing activity. Tying the aforementioned merchandise trade adjustments to firms in manufacturing via record linkages as well as commodities can increase the accuracy and data confrontation usefulness of the adjustments.

150. In the basic goods for processing model, the net revenue from such processing should be equivalent to the net processing service exports and the net expense should be equal to the net processing imports, in any given period. This relationship allows for data confrontation on processing trade margins associated with these two data sources. In the case of international trade in services surveys, an exact link between trade and manufacturing would allow for more precise goods for processing adjustment by industry. In addition, the commodity detail by firm would likely also prove useful.

**e) Foreign direct investment surveys**

151. Foreign direct investment (FDI) surveys of inward and outward cross-border inter-company investment are enterprise-based or legal entity-based, and typically have adequate coverage. In addition, the surveys usually collect (supplemented with other sources) information on multinational enterprises’ ownership structures. For both inward and outward FDI, it is typically possible to identify and isolate majority owned affiliates by industry. In fact, majority-owned foreign affiliates are the basis for foreign affiliate statistics.
152. As an alternative to asking questions on the ownership of material inputs or the other criteria for establishing factoryless goods producers (FGPs), it may be simpler (in the sense of low response burden) and more accurate (than direct questions on activity surveys) to adopt a set of rules based on ownership and control of the elements of global production. If cross-border processing involves majority-owned foreign affiliates and a principal parent with no manufacturing in the economy in which it resides, then compilers can assume that the parent controls the production process, directly or indirectly owns the material inputs, likely owns the associated intellectual property, and will take ownership of the final products. In this sense, it is clear that the parent company of majority-owned foreign affiliates assumes the bulk of the risks and rewards via its lasting interest investment.

153. Tying the FDI ownership structures into manufacturing surveys and/or merchandise trade data will likely necessitate the use of record linkages. In this context it is ideal if the FDI frame is hooked to a centralized business register.

f) Foreign affiliate statistics

154. Foreign affiliate statistics (FAS) also referred to as foreign affiliate trade statistics (FATS) make use of the FDI survey frame to identify majority-owned foreign affiliates, and may even be integrated with FDI surveys. FATS cover activities of majority-owned affiliates associated with both inward FDI (i.e., inward FATS) and outward FDI (i.e., outward FATS). These surveys try to get at the fundamental question of what is the impact on the domestic economy of FDI relationships; and while FATS data are not fully standardized internationally in terms of variables, in most countries these programs tend to measure employment, sales, financial variables, etc.

155. Sales of foreign affiliates typically cover foreign portion (exports) and often asks for sales back to country of the parent enterprise, including sales back to the parent enterprise and/or other affiliates enterprises. Sales are not typically broken down between final sales and goods under processing arrangements, but such detail could be added; and, given the fragmentation of global production across affiliated entities, this is arguably an ideal place to seek this information. In other words, it is possible to directly collect information on total processing revenues and expenses, or net revenues, with majority-owned foreign affiliates. Assuming adequate coverage in FATS, this source would also provide some degree of geographical (countries and economic regions) detail which would be useful for data confrontation purposes.

156. In terms of tying this to factoryless producers, there are two possible approaches: Assume that the parent of the majority owned affiliates is the controlling principal, as it the case in the FDI section above; or, ask some specific questions on ownership and control of the production process as articulated in the section on manufacturing surveys. In either case, once a reasonably good control total for processing with majority-owned affiliates is established, record linkages can tie this back to manufacturing and merchandise trade data, as a means to establish factoryless goods producers involved in processing versus other firms involved in processing.

g) Enterprise financial statistics

157. For countries that have them, surveys that collect domestic enterprise financial statistics — income statements and balance sheets — can also be of use in measuring global production. These surveys cover both financial and non-financial industries. The approach would typically be a stratified
survey\textsuperscript{19}, and these types of enterprise surveys are often benchmarked to administrative data (taxation statistics) in order to estimate a universe.

158. In most economies, globalized production would largely take place among the larger enterprises, covered in the take-all strata. As an alternative to the FDI and FATS approaches, this provides an opportunity ask both qualitative and quantitative questions about global production, including ownership questions. However, given the relationship with and the profiling on manufacturing surveys, it might be advisable to make these questions an insert (e.g., additional schedule) for a select group (target group) of multinational corporations. As with the FATS approach, this could also provide a control total for processing. If the enterprise program has an ownership and control corporate structure associated (perhaps as part of a centralized business register) then assumptions with respect to ownership and control of production processes similar to the FDI approach\textsuperscript{20} can be made.

159. This work would be more efficient if the enterprise survey was linked to a centralized business register with international activities’ flag. First, the link to the business register including ownership structures would allow for a tie in to the establishment based surveys discussed above. Enterprise surveys could then be used to assess coverage or benchmark variables such as revenue from providing processing services to non-residents or expenses associated with purchasing processing services from non-residents. Second, the centralized business register’s international activities flag would facilitate (in terms of managing response burden) the targeting of key enterprises for additional questions.

160. Lastly, the results from the enterprise survey can be used in record linkages to tie back to manufacturing and merchandise trade data, as a means to establish factoryless goods producers involved in processing versus other firms involved in processing. These results can also be linked to cross-border enterprise surveys, including trade in services, foreign direct investment and foreign affiliate statistics.

\textbf{h) Surveys of intellectual property products}

161. Many countries would by now have instituted a survey (typically, and enterprise or legal entity survey) to measure research and development and intellectual property products. These are designed in part to meet the need to capitalize research and development in the national accounts, and can be linked to international trade in services and other surveys.

162. Ideally, these surveys would cover questions on revenues (sales and property income) and expenses (purchases and fees) associated with IPPs by type of IPP and with a cross-border dimension (including minimum geographical detail), control of IPPs (business decisions on IPPs owned), and links to foreign affiliates and non-affiliates. Supplementary questions could be added on control of the production process associated with the IPPs and ownership of the final output associated with the IPPs, but these might best be derived from record linkages with other surveys.

\textbf{Data confrontation approaches}

163. There are two challenges to measuring global production symmetrically – that is domestic production and production abroad. The first is with respect to adopting the same concepts and classifications worldwide; and the second relates to a need for data confrontation.

\textsuperscript{19} As with many surveys, including a take-all, take-some (sample) and take-none strata.

\textsuperscript{20} Notably, however, the results might differ somewhat from those in the FDI statistics.
a) National data confrontation

164. Compilers will first have to ensure that new estimates are consistent across surveys, adjusted trade international estimates as well as in the components of the national accounts. For example, the net of import-export adjustments from merchandise trade should be equivalent to the cross-border processing services. It is expected that countries will differ in their approaches to measuring processing and merchanting, partly based on availability of data. In addition, some exercises, such as record linkages and some data sources, may only be available on an annual basis; and this situation, will require the development of sub-annual projectors.

165. As noted in the previous section (paragraph xx) full measurement of economic flows on a change ownership basis will improve commodity balancing in the supply-use tables, by eliminating a series of imputations based on partial information. This balancing process can serve as a test of the accuracy-reliability of the new estimates.

166. Improved balancing in supply-use tables may lead to reduced measurement error in the national accounts and more accurate estimates of annual and quarterly GDP and balance of payments. In doing so it would bring the BOP-SNA trade in goods estimates in line with survey results in manufacturing and service industries; and there would be a full accounting of the differences between trade in goods and merchandise trade statistics. In addition, the size and coverage of trade in services would increase from the inclusion of processing and merchanting. All of these revisions can and should be cross-referenced with each other.

Data confrontation between compiling agencies within countries is recommended.

b) International data confrontation

167. National data confrontation would normally take place, and it is expected that most countries will be able to assess and improve the quality of their new estimates related to global production. International data confrontation — or more precisely — bilateral / multilateral country data confrontations are more challenging. However, given the changes to the nature of trade in goods and services resulting from the implementation of the ownership principle as well as any changes to the delineation of industries, international data confrontation will likely be important to ensure international consistency in trade (and production) estimates for both domestic measures and measures of these activities abroad. Agreement on trade adjustments and on the industrial classification of large firms engaged in aspects of global production would go a long way towards achieving international consistency.

168. Bilateral data confrontation is a best statistical practise that would typically focus on major trading partners. It would also ideally include countries where the purchase or sale of processing services is significant and/or expanding at a fast pace. Data confrontations do not have to take place annually to be effective. One obstacle to this effort is willingness of partner countries to undertake bilateral comparisons.

169. Restrictions can be one impediment to willingness. Legislation may exist in some jurisdictions which restrict the amount of information that can be exchanged with compilers in other countries. This most often applies to discussions of statistics that are best confronted with micro data from large transactors, which are constrained by confidentiality rules. Nevertheless some progress can be made in these cases. For example, while it may not be possible to compare data for individual countries, it may be acceptable to discuss in which industries certain major players (say in processing services) are classified between two countries. This in turn sheds light on the statistical treatment of
transactions and can lead to more consistent international data. This can also be supplemented by (i) detailed comparisons and discussions of industry estimates and (ii) trade in goods adjustments.

170. As implied above, it may be necessary to conduct multilateral data confrontations. In this sense, such data confrontations are also costly, with travel involved and implication of more than a few staff. Given this cost of investment the expectation is that it should generate benefits to both parties. That said often the major trading partner for one country is not a major trading partner from another country’s perspective. When this situation arises, the return on data confrontation investment is obvious for one of the partners and not for the other.

171. One way to deal with this dilemma is to have international agencies support bilateral data confrontations. As an example, statisticians regularly incur the cost of attending meetings at the OECD and this provides an opportunity to facilitate data confrontation. For countries, staying on for a few extra days to meet four key partner countries (say, arranged in advance) is an efficient method of data confrontation. For international agencies, supplying some small meeting rooms over a few days to facilitate this process would serve the needs of those countries as well as those of the international agencies in terms of better quality data.

6. Conclusion

172. In the end, country compilers will likely use a mix of the above-noted sources and approaches, that reflect data availability in own countries. The upshot of this reality is that international comparability of data is expected to be an issue, and this underlines the need for data confrontation noted above.

References

Economic Classification Policy Committee (ECPC) *Recommendation for Classification of Outsourcing in North American Industry Classification System (NAICS) Revisions for 2012*


To be completed later.
Appendix 1 – Case study: Approach to measuring global production in Canada

To be completed at a later date.

Appendix 2 – Case study: Canada-US bilateral trade and BOP reconciliations

To be completed at a later date.