European Parliament

Is data the new oil?

Competition issues in the digital economy

SUMMARY

The global debate on the extent to which current competition policy rules are sufficient to deal with the fast-moving digital economy has never been more pertinent. An important part of this debate concerns the market power of large high-tech companies that dominate many online markets. The main factors behind these developments are economies of scale and scope, network externalities, and the rising economic significance of data, which are a highly valuable commodity in an online economy. While being indispensable to the development of potential game changers – such as artificial intelligence – data are also a crucial input to many online services, production processes, and logistics – making it a critical element in the value chain of many different industries.

Data-dependent markets are also characterised by a high level of concentration and, according to many experts, high entry barriers relating to access to and ownership of data – which make it difficult to challenge the incumbent companies. On the other hand, the large players are generally considered to be very productive and innovative. Some studies, however, show that the diffusion of know-how and innovation between the market leaders and the rest of the economy may be affecting competiveness in general.

One possible way to correct these shortcomings is to regulate the sharing of data. While the risks of policy-making in this field are generally well-known and centre around the need to protect privacy – particularly where personal data are involved – and to prevent the collusive aspects of data sharing, there is currently no global model to follow. The European Union has taken multiple initiatives to unlock data markets through modern, user-centred laws such as the General Data Protection Regulation (GDPR) and the regulation on the reuse of public sector information. The global thinking seems to gradually favour more prudent oversight of the market, considering its economic heft.

In this Briefing

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Context

One of the fundamental questions facing modern economic policy is whether and how to regulate the digital economy. The two main lines of debate are taxation and competition. Taxation has gathered international attention with some pioneer tax efforts by individual countries, the 2018 EU tax proposals, and the OECD efforts to work out a global solution.[1] Competition is hotly debated, and points of view across the world vary. Many argue that regulating the digital economy stifles innovation and reduces its growth potential, while others say that legislation has been lagging behind the dynamic developments and that, in effect, a number of market failures have already materialised. The pivotal issues in this context are the extent to which the current competition policy rules are sufficient to deal with the fast-moving digital economy, and how to modify them so that they can address the new concerns adequately.

The global economy has undergone profound and rapid change with the rise of digital technology. This shift is consistent with the general rise of the intangible economy over the past 20 years, attributed mainly to technological progress that enhances the productivity of skills and capital. This technology-based transition towards intangibles could be the main factor behind many major economic trends shaping today's economy, such as income polarisation and reallocation of credit from productive to asset financing.[2] This transition has accelerated significantly in recent years. In the last decade alone, the list of the world's largest global companies has changed dramatically. Businesses characterised by ownership of strong fixed capital assets, particularly those active in the oil sector, dominated the world's top firms in 2008. Ten years later, in 2018, the value of the intangible economy had risen to such an extent that the five largest global firms were all technology companies.[3]

Table – Largest global companies in 2008 and 2018

	2008			2018		
Rank	Company	Founded	Value (US$ bn)	Company	Founded	Value (US$ bn)
1	**PetroChina**	1999	728	**Apple**	1976	890
2	**Exxon**	1870	492	**Google**	1998	768
3	**General Electric**	1892	358	**Microsoft**	1975	680
4	**China Mobile**	1997	344	**Amazon**	1994	592
5	**ICBC**	1984	336	**Facebook**	2004	545

Source: Visceral Business, 2018.

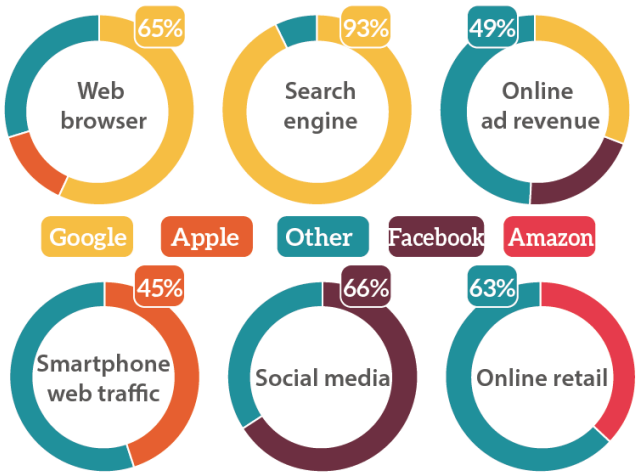
A crucial question is whether the large technology companies exert market power that is significant to the point of being disadvantageous to competition, consumer welfare, and productivity. The Organisation for Economic Co-operation and Development (OECD) maintains that, while there are differences between the United States and the EU, market power seems to have been increasing in both regions, although this increase is not exclusive to digitally intensive sectors. Empirical research points to the fact that many OECD countries, particularly the US, have experienced a rise in the number of 'superstar firms'. While such firms indicate rising concentration in economic sectors, they are often considered to be highly productive and innovative.

It is important to note that both the EU and the US suffer from overall stagnating productivity. One of the factors behind this is the uneven concentration in the economy – while some firms experience strong productivity gains, mainly thanks to rapid technological progress, others are stagnant and

not able to catch up. The rising divide between the pioneering companies and those lagging behind has been identified by the OECD, which concluded that technological diffusion is stalling and dragging down overall productivity. The reasons that make it increasingly difficult for non-leading firms to compete with market leaders are mainly the rising barriers to market entry and the high costs of switching to a knowledge-based economy.

Indeed, it is no coincidence that certain digital markets, such as those with strong presence of online platforms, and which have had to face faster and more profound technological changes, are characterised by a disproportionately higher growth in concentration rates.[4] This suggests that technological dynamism plays an important role in turning leading firms into dominant superstars. Indeed, the International Monetary Fund (IMF) talks about the emergence of superstar sectors based on digital innovation.

Figure 1 – Global market share by company



Sources: W3Counter, GSStatCounter, eMarketer.

Innovation in many sectors of the digital economy requires high fixed costs but can be reproduced extensively at zero marginal cost, which is what creates increasing returns to scale. Undoubtedly, the rise of platform and knowledge-based superstar firms is currently unmistakable in the digital economy, where only a handful of companies control the largest market share (see Figure 1).

There are rising concerns that this trend is the sign of a shift of digital markets towards a 'winner-takes-all' dynamic, where the companies that achieve market leadership, or manage to control a significant share of the market, can tip the market in their favour, becoming very difficult to 'dethrone' and creating a number of issues in the area of market competition, as discussed below.

What makes the digital economy distinct?

The economic literature recognises some main inherent characteristics of internet-based business models. These models often lead to the development of ecosystems that give incumbents a strong competitive advantage. First, the cost of production of digital services and goods is often disproportionately low considering their large numbers of users. This leads to enormous returns to scale, which, while not exclusive to the digital economy, have a more pronounced effect in this sector, where marginal costs are often low or close to zero.[5] Digital firms may also reach economies of scope, where data from one stream are used to generate new services. According to the OECD, these characteristics create a new situation when compared to traditional business models. The lower production costs, the easier penetration of multiple markets, and the higher intensity in knowledge assets make it possible for digital companies to scale up faster, generating rapidly increasing returns to scale. This first-mover advantage can potentially make it harder for new players to enter the market. Digital firms are able to achieve scale without mass. They can have a strong presence in a particular market, to which they supply their digital services, without being physically established in that market.

Second, the digital economy is characterised by strong network externalities.[6] The more users embrace a given product, service, or technology, the easier and the more attractive it is for new

users also to jump onboard. There are currently two kinds of network effects: (i) direct network effects – typical of social networks and communication applications and platforms, such as Facebook and WhatsApp, where the new users are attracted by the numbers of existing users, and (ii) indirect network effects – typical of platforms that facilitate transactions, such as Amazon, and of platforms with an advertisement-based revenue model, such as YouTube. In the latter case, a platform becomes more appealing to one group of users (e.g. advertisers) as another group of users (e.g. consumers) grows in number. From a competition point of view, these network effects may make it more difficult for a new entrant to compete with an incumbent market leader – the mere fact of having better quality or a lower price may not be enough to convince the users of an established company to switch to a new platform, even if it is objectively superior.

Third, the use and importance of data have risen substantially with the emergence of the digital economy. While becoming increasingly significant for all sorts of commercial purposes, data also play a crucial role in achieving the economies of scale and network externalities discussed above. The technology-assisted use of data may well have been the leading force behind the ongoing digital transformation. As such, the role of data has come to the forefront of the current debate on regulation of the digital economy.

Economic significance of data

The amount of data generated in the constantly evolving digital economy is growing at an increasing pace. In 2016, IBM reportedly noted that 90 % of the data in the world today had been created in the past two years alone. Amounts are bound to increase even faster – experts estimate that the Global Internet Protocol (IP) traffic, a proxy for data flows, will be twice as big in 2021 as in 2018. Data will become even more important due to the fact that they are being increasingly generated by networked end-user devices and the Internet of Things (IoT). The economy is inevitably moving towards the wider production of new products and services based on general-purpose technologies, such as artificial intelligence (AI), machine-learning, and other similar high-performance computer-driven processes whose real utility and value are impossible to estimate today. These technologies all depend on availability and access to data.

Data may be the new most valuable asset in the modern economy. As such, they will play an increasingly fundamental role as a parameter of competition, with many consequences for today's businesses. While being indispensable to the development of potential game changers such as AI, data are also a crucial input to many online services, production processes, and logistics – which in turn makes them a critical element of the value chain of numerous industries. Data can also be used to create innovative business models (usage data and process data may be analysed to enhance servitisation) and entirely new markets (such as fintech). As a result, and perhaps unsurprisingly, the phrase 'data are the new oil' is increasingly heard in discussions on competition in the digital era, particularly since the publication of a widely referenced article by *The Economist* in 2017.[7] A key difference is that, while oil is obviously a finite and non-reusable resource, data can be infinite and reused – with account taken of ownership and access rights.

Information has always had a value in economic activities. However, the IMF singles out two relatively recent technological trends that are essential to explaining the meteoric rise in importance of data – technological progress and the development of sophisticated analytical techniques. Technological progress has sharply reduced the costs of collecting, storing, and using quantifiable data – which, due to increasingly digitalised economic and social activities, are constantly being produced. The development of sophisticated analytical techniques has enabled advanced degrees of data processing, which in turn produce greater value from data. The significance of these two factors may be illustrated by the fact that data are central to the highly lucrative business models of the world's largest corporations.

According to the OECD, as the volume of data continues to rise, 'data ownership is concentrating, but its overall value remains unknown. International bandwidth usage is increasingly shifting

towards content providers such as Amazon, Google, Facebook, and Microsoft, among others'. The ability of many of these large digital firms to asymmetrically acquire and analyse data, including across a wide range of products and markets, raises legitimate competition policy questions. This is particularly valid for enterprises whose central role in data acquisition and analysis may raise significant barriers to entry for other firms.

Competition issues

There are rising concerns regarding competition in data-intensive markets – the reasons for which are not yet consensual or fully understood. They may stem from the natural structure and characteristics of digital markets, the regulatory barriers to competition, problems associated with the conduct of firms, or a combination of all of these. Some characteristics inherent to the digital economy, such as economies of scale and scope, network externalities, and cost structures, have the potential to create entry barriers. There are indeed signs that competitive intensity may be weakening on a number of digital markets, as indicated by the growth of the mark-ups charged by companies in relation to their costs, and the reduction in the numbers of new players entering the market. High levels of concentration and dominance have already been achieved on a number of digital markets. As the next technological revolution will most likely centre around AI and machine learning, the companies best placed to take advantage of it may well be those that are already large at present, given that data are indispensable for these technologies to thrive. This could create more insurmountable entry barriers. The question therefore is whether data should be managed in a way that ensures adequate competition. Since data can be used by a number of firms simultaneously and can play an important role in firms' competitiveness and opportunities to innovate, the wide dissemination of data and the use of them by the largest possible number of firms could, in principle, increase economic and social welfare.[8] Empirical research shows, however, that enterprises may have incentives to hoard data in order to maintain their advantage over potential competitors, decreasing overall welfare.

Some experts believe that holding a large pool of user data generated by certain digital platforms confers substantial advantages to established companies. They are thus able to acquire a competitive advantage by means of a mechanism known as a feedback loop, which means improving the quality and value of a firm's products and services either by using data already at its disposal or by using revenue generated from business users, such as from targeted online advertising. These improvements in turn draw users attracted by higher quality and better-targeted products and services, creating a virtuous cycle that makes it hard for small players to challenge large companies. The exclusive ownership of data may therefore lead to weaker competition. Consequently, the benefits from the feedback loop may not be fully shared with customers, whether there is foul play on the part of large companies or not. The OECD notes that 'the dominant platform may not do anything that can be properly qualified as anti-competitive, and yet the feedback loop can reinforce dominance and prevent rival platforms from gaining customers'. Additionally, there are a number of recognised market failures due to data ownership and analysis, such as exploiting consumers' behavioural biases – consumers not able to choose the best course of action – and information asymmetry – consumers not knowing or understanding what data they share.

Furthermore, users may be locked into a company if their data cannot be easily transferred, because of the risk of losing it. Because many dominant players in the data economy cover the entire online value chain, they link multiple online markets, combining data and generating valuable datasets that cannot be easily replicated. Such 'ecosystems' may raise barriers to entry if they integrate complementary services without making them inter-operable with alternative offers, given that potential competitors are then forced to duplicate the broad offer. Data also become an important issue when competitors merge, creating larger datasets and significantly increasing their market power. Moreover, data can be used with the intention of excluding competitors, leading to instances of abuse of a dominant position.

The OECD sees specific risks related to big data that make the increasing economic returns on data harder to exhaust, prolonging the phase in which businesses grow rapidly. By the time the growth of big data firms starts to slow down, they have already become so big that smaller players find it hard to compete effectively. The cost structure of treating and using information initially involves high sunk costs, followed by close-to-zero marginal costs. Once the system is in place, data algorithms constantly improve it and increase its quality, leading to high economies of scale and scope and facilitating market concentration by dominant firms. Some examples of anti-competitive practices specific to big data are: an online platform granting an enterprise exclusive access to data providing it with an unfair advantage over its competitors, the leveraging of data from one market to achieve market power elsewhere by 'bundling' or 'tying' strategies, and the collusion of firms forming digital cartels that use algorithms with market data.

The debate on the competitive implications of data is far from settled, given that the available evidence is often mixed. Opponents of classifying digital champions as monopolies argue that past evidence from similar dynamic technology and innovative markets shows that there is no guarantee that a firm's dominant position today will endure in the future or that the dominance is bad for consumers' welfare. They also maintain that data themselves have no intrinsic value – only when data can solve specific problems in previously impossible ways do they acquire value – and that this requires investment, innovation, and the right managerial toolkit. Defenders of the competition policy status quo argue that both network and scale effects ultimately benefit consumers and society at large, for they deliver better and more innovative goods and services that would be impossible to produce without a certain scale. They also argue that entry barriers created by data are weaker than they seem because a) the same data can be used by competitors, b) data lose value quickly, c) cloud services lower costs, and d) high costs of entry exist in many other competitive industries, such as the automotive industry. Furthermore, many companies apparently understand that the short-term benefits of hoarding data are inferior to the long-term benefits of sharing them, despite the legal uncertainties surrounding data sharing. Defenders of large data-based companies conclude that 'any potential harms are more likely to be related to conduct, rather than structure, and these can occur in industries with higher as well as moderate concentration ratios.'[9]

Data sharing

A widely debated method to address the competition concerns discussed above is to regulate the sharing of data, and even to make it mandatory in specified cases. As long as privacy and security are safeguarded, sharing data may indeed generate a broader social good. Pooling together the same type of, or complementary, data may enable firms to develop new or improved goods and services, and to base their algorithms on a broader, more meaningful basis. The relatively short history of the digital economy indicates that preventing data portability and inter-operability, which are essential prerequisites for data sharing, creates barriers to entry and limits competition. A recent report prepared for the European Commission by a group of experts suggests that data portability could be imposed on certain dominant incumbent firms, possibly through sectoral legislation, in cases where particularly strong lock-in effects are present. Inter-operability may be enforced through common standards and sector-specific regulations.

However, data portability itself may not be the most effective solution to competition concerns stemming from fundamental characteristics of digital markets, whose cost structure often requires strong economies of scale and whose network externalities may continue to prevent consumers from switching between competitors. The extent to which inter-operability standards would weaken these characteristics is unclear. Furthermore, ensuring data portability may be costly, particularly for SMEs. The report for the Commission therefore advises that mandating data inter-operability should (i) be carried out by sectoral legislation, with a focus on situations where data access opens up secondary markets for complementary services, or (ii) be limited to dominant firms to mitigate anti-competitive risks. However, data sharing or pooling has its own limitations and risks. It should neither shut out competitors from the market nor facilitate the exchange of commercially

sensitive information, such as costs or prices. These limitations reduce the amount of data that is actually shareable – they need to be limited in scope, aggregated, and anonymised. Furthermore, regulators need to be careful not to create disincentives for enterprises willing to collect and process data, leading them instead to 'free ride' on publicly available data pools.

While the risks of policy-making in this field are generally well known and centre around the need to protect privacy – particularly where personal data are involved – and preventing the collusive aspects of data sharing, there is currently no global model to follow. It is important to remember that competition policy is not the only determinant of how data should be shared. The interaction among different legal regimes regulating access to data also plays a major role. The IMF advocates an integrated cross-cutting policy which (i) clarifies the distribution of economic returns from data, (ii) encourages user control of data, and considers mandatory data sharing across firms to boost competition and weaken the market power of incumbents, (iii) is based on robust cyber-security, and (iv) prevents international fragmentation in data markets.

It is worth mentioning that the European Union's General Data Protection Regulation, known as GDPR, sets the global standard for access to data. The importance of the GDPR as a modern policy framework is likely to increase. Its emphasis on data protection and personalised data control creates a regulatory model that puts the user and the generator of data in control, and possibly limits the power of enterprises. However, the emphasis of EU law on data protection has also brought to public attention the regulation's possible wide-ranging impact on the economy. GDPR critics maintain that it may even undermine innovation or become a quasi-tax on digital technologies. However, according to International Telecommunications Union (ITU), the international regulatory body, the effects of the GDPR on business models are more likely to lead to positive effects, tackling monopolistic structures and lock-ins and promoting consumer trust in digital markets.

The European Union has taken a number of important steps to actively open up its data markets, including laws that enable the reuse of public and publicly funded data and that address the fragmentation of markets along national lines (Regulation on free flow of data). As a result, the subtle balance between safeguarding public interest and guaranteeing framework conditions conducive to sound competition and innovation seems to have been maintained. However, effective oversight of data markets by the Commission is likely to continue to be necessary. The European Commission will be better equipped to monitor digital markets thanks to dedicated funding under the Single Market Programme, which will finance new IT tools and expertise. Recent developments in the United States, where Congress has begun to question the high-tech sector's market power and its influence on competition, seem to confirm the need for more careful scrutiny on the part of the Commission.

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ENDNOTES

1 For more details, see EPRS briefings on digital services tax and taxation of significant digital presence.

2 Income polarisation is a process of concentration of income in two groups – high and low income groups. This usually means that 'the rich are getting richer, and the poor are getting poorer,' leading to a squeezing out of the middle-income group. In this particular context it may mean that, as intangible assets become more productive, innovators gain a rising income share and accumulate savings, leading to increased house prices and inequality in the economy.

3 Taking into account the top 10 companies, half of the largest firms were oil companies in 2008, while in 2018 seven out of 10 were technology companies.

4 In its 2016 communication, the Commission identified a number of characteristics common to online platforms: 'they have the ability to create and shape new markets, to challenge traditional ones, and to organise new forms of participation or conducting business based on collecting, processing, and editing large amounts of data; they operate in multisided markets but with varying degrees of control over direct interactions between groups of users; they benefit from 'network effects', where, broadly speaking, the value of the service increases with the number of users; they often rely on information and communications technologies to reach their users, instantly and effortlessly; they play a key role in digital value creation, notably by capturing significant value (including through data accumulation), facilitating new business ventures, and creating new strategic dependencies.'

5 Marginal costs are a change in total production costs generated by producing one additional unit of goods or services.

6 Network externality is a notion that explains that a demand for a given product or service is related to the demand of other consumers purchasing that product or using that service. In other words, the buying patterns of customers are influenced by other users of a product or service.

7 The phrase is widely attributed to British mathematician Clive Humby, who used it in 2006.

8 Caveats to this include privacy concerns and risks of weakening incentives for firms to invest in gathering data if they assume that the data will be available for free elsewhere.

9 As shown by the cases where the Commission challenged Google, abuses of dominant position based on data and size do occur. Those cases also show that digital markets are so dynamic that ex-post intervention by competition authorities should happen when the company is already too big to be effectively challenged by the other smaller firms.

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