Prof. Dr. Paul J.J. Welfens

Jean Monnet Professor for European Economic Integration; chair for Macroeconomics; president of the European Institute for International Economic Relations at the University of Wuppertal, Alfred Grosser Professorship 2007/08, Sciences Po, Paris, Research Fellow, IZA, Bonn, Non-Resident Senior Fellow at AICGS/Johns Hopkins University, Washington DC welfens@eiiw.uni-wuppertal.de, www.eiiw.eu;

ICT, Innovation, Growth Dynamics and Globalization

Paper prepared for Jean Monnet Workshop III, ICT and Economic Globalization Essen 11-12. November 2012

Content

- 1. Introduction
- 2. ICT Dynamics in OECD Countries
- 3. ICT Expansion, Innovation and Growth: Theoretical Aspects
 - 3.1 ICT Expansion, Globalization and Income Disribution
 - 3.2 ICT: Labor Markets, Adjustment and Growth
 - 3.3 ICT in a Modified Neoclassical Growth Model
- 4. Policy Issues
- 5. ICT Policy Issues

1. Introduction

- ICT innovation dynamics continues to be high worldwide; 25 years of telecomms deregulation
- 2/3 of ICT markets (Global Insight) concern the business community, competitive & innovation driven
- ICT investment expenditure is pro-cyclical
- ICT expansion continues due to falling relative price of ICT goods and services over time
- EU/euro area has a growth problem hence stronger focus on ICT should be taken!?

1. Introduction

- ICT is general purpose technology with
 - Economies of scale
 - Network effects in some sectors
- ICT innovation dynamics continues to be high; in Germany much ICT innovation in the automotive industry and other sectors
- ICT growth is continuing in real terms ICT investment relative to GDP is rising; based on nominal figures ratio is falling=biased perception

Competition in Telecommunications Has Been Reinforced since 1984/1998

- UK and US adopted competition in 1984; strong efficiency gains, massively falling prices, higher innovation dynamics
- EU (disregarding UK) introduced competition in 1998: fixed line network operation and voice telephony
- However, problems in mobile competition:
 - No level playing field (auctions vs. Beauty contest)
 - No rules for secondary markets for trading of licenses
 - No good definition for new digital universal services
 - Unclear conditions for intra-EU digital mergers

ICT, Trade, Growth, FDI and Globalization

- ICT expansion fall of costs of international telecommunications costs stimulates trade (JUNGMITTAG/WELFENS, 2008: gravity equation), similar mechanism might apply to FDI; note: increasing trade creates specialization gains and raises output at home and abroad.
- New global digital markets = true globalization
- Relative ICT prices fall over time = incentive to invest more in ICT capital and to raise the share of ICT intermediate products
- New Phenomenon of global or regional digital networks/search engine platforms – how can one organize competition? (market entry difficult as there are high sunk costs: R&D and marketing)
- More general question: How is growth affected by "digital expansion", what should policymakers do in the field of ICT policy – how big are positive external effects of ICT firms, ICT projects and digital networks or clusters? (reason for government subsidies...)
- How important is ICT investment relative to GDP?

Prof. Welfens/EIIW, Wuppertal

Recent Findings on the Link Between ICT and Growth

- Not just high innovation rate in ICT sector (and use of ICT capital goods), but also role of intermediate domestic and imported ICT goods – and non-ICT goods (STIROH papers).
- Strobel, Ifo Paper 2012: ICT Intermediates, Growth and Productivity Spillovers Evidence from Comparison of Growth Effects in German and US Manufacturing Sectors

2. True ICT Dynamics in OECD Countries

ICT dynamics are underestimated in the general public and on the side of governments in OECD countries – main problem is that nominal share of ICT in (nominal) output has started to fall in many countries around 2005; but in real terms it is increasing! True ICT Investment-GDP Share (ICT Price Index 2000=100) vs Ratio of Nominal ICT to Nominal GDP (%)



Nominal ICT Investment Shares in Percentage of GDP (Y / Q / M)



10

Real ICT Investment Shares in Percentage of Real GDP; in % (Base Year 2000) (**Y** / Q / M); Role of ICT rising over time!; good news for countries producing ICT capital goods!



11

ICT Employment Growing in OECD Countries (few exceptions)

Figure 1.6. Share of ICT sector employment in business sector employment, 1995 and 2009



Note: The data for Estonia are from 2001 instead of 1995. Data are not available for Chile, Iceland, Israel, Mexico, New Zealand, Poland and Turkey. The ICT sector is defined according to the 2002 OECD ICT sector definition based on ISIC Rev. 3.1 (see endnote 2). In order to obtain ICT aggregates compatible with national accounts totals, data have been partly estimated based on data from other official sources. In some cases, such estimates were not possible, resulting in an underestimated ICT sector. This is the case for Estonia, Slovenia and Switzerland where data on software publishers (ISIC 72) in Estonia and on telecommunications (ISIC 642) in Slovenia and Switzerland were not available. For industries such as renting of office machinery and equipment (ISIC 7123) estimates were only available for seven countries. Sources: OECD estimates, based on national sources; OECD STAN and National Accounts Databases, March 2012.

Role of **Software Increasing** in Leading OECD Countries: Gap is Considerable for Some: PG, IT

Figure 1.20. ICT investment by asset in OECD countries, 2010

Percentage of non-residential gross fixed capital formation, total economy



Note: ICT equipment is defined here as computer and office equipment and communication equipment; software includes both purchased and own account software. Software investment in Japan is likely to be underestimated, owing to methodological differences.

1) 2009; 2) 2008; 3) 2007; 4) 2005; 5) 2004.

Source: OECD Productivity Database, May 2012.

Quelle:OECD (2012), Internet Economy Outlook. Prof. Welfens/EIIW, Wuppertal

Specialization in ICT R&D

Figure 1.24. ICT BERD specialisation, 2010 or latest year available



Percentage of GDP and as share of total BERD

Definition of ICT Sector (OECD)

Note: ICT sector is defined here as the sum of the following categories in ISIC 3 Rev. 1: 30, 32, 642 and 72. Data on ICT manufacturing is not available in Chile, Israel and New Zealand. Data on ICT services is not available in Germany. See also endnote 9. For Belgium, France, Russian Federation and South Africa, data are distributed according to the product field of the R&D. For the Czech Republic, data are distributed according to the main activity of the enterprise carrying out the R&D. Since 2004, the R&D of enterprises in the research and development industry (ISIC, R-3: 73) has been redistributed to the industries for which the R&D was carried out. For United Kingdom, data are distributed according to the product field of the R&D for large firms, while for small firms the R&D is allocated to their main activity. R&D firms are redistributed to the industry served. Telecommunications (ISIC, R-3: 642) includes postal services (ISIC, R-3: 641). For all the other countries in the chart, data are distributed according to the main activity of the enterprise carrying out the R&D.

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

1) 2009; 2) 2008; 3) 2007.

Source: OECD ANBERD and RDS Databases, June 2012; Statistics Sweden, June 2011.

ICT Spending by Sectors: Education is Negative Outlier!?



Source: Based on data published by World Information Technology and Services Alliance (WITSA), based on research conducted by Global Insight, Inc. December 2010.

Retail Trade



Figure 2.16. Online share of retail trade, 2011

Source: Based on Centre for Retail Research (CRR), Online Retailing: Britain and Europe, May 2012.

Web Supply Dynamics: Germany (10%) Weak; Poland, Austria, Spain etc. Strong; Korea & Scandinavia ++

Figure 3.10. Internet users who created a web page, 2011 or latest available year



Note: Data from the EU Community Survey covers EU countries plus Iceland, Norway and Turkey. Internet users are considered for this figure as individuals who have ever used the Internet for countries covered by Eurostat. For countries covered by the OECD ICT questionnaire, data are presented as a percentage of individuals with the exception of Japan and Korea. Individuals aged 16-74 years, except for Japan (6+). Country notes: For Japan: Internet users accessing from personal computers and mobile phone. For Korea: Minihomepages ("minihompys") and web pages.

1. 2010.

Source: OECD ICT Database and Eurostat Community Survey on ICT usage in households and by individuals, May 2012.

Social Networking

Figure 3.11. Demographics of social networking activity in the EU27 area, 2010



Source: Based on Eurostat Community Survey on ICT usage in households and by individuals, May 2012.

Social Networking

Figure 3.12. Internet users engaging in social networking, 2011



Note: Engaging in social networking is considered as creating a user profile and posting messages or other contributions to Facebook, Twitter, etc. Internet users are considered for this figure as individuals who have used the Internet in the last three months for European countries. Individuals aged 16-74 years, except Canada (16+). 1. 2010.

Sources: Based on Eurostat Community Survey on ICT usage in households and by individuals, May 2012. Canadian Internet Use Survey, 2010 from Statistics Canada. StatLink aug http://dx.doi.org/10.1787/888932693341

Internet Purchases: Spain, Portugal, Greece, Italy...weak

Figure 3.13. Individuals who ordered or purchased goods or services on the Internet, 2011 or latest available year



Note: Data from the EU Community Survey covers EU countries plus Iceland, Norway and Turkey. It refers to individuals aged 16-74 years, except for Canada (16+), Israel (20-74), Japan (6+), Switzerland (14+). Data refer to individuals who have bought or ordered goods or services over the Internet, for non-work use, in the last three months (for countries covered by Eurostat). For the rest of the OECD countries it refers to individuals placing orders over the Internet in the last 12 months.

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

1) 2010; 2) 2009; 3) 2008; 4) 2005; 5) 2003.

Sources: OECD ICT Database and Eurostat Community Survey on ICT usage in households and by individuals, May 2012. Canadian Internet Use Survey, 2010 from Statistics Canada.

Quelle:OECD (2012), Internet Economy Outlook. Prof. Welfens/EIIW, Wuppertal

3. ICT Specifics, Innovation and Growth: Theoretical Aspects

ICT specifics

- Scale economies + network effects play a role
- Bundling plays a role in some markets
- Two-sided markets (credit cards; google, e-bay: Digital Walras is expanding!
- Global expansion of ever-faster financial markets: Creates overshooting problems; good for whom?
- Increasing ability of firms/banks for price differentiation in certain sectors & activities: e.g. via individual scoring of customers e.g. banks use this for determining individual interest rates = redistribution of consumer welfare in favor of capital owners/profits.

3.1 ICT Expansion, Globalization and Income Disribution

- Important empirical paper: JAUMOTTE, F.; LALL, S.; PAPAGEORGIOU, C. (2008), Rising Income Inequality: Technology, or Trade and Financial Globalization, IMF Working Paper WP/08/185, Washington DC
- There is convergence of per capita income across countries = result of rising trade and increasing openness of economies
- However, inequality within countries is rising! WHY??

JAUMOTTE et al. paper (2008)

- Income differentials within countries are rising; mainly skilled wage ratio rising relative to unskilled wage
 - The latter reflects skilled-biased technological progress related to ICT expansion: relative demand for skilled workers rises
 - Impact of financial globalization = availability of loans – at low interest rates – increases; this is in favor of skilled workers who can get such loans; and in favor of capital owners/real estate owners who have collateral!
 - Add to this a specific aspect of ICT expansion...(Welfens, 2004) Prof. Welfens/EIIW, Wuppertal

ICT Shifts Economic Rents in Favor of Capital Owners (e.g. Banks: loan business for households with scoring approach)



Prof. Welfens/EIIW, Wuppertal

3.2 ICT: Labor Markets and Growth

1. Labor markets

- Creation of new digital firms is possible on the basis of the internet; however, ICT start-ups face the problem that they have lack of collateral for getting loans
- Opportunity: micro-multinationals 5 individuals already can create a multinational digital company= ICT reinforces multinationalization & globalization
- Better matching through ICT/internet is possible see results from Canada; why is diffusion so slow? If EU countries were like Canada, unemployment rate lower!!

Internet and Matching: Job Market Perspectives

Figure 3.19. Individuals using the Internet for job searches, 2011 or latest available year



Note: Data from the EU Community Survey covers EU countries plus Iceland, Norway and Turkey. Individuals aged 16-74 years, except for Canada (16+), Japan (6+), Switzerland (14+). For countries covered by Eurostat, individuals were asked about activities they had carried out on the Internet in the last three months. For the other OECD countries, it generally refers to the last 12 months. Data refer for Eurostat countries to individuals who used the Internet in the ast three months for job research or for sending job applications. Country notes: For Switzerland: Data refer to internet users who used the Internet at least once within the last six months.

l) 2010; 2) 2006; 3) 2005; 4) 2003.

Source: OECD ICT Database and Eurostat Community Survey on ICT usage in households and by individuals, May 2012. Canadian Internet Use Survey, 2010 from Statistics Canada.

Quelle:OECD (2012), Internet Economy Outlook. Prof. Welfens/EIIW, Wuppertal

3.3 ICT and Innovations in a Neoclassical Growth Model



More innovations, but shorter Innovation Cycles = Rise of the Depreciation Rate

Software Replaces Hardware = Decline of Depreciation Rate

Digital Innovations/Creative Networks as a New Field of Innovations

ICT and Growth (e' is Euler number)

Modify the neoclassical growth model

- Consider the standard model first (T tax rate, t time):
- Y = K^β(AL)^{1-β}; K capital, A knowledge, L labor; growth rate of A is a (exogenous); growth rate of L is n (exogenous); Savings function S=s(1-τ)Y
- Impose condition for goods market equilibirium S=Y(1-τ)Y = dK/dt +δK; δ is capital depreciation rate
- Result (steady state #): $y'#:=Y/(AL) = (s(1-T)/(a+n+\delta))^{\beta'}$ where $\beta':=\beta/(1-\beta)$; $0 < \beta < 1$. Let e' be Euler number
- $Y = A_0 L_0 (s(1-\tau)/(a+n+\delta))^{\beta} e^{(a+n)t}$
- Growth rate of Y in steady state is (a+n)

ICT Affects Growth...

- ICT and financial globalization implies that savings rate s falls (easier to get loans)
- However, the relative fall if ICT price implies that effective savings rate remains relatively high even if s falls.
- ICT reinforces foreign direct investment; we will consider asymmetric case: only country I has FDI inflows. Let a* denote the share of capital K owned by foreign investors; and s' the savings rate of foreign investors. Let a' denote exogenous technological progress; * for foreign variable
- $S = (s(1-a^*\beta)(1-T)(1-\lambda)^{1-\beta} + s^*a^*\beta(1-\lambda)^{1-\beta})Y$; competition in markets!
- Progress function: a= a' + θa*a* + θ'j'a* + λ'λwhere j' is the share of imported technology-intensive intermediate goods; ICT expansion including falling international telecommunication costs (Jungmittag/Welfens,2008) raise j'. Also rise of a* anda*.

ICT Expansion Affects

- In a modified model (see Welfens, Innovations in Macroeconomics, 3rd edition: more than 4000 downloads...)
 - The share of workers in R&D (only 1-λ are producing); it will increase
 - The share of capital stock a* owned by foreign investors: it will rise = enhanced globalization
 - The share of intermediate technology-intensive imported inputs j' will increase

Growth Model: a' is exogenous progress rate

ICT-adjusted steady state y^{\prime} # (λ is share of workers employed in R&D) is:

 y#:=Y/L =((s(1-λ)^{1-β}(1-a*β)(1-т) + s`a*β)/(a` +θa*a*+θ`j`a*+n+δ))^β e`^{(a` + λ`λ+θa*a* + θ`j`a*)t}; level of growth path could fall, but slope (growth rate) rising; after point D Iny higher!!



4. Policy Issues

- International R&D spillovers through digital R&D and the internet expansion; calls for more joint international R&D projects; R&D policy cooperation = hardly existing (EU only modestly)
- Governments promoting ICT clusters always a good idea? Sometimes weak firms – seeking shelter form winds of the market – will seek to join the cluster (see SCHRÖDER, 2012)
- ICT Continues to Stimulate Growth Rate in World Economy, but venture capital is scarce; US much better than EU or Euro area: where is the digital growth initiative in the EU?

4. Policy Priorities: OECD (2012)

Table 0.1. Overall ICT policy priority areas

- 1 Broadband
- 2 ICT skills and employment
- 3 Government online
- 4 Security of information systems and networks
- 5 R&D programmes
- 6 Technology diffusion to business
- 7 Electronic settlement/payment
- 8 Digital content

Additional Thoughts on ICT Policy

- Towards a global universal digital service
- Phasing out telecommunications regulations and creating true EU single digital market
- Government tasks at the national and international level
- Smart grid expansion
- Golden rule in the digital world economy

Policy Issues

- New definition of universal digital services = (e.g.) global internet service at affordable flat rate; could be justified on the basis of positive external national and international effects (innovation spillovers):
- Proposal: Payment for digital universal services through taxation of emissions = double dividend from internalizing positive and negative external effects

EU Single Digital Markets

- Partial success story
- Needed:
 - Better rules for level playing field in mobile telecommunications
 - Consider market shares on the basis of EU single market – with combined shares fixed-line&mobile
 - Allow consolidation of telecommunications markets in EU – more international competition to be achieved

ICT Investment in the Education Sector

- Education sector is 6% of value-added in EU, but only 1% of ICT expenditures is in the education sector
- Governments at the regional, local and national level have underspending on ICT

 in schools and universities; many schools in Germany with very restricted access for pupils to the internet/websites

Government Face Serious Tasks in EU Countries

- E-government is weak in many EU countries: (e.g. Germany No. 15 or so)
- 1) Introduce urgently uniform budget software in all EU Ministries of Finance and allow Commission to look into digital budget process = not repeating the Greek cheating of 2009
- 2) Improve government's digital procurement = cutting deficits in EU countries
 34

Following Canada: SME Digital Policy

Box 8.2. Canada's Digital Technology Adoption Pilot Program (DTAPP)

In fall 2011, the National Research Council of Canada's Industrial Research Assistance Program (NRC-IRAP) launched an USD 80 million Digital Technology Adoption Pilot Program (DTAPP) to be delivered over three years and designed to accelerate the adoption of digital technologies by SMEs in collaboration with colleges *i.e.* from identifying the technology to be used, right through to adapting that technology to their business processes and gauging its effect on the SMEs productivity.

DTAPP is divided into three elements: i) increasing pilot SMEs' adoption of digital technologies in all economic sectors through targeted digital technology advisory services and financial assistance; ii) collecting information from pilot participants, as well as supporting national surveys to better understand barriers to technology adoption; and, iii) raising awareness of the benefits and importance of adopting digital technologies.

Source: OECD (2012), Internet Economy Outlook.

New Fields of ICT Expansion

ICT hardware & software: further expansion – with increasing role of software which in turn is subject to international outsourcing and offshoring (MEIJERS/WELFENS et al. ; WELFENS/WESKE Book)

Online markets/digital services; Digital Lifelong learning; Euniversity networks (US++;EU?)

Digital government procurement= cutting deficits Cross-Innovation: e.g. ICT & Automotive; ICT & Health; Smart Grids

Smart Grid Dynamics: Which Investments, Which Ownership

Smart Grids/Smart Meters

Relevant Data: Ownership, can be leased/sold?; energy companies should not be owners of data; regulation for handing over data to potential competitor.

> Smart grids are machting electricity demand and supply side = reduce peak demand = reduce volume of electricity producer park = savings on costs and avoiding CO2 emissions.

Unfinished Lisbon 2010 Agenda

- No comprehensive Commission Report on Agenda 2010 available (ECB Report available; partly critical)
- National governments and the EU should rely more on indicator-based ICT modernization strategy (EU including Europe 2020); enhance EU Digital Summit
- Commission should push the Euro crisis countries to make special efforts in the field of ICT expansion and digital innovation/digital entrepreneurship
- ITU, EU, EBRD could support private public partnerships in Europe – towards new mobile digital universal service (e.g. Google Free Zone in the Phillipines for BASIC Internet; why not everywhere? Least subsidy principle, BUT Sustained Competition!

Crucial New Emphasis in Telecommunications Policy

- Emphasize competition in mobile telephony
- Put focus more on EU mobile internet
 - EU flat rate must be offered = part of new regulation
 - Network neutrality definition could be differentiated concept (see also KNIEPS/VOGELSANG (2009) special issue International Economics and Economic Policy
- Stabilization of the euro area with new impulses for integrated digital market & ICT R&D

ICT Patents per 1 Mill. Inhabitants at the USPTO 5 Italy 4 Portu gal talien Spanien Griechenland 3 2 Spain 1 Greece Portugal n 1968 1983 1988 1993 1998 2003 2008 1963 1973 1978

Prof. Welfens/EIIW, Wuppertal

Foreign Direct Investment Inflows as a Percent of GDP

A[®] b b ild ung 1: A usländ ische Direktinvestition szuflüsse (% des BIP, jährlich, Quelle: OECD)



46

EU Facing Challenges

We need

- More use of the internet for job searching
- Providing better financial framework for creating digital firms – with almost no traditional collateral
- Digital government procurement platforms should be modernized
- Government should encourage people to develop adequate skills for the digital society and the digital economy; digital retraining schedules to be developed
- New global digital international university markets; this could be a field of EU policy initiatives

www.eiiw.eu



Prof. Welfens/EIIW, Wuppertal

Digital Markets

Figure 3.15. Goods and services ordered in the last 12 months for EU27, 2011

Percentage of individuals who ordered goods or services, over the Internet, for private use, in the last year



Note: Telecom services refer to, for example, TV, broadband or subscription, uploading money on prepaid phone cards. *Source:* Based on Eurostat Community Survey on ICT usage in households and by individuals, May 2012.



Note: E-commerce sales are sales of goods and services where an order is placed by the buyer or price and terms of sale are negotiated over an Internet, extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system. Payment may or may not be made online. Estimates are adjusted for seasonal variation, but not for price changes. Total sales estimates are also adjusted for trading-day differences and moving holidays. *Source*: Based on US Census Bureau, Quarterly Retail E-Commerce Sales, 1st quarter 2012, May 2012.

Internet Use at Work

Figure 4.8. Share of employed persons at work using an Internet-connected computer, selected OECD countries, 2005 and 2011



Percentage of total employment

Notes: Excluding the financial sector. See endnote 1.

1. 2010.

Source: Based on data from the Eurostat Community survey on ICT usage and e-Commerce in enterprises, June 2012.

Supply-side Dynamics

Figure 4.9. Businesses with a website, selected OECD countries, 2011 or latest available year

Percentage of businesses with 10 or more persons employed



Notes: For Australia: Website includes a presence on another entity's website. See endnote 1.
Information on data for Israel: http://dx.doi.org/10.1787/888932315602.
1) 2010; 2) 2009; 3) 2008; 4) 2007; 5) 2006; 6) 2004; 7) 2003.
Source: OECD ICT Database and Eurostat Community survey on ICT usage and e-Commerce in enterprises, June 2012.

Leading ICT Firms

Table 1.2. Top 250 ICT firms by sector, 2000 and 2011

Industry	Revenue 2000	Revenue 2011	Employment 2000	Employment 2011	R&D 2000	R&D 2011	Income 2000	Income 2011
Communications equipment	152 261	235 085	499 243	645 909	16 346	28 080	12 045	16 553
Electronics & components	737 852	1 144 637	2 618 862	4 204 283	29 445	45 984	41 007	34 835
Internet	5 911	113 623	15 186	122 901	521	10 692	-1 672	17 240
IT equipment	299 489	780 423	393 142	2 750 281	10 550	21 664	12 146	47 751
IT services	189 763	366 521	706 587	2 080 974	5 972	7 073	16 974	29 074
Semiconductors	104 885	188 614	293 631	481 033	10 919	25 684	20 162	26 696
Software	51 817	156 313	147 797	341 650	8 090	21 523	10 536	42 155
Telecommunications	667 844	1 617 381	1 984 747	3 600 244	4 777	636	45 567	120 801
Total	2 209 822	4 602 598	6 659 195	14 227 275	86 621	161 336	156 763	335 106

USD millions in current prices and number of employees

Note: Cohort data are necessarily incomplete for firms that did not exist and/or report in 2000. Sources: OECD Information Technology Database; compiled from annual reports, SEC filings and market financials, July 2012.

Internet Dynamics: User Side (Individuals)

Figure 3.9. Individuals who used Internet for communicating, 2010 or latest available year



Note: Individuals aged 16-74 years, except for Canada (16+), Israel (20-74), Japan (6+), Switzerland (14+). For countries covered by Eurostat, individuals were asked about activities they had carried out on the Internet in the last three months. For the other OECD countries, it generally refers to the last 12 months. Data generally refer to communicating for Eurostat countries. For Israel, Japan, Mexico, New Zealand and Switzerland data refer to sending and/or receiving e-mails only. For Korea, data refer to sending/receiving e-mails and making voice calls (VoIP). For the United States data refer to e-mail or instant messaging.

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

1) 2009; 2) 2006; 3) 2005; 4) 2003.

Country notes: For Israel: Data refer to the use of Internet in the last 3 months. For Japan: Internet Users accessing from personal computers and mobile phone. For Switzerland: Data refer to Internet users who used the Internet at least once within the last six months.

Source: OECD ICT Database and Eurostat, Community Survey on ICT usage in households and by individuals, May 2012. Canadian Internet Use Survey, 2010 from Statistics Canada.







Figure 4.18. Total turnover of companies from e-commerce, 2011 or latest available year

Notes: The figure shows total sales via the Internet or other networks during the reference year, excluding VAT. Businesses with at least 10 persons employed. Country notes: See endnote 1. For Australia and Switzerland, economic activities data correspond to the classification ISIC Rev. 4. Include the following industries: Manufacturing (ISIC C); Construction (ISIC F) Wholesale trade, except of motor vehicles and motorcycles (ISIC G: Division 46); Retail trade, except of motor vehicles and motorcycles (ISIC G. Division 47); Accommodation and food service activities (ISIC I); Transportation and storage (ISIC H); Information and communication (ISIC J); Real estate activities (ISIC L) Professional, scientific and technical activities (ISIC M); Administrative and support service activities (ISIC N). Finance and Insurance (ISIC J) are excuded. For Mexico, economic activities data correspond to the classification ISIC Fy; Wholesale trade (ISIC 51); Retail trade (ISIC 52); Hotels and restaurants (ISIC H); Transport, storage and communications (ISIC I); Real estate, renting and business services (ISIC K).

1) 2010; 2) 2008; 3) 2009.

Source: OECD ICT Database and Eurostat Community survey on ICT usage and e-Commerce in enterprises, June 2012.

Internet Sales

Figure 4.19. Businesses selling/purchasing over the Internet, 2011 or latest available year



Businesses with 10 or more persons employed

Notes: The definition of Internet selling and purchasing varies between countries, with some explicitly including orders placed by conventional e-mail (e.g. Australia and Canada) and others explicitly excluding such orders (e.g. Ireland, the United Kingdom and some other European countries). Most countries explicitly use the OECD concept of Internet commerce, that is, goods or services are ordered over the Internet but payment and/or delivery may occur offline. For countries covered by Eurostat, see endnote 1. Selling/purchasing data refer to "over any networks" excluding manually typed e-mails (except United Kingdom where for 2007 manually typed mails were included). See endnote 2.

1) 2010; 2) 2008; 3) 2007.

Source: OECD ICT Database and Eurostat Community survey on ICT usage and e-Commerce in enterprises, June 2012.

ICT Policy Areas



Figure 8.1. Recently increased priority ICT policy areas

Note: The chart ranks ICT policy areas by the number of countries attributing particular prioritisation for the economic recovery ("increased" priority).

Source: Based on 23 responses to the OECD Internet Economy Outlook Policy Questionnaire 2012, section "Current IT policy priorities and new directions".

Quelle:OECD (2012), Internet Economy Outlook.

Prof. Welfens/EIIW, Wuppertal



Figure 1.7. Growth in quarterly employment in ICT manufacturing, June 2007-December 2011

Quelle:OECD (2012), Internet Economy Outlook. Prof. Welfens/EIIW, Wuppertal

Source: OECD calculations based on data from national statistical offices, short-term indicators, March 2012.



Note: Cohort data are necessarily incomplete where firms did not exist and/or report in 2000. As a result these data marginally exaggerate revenue growth for Argentina, China, France, Germany, India, Italy, Japan, Chinese Taipei, Turkey, the United Kingdom and the United States. Sources: OECD Information Technology Database; compiled from annual reports, SEC filings and market financials, July 2012.

	Digital content	Clothing and accessories	Books CDs and DVDs	Hobby supplies and general items	Tickets coupons and vouchers	Financial trading	Foodstuffs	Travel	PCs and accessories	Other
2010	40.7	36.0	34.8	33.0	24.0	22.2	22.1	20.5	17.1	22.2
2009	47.4	32.7	33.6	30.0	22.6	23.1	20.5	19.2	16.6	19.6
2008	49.0	31.8	32.4	31.0	21.9	22.7	19.9	18.3	17.0	11.3
2007	n.a	35.1	39.7	35.2	25.7	15.5	24.1	20.8	22.3	11.0
2006	n.a	36.1	40.1	37.0	25.6	16.6	21.9	20.4	23.2	10.8
2005	n.a	34.8	38.9	37.8	26.1	14.3	21.6	20.4	23.6	n.a
2004	n.a	23.8	38.7	26.4	27.1	8.2	16.1	15.1	22.5	n.a
2003	n.a	26.9	39.7	27.7	27.0	4.8	18.1	12.1	24.3	n.a
2002	n.a	16.9	23.8	19.8	19.1	3.8	10.8	9.7	19.7	n.a

 Table 3.1.
 Merchandise/services purchased or traded online in Japan, 2002-10

Percentage of Internet users

Note: Internet users aged 15 years or more and who purchased online.

Source: Communications Usage Trend Survey in 2010, Ministry of Internal Affairs and Communications of Japan (MIC).



Figure 4.2. Businesses using the Internet, 2011

Percentage of businesses with 10 or more persons employed

Notes: See also endnote 1: For Japan: Businesses with more than 100 regular employees. For Mexico: Businesses with 50 or more employees for 2003 and with 20 or more personnel for 2008 data. For Switzerland: Businesses with five or more employees and connections equal to or faster than 144 Kilobits per second (mobile and fix).

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

1) 2010; 2) 2009; 3) 2008; 4) 2007.

Source: OECD ICT Database and Eurostat Community survey on ICT usage and e-Commerce in enterprises, June 2012.

Convergence followed by divergence

Figure 2:





