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E-Commerce Statistics: Explanation and Sources

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Summary

The value of e-commerce transactions, while still small relative to the size of the U.S. economy, continues to show strong growth despite a recent economic downturn. Congress will play a vital role in many e-commerce policy issues, including Internet taxation, encryption and electronic authentication (i.e., digital signatures), intellectual property protection (i.e., patent or copyright infringement), computer network security, and privacy safeguards for individuals and organizations, as well as consideration of how European Union (EU) and World Trade Organization (WTO) policies may affect U.S. e-commerce activities

Although e-commerce growth is widely discussed, until recently it had remained largely undefined and unrecognized in official economic statistics. Establishing relevant and consistent working definitions is a critical first step in developing useful measures for e-commerce. The Bureau of the Census initiated an aggressive program in 2000 to begin filling the e-commerce data gap. In addition, the Bureau of Economic Analysis (BEA) is involved in measuring the new economy. BEA is studying the impact of the digital economy, to determine whether these changes should be captured in gross domestic product (GDP) and other economic accounts estimates.

Nonetheless, the Census Bureau and BEA face a number of obstacles to providing accurate forecasts of electronic commerce. These include categorizing retailers who appear, disappear, or change products with dizzying regularity. There are hurdles in collecting data from e-commerce companies, and in projecting data from survey respondents so that it represents the entire universe of e-commerce spending.

Private consulting firms and research and polling firms that provide estimates of the impact of the Internet on consumers and business, such as Nielsen and Gallup have also entered the field, along with new types of companies, such as Forrester Research, Gartner Group, Jupiter Communications, International Data Corporation (IDC), and Nielsen/Net Ratings. There is much debate over which Web measurement company's methods are more accurate. The research firms disagree among themselves about sampling methods, panel selection, and differing methods of identifying and soliciting the survey participants result in different data interpretations.

This report addresses the complexities of measuring e-commerce growth, and provides background information on government and private firms' methods for estimating it.

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E-Commerce Statistics: Explanation and Sources

What Is E-Commerce?

Electronic commerce (or e-commerce)—i.e., business processes which shift transactions to the Internet (or some other nonproprietary, Web-based system)—is growing at a rapid rate. The value of e-commerce transactions, although still small relative to the size of the U.S. economy, continues to show strong growth despite a recent economic downturn. More significant than the dollar amount of these transactions, however, are the new business processes e-commerce makes possible and the new business models it is generating. Many new Internet-based companies and traditional producers of goods and services are working to transform their business processes into e-commerce processes in an effort to lower costs, improve customer service, and increase productivity, with varying degrees of success.

Congress will play a vital role in many e-commerce policy issues, including Internet taxation, encryption and electronic authentication (i.e., digital signatures), intellectual property protection (i.e., patent or copyright infringement), computer network security, and privacy safeguards for individuals and organizations, as well as consideration of how European Union (EU) and World Trade Organization (WTO) policies may affect U.S. e-commerce activities.

Complexities of Measuring E-Commerce

Difficult to Define

Although e-commerce growth is widely discussed, it remains largely undefined and unrecognized in official economic statistics. Establishing relevant and consistent working definitions is a critical first step in developing useful measures for e-commerce. Policymakers, industry, and the media use a variety of methods to capture digital or electronic economic activity. Moreover, these terms often are used interchangeably and with no common understanding of their scope or relationships.¹

¹ Barbara Fraumeni, Marilyn Manser, and Thomas Mesenbourg, “Government Statistics: E-Commerce and the Electronic Economy,” U.S. Census Bureau, June 15, 2000, available at [<http://www.census.gov/econ/www/ecom2.htm>].

It is difficult to determine if all the dimensions of what is occurring in e-commerce can be identified. For example:

- How is business-to-business (B2B) and business-to-consumer (B2C) e-commerce impacting on the accuracy of labor surveys?
- What are the goods and services choices, characteristics, and prices offered?
- How difficult is it to track international transactions; and business costs and productivity?²

Other Measurement Challenges

E-commerce businesses pose additional measurement challenges. These businesses can quickly expand their product line, adding new goods and services, even entering into entirely new kinds of activities, much faster than their retail and wholesale brick-and-mortar counterparts.

Additionally, the characteristics and prices of e-commerce products may not be the same as those sold in retail brick-and-mortar outlets or through wholesalers. For example, the Consumer Price Index (CPI) and resulting real personal consumption measures do not capture all aspects of consumer benefits from business-to-consumer transactions. E-commerce retail purchases may involve particular amenities for the consumer (such as convenience of shopping from home, added information that is available on the product, or lower prices) or deterrence (such as frustration at lengthy downloads, not being able to examine an item, or service deterioration).

These are the types of factors that are not captured in general in measures of prices and real gross domestic product (GDP). It is not clear that these sorts of problems are greater for e-commerce than for other activities, nor even that they do not in general balance out. In the area of business-to-business e-commerce, improved speed and convenience may result in lower costs and higher productivity, but may not be reflected in the measured characteristics or effective prices of the goods and services exchanged or in measures of real output.³

Another controversy is the ability to measure Web use in the workplace. Approximately 66% of U.S. workers have access to the Internet at work;⁴ and, according to a December study by the Nielsen/NetRatings research firm, half of all online purchases in the United States in November 2001 were done from the workplace. (Despite the fact that there are three times more Internet users who have Web access at home, the percent of shopping activity at work matches the percentage

² Ibid. Government Statistics, section IIB.

³ Ibid.

⁴ Xylo, "The Xylo Report August 2001: Internet Usage in the Workplace (benchmark study)," press release, August 21, 2001, available at [<http://www.xylo.com/press/pr082101.htm>].

of shopping from home.)⁵ Companies are notoriously reluctant to place Web measurement software on their workers' computers.⁶ Privacy and the protection of proprietary business information would most likely have to be resolved before this could become a common measurement tool.

Government Estimates

Bureau of the Census

The Bureau of the Census initiated an aggressive program in 2000 to begin filling the e-commerce data gap. During the summer of 1999, the Census Bureau developed definitions and concepts to describe the digital economy, identifying three components: electronic business, electronic commerce, and e-business infrastructure. In order to begin measuring e-commerce, data were collected in four Census Bureau surveys: the Annual Survey of Manufacturers, the Annual Trade Survey, the Service Annual Survey, and the Annual Retail Trade Survey. In the fall 1999, the Bureau added two questions to its monthly retail trade survey of 8,000 retail firms: whether the firms were selling online, and if they reported affirmatively, what was the dollar volume of their e-commerce sales. The Bureau developed a new Internet site—E-Stats [<http://www.census.gov/eos/www/ebusiness614.htm>], devoted to “measuring the electronic economy” with data reports, information on statistical methodology, related data program links, and e-commerce contacts.

Statistics. In March 2001, *E-Commerce 1999* was posted to the E-Stats site, providing the first official data on e-commerce activity for key sectors of the U.S. economy.⁷ In June 2000, an E-Stats analytic report, *Manufacturing 1999 and Mid-2000*,⁸ provided a comparison of 1999 online purchases and e-commerce shipments at U.S. manufacturing plants and presented the first data on e-business processes in those plants.

The first official retail e-commerce estimates were released on March 2, 2000, covering the fourth quarter 1999. This retail sales report provides a tally of retail sales of goods and services where an order is placed by the buyer or where price and terms of sale are negotiated over an Internet, extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system. The data is collected monthly

⁵ Nielsen/NetRatings, “Nielsen/NetRatings Announces Top E-Tailers, Led by Amazon.com,” press release, December 19, 2001, available at [http://www.nielsen-netratings.com/2001_Holiday/holiday_release.jsp].

⁶ Mike O’Leary, “Web Measurers Wrestle with Methodologies, Each Other.” *Online*, May/June 1999, p. 106.

⁷ U.S. Bureau of the Census, *E-Commerce 1999*, March 7 2001, see [<http://www.census.gov/eos/www/papers/estatstext.pdf>].

⁸ U.S. Bureau of the Census, *Manufacturing 1999 and Mid-2000*, June 8, 2001, see [<http://www.census.gov/eos/www/papers/MCDTEXT1.pdf>].

but published in quarterly estimates. (The most recent retail e-commerce sales figures are at [<http://www.census.gov/mrts/www/current.html>].)⁹

In November 2001, the Census Bureau released U.S. retail e-commerce sales figures for the third quarter of 2001.¹⁰ The Bureau estimated that U.S. retail e-commerce sales for the third quarter of 2001, not adjusted for seasonal, holiday, and trading-day differences, was \$7.47 billion, an increase of 8.3 % from the third quarter 2000. Total retail sales for third quarter 2001 were estimated at \$786 billion, an increase of 1.8% from the same period a year ago. The third quarter 2001 e-commerce estimate increased 0.2% from the second quarter of 2001, while total retail sales decreased 2.6% from the prior quarter. E-commerce sales in the third quarter of 2001 accounted for 0.9% of total sales, unchanged from the second quarter of 2001. E-commerce sales were 0.9% of total sales in the third quarter of 2000. This retail e-commerce sales report provides a simple tally of retail sales of goods and services where an order is placed by the buyer or where price and terms of sale are negotiated over an Internet, extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system.

One analyst concludes, “That is a far cry from the monthly retail reports released by the Census Bureau, which break down [conventional] sales totals of traditional retailers by categories like shoes, liquor, and furniture.”¹¹ Census Bureau officials hope to achieve a similar level of detail with e-commerce reports, but they must overcome obstacles which have slowed the effort.

First is the issue of how to categorize retailers who appear, disappear, or change their products with dizzying regularity. For instance, Lee Price, chief economist for the Economics and Statistics Administration, was quoted as saying, “It’s not just a question of taxonomy. It’s one of evolving taxonomy. Amazon used to just sell books. Now they sell a much more varied selection. You have to figure out how to capture that.”¹² Also, businesses are still developing interactions between brick-and-mortar establishments and their e-commerce equivalents (for example, Wal-Mart’s physical stores compete with its Internet presence).

⁹ Thomas Mesenbourg, *Measuring Electronic Business*, U.S. Bureau of the Census, 2001, see [<http://www.census.gov/eos/www/papers/ebusasa.pdf>].

¹⁰ Retail E-Commerce Sales in Third Quarter 2001 Were \$7.5 Billion, Up 8.3 Percent from Third Quarter 2000, Census Bureau Reports. Bureau of the Census press release, November 28, 2001. See [<http://www.census.gov/mrts/www/current.html>].

Note: The retail e-commerce data in this report are based on a new sample of retailers that uses the North American Industry Classification System (NAICS) in place of the Standard Industry Classification (SIC) system. The retail e-commerce sales prior to first quarter 2001 were restated on a NAICS basis beginning with fourth quarter 1999.

¹¹ Bob Tedeschi, “Government Figures Will Shed Little Light on Holiday Online Sales,” *New York Times Cybertimes*, Jan. 10, 2000. See [<http://www.nytimes.com/library/tech/00/01/cyber/commerce/10commerce.html>].

¹² *Ibid.*

Second, participation in the Monthly Retail Trade Survey is voluntary for e-businesses. The Census Bureau derived the initial fourth quarter 1999 e-commerce data from questions asked in its monthly retailing survey, which was sent to approximately 11,000 retail firms. Of that total, 7,500 companies responded—2,000 of which indicated they were involved with Internet retailing. As in all sampling surveys, analysts must weigh the data from those who did not respond, just as they weigh the results of those who responded. In contrast, the Annual Retail Trade (ART) survey *requires* participation by businesses. The 2001 ART, which will be mailed out in February 2002, will provide the first comparable annual survey and will become the baseline for future quarterly data, according to the Bureau. It is anticipated that this data will be available in March 2003.

(It is important to note that the Census Bureau is measuring the overall “electronic economy” with its E-Stats program, not simply retail sales.)

Industry analysts and executives are hopeful that Census Bureau figures will provide more reliable information than is now available. This will be important for seeing long-term trends, but the data will not provide immediate data on Internet sales. Jack Staff, chief economist with Zona Research, has stated “It’ll take at least three years for the government data to be highly usable. But there’s a whole segment of the Internet industry that’s devoted to the numbers, and it’ll be fundamentally changed once better numbers come along. And that’s as it should be.”¹³

Bureau of Economic Analysis

The Bureau of Economic Analysis (BEA), within the U.S. Department of Commerce, is also involved with measuring the “new economy,” which it defines as the impact of technological innovation over the last several decades, including electronic commerce. Among the questions BEA is considering are:

- Is it real, or is it an illusion of measurement?
- Does it represent a fundamental and lasting change in the structure of the economy, or is it the result of a number of temporary phenomena?
- Can it be accurately measured?¹⁴

The answers to these questions are important because if it is real, structural, and likely to last, then there are major implications for tax and spending projections, technology policy, and understanding of long-term growth and productivity. Conversely, if the new economy is not real and is not likely to last, there are major implications for federal budget projections.

¹³ Ibid.

¹⁴ J. Steven Landefeld and Barbara M. Fraumeni, “Measuring the New Economy,” *Survey of Current Business*, Mar. 2001, p. 23-40.
See [<http://www.bea.doc.gov/bea/articles/beawide/2001/0301mne.pdf>].

The BEA concludes that the Census Bureau's estimates provide important insight into various aspects of the new economy, but a comprehensive examination of the major issues requires further information on the overall volume of e-business, as well as its impact on GDP, across products, industries, and regions, and on incomes and prices.¹⁵ BEA is proposing a comprehensive measure of e-business and high-tech that would measure the new economy in a comprehensive and consistent fashion. However, without such measures, researchers have attempted to measure the impact of the new economy using existing BEA estimates—mainly information from BEA's national income and product account (NIPA) estimates, its wealth accounts, its international transactions accounts, and its input-output data I-O and GDP-by-industry accounts.

Consulting and Research Firm Estimates

More and more businesses have decided that the Internet is the key to success and are aware of their acute need for e-commerce guidance. With increasing frequency, e-commerce research firms declare that they have all the answers for e-commerce strategies. As a 1999 *Fortune* article states, "No one knows how much real insight online consulting firms provide, but what would-be Internet player can afford not to subscribe? Planning for the future is hard in a mature industry; it's nearly impossible in one still teething."¹⁶

Web traffic measurement may seem tedious, but with the number of dollars at stake, it is very important to businesses. For instance, advertisers, who are spending a lot of money, are very interested in knowing how many eyes, and whose, are viewing their ads. (A recent survey from the Association of National Advertisers [ANA] estimated that 79% of major U.S. companies advertised online last year, up from 67% in 1999. The average online ad allocation per company was \$2.4 million.)¹⁷

Thus, new business activity has emerged to fill the need to gather e-commerce statistics: gathering and selling strategic and statistical information about the Internet. Internet organizations, such as the Internet Society and the International Telecommunications Union, have begun to compile information on the size and growth of the Internet. Ideally, e-commerce growth and demographics can be calculated from these organizations' estimates of the total Internet "universe." Private consulting firms and research and polling firms such as Nielsen and Gallup also entered the field, along with new types of companies, such as Forrester Research, Gartner Group, Jupiter Communications, International Data Corporation (IDC), and Nielsen/NetRatings, which provide estimates of the impact of the Internet on consumers and business.

¹⁵ Ibid. p. 26.

¹⁶ Daniel Roth, "My, What Big Internet Numbers You Have!" *Fortune*, Mar. 15, 1999, p. 114-20.

¹⁷ Nua Internet Surveys, *Most Large Firms Advertise Online*, Oct. 18, 2001, available at [http://www.nua.ie/surveys/?f=VS&art_id=905357310&rel=true].

There is much debate over which Web measurement company's methods are more accurate. The research firms disagree among themselves about sampling methods and panel selection, since differing methods of identifying and soliciting the survey participants result in different data interpretations.

Forrester Research in Cambridge, MA, and Jupiter Communications in New York City are two of the largest Internet research firms. They are so-called syndicated research firms, which means that they publish a wide range of reports with high subscription fees to a small, targeted audience of corporate executives. For example, for approximately \$20,000, a company can buy a subscription for one of eight industry sector guides from Jupiter Communications. Then every month for a year, it receives a 32-page report filled with analysis and advice, survey data, and industry forecasts, all on the impact of e-commerce in a particular field.

To compile their information, these firms' analysts interview advertisers and executives at top Web sites, review annual reports, adjust overly-optimistic figures, assemble historical research comparing ad spending with consumer research, and estimate spending for online advertising. As Forrester's chief Internet advertising analyst says, "The interesting thing about projections is that they come out looking very exact. But really, it's just your opinion expressed numerically."¹⁸ Although research firms such as Forrester and Jupiter attempt to make methodical projections, the results are often imprecise.

One observer says the models used by Forrester or Jupiter "have little resemblance to statistical techniques, like regression analysis or time-series analysis, used by traditional market researchers or industrial forecasters to determine next year's worldwide consumption of, say, gasoline or Coca-Cola. That, of course, is because enterprises that forecast the consumption of resources or consumer items can draw on decades of historical data."¹⁹ Using such techniques would not now work for companies like Forrester or Jupiter because the Internet e-commerce environment has existed for only 3 to 4 years for most businesses.

In the business of assessing the Internet's future, there seems to be little accountability for incorrect forecasts. Many industry executives "admit that they view the companies and the media froth they generate as necessary evils"²⁰ But businesses need the Internet research consultants' estimates to write business plans and attract investors, although, at this time, the estimates are not based on historically valid measurement models.

¹⁸ Roth, p. 120.

¹⁹ Jim Frederick, "\$6 Billion on Online Holiday Sales by the End of This Month! \$24 billion in Internet Ads by 2003! 2.3 Trillion E-biz Predictions by 2010!" *New York Times Magazine*, Dec. 19, 1999. p. 70-73.

²⁰ *Ibid.*, p. 73.

Recent E-Commerce Statistics

With all the caveats discussed above, following is a sampling of estimates of the size and growth of e-commerce. (For a selected list of Web sites for e-commerce statistics, see the *Selected Web Addresses for Internet and E-Commerce Statistics*, below.)

- As discussed above, the Bureau of the Census Internet site—E-Stats [<http://www.census.gov/eos/www/ebusiness614.htm>]—provides official federal data and estimates to measure the electronic economy.
- The number of Americans buying online will nearly double from 64.1 million as of 2000 to 130 million by 2005, according to a report by the research firm eMarketer. The report has varying e-commerce estimates for the year 2001 in the United States, with numbers ranging from \$37.1 billion by Direct Marketing Association to \$117 billion by Keenan Vision. eMarketer's own estimate is that U.S. business-to-consumer revenues, which totaled \$38.3 billion in 2000, will quadruple to \$156 billion by 2005. These numbers vary significantly from the estimates provided by the U.S. Census Bureau (see above).²¹
- Global spending on e-business infrastructure is set to fall to \$31 billion this year, down from \$36 billion last year, according to Strategy Analytics. The drop in spending can be attributed to “last year's dot-com implosion and this year's global economic downturn,” according to the firm.²²
- Nielsen/NetRatings released its *First Quarter 2001 Global Internet Trends* report, which surveyed 27 countries in North America (but not the United States), Europe, the Middle East and Africa, Asia-Pacific, and Latin America.²³ One in 11 European adults used the Internet to make an online purchase in the first quarter of 2001, according to this report.
- A report from McConnell International discusses the “e-readiness” of 53 countries. *E-readiness* is defined as “the capacity of nations to participate in the global economy,” and the report measures e-readiness by examining each country's progress in five key sectors: connectivity, e-leadership, information security, human capital, and e-business climate. These 53 countries together contain over two-thirds of the world's population.²⁴

²¹ Paul Krill, “E-Commerce Grows, Despite Slumping Economy,” *PC World.com*, Sept. 25, 2001, see [<http://www.pcworld.com/resource/printable/article/0,aid,63206,00.asp>].

²² Nua Internet Surveys, *Spending on Ebusiness Initiatives to Drop*, Sept. 25, 2001, see [http://www.nua.com/surveys/index.cgi?f=VS&art_id=905357226&rel=true].

²³ Nielsen/Net Media, “429 Million People Worldwide Have Internet Access,” press release, June 11, 2001. [http://209.249.142.22/press_releases.asp?country=north+america&range=365&submit=GO]

²⁴ McConnell International, *Ready? Net. Go! Partnerships Leading the Global Economy*, May (continued...)

Selected Web Addresses for E-Commerce Statistics

Center for Research in Electronic Commerce (University of Texas, Austin)
[<http://cism.bus.utexas.edu/>]

Digital Economy 2000 (report from the U.S. Department of Commerce, June 2000)
[<http://www.esa.doc.gov/de2k.htm>]

eMarketer
[<http://www.emarketer.com/estatnews/>]

E-Stats, March 2001 (results of the 1999 e-commerce survey by the U.S. Bureau of the Census)
[<http://www.census.gov/econ/estats/papers/estatstext.pdf>]

Internet Economy Indicators
[<http://www.internetindicators.com/facts.html>]

Measuring the Internet Economy, January 2001 (University of Texas and Cisco Systems)
[<http://www.internetindicators.com/>]

University of California E-economy Project
[<http://e-economy.berkeley.edu/>]

U.S. Government Electronic Commerce Policy
[<http://www.ecommerce.gov/>]

²⁴ (...continued)

2001, see [<http://www.mcconnellinternational.com/ereadiness/ereadinessreport2.htm>].