

**The Measurement and Analysis of E-Commerce:
Frameworks for Improving Data Availability**

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ABSTRACT:

Interest in the expansion of e-commerce as a driver for economic development, especially e-commerce across borders, has intensified in recent years. While there is an apparent widespread consensus on the environmental factors necessary to promote e-commerce in developing countries, the basis of empirical evidence on both the extent of e-commerce and the extent to which this is associated with any of its proposed drivers is disappointingly weak. This paper aims at summarizing the current state of affairs with respect to the availability of data and suggests some ways forward in terms of generating an increased supply of policy-relevant data and analysis.

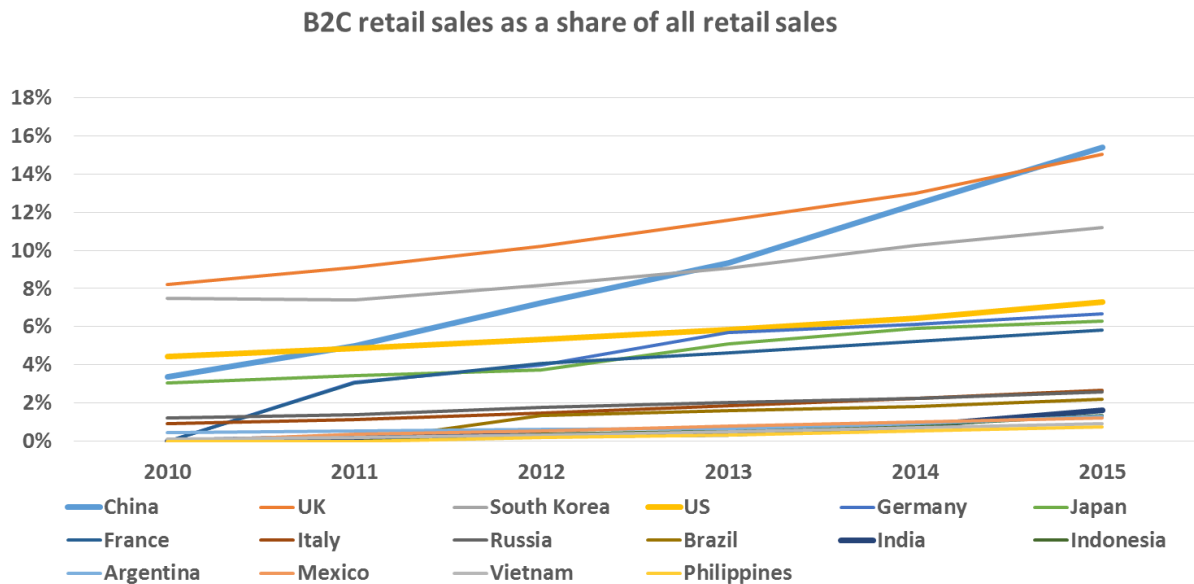
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1. Introduction

a. Importance of e-commerce for the global economy

The emergence of e-commerce, the activity whereby buying and selling takes place in a manner facilitated by the Internet, has transformed the global commercial landscape. Consumers in high-income countries, engaging in business-to-consumer (B2C) e-commerce, increasingly prefer shopping online to visiting brick-and-mortar retailers. In China and Korea, consumers and firms have caught on quickly to the advantages of e-commerce, leapfrogging most of North America and Europe in this regard (Figure 1). An even larger volume of business-to-business (B2B) e-commerce, using such technologies as electronic data interchange (EDI), is taking place mostly under the radar from the point of view of most people. Of an estimated \$25.3 trillion on global e-commerce in 2015, nearly 90 percent is estimated to be B2B, with the rest B2C (UNCTAD 2017, p. 28). The value of these flows is estimated to reach 34 percent of GDP for the top 10 economies involved in e-commerce.

Figure 1



Source: eMarketer

This way of doing business is transforming global value chains and the way that firms network with each other. The potential for e-commerce to promote economic development in low- and middle-income countries has also attracted attention. Small traders using e-commerce in a wide variety of developing countries are able to export more easily and to a wider variety of destinations than firms using more traditional methods of selling (eBay 2016). Yet even though

e-commerce is growing rapidly, the potential of cross-border e-commerce as a method of trade may be largely untapped. Estimates as of 2015 indicate that cross-border B2C e-commerce accounts for only 1.1 percent of merchandise imports, and only 7 percent of total B2C, the rest being domestic (UNCTAD 2017, p. 33).

At the same time, the potential of e-commerce has come to the attention of policymakers worldwide. In its declaration of April 7, 2017, ministers of the G20 countries responsible for the digital economy recognized the increasing importance of the digital economy for inclusive growth and economic development, and laid out an ambitious program for promoting the benefits of digitization.¹ International meetings at the WTO, including the annual Public Forum and Aid-for-Trade meetings, as well as UNCTAD's annual E-Commerce Week, have placed the topic of e-commerce and how to best promote its benefits squarely in visible focus. Recognizing that the expanding role of e-commerce may require a corresponding set of multilateral rules, in January 2019, 48 WTO delegations (including the 28-member European Union) jointly announced their intent to commence WTO negotiations on trade-related aspects of e-commerce (WTO 2019).

However, a severe limitation of available data prevents analysts from assessing how much e-commerce exists in most countries. This, in turn, frustrates attempts to use cross-country data to provide relevant policy advice on how to promote e-commerce. Policymakers desiring to promote e-commerce, but with limited resources would like to know whether to invest in broadband connectivity, payments systems, trade facilitation, entrepreneurial skills, postal inclusion, or startup financing. But official data from most developing countries is non-existent, and private data are expensive. Data on B2B e-commerce, believed to be much larger than B2C e-commerce, is scarcer than B2C (UNCTAD 2016). Cross-border e-commerce is much harder to identify than domestic e-commerce, and data on cross-border B2B e-commerce are non-existent. The irony in all this is that it is exactly in those areas where the relevance of e-commerce for development is likely to be most relevant – developing countries, cross-border trade, the linkage of B2B e-commerce and global value chains – that we know the least.

b. Importance of measurement

It is natural that both economists and policymakers would wish to know what the principal drivers of e-commerce are, particularly in developing countries, where the activity is still in its infancy. As of 2013, less than 10 percent of individuals in middle-income countries like Turkey, South Africa, Mexico, or Thailand had made an online purchase in the last year, and less than 2 percent of retail sales in such countries were made online.² A number of factors have been proposed that could be inhibiting the growth of e-commerce in such places, ranging from

¹ The G20 Digital Ministers' Declaration may be found at https://www.bmwi.de/Redaktion/DE/Downloads/G/g20-digital-economy-ministerial-declaration-english-version.pdf?__blob=publicationFile&v=12

² Eurostat, ITU, national data, and Euromonitor data cited in UNCTAD (2015), 19-21.

inadequate payments systems to trade facilitation issues at customs to the legal and regulatory environment to entrepreneurial skills.

The difficulty at present in associating potential environmental drivers of e-commerce with the presence of e-commerce in a systematic manner consists largely in the very limited amount of data available on the presence of e-commerce. The vast majority of countries do not collect official data on this topic. Significantly more data are in private hands, including the operators of e-commerce platforms and analytical services directed at marketers, but they are expensive, which limits their use. The existing data sheds only a little light on important distinctions among different types of e-commerce, such as business-to-business (B2B) vs. business-to-consumer (B2C), or on what kind of goods and services enter into e-commerce. Most There are virtually no data on cross-border e-commerce, i.e. international trade in goods and services which are enabled by the Internet. The data sources that are available use widely differing definitions of e-commerce. Nor is terminology standardized; writers on this topic either use “digital trade,” “e-commerce” and “e-trade” interchangeably, or attempt to use these terms to demarcate different concepts in a manner which has not yet been standardized.

It is no wonder that the G20 Digital Ministers encouraged the Inter-Agency Task Force on International Trade Statistics (TFITS), chaired by OECD and WTO, to work more closely with national statistical agencies and the business community in order to generate proposals for a common understanding of measurement issues in “digital trade,” identify biases and gaps in current statistics, and suggest ways to address these challenges.³

The purpose of this paper is to describe the relatively good state of data on the enabling factors of e-commerce, and to aid in its dissemination; to describe the current challenges with available official and private data on the extent of e-commerce itself; and to make some modest recommendations for the way forward.

At the same time, data on the enabling factors of e-commerce are relatively more abundant. For most countries, and often for multiple years, we know how many internet and cell phone users there are, and what the basic price of these services are. We know what percentage of the population has credit and debit cards (and actually uses them), and to what extent people are using the newer forms of mobile money; how many people have a postal address for delivery, what the quality of a country’s logistic systems are, the extent of ICT skills in the entrepreneurial population, and the coverage of a country’s laws to establish a policy regime for e-commerce. Already several attempts have been made to summarize this information in indices and rankings.

³ G20 Digital Economy Ministers’ Declaration, op. cit., p. 18

We are thus in the situation of analysts who would really like to know which types of X (enabling factors) encourage Y (e-commerce), because e-commerce is very important, but who are in the awkward position of being able to see X fairly well but Y fairly poorly. In econometricians' language, we know a lot about the independent variables but very little about the dependent variable.

2. Measuring the environmental factors believed to drive e-commerce

In today's world, countries are increasingly interested in advancing e-commerce in their economies to promote trade across borders by lowering the costs, to achieve significant improvements in the ability to expand global trade, and to boost export diversification and job creation. E-commerce will especially play an important role in developing countries by fostering SMEs productivity and participation in global value chains. However, the e-commerce environment in many countries is inadequate to promote diversification in export markets and to lower trade costs of goods and services.

In order to make e-commerce have a greater impact on economic growth and socio-economic development, governments, private sector enterprises, and consumers need to pay more attention to increase internet usage to develop online shopping. In particular, SMEs that sell online report major economic benefits from the Internet in distribution, marketing, and the range of products they are able to stock and sell, and place a high value on websites (Suominen, 2014). Thus, to foster economic growth it is believed that the ICT Infrastructure and services, payment solutions, trade logistics and trade facilitation, e-commerce skills development, legal and regulatory frameworks, and access to finance are the environmental factors which can be the main drivers of e-commerce should be developed in most of the countries around the world.

Data on these environmental factors are gathered together and made accessible in the E-Commerce for All data, which are available at the World Bank's WITS portal. These data were produced in collaboration with UNCTAD and other organizations in the E-Commerce for All consortium.⁴ They enable the creation of individual country profiles as well as international comparisons, either with a pre-population set of reference countries, or by a group of countries of the user's own choosing. While the E-Commerce for All data are a cross-section (country by most recent year), some of them are available in time series, either from the original sources or elsewhere.⁵

The data are drawn from a wide variety of different sources. The ITU dataset provides ICT infrastructure variables; the World Bank Global Findex dataset gives information on payment

⁴ These data are available at <http://wits.worldbank.org/analyticaldata/e-trade/Country/USA/> and are briefly described at <http://blogs.worldbank.org/trade/measuring-environment-e-commerce-new-tool/>.

⁵ Time series data for some of the E-Commerce For All Indicators are available at the World Bank's TC360 portal (<http://tcdata360.worldbank.org/>)

systems; the UPU, the World Economic Forum, and the World Bank LPI datasets and Enterprise Surveys results deliver trade logistics and trade facilitation indicators; the World Economic Forum NRI and the World Bank Enterprise Surveys ensures the level of e-commerce skills development; the UNCTAD Global Cyberlaw Tracker provides information on legal and regulatory frameworks in countries; and the World Bank Enterprise Surveys are also the source for access to financing. In addition, we take e-commerce readiness assessment indicators from the following datasets: The UNCTAD B2C E-Commerce Index, the ITU ICT Development Index, and the World Economic Forum NRI.

Each of the pillars of the E-Commerce for All data, which represent either enabling factors for e-commerce or summary information on same, are described below.

a. ICT Infrastructure and Services

During the recent years, most of studies have emphasized that there is a positive relationship between Information and Communications Technology (ICT) and productivity growth. Especially, the Internet and e-commerce lead to efficiency improvements, better asset utilization, faster time to market, reduction in total order fulfillment times and enhanced customer service (Terzi, 2011). However, in most of the countries there is limited skills among enterprises to use ICTs for buying and selling goods and services. In addition, there is very little access to the Internet and other fundamental services for e-commerce. Therefore, providing necessary conditions for the development and promotion of ICT infrastructure and services are fundamental for e-commerce development.

Data for this pillar is gathered from the International Telecommunications Union (ITU) Database which provides Internet usage (including fixed- and mobile-broadband subscription data) on ICT access. Based on results from national household surveys, the main indicator gives us the percentage of individuals that are using Internet. With these indicators it is important to understand whether people have access to internet, broadband, and cell phones and how much does these cost to individuals.

b. Payment Solutions

One of the main barriers to e-commerce transactions is the lack of payment processing methods. It is estimated that over a billion Internet users worldwide do not have access to a credit card. E-commerce users benefit from an environment where payments can be made safely and easily, using effective solutions involving banking and non-banking operators, with greater interoperability and universal connectivity (UNCTAD, 2016). Payment systems, including mobile money, are rapidly evolving, opening up new possibilities for consumers and corporate buyers.

However, still in several countries, cash on delivery remains the preferred option due to the challenges faced in online payment security.

In the e-commerce environment it is important for many SMEs to conduct online credit/debit card or other established electronic payment vehicles for products and services they offer for sale. The World Bank Global Findex database captures information on the percentage of access and usage to credit and debit cards. It also provides the percentage of mobile phone usage to make payments and purchases, or to send/receive money. This dataset is important to see who has access to credit/debit cards and to check the necessity of newer 'mobile money' solutions in a country.

c. Trade Logistics and Trade Facilitation

An effective and competitive national and international trade logistics as well as cross-border facilitation measures remain key for any goods related to international e-commerce transaction. It is important for goods to travel seamlessly and quickly through borders, especially the ones traded in small parcels through e-commerce. Around the world, in general, transport costs have gone down, shipping connectivity has increased and trade facilitation indicators have improved (UNCTAD, 2016). However, for some developing countries' transport costs are still prohibitively high.

To identify and promote comprehensive trade logistics and trade facilitation areas it is important to understand the quality of logistics services for international delivery, customs procedures, and postal services for e-commerce development. Universal Postal Union (UPU), World Economic Forum, and the World Bank data sources, such as Logistics Performance Index (LPI) and Enterprise Surveys, are the sources used to put together the main indicators for this pillar. These datasets are important to identify the quality of logistics services for international delivery; the details of customs procedures; and customer accessibility of postal services.

d. E-Commerce Skills Development

Lack of skills in government institutions, organizations, banks and other financial institutions, as well as among entrepreneurs and SMEs that want to engage in e-commerce is a major barrier for development. Moreover, there is not enough e-commerce experts that can provide knowledge and training to relevant stakeholders in developing countries. In many countries, enterprises as well as policy makers lack capacities and technical skills to harness e-commerce, hampering the uptake of online commerce (UNCTAD, 2016).

In order to engage with digital technologies development of e-commerce skills and entrepreneurship is necessary. Therefore, it is important to analyze the World Economic Forum Network Readiness Index (NRI) database in order to understand to what extent do firms engage with digital technologies today. This source will provide the information about how well the firms are able to absorb technology and internet to sell their goods and services to consumers. In addition, the World Bank Enterprise Surveys provides similar information about the percentage of firms using emails to interact with clients or suppliers.

e. Legal and Regulatory Frameworks

It is believed that firms facing higher regulatory support are more likely to achieve a greater extent of e-commerce use. Hence, creating security and trust for both consumers and businesses are fundamental for an environment conducive to e-commerce. Ideally, legal and regulatory frameworks facilitating online trade should strike a balance between trade development and compliance with domestic, regional and international legal instruments (UNCTAD, 2016). Governments could encourage e-commerce usage by establishing supportive business laws to protect e-commerce transactions, regulating the Internet to make it a trustworthy business platform, and providing incentives for using e-commerce in government procurements and contracts (Zhu and Kraemer, 2005).

Laws and regulations that ensure easy entry and exit of firms play an initial role in allowing businesses to access digital technologies, and so how to protect the security of e-commerce business activities will always be the core area of economic development. The relevant data for the legal and regulatory frameworks in countries are provided by the UNCTAD Global Cyberlaw Tracker which indicates the presence or lack thereof of a legal framework for electronic transactions and signatures, as well as laws for consumer protection for online purchases, for data protection and privacy, and for cybercrime prevention in place in member countries.

f. Access to Finance

It is important for the banking industry to respond to the rapid development of e-commerce environment. Especially, most developing economies do not yet provide reliable financing solutions to SMEs to set up their payment capabilities to engage in the e-commerce system. Hence, in order to facilitate the growth of e-commerce in developing countries, it is crucial to facilitate the evolution of a robust financial architecture that funds innovation and entrepreneurship at all points across the e-commerce value-chain (UNCTAD, 2016).

Firms will have the advantage to take new opportunities once banks are able to develop a range of more efficient ways to deliver their products online. Data provided from the World Bank Enterprise Surveys provides the information on the percentage of firms identifying access of finance as a major constraint, the loans requiring collateral in order to get the financing, and the proportion of the working capital that is financed by bank loans.

g. E-Commerce Readiness Assessments

E-commerce readiness assessment provides a unified framework to evaluate the digital differences among developed and developing countries. The e-commerce readiness indexes are measured at the national level across key sectors of the economy by using different techniques of measurement. Despite the variations in the definitions and techniques of measurement, these indexes generally represent the level of ICT infrastructure, Internet access, quality of network access and network speed, human resources, etc. This means that countries can readily identify areas in which they need to enhance their capabilities in order to improve services, create new opportunities for firms, and contribute to effectiveness of the business environment. Within this framework, the UNCTAD B2C E-Commerce Index, the ITU ICT Development Index, and the World Economic Forum Networked Readiness Index are the most popular e-commerce readiness indexes among others. These indexes provides information on each country's general e-commerce outlook.

3. Measuring participation in the activity of e-commerce: the weakest link

There are relatively few official sources for data on e-commerce. These differ in their definitions of e-commerce, in the types of information they gather and present, and in their method of gathering data. Some attach questions to existing business surveys used for broader data collection, and some use special surveys. This section reviews official data from four sources for which documentation is available in English: The U.S. Department of Commerce (E-Stats), Eurostat, for the European Union (E-Commerce Statistics), the United Kingdom's Office of National Statistics (E-commerce and ICT activity Statistical bulletins), and Statistics Korea aka KOSTAT (Monthly Online Shopping Survey of Statistics, and other data prior to 2014).

Private sources of data often have greater coverage, but charge a fee for access. These sources are generally directed at supporting firms in their marketing efforts rather than policy analysis. As such, they offer a wide variety of special reports in addition to statistical data, and tend to focus on B2C (business-to-consumer) e-commerce. Two examples are briefly discussed here: Euromonitor and e-Marketer.

A general limitation of available data sources is that they provide relatively little information on cross-border e-commerce per se. Data are either collected by country of origin (location of firm doing the selling) or country of destination (location of the buyer).

a. Definitions and coverage

This section provides some of the main definitions of e-commerce used both by international agencies, by national statistical agencies, and by private data providers. It also highlights some of the insights available from different data sources, to illustrate their differences in coverage. For example, while some sources report both B2B and B2C data, others do not, and similarly some sources report cross-border transactions while others do not. There is no claim made that the following information is exhaustive, especially as new sources and methods appear on a regular basis.

Information pertaining specifically to the relative size of B2B and B2C commerce is gathered in the next section.

i. International agencies⁶

The Task Force on International Trade Statistics (TFITS), a joint work of OECD, WTO, IMF, other international organizations, and national statistical agencies, defines digital trade as “all trade that is digitally ordered and-or digitally delivered (OECD, WTO, IMF, 2020 forthcoming). This definition, in turn, is made up of two components:

Digitally ordered trade is defined in a manner equivalent to the OECD definition of e-commerce as “*The international sale or purchase of a good or service, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders.*”

In turn, *digitally delivered trade* is defined as “*International transactions that are delivered remotely in an electronically downloadable format, using computer networks specifically designed for the purpose.*”

Conceptually, “digitally ordered trade” could apply to either goods or services, while “digitally delivered trade” primarily consists of services.

⁶ https://www.wto.org/english/tratop_e/ecom_e/ecom_e.htm

For its own purposes, the WTO has developed a definition of “electronic commerce.” The WTO definition arises from the Work Programme On Electronic Commerce of September 1998:

"Exclusively for the purposes of the work programme, and without prejudice to its outcome, the term 'electronic commerce' is understood to mean the production, distribution, marketing, sale or delivery of goods and services by electronic means."

The most well-known contexts in which this definition is used is with regard to the moratorium on customs duties on electronic transmissions, and in work on the so-called Joint Statement Initiative (WTO

ii. U.S. Department of Commerce⁷

The E-Stats data of the U.S. department of Commerce define two different concept: “e-shipments,” which apply to manufactured products, and “e-commerce sales/revenues, which applies more broadly.

E-shipments are defined as “online orders accepted for manufactured products from customers, including shipments to other domestic plants of the same company for further manufacture, assembly, or fabrication where price and terms of sale are negotiated over an Internet, Extranet, Electronic Data Interchange (EDI) network⁸, electronic mail, or other online system. Payment may or may not be made online.”

E-commerce sales/revenues, on the other hand, are defined as “the sales of goods and services where the buyer places an order, or the price and terms of the sale are negotiated, over an Internet, mobile device (m-commerce), extranet, EDI network, electronic mail, or other comparable online system. Payment may or may not be made online”.

The E-Stats data are collected in the course of four already existing Department of Commerce surveys of manufacturing, wholesale trade⁹, retail trade, and services industries. Thus, measures of e-commerce sales, revenue or shipments are comparable with totals for the sector, and the share of activity due to e-commerce can be calculated. However, because of conceptual differences across the surveys measures of e-commerce in the broad sectors are not additive.

⁷ See <https://www.census.gov/programs-surveys/e-stats/about/faqs.html>

⁸ Electronic Data Interchange (EDI) is the computer-to-computer exchange of business documents in a standard electronic format between business partners. Thus, transactions by EDI methods are business-to-business (B2B) e-commerce transactions.

⁹ The data include merchant wholesalers, which take title to the goods they sell and typically maintain their own warehouses, but do not include non-merchant wholesalers, who are middlemen who do not take title to the goods they sell (e.g. agents, brokers, commission agents, and electronic marketplaces).

The data do not include activities outside these four surveys. In particular, E-Stats does not cover agriculture, mining, construction, or non-merchant wholesalers (agents, brokers, and electronic markets in wholesale trade.) In particular, E-Stats do not include sales of eMarketplaces which do not take title to goods (e.g. eBay or Etsy), but they *do* include e-commerce divisions of brick-and-mortar companies, so long as the order is fulfilled from a separate warehouse and not from a retail store (e.g. Walmart.com).

Exports (sales made outside of the United States) are recorded in the E-Stats data but not broken out separately.

E-Stats reveals that the extent to which different sectors derive shipments/sales/revenues¹⁰ vary by the reporting sector. Some relevant comparisons include the following:¹¹

- In 2016, e-commerce shipments of U.S. manufacturers were about \$3.470 trillion, followed by \$2.325 trillion of e-commerce sales for merchant wholesalers, \$609 billion of e-commerce revenues for service industries, and \$389 billion of e-commerce sales for retailers.
- E-commerce accounted for 64.8 percent of all manufacturing shipments in 2016, 32.4 percent of all merchant wholesale trade, 8.0 percent of all retail trade, and 4.2 percent of all service industry revenues.
- Particularly high shares of e-commerce shipments in manufacturing were observed for transportation equipment (83.6 percent), beverage and tobacco products (74.9 percent), and paper (70.5 percent).

iii. Eurostat¹²

Eurostat defines e-commerce as “the sale or purchase of goods or services, whether between businesses, households, individuals or private organizations, through electronic transactions conducted via the internet or other computer-mediated (online communication) networks.” As in the United States, the definition depends on the technology used to order the goods, not the technology of delivery or payment. E-commerce goods can be delivered or paid for online or offline. One difference from the U.S. approach is that orders made via manually typed e-mails are excluded from the definition of e-commerce.

Data are collected through two purpose-made surveys: the Community survey on ICT usage in household and by individuals, and the Community survey on ICT usage and e-commerce

¹⁰ The concepts of shipments, sales, and revenues are roughly comparable but vary somewhat depending on the bro<https://www.census.gov/content/dam/Census/library/publications/2018/econ/e16-estats.pdf>ad sector being surveyed.

¹¹

¹² <http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:E-commerce>

in enterprises. Thus, e-commerce data are collected separately from other types of data on households, individuals, and enterprises, and are not comparable with data of that type, thus making it difficult to calculate e-commerce as a share of total commerce in such categories.

The survey of households and individuals explicitly includes purchases made by the internet of (1) financial investments, such as shares; (2) reservations for accommodation and travel; (3) participation in lotteries and betting; (4) paying for information services from the Internet; and (5) buying via online auctions

The sectoral coverage of the enterprise survey includes are manufacturing, electricity, gas and steam, water supply, construction, wholesale and retail trades, repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities, information and communication, real estate, professional, scientific and technical activities, administrative and support activities and repair of computers and communication equipment. Information is captured on enterprises by size category.

Insights from Eurostat (2018) include the following, for the EU-28 in the year 2017:

- 20 percent of all enterprises had e-sales, accounting for 17 percent of all enterprise turnover. E-sales turnover was greater for large enterprises (24 percent) than for medium (13 percent) or small (7 percent) enterprises.
- 14 percent of enterprises used web sales only, 3 percent used EDI-type sales, and 2 percent used both. However, turnover from EDI-type sales accounted for 11 percent of total turnover, compared to web sales accounting for 7 percent of total turnover. By size, 16 percent of the turnover of large enterprises was from EDI-type sales and 9 percent from web sales, while small enterprises derived 3 percent of their turnover from web sales and 4 percent from EDI-type sales. Thus, bigger firms tended to use EDI more.
- Across sectors, the largest proportionate users of EDI were manufacturing (18 percent of turnover); wholesale and retail trade, including vehicle repair (10 percent); and and transport and storage (10 percent). The largest proportionate users of web sales were accommodation (28 percent of turnover); transport and storage (12 percent); public utilities, including electricity, gas, water and sewer, and waste management and remediation (12 percent); and information and communication (11 percent).
- The extent to which countries rely on e-sales varies widely across EU countries. At one extreme, e-sales account for 35 percent of turnover in Ireland, 32 percent in Belgium, and 28 percent in Czechia; at the other extreme, e-sales account for 3 percent of turnover in Greece, 5 percent in Cyprus and Bulgaria, and 6 percent in

Latvia. In general, countries with high rates of e-sales also have a higher share of EDI, while countries with low rates of e-sales also have higher shares of web sales.

- Considering only web sales, 87 percent of turnover comes from firms' own website or apps, while 13 percent comes from online marketplaces. There is a broad correlation between the prevalence of e-sales in general, and the use of firms' own website or apps, suggesting that firms with lower capabilities are more likely to use market places. However, there are some variations in this pattern. The share of web sales made through market places ranged from 20 to 35 percent in Cyprus, Italy, Latvia, Slovenia, the Netherlands, and Finland.

Several individual EU countries have their own data reporting on e-commerce, including the United Kingdom, France¹³, and Spain¹⁴. In some cases these reports appear to be derivative from the Eurostat data. We review the UK's data below, while leaving the others to the reader.

iv. United Kingdom.¹⁵

The UK Office of National Statistics uses the OECD definition of e-commerce, under which an e-commerce transaction is defined as "the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders". Again, under this definition, "the goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted online". The definition implicitly excludes orders made by e-mail.

The source of the UK data are the E-commerce Survey of UK Businesses, supplemented with information from the Annual Business Survey (ABS). They contain data by size of firms; micro-enterprises (fewer than 10 employees) as well as firms with 10 to 49, 50 to 249, 250 to 999 and 1,000 or more employees. Although the E-commerce survey and the Retail Sales Inquiry (RSI) are based on different concepts, measures of e-commerce intensity (e-commerce as a share of total activity) are presented. This appears to allow for more nuanced concepts of B2B vs. B2C e-commerce activity, of which more below.

v. Korea:¹⁶

Until recently, Statistics Korea (KOSTAT) collected data on B2B (business-to-business), B2C (business-to-consumer) and B2G (business-to-government) e-commerce. In February 2015,

¹³ <https://www.insee.fr/en/statistiques/3566593>, for example.

¹⁴ <https://www.ine.es/jaxi/Datos.htm?path=/t09/e02/a2017-2018/I0/&file=01001.px>, for example.

¹⁵ <https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/e-commerceandictactivity/2015#main-points>

¹⁶

<http://kostat.go.kr/portal/eng/pressReleases/1/index.board?bmode=read&aSeq=313310&pageNo=&rowNum=10&amSeq=&sTarget=&sTxt=>

KOSTAT announced that the B2B and B2G data were being discontinued, based on “opinions from policy-making agencies, research institutes, and universities” that such data were “not any longer useful.” However, data on a B2C basis continue to be collected in the Monthly Online Shopping Statistics, for which there is a perceived growing need. These data include breakdowns by the types of commodities traded, as well as sources and destinations of cross-border purchases and sales.¹⁷

Insights from the Korean data include the following, taken from their report covering the second quarter of 2019:

- More than 60 percent of online shopping done by Koreans uses mobile phones.
- About 75 percent of online shopping is for goods, of which the leading categories are electric and electronic goods, clothing, and food & beverages, and about 25 percent is for services, of which the dominant category is travel and transportation.
- Overseas online sales (presumably exports) and overseas online purchases (presumably imports) each account for about 3 to 4 percent of the value of total online transactions. Over 80 percent of overseas online sales are made to China, while about 50 percent of overseas online purchases are made from the United States.

vi. Japan¹⁸

The E-Commerce Market Survey is released on an annual basis and is disseminated through the news releases of the Ministry of Economy, Trade, and Industry. It contains information about both B2B and B2C trade, focusing on Japan’s domestic market. The detailed information is in Japanese, with an English summary.

The survey uses both a narrow and a broad definition of domestic e-commerce. The narrow definition is

“Transactions that are conducted (purchase orders are issued) via computer network systems **using Internet technologies** and whose contract amounts are captured also via such systems” (emphasis added),

while the broad definition omits the bold phrase “using Internet technologies.” It is not clear whether the broad definition is meant to include EDI (which is not the World Wide Web), e-mail (which uses the Internet but is excluded from most definitions of e-commerce), or something else.

¹⁷ <http://kostat.go.kr/portal/eng/pressReleases/3/5/index.board>

¹⁸ The most recent E-Commerce Market Survey of MITI is at https://www.meti.go.jp/english/press/2019/0516_003.html. The original underlying reports are in Japanese.

While the Japanese data do not contain a complete accounting of cross-border e-commerce for Japan, one unique feature is an annual survey of bilateral e-commerce (sales and purchases) across the three partners China, Japan, and the United States. It is not clear how these data are obtained.

vii. China

Official data on e-commerce are collected by the National Bureau of Statistics and may be found in the China Statistical Yearbook¹⁹ presented both by sector and by region. For each sector, both sales of e-commerce and purchases of e-commerce are reported. Overall, for 2017, total Chinese e-commerce sales are reported to be 13.048 trillion yuan (USD 1.93 trillion) while purchases of e-commerce by sectors are reported to be 7.437 trillion yuan (USD 1.10 trillion). The prevalence of e-commerce transactions by sectors varies widely. 22.7 percent of enterprises engaged in “information transmission, software, and information technology” had e-commerce transactions in 2017, and 20.3 percent of enterprises in “culture, sports, and entertainment” also engaged in e-commerce, while only 2.7 percent of enterprises in the mining sector and 3.4 percent of enterprises in real estate had e-commerce transactions. On a regional basis, 19.0 percent of enterprises in Beijing and 14.8 percent in Hainan engaged in e-commerce, as compared to 4.3 percent each in Jilin and Heilongjiang provinces in the northeast.

viii. Canada

Statistics Canada tracks retail e-commerce sales (B to C) on a monthly basis.²⁰ Total retail e-commerce sales are contrasted with the NAICS categories for “retail trade” (44-453) and “electronic shopping and mail-order houses (45411), thus making it possible to calculate the share of retail e-commerce engaged in by traditional retailers as well as those specializing in e-commerce.

ix. Private data

a. Euromonitor

The focus of Euromonitor is on internet retailing (B2C), rather than B2B or C-to-C retailing. They generate data on a large number of variables for about 100 countries, and produce special reports on a variety of topics, situating internet retailing in the context of retailing more broadly.

¹⁹ In the 2018 China Statistical Yearbook (<http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm>), sectoral data on e-commerce and the “informatization of enterprises” (the extent to which enterprises use computers and have websites) are in table 16-39, while comparable regional data are in table 16-40.

²⁰ <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2010007201>

Euromonitor synthesizes estimates from a variety of primary and secondary sources using expert opinion.

From their website: ²¹

Euromonitor, established in 1972, is a leading source of strategic global market intelligence in a variety of industries. They generate data on a large number of variables for approximately 100 countries, and produce special reports on a variety of topics including non-store retailing, methods of payment, and the digital retail landscape in particular countries. Their measurement areas in the internet retailing sector are part of their broader work in retailing generally. To produce their estimates, Euromonitor synthesizes an array of primary and secondary sources, making use of expert knowledge of a network of researchers worldwide.

With respect to data, the focus of Euromonitor is on internet retailing, rather than B2B or C-to-C e-commerce. Sales are attributed to the country where the consumer is based, rather than where the producer lives. Thus, they include both imports and purchases from domestic sellers. This may be contrasted with the U.S. E-Stats data which are on an origin basis and include exports. Another significant feature of Euromonitor's definition of internet retailing is that both the order and the payment should be processed via the web. This again contrasts with the official data sources discussed above, which include orders made on line regardless of the mode of payment. Euromonitor data include both physical merchandise and digital goods (eg apps, digital music, games, and movie downloads). They do include transactions from online auctions and marketplaces (by contrast, U.S. E-Stats do not include data from marketplaces such as Amazon) and even provide shares of activity in individual countries which are attributable to certain online marketplaces. Some data are available for specific market segments, such as apparel.

b. eMarketer²²

eMarketer provides data and reports on a wide variety of digital business practices and marketing methods. Topics covered include digital advertising, B2B Marketing, content marketing, demographics, display marketing, e-mail marketing, e-commerce and retail, industry-specific marketing, marketing technology, media and device usage, mobile & tablets, search marketing, social media, and digital video.

eMarketer collected data on B2C e-commerce (retail sales) for about 30 countries as of mid-2017. These are presented together with total retail sales so that an intensity measure can be generated (percentage of retail sales which are e-commerce sales, and percentage of internet users or population which are e-commerce buyers. Data include projections for near future years. Measures of the enabling environment (internet connectivity, mobile phone use, etc.) are provided for a larger range of countries than those for which e-commerce retailing are available.

²¹ <http://www.euromonitor.com/internet-retailing>

²² <https://www.emarketer.com/>

The definition of “retail ecommerce sales” used by eMarketer includes products or services ordered using the Internet via any device, regardless of the method of payment or fulfillment. It excludes travel and event tickets (Liu 2015).

b. B2B vs. B2C e-commerce

It is widely recognized that B2B e-commerce is several times larger than B2C e-commerce. As noted above, UNCTAD (2017) estimated that 89 percent of global e-commerce was B2B.

However, the data points available to support this hypothesis are relatively few. Here are some of them.

As noted above, Eurostat (2018) reports that 11 percent of total business turnover in the EU-28 in 2017 consisted of EDI-type transaction, while 7 percent was web sales. Of those 7 percent, 4 percent were B2BG (business to business or government) while 3 percent was B2C. Assuming that all of the EDI-type transactions were B2BG, that implies that 18 percent of EU-28 turnover was B2BG e-sales while 4 percent was B2BG; thus, B2BG is four or five times larger than B2C.

In Korea, KOSTAT stopped surveying B2B and B2G (business-to-government) e-commerce after 2013. The most recent survey, conducted in 2013, shows B2B e-commerce at 91.0 percent of total Korean e-commerce, and also shows B2G (business to government) e-commerce to be approximately triple the level of B2C e-commerce (5.9 percent vs. 2.0 percent). (Table 1)

Table 1 Korean E-Commerce Transactions By Sector

< E-commerce Transactions by Sector >

(Unit: billion won, %)

Classification	2012	Compo- sition	2013 ^P	Compo- sition	Year-on-year	
					Change	Percent change
○ Total	1,146,806	100.0	1,204,091	100.0	57,285	5.0
- Business to Business (B2B)	1,051,162	91.7	1,095,696	91.0	44,534	4.2
- Business to Government (B2G)	62,478	5.4	70,649	5.9	8,171	13.1
- Business to Consumer (B2C)	21,160	1.8	24,331	2.0	3,172	15.0
- Consumer to Consumer (C2C)	12,006	1.0	13,414	1.1	1,408	11.7

Source: KOSTAT

Eurostat (2018) estimates

In the United Kingdom, data are collected by method of electronic transaction (EDI or website) and by sector (B2B or B2C). EDI transactions are B2B by definition, while website transactions can be either. The overall picture shows that over 77 percent of UK e-commerce was B2B in 2015, with nearly 60 percent being B2B by electronic data interchange (EDI) rather than on a website (Table 2). One can then say that over half of the recorded e-commerce in the UK does not even take place on the World Wide Web, but on dedicated networks.

Table 2 UK E-Commerce Transactions By Sector and Technology, 2015

Mode	Sector	Value in 2015 (billion UK £)	Percent of grand total
All modes	total	533	100
	B2B*	412	77.3
	B2C	119	22.7
Electronic Data Interchange (EDI)	B2B* (by definition)	318	59.6
Website	total	215	40.3
	B2B*	94	17.6
	B2C	119	22.3

*includes B2G

Source: UK Office of National Statistics

Data from the Japanese Ministry of International Trade and Industry²³ imply that in 2018, Japan's domestic B2B e-commerce market was worth 344.2 trillion yen (about USD \$3.11 trillion), while the B2C e-commerce market was worth 18.0 trillion yen (about USD \$303 billion). This implies that the domestic B2B market was 19 times the size of the domestic B2C market. Moreover, e-commerce accounted for 6.22 percent of all B2C transactions and 30.2 percent of all B2B transactions, with these ratios growing over time.

²³ https://www.meti.go.jp/english/press/2019/0516_003.html

4. Strengthening data collection and analysis for e-commerce²⁴

There are a variety of strategies available to extend the availability of official data on e-commerce. Some of these are straightforward and relatively inexpensive; others involve making inferences or estimates on already available data. In other cases, such as e-commerce mediated by platforms, there are significant conceptual issues. The Inter-Agency Task Force on International Trade (TFITS) convened an expert group in 2017 to address the demand for improved data on digital trade, drawn from international organizations, national statistics agencies, and central banks. This group has produced a handbook (OECD/WTO/IMF 2020 forthcoming) that both deals with the conceptual issues with measuring digital trade, and identifies a number of existing national and international efforts that could be used in the development of best practice strategies of measurement.

As we have seen, many countries already run surveys to estimate e-commerce sales for *digitally ordered trade*. These may be administered as additional modules to already existing national surveys on industry or services, or by special-purpose surveys. Information on cross-border e-commerce may be elicited by adding additional questions asking respondents to provide a view of the share of sales abroad that are digitally ordered.

One complication with this method is that firms may not know whether a purchase was from a non-resident unit. If the purchase was made through an intermediary platform, the location of the buyer may be obscured, and nation-level domain names (e.g. *.fr*, *.uk.*, *.cn*, etc.) can be misleading. Another is that households increasingly participate in e-commerce, and their transactions may not be captured in firm-level surveys.

Digitally delivered trade, according to the TFITS definition, consists only of services (though there are continued debates about how to classify 3-D printing and crypto assets.) It thus makes sense to distinguish digitally ordered trade between goods and services. One approach to estimating digitally delivered services trade is to develop judgments based on expert opinion about the types of services that it is feasible to deliver digitally, the share of trade which is likely to be delivered digitally (as opposed to by post or some other method), which may vary by both the industry of production and the category of trader (firm, household, government, etc.) and then apply these shares to existing statistics on international services trade. However, since existing surveys on international trade and services typically exclude Mode 2 trade (consumption abroad), such surveys may need to be supplemented by separate surveys for

²⁴ This section relies heavily on OECD, WTO, IMF (2020 forthcoming), to which the reader is referred for further details.

such activities as tourism and passenger travel to get a complete picture of cross-border e-commerce in services.

Some countries are exploring the potential of using credit card data to provide information on digital ordering. Such data are primarily useful for household transactions, but can also be used to infer relevant shares of trade that is digitally ordered. These can be coupled with information from courier companies, postal services, and other Big Data sources.

Digital intermediary platforms (DIPs) may be considered as simply vehicles for either digitally ordered or digitally delivered trade. However, they are of special interest for measurement purposes. DIPs are specifically interesting for public policy purposes because of their potentially disruptive impact. In some cases, it may be possible that dedicated surveys of DIPs can support general official data collection on e-commerce. In China, cooperation between the National Bureau of Statistics and large platforms such as Alibaba and Taobao generates a large quantity of data. DIPs also raise special concerns for measurement. The DIP, as an intermediary, may be located neither in the buyer's country or the seller's country. DIPs also themselves provide traded services, as they may charge a fee for promoting the interaction between buyers and sellers. These services represent yet further cross-border transactions which one would wish to track as part of a comprehensive estimate of e-commerce.

All of this suggests that *the cost of developing new e-commerce data depends on the state of existing development of national statistics in general*. In a country with already existing official surveys on industry, services, retailing, and international services trade, much can be accomplished by adding questions to already existing surveys, and by adjusting the sampling frame (to oversample sectors in which e-commerce is believed to be prevalent, or to include DIPs). In lower-income countries or countries which otherwise have limited capacity for data collection, these surveys may not exist, or be primitive. In this case collecting e-commerce data becomes part of improving national statistics collection in general. This is likely to make the process more difficult; however, the prospect of being able to build questions about e-commerce into surveys at the original design stage offers the prospect that low-income countries may in some cases be able to leapfrog other countries in terms of collecting data on e-commerce.

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Table 1: Correlation Matrix of Important Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) E-commerce sales share in retail sales	1.0000											
(2) Internet users	0.5378 (0.0022)	1.0000										
(3) Active mobile subscriptions	0.4339 (0.0166)	0.7184 (0.0000)	1.0000									
(4) Credit card	0.5399 (0.0021)	0.8436 (0.0000)	0.6481 (0.0001)	1.0000								
(5) Credit card used	0.5206 (0.0032)	0.7995 (0.0000)	0.6158 (0.0003)	0.9885 (0.0000)	1.0000							
(6) Mail delivered at home	0.4978 (0.0060)	0.5803 (0.0010)	0.4838 (0.0078)	0.4648 (0.0111)	0.4149 (0.252)	1.0000						
(7) Postal reliability	0.5257 (0.0034)	0.6736 (0.0001)	0.6625 (0.0001)	0.6705 (0.0001)	0.6492 (0.0001)	0.6167 (0.0004)	1.0000					
(8) Logistics competence	0.4526 (0.0120)	0.6090 (0.0004)	0.4640 (0.0098)	0.5855 (0.0007)	0.5422 (0.0020)	0.5748 (0.0011)	0.6965 (0.0000)	1.0000				
(9) Burden of customs procedures	0.4569 (0.0111)	0.6275 (0.0002)	0.6016 (0.0004)	0.6237 (0.0002)	0.6017 (0.0004)	0.5267 (0.0033)	0.7947 (0.0000)	0.6289 (0.0002)	1.0000			
(10) B2B ICT use	0.5133 (0.0037)	0.7296 (0.0000)	0.6573 (0.0001)	0.6465 (0.0001)	0.6007 (0.0004)	0.3590 (0.0558)	0.7686 (0.0000)	0.6357 (0.0002)	0.8404 (0.0000)	1.0000		
(11) B2C internet use	0.5616 (0.0012)	0.6031 (0.0004)	0.5225 (0.0031)	0.5589 (0.0013)	0.5485 (0.0017)	0.2532 (0.1851)	0.6871 (0.0000)	0.5577 (0.0014)	0.6027 (0.0004)	0.8542 (0.0000)	1.0000	
(12) Firms technology absorption	0.5091 (0.0041)	0.6615 (0.0001)	0.6901 (0.0000)	0.6799 (0.0000)	0.6440 (0.0001)	0.3591 (0.0558)	0.7008 (0.0000)	0.5922 (0.0006)	0.7733 (0.0000)	0.9079 (0.0000)	0.8255 (0.0000)	1.0000

Data on e-commerce share in retail sales are from eMarketer. For other variables and their sources, see the E-Trade For All dataset (op cit).

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