

Chapter 1

GROWTH OF ELECTRONIC COMMERCE: PRESENT AND POTENTIAL

The promise of significant economic growth places electronic commerce (see Box 1.1) high on many public and private sector agendas. And to date, the growth has been impressive. Starting from basically zero in 1995, total electronic commerce is estimated at some \$26 billion for 1997; it is predicted to reach \$330 billion in 2001-02 (near term) and \$1 trillion in 2003-05 (future). These estimates are very speculative and rank among the highest of the dozen estimates generated by various management consultancy or market research firms (Table 1.1). They are adopted so as to ensure complete geographical (world) and product (business-to-business and business-to-consumer) coverage and because recent reports of sales by leading e-commerce merchants (Table 1.2) suggest that the growth rate may be faster than expected.

To put these estimates into a broader context, four benchmarks are selected for comparison: US catalogue sales, purchases made on credit cards in the United States, total sales generated by direct marketing in the United States, and retail sales summed across seven OECD countries.¹ Electronic commerce in 1995-97 is the equivalent of 37 per cent of US mail order catalogue shopping, 3 per cent of US purchases using credit/debit cards, and 0.5 per cent of the retail sales of the seven OECD economies (Table 1.3). The near-term estimate suggests that e-commerce will quickly overwhelm US catalogue shopping. If the optimistic future forecast (2003-05) is realised, OECD-wide e-commerce will be the equivalent of 15 per cent of the total retail sales of seven OECD countries. While significant, this level of activity is less than current sales generated by direct marketing in the United States through mail, telephone and newspapers (Direct Marketing Association, 1998).

Table 1.1. **Comparison of various total e-commerce estimates**

	US\$ million	
Activity	1995-97	2000-02
Total		
IDC	1 000	117 000
INPUT	70	165 000
VeriFone	350	65 000
ActivMedia	24/400	1 522 000
Data Analysis	2 800	217 900
Yankee	850	144 000
E-land	450	10 000
EITO	475	262 000
AEA/AU	200	45 000
Hambrecht & Quest	1 170	23 200
Forrester	8 000	327 000
Morgan Stanley	600	375 000
Median value	725	154 500

Sources: Girishankar, 1998a; <http://www.tpn.geis.com> (10 May 1997); Morishita, 1997; Borland, 1997b; Morgan Stanley Dean Witter, 1997; Direct Newline, Media Daily Archive, 1998; Strassel, 1997b; Margherio *et al.*, 1998; "PC Week's Top-10 E-commerce Sites", <http://www.pcweek.com> (14 January 1997); "Lawsuite Aside, Amazon.com Racks Up Sales", www.techweb.com (16 February 1998); "Barnes and Noble Sees \$100M in Online Sales", www.techweb.com (19 January 1998); Jackson, 1997b; "The Once and Future Mall", *The Economist* (1 November 1997); Margolis, 1998; "CyberSex", *The Economist* (4 January 1997); Weber, 1997; Sussman, 1997; Macavinta, 1998; Schwartz, 1995; Bruner, 1997; "Competition on the Rise as Net Music Sales Take Off", www.internetnews.com (13 February 1998). Detailed sources available on request.

Box 1.1. Defining electronic commerce

In order to explore and estimate the socio-economic impacts of electronic commerce, it is essential to define electronic commerce. As with many new services, this is not a simple matter, as definitions given by various sources differ significantly. Some include all financial and commercial transactions that take place electronically, including electronic data interchange (EDI), electronic funds transfers (EFT), and all credit/debit card activity. Others limit electronic commerce to retail sales to consumers for which the transaction and payment take place on open networks like the Internet. The first type refers to forms of electronic commerce that have existed for decades and result in trillions of dollars worth of activity every day. The second type has existed for about three years and is barely measurable.

Enter the Internet

This study takes a view somewhere between these two extremes. It is concerned specifically with business occurring over networks which use non-proprietary protocols that are established through an open standard setting process such as the Internet. As used here, the term “business” broadly means all activity that generates value both within a firm (internally) and with suppliers and customers (externally). In this sense it would include internal networks (e.g. intranets) as well as networks that extend to a limited number of participants (e.g. extranets). Some of this activity may result in a monetary transaction and some will not. To assess the economic impact of e-commerce more fully, that portion of the infrastructure which is primarily dedicated to such activity is also included.

The focus on networks that use non-proprietary protocols, which are a relatively new phenomenon, is central. Earlier forms of e-commerce required pre-existing relationships, expensive and complex custom software, and dedicated communication links. In many cases, the system required strictly compatible equipment. Consequently, the main users of early e-commerce (EDI and EFT) were large businesses and their first-tier suppliers. These links created two-way markets between specific parties. While such forms of e-commerce will continue, recent attention to e-commerce is due to the Internet and its open, non-proprietary protocol (Transport Control Protocol/Internet Protocol – TCP/IP), to the development of the World Wide Web (WWW) which uses a standard coding system (hypertext markup language – HTML) for representing data, and to the development and diffusion of browsers that provide a standard interface for accessing WWW sites. All of these technologies use existing communication systems to create a network that is independent of any one platform. In fact, one of the drivers of the Internet is the fact that it exploits all of the existing ICT infrastructure, so that it can be used with a minimal amount of new investment. Telephone systems, computer systems, and cable TV systems can be interconnected, largely thanks to the widespread regulatory reform of communications systems, which has eroded the boundaries that previously separated the different systems and led to competition and innovation, thereby lowering costs and vastly increasing options.

This new information infrastructure has certain properties which make it attractive to users and help to propel its exponential growth:

- The cost of accessing the Internet is very low compared with networks that adhere to proprietary systems. This has reduced users’ fears that the technology may quickly become obsolete or be abandoned and has encouraged many to adopt it and build to the current standard. Inclusiveness is a hallmark of open networks like the Internet, and the widespread adoption of these standards has created a virtuous circle: a significant industry is innovating and producing to these standards, with the result that they are being extended to a wide range of data, including voice, audio and video.
- The combination of technologies – Internet, WWW and browser – enable interactive media that allows one-to-many communication. It accommodates customer feedback and interaction (Wigand, 1997) and presents a significant advantage over other e-commerce technologies such as EDI, TV, and telephone. In a sense, EDI is a market, while e-commerce over open networks is a marketplace in which all types of buyers and sellers can interact (Richard Hawkins, SPRU, personal communication).

Because each of these technologies is evolving, today’s “Internet” may very well become a different set of technologies and standards in the future. Yet the appeal of universal connectivity keeps most of these fundamental technologies (e.g. a new TCP/IP version, new mark-up text language) open and non-proprietary (e.g. Java, Netscape Communicator code). This both generates and encourages a large industry that supports and develops the Internet; it also explains why the current interest in and enthusiasm for e-commerce is focused on Internet-enabled e-commerce. Thanks to these technologies and to institutional reforms, the cost and difficulty of electronic commerce have decreased, so that average consumers can routinely engage in it from their homes.

Box 1.1. **Defining electronic commerce** (cont.)**A policy-driven definition of e-commerce**

By focusing on e-commerce over networks which use an open, non-proprietary standard, the definition adopted here can be narrowed to an *application* that operates across an information and communication infrastructure like the Internet. Viewed in this way, electronic commerce is one of many applications and components of the broader Internet and the ICT sector. This book does not attempt to synthesise the extensive work that has been conducted on the impact of ICT on OECD economies, but it draws upon that work when it provides insight into how e-commerce may affect our economies. The division is not always clear and presents many conceptual problems. Why does the migration of commercial activity from a proprietary EDI system to an Internet EDI system not count as e-commerce one day but count as e-commerce the next? Do other internal business production processes, such as the “publication” of company phone directories on an intranet, constitute e-commerce? Like any definition of cross-cutting activities (e.g. tourism), it is difficult to make sharp distinctions, and further analysis and refinement are needed. However, the Internet protocol makes such a difference in terms of its potential reach, that it makes a useful demarcation point. Moreover, adopting too broad a definition would dilute the utility of an impact analysis and the policy implications that may be drawn from it. Nevertheless, there are important lessons to be learned from other, non-Internet based, forms of electronic commerce, especially in terms of identifying some of the broader social impacts. Where appropriate, allusions to these other types of electronic commerce will be made.

Future research agenda

Future work analysing electronic commerce would clearly benefit from the adoption of a definition that would provide some consistency across studies and a reference point for the collection of data. Work to develop a definition should be undertaken at the national and international level in consultation with business, labour and consumer representatives. Because of inherent differences in policy interests, a flexible definition based on a core concept which can then be expanded to include other aspects of electronic commerce may be the most practical.

This chapter analyses the geographic distribution, product mix and sectoral penetration, and likely growth of electronic commerce now (1995-97), in the near-term (2000-02), and in the future (2003-05). It does this by marshalling as many estimates as possible, for two main reasons:

- first, to reveal the huge variance that exists across various estimates, a fact that underscores the lack of empirical rigour that plagues measurement of this activity (see Box 1.2) and should raise cautionary flags about the use of any one set of estimates (including those presented above);
- second, by drawing together such disparate data, it may be possible to construct a mosaic which provides a clearer quantitative picture of the current structure and future direction of e-commerce.

Electronic commerce in the United States, Europe and Asia

At present, the United States is typically credited with about four-fifths of world-wide e-commerce activity (Table 1.5). Again, the figures are very rough (see Box 1.2). They suggest that Western Europe represents about 10 per cent and Asia about 5 per cent of the world total. In Europe, the United Kingdom and the Nordic countries are the current leaders, although some estimates attribute significant activity to Germany (Table 1.5). A supporting indicator is the location of the top 100 Web sites for consumer (retail) activity (Table 1.6). For each of the major categories of e-commerce activities – live audio, shopping, finance, and content (news, sports, adult) – the United States typically has 67 to 85 of the top 100 sites. Canada comes in second for five out of the six categories. Another proxy is the number of adults who access the Internet (Figure 1.1); the United States accounts for more than half of the OECD total.

Over the near term, the United States’ lead is expected to decline to about two-thirds to three-quarters of world total e-commerce activity,² particularly because France’s Minitel and Germany’s T-Online services have accustomed their citizens to online buying; as these services migrate to the Internet, e-commerce should expand. Also, Europe may see a user-led demand pull, in contrast to the technology push thought to characterise the US situation (Hawkins, 1998).

Table 1.2. **Selected individual firm e-commerce revenues by activity**

US\$ million	
Activity	1995-97
E-commerce: business-to-business	
CSX	3 000
GE	1 000
NEC	16 528
Cisco (e-commerce sales)	2 496
Computers: Dell	730
Computers: Gateway	150
Computers: NECX	35
Images: Photodisc	4
Total business-to-business	23 943
E-commerce: business-to-consumer	
Autos: Auto-By-Tel	14
Flowers: 1-800-Flowers	48
Books: Amazon	148
Books: Barnes & Noble	14
Groceries: Peapod	60
Groceries: NetGrocer	78
Gardening: Garden Escape	1
Misc.merchandise: AoL	464
Misc.merchandise: Onsale.com	100
Misc. merchandise: NetMarket.com (Cendant (CUC))	1 000
Misc. merchandise: Internet Shopping Network	15
Misc. merchandise: eBay	100
Toys: eToys	10
Newspapers: Wall Street Journal	7
Travel: Expedia	104
Travel: Preview	12
Travel: EasySABRE and Travelocity	100
Ticket sales by Ticketmaster	60
Pornography: Virtual Dreams	8
Pornography: Internet Entertainment Group	20
Pornography: Persian Kitty	1
Pornography: CyberErotica	9
Pornography: Playboy	4
On-line gambling: Sports International	6
On-line gambling: Interactive Gambling and Communications	58
Music: CDnow	15
Music: Tower Records	8
Music: N2K	12
Consumer stock brokerage: E*Trade	148
Total business-to-consumer	2 624
Total	26 567

Source: See Table 3.1.

Table 1.3. **Estimates of e-commerce sales compared to various benchmarks**

	E-commerce estimates (US\$ billion)	US catalogue sales (percentage)	US credit card purchases (percentage)	Direct marketing (percentage)	OECD-7 total retail sales (percentage)
Current (1996/97)	26	37	3	2	0.5
Near-term (2001/02)	330	309	24	18	5
Future (2003/05)	1 000	780	54	42	15

Source: OECD estimates; US catalogue sales (\$78.6 billion) and direct marketing sales (\$1 226.0 billion) data and growth rates (6.3 and 8.7 respectively) are from Direct Marketing Association (1998), "Economic Impact: US Direct Marketing", April; credit card activity is based on VISA and MasterCard US charges in 1997 (\$870 billion) and the 1996 to 1997 growth rate of 10 per cent; OECD-7 retail sales (\$5 328 billion) are for Canada (1997), France (1996), Finland (1997), Germany (1995), Japan (1994), United Kingdom (1994) and the United States (1997).

Box 1.2. Data and measurement issues for e-commerce

For many reasons – its recent emergence, its fast growth from a small base, entry and exit by a wide variety of firms (often small and not publicly traded), and the multitude of business models being tested – traditional sources of economic data such as public statistical offices have not yet compiled data on electronic commerce (see Box 3.2). Consequently, the only readily available data come from firms engaging in e-commerce or from market research firms or management consulting firms that conduct surveys of electronic commerce.

This can pose problems. Some firms may seek to “talk themselves up” prior to an initial public stock offering. Many are suppliers of e-commerce infrastructure and may want to build momentum for the activity. Market research firms or management consulting firms, for their part, provide advice and data about the current state and future direction of electronic commerce. Since they will presumably expand along with the electronic commerce market, they are likely to have an incentive to suggest that the e-commerce market is large and growing rapidly (Franson, 1997). Neither of these sources of data is immune from the statistical problems that plague the public statistical agencies. However, they rarely make available information on their collection methods or definition of e-commerce, or provide reports describing the statistical robustness of the data. Some estimates vary by over a factor of 100, presumably because of differences in coverage, definition and methodology.

While this situation is problematic for businesses thinking about engaging in electronic commerce, they are usually seasoned consumers of such data. They also benefit from their own internal data collection exercises, which can act as a check on these estimates, an advantage not enjoyed by most public policy makers and analysts.

Moreover, most estimates are based on sales or revenue. The problem here is three-fold. First, these figures include costs of doing business; this results in double-counting as the output of one e-commerce industry (e.g. Internet advertising or e-payment services) is counted in the “sales” figures of other e-commerce businesses, especially for business-to-business electronic commerce. Second, they give no indication of whether or not electronic commerce is simply displacing sales from more traditional channels. Third, they do not reveal whether firms engaging in electronic commerce are making a profit. In fact, most business-to-consumer electronic commerce firms are not. This severely limits an analysis of the economic impact of electronic commerce in terms of contribution to gross domestic product (GDP) (value added). Nonetheless, sales or revenues are typically the only indicator of activity available, and, although crude, they do give an idea of market size.

Lastly, most e-commerce estimates and anecdotes come from the United States. This is natural, to some degree, given that the United States generates a large share of e-commerce. While many aspects of the United States’ culture and regulations may limit generalisation of that experience to the rest of the OECD, the size and diversity of the US market and fact that the United States is relatively advanced in the adoption of e-commerce, make it a useful case study of what may happen more broadly.

Factors which might limit growth in Europe are the continued high costs and the lack of good intra-Europe bandwidth (KPMG, 1998), the slow pace of planned liberalisation of the telecommunications sector (Forrester Research, 1998a), and a lack of awareness of the potential benefits (European Commission, 1997a). In general, European consumers appear to be less inclined to engage in “distance” retail than Americans, with per capita mail order sales that are less than half those of the United States (Federation of European Direct Marketing and NTC Research Ltd., 1997). Although Asia, especially Singapore and Hong Kong (China), have been keen adopters of electronic commerce, take-up has been more sporadic in the larger Asian economies of Japan and Korea. In general, the high cost of communications, the difficulty of engaging in new investment during the current economic turbulence, and the transition associated with regulatory reform may limit near-term growth (Ministry of International Trade and Industry, 1997). Even so, Japan has seen the number of its “cyberstores” increase from 214 in September of 1995 to 6 500 in February of 1998, with nearly \$700 million in revenues (Ministry of Post and Telecommunications, 1998).

The infrastructure for e-commerce

Like traditional commerce, electronic commerce requires a substantial infrastructure composed of intermediaries that allow sellers to transact business with buyers. As in the US gold rush of the 1800s, the real winners may not be the miners but the suppliers that outfitted them with food, clothes and pickaxes. In 1995-97, in fact, expenditures on Internet-related infrastructure are estimated to reach some \$40 billion, far more than

Box 1.3. Recent efforts by national statistical offices

One reflection of the importance of electronic commerce is the fact that it has begun to be evaluated by public statistical offices, many of which have started preliminary surveys or are in the planning stages.

Australia: Questions asking the extent and value of online e-commerce activities were incorporated into the most recent surveys on business and household use of IT.

Canada: In 1997, Canada conducted a survey on communications and electronic banking services conducted by telephone, PC dial up and the World Wide Web as well as e-commerce-related questions in its innovation survey and its survey of advanced technology in manufacturing in 1998.

France: The main focus to date has been on business-to-business use of networks and the impact on organisational structure and productivity. It is envisioned that the annual survey on company structure will increasingly ask questions about the share of investment dedicated to ICT and the portion of sales made through networks.

Nordic countries: The five Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) collectively contribute to a project which develops methods for measuring ICT usage. Out of 18 ICT issue areas, electronic commerce has been identified as having the highest priority and members such as Finland plan to survey enterprises in 1999. Sweden started to survey this activity in 1997.

United States: The United States, in consultation with Canada and Mexico, is studying the creation of a new industry code to recognise electronic shopping establishments separately for inclusion in the North American Industry Classification System (NAICS) in 2002. Currently, e-commerce merchants are included in “nonstore retailers” (US SIC 596) (e.g. mail order).

A number of other countries, such as **Italy**, have work under way to explore various methodological issues associated with measuring electronic commerce activity. Others, such as the **United Kingdom** and the **Netherlands**, are using private consulting firms to survey electronic commerce activity.

OECD: An advisory statistical panel was established in 1996 in response to the adoption by Ministers of recommendations made by the ICCP Committee in “Global Information Infrastructure and Global Information Society” (GII-GIS) [OCDE/GD(96)93]. One of the primary tasks this group was charged with was the creation of internationally recognised definitions. Meeting in 1998, this group agreed upon a definition for information and communication technologies. Work has begun on defining the broader “information economy”, and some Member countries have suggested that the group should define electronic commerce statistically.

the business-to-consumer segment and above most estimates of current business-to-business activity. Assuming that one-fifth of Cisco’s \$6.4 billion in router sales is attributable to demand linked to electronic commerce, this exceeds most estimates of total current electronic commerce.

The firms that were among the first to exploit the advantages of electronic commerce are those that are supplying the infrastructure for electronic commerce. Cisco’s router sales and Dell’s sales of personal computers (PCs) are two prominent examples. While their experience cannot be broadly generalised, their growth has been extraordinary: in the space of one year, Dell increased its online sales from \$1 million a day

Table 1.4. Geographic breakdown of e-commerce, various years

	Booz-Allen & Hamilton (1997)	IDC (1997)	ActivMedia (1997)
United States/North America	76	87	86/93
Western Europe/Europe	24	8	5
Japan/Asia-Pacific		4	1
Rest of world		1	1
Total	100	100	93/100

Source: ActivMedia 1997 quoted by Margolis, 1998; March; Booz-Allen & Hamilton, 1997a; IDC, 1998.

Table 1.5. **Comparison of various e-commerce estimates by country**

US\$ million

	1995-96	1996-97	2000-01	2001-02
Europe				
Benelux	13		4 800	
France	0	4	6 100	8 367
Germany	0	73	9 700	16 090
Italy	0	1	3 900	
Netherlands		2		
Nordic	13		6 800	
Sweden		3		
Scandinavia				6 436
Spain	0	1	1 500	
United Kingdom	26	9	11 000	12 872
Rest of EU	13	3	500	20 595
EU total	65	96	44 300	64 360
Asia				
Australia		28		
Japan		682		

Source: EITO, 1997; Strassel, 1997a; Forrester Research, 1998b; IDC, 1997c; "Internet Commerce to Top \$30 Billion in Western Europe in 2001", <http://www.internetnews.com> (20 February 1998); MPT, 1998; Parliament of the Commonwealth of Australia, 1998.

to \$5 million a day today and expects that online sales will soon represent half of its total sales³ Cisco first allowed customers to purchase equipment over its Web site in 1996 and generated \$100 million in sales; sales reached over \$1 billion in 1997 and are expected to reach \$4 billion in 1998 (Margherio *et al.*, 1998).

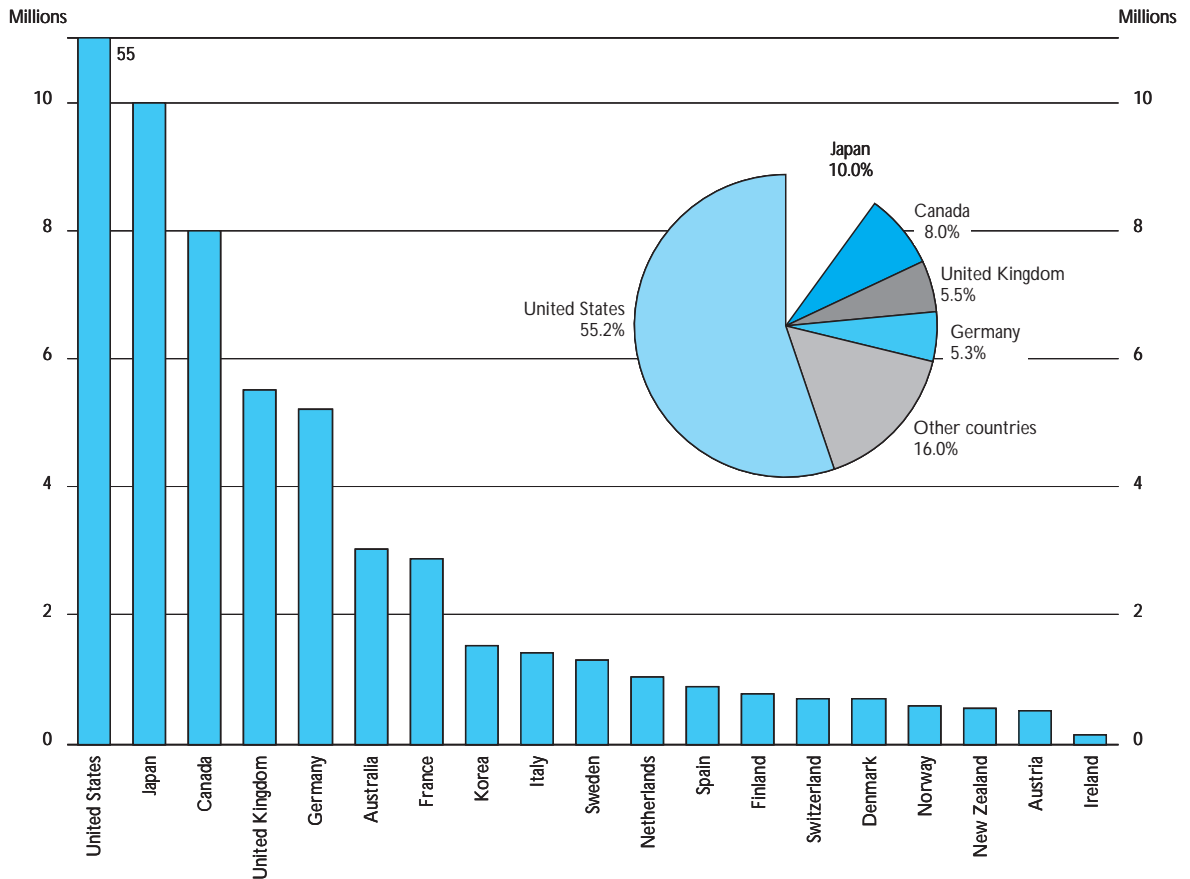
As Internet technology forces convergence across what were once considered separate areas (*e.g.* broadcasting, communications and computing), it becomes more difficult to identify clearly what constitutes the infrastructure supporting e-commerce. Under a very narrow and conservative definition, the e-commerce infrastructure has four parts: *i) hardware* (PCs, routers, servers, etc.); *ii) network service providers* (*e.g.* Internet access); *iii) software* to run the hardware and e-commerce packages; and *iv) enabling services* (*e.g.* e-payment, authentication/certification services, advertising, delivery). Of the four categories, hardware is estimated to have the largest sales at present, at roughly \$10 billion to \$30 billion (Table 1.7). In most cases, however, estimates of hardware expenditures cover all Internet-related hardware, not just that portion of Internet use dedicated to electronic commerce. The software for running PCs, servers, routers and support networks is a smaller but not insignificant part of the market, ranging from \$300 million to \$900 million in 1996; specific software, such as "turnkey" packages that allow merchants to set up a storefront on line, are estimated by Forrester Research to have earned revenues of about \$20 million in 1996.⁴ Providers of Internet service (ISPs) currently generate about \$125 million in revenues but this could drop as prices fall; in the past year, the OECD average for 20 hours of Internet access has fallen from \$68 to \$20 (OECD, 1997a).

Table 1.6. **Location of top 100 WWW sites by category, June 1997**

	Live audio	Shopping	Finance	News	Sport	Adult
United States	78	85	75	67	79	79
Canada	4	6	6	5	8	10
United Kingdom	3	2	5	6	8	2
Germany	4	1	1	2	2	1
France	-	-	2	1	3	-
Japan	2	-	1	-	-	2
Other						

Source: OECD, 1997d; <http://www.allwhois.com>.

Figure 1.1. **Adults accessing the Internet, selected OECD countries¹**



1. Methodologies vary across countries. Data are provided as an indicator of the diffusion of Internet's use within countries. The numbers were measured between December 1997 and June 1998.
 Source: OECD, based on data from <http://www.headcount.com>.

Lastly, new intermediaries that help buyers and sellers conduct business are emerging. They provide services such as directories, advertising, e-payment, insurance, network diagnostics, authentication and certification. To date, advertising remains the dominant business model for business-to-consumer e-commerce: give away your product but charge for placing advertisements on or near it. Jupiter estimates 1996 Web-based advertising revenue at \$310 million [reasonably close to the \$266 million reported by the Internet Advertising Bureau (<http://www.jup.com>, 12 March 1997)]. Of this sum, ten sites – most of them providing some type of intermediary service (browser, search engines) – represent about half of the total.

In general, the information infrastructure that supports electronic commerce is a significant and growing part of the overall OECD economy, especially in the United States. A recent report by the US Department of Commerce estimates that while ICTs only represent about 8 per cent of GDP, they have contributed nearly double that to recent GDP growth (Figure 1.2). By 1998, the US ICT sector contributed a larger share to GDP than the automobile and aerospace sector combined.

Business-to-business electronic commerce

In business-to-business electronic commerce, businesses use the Internet to integrate the value-added chain which can extend from the supplier of raw materials to the final consumer. Business-to-business

Table 1.7. E-commerce broken down into major segments and products
Comparison of various estimates

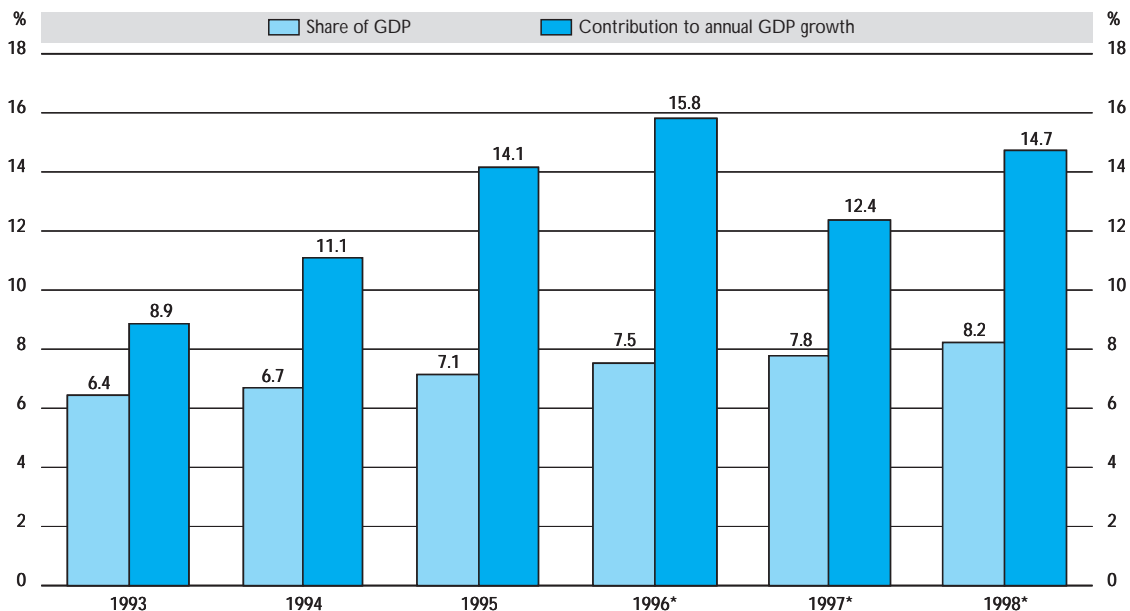
US\$ million

Activity	1995-97	2000-02
Infrastructure		
Hardware		
Total ¹	10 950	43 000
Computer products	140	2 105
Network hardware	29 000	72 000
Network services		
Total ¹	300	5 000
ISP revenue	125	12 000
Internet services market (access, hosting, communication)	6 200	34 400
Software and comp. serv.		
Total ¹	900	5 100
E-comm apps	121	3 800
Enabling services		
Total ¹	500	10 000
Ads	32	2 800
Ads	74	4 800
Ads	906	
E-commerce: business-to-business		
Retailer	10 000	
Auto manuf.	7 000	
Computers/consumer electronics	767	8 200
Software	212	3 498
Software	250	4 600
Internet telephony		9 000
E-commerce: business-to-consumer		
Apparel	46	322
Gifts/flowers	45	658
Books	109	2 200
Travel	276	8 600
Travel	457	10 000
Groceries	767	6 600
Food/drink	39	336
Clothing	18	1 900
Entertainment	298	1 920
Ticketing	52	1 700
On-line subscription	120	966
On-line subscriptions	22	158
On-line magazines	1	15
Pornography	137	296
Music	13	1 200
Music	46	1 600
On-line games	127	1 013
On-line games	165	1 260
On-line gambling	160	8 600
On-line gambling	2 245	9 911
Consumer stock brokerage	628	2 200
Consumer insurance (auto, term, homeowner)	39	1 110
Financial services	1 200	5 000
E-commerce total		
Forrester	518	6 579
Iconoclast	1 100	24 100

1. Estimate for the whole segment.

Sources: *Fortune*, "The Birth of Digital Commerce" (9 December 1996); Page, 1998; *Wall Street Journal* (3 March 1997, p. A12); ActivMedia, 1998; Data Analysis, 1997; Cerf, 1997; E-land, 1997; EITO, 1997; AEA/American University, 1996; <http://www.cyberatlast.com> (2 April 1997); <http://www.forrester.com>; Meeker, 1997; "Linking Up", *The Economist* (5 April 1997, p. 72); Meeker and DePuy, 1996; Lesk, 1997; Tchong, 1998; "Net Biz Software to Top \$3B", <http://www.techweb.com> (13 May 1997); Internet Advertising Bureau, 1998; OECD, 1997e; Marsicano, 1998; Moad, 1997; SRI Consulting, 1998; <http://www.jupiter.com>, 1997; "Vanishing Breed", *The Economist* (10 January 1998); Franson, 1998; "Making Money on the Net", *Business Week* (23 September 1996); Margherio *et al.*, 1998; "Surf Music", *The Economist* (16 August 1997); Patrizio, 1997; Murphy, 1997; Crockett, 1997; Festa, 1997; Marable, 1997. Detailed sources available on request.

Figure 1.2. **US ICT industry share of GDP and contribution to growth**
Percentages



* Estimated.
Source: Margherio et al., 1998.

electronic commerce dominates the total value of e-commerce activity, accounting for about 80 per cent at present (Table 1.8). This share is probably conservative. As Table 1.2 shows, three firms – General Electric, CSX and NEC – report conducting over \$20 billion in business-to-business electronic commerce. This exceeds all the business-to-consumer sales estimates for 1995-97 by a large margin as well as most estimated e-commerce totals. Because the economic factors affecting the adoption of e-commerce between businesses are much different from those affecting business-to-consumer e-commerce, business-to-business e-commerce is likely to maintain or enlarge its advantage for the foreseeable future.

Table 1.8. **E-commerce estimated to be business-to-business**

Firm (year)	Percentage
IDC (1997) ¹	61
Negroponte (1998) ²	70
Forrester Research (1998) ³	84
Forrester Research (2001) ⁴	88
ActivMedia (1996) ⁵	72
Lorentz (1997) ⁶	80
Price Waterhouse (2002) ⁷	78
Piper Jaffray (2001) ⁸	90
Average	78

1. Meeker, 1997.
2. Moltzen, 1998.
3. Forrester Research, 1998b.
4. Forrester Research, 1998a.
5. ActivMedia, 1998.
6. Lorentz, 1998.
7. Price Waterhouse, 1998.
8. Cohen, 1998.

Electronic links between businesses are not new. They have existed for decades, in the form of electronic data interchange (EDI) supplied by value-added networks (VAN) operated over leased telephone lines. Large manufacturing firms are the main users of EDI. General Electric (GE), one of the largest EDI service suppliers, estimates that 80 per cent of suppliers are not connected to an EDI system but rely on fax, telephone or mail.⁵ Currently, EDI accounts for some \$150-\$250 billion in sales (Margherio *et al.*, 1998).

Adoption of Internet protocols and use of the Internet infrastructure are expected to transform EDI from a set communication system, based on dedicated leased lines, between large firms with an established relationship to a flexible system that draws in a much wider range of firms, many of whom may not know each other. EDI over the Internet costs about one-tenth that of a VAN and greatly lowers the barriers to adoption.⁶ Boeing, for example, saw a five-fold increase in customers participating in its parts-ordering system when it moved from a strictly EDI-VAN system to an EDI Internet system (Margherio *et al.*, 1998). For business-to-business electronic commerce, migration to the Internet is expected to result in a near doubling of EDI to \$383 billion in the year 2000, a third of which will be used to connect second- and third-tier suppliers (OECD, 1998a).

In addition to EDI over the Internet, there are three other major forms of business-to-business e-commerce: *i*) use of the Internet, WWW pages and browsers; *ii*) deployment of "intranets" (networks internal to the firm that use the IP protocol), which streamline the firm's internal "business" functions; and *iii*) extension of a firm's intranet to select business partners ("extranets"). While all three are important aspects of business-to-business electronic commerce, estimating their impact on sales or economic growth is difficult. Furthermore, their greatest effect is often on transaction costs, firm organisation, employment, and product quality. Such impacts are only indirectly associated with economic growth and are analysed in later chapters of this book. Nevertheless, such networks may be large: Hitachi's extranet includes over 2 100 companies (Morishita, 1997), and Ford's intranet connects 120 000 workstations (Cronin, 1998). These are expected to have a ripple effect as firms or units now linked to these networks create their own extranet or intranet.

Not surprisingly, some of the largest business-to-business e-commerce players are firms involved in supplying the infrastructure for the Internet. Cisco, the dominant supplier of network routers, with over two-thirds of the market, reports that it will generate over \$2 billion in revenue from its Web site this year (from orders to the Web site – payment is off-line) (Kerstetter, 1997). Dell, which makes PCs, uses electronic commerce to sell \$3-\$5 million worth of products daily and had over \$1 billion in overall sales in 1997 (Oeler, 1998). Most of these transactions are business-to-business, although some fraction of PC sales are to households. Like hardware, much software is sold to businesses over the network, and as with PCs, a small portion of sales go to consumers. The Japanese Ministry of Posts and Telecommunications (1998) reports that about one-third of all purchases of goods and services on the Internet in Japan are for software. Similarly, e-commerce products thought to be primarily consumer items, such as books and travel, are now being aggressively promoted to businesses (Frook, 1998a).

Drivers and inhibitors of business-to-business electronic commerce

In business-to-business e-commerce, three factors are likely to lead to quick adoption of e-commerce: *i*) a reduction in transaction costs and improvement of product quality/customer service; *ii*) a defensive reaction to competitors engaging in e-commerce; and *iii*) insistence by large businesses that all of their suppliers link into their e-commerce system as a condition of doing business.⁷ The first factor, reduced transaction costs, drives the second and third and will be explored in greater detail in the next chapter. However, electronic commerce clearly reduces these costs and thus drives its adoption.

It is expected that by 2001-02, many barriers, such as questions of security and reliability which now limit the extension of Internet EDI to unknown firms, will have been overcome. As a result, there will be a significant increase in business-to-business e-commerce as it draws in smaller second- and third-tier suppliers. For example, the US Automotive Network eXchange (ANX), developed by the Automotive Industry Action Group (AIAG), makes use of the Transport Control Protocol/Internet Protocol (TCP/IP) to link automotive suppliers to each other and to original equipment manufacturers (OEM) (*e.g.* GM, Ford and Chrysler). Dispensing with the multiple networks and protocols that now link first-tier suppliers to OEMs, the new system will provide a single common system that can be extended to include all suppliers.

Now in testing and pilot projects, it is expected to be operational by 2000.⁸ Standard and Poor's and US Department of Commerce (1998) estimate that if a fifth of all US auto parts are sold by business-to-business electronic commerce in 2000, this will represent over \$30 billion more than the total reported in Table 1.2. Likewise, many large firms are now experimenting with e-commerce. Once their system is operational, the level of activity should increase rapidly. For example, GE's use of the Internet for procurement currently stands at \$1 billion, but GE has announced its intention to move \$5 billion worth of procurement to this system in two years' time (Margherio *et al.*, 1998). As firms expand their experimentation with business-to-business e-commerce, the growth rate and resultant economic impact are likely to be large.

The largest impact of business-to-business e-commerce is likely to be on small and medium-sized enterprises (SMEs), because many large businesses already have EDI systems in place. The accessibility of the Internet makes electronic commerce a realistic possibility for SMEs and is likely to lead to its widespread diffusion. A recent survey conducted by International Data Corporation (IDC) found that the share of small firms (less than 100 employees) in the United States using the Internet had more than doubled between 1996 and 1998, from 19.7 per cent to over 40 per cent (Ohlson, 1998).

In addition to migrating existing activity to e-commerce, new business-to-business products are being created which did not, or could not, exist before electronic commerce over the Internet made them economically viable. For example, spot markets that match buyers and sellers for a wide variety of goods ranging from electronic components to agricultural commodities to transportation futures have sprung up; they represent only the beginning of what is expected to be a wide number of new business-to-business opportunities. Another example is the extension of EDI-type links via the Internet.

Parcel delivery, logistics and order fulfilment services, frequently by the same firm, are also experiencing growth as e-commerce increases. As businesses move to "build-to-order" processing and just-in-time inventories, a premium is placed on timely, accurate inbound and outbound logistics. In addition, there is greater demand by final consumers for fast order fulfilment and the ability to track an order as it is being processed and delivered. Given the complexity of these tasks, it is not surprising that a quarter of Web sellers are reported to outsource order fulfilment (Ernst & Young, 1998), letting firms like United Parcel Service, Federal Express, DHL, and Lufthansa provide not only shipping but also warehousing, packaging, customer support and, in some cases, new intermediary functions such as collection of taxes (KPMG, 1997). As e-commerce grows and as parcel volume increases, especially to small businesses, this intermediary business should experience significant growth. Federal Express estimates that 68 per cent of the 3 million packages it processes daily are now initiated through interactive networks. Federal Express started out using a software that linked firms to it via proprietary networks in 1983 and accumulated 50 000 clients over the next 12 years; between 1995 and 1998, as it moved to the Internet and as electronic commerce over the Internet began, the number of clients jumped to nearly a million.⁹

Business-to-consumer electronic commerce

The nature and scope of business-to-consumer electronic commerce

Although business-to-business electronic commerce represents the bulk of all electronic commerce, most attention and speculation about e-commerce has focused on the business-to-consumer segment. With household transactions typically accounting for over half of all domestic final demand,¹⁰ this is not surprising. Moreover, as business PCs and networks are saturated, it is natural for the focus of attention to turn to the household.

The popular press has largely focused on e-commerce merchants that sell tangible products (*e.g.* books, wine, flowers, computers). However, with the possible exception of computers, the largest segments involve intangibles (*e.g.* entertainment, software) (Table 1.9). This confirms the experience of France Telecom's Minitel service, which has engaged in electronic commerce over a closed network for well over a decade and where the main beneficiaries have been intangibles (OECD, 1998a). This makes intuitive sense: when the product cannot be physically examined, traditional commerce has no advantage over the convenience of electronic commerce.

Table 1.9. **Top 10 retail shopping sites based on usage, February 1997**

Shopping site	Product
1. shareware.com	software
2. download.com	software
3. columbiahouse.com	music/video
4. Amazon.com	books
5. hotfiles.com	software
6. surplusdirect.com	computer hardware and software
7. freeride.com	coupon site
8. jumbo.com	software
9. gw2k.com	computers
10. bluemountainarts.com	greeting cards

Source: PC Meter data as reported by Meeker, 1997.

Intangible products

The largest segment of business-to-consumer e-commerce involves intangible products that can be delivered directly to the consumer's computer over the network. It is composed of five broad categories: entertainment, travel, newspapers/magazines, financial services, and e-mail.

Entertainment, which includes adult entertainment, online games, music and video, is the largest category of products sold to consumers. Forrester Research estimates that adult entertainment alone accounted for 10 per cent of all 1996 business-to-consumer e-commerce (\$50 million) and would triple to \$137 million in 1997, just behind computer products and travel.¹¹ Table 3.2 suggests that this figure is conservative, since five sites report revenues of roughly one-third of that total in 1995-97. Firms that track visits to Web pages and analyse the keywords typed into search engines confirm the popularity of adult material. One respected source of information on Web use reports that while adult sites account for 2 to 3 per cent of the 200 000 commercial Web sites, they account for 10 to 20 per cent of all searches by search engines.¹²

"Pay-for-play" online games and online distribution of music each generated revenues of roughly \$50 million in 1996-97 (<http://www.forrester.com>, 12 April 1997). The interactivity of the Internet means that online game players, in some cases dozens of people, play against each other rather than against the computer as is the case for most current computer games. Many CD-ROM games now incorporate an online component. A limiting factor is the high-bandwidth requirement of some games that use realistic, moving graphics. While rapid growth is forecast for the music industry as well, current achievements have been more modest. Forrester Research predicts that online sales of CDs account for less than 1 per cent of all pre-recorded music sales (Lipton, 1997). Digital download represents a very small part of this segment and is mainly limited to unknown artists or those with a very small following. Jupiter Communications predicts that online downloads will represent only 2 per cent of music sales in 2002 (Lipton, 1998).

Online gambling is an entertainment area with large, but poorly understood, activity. Most of this activity is on sites located in off-shore havens such as Grenada, home of Sports International. According to one estimate, over \$30 billion worth of gambling is conducted on line (Schwartz, 1995). If so, gambling would be the largest single electronic commerce activity. While this estimate seems high, one Internet gambling firm, Interactive Gambling and Communications Corp., had 1996 revenues of \$58 million (Brunker, 1997).

Travel services, particularly airline reservations, are another major category of business-to-consumer e-commerce. A recent European Commission policy paper on electronic commerce credits travel services with over half of all electronic commerce (European Commission, 1997b). Jupiter estimates at \$276 million in 1996 online revenues for travel (air, hotel, car rental, cruises, vacation packages, as well as advertising on travel-oriented sites).¹³ Press accounts of individual firms such as Microsoft's Expedia and American

Airlines Travelocity suggest that this estimate may be conservative, as these firms are generating annual sales of roughly \$100 million each (Table 1.2) (Anderson, 1997; Faiola and Ginsberg, 1998).

More than 2 700 US newspapers post an edition on line, and 60 per cent of them have a daily print circulation of less than 30 000 (Schavey, 1998). Estimated revenue for this segment is around \$20 million, an indication that relatively few newspapers and magazines have begun to charge readers. Many of the early, high-profile entrants have had to significantly modify their strategies because readers balk at paying.¹⁴

Financial services are an important business-to-consumer category. Because many firms engaged in online activity also provide traditional financial services, revenue estimates are difficult to obtain, but one stock brokerage, E*Trade, reported \$148 million in revenues in 1996 from 50 000 active accounts and \$2.8 billion in assets.¹⁵ Another, Charles Schwab & Co., performs nearly two-fifths of all of its trades on line, has tripled the number of online accounts to 1.3 million in the last two years, and has doubled assets to \$92 billion in one year (1997-98) (Girishankar, 1998*b*). By one estimate, online trading of stocks accounted for 17 per cent of all retail stock activity in 1997, double the 1996 share (Newsedge, 1998).

Banking is also enjoying significant e-commerce activity. A recent Ernst & Young survey of 130 financial services companies in 17 countries found that 13 per cent of the firms were using the Internet for transactions with customers in 1997 and that 60 per cent intended to do so by 1999 (Corrigan and Authers, 1997). Nearly a quarter of the 100 top US banks offer online access to accounts. Europe appears to be significantly ahead of the United States in this area; for example, nearly every major German bank is reportedly already on line and Finland has established an extensive network banking system (Strassel, 1997*a*).

Insurance, on the other hand, has taken advantage of the Internet more slowly. However, with the arrival of new entrants such as Quicken (a major US supplier of personal finance software) in this market segment, prospects for growth appear strong. Quicken's sales from its InsureMarket site doubled in 1997, and new product launches in the auto and home insurance segments are planned (Marable, 1997).

While e-mail receives less attention than many of the new e-commerce services appearing on the Internet, it is arguably one of the "killer apps" (an application which users find so useful that it is the reason for going on line and subsequently using other services). Nearly two-thirds of all US businesses with a computer have e-mail (IDC, 1997*a*). About 15 per cent of the US population has access to e-mail,¹⁶ and as users become more accustomed to the Internet, use of e-mail increases on average to about 25 messages a day (ActivMedia, 1998). As a share of all messages (e-mail plus mail), e-mail has moved from less than a fifth in 1988 to almost half in 1994 (Meeker, 1997).

While e-mail is frequently a "free" service that comes bundled with Internet access, variations are becoming important electronic commerce services. Bill paying is one of the most important, as it represents roughly half of the US Post Office's letter volume (Childs, 1998) and 40 per cent of all cheques written in the United States. E-commerce bill presentation and payment are growing quickly, largely because nearly 70 per cent of all bills are generated by 200 entities (utilities, credit card issuers, insurance companies, etc.) (Authers, 1998). This concentrated market, combined with significant savings in postage, paper and labour, has attracted a large number of participants.¹⁷ It is estimated that 7 per cent of US bills were paid electronically in 1995 (Institute for the Future, 1996).

Tangible products

To date, the main tangible products sold electronically have been electronics (including computers), books, clothing and food/drink. Each currently generates \$100-\$200 million worth of business-to-consumer sales (Tables 3.2 and 3.7). Many of these categories are dominated by traditional retailers that have established electronic commerce operations (*e.g.* Dell in the United States, La Redoute in France, Marks & Spencer in the United Kingdom, and supermarkets in the Netherlands). Behind these broader categories are speciality-item merchants (books, flowers, and music CDs) that add value by providing a wider selection, more information about a product, or convenience. As Wal-Mart's decision to make 80 000 items available on line shows, however, a wide variety of products can be sold over the Internet (<http://www.ft.com/hippocampus/4cfce.htm>, 2 April 1997). Even some of the most tangible of all house-

hold items (groceries, houses, cars) are now sold electronically. Chrysler estimates that 1-2 per cent of all of its sales were done via online services in 1996,¹⁸ and JD Power, a marketing firm specialising in the auto industry, estimates that 16 per cent of people buying a new car or truck in 1997 used the Internet as part of the purchasing process (Margherio *et al.*, 1998).

Recent and near-term growth rates

To comprehend how business-to-consumer electronic commerce may look over the near term, it is useful to look first at growth over the past few years. While it is easy to have fast growth rates from a small base, many start-ups have rapidly become important competitors in their industry. This suggests that e-commerce is more than a novelty item for select market niches.

- Amazon.com is now the fifth largest US bookseller, and book sales by electronic commerce now represent 20 per cent of all book sales in the United States.¹⁹ Over six quarters, to mid-1997, the number of books sold grew by 3 066 per cent (Morgan Stanley Dean Witter, 1997).
- Ticketmaster reports that its online sales of tickets to events such as concerts or sporting events have increased to \$19.8 million per quarter, up by 270 per cent from the first quarter of 1997 to the first quarter of 1998, and now account for 3 per cent of all its domestic ticket sales, up from 1 per cent in 1997.²⁰
- Online retail trading of stocks accounts for 17 per cent of all US retail stock trading activity in 1997, double the 1996 share (Newsedge, 1998); 41 per cent of all stock trades made by Charles Schwab, the largest US discount broker, were conducted on line in the first quarter of 1998, up from a third in 1997 (Kehoe, 1998).
- E*Trade increased the number of its active accounts by 243 per cent over the same period (Morgan Stanley Dean Witter, 1997).
- Auto-By-Tel's share of references resulting in a car sale, as a share of the total number of US domestic units sold, has increased from 0.33 per cent in the first quarter of 1996 to 1.88 per cent in the first quarter of 1997 (Meeker, 1997). Its revenue grew by 418 per cent over six quarters to mid-1997 (Morgan Stanley Dean Witter, 1997).
- In 1996, independent travel agents handled 80 per cent of US airline reservations; by 1998, their share had fallen to 52 per cent, with airlines dealing directly with customers via the Web or telephone (Kehoe, 1998). The American Society of Travel Agents estimates that 1 per cent of all US airline tickets were sold on line in 1997 (Margolis, 1998).
- In terms of merchandise sold on line, AOL has seen growth of 90 per cent from the beginning of 1996 to mid-1997. Subscribers' visits to the AOL Marketplace rose from an average of two in the first quarter of 1996 to 11 in the first quarter of 1997 (Morgan Stanley Dean Witter, 1997).

Table 1.1 gives a number of near-term (2000-02) estimates of the size of electronic commerce. The estimates vary widely, from a low of \$10 billion to a high of \$1.5 trillion, with a median of \$154.5 billion. Compared to the median derived from the 1995-97 estimates, the annual average growth rate is approximately 200 per cent.

As illustrated above, the business-to-consumer segment of electronic commerce is very sector-specific. Box 1.4 presents some figures on the possible impact on selected sectors in the near term. The estimates represent a deepening of activity across the fairly narrow group of sectors that are currently aggressive users of electronic commerce. By 2001-02, larger sectors – banking, insurance, bill paying/postal services – which are currently testing or developing e-commerce products will become more actively involved. Many of these services now use proprietary software or networks to provide services to a select group of customers. Over the next few years, these services will migrate to the Internet and will probably use a standard browser as the interface for their service. Coupled with more ubiquitous access devices, such as set-top boxes for TVs, it will be possible to offer the service to a much wider range of users and to begin to diffuse electronic commerce widely.

Box 1.4. **Predictions of near-term growth in selected e-commerce sectors**

In the expectation that 50 million people will soon pay an annual fee of \$240 (\$20/month) for Internet access, Internet access providers will generate \$12 billion in revenues (Lesk, 1997).

E-commerce-specific software such as "turnkey" packages which allow merchants to set up a storefront on line should experience strong growth. Forrester Research estimates that this segment earned revenues of about \$121 million in 1996 and should reach \$3.8 billion by 2000.²¹

Forrester Research predicts that 50 per cent of all software distributed by Microsoft, Netscape, Oracle will be done over the Internet by 1999 (Erwin *et al.*, 1997).

Both JD Power, a marketing firm specialising in the automotive industry, and KPMG, an accounting/consultancy firm, estimate that by 2000, 20 per cent of new and used cars will be bought using the Internet (Griffiths, 1998). Chrysler predicts that by 2000 a quarter of its sales will take place on line (Anderson, 1997).

Jupiter Communications predicts that by 2002, 7.5 per cent of all music will be sold on line.²²

Forrester Research expects 8 per cent of all travel tickets and 15 per cent of business travel (Forrester Research, 1997) to be sold over the Internet in 2001 and amount to \$10 billion.

Piper Jaffrey estimates that by 2001 online trading of stocks will account for 60 per cent of discount commissions and 10 per cent of all retail stock brokerage commissions.

A Booz-Allen & Hamilton survey of European banks found that 154 had Internet sites, with sites increasing at a rate of 90 per cent per year. Over half had introduced or had plans to introduce online banking (*Financial Times*, 12 August 1996, p.1).

Electronic bill paying is estimated to increase to 18 per cent by 2000 (Institute for the Future, 1996).

Drivers/inhibitors for business-to-consumer electronic commerce

Factors influencing growth in business-to-consumer electronic commerce differ significantly from those that affect business-to-business electronic commerce. They are more likely to limit its growth and to hold it to 10-20 per cent of the overall total in the near term. While competition may force businesses to engage in business-to-business e-commerce, the business-to-consumer segment faces barriers such as concerns about security of payment, potentially fraudulent merchants, privacy of personal data, and difficulty and expense in accessing e-commerce merchants. In addition to these legal and psychological barriers, three economic factors will have a large impact on the growth of business-to-consumer electronic commerce: *ease and cost of access*, *convenience*, and the *appeal of mass customisation*.

Many observers feel that the cost and complexity of the PC, which is currently the primary access device, is a key factor shaping the demographics of the e-commerce consumer (IDC, 1997b). In addition, there is the cost of getting on line and finding the site with the products of interest. Even when the site is located, navigating it can be a challenge even to the experienced user. It may be that only when there is a very simple – what John Landry of Lotus calls a "brain-dead easy" – access device, something like a TV with very simple controls, will business-to-consumer e-commerce reach massive scale. While such devices are available now and are being refined (*e.g.* WebTV), it remains to be seen whether or not a broad spectrum of households will quickly adopt e-commerce. Even then, the economic impact may not be large, as the current demographic profile of e-commerce shoppers – high disposable income, young, well-educated – is what most retailers target and the profile attributed with generating most sales.²³ Nonetheless, a simplified access device should stimulate e-commerce shopping. The finding that the longer shoppers use the Internet, the more likely they are to buy on line and the less likely they are to shop in traditional stores supports this view (ActivMedia, 1998). The volume of commercial activity on France's Minitel, for example, did not peak for nearly a decade after it was first introduced (OECD, 1998a).

Once consumers have access, the main drivers of business-to-consumer electronic commerce appear to be convenience, choice, personalisation, amusement, and savings. Of these, the near-term importance of convenience is frequently singled out.²⁴ Given the current demographic profile and lifestyle of e-commerce shoppers, it is not surprising that they value services that offer convenience. Surveys

indicating that such shoppers tend to shop at atypical hours bear this out: America Online reports that about 40 per cent of electronic shopping takes place between 22:00 and 10:00 (Margherio *et al.*, 1998), when most stores are closed. Likewise, Lands' End, the large US mail order clothing firm, reports a lunch-time spike in their online sales during the working week.²⁵ REI, a sporting goods and outdoors retailer, gets 35 per cent of its online orders between 22:00 and 7:00 ("Cyberspace Winners: How They Did It", *Business Week*, 22 June 1998). To some degree, the emphasis on convenience is due to long working hours, especially in the United States²⁶ and Japan, and limited opening hours for traditional retail establishments, especially in Europe. As long as this is the case, business-to-consumer e-commerce is likely to grow.

After convenience, a characteristic frequently cited as a spur to business-to-consumer e-commerce is the possibility of forming a one-to-one relationship between merchant and consumer which allows products to be customised. Current examples include the PC configuration, custom stock portfolios, personalised greeting cards, made-to-measure jeans, and custom-made CD compilations. Many e-merchants that do not offer customised products provide a huge variety of products with niches so small that they begin to approach custom-made products: bookstores offering millions of titles, general merchandise sites offering 90 per cent of all household needs, and car sites with links to every major manufacturer. This increased choice is a feature that consumers value, especially for locating speciality or hard-to-find items. Likewise, well-designed sites guide the user, remember consumer preferences, and in some cases reconfigure themselves to reflect past behaviour.

At the same time, the premium placed on convenience can work against strategies that emphasize choice as making decisions takes time. While e-commerce sites are helpful for finding the proverbial "needle in the haystack", too much choice can confuse and irritate customers. Ravi Dhar of Yale University found that as choice increased so did the possibility that consumers would not buy anything. John Gourville of the Harvard Business School suggests that if consumers are asked to make too many trade-offs they become anxious.²⁷ This research suggests, first, that choices must be real and not frivolous "versioning" (*e.g.* 35 versions of one brand of toothpaste); and, second, that selection must be easy (*e.g.* use of agents/pre-set preferences). The degree to which business-to-consumer e-merchants recognise this may have a significant impact on the near-term growth of electronic commerce.

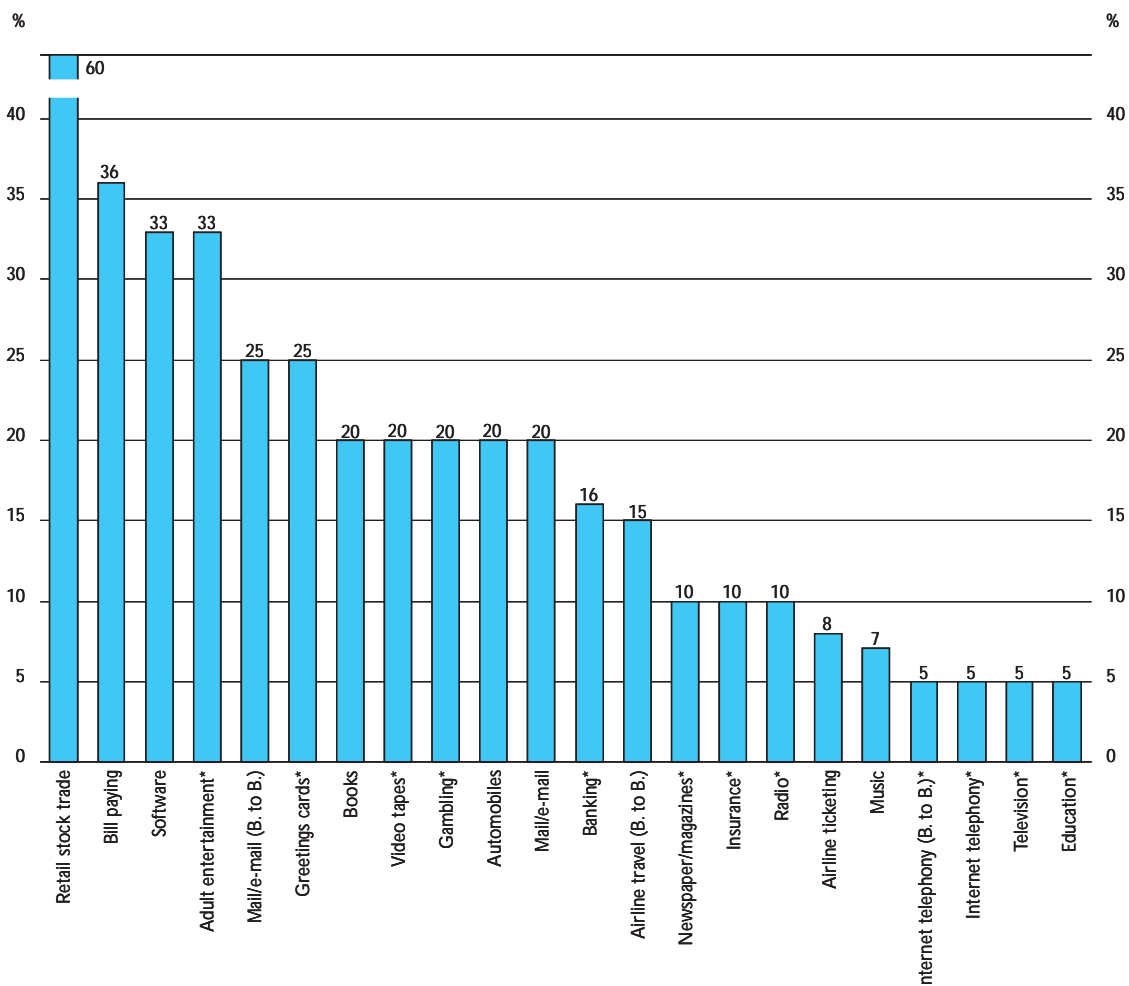
The future (beyond 2002)

While many factors are likely to affect the future of e-commerce, including general economic conditions, the European monetary union, the millennium bug, and unforeseen technological advances, two of the dominant forces are certain to be the ageing of the "Nintendo" generation – those who grew up with video games and are comfortable with information technology – and the widespread diffusion of business-to-business electronic commerce in the near term. By engaging in business-to-business electronic commerce, firms open up and transform many of their operations (see Chapter 3 on industrial organisation), thereby positioning themselves so that the transition to direct sales to consumers should be natural and relatively easy. It is therefore likely that electronic commerce will be stimulated by both the demand and supply sides.

Figure 1.3 shows sectors identified in this chapter that may be affected by electronic commerce as it develops over time. Many of the sectors affected by business-to-business electronic commerce lack penetration estimates because in many cases the displacement effect is internal.

To judge the potential economic impact of business-to-consumer electronic commerce, the question is whether near-term growth will represent a "skimming of the cream" or whether it will represent the "tip of the iceberg", that is, whether a tipping point will be reached and electronic commerce will become a major mode of conducting business in the OECD area. History is littered with instances where the potential impact of new technologies was not foreseen (*e.g.* the mainframe computer, the photocopier) as well instances where the impact of a technology was vastly overestimated (*e.g.* the "paperless office", telephone/mail order shopping). The impact of electronic commerce – whether large or small – will probably only be apparent at least five years from now and more likely 15 to 25 years from now (Myhrvold, 1997). It is likely to be first felt in the business-to-business segment, where growth and diffusion are expected to be significant while the growth of the business-to-consumer segment is likely to be more modest and sector-specific.

Figure 1.3. **Impact of e-commerce on a product basis, 2000-05**
Estimates of online shares in percentages



* OECD estimate.

Source: OECD, compiled from various sources.

On the basis of current experience and judging from the various e-commerce successes and failures to date, sectors likely to be significantly affected by electronic commerce in the future are those whose products have a high price-to-bulk ratio such as music CDs, commodities such as routine business flights, and intangibles such as software that can be delivered electronically. Products unlikely to be significantly affected include those with high tactile characteristics such as fur coats or high fashion clothing and expensive items such as furniture. But even these may be amenable to electronic commerce if trusted third parties provide accreditation or warranty as is now done for wine and used cars.

The future growth of electronic commerce is likely to follow “the reverse product cycle” of innovation in services: in the initial phase, incremental process innovations increase efficiency; in the second, more radical process innovations lead to substantial improvements in quality; and in the third, “... product rather than process innovations become dominant,... new industries emerge and the overall impact on output and employment is expansionary” (Barras, 1986). While all three phases will operate in the three time periods analysed here, the most significant new products can be expected to emerge in the more distant future.

The future of existing products

While the new modes of conducting business offered by electronic commerce will generate growth, products and methods that e-commerce renders obsolete will be displaced. Initially, electronic commerce may generate efficiency gains as new methods replace previous ones. In the process, businesses will fail and jobs will be lost. This is the natural evolution of economies, and there are many historical precedents to show that the economic efficiency that emanates from this “creative destruction” is beneficial to the economy and ultimately generates more growth and jobs (OECD, 1998b). Nevertheless, when assessing the growth prospects of electronic commerce, it is important to realise that some sectors may experience negative growth.

Aside from sectors already identified as likely participants in electronic commerce, the more distant future (beyond 2002) is likely to see other industries, whose primary function is the transmission of information, using e-commerce to provide that service. They include not only the so-called carriers or broadcasters, such as the communication, radio and TV industries, but also those whose main activity is to transmit information and knowledge, such as teachers, health practitioners, and many government services. This migration depends on the availability of sufficient bandwidth, since the information intensity of many of these activities (*e.g.* the need to transmit moving pictures) requires significantly more capacity than is typically available today. Achieving this added capacity is a function of continued technological development and diffusion and regulatory reform that supports competition and innovation.

The focus on products in this section is by and large restricted to the business-to-consumer segment. While business-to-business e-commerce is, and will probably continue to be, the dominant segment, it is more likely to change production *processes* rather than to generate new *products*. Likewise, the impact on the generic wholesale and retail sector will only be briefly touched on, as the bulk of e-commerce’s impact on these sectors is associated with “disintermediation”, whereby producers sell directly to consumers without the aid of intermediaries or where new electronic intermediaries compete directly with their “bricks-and-mortar” equivalent (*e.g.* online versus off-line bookstores). As in the case of business-to-business e-commerce, the bypassing of traditional distribution channels is mainly a change in process and is viewed as a change in the cost structure of doing business. These issues are analysed in some depth in Chapter 2.

Telephony, fax, video conferencing and the Internet

The Internet provides a standard technology for a wide variety of communications that previously used different systems (fixed-line, circuit telephone service, fax transmission and broadcasting). Internet bandwidth limitations cause the quality of some of these services to drop and make the service less reliable than current norms. Therefore, some observers estimate that the immediate impact will be larger on communication services that are not time-dependent (fax, voice mail, and pagers) and that only about 5 per cent of the voice market will shift to Internet in the near future, owing to sensitivity to losses in quality.²⁸ While this is a concern, some applications and consumers may be willing to trade off quality for a reduction of 50-90 per cent in the price of conventional telephone service (Atkins, 1997). Currently, it is estimated that networks adhering to the Internet protocol handle about 31 million minutes of traffic a year, a small fraction of the 530 billion minutes handled by public switched telephone networks (PSTN) in 1997 (Moozakis, 1998). With large carriers such as Deutsche Telekom engaging in pilot projects in the use of IP telephony and AT&T announcing that it intends to move its entire network infrastructure to an Internet protocol platform (Kujuba, 1998), this is likely to change in the future (OECD, 1997b). Analysys, a telecommunications strategy consultant, predicts that Internet telephony traffic will overtake traffic carried by the fixed network by 2000 (Reuters, 1998).

In addition, the use of telephony and fax services may change as electronic commerce is adopted. A factor that may temper this displacement is continuing consumers distrust of the Internet as a vehicle for payment, with the result that they continue to rely on the phone and fax to transmit the relevant information. Likewise, with the development of Internet telephony, most e-commerce sites in the near future will have a telephone link to a customer service representative who could maintain the role of the telephone in the sales process. Despite these mitigating factors, Forrester Research predicts that as a channel for

selling, phone and fax will drop from 51 per cent in 1997 to 32 per cent in 2000 and that Internet commerce will increase from 15 per cent to 42 per cent (Erwin *et al.*, 1997). This will not have a demonstrable impact on the telephone system *per se*, but it could affect the size and number of call centres as fewer operators are needed as processing transactions becomes more efficient.

Entertainment

As TV and radio are “webcast”, electronic commerce over the Internet may offer a new mode for the delivery of entertainment services. In addition, new products, such as multimedia content, which compete with TV and radio and other leisure activities, such as gambling, video rental and video game playing, are likely to be affected. WebCensus, a survey conducted by Hambrecht & Quist and LinkExchange, examined the time household Web users spent daily on various media. When asked what they sacrificed for the Web, 22 per cent watched less TV, 12 per cent read less print media, and 3 per cent listened to less radio (Hu, 1998). During peak evening viewing periods, the number of Americans logged onto America Online now regularly surpasses the number watching CNN or MTV (Jackson, 1997a). However, it is unlikely that the Internet will broadly displace TV or radio, although it may take over some key demographic slices of the population, thereby reducing the value of TV advertising time. It is more likely that TV and the Internet will begin to interact and encourage viewers to “click here” for more information about a programme or product. More generally, people have a limited amount of leisure time, and new activities will necessarily come at the expense of old (European Commission, 1997c).

Broadly, webcasting is the transmission of audio or video over the Internet (OECD, 1997c). Although it is in its infancy, 400 radio stations are already on the Internet (*e.g.* <http://www.timecast.com>). They range from large stations, such as ABC and CBS in the United States and CBC in Canada, to small live music stations in Brazil (<http://www.convex.com.br/clube>). Several TV stations are testing use of the Internet, and streaming video is already a common feature of many Web sites. Despite its relatively poor quality, video transmission over the Internet is used for conference calls, security, and surveillance. Even if quality never reaches the level of current TV broadcasts, this market is expected to become a significant segment of electronic commerce in the future with the sale of low-quality/low-cost applications for monitoring production processes, watching children, and security surveillance (ActivMedia, 1998).

Multimedia is a digitised interactive application involving more than one medium (video, text, graphics, sound). Its major uses range from entertainment to education (these are often combined to form “edutainment”) to conveying information, to corporate applications. Corporate applications are the largest segment today, and are largely used to encourage online sales. Multimedia content facilitates electronic commerce whenever customer interaction is required, such as filling out forms. As a result, it aids in the collection of information and the development of detailed customer databases that include purchasing patterns, interests and preferences, and demographic information, enabling the mass customisation of products and services. At present, the growth potential of multimedia and its various applications is mainly limited by current bandwidth constraints.

Education

Although distance learning has existed for some time, the Internet makes possible a dramatic expansion in coverage and better delivery of instruction. Text can be combined with audio/video, and students can interact in real time via e-mail and discussion groups. Students in Korea can now attend US universities over the Internet and pay tuition fees by credit card (Chandersekaran, 1998). Such technical improvements coincide with a general demand for retraining and upskilling by those who, due to work and family demands, cannot attend traditional courses.

Distance learning via the Internet is likely to complement existing schools for children and university students, but it could have more of a substitution effect for vocational training and continuing education programmes. For some degree programmes, high-prestige institutions could use their reputation to attract students who would otherwise attend a local facility. Fears that information technologies may adversely affect education date back to the radio and surfaced again with the advent of television and video cassette recorders. Such fears were groundless, and the same is likely to be true for the Internet,

especially since the Internet overcomes many of the deficiencies associated with the previous technologies. Instead, owing to the Internet's ease of access and convenience for distance learning, overall demand will probably expand, leading to growth in this segment of e-commerce but little displacement of existing programmes (Selingo, 1998). Nevertheless, competition should increase as geographical constraints subside. Once the domain of somewhat unconventional educational institutions, distance learning is now offered by a wide number of prestigious institutions.²⁹

Health services

Provision of health services has two facets that are amenable to electronic commerce. One is use of the Internet to streamline the capturing, storing and processing of information such as patients' records, physicians' notes, test results, and insurance claims information. It is estimated that these processes account for about one-third of health-care costs in the United States and Denmark (Evans and Wurster, 1997; OECD, 1997c). The use of a standard electronic system would reduce these costs as well as errors (e.g. due to side-effects of drugs, wrongly prescribed drugs) and insurance fraud. The second use is for telemedicine. This can consist of at least three different services: teleradiology (transmission and diagnosis of X-rays, ultrasound images, or magnetic resonance images), telepathology (real-time transmission and diagnosis of information to a pathology lab during an operation), and virtual reality (the use of computer simulation techniques to train and instruct) (BIAC, 1997). While it is unlikely that surgery will be performed at a distance or that computer diagnosis will replace human diagnosis, a number of trials have shown that a wide variety of simple procedures, monitoring, and preventive medicine can be conducted by telemedicine.

The increased demand for health services as OECD populations age, budgetary pressures to contain health costs, and regulatory reform all should help to promote future e-commerce activity in health services. Militating against this trend will be policy concerns regarding privacy of patients' personal data and national licensing and health practice regulations that restrict the provision of certain services across borders.

Other professional services

Professionals whose occupations largely involve the exchange of ideas or advice (architects, engineers, accountants, lawyers, consultants) may gravitate to electronic commerce, especially to acquire and serve clients (Chittum, 1998). While clients are unlikely to engage such services without direct personal contact, e-commerce is likely to expand the market for them and increase the level of client interaction (e.g. review of draft legal agreements).

Publishing

Many magazines and newspapers have gone on line, and a few charge a subscription fee for access. To date, the success of this activity has been limited to a few niche areas; this limits the displacement that can be expected in the near future. This is especially true for magazines, which typically rely on subscriptions for 40-60 per cent of their revenue and which have found it difficult to gain online subscribers, as many users have become accustomed to receiving online content free of charge (Margherio *et al.*, 1998). Exceptions may include adult magazines, as the decline in circulation of some magazines is attributed to the Web, as well as scientific and academic journals and reference publications (e.g. legal opinions) (Hays, 1997).

Newspapers are far more dependent on advertisements, an e-commerce business model which has had some success.³⁰ In particular, the profitability of traditional newspapers could be threatened by the migration of classified ads – a source of about 37 per cent of revenues – to the Internet, where the possibility of making exact searches and fast comparisons gives e-commerce an advantage over the traditional paper (Margherio *et al.*, 1998). In addition, many e-commerce sites have adopted a business model whereby they provide a classified ad service without charge, try to generate significant traffic, and simply charge for advertising at that site (Evans and Wurster, 1997). If the model succeeds, it could undercut traditional newspapers. A 1996 Newspaper Association of America study concluded that newspapers could

lose up to 50 per cent of classified ad revenues by 2001 if the trend continues, and “if that happens the average newspaper’s operating margin will fall from 14 per cent to 3 per cent” (Margherio *et al.*, 1998). In that case, it is likely that many will go out of business.

Two other developments could pose threats to traditional newspapers. The first is the development of city-specific online guides. These could draw off a large portion of local advertising as well as classified ads. Such products would mainly affect local newspapers, entertainment guides (*e.g.* Pariscope), and local TV. The second is the ability to build one’s own tailored online paper, which could challenge the “one size fits all” model of current newspapers. In general, newspaper readership is declining as a result of competitors (*e.g.* TV) and the changing behaviour of new generations. The advent of e-commerce is only likely to accelerate an existing trend. Nonetheless, many newspapers are adapting and using their established reputation and network of journalists to compete in the new environment (see, for example, <http://www.nytoday.com>).

Books, on the other hand, are enjoying a renaissance, possibly because of e-commerce bookstores and innovations in traditional bookstores. While publishers of popular books are unlikely to be adversely affected by e-commerce, publishers of reference material may be, because the ease of updating and searching online databases makes printed versions non-competitive. The demise of the *Encyclopaedia Britannica* as encyclopaedias on CD were bundled with the purchase of a PC in the United States shows how electronic commerce might more broadly affect paper reference publications (Evans and Wurster, 1997).

Finally, it is very probable that electronic commerce will lead to a decline in other printed products such as catalogues, telephone books, photocopies, etc.

Financial services

Financial services, including banking, stock trading, insurance, and provision of financial information, are likely to be significantly affected by e-commerce. As for other products, the displacement of existing activities will be offset by overall increases in the market for these services as prices decline and people make more frequent use of them. For example, there is more frequent stock trading now that commissions are low. Finnish banking, a leader in the use of electronic payment systems, offers a rough indication of what may happen to financial services in the OECD area. In moving banking out of branches and onto networks, Finland has seen a sharp 54 per cent annual growth in productivity (measured by transactions per employee, 1984-96) and a 3.5 per cent annual decline in employment, resulting in a cut of more than a third of the jobs between 1984 and 1996. James Culberson, President of the American Bankers Association, predicts a similar trend in the United States in the near future, with half of all transactions conducted electronically and one-third of all branches closing (Margherio *et al.*, 1998).

Letter delivery

E-mail is a very popular Internet application, and nearly 60 per cent of US households with online connections (about 20 per cent of households) (Margolis, 1998) and 85 per cent of US businesses (about 50 per cent of all businesses) (IDC, 1997c) use it daily. While much of this mail consists of small, spontaneous messages that complement existing letter mail, some substitution is inevitably occurring as well. The Universal Postal Union (UPU) estimates that because of e-mail, the share of physical mail in the overall communication market (mail, fax, phone, e-mail) in Western Europe and North America should drop from about 28 per cent in 1995 to less than 20 per cent as e-mail doubles from 12 per cent to 24 per cent (UPU, 1997). The biggest impact is expected in business-to-business mail, where e-mail is expected to displace about 12 per cent of the flow by 2005; in the business-to-consumer segment, e-mail is expected to displace 4-5 per cent. Compared to other sources, these estimates appear to be very conservative: US Postmaster General Marvin estimates that over the last five years business-to business first-class mail dropped by over a third because of e-mail.³¹ Moreover, the rapid migration of bill paying to electronic commerce (over a third by 2005) (Institute for the Future, 1996) could seriously impact letter delivery, as bills represent a third of the US Postal Service’s revenues and half of its volume (Childs, 1998). Morgan Stanley estimates that, by 1994, 44 per cent of “messages” were transmitted by e-mail, up from 29 per cent in 1991 (Meeker, 1997).

Although post offices are now responding by offering their own e-mail-based services (Strassel, 1997b), the probable overall impact is a shrinking of delivered mail as e-mail grows. This will affect postal services and their suppliers (e.g. trucks) as well as suppliers of postal equipment (e.g. postage meters) and the internal mail rooms of nearly every organisation. Offsetting this decline is an increase in the number of parcels delivered as a result of e-commerce. More generally, existing post offices may come to act as central warehousing and load consolidation points that provide delivery services across a standardised fixed route much like today's mail delivery (ActivMedia, 1998). This would avoid the problem of numerous delivery trucks coming to the same address but would put the post offices in direct competition with the parcel delivery firms that are already providing this service.

Stimulating product innovation

The greatest future economic impact due to electronic commerce is likely to come from the creation of new products or the radical transformation of existing ones (effectively making them new) and the consequent creation of new demand. Historically, these new, frequently unforeseen, products have been the engines of growth and the source of new employment (e.g. home electronics, the television/film industry, software). While extraordinarily difficult to identify or quantify with any precision, five characteristics of e-commerce are likely to be a springboard for the demand for new products.

Market extension/aggregation

Because a Web page is accessible to anyone with access to the Internet, electronic commerce greatly extends the market reach of firms, vastly expanding opportunities and revealing new demand that fuels economic growth. This phenomenon is already evident. W.W. Grainger, a leading North American distributor of maintenance and office supplies, reports that 30 per cent of its online customers are new or incremental customers. Dell reports that 80 per cent of consumers and half of the small and medium-sized enterprises (SMEs) that purchase over its Web site have never purchased from them before, and one out of four say that they would not have purchased if it was not for the Web site (Margherio *et al.*, 1998). Playboy reports that three-quarters of its e-commerce revenues were collected from customers who were buying from Playboy for the first time (Macavinta, 1998). The reach of e-commerce and the reduction in transaction costs associated with it also enable an aggregation of demand, creating a market which can sustain new niche products; in the past, the small market potential would have been economically unfeasible. Examples abound, from home-made salsa sauce from Texas to rare quilt patterns from France.

Online auctions, such as those used by airlines to sell unsold seats at the last minute, are another example of using e-commerce to aggregate demand, creating a new market that delivers value to the consumer (inexpensive flights) and revenue to the producer. American Airlines estimates, for example, that it has generated tens of millions of dollars in incremental revenue by selling seats that previously went unsold since it launched NetSAAver in 1996 (Margherio *et al.*, 1998). Another example is the creation of spot markets for products for which the market was too diverse and scattered but which electronic commerce makes feasible: Fastparts, Inc. sells to buyers at a discount, through a spot market, surplus inventory of electronic components from assemblers of electronic goods (e.g. computers), which is estimated to represent some 10 per cent of the total annual shipments of the electronic component industry. This allows sellers to recover about half of the value of the part, while buyers receive a price reduction of 30-50 per cent (Margherio *et al.*, 1998)

Radically redefining existing products

Old products are being radically transformed by the addition of intangible digital improvements that continue to erode the distinction between a good and a service. Examples abound, from networked Coke machines to satellite navigational systems in cars. The reduction in communication and information costs is a common element in much of this transformation. E-mail is an obvious example. It is seen as a substitute for physical mail, but it can be sent securely to many recipients across the globe, with verification, in a few hours. In addition to text, it can contain links to other documents and include audio and video clips and multiple attachments. With traditional mail, this would be either impossible or very difficult. This

new functionality and interactivity is an aspect of electronic commerce that is likely to transform old products and thus generate new demand. Although hackneyed, the example of Amazon.com, the online bookstore, shows how the retail experience can differ from what it is in the traditional bookstore: millions of books to choose from, chats with authors, collaborative filtering to suggest books potentially of interest, reviews by critics and customers, games. It is questionable as to whether the same product is being sold. Redefining how products ranging from cars to wills are sold could create new demand.

Marketing “free” products

Electronic commerce’s lower transaction costs, as well as its interactivity and ability to market on a one-to-one basis, make it possible to market items that previously could not economically be bought or sold and existed as non-market transactions. Two current examples are advertising and private information, but many “free” goods such as shareware (free software) and free content could follow this model. In the past, the only monetary benefit a consumer could have gained from reading an ad would be a coupon or rebate for a price reduction when buying the product or possibly an in-kind benefit such as frequent-flyer miles. With pay-per-view advertising, electronic commerce now enables advertisers to pay consumers to read an ad (Borland, 1997a). Similarly, in the past, private information about individuals collected by businesses for marketing purposes, such as name, address, and demographic and financial information, was often acquired from individuals without any direct compensation. With e-commerce, it is possible to establish a market for this information, and businesses can buy this “product” from owners just as they compensate workers for their labour. The creation of these new markets should be a significant source of new e-commerce-generated growth.

One-to-one marketing

As the number of e-commerce users rises, so does the capacity of businesses to gather, store and, most importantly, access transaction data that link consumers to products. These databases have become modern-day treasure troves and essential e-commerce tools. The importance of such data and analysis predates Internet e-commerce, but because of the interactive nature of the Internet some sites can prohibit users from viewing the site unless they accept a computer programme that provides information about “what has happened on your computer in the recent past” (a “cookie”: see http://www7.netgrocer.com/cookie_explain.cfr). According to Dataquest, the world-wide data warehousing industry grew by 34 per cent in 1997, with revenues reaching \$1.47 billion. It is forecast to reach \$1.88 billion in 1998. Businesses use the information gained in this way to use product suggestions and personalised interfaces as marketing tools. Amazon.com, for example, uses filtering tools to profile customers and determine their purchasing patterns. On the basis of information gleaned from this database, Amazon suggests other books that might interest customers, based on the purchasing patterns of those who have bought similar books (Wilson, 1998).

Database mining has become an attractive industry on its own. New companies, such as AIR MILES International Holdings N.V., specialise in tracking customer purchases at a wide variety of locations. In exchange for detailed purchasing information from retailers as diverse as gasoline stations, moving companies, department, grocery, liquor and hardware stores, AIR MILES offers a small incentive to customers in the form of points that can be converted into air miles with selected airlines or into other products and services such as movie tickets or free long-distance calls. From the user’s point of view, swiping the AIR MILES card at the cash register when buying a dishwasher and a week’s supply of groceries can provide enough points for two tickets to a major sports event. In Canada, one in every two households collects these air miles. The company also operates in the United Kingdom, the Netherlands, and Spain.

Thanks to consumers who willingly provide detailed purchasing information, AIR MILES and similar companies create extensive databases that can be used by participating merchants to plan sales campaigns and identify potential target markets. Marketing companies are now able to profile people’s hobbies. Among Canadians who make purchases online, for example, 48 per cent are avid gardeners. As customer profiles become clearer, so do the marketing methods that take advantage of this information

(Wilson, 1998). However, significant concerns regarding privacy and ownership of such information must be addressed and may limit this activity.

POLICY IMPLICATIONS AND THE FUTURE RESEARCH AGENDA

E-commerce is growing very quickly, albeit from a small base. When compared to benchmarks such as catalogue shopping or credit card activity, it is clear that electronic commerce is in an embryonic stage and that technology and market dynamics are still casting its basic shape. This is especially true for the business-to-consumer segment, which is a small fraction of the business-to-business segment. Policies should therefore be crafted cautiously, and with due recognition of the evolving nature of electronic commerce. Although nearly all sources indicate that business-to-business e-commerce dominates the market, most existing analysis and available data focus on the business-to-consumer segment.

- *Future research in this area should rectify this imbalance and, given the importance of business-to-business e-commerce, some of the economic and social impacts stemming from it should be analysed.*

Current estimates suggest that the United States currently generates about four-fifths of total world-wide e-commerce activity. As countries seek to dismantle some of the barriers to global electronic commerce, this imbalance raises competitive concerns and some suspicions.

- *The causes of this imbalance, its likely duration, and any particular factors that might preserve or reduce it could be a valuable topic for study.*

Within the business-to-consumer segment, activity is very sector-specific and a number of factors may inhibit its future potential for growth. In order to set a policy agenda and a timetable, a more accurate sense of the growth and direction of business-to-consumer e-commerce would be useful.

- *Research directed towards identifying the key inhibitors and drivers of business-to-consumer e-commerce could guide policy and make it possible to better judge the importance of this activity.*

In both the business-to-business and business-to-consumer markets, digital products such as software, travel services, entertainment and finance are the leading e-commerce products. Their intangible nature forces a re-evaluation of existing rules and practices.

- *Better measurement of these e-commerce products is needed because of the potential policy implications. It is important to examine how their intangible nature affects policies concerning trade, competition policy, price movements, economic cycles, etc.*

Fundamental to all of these policy implications is a greater ability to measure electronic commerce accurately. Statistics that measure the level, growth, and composition of e-commerce are badly needed to focus the policy debate. Research in these areas should be directed towards defining activities that truly illuminate the e-commerce phenomenon so as to give policy makers a better idea of where it is important to implement e-commerce policies. In the current situation, the wide variety of disparate estimates does little to clarify the issues.

- *Work should be undertaken to develop a statistical methodology and apparatus for measuring electronic commerce.*

NOTES

1. The countries are: Canada (1997), Finland (1997), France (1996), Germany (1995), Japan (1994), the United Kingdom (1994), and the United States (1997).
2. Forrester Research (1998a) reports that in 2001, the EU will have revenues one-third those of the United States.
3. "Dell: Net to Make up Half of Sales", <http://www.news.com>, 28 April 1998.
4. "Net Biz Software to Top \$3B", <http://www.techweb.com>, 13 May 1997.
5. Interview with J.L. Trétois, Development Manager, GEIS, 2 September 1997.
6. *Ibid.*
7. It is estimated, for example, that up to 70 per cent of EDI links are established primarily because a major corporate or government customer specifies doing so as a term of contract. See OECD/ISO (1996).
8. "Overview of the ANX Network Service", <http://www.aiag.org/anx>, 26 May 1998.
9. "FedEx Sees Surge in E-commerce", <http://www.news.com>, 22 May 1998.
10. Domestic final demand is the same as total final demand except that imports have not been included. See OECD (1995).
11. "CyberSex", *The Economist*, 4 January 1997.
12. Donna Hoffman of Vanderbilt University quoted by Sussman (1998).
13. "Top End Online Travel Market Closing as Bottom Tier Open to New Players: Online Travel Sites Must 'Differentiate or Die'", <http://www.jup.com>, 24 April 1997.
14. "Can Pay, Won't Pay", *The Economist*, 14 February 1998; and Reeve (1998).
15. "PC Week's Top 10 E-commerce Sites", <http://www.pcweek.com>, 14 January 1997.
16. "The US Post Office Girds for E-mail Competition", *Business Week*, 26 January 1998.
17. A current partial list of organisations experimenting with electronic bill paying includes: California utilities Edison (4.2 million customers) and Los Angeles Department of Water and Power (1.2 million residential customers); American Express (600 000 customers); Chase Manhattan Bank; AT&T (75 million customers will be offered the option); MCI; Bell South; Southern Bell Corp.; Shell Oil; JC Penny. See Rafter (1998).
18. "The Hottest Web IPO You Never Saw", *Business Week*, 14 April 1997.
19. Presentation by Ira C. Magaziner at the conference, "The Internet and Electronic Commerce", 28 January 1997, Prague, Czech Republic.
20. "Ticket Master Online Sales up 270%", <http://www.news.com>, 15 May 1998.
21. "Net Biz Software to Top \$3B", <http://www.techweb.com>, 13 May 1997.
22. "Surf Music", *The Economist*, 16 August 1997.
23. Ody (1996) states that "75 per cent of retail sales volume comes from the top 30 per cent of shoppers". Evans and Wurster (1997) state that "10% of the population that now use personal-financial management software (e.g. Intuit) probably account for 75% of the profits of the banking system".
24. Meeker (1997) reports that 69 per cent of respondents who purchased products on the Web listed convenience as a major factor.
25. "Lands' End and E-commerce: A Perfect Fit", <http://www.internetnews.com>, 12 September 1997.
26. A recent Harris poll found that the median number of hours worked per week in the United States rose from 40.6 in 1973 to 50.6 in 1995, while leisure time fell from 26.2 to 19.2. See Meeker (1997).
27. *The Economist* (1998), "Market Makers", 14 March.
28. "Report: Net to Dial up \$9 billion by 2002", <http://www.internetnews.com>, 17 April 1998.

29. For example, the Western Governors University – which is a co-operative project of 17 US state universities (Arizona, Colorado, Idaho, Nebraska, New Mexico, North Dakota, Oregon, Utah, Washington, Wyoming, Alaska, Hawaii, Montana, Nevada, Oklahoma, Texas, Indiana), that of the territory of Guam, the California Virtual University (which represents all the California state universities) and Penn State’s “World campus” distance education programme – plans to offer 25 certificate programmes with an enrolment of 5 000 students by 2003. See Selingo (1998).
30. “Can Pay, Won’t Pay”, *The Economist*, 14 February 1998.
31. “The US Post Office Girds for E-mail Competition”, *Business Week*, 26 January 1998.

