Chapter 4

The digital economy, new business models and key features

This chapter discusses the spread of information and communication technology (ICT) across the economy, provides examples of business models that have emerged as a consequence of the advances in ICT, and provides an overview of the key features of the digital economy that are illustrated by those business models.

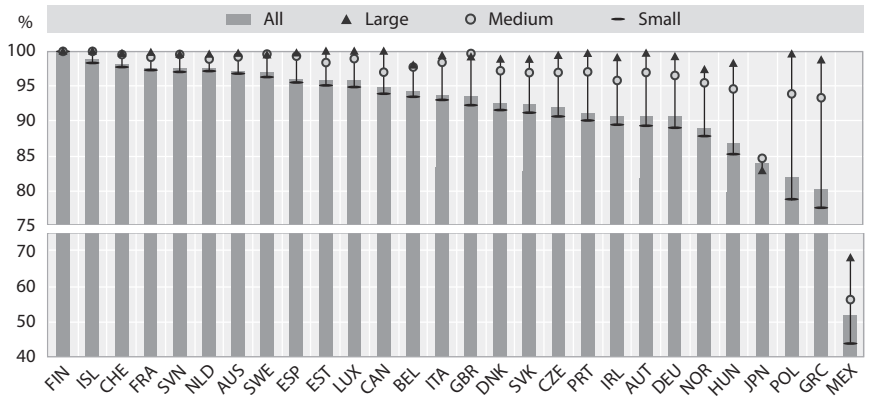
The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

4.1 The spread of ICT across business sectors: the digital economy

All sectors of the economy have adopted ICT to enhance productivity, enlarge market reach, and reduce operational costs. This adoption of ICT is illustrated by the spread of broadband connectivity in businesses, which in almost all countries of the Organisation for Economic Co-operation and Development (OECD) is universal for large enterprises and reaches 90% or more even in smaller businesses.

Figure 4.1. **Enterprises with broadband connection, by employment size, 2012**

Fixed and mobile connections, as a percentage of all enterprises



For Australia, data refer to 2010/11 (fiscal year ending 30 June 2011) instead of 2012. For Canada, medium-sized enterprises have 50-299 employees instead of 50-249 persons employed. Large enterprises have 300 or more employees instead of 250 or more persons employed. For Japan, all businesses with 100 or more persons employed instead of 10 or more, 100-299 instead of 50-249, and 300 or more instead of 250 or more. For Mexico, data refer to 2008 instead of 2012 and to businesses with 20 or more persons employed instead of 10 or more. For Switzerland, data refer to 2011 instead of 2012.

Source: OECD (2013), *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth*, OECD Publishing, Paris, www.oecd.org/sti/scoreboard.htm based on OECD ICT Database and Eurostat.

The widespread adoption of ICT, combined with the rapid decline in price and increase in performance of these technologies, has contributed to the development of new activities in both the private and public sector. Together, these technologies have expanded market reach and lowered costs, and have enabled the development of new products and services. These technologies have also changed the ways in which such products and services are produced and delivered, as well as the business models used in companies

ranging from multinational enterprises (MNEs) to start-ups. They also support activity by individuals and consumers, and have led to the creation of new payment mechanisms including new forms of digital currencies. The advent of the Internet brought major changes first to the entertainment, news, advertising, and retail industries. In those industries, the first major digital players initially started from traditional business models, adapting them to better end-user equipment (both inside and outside organisations) and more extensive interconnection through the Internet.

For example, online retailers initially adapted the business model of brick-and-mortar stores by selling traditional physical goods (for example, books) digitally. Online intermediaries that allowed the discovery, sale, and purchase of goods and services such as vehicles, homes, and jobs were another early category. Other digital players specialised in the online selling of traditional services (for example, online insurance brokers). Retailers then began selling digital products and services, like downloadable and streaming music and movies, executable code, games, and services based on data processing, increasingly blurring the line between goods and services as businesses continued to develop. Online advertising similarly started from traditional advertising business models, becoming more sophisticated as the potential of digital technology became fully integrated into the industry. New online services enabling a sharing and service economy have also appeared, allowing people to rent out their homes, vehicles and skills to third parties.

As technology has advanced and costs of ICT have continued to fall, ICT has proven to be general-purpose technology that has become embedded in and central to the business models of firms operating across the economy. Businesses across all sectors are now able to design and build their operating models around technological capabilities, in order to improve flexibility and efficiency and extend their reach into global markets. Businesses across all sectors have changed the way their business is conducted by taking advantage of advances in communications and data processing capacity to lower transaction costs and extend their reach into global markets.

These advances, coupled with liberalisation of trade policy and reduction in transportation costs, have expanded the ability of businesses in all sectors to take advantage of global value chains in which production processes can be geographically dispersed in locations around the world to take advantage of the features of local markets. For example, in sectors relying heavily on technology and research and development, design and production can be managed centrally, while the assembly can be fragmented in different countries to take advantage of skilled labour and local resources.

Sectors as diverse as retail, logistics and education have changed and keep changing due to the spread of ICT:

- **Retail**: The digital economy has enabled retailers to allow customers to place online orders (often fulfilled from a local store) and has made it easier for retailers to gather and analyse data on customers, to provide personalised service and advertising. It has also enabled retailers to manage logistics and supply stores with products, which has had a significant, positive impact on productivity.
- **Transport and Logistics**: The logistics sector has been transformed by digital economy, which enables the tracking of both vehicles and cargo across continents, the provision of information to customers and facilitates the development of new operational processes such as Just In Time delivery in the manufacturing sector. Vehicle telemetry also helps maximise fuel efficiency, ensure efficient use of the transport network and support fleet maintenance activities. The information collected by fleets can also be used to create datasets with commercial value.
- **Financial Services**: Banks, insurance providers and other companies, including non-traditional payment service providers, increasingly enable customers to manage their finances, conduct transactions and access new products on line, although they still continue to support branch networks for operations. Better use of data also allows growth in customer insights and associated products, such as personalised spending analysis, which can be used to generate advertising revenue. The digital economy has also made it easier to track indices and manage investment portfolios and has enabled specialist businesses such as high-frequency trading.
- **Manufacturing and Agriculture**: The digital economy has enhanced design and development, as well as the ability to monitor production processes in factories and control robots, which has enabled greater precision in design and development and ongoing product refinement. The products being produced are also increasingly knowledge-intensive. In the automobile industry, for example, it is estimated that 90% of new features in cars have a significant software component. On farms, systems can monitor crops and animals, and soil/environmental quality. Increasingly, routine processes and agricultural equipment can be managed through automated systems.
- **Education:** As the digital economy spreads, universities, tutor services and other education service providers are able to provide courses remotely without the need for face to face interaction through technologies such as video conferencing and streaming and online collaboration portals, which enables them to tap into global demand and leverage brands in a way not previously possible.

- **Healthcare:** The digital economy is revolutionising the healthcare sector, from enabling remote diagnosis to enhancing system efficiencies and patient experience through electronic health records. It also allows opportunities for advertising, for example of drugs and other treatments.
- **Broadcasting and Media:** The digital economy has dramatically changed the broadcasting and media industry, with increasing broadband access in particular opening new avenues for delivery of content for traditional media players, while also enabling the participation in the news media of non-traditional news sources, and expanding user participation in media through user-generated content and social networking. The digital economy has also enhanced the ability of companies to collect and use information about the viewing habits and preferences of customers, to enable them to better target programming.

As digital technology is adopted across the economy, segmenting the digital economy is increasingly difficult. In other words, because the digital economy is increasingly becoming the economy itself, it would be difficult, if not impossible, to ring-fence the digital economy from the rest of the economy. Attempting to isolate the digital economy as a separate sector would inevitably require arbitrary lines to be drawn between what is digital and what is not. As a result, the tax challenges and base erosion and profit shifting (BEPS) concerns raised by the digital economy are better identified and addressed by analysing existing structures adopted by MNEs together with new business models and by focusing on the key features of the digital economy and determining which of those features raise or exacerbate tax challenges or BEPS concerns, and developing approaches to address those challenges or concerns.

4.2 The digital economy and the emergence of new business models

The digital economy has given rise to a number of new business models. Although many of these models have parallels in traditional business, modern advances in ICT have made it possible to conduct many types of business at substantially greater scale and over longer distances than was previously possible. This section discusses several prominent examples of these new business models. Some of these business models may complement each other and in some cases overlap with each other (for example, payment services could be described under e-commerce or under cloud computing). The business models discussed below are by no means exhaustive. Indeed, just as innovation in the digital economy allows the rapid development of new business models, it can also quickly cause existing businesses to become obsolete. The types of business discussed include several varieties of e-commerce, app stores, online advertising, cloud computing, participative networked platforms, high speed trading, and online payment services.

4.2.1 Electronic commerce

Electronic commerce, or e-commerce, has been defined broadly by the OECD Working Party on Indicators for the Information Society as "the sale or purchase of goods or services, conducted over computer networks[1] by methods specifically designed for the purpose of receiving or placing of orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or service do not have to be conducted online. An e-commerce transaction can be between enterprises, households, individuals, governments, and other public or private organisations" (OECD, 2011). E-commerce can be used either to facilitate the ordering of goods or services that are then delivered through conventional channels (indirect or offline e-commerce) or to order and deliver goods or services completely electronically (direct or on-line e-commerce). Although e-commerce covers a broad array of businesses, this section provides an illustration of some of the more prominent types.

4.2.1.1 Business-to-business models

The vast majority of e-commerce consists of transactions in which a business sells products or services to another business (so-called business-to-business (B2B)) (OECD, 2011). This can include online versions of traditional transactions in which a wholesaler purchases consignments of goods online, which it then sells to consumers from retail outlets. It can also include the provision of goods or services to support other businesses, including, among others: *(i)* logistics services such as transportation, warehousing, and distribution; *(ii)* application service providers offering deployment, hosting, and management of packaged software from a central facility; *(iii)* outsourcing of support functions for e-commerce, such as web-hosting, security, and customer care solutions; *(iv)* auction solutions services for the operation and maintenance of real-time auctions via the Internet; *(v)* content management services, for the facilitation of website content management and delivery; and *(vi)* web-based commerce enablers that provide automated online purchasing capabilities.

4.2.1.2 Business-to-consumer models

Business-to-consumer (B2C) models were among the earliest forms of e-commerce. A business following a B2C business model sells goods or services to individuals acting outside the scope of their profession. B2C models fall into several categories, including, for example, so-called "pureplay" online vendors with no physical stores or offline presence, "click-and-mortar" businesses that supplemented existing consumer-facing business with online sales, and manufacturers that use online business to allow customers to order and customise directly.

The goods or services sold by a B2C business can be tangible (such as a CD of music) or intangible (i.e. received by consumers in an electronic format). Through digitisation of information, including text, sound, and visual images, an increasing number of goods and services can be delivered digitally to customers increasingly remote from the location of the seller. B2C e-commerce can in many cases dramatically shorten supply chains by eliminating the need for many of the wholesalers, distributors, retailers, and other intermediaries that were traditionally used in businesses involving tangible goods. Partly because of this disintermediation, B2C businesses typically involve high investment in advertising and customer care, as well as in logistics. B2C reduces transaction costs (particularly search costs) by increasing consumer access to information. It also reduces market entry barriers, as the cost of maintaining a website is generally cheaper than installing a traditional brick-and-mortar retail shop.

4.1.2.3 Consumer-to-consumer models

Consumer-to-consumer (C2C) transactions are becoming more and more common. Businesses involved in C2C e-commerce play the role of intermediaries, helping individual consumers to sell or rent their assets (such as residential property, cars, motorcycles, etc.) by publishing their information on the website and facilitating transactions. These businesses may or may not charge the consumer for these services, depending on their revenue model. This type of e-commerce comes in several forms, including, but not limited to: *(i)* auctions facilitated at a portal that allows online bidding on the items being sold; *(ii)* peer-to-peer systems allowing sharing of files between users; and *(iii)* classified ads portals providing an interactive, online marketplace allowing negotiation between buyers and sellers.

4.1.2.4 Growth of e-commerce

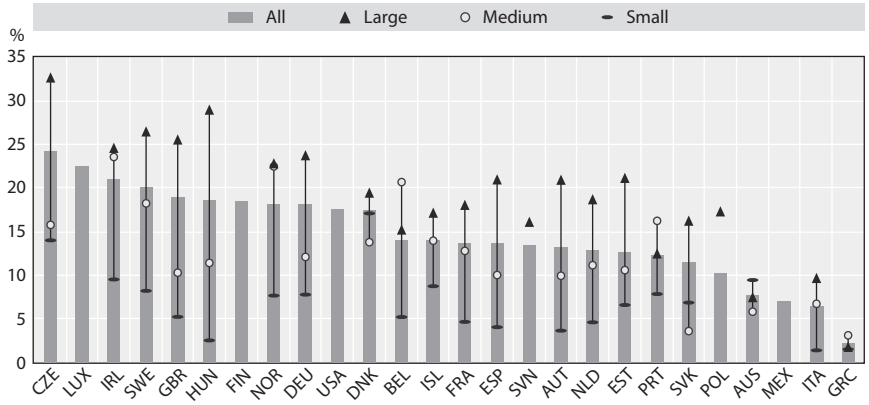
The Internet facilitates transactions such as ordering goods and services. This means that many transactions that would have taken place without the Internet can be conducted more efficiently and at less expense. In addition, the Internet has expanded the reach of smaller businesses, enabling them to reach markets that would not have been possible to reach without its existence. As a result, the number of firms carrying out business transactions over the Internet has increased dramatically over the last decade.

For example, e-commerce in the Netherlands has increased as a share of total company revenue from 3.4% in 1999 to 14.1% in 2009. Similarly, between 2004 and 2011 this share increased from 2.7% to 18.5% in Norway and from 2.8% to 11% in Poland. Based on comparable data, as illustrated in the chart below, e-commerce is nearing 20% of total turnover in Finland, Hungary, and Sweden, and 25% in the Czech Republic (OECD, 2012).

In 2012, B2C e-commerce sales were estimated to exceed USD 1 trillion for the first time. During 2013, they are estimated to grow an additional 18.3% to USD 1.298 trillion, with the Asia-Pacific region surpassing North America as the top market for B2C e-commerce sales (Emarketer, 2013). It is worth mentioning that at the moment B2C e-commerce represents a small fraction of overall e-commerce, which is mainly made of B2B transactions. Global B2B e-commerce, particularly among wholesalers and distributors, was estimated to be approximately USD 12.4 trillion in 2012 (WTO, 2013). According to other estimates made by the International Data Corporation, the size of total worldwide e-commerce, when global B2B and consumer transactions are added together, equalled USD 6 trillion in 2013.

Figure 4.2. **Turnover from e-commerce, by enterprise size, 2012**

As a percentage of turnover in enterprises with 10 or more persons employed



Where available, firm size classes are defined as: small (from 10 to 49 persons employed), medium (50 to 249), large (250 and more). Sector coverage consists of all activities in manufacturing and non-financial market services, but for Australia (where Agriculture, forestry and fishing is also included) and the United States (all market services are included but management of companies and enterprises – NAICS 55). For Australia, data refer to the fiscal year ending 30 June 2011 (2010/11) instead of 2012; for Denmark and Germany they refer to 2010; for Mexico, data refer to 2008 and include only businesses with 20 or more persons employed.

Source: OECD (2013), *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth*, OECD Publishing, Paris, www.oecd.org/sti/scoreboard.htm based on OECD, ICT Database; Eurostat and national sources, June 2013.

4.2.2 Payment services

Paying for online transactions traditionally required providing some amount of financial information, such as bank account or credit card information, to a vendor, which requires a high degree of trust that is not always present in the case of an unknown vendor, particularly in the case of a C2C transaction. Online payment service providers help address this concern by providing a secure way to enable payments online without requiring the parties to the transaction to share financial information with each other.

A payment service provider acts as an intermediary (typically using a software-as-a-service model) between online purchasers and sellers, accepting payments from purchasers through a variety of payment methods, including credit card payments or bank-based payments like direct debit or real-time bank transfers, processing those payments, and depositing the funds to the seller's account. Electronic payment systems offer a number of benefits for users, such as *(i)* protection against fraud, since the seller and buyer do not exchange sensitive information; *(ii)* faster delivery of payment compared with traditional payment methods; and *(iii)* in many cases, the ability to transact in multiple currencies. Payment service providers typically charge a fee for each transaction completed, which can be either a fixed charge or a percentage of the value of the transaction, though some payment service providers also charge monthly fees or setup fees for certain additional services.

A number of other alternative online payment options are in use as well, including:

- **Cash payment solutions**, in which a customer buys online, and pays in cash with a barcode or payment code at participating shops or settlement agencies, offering a way for customers unwilling to use other online payment methods to make online purchases in a secure manner.
- **E-wallets or cyber-wallets**, which are previously charged with credits and can be spent online as an alternative to the use of a credit card. These are often used for micropayments because the use of a credit card for frequent small payments is not economical.
- **Mobile payment solutions**, which encompass all types of technologies that enable payment using a mobile phone or smartphone, including, among others, mobile card processing using card readers connected to smartphones, in-app payments for virtual products, and near-field communications solutions which use short-range wireless technology to exchange information.

As discussed in Chapter 3, the digital economy has also given rise to virtual currencies that can be used to purchase goods and services from

businesses that agree to accept them, acting as an alternative to payment services. In some cases, exchanges have arisen to allow purchase and sale of these virtual currencies for real currency.

4.2.3 App stores

The growth of Internet access through smartphones and tablets has caused an increase in the frequency of use of online services and the development of application stores, a type of digital distribution platform for software, often provided as a component of an operating system. Application stores typically take the form of central retail platforms, accessible through the consumer's device, through which the consumer can browse, view information and reviews, purchase and automatically download and install the application on his/her device.

Accessibility to application stores varies. Some application stores are only usable by consumers with a particular device. These stores may represent the sole way for users of that device to obtain applications, or may represent one of several possible means for users to obtain applications. Some application stores are accessible by consumers of any device using a particular operating system. Others are usable by consumers with service contracts with a particular network operator. Finally, certain others are freely accessible and are not dependent on the type of device, proprietary software, or service provider.

App stores will typically include both applications developed by the business operating the app store (typically, an operating system developer, device manufacturer, or telecommunications network provider), or by a third-party developer. Applications may be downloaded for free or for a fee. Free applications may be supported by advertising. In addition, applications are increasingly moving to a "freemium" model, in which basic functionality is provided for free, but customers may pay for additional content or features.

An application store will typically feature applications produced by developers in multiple countries. In addition, while many app stores are targeted at customers in particular geographic markets, applications are often cross listed on multiple app stores targeted at multiple geographic regions.

Use of application stores is growing rapidly. Gartner, Inc., an information technology research and advisory company, estimated that downloads from app stores would reach 102 billion in 2013, up from 64 billion in 2012.

Total revenue from app store purchases was expected to exceed USD 26 billion in 2013, an increase of 31% over the total in 2012. As noted above, free applications are becoming increasingly prevalent, and are expected by 2017 to account for 94.5% of total downloads, with in-app purchases accounting for 48% of total app store revenues.

4.2.4 Online advertising

Online advertising uses the Internet as a medium to target and deliver marketing messages to customers. Internet advertising offers a number of advantages over traditional advertising. For example, many Internet advertisers have developed sophisticated methods for segmenting consumers in order to allow more precise targeting of ads. Many Internet advertising publishers have also developed ways for clients to monitor performance of ads, tracking how users interact with their brands and learning what is of interest to current and prospective customers. Online advertising takes a number of forms, the most prominent of which are display ads, in which an advertiser pays to display ads linked to particular content or user behaviour, and search engine ads, in which an advertiser pays to appear among Internet search results.

Online advertising involves a number of players, including web publishers, who agree to integrate advertisements into their online content in exchange for compensation, advertisers, who produce advertisements to be displayed in the web publisher's content and advertising network intermediaries, who connect web publishers with advertisers seeking to reach an online audience. Advertising network intermediaries include a range of players, including search engines, media companies, and technology vendors. These networks are supported by data exchanges, marketplaces in which advertisers bid for access to data about customers that has been collected through tracking and tracing of users' online activities. These data can be analysed, combined, and processed by specialist data analysers into a user profile.

In advertising-based business models, publishers of content are frequently willing to offer free or subsidised services to consumers in order to ensure a large enough audience to attract advertisers. The most successful advertising companies have been those that combine a large user base with sophisticated algorithms to collect, analyse, and process user data in order to allow targeted advertisements. While traditional advertising involved payment for display of ads for a specified period of time, with little way to monitor visibility or user response, online advertising has given rise to a number of new payment calculation methods, including cost-per-mille (CPM), in which advertisers pay per thousand displays of their message to users, cost-per-click (CPC), in which advertisers pay only when users click on their advertisements, and cost-per-action (CPA), in which advertisers only pay when a specific action (such as a purchase) is performed by a user.

Internet advertising is rapidly growing, both in terms of total revenues and in terms of share of the total advertising market. PwC estimates that Internet advertising reached USD 100.2 billion in 2012, which represented 17% growth from the previous year, and a 20% share of the total global advertising market. The market for Internet advertising is projected to grow at a rate of 13% per year during the period from 2012 to 2017, reaching

USD 185.4 billion in 2017. Internet advertising would by that point become the second-largest advertising medium behind television advertising, with a 29% share of the overall global market. Within the online advertising market, search advertisement holds the greatest share at approximately 42% in 2013, and is expected to continue to hold in excess of 40% of the market through 2017, although both mobile and video advertising are projected to grow substantially by 2017 (to 15% and 8%, respectively) (PwC, 2013).

4.2.5 Cloud computing

Cloud computing is the provision of standardised, configurable, on-demand, online computer services, which can include computing, storage, software, and data management, using shared physical and virtual resources (including networks, servers, and applications).[2] Because the service is provided online using the provider's hardware, users can typically access the service using various types of devices wherever they are located, provided they have a suitable Internet connection.

The resources to which cloud computing customers are granted access are not stored on a single computer. Instead, they are on many networked computers that are available to everyone who has access to that "cloud" of computing resources (which, depending on the cloud, could be a single organisation, a community of organisations, the general public, or some combination thereof). The system copies each user's data and software to other servers, which allows it to allocate requests for hardware resources to whatever physical location is best able to satisfy the demand efficiently. Each user has access to a large amount of computer resources when needed, and only when needed. This redundancy ensures that the failure of one machine will not lead to loss of data or software.

Cloud computing often provides customers with a cost effective alternative to purchasing and maintaining their own IT infrastructure, since the cost of the consumer resources is generally shared among a wide user base. The advantages of cloud computing are largely driven by economies of scale in setting up the infrastructure and maximising server usage by sharing space among clients whose needs for space and processing power may vary on a flexible basis.

The most common examples of cloud computing service models are:

- **Infrastructure-as-a-service**: In the most basic cloud-service model, providers of infrastructure as a service (IaaS) offer computers – physical or (more often) virtual machines – and other fundamental computing resources. IaaS clouds often offer additional resources such as a virtual-machine disk image library, raw (block) and file-based storage, firewalls, load balancers, Internet Protocol (IP)

addresses, virtual local area networks (VLANs), and software bundles. The customer does not manage or control the underlying cloud infrastructure, but has control over the operating system, storage, and deployed applications, and may be given limited control of select networking components (e.g. host firewalls).

- **Platform-as-a-service**: Platform as a service is a category of cloud computing services that provides a computing platform and programming tools as a service for software developers. Software resources provided by the platform are embedded in the code of software applications meant to be used by end users. The client does not control or manage the underlying cloud infrastructure, including the network, servers, operating systems, or storage, but has control over the deployed applications.
- **Software-as-a-service**: A common form of cloud computing in which a provider allows the user to access an application from various devices through a client interface such as a web browser (e.g. web-based email). It can be provided either to business customers (B2B) or individual customers (B2C). Unlike in the old software vendor models, the code is executed remotely on the servers, thereby freeing the user of the necessity to upgrade when a new version is available – the executed version is always the latest, which means that new features go instantaneously to market without friction. The consumer generally does not manage or control the underlying cloud infrastructure, including the network, servers, operating systems, storage, or individual application capabilities, with the possible exception of limited user-specific application configuration settings.

Other X-as-a Service (XaaS) concepts include content or data:

- **Content-as-a-service**: Where rights are obtained and software is provided to allow content to be embedded by purchasers, content can be purchased as a service. This has been used particularly in the case of user-created content.
- **Data-as-a-service**: Data from multiple sources can be aggregated and managed by a service provider, so that controlled access to that data can be granted to entities that may be geographically and organisationally removed from each other, without each entity needing to develop or acquire the infrastructure necessary to prepare and process that data.

In the consumer markets, many cloud services (e.g. email, photo storage, and social networks) have been provided free of charge, with revenue generated through advertising or the sale of data on user behaviour, or on a "freemium" basis in which basic services are provided for free and expanded

services require payment. Other consumer cloud services, such as web hosting or hard drive backup, are sold on a monthly subscription basis. In B2B markets, cloud services are most typically sold by subscription, although "pay as you go" models are increasingly available.

4.2.6 High frequency trading

High frequency trading uses sophisticated technology, including complex computer algorithms, to trade securities at high speed. Large numbers of orders which are typically fairly small in size are sent into the markets at high speed, with round-trip execution times measured in microseconds. The parameters for the trades are set with algorithms run on powerful computers that analyse huge volumes of market data and exploit small price movements or opportunities for market arbitrage that may occur for only milliseconds. Typically, a high-frequency trader holds a position open for no more than a few seconds. In other words, high frequency trading firms profit mostly from small price changes exploited through small, but frequently executed trades.

Because trades are conducted entirely electronically, high frequency trading generally does not require personnel in the country where the infrastructure used to make trades is located. The implementation and execution of successful trading strategies depends on several factors, including the development of algorithms for trading, as well as writing programmes to monitor losses and performance and to automatically shut down trading to avoid fast-accruing losses. In addition, high frequency trading depends on the ability to be faster than competitors, which means that it is extremely sensitive to latency. As a result, the location of the server is extremely important to the business, with servers located close to the relevant exchange providing a meaningful advantage over servers located farther away. As a result, financial institutions offer installation of trading engines directly adjacent to their own infrastructure, minimising network latency.

4.2.7 Participative networked platforms

A participative networked platform is an intermediary that enables users to collaborate and contribute to developing, extending, rating, commenting on and distributing user-created content. User created content (UCC) comprises various forms of media and creative works (written, audio, visual, and combined) created by users. A range of different distribution platforms have been created, including text-based collaboration formats such as blogs or wikis, group-based aggregation and social bookmarking sites, social networking sites, podcasting, and virtual worlds. Social networking applications are possibly the best known participative networked platform but the same model is also used in other areas, like fashion design, toy design, and computer games just to

name a few. In general, UCC is created without the expectation of profit. The participative platform featuring the UCC, however, may monetise the UCC in a variety of ways, including through voluntary contributions, charging viewers for access on a per-item or subscription basis, advertising-based models, licensing of content and technology to third parties, selling goods and services to the community, and selling user data to market research or other firms.

Box 4.1. **Diversity of revenue models**

The diversity of businesses in the current digital economy is illustrated by the variety of ways in which businesses turn value into revenue. The most common revenue models include the following:

i. Advertising-based revenues. One version of this model offers free or discounted digital content to users in exchange for requiring viewing of paid-for advertisements. Other models rely on providing advertising through mobile devices based on location or other factors. A third type concerns social media websites or platforms who typically build up a large online user community before monetising their captive audience through advertising opportunities.

ii. Digital content purchases or rentals. Users pay per item of download – for instance, e-books, videos, apps, games and music would fall into this category.

iii. Selling of goods (including virtual items). This category, which overlaps to a degree with (1), would include online retailers of tangible goods but could also cover online gaming, where users are offered a free or discounted introductory product but are also offered purchasable access to additional content or virtual items to enhance the experience.

iv. Subscription-based revenues. Examples include annual payments for "premium delivery" with online retailers, monthly payments for digital content including news, music, video-streaming, etc. It could also include regular payments for software services and maintenance such as anti-virus software, data storage, customer "help" services for operating systems, and payment for access to the Internet itself.

v. Selling of services. This category overlaps with (iv) but would include traditional services which can be delivered online such as legal services (e.g. e-conveyancing), financial services (e.g. brokerage), consultancy services, travel agency etc. It would also include a large range of B2B services linked to enterprises who provide core Internet access and act as Internet intermediaries (web hosting, domain registration, payment processing, platform access, etc.).

Box 4.1. **Diversity of revenue models** *(continued)*

vi. Licensing content and technology. Again, this category overlaps with (iv) and (v) but might typically include access to specialist online content (e.g. publications and journals), algorithms, software, cloud based operating systems, etc., or specialist technology such as artificial intelligence systems.

vii. Selling of user data and customised market research. Examples include Internet service providers (ISPs), data brokers, data analytics firms, telemetrics and data gained from non-personal sources.

viii. "Hidden" fees and loss leaders. There may be instances in integrated businesses where profits or losses may be attributable to online operations but because of the nature of the business, cross-subsidy with physical operations occurs and it is difficult to separate and identify what should be designated as 'online revenue'. An example might include online banking, which is offered "free" but is subsidised through other banking operations and fees.

4.3 Key features of the digital economy

There are a number of features that are increasingly prominent in the digital economy and which are potentially relevant from a tax perspective. While these features may not all be present at the same time in any particular business, they increasingly characterise the modern economy. They include:

- Mobility, with respect to *(i)* the *intangibles* on which the digital economy relies heavily, *(ii) users*, and *(iii) business functions* as a consequence of the decreased need for local personnel to perform certain functions as well as the flexibility in many cases to choose the location of servers and other resources.
- Reliance on data, including in particular the use of so-called "big data".
- Network effects, understood with reference to user participation, integration and synergies.
- Use of multi-sided business models in which the two sides of the market may be in different jurisdictions.
- Tendency toward monopoly or oligopoly in certain business models relying heavily on network effects.
- Volatility due to low barriers to entry and rapidly evolving technology.

4.3.1 Mobility

4.3.1.1 Mobility of intangibles

Development and exploitation of intangibles is a key feature of the digital economy. This investment in and development of intangibles is a core contributor to value creation and economic growth for companies in the digital economy. For example, digital companies often rely heavily on software, and will expend substantial resources on research and development to upgrade existing software or to develop new software products.

This heavy reliance on intangibles can be present even where technology is incorporated into a business model primarily to manage wholly tangible resources. For example, an online retailer may develop a multi-layer digital activity to manage a logistic platform including warehouses and shipping capacity. As businesses evolve, the relative importance of these intangibles frequently grows, resulting in further concentration of value in the intangibles. Under existing tax rules, the rights to those intangible assets can often be easily assigned and transferred among associated enterprises, with the result that the legal ownership of the assets may be separated from the activities that resulted in the development of those assets.

4.3.1.2 Mobility of users

Advances in ICT and the increased connectivity that characterises the digital economy mean that users are increasingly able to carry on commercial activities remotely while traveling across borders. An individual can, for example, reside in one country, purchase an application while staying in a second country, and use the application from a third country. Challenges presented by the increasing mobility of consumers are exacerbated by the ability of many consumers to use virtual personal networks or proxy servers that may, whether intentionally or unintentionally, disguise the location at which the ultimate sale took place. The fact that many interactions on the Internet remain anonymous may add to the difficulty of the identity and location of users.

4.3.1.3 Mobility of business functions

As noted above, improved telecommunications, information management software, and personal computing have significantly decreased the cost of organising and co-ordinating complex activities over long distances. As a result, businesses are increasingly able to manage their global operations on an integrated basis from a central location that may be removed geographically from both the locations in which the operations are carried out and the locations in which their suppliers or customers are located.

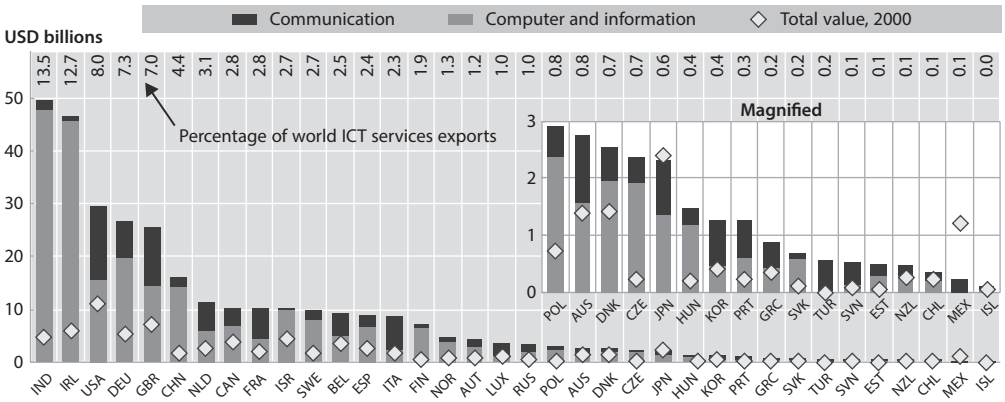
One impact of these changes has been an expansion of the ability to access remote markets, which has substantially increased the ability to provide those goods and services across borders. This has been illustrated by the dramatic growth of international trade in ICT services in recent years. In particular, since 2000, the share of Computer and Information services on world exports of services doubled from 3% to 6%, while that of Telecommunication services increased from 2.2% to 2.3% (OECD, 2013). For the OECD, the combined share of Computer and Information and Communication services rose from 5.7% to 9.0% of total service exports.

Several important shifts in the provision of ICT services have occurred in recent years. India has quickly become the leading exporter of ICT services, followed by Ireland, the United States, Germany, and the United Kingdom. China as well became one of the major exporters. These six countries together represent about 60% of total exports of ICT services.

In addition, technological advances increasingly make it possible for businesses to carry on economic activity with minimal need for personnel to be present. In many cases, businesses are able to increase substantially in size and reach with minimal increases in the number of personnel required to manage day-to-day operation of the businesses (so-called "scale without mass"). This has been particularly true in the case of Internet businesses,

Figure 4.3. **OECD and major exporters of ICT services, 2000 and 2012**

Billions of USD and percentages of total world exports of ICT services

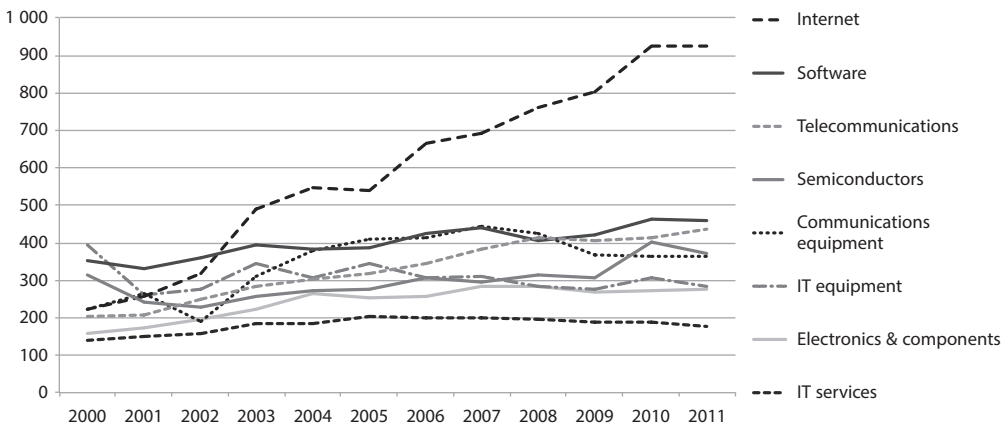


Data for Canada, Finland, Iceland, Israel, Mexico, Norway, Slovenia, Turkey and the United States refer to 2011 instead of 2012. For Luxembourg and Kuwait refer to 2002 instead of 2000, and for Denmark to 2004. Exports of computer and information services are not included for Mexico.

Source: OECD (2013), *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth*, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_scoreboard-2013-en.

which have in many cases quickly amassed huge numbers of users while maintaining modest workforces. As a result, the average revenue per employee of top Internet firms, as shown in Figure 4.4, is substantially higher than in other types of businesses within the ICT sector.

Figure 4.4. **Average annual revenue per employee of the top 250 ICT firms by sector, 2000-11**[3]



Source: OECD (2012), *OECD Internet Economy Outlook 2012*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264086463-en.

The ability to manage business centrally while maintaining substantial flexibility over the location of business functions has increased the ability of businesses to spread functions and assets among multiple different countries. While such globalisation of business among larger organisations is certainly not a new phenomenon, the spread of the digital economy, combined with the growing importance of the service component, as well as reductions in trade costs due to trade and investment liberalisation and regulatory reforms, have helped to remove logistical barriers and increase the pace at which such globalisation is possible. Technological advances have also permitted greater integration of worldwide businesses, which has increased the flexibility of businesses to spread their activities among several locations worldwide, even if those locations may be distant from each other and from the physical location of their ultimate customers. In addition to improving the flexibility of larger, more established organisations, advances in information and communications technology have made it more possible for even small and

mid-sized businesses to reach global markets from their inception. In short, global interconnectedness has grown to unprecedented levels.

Advances in technology have improved access to real-time market information and business analytics, and have improved communications within and between firms. These improvements have improved the capacity of businesses to manage their global operations on an integrated basis, with individual group companies exercising their functions within a framework of group policies and strategies set by the group as a whole and monitored centrally. Improved telecommunications, information management software, and personal computing have significantly decreased the cost of organising and co-ordinating complex activities over long distances, and enabled the creation of new and more efficient business models. This integration has made it easier for business to adopt global business models that centralise functions at a regional or global level, rather than at a country-by-country level. Even for small and medium enterprises (SMEs), it has now become possible to be "micro-multinationals" that operate and have personnel in multiple countries and continents.

As worldwide operations have become more integrated, production processes increasingly take place as part of global value chains in which various stages of production are spread across multiple different countries, and are performed by a mix of independent and affiliated suppliers. Businesses are increasingly able to choose the optimal location for productive activities and assets, even if that location may be distant from the location of customers or the location of other stages of production. In addition, rapid advances in information and communication technology have meant that services such as data entry, information processing, research, and consulting can increasingly be carried out remotely. These functions can be carried out by related parties, or, if a business determines that it is more advantageous to outsource the function, by an unrelated service provider.

There are limits to this flexibility, however. In general, fragmentation of activities among multiple locations involves trade-offs between lower costs for the activity itself and higher transaction and co-ordination costs. In addition, skills and talent remain a critical resource in the digital economy. Although many functions can be performed with limited personnel, managers, developers, software architects, and designers, among other key functions, remain instrumental. As a result, location of many of the substantial functions of a digital business must occur in locations in which these key people are willing to work. Further, although digital services can substantially expand the reach of businesses, these digital services often require a massive investment in infrastructure components. For example, cloud computing providers must build "server farms" of interconnected computers, and while there may be some flexibility as to where these

resources are located, concerns like access to inexpensive and reliable sources of power and cooling may heavily influence the choice of location. In addition, in many businesses the user experience is meaningfully improved by proximity to the core infrastructure.

The result is that there are often compelling reasons for businesses to ensure that infrastructure resources are placed as close as possible to where key markets of users are, so that users experience less latency, shorter lag time, and higher quality. In addition, in some businesses, the need for a tangible presence in a jurisdiction for regulatory reasons may also limit choices about where to locate infrastructure and business activities.

4.3.2 Reliance on data

It is common in the digital economy for businesses to collect data about their customers, suppliers, and operations. For example, the use of a product or service by a user may provide data about the user that has value to the business as an input either in improving existing products and services or in providing products and services to another group of customers.

Data can include both personalised data and data that is not personalised, and can be obtained in a number of ways. In the case of personal data, as mentioned in Chapter 3 (3.1.5 Use of data), it can be obtained directly from customers (for example, when registering for an online service), observed (for example, by recording Internet browsing preferences, location data, etc.), or inferred based on analysis in combination with other data. It is estimated that sources such as online or mobile financial transactions, social media traffic, and GPS co-ordinates generate in excess of 2.5 exabytes (billions of gigabytes) of data every day (World Economic Forum, 2012). The dividing line between personal and non-personal data is not always clear; however, as data obtained from multiple private and public sources will frequently be combined in order to create value. A recent study quantifies the value of the Data-Driven Marketing Economy (DDME) and looks at the revenues generated for the US economy. The study found that the DDME added USD 56 billion in revenue to the United States economy in 2012 and notes that the real value of data is in its application and exchange across the DDME (Data-Driven Marketing Institute, 2013).

Although the use of data to improve products and services is not unique to the digital economy, the massive use of data has been facilitated by an increase in computing power and storage capacity and a decrease in data storage cost, as shown in Figures 4.5 and 4.6, which has greatly increased the ability to collect, store, and analyse data at a greater distance and in greater quantities than was possible before. The capacity to collect and analyse data is rapidly increasing as the number of sensors embedded in devices that are

networked to computing resources increases. For example, while traditional data collection for utility companies was limited to yearly measurement, coupled with random samplings throughout the year, smart metering could increase that measurement rate to 15 minute samples, a 35 000 time increase in the amount of data collected (OECD, 2013). This has manifested itself in particular in the concept of "big data", meaning datasets large enough that they cannot be managed or analysed using typical database management tools. The value of the ability to obtain and analyse data, and big data in particular, is increasingly well documented by market observers.

Figure 4.5. **Estimated worldwide data storage**

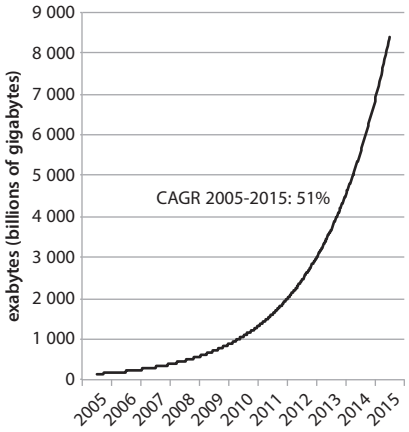
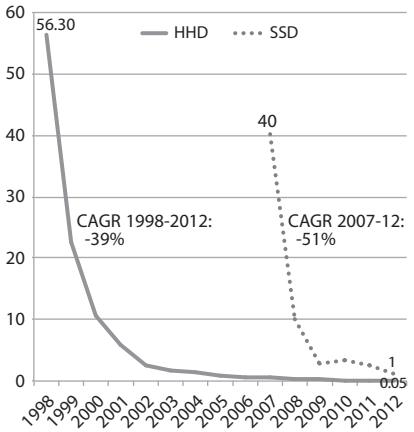


Figure 4.6. **Average data storage cost for consumers 1998-2012**



Source: OECD (2013), "Exploring Data-Driven Innovation as a New Source of Growth: Mapping the Policy Issues Raised by 'Big Data'", *OECD Digital Economy Papers*, No. 222, OECD Publishing, Paris, http://dx.doi.org/10.1787/5k47zw3fcp43-en.

For example, in a 2011 report on big data, the McKinsey Global Institute estimated the value that could be created through the analysis and use of big data at USD 300 billion in the health sector in the United States and at EUR 250 billion in the general government sector in Europe. The same report estimates that use of big data could generate a total consumer surplus of USD 600 billion. Big data has substantial application in targeting government aid and services as well. It has been used, for example, to monitor refugee movements following natural disasters, in order to ensure that health risks could be accurately predicted and aid could be well targeted (World Economic Forum, 2012).

The McKinsey Global Institute Report notes five broad ways in which leveraging big data can create value for businesses:

i. Creating transparency by making data more easily accessible in a timely manner to stakeholders with the capacity to use the data.

ii. Managing performance by enabling experimentation to analyse variability in performance and understand its root causes.

iii. Segmenting populations to customise products and services.

iv. Improve decision making by replacing or supporting human decision making with automated algorithms.

v. Improve the development of new business models, products, and services.

4.3.3 Network effects

Networks effects refer to the fact that decisions of users may have a direct impact on the benefit received by other users. A simple example of this is the introduction of the fax machine. While a single fax machine had no utility by itself, users choosing to purchase a fax machine received the benefit of the decisions of earlier users to purchase a fax machine, in the form of the ability to communicate through this new technology with an existing network of potential counterparties.

These network effects are an important feature of many businesses in the digital economy. Network effects are seen whenever compatibility with other users is important, even where the primary purpose of a particular technology may not be to interact with others. For example, a widely-adopted operating system will generally have a larger amount of software written for it, resulting in a better user experience. These effects are known as positive externalities, meaning situations in which the welfare of a person is improved by the actions of other persons, without explicit compensation. For example, when additional people join a social network, the welfare of the existing users is increased, even though there is no explicit agreement compensation among the users for this improvement. Externalities can also be negative. For example, as an increasing number of persons use a communications network at the same time, congestion may decrease the value to each user of the network, with no compensation among the affected parties (Easley and Kleinberg, 2010).

Some network effects come from users' marginal utility to each other: the more users there are, the higher the value created is. A simple example is a media sharing site, in which all content is generated by users, and the experience of users is enhanced as additional users join and share content.

Where a business model encourages interactivity among users, it tends to encourage these network effects. For example, in certain business models, network effects come from a competitive advantage gained from the critical mass of buyers and sellers. A retail site may develop an architecture that encourages users to review and tag products. These user reviews enhance the ability of users to make informed choices, while product tagging improves their ability to find products relevant to their interests.

Other network effects derive from vertical integration, relying on synergies between different layers or different applications to create added value and consolidate market position. This is particularly illustrated by the trend toward the "Internet of Things", in which companies deploy software in many devices and objects, and leverage this web of infrastructure to sell goods or services either to the owners of those devices or to advertisers. In this model, hardware and software infrastructure becomes a privileged channel to get in touch with end users and to create value by monetising their attention (advertising-based business models), the data that flows from them, or the externalities generated through network effects, or through selling them goods or services.

4.3.4 Multi-sided business models

A multi-sided business model is one that is based on a market in which multiple distinct groups of persons interact through an intermediary or platform, and the decisions of each group of persons affects the outcome for the other groups of persons through a positive or negative externality. In a multi-sided business model, the prices charged to the members of each group reflect the effects of these externalities. If the activities of one side create a positive externality for another side (for example more clicks by users on links sponsored by advertisers), then the prices to that other side can be increased.

An example of a multi-sided business model involving positive externalities for different sides of the market is a payment card system, which will be more valuable to merchants if more consumers use the card, and more valuable to consumers if more merchants accept the card. Similarly, an operating system is more valuable to end users if more developers write software for it, and more valuable to software developers if more potential software purchasers use the operating system.

A negative externality from one side for another side (e.g. displays of intrusive and unattractive advertising banners) can be offset by a lower price, or even no charge or a reward for the users. The classic case in which one side experiences negative externalities from the other side's participation is found in the media industry. In that case, a company attracts users by

providing content (television or radio programming, a magazine, a trade publication, a phonebook, or a newspaper) for free or at a cost less than the cost of production. The media company displays advertisements to its readers/listeners/viewers and earns revenue from advertisers whose ads it displays. Alternatively, it might earn revenue from selling information about its readers/listeners/viewers to interested parties.

The rise of the digital economy made multi-sided business models more prevalent in a cross-border context. In this regard, two key characteristics of multi-sided business models in the digital economy should be noted:

- **Flexibility:** The nature of digital information and the infrastructure of the Internet greatly expand the facility to design and implement multi-sided business models. Resources such as content, user data, or executable code can be stored to create value long after they have been produced. This specific nature of digital resources makes them an asset in business models where the different sides of the market can be created then dynamically adapted based on evolving technology, the latest expression of consumer demand, and a firm's position on the market. In addition, as discussed below, digital technology has enhanced the ability to collect, analyse and manipulate user and market data, which has allowed platforms to enhance the value to one side of a market of the participation of the other side of the market.
- **Reach:** The digital economy also makes it easier to locate the different sides of the same business model in different countries. Whereas many traditional multi-sided business models such as broadcasting paid for by advertising, or shopping malls were confined to a limited perimeter due to physical constraints or to regulations, over-the-top businesses in the digital economy can more easily connect two sides that are located far from one another to maximise value on each side. For instance, resources designed to collect data can be located near individual users, whereas the infrastructure necessary to sell this data to paying customers can be located elsewhere.

The digital economy features two prominent categories of multi-sided business models. First, a business can operate several applications that provide complementary services. This creates two types of synergy: on the one hand, the various activities pool their resources such as executable code, content, or user data; on the other hand, the activities may be put into a package that is more attractive for users. Second, vertical platform models are used to make resources available for third-party developers so as to attract their creativity as part of open innovation strategies. A platform is often the result of the large-scale development of an application that gets

commoditised. For example, a company may develop a social networking service, using internally produced applications to attract consumers and funding operations through the sale of advertising. The company may also choose to open an application programming interface (API) which allows developers to easily implement applications using the platform. Access to the API minimises the developers' initial investment and facilitates their access to the market of consumers that use the platform. The participation of the developers, in turn, enhances the user experience, thereby further strengthening the company's position in the marketplace.

4.3.5 Tendency toward monopoly or oligopoly

In some markets, particularly where a company is the first actor to gain traction on an immature market, network effects combined with low incremental costs may enable the company to achieve a dominant position in a very short time. This ability to gain traction can be enhanced where a patent or other intellectual property right grants one competitor the exclusive power to exploit a particular innovation in a particular market. The impact of these network effects tend to lead to this result, for example, where companies provide a platform or market in which users on one side of the market prefer to use only a single provider, so that value to those users is enhanced when a single standard is chosen, and the price that can be charged to the other side is enhanced because the platform becomes the only means of access to those users. Ease of adoption of a new platform means that some players, as a result of customer choices compounded by network effects, have been able to rise to a dominant market position extremely quickly. In some cases, despite the volatility outlined below, companies have been able to leverage that market position to secure dominance. In markets that feature this tendency, network effects are magnified. It should be noted, however, that in the digital economy, many networks operate simultaneously, with the result that in many cases competition in a monopolised market may be influenced by other markets, which combined with the reduced entry barriers, can moderate monopoly power in the first market.

4.3.6 Volatility

Technological progress has led to progress in miniaturisation and a downward trend in the cost of computing power. In addition, neither an Internet end user nor in many cases the service provider are required to pay a marginal price for using the network. These factors, combined with increased performance and capital expenditure have markedly reduced barriers to entry for new Internet-based businesses. These factors have combined to foster innovation and the constant development of new business models. As a result, in short periods of time, companies that appeared to control a substantial part

of the market and enjoyed a dominant position for a short period of time have found themselves rapidly losing market share to challengers that built their businesses on more powerful technology, a more attractive value proposal, or a more sustainable business model. Due to the fast pace of innovation, the few companies that have managed long-term success typically have done so by investing substantial resources in research and development and in acquiring start-ups with innovative ideas, launching new features and new products, and continually evaluating and modifying business models in order to leverage their market position and maintain dominance in the market.

Notes

1. E-commerce includes orders made over the Internet, through an extranet (a network where outside business partners, supplier or customers can have limited access to a portion of enterprise intranet/network), or through an electronic data interchange (EDI – a proprietary electronic system used for exchanging business data over networks).

2. Cloud computing is defined in the report of the US National Institute of Standards and Technology (NIST) as ''a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.''

   According to NIST, the cloud model is composed of five essential characteristics:

   - **On-demand self-service**: A user can unilaterally act without requiring human interaction with each service's provider.
   - **Broad network access**: Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous client platforms (e.g. mobile phones, laptops, and PDAs).
   - **Resource pooling**: The provider's computing resources (e.g. storage, processing, memory, network bandwidth, and virtual machines) are pooled to serve multiple users using a multi-tenant model.
   - **Rapid elasticity**: Capabilities can be rapidly and elastically provisioned.
   - **Measured Service**: resources use can be monitored, controlled, and reported providing transparency for both the provider and consumer of the utilised service.

3. The ICT Top 250 list is a well-established list compiled by the OECD since 2002. The sources used to identify the top ICT firms include Business Week's Information Technology 100, Software Magazine's Top 50, Forbes 2000, Washington Post 200, Forbes Largest Private Firms, Top 100 Outsourcing, World Top 25 Semiconductors. The list relies on financial reports available publicly. The OECD defines ICT activities as production of goods or services "primarily…intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display" and therefore ICT firms are those that produce the equipment, software and services that enable those activities. Each of the top 250 firms is classified by ICT industry sector: *i)* communication equipment and systems; *ii)* electronics; *iii)* semiconductors; *iv)* IT equipment and systems; *v)* IT services; *vi)* software; *vii)* Internet; and *viii)* telecommunication services. Note that these figures describe total revenue earned, rather than net profits.

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