

CHAPTER 13

E-commerce

Introduction

13.1 International e-commerce, which involves cross-border transactions over the internet, shows every sign of continuing to expand rapidly. The potential savings of transaction costs from e-commerce are substantial. The most important cost-saving aspect of e-commerce is the reduction in travel, administration, communication and search costs. One consequence of such cost advantages is that many small cross-border transactions have now become economic. In addition, e-commerce has also made possible new kinds of trade in services.

13.2 While the growth of cross-border e-commerce is widely acknowledged, it imposes measurement challenges for international trade statistics. This chapter begins with definitional and conceptual issues related to e-commerce, which falls into two transactional categories: products ordered and delivered via electronic means, and products ordered electronically but delivered physically.

13.3 Various definitions of e-commerce exist. For instance, “electronic means” is a broad term that includes both the internet and a range of other computer-based networks. The statistical challenge of measuring e-commerce and how it may affect national accounts is the main topic of this chapter. The globalization aspect of e-commerce accounts for part of the measurement challenge. Before discussing the implications for different areas of national accounts and related statistics (international trade, consumer prices, transportation margins, etc.), the chapter considers what economic benefits lead firms and consumers to engage in e-commerce, and its economic effects.

13.4 Annex 13.1 to this chapter describes initiatives on e-commerce by Statistics Netherlands. This country experience offers further insights into the practical difficulties presented by e-commerce to compilers of national accounts.

Definitions

13.5 Domestic e-commerce involves within-border transactions through the internet or other external networks, while international e-commerce relates to cross-border transactions. These transactions may refer to selling or buying goods and/or services which are then delivered online or physically.

13.6 The transaction-based concept that restricts e-commerce solely to buying and selling makes it distinct from other forms of e-business. E-business includes all aspects of online business activity – purchasing, selling, marketing of new ideas and products and services, handling logistics, support services, inventory management, etc. For the purpose of this chapter, international e-commerce can be defined as consisting of transactions that involve online orders leading to the (import or export) delivery of goods and services. As will be seen, this general definition is consistent with BPM6, the *Manual on Statistics of International Trade in Services* (MSITS 2010), and the definition used by the OECD.

13.7 The most appropriate definition of e-commerce may depend on the question being investigated. Thus in academic literature e-commerce is broadly defined, as it refers to an activity that is part of more general information and communication technology (ICT) activities. This is also true for policymakers who employ broad definitions emphasizing the impact of e-commerce on all aspects of the economy. At other times, narrower definitions can be used to address more specific policy areas such as intellectual property rights, taxation, outsourcing and trade. For instance, for an investigation into the impact of offshore outsourcing on employment, an appropriate definition would relate to e-commerce in newly tradable services. Examples of newly tradable services include the foreign relocation of US tax return assistance and call centres.⁷⁷

⁷⁷ See, for example, Timmons, 2010, for a prediction that outsourcing of legal services to India will reach \$1 billion by 2014. An implication is that some firms will become substantial importers of services.

13.8 Another important question is which type of e-commerce should be investigated. E-commerce (national or international) can be grouped into different categories. The most common are: business-to-business (B-to-B), business-to-consumer (B-to-C) and consumer-to-consumer (C-to-C) commerce. B-to-B commerce consists of a broad range of intercompany transactions, including wholesale trade as well as trade in intermediate goods and services (examples include manufacturing parts and components, technology, services, and resources). Financial business such as in insurance, commercial credit and other financial assets may be included (Lucking-Reiley and Spulber, 2001). B-to-C commerce is a segment of e-commerce where firms sell goods and services to consumers (persons, or households). There is a general agreement that B-to-B is larger than B-to-C (for instance, Fraumeni, 2001; CBS (Statistics Netherlands), 2009). However, the B-to-C sector is experiencing much more rapid growth for three important reasons: increasing use of the internet, the emergence of specialized online shops, and globalization of the internet. The third category of C-to-C commerce relates to the selling of goods and services among consumers. In this market, specialized e-commerce firms (e.g. e-Bay, Amazon) act as intermediaries permitting households to transact in new and used goods and services. Advertising revenues, including charges to have a link appear on a web page, represent an important source of revenue.⁷⁸ While each of these different categories relates to a particular type of interaction between buyers and sellers, all have a major impact on data availability and measurement, with implications for national accounts, as further explored in paragraphs 13.24-13.31 below.

13.9 E-commerce usually means that orders are placed over the internet. However, definitions vary, mainly with respect to whether e-commerce refers only to selling and buying through the internet or extends to other electronic networks,

⁷⁸ Online advertising is a form of promotion that uses the internet for the purpose of delivering marketing messages to attract customers. The selling of internet advertising is an important type of B-to-B transaction. In 2008, it was estimated that Google controls about 69 per cent of the online advertising market.

such as electronic data interchange⁷⁹ (EDI), intranet and extranet.⁸⁰

13.10 In 1999, the OECD set up an international working group to compile a definition of e-commerce that could be used in policymaking and that was statistically reliable and feasible. The working group compiled two definitions of e-commerce with the following dimensions: the network used for e-commerce, and the business processes related to e-commerce. They are:

- a. Broad: the sale or purchase of goods and services conducted over computer-mediated networks, including EDI but excluding intranet transactions.
- b. Narrow: the sale or purchase of goods and services conducted over the internet, including web-enabled EDI and any other web-enabled application but excluding intranet transactions.

13.11 The broad definition concerns the purchase and sale of goods or services via computer networks, covering all electronic transactions. The narrow definition differs in only one aspect, namely that the network used to order the goods and services is the internet.

13.12 What are the shortcomings of the broad definition? The broader but more inclusive definition includes proprietary networks used, such as EDI, in addition to the internet. Where e-commerce has already been a regular feature of business activities for many years, as in the United States and Western Europe, this definition may be more relevant for capturing the full scope of such activities. However, taking into account differences in terms of the technological endowment across countries, the broader definition may be less relevant to smaller and less developed economies where the major network involved is the internet. For instance, Stare (2001) noted that improvements in the overall telecommunications infrastructure and internet access services would stimulate the diffusion of e-commerce in Central

⁷⁹ EDI allows direct communication of standardized trading messages between computer systems. Before the internet, EDI systems were primarily used by large businesses and were strictly proprietary (conducted over private networks). With the emergence of the internet, some EDI systems were transformed into open networks.

⁸⁰ Intranet computer networks allow for communication solely within an enterprise, while extranet is part of intranet that is also accessible to selected users outside the enterprise, such as vendors and clients. Other technology that could be part of a computer-mediated network is enterprise resource planning (ERP) and customer relationship management (CRM). ERP concerns software that integrates data on planning, purchasing, logistic and production activities. CRM is especially oriented towards sharing information on sales and marketing data.

and Eastern European countries. For these cases, the narrower (internet) definition could be more applicable.

13.13 A new definition of e-commerce proposed by the OECD removes some of these shortcomings. The OECD 2010 definition refers to “...the sale or purchase of goods and services conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods and services do not have to be conducted online...” This new definition is now used in data collection in most EU member countries. It includes orders placed on web pages, EDI and extranet, and excludes orders made by telephone, facsimile or manually typed e-mails. A major change is that the proposed definition is no longer based on a narrow-broad distinction. Indeed, the new term “computer networks” no longer includes the networks distinction between internet and other e-commerce related electronic transactions. The underlying rationale of this new definition is that information can now be collected on the basis of either transaction mode. In addition, the term “computer network” is broadly defined to give the flexibility to accommodate future changes in how e-commerce is conducted. For instance, an attractive feature of open-source software for web servers and web browsers (e.g., Apache, Linux, and Firefox) is that anyone may develop or improve current software because source codes are publicly available.

13.14 The OECD task force proposes that the specific transaction mode is captured in the form of a new questionnaire where respondents are given the choice between web sales, web purchases, EDI sales, EDI purchases, and other potential types of e-commerce, each of these e-commerce transaction models being defined. Evidence suggests that this will improve the response to data requests (OECD, 2010b).

Economic rationale of e-commerce

13.15 E-commerce can be considered as a process that mediates transactions of selling goods and services through electronic exchange. It is widely accepted that e-commerce improves efficiency through cost reductions, more competition and a better organization of production processes, and widens choice. These mechanisms are discussed in turn. Electronic transactions through the internet avoid many of the operating costs related to processing an order. Lucking-Reiley and Spulber (2001) discuss these

savings at each stage. Before the transaction, internet technology reduces the costs of searching for suppliers and buyers and making price and product comparisons. During the transaction, e-commerce reduces the cost of communicating transaction details (travel costs, paper processing, etc.). After the transaction, e-commerce lowers the costs of monitoring contractual performance and permits inventory and supply management to be automated. While empirical evidence of these potential cost savings is limited, it is estimated that, depending on the industry, such cost reductions are of the order of five to ten times (Lucking-Reiley and Spulber) and range up to 80 per cent of total input costs (OECD, 2000; Garicano and Kaplan, 2001).

13.16 Cost advantages, as a result of the automation of transactions, may mean lower prices which benefit consumers. A Goldman Sachs (2000) study estimated that an economy-wide price reduction of 4 per cent could be attained, although such estimates depend on numerous assumptions. The more elaborate study by Garicano and Kaplan estimates that in the wholesale auction market for used cars e-commerce reduces transaction costs by 80 per cent, or about 5 per cent of the commercial value, which in turn has translated into a reduction of 2 per cent in the price of used cars.

13.17 A second potential benefit of e-commerce is a stimulus towards a more competitive environment. E-commerce can lower production costs for existing producers and the lower costs may be passed to consumers through lower prices without affecting profitability. Hitt and Brynjolfsson (1996) use firm-level data on IT spending by 370 large firms. The evidence shows that the adoption of the internet did not result in higher profitability. Similar evidence is found in the banking industry with the introduction of automated teller machines (ATM) (Humphrey, 1994). Indeed, ATMs have helped to reduce transaction costs by 15 per cent. At the same time, transaction volumes more than doubled and the benefits went to consumers. While the ATM does not add any additional value to banks, the study concludes that it meets a strategic necessity for them.⁸¹

13.18 Market imperfections may reduce competition and prevent lower production costs from being passed on to consumers. So far the empirical evidence is mixed, with some work suggesting lower, constant or even higher prices

⁸¹ However, an additional argument not explored in the paper is that the large volume of ATM transactions despite constant profits may reflect a firm’s strategy to increase market share.

(see Visser and Lanzendorf, 2003, and OECD, 2000, for a review of some of the empirical literature).⁸² Other factors may also be important, although this is still subject to debate. For example, Schmitz and Latzer (2002) advance theoretical arguments and empirical evidence to challenge the widely held view that B-to-C commerce markets are strongly competitive, arguing that the goods sold in B-to-C e-commerce are heterogeneous composite goods, that market transparency in B-to-C e-commerce is lower than widely assumed, and that high endogenous sunk costs limit the intensity of competition in B-to-C e-commerce.

13.19 The intensification of competition as a result of e-commerce does not always bring lower prices. The study of Goldmanis and others (2010) looks at three US industries, bookshops, travel agencies and new car dealerships, finding that the growth of e-commerce affects the structure of the industry through market reallocation, that is, larger firms grow at the expense of smaller firms. These results imply that the exit rate of especially small firms can be seen as an inefficient consequence of meeting growing consumer demands at lower search costs through e-commerce.

13.20 A third mechanism specifies the efficiency impact of B-to-B commerce through a better organization of production processes. Because e-commerce may reduce transaction costs, as discussed above, firms may be led to reorganize the structure of their production network or supply chain. Better organization of production includes centralization of management and administration. As shown in the literature, B-to-B e-commerce encourages vertical integration and outsourcing of production and service-related activities (Lucking-Reiley and Spulber, 2001; Zhu, Kraemer and Xu, 2006). Another factor working in the same direction is the globalization of many enterprises noted elsewhere in this guide (Kraemer, Gibbs and Dedrick, 2002). Indeed, cross-country empirical evidence quoted in their study suggests that firms engaged in foreign activities have an extra incentive to adopt e-commerce, to help improve the integration of the value chain.

13.21 While the discussion in the previous paragraph is especially true for B-to-B commerce in

intermediate inputs, the globalization aspect may also be relevant for transactions in final goods and services (B-to-C commerce). There is some reason to think that downstream activities such as marketing, sales and customer service are more locally dependent. With specific reference to B-to-C commerce, some empirical findings reinforce this expectation. For instance, Globberman, Roehl and Sandifird (2001) confirm that globalization is an important determinant for B-to-B commerce in the retail brokerage industry, while B-to-C is rather a driver to enhance a local competitive advantage. The more elaborate study by Kraemer, Gibbs and Dedrick found similar evidence across countries and industries. Much however may depend on the type of product. For more generic products such as electronic goods, software, clothing, books, and music, supply and demand is more cost-driven than determined by local tastes and habits.

13.22 Another benefit of e-commerce is more variety in similar products. Product differentiation is a business strategy in which firms attempt to create and exploit differences between their products and those offered by competitors. These differences may lead to competitive advantage if customers perceive and welcome the difference. Greater variety benefits consumers through wider choice. Consumer e-commerce, such as internet shopping, can widen choice through access to a wider range of sellers; niche sellers of specialized products may then be able to realize enough economies of scale to become profitable.

13.23 Thus four factors by which e-commerce improves efficiency have been discussed in this section: cost reductions, more competition, a better organization of production processes, and greater access to different varieties of products. The literature usually regards these as the most essential factors, without ruling out that other indirect effects of e-commerce might usefully be explored, including the impact of B-to-C commerce on consumption patterns, the reallocation of labour through the impact of B-to-B commerce, and macroeconomic implications.

Statistical treatment in international standards

13.24 Thus far the statistical guidance on e-commerce in international manuals has been very limited. As will be explained in the next section, solutions on how to treat the electronic supply of products are being sought, and such trade is now treated as international e-commerce in services.

⁸² It is evident that transactions and cost reductions are likely to be different for various types of product. The OECD review covers some work with specific reference to B-to-C commerce. Some studies have estimated that such costs for digitalized products (e.g., CDs, books, airline tickets) tend to be on average 10 per cent lower than for conventional retail sales. Whether these cost savings benefit consumers is not investigated.

13.25 The treatment of e-commerce transactions within the framework of BPM6 falls into two categories (see BPM6, paragraph 10.10):

- Goods and services ordered and delivered via electronic means.
- Goods and services ordered electronically but delivered physically.

13.26 When items are delivered physically, the usual statistical treatment of transactions in goods and services is applied, and shipping charges are allocated in line with the “free on board” principle. In case of electronic delivery *“in general, charges for electronically delivered products are included in services...”* and *“financial services associated with e-commerce are included in financial services”* (BPM6, paragraph 10.10) The definitions of goods and services in BPM6 are in line with the 2008 SNA treatment of goods and service transactions.

13.27 Chapter 10 of BPM6 further describes the treatment of charges related to the use of intellectual property (section h) and the classification of telecommunication, computer and information services (section i).

13.28 Table 13.1 shows when to record e-commerce as transactions in goods or services, based on the type of licence attached to the product (perpetual use, period licence, etc.) and the method of delivery (physical or electronic). For instance, the purchase of software is recorded as purchase of a good if the purchase includes a

perpetual licence to use the software, but as purchase of a service if the licence restricts use to a limited period. Information services which may include downloaded content that is not software (such as electronic access to a newspaper, or to audiovisual products), are all categorized as charges for the use of intellectual property, and so as purchases of a service, provided that, if appropriate, a licence fee is charged for use of the product for a specified period.

13.29 The MSITS 2010 uses the same definition as BPM6 for international e-commerce (see paragraph 3.62). The *International Merchandise Trade Statistics* manual (IMTS 2010) also discusses goods bought through electronic commerce (see paragraph 1.34), recognizing that data collection on exports and imports of e-commerce products is challenging (as for example when goods are shipped through parcel or courier services).

13.30 There is a general recognition that the electronic delivery of international e-commerce services is covered by the General Agreement on Trade in Services (GATS)

13.31 It might be added that the Eurostat Task Force on the Rest of World has recommended further work on the recording of e-commerce, noting that *“information from credit card operations will be highly valuable for the assessment of transactions, in particular at high frequency, notably for travel and e-commerce”*. Credit card data may give a useful indication of

Table 13.1 International treatment of e-commerce

<i>E-commerce goods and services</i>	<i>Classification</i>	<i>International treatment</i>
(a) Sale or purchase of goods over computer networks - delivered physically	goods	Merchandise trade as defined in IMTS 2010, BPM6 and 2008 SNA
(b) Sale or purchase of goods over computer networks - delivered electronically	services	
(c) Sale or purchase of services over computer networks - delivered electronically	services	
(d) Sale or purchase of computer-related services over computer networks - delivered physically (provided on physical media) - with right to perpetual use	goods	BPM6
(e) Sale or purchase of computer-related services over computer networks - delivered physically (provided on physical media) - with period licence fee	services	
(f) Sale or purchase of computer-related services over computer networks - delivered electronically or downloaded	services	

Note: The table summarizes the coverage, classification and corresponding source in international standards for the statistical treatment of e-commerce goods and services. The first block concerns goods and services that do not involve intellectual property rights; the second block relates to e-commerce in intellectual property products (software, telecommunication, audiovisual and other related services).

internet sales and provide relevant information for consumer price indices (CPIs).

Measurement

13.32 The extent to which international trade is affected by international e-commerce much depends on how it is recorded in the data. This section sets out some measurement challenges presented by e-commerce, especially for international trade statistics. Annex 13.1 describes some data initiatives by Statistics Netherlands, including the development of EU-harmonized ICT surveys. How activities related to e-commerce are treated in the national accounts will be covered in the next section.

Classification, identification and coverage

13.33 While the purchase order, including the search for the product or service, must be completed electronically for many products, it is only for services and digital goods that delivery is made online. The measurement of output of services has always been difficult (because of the need to identify a standard product); e-commerce, by encouraging trade in services, adds to the importance of the problem.

13.34 The tables in annex 13.2 provide some numerical illustrations. Service industries that have been affected by e-commerce include transport and storage, IT, insurance, and other business services. Examples of e-commerce activities in these industries include online payments for travel arrangements (hotels and travel), insurance purchases, and software and other related services. In the case of IT products, it is difficult to measure the output of software directly (as well as related IT services), which in turn may affect the output of hardware. One notable outcome is an unusually large share of e-commerce in total turnover in the transportation and storage industry (see especially table 13.2.2); this industry includes airlines which make heavy use of online bookings.

International e-commerce

13.35 Digitalized products with physical counterparts (newspapers, e-books, airline tickets, etc.) and the distinction between goods and services are crucial for international trade data collection purposes (Ruffles, 2001 and Kuhn, 2001), and, as will be discussed later, for national accounts and for measuring consumption and consumer prices. There is general agreement that the cross-border supply of digitalized products should be seen as a service which, for instance, permits the consumer to use digital information to

make a product. As indicated above, recommendations exist with respect to classification of international transactions relating to IPPs as well as other services which are internationally traded through the internet. However, gaps exist in international trade statistics concerning electronically-delivered products because the location of the supplier and the internet host may be uncertain.

13.36 This latter point is part of a broader issue of allocating economic transactions in the form of services where intermediaries are involved in the marketing or billing for a service which may actually be supplied by a producer to a third country. For instance, a resident of country A (the compiling country) purchases a product (goods or services) from country B which supplies the product to country C. During this process the good or service does not enter or leave the compiling economy. This is a type of merchanting activity (see Chapter 6 above).

13.37 It is clearer that products ordered and paid for through the internet, but delivered physically, should be considered as trade in goods. Such e-commerce is indeed included in merchandise trade statistics, though it may not be possible to identify it separately unless the method of ordering the good is recorded.

13.38 The export side of service activities related to e-commerce could relatively easily be captured by surveying a population of specialized companies believed to be engaged in e-commerce trade in particular services (legal, accounting and financial services, etc.). However, imports of services related to e-commerce are harder to capture, because any resident enterprise or household may be involved.

13.39 Since e-commerce pervades almost the entire economy, it is not an activity that can be found in a single industry. Some industries are, however, likelier to be involved in e-commerce than others. For example, in the new NACE classification (revision 2), the European standard for industry classifications, a category is introduced for *Web portals* (code 6312) and *Retail sale via mail order houses or via internet* (code 4791- previously this category covered only *Retail sale via mail order houses*). Statistical data on these industries may provide an indication of e-commerce developments. However, more data on e-commerce is needed in other industries to enable conclusions for the entire economy to be drawn.

13.40 Some additional problems related to e-commerce trade are listed below:

- Low-value exports – the value of transactions below threshold values may, with the increasing trend towards international e-commerce, aggravate the problem of undercounting. The problem of undercounting low-value transactions is especially prevalent in B-to-C commerce where many transactions are one-off and of low value.
- Underreported transactions – international e-commerce leads to an increase in many small-scale services which may fall below the threshold value set by statistical reporting systems.
- New products – e-commerce is merely another channel to reach customers with new products, e.g. e-books, e-newspapers, e-administrative support, displacing some current trade streams and leading to a fall in recorded trade flows unless the new business can be captured in surveys. This may be particularly true for B-to-B commerce which comprises the largest part of cross-border trade.
- Residents' online purchases are not captured in Intrastat, the system for recording cross-border trade within the European Union (see Chapter 9, annex 9.4); online purchases from outside the European Union are counted if they exceed a threshold value and there is physical delivery.

Additional data challenges

13.41 E-commerce has the potential to cause understatement of exports of goods and services which in turn affects the accuracy of GDP estimates. However, other items in the national accounts may be affected as well. This section focuses on some additional implications of e-commerce.

Retail trade

13.42 Statistics Netherlands measures spending by households in its monthly statistics on consumption expenditure. Part of this expenditure takes place in retail outlets. In its monthly statistics on retail trade, Statistics Netherlands monitors sales by various parts of the retail sector. Both statistics therefore give a picture of spending by households, one from the point of view of the consumer, the other from the perspective of the seller. The monthly statistics on retail trade, represented by the retail turnover index, are also an important source for monthly statistics on consumption expenditure. Monthly data on retail

turnover provide an indicator of quarterly household consumption, which is the largest expenditure item in the national accounts.

13.43 International e-commerce may give rise to some discrepancies between retail consumption expenditure within the national borders and gross retail sales. Gross retail sales, which include all sales of goods and services of domestic enterprises to domestic and foreign consumers (including e-sales), represent not only sales by firms included in business registers, which serve as the population base for the calculation of the index, but also by foreign firms which may have domestic VAT registration but are not included in the business registers.

13.44 With specific reference to EU regulations (Nos 1165/98 and 1158/2005) defining the coverage of short-term business statistics (STS), the scope of turnover indices does not take into account domestic sales when the invoice is issued from abroad, although it includes exports from the domestic country (non-domestic orders). Non-domestic orders are split between orders from the euro area and orders from elsewhere. This distinction concerns only industry (annex A in the STS). Retail trade (annex C) and other services (annex D) do not require the distinction to be made.

13.45 The emergence of small retail trade e-commerce services in the form of electronically delivered products (media products, e-books, etc.), with domestic and foreign turnover, is a challenge for compilers of (quarterly) statistics on household consumption if the distinction between domestic and non-domestic markets is not made. While the *Household Budget Survey* (HBS) is the prime annual source for household consumption expenditure, “[the] retail turnover index covered by the STS regulation is a short term statistics on turnover where monthly data on retail trade provides an indicator of quarterly consumption in national accounts which is the largest element of expenditure” (Eurostat, 2006, page 81).

Price indices

Consumer prices

13.46 This section discusses potential bias in the CPI arising from e-commerce activities. The CPI reflects the change in the price of a representative basket of goods and services purchased or acquired by an average household for the purposes of its own final consumption. The prices recorded for the CPI usually are purchasers' prices, including indirect taxes such as VAT and taxes on specific products, e.g. motor vehicles, alcohol and tobacco, and

subsidies. Prices are collected from retail outlets of all kinds.

13.47 The impact of e-commerce products on the CPI depends on two factors: the weight of e-commerce spending in household final consumption expenditure; and the price changes for e-commerce products (goods and services) compared to the changes in prices of consumer products purchased from traditional outlets. As an illustration, in the Netherlands in 2009 e-commerce purchases by households were estimated at almost €6 billion, more than 50 per cent more than in 2007.⁸³ This was some 2-3 per cent of total household expenditure. Table 13.2.4 in annex 13.2 shows some of the products that are purchased online.

13.48 The question whether internet trade is sufficiently important to be included in the CPI requires more attention. Whether e-commerce leads to lower prices is unclear (see paragraphs 13.18-13.19 above), though much points in this direction. In the Netherlands, about 50 per cent of respondents find the price advantage vis-à-vis traditional retail prices an important reason to buy online (CBS, 2009). In addition, the wide range of products and services available online from foreign internet sites may bring lower prices to domestic consumers.

13.49 From a more general perspective, CPI compilers recognize the methodological challenge of introducing new and modified goods and services (substitution bias, quality change bias, new goods bias) and the emergence of new retailers (outlet substitution bias). For various reasons, e-commerce may be a source of measurement bias: e-commerce allows consumers to switch from traditional outlets directly to wholesalers and internet firms and facilitates introduction of new goods from abroad (especially for electronic products, e.g. iPhone, Microsoft Zune).

13.50 Switching from traditional stores to cheaper internet sources is a new source of outlet substitution bias, which occurs when consumers switch to cheaper outlets for identical products between the reference period and the current period. The bias arises because the CPI is based on average changes in the prices charged by outlets which were selling in both the reference and current period. A number of studies in the 1990s indicated an upward bias in the CPI from outlet substitution of about 0.1 per cent per year. Because of more frequent updates of the samples of outlets and products and implementation of new

calculation methods, the magnitude of any outlet substitution bias in most countries is probably now below this. With new e-retail stores replacing traditional outlets, potential outlet substitution bias could in principle be eliminated by adjusting the CPI by a factor reflecting the relative price levels. In practice, however, this will be difficult as e-commerce products are introduced gradually from month to month, and the statistical office may not always have the detailed product characteristics to control for any quality changes (differences in prices across outlets that reflect quality differences, including payment conditions, delivery charges, etc., should not be included in the CPI).

13.51 To the extent however that the emergence of e-commerce sources leads to lower retail prices for goods and services from established outlets that are already included in the CPI basket, the CPI will provide a good measure of price developments, and it may not be necessary to establish separate price collection of goods and services in e-commerce.

13.52 A comparison of price trends in e-commerce goods and services with price trends for the same goods and services in traditional outlets, based on a carefully constructed sample survey, would help to resolve the question of whether e-commerce purchases should be included in the CPI. It would need to include reliable price information on new goods, and take account of the quality adjustment point relating to e-commerce.

13.53 A final point to consider concerns the price implications of e-commerce products and services supplied from abroad. If e-commerce enables consumers to order goods from abroad, should those foreign prices be included in a country's CPI? The answer will partly depend on what concept the CPI seeks to measure. But even if the stated measurement concept is a cost of living index for residents, the main use of the CPI as a measure of domestic inflation argues against including foreign prices for goods ordered over the internet. A more practical reason for excluding these foreign prices is that their effect on the CPI may be very minor, or that competition from the foreign source may already have led domestic outlets to reduce their prices for similar goods and services (in quality adjusted terms).

Producer prices

13.54 The term producer price indices (PPIs) covers both price indices of produced goods or services (output prices), and price indices of (intermediate) inputs into the production process.

⁸³ Thuiswinkel Markt Monitor - see further CBS, 2009.

13.55 Output PPIs are commonly used; they include PPIs for goods for the domestic market and PPIs for goods produced for export (export price indices). Similar output PPIs for services are also compiled in many countries. The relevance of e-commerce to output PPIs concerns keeping up to date the sample of establishments and products (goods or services) in the index, and how new e-commerce products are included in the index.

13.56 Existing producers already in the sample, or new producers entering the market, may offer products via e-commerce. These should in principle be included in the index following standard practice, e.g. that the product accounts for at least 10 per cent of the value of the establishment's production, or that the establishment itself has identified the product as economically important.

13.57 If the e-commerce products are sold at different prices or exhibit different price trends from similar products sold via conventional channels, failure to include them in the PPI may introduce bias into the index. Even if e-commerce products are included, the way it is done may still introduce some bias. If a conventionally sold product and an e-commerce product can be considered as similar (close substitutes of essentially the same quality), the full price difference should be reflected in the index. However, if the e-commerce product is linked into the index, only the price trend of the product will influence the index, while the difference in the price level between the conventional product and the e-commerce product will not be reflected in the index. To the extent that the difference in price levels is not reflected in the index, there may be a tendency of the index to overstate average price developments if e-commerce products in general are cheaper than similar products sold through conventional channels.

13.58 On the other hand, price differences between otherwise similar conventional and e-commerce products may reflect quality differences in terms of e.g. product specifications, or payment or delivery conditions. In such cases the difference in the price level should not be included in the index, as it reflects a quality difference. Frequent update of the sample of establishments and products will help to reduce potential bias from e-commerce, and the index compilers may attach particular importance to sampling e-commerce products on markets where they are believed to have an influence on the general price development.

13.59 Input PPIs include various types of building and construction price indices, and import

price indices for goods and services. As discussed earlier, producers or importers may tend to substitute in favour of lower cost inputs where this is made possible by B-to-B e-commerce. If lower priced e-commerce products are not included in the index, there is a risk that the index may overstate the average development of input prices, much as a Laspeyres CPI may tend to overstate price increases for households.

13.60 In many price surveys the respondents will be asked only to indicate the price of a specific product, irrespective of the source from which the product was acquired. In these cases, if the respondent shifts from conventional to e-commerce purchase, the price differences should be reported and included in the index. Thus any potential bias will much depend on national practices in updating samples, the methods used for inclusion of new products, and survey design.

13.61 Import price indices provide a special challenge as substitution between establishments and products becomes more complex in the context of cross-border outsourcing. B-to-B commerce facilitates outsourcing of production and services-related activities (see paragraph 13.20) and also makes it easier and less costly for the importing establishment to substitute between products and suppliers. If this type of substitution is not taken into account, the index will have a tendency to overstate the average price change from the viewpoint of importers. The size of possible upward bias in import price indices because of e-commerce is unknown and depends, as mentioned, on national sampling and survey practices. However, potential bias can be reduced by frequently updating the sample of establishments and products to better reflect actual market conditions.

13.62 Enterprises may of course also switch from buying intermediate input from domestic suppliers to (cheaper) foreign suppliers. The resulting changes in costs will not be reflected in any single price index, as domestically produced and imported products are usually included in different price indices. Growth in the domestic producers' value added because of substitution of cheaper foreign inputs may therefore be identified as volume growth rather than attributed to price changes (see Houseman, 2008). As noted in Chapter 2, this effect applies in principle to all substitution between domestic and foreign suppliers, and is not restricted to e-commerce. E-commerce, however, may make this type of substitution more common, adding further to measurement problems.

Challenges for national accounts

13.63 This section discusses challenges presented by e-commerce from the perspective of national accounts.

13.64 Five areas of difficulty emerge from the discussion above:

- Identifying B-to-C and B-to-B international e-commerce and its impact on GDP.
- Underreporting of small-value trade flows arising from e-commerce.
- The emergence of new products and more varieties of similar products.
- Possible bias introduced by e-commerce into price deflators and therefore into volume estimates in the national accounts.
- Issues related to the identification of the e-commerce supplier (resident or foreign).

13.65 In the national accounts of the Netherlands there is currently no distinction between the part of GDP that is generated by e-commerce and that generated by sales through other channels; the distinction is difficult or even impossible to make. The absence of statistical information on e-commerce may indirectly lead to bias in estimates of GDP and economic growth. For example, online purchases of music downloaded from foreign websites should be part of household consumption, and failure to include them may lead to errors in GDP. It might seem that both consumption and imports will be understated, with no net effect on GDP. But the household expenditure may be picked up by the HBS, with no indication whether the purchase is from a foreign or domestic provider. The effect may be to overstate GDP measured from the expenditure side.

13.66 Another issue relates to the measurement of trade margins. A trade margin is the difference between the price realized when a product is sold and the price that would have to be paid by the distributor to replace it at the time of sale. It would be useful to distinguish between trade margins that are generated from the internet and those arising from regular trade, since they may differ. A measurement problem arises when firms employ a mix of regular and online channels; in the absence of a relevant question in business surveys, it is impossible to determine total sales margins.

13.67 Other factors arising from e-commerce which are relevant to national accounts include

price effects, consumer savings, consumption of new products, and effects on transportation and travel. The review of the literature by Visser and Lanzendorf (2003) explores these effects. It seems that B-to-C commerce results in an overall increase of both individual travel and freight transport. The increase of freight transport can be easily explained by more home deliveries. An additional effect of e-commerce may be that many traditional retailers close down, resulting in more car use for shopping and longer personal journeys.

13.68 The majority of value added that can be attributed to e-commerce is probably captured in the national accounts. Online purchases and sales by domestic companies are included in their overall purchases and sales in the production statistics. All online B-to-B transactions of domestic companies are covered in the national accounts (although a distinction between online transactions and other transactions cannot be made).

13.69 In addition, all online B-to-C transactions between domestic firms and domestic or foreign consumers are recorded in sales by domestic firms. A problem here though is that sales over the internet to foreign customers may be misclassified as domestic sales (and so be included in household final consumption) rather than as exports.

13.70 Some purchases by domestic consumers from foreign websites may go unrecorded, in which case household consumption will be understated. If they are picked up by the HBS, households may not always be able to indicate whether the purchase is from a foreign or a domestic supplier.

13.71 In the Statistics Netherlands survey on ICT use by households, B-to-C transactions are picked up through questions related to the frequency and size of internet purchases. However, no distinction is made between domestic and foreign purchases, which makes it impossible to calculate the total volume of the (domestic) B-to-C market. The absence of data identifying e-commerce purchases abroad may lead to an understatement of imports.

13.72 An additional category of e-commerce is composed of C-to-C transactions. In the Netherlands a large amount of online trade consists of (second-hand) trade between consumers. For example, the total value of transactions on marktplaats.nl (an online market for consumers) amounted to €4.7 billion in 2006. This was substantially more than the estimated amount of online sales by Dutch web shops in 2006 (€2.8 billion). While the transfer of goods between consumers is not part of household consumption

and does not contribute to GDP, the fees and commissions paid by consumers to the companies that facilitate the sale and purchase of goods are part of household final consumption expenditure, and amounts spent on them should be recorded in the national accounts. If these companies are domestic, their revenues are picked up by regular statistics. If these firms are non-resident (like, for the Netherlands, ebay.com and Amazon.com) supplementary estimates for household consumption and imports of services should be made.

Concluding remarks

13.73 This chapter has discussed the definitional and conceptual issues related to e-commerce. The OECD has proposed a new definition which has the potential to solve many of the difficulties related to the supply of useful data. The statistical challenges for measurement and the implications for national accounts and related statistics (international trade, CPI, PPI, transportation margins) have also been discussed.

13.74 Some work remains to be done on classifying e-commerce more explicitly. As for other types of products in the *Extended Balance of Payments Services Classification 2010* (see for example paragraph 3.274 onwards of the MSITS 2010), it could be useful to include an alternative grouping of transactions relating to e-commerce with a clear definition of what type of products should be covered.

13.75 Obtaining better data relating to e-commerce is a challenge but would solve many problems in the national accounts. Some efforts are being made. Annexes 13.1 and 13.2 describe the Statistics Netherlands experience in developing and collecting data on e-commerce, through surveys of domestic internet sales and purchases and also of transactions with other EU countries and elsewhere, and present some results. Information on credit card operations will also be highly valuable for the assessment of e-commerce transactions.

Annex 13.1

Measurement of e-commerce in the Netherlands

13.2.1 This annex briefly describes the Statistics Netherlands experience in developing and collecting data on e-commerce, highlighting some data gaps and other outstanding problems.

The Statistics Netherlands definition of e-commerce

13.2.2 Statistics Netherlands publications refer to a Eurostat definition of e-commerce:

"Placing or receiving orders for goods or services through electronic networks, regardless of delivery and payment methods, excluding orders by telephone, fax, or conventional e-mail."

13.2.3 This definition includes e-commerce turnover via the internet and other networks such as EDI/ADE (automatic data exchange), with a distinction between "public" e-commerce (via the internet/a website, including B-to-B and/or B-to-C) and "private" e-commerce, meaning sales media such as EDI/ADE (B-to-B via intranet and other private networks).

Survey of automation and ICT

13.2.4 The automation survey (currently called the survey on ICT in enterprises) started in 1982. The rapid developments in ICT in the last two decades have made it necessary to update the survey regularly. During the first years, the questions focused on the costs of automation, computer personnel, and the ownership of computers. The emphasis has shifted to the use of external networks like the internet. Total e-commerce sales have been included in each yearly survey since 1999.

13.2.5 The first EU harmonized survey started in 2001, initially as a pilot. Among the questions were some related to electronic commerce in the year 2000; these have been incorporated in the *Automation Survey 2000*. Since 2002, an annual *Community Survey on ICT Usage and e-Commerce in Enterprises* has been conducted on the basis of a Eurostat questionnaire list. From 2001 to 2008 data can be compared across some (later all) EU countries. In 2008, questions covered the shares of turnover generated via a public website, automated data exchange or other private systems; the proportion of purchases generated via electronic networks; and total e-turnover, split between the Netherlands, the rest of the European Union, and elsewhere.

13.2.6 In addition to questions related to the quantity of e-commerce, there are also questions on the usage of diverse ICT components such as website, CRM (customer relation management) and SCM (supply chain management).

Business statistics

13.2.7 Business statistics (sometimes referred to as production statistics) include questions related to e-commerce turnover generated via the internet. The questions are limited to the retail, travel and wholesale sectors, and there are recognized weaknesses in both the questions and the responses. The questionnaires and samples should probably be modified in the interests of consistency and better coverage.

13.2.8 A provisional conclusion is that at present the production side does not provide a complete picture of e-commerce.

Annex 13.2

Data relating to e-commerce in the Netherlands

Table 13.2.1 Supply chain management (SCM), 2008⁽¹⁾

	<i>Method used</i>		
	<i>Applies some kind of SCM</i>	<i>SCM via websites</i>	<i>SCM via automated data exchange</i>
<i>Per cent of the total number of companies</i>			
Total	13	8	5
<i>Sector of industry (SIC 2008)</i>			
Manufacturing	15	9	6
Electricity and gas supply; water supply; waste management	11	7	7
Construction	8	5	1
Wholesale and retail trade; repair of motor vehicles and motorcycles	21	12	11
Transportation and storage	13	10	9
Accommodation and food service activities	7	6	1
Information and communication	15	13	7
Financial institutions	9	8	7
Renting, buying and selling of real estate	6	4	2
Consultancy, research and other specialized business services	8	6	3
Renting and leasing of tangible goods and other business support services	7	5	2
Human health and social work activities	5	3	3
<i>Company size</i>			
10-19 employees	10	7	2
20-49 employees	12	7	6
50-99 employees	14	9	8
100-249 employees	24	15	14
250-499 employees	34	22	22
500 and more employees	41	31	29

⁽¹⁾ Companies with ten and more employees.

Source: Statistics Netherlands, *ICT Use by Enterprises, 2008*.

Table 13.2.2 E-commerce turnover by sector of industry (SIC 2008) and company size, 2008⁽¹⁾

	2008
	<i>Per cent of total turnover</i>
Sector of industry (SIC 2008)⁽²⁾	
Construction	2.26
Electricity and gas supply; water supply; waste management	3
Renting, buying and selling of real estate ⁽³⁾	5.12
Consultancy, research and other specialized business services ⁽³⁾	5.12
Human health and social work activities	5.23
Renting and leasing of tangible goods and other business support services	7.38
Information and communication	7.75
Accommodation and food service activities	9.7
Wholesale and retail trade; repair of motor vehicles and motorcycles	13.84
Manufacturing	14.81
Transportation and storage	24.54
Company size	
20-49 employees	7.9
50-99 employees	10.8
100-249 employees	13.0
250-499 employees	12.6
500 and more employees	14.1

⁽¹⁾ Companies with ten and more employees.

⁽²⁾ Excluding financial institutions.

⁽³⁾ *Renting, buying and selling of real estate* and *Consultancy, research and other specialized business services* are taken together.

Source: Statistics Netherlands, *ICT Use by Enterprises 2008*.

Table 13.2.3 Sectors of industry making most intensive use of electronic sales by company size, 2008⁽¹⁾

	<i>Per cent of the total number of companies</i>
Total	25
Sector of industry (SIC 2008)⁽²⁾⁽³⁾	
Accommodation	66
Travel agencies, reservation services and tour operators	65
Insurance	57
Wholesale	46
Information and communication	45
Renting of real estate	40
Company size	
10-19 employees	23
20-49 employees	27
50-99 employees	30
100-249 employees	32
250-499 employees	33
500 and more employees	36

⁽¹⁾ Companies with ten and more employees.

⁽²⁾ Only sectors of industry with a high share of companies with electronic sales are listed.

⁽³⁾ The figures in this table are based on more detailed breakdowns of sectors of industry than those quoted elsewhere in this chapter.

Source: Statistics Netherlands, *ICT Use by Enterprises 2008*.

Table 13.2.4 Online purchases by type, 2005-2009⁽¹⁾

	2005	2006	2007	2008	2009
	<i>Per cent of internet users</i>				
Lottery or gambling	2	5	5	5	8
Groceries, cosmetics and cleaning products	4	5	9	8	9
Other purchases	6	4	4	4	11
Hardware	11	14	13	14	13
Shares, financial services, insurance	5	11	11	10	15
Household items ⁽²⁾	19	21	20	18	23
Software	15	21	22	22	26
Electronics	19	22	24	27	26
Film, music	21	25	24	25	30
Clothes, sports gear	28	35	37	39	43
Literature (books, magazines)	31	36	37	40	44
Tickets for events	22	33	36	37	45
Travel, holidays, accommodation	35	44	47	47	58

⁽¹⁾ Internet users who bought products online in the three months before the survey.

⁽²⁾ E.g. furniture, washing machines, toys.

Source: Statistics Netherlands, *ICT Use by Households and Individuals, 2005-2009*.