



Just the FACTS

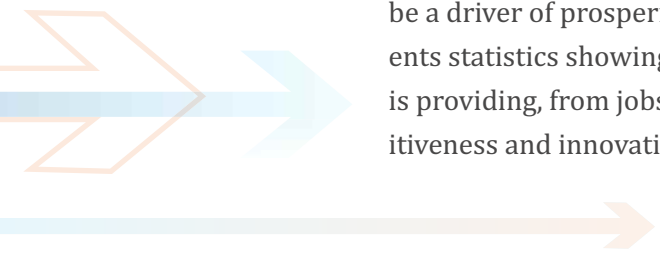
The Economic Benefits of Information and Communications Technology

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A prominent economist once asked, “computer chips, potato chips, what’s the difference?” The short answer is “a lot.” As this fact sheet demonstrates, computer chips—or more broadly defined, information and communications technology, including hardware, software, telecommunications, and the Internet—has been, is and will likely remain, for the foreseeable future, the dominant driver of growth and innovation in the United States and throughout the global economy. Even more than 28 years after the first dot-com website was registered, information and communications technology (IT) continues to be a driver of prosperity. This fact sheet presents statistics showing the benefits that IT is providing, from jobs and output to competitiveness and innovation.



Information and Communications Technology...

Creates High-Paying Jobs

- Between 2001 and 2011, over 565,000 IT-related jobs (in all industries) were created in the United States, an increase of 22.2 percent. IT jobs grew more than 95 times faster than employment as a whole, which grew by only 0.2 percent.¹
- In 2011, IT workers earned \$78,584 a year, 74 percent more than the average worker (\$45,230). Accounting for just the growth in these high-paying IT jobs, U.S. GDP was over \$89 billion larger in 2011 than it was in 2001.²
- Even during the Great Recession and its aftermath, when overall jobs were declining, IT jobs grew. Between May 2007 and May 2011, IT jobs grew by 6.8 percent, contributing \$37 billion to an economy that was otherwise stagnant.³
- Increased investments in IT actually lead to more, not less job creation. U.S. corporations that invested more in IT expanded their workforces by 14 percent between 2006 and 2010, while the average increase of Fortune 500 firms that invested less in IT increased employment just 6 percent.⁴
- From 2000 to 2009, service-sector companies that used IT intensively grew jobs at a rate of 5.1 percent, while non-IT intensive service companies expanded jobs by only 1.5 percent.⁵

- In 2010, IT industries employed 5.8 percent of workers in Organisation for Economic Cooperation and Development countries, a 13 percent increase over the 5.1 percent they employed in 1995.⁶
- In OECD countries, employment in IT services grew by 18 percent between 1996 and 2008, while employment in business services overall grew by 12 percent.⁷
- For every 1 percent increase in broadband penetration in a U.S. state, employment increases by 0.2 to 0.4 percent.⁸
- The Internet creates 2.6 jobs for every job it eliminates⁹

Comprises a Significant Share of GDP

- In 2011, the IT industry contributed about \$650 billion to the U.S. economy, or 4.3 percent of GDP, increasing from 3.4 percent of GDP in the early 1990s.¹⁰ Include the benefits to other sectors derived from IT use and this rises to approximately \$1 trillion, or 7.1 percent of GDP.¹¹
- Global output from IT industries more than doubled from \$1.2 trillion in 1995 to \$2.8 trillion in 2010, accounting for 6 percent of global GDP.¹²
- The Internet “industry” accounts for, 3.4 percent of GDP across the large economies that comprise 70 percent of global GDP.¹³

Information and Communications Technology...

Drives Productivity and GDP Growth

- IT was responsible for 75 percent of U.S. productivity growth from 1995 to 2002, and 44 percent from 2000 to 2006.¹⁴
- IT has accounted for 20 percent of U.S. GDP growth since 1995, despite constituting just 4 percent of U.S. GDP.¹⁵
- Over the last two decades, IT has made the U.S. economy over \$2 trillion larger in terms of annual GDP.¹⁶
- A 10 percent increase in a country's IT capital stock adds approximately 0.45 percentage points to its annual GDP growth.¹⁷
- The Internet alone accounted for 21 percent of the GDP growth from 2006 to 2011 across 13 leading economies—Brazil, Canada, China, France, Germany, India, Italy, Japan, Korea, Russia, Sweden, the UK, and the United States.¹⁸
- Because of the impact of dot-com Internet domains, annual global GDP is \$1.5 trillion larger.¹⁹
- The value added by IT services in OECD countries grew by 115 percent between 1996 and 2008.²⁰
- Between 2006 and 2010, corporations that invested more in IT increased productivity three times as fast as corporations that invested less.²¹

- IT workers contribute three to five times more to productivity than non-IT workers.²²
- IT purchases generate approximately three times their cost in value for consumers.²³
- A 10 percent increase in broadband penetration adds between 0.25 and 1.38 percentage points to a country's GDP growth.²⁴
- A 10 percent substitution from 2G to 3G mobile broadband penetration increases GDP per capita growth by 0.15 percentage points per year, and a doubling of mobile data use increase GDP per capita growth by 0.5 percentage points.²⁵
- Broadband adoption increases the productivity of manufacturing firms by approximately 5 percent, of services firms by approximately 10 percent, and of firms in the information industry by approximately 20 percent.²⁶
- In EU countries labor productivity is higher in industries where more employees are linked by broadband.²⁷
- A 10 percent increase in mobile device penetration increases productivity by 4.2 percentage points.²⁸

Information and Communications Technology...

Helps Build High-Growth Companies

- In the 2011 *Inc. 5000* rankings of the 5,000 fastest growing companies in the United States, almost one-quarter (1,140) were in the IT industry, with a three-year average growth rate of 302 percent and revenues totaling nearly \$54 billion.²⁹
- In Deloitte's 2011 *Technology Fast 500 Ranking*, a ranking of the fastest growing high-technology firms in the United States, 330 of the 500 companies were in the IT industry.³⁰
- In Canada, France, Germany, the U.K. and the United States, small firms that adopt Internet business solutions earn approximately nine percent more revenue than other small firms.³¹

Creates New Sectors and Ways of Doing Business

- Between 2002 and 2011, U.S. retail sales through e-commerce increased by 19.8 percent annually in comparison to just 3.2 percent for total retail sales, reaching \$193 billion in 2011.³²
- In 2012 there were 466,000 U.S. jobs related to mobile apps, up from zero in 2007. The mobile app economy generated almost \$20 billion in revenue in 2011.³³

- In 2012, over 88 percent of the 500 most popular mobile apps were developed by small businesses, most with fewer than 10 employees.³⁴
- While 21 million dot-com domain names were registered between 1985 and 2000, 57 million were registered between 2000 and 2010, bringing the number of global dot-com domain names to close to 80 million.³⁵
- In 2010, e-commerce accounted for 46 percent of U.S. manufacturing sales, 25 percent of merchant wholesalers' sales, and 16 percent of retail sales.³⁶
- Around 30 percent of people in the OECD buy goods or services over the Internet. Over half do so in the UK, Denmark, Norway, Korea, the Netherlands and Australia.³⁷
- In 2010, Internet advertising accounted for 14 percent of global advertising expenditure and is expected to reach 18 percent by the end of 2013.³⁸
- On average, nearly 40 percent of people in OECD countries use banking services on the Internet.³⁹
- Between 2004 and 2010, the number of registered Skype users increased by almost 30 times, up to 560 million worldwide.⁴⁰

Information and Communications Technology...

- In 2010, nearly 50 percent of OECD Internet users were active social network users.⁴¹
- Almost 50 percent of Internet users in OECD countries use the Internet for formalized education activities.⁴²
- In 2010, 66 percent of OECD businesses used the Internet for returning completed forms to public authorities.⁴³
- In 2012, 44 percent of medication prescriptions dispensed in the United States were routed electronically.⁴⁴

Is a Key Source of Competitive Advantage

- As of 2010, U.S. firms held a 26 percent share of the global IT industry (while U.S. GDP accounted for 23 percent of global GDP) and are the world's largest producers of IT goods and services.⁴⁵
- In 2011, IT products comprised 31 percent of U.S. advanced technology product exports and about 9 percent of all U.S. goods exports.⁴⁶
- From 1996 to 2008, total global trade in IT products increased more than 10 percent annually, from \$1.2 trillion to \$4 trillion.⁴⁷
- In 2009, OECD countries' exports of IT were greater than \$130 billion and accounted for 5 percent of total service exports.⁴⁸

And Drives Innovation

- The probability of a firm developing a product or process innovation increases with the intensity of the firm's IT use.⁴⁹
- Among German firms, broadband access increases the likelihood that a firm will introduce a new innovation by around 40 percentage points.⁵⁰
- In the European Union, the United States and Japan, the IT sector is by far the largest R&D investing sector. The IT industry accounts for 25 percent of all business expenditure on R&D in the European Union.⁵¹
- No major sector of the U.S. economy invests more in R&D than the computers and electronic products industry; it invests 10.1 percent of sales in R&D, more than three times the U.S. average. Semiconductors are the most R&D-intensive U.S. industry, investing 24 percent of sales into R&D.⁵²
- In 2008, IT industries accounted for more than 20 percent of total business R&D expenditure in most OECD countries.⁵³
- In 2008, 54 percent of patents granted by the U.S. Patent and Trademark Office were IT-related.⁵⁴

Endnotes

1. Bureau of Labor Statistics, Occupational Employment Statistics (occupational employment and wage estimates, national cross-industry estimates, May 2001, May 2011; accessed July 17, 2012), http://www.bls.gov/oes/oes_dl.htm. Authors' analysis. Occupations included in the IT jobs classification in 2011 are "Computer Systems Analysts," "Computer Programmers," "Software Developers, Applications," "Software Developers, Systems Software," "Database Administrators," "Network and Computer Systems Administrators," "Computer Support Specialists," "Computer and Information Research Scientists," "Information Security Analysts, Web Developers, and Computer Network Architects," and "Computer Occupations, All Other." Because the Bureau of Labor Statistics regularly reclassifies occupations as the economy evolves, there are differences in the IT jobs classification for 2001. Specifically, 2011's "Information Security Analysts, Web Developers, and Computer Network Architects" occupations did not exist in 2001 and "Computer Occupations, All Other" was not counted in 2001. Additionally, 2001 included a "Network Systems and Data Communication Analysts" occupation that had been superseded by 2011.
2. Bureau of Labor Statistics, Occupational Employment Statistics (occupational employment and wage estimates, national cross-industry estimates, May 2001, May 2011; accessed July 17, 2012), http://www.bls.gov/oes/oes_dl.htm. Authors' analysis. IT jobs' contribution to GDP was calculated by subtracting the product of IT employment in 2001 and IT earnings in 2001 from the product of IT employment in 2011 and IT earnings in 2001. This assumes that these workers currently employed in IT would otherwise be unemployed.
3. Bureau of Labor Statistics, Occupational Employment Statistics (occupational employment and wage estimates, national cross-industry estimates, May 2007, May 2011; accessed July 18, 2012), http://www.bls.gov/oes/oes_dl.htm. Authors' analysis. IT jobs' contribution to GDP was calculated by subtracting the product of IT employment in 2007 and IT earnings in 2007 from the product of IT employment in 2011 and IT earnings in 2001. This assumes that these workers currently employed in IT would otherwise be unemployed.
4. Howard Rubin, "The Drunk, the Street Light, and the President (and Jobs, Innovation, and Competitiveness)," *Innovation Policy Blog* (blog), March 27, 2011, <http://www.innovationpolicy.org/the-drunk-the-street-light-and-the-president>.
5. Catherine L. Mann, "Information Technology, Diffusion, and Job Creation" (working paper, Brandeis University, March 4, 2012), http://www.brandeis.edu/departments/economics/RePEc/brd/doc/Brandeis_WP46.pdf.
6. OECD, *OECD Information Technology Outlook 2010* (Paris: OECD, 2010), 129, http://www.oecd.org/document/20/0,3746,en_2649_33757_41892820_1_1_1_1_00.html.
7. OECD, *The Future of the Internet Economy: A Statistical Profile* (Paris: OECD, 2011), <http://www.oecd.org/sti/ieconomy/48255770.pdf>.
8. International Telecommunications Union, *The Impact of Broadband on the Economy: Research to Date and Policy Issues* (Geneva: ITU, 2012), http://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf. Assumes the economy is not already at full employment.
9. James Manyika and Charles Roxburgh, "The Great Transformer: The Impact of the Internet on Economic Growth and Prosperity," McKinsey Global Institute, October 2011, 3, http://www.mckinsey.com/Insights/MGI/Research/Technology_and_Innovation/The_great_transformer.
10. Bureau of Economic Analysis, GDP-by-Industry Accounts (value added by industry; accessed December 12, 2012), http://www.bea.gov/iTable/index_industry.cfm; Robert J. Shapiro and Aparna Mathur, "The Contributions of Information and Communication Technologies To American Growth, Productivity, Jobs and Prosperity," Sonecon, September 2011, http://www.sonecon.com/docs/studies/Report_on_ICT_and_Innovation-Shapiro-Mathur-September8-2011-1.pdf.
11. Shapiro and Mathur, "The Contributions of Information and Communication Technologies."
12. National Science Board, *Science and Engineering Indicators 2012*, January 2012, 6-15, <http://www.nsf.gov/statistics/seind10/pdf/c06.pdf>.
13. James Manyika and Charles Roxburgh, *The Great Transformer: The Impact of the Internet on Economic Growth and Prosperity* (New York: McKinsey Global Institute, 2011), http://www.mckinsey.com/insights/high_tech_telecoms_internet/the_great_transformer.
14. Erik Brynjolfsson and Adam Saunders, *Wired for Innovation: How Information Technology is Reshaping the Economy* (Cambridge, MA: MIT Press, 2010).
15. Bureau of Economic Analysis, GDP-by-Industry Accounts (contributions to percent change in real gross domestic product by industry; value added by industry; accessed April 26, 2013), http://www.bea.gov/iTable/index_industry.cfm.
16. Robert D. Atkinson, et al., *The Internet Economy 25 Years After .Com: Transforming Commerce and Life* (Washington, DC: ITIF, 2010), <http://www.itif.org/files/2010-25-years.pdf>.
17. Khuong Vu, "Measuring the Impact of ICT Investments on Economic Growth" (working paper, Program on Technology and Economic Policy, Harvard Kennedy School of Government), 27, <http://www.hks.harvard.edu/m-rcbg/ptep/khuongvu/Key%20paper.pdf>.
18. James Manyika and Charles Roxburgh, *The Great Transformer: The Impact of the Internet on Economic Growth and Prosperity* (New York: McKinsey Global Institute, 2011), http://www.mckinsey.com/insights/high_tech_telecoms_internet/the_great_transformer.
19. Atkinson, *The Internet Economy*.
20. OECD, *The Future of the Internet Economy*.
21. Howard Rubin, "Technology Economics: The Real Business Impact of Technology Leaders – "The Rubin 300", The Innovation Files (blog), May 5, 2011, <http://www.innovationfiles.org/technology-economics-the-real-business-impact-of-technology-leaders-%E2%80%93-the-%E2%80%9Ccrubin-300%E2%80%9D/>.
22. Atkinson and McKay, *Digital Prosperity*, 3.
23. International Telecommunications Union, *The Impact of Broadband on the Economy*.
24. Deloitte, What is the Impact of Mobile Telephony on Economic Growth? (London: GSM Association, 2012), <http://www.gsma.com/publicpolicy/wp-content/uploads/2012/11/gsmadeloitte-impact-mobile-telephony-economic-growth.pdf>.
25. Ibid.
26. International Telecommunications Union, *The Impact of Broadband on the Economy*.
27. OECD, *The Future of the Internet Economy*.
28. Deloitte, *What is the Impact of Mobile Telephony?*
29. "2011 Inc. 5000," Inc. website, Mansueto Ventures LLC, 2011, <http://www.inc.com/inc5000/welcome>. IT industries are "Computer Hardware," "IT Services," "Software," and "Telecommunications."
30. "Deloitte's 2011 Technology Fast 500 Ranking," Deloitte, 2011, http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/TMT_us_tmt_us_tmt_2011%20Fast500%20Rank%20v2.pdf. - link doesn't work. IT industries are "Communications/Networking," "Software," "Internet," and "Semiconductor."
31. Donald A. Johnston, Michael Wade, and Ron McClean, "Does E-Business Matter to SMEs? A Comparison of the Financial Impacts of Internet Business Solutions on European and North American SMEs," *Journal of Small Business Management* 45, no. 3 (July 2007): 354-361.
32. Census Bureau, Quarterly E-Commerce Report (time series, adjusted; accessed September 22, 2012), <http://www.census.gov/retail/index.html>.
33. Michael Mandel, *Where the Jobs Are: The App Economy* (Washington, DC: TechNet, 2012), <http://www.technet.org/wp-content/uploads/2012/02/TechNet-App-Economy-Jobs-Study.pdf>; Executive Office of the President, Council of Economic Advisers, *The Economic Benefits of New Spectrum for Wireless Broadband* (Washington, DC: White House, 2012), http://www.whitehouse.gov/sites/default/files/cea_spectrum_report_2-21-2012.pdf.
34. Executive Office of the President, *The Economic Benefits of New Spectrum for Wireless Broadband*.
35. Atkinson, *The Internet Economy*.
36. "E-Stat" (technical report, Census Bureau, May 10, 2012), <http://www.census.gov/econ/estats/2010/2010reportfinal.pdf>.
37. OECD, *The Future of the Internet Economy*.
38. Ibid.
39. Ibid.
40. Ibid.
41. Ibid.
42. Ibid.
43. Ibid.
44. Surescripts, *The National Progress Report on E-prescribing and Safe-Rx Rankings: Year 2012* (Arlington, VA: Surescripts, 2013), <http://www.surescripts.com/downloads/npr/National%20Progress%20Report%20on%20E%20Prescribing%20Year%202012.pdf>.
45. National Science Board, *Science and Engineering Indicators 2012*, appendix table 6-13.
46. Bureau of Economic Analysis, International Economic Accounts (U.S. trade in goods; accessed December 12, 2012), http://www.bea.gov/iTable/index_ita.cfm; Census Bureau, Foreign Trade (advanced technology products; accessed December 12, 2012), <http://www.census.gov/foreign-trade/statistics/country/>.
47. Osamu Onodera, "Trade and Innovation Project: A Synthesis Paper" (working paper, OECD, Paris, August 7, 2008), 4, <http://www.oecd.org/dataoecd/60/22/41105505.pdf>.
48. OECD, *The Future of the Internet Economy*.
49. OECD, *Measuring Innovation: A New Perspective* (Paris: OECD, 2010), 84-85, <http://www.oecd.org/dataoecd/29/29/45188243.pdf>.
50. Irene Bertschek, Daniel Cerquera, and Gordon J. Klein, "More Bits – More Bucks? Measuring the Impact of Broadband Internet on Firm Performance," *Information Economics and Policy*, forthcoming.
51. Reinhilde Veuglers, Bruno van Pottelsberghe, and Nicolas Véron, "Lessons from ICT Innovative Industries: Three Experts' Positions on Financing, IPR and Industrial Ecosystems" (working paper, Publications Office of the European Union, Luxembourg, 2012), http://is.jrc.ec.europa.eu/pages/ISG/documents/Lessons_from_ICT_innovative_industries_DRAFTFORWEBSITE_29082012.pdf.
52. National Science Board, *Science and Engineering Indicators 2012*, Appendix table 4-16, "Domestic sales, domestic R&D performed and paid for by the company, and R&D intensity, by industry and company size: 2008," <http://www.nsf.gov/statistics/seind12/appendix.htm>.
53. OECD, *The Future of the Internet Economy*.
54. OECD, Patent Statistics (patents by main technology and International Patent Classification; accessed April 26, 2013), <http://dx.doi.org/10.1787/patent-data-en>.



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