

ADDRESSING COMPETITION CONCERNS IN BIG DATA

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ABSTRACT

The dynamics of time never remain static and especially in the arena of technological development it has always been boosted with new developments leading to rise of digital economy in global scenario. It has created a new virtual gold in form of 'Data' where entire trade warfare depends upon access and utilization of such data. While the world stood in admiration and awe at the arrival of Artificial intelligence, as an "invisible hand of help", it created a flutter of sorts and raised many an eyebrows amongst the academicians and practitioners of law. What worries the academicians and practitioners alike is the uncertain and infinite dimensions of its relationship with Competition law. Unaware of the risks and uncertainties it may lead to, the regulatory bodies often resort to the "precautionary principle" and decide not to interfere at such nascent stages as it may lead to disturbing the market dynamics and thereby stunting growth. A digital economy, though very clear in its principles, poses certain challenges when put into practice. It threatens to upset the spirit of competition, as the reliance on digital economy continues to grow. Moreover, witnessing the exponential growth of AI as a mute spectator can be equally catastrophic as the possibility of its abuse by the players would also increase due to the non-interventionist approach by the regulators. Not only is the growth of Artificial intelligence certain, that too by leaps and bounds due to its efficiency increasing attributes, but also the fact that it has changed, forever, the way things were done. This, therefore, must lead to another important change: The approach and tools of Competition regulators in dealing with this new enigma!

In the course of this paper, the author attempts to highlight what big data is and how big data can be manipulated. The author intends to focus on why cartels can pose a serious threat in a

digital economy and why a stringent competition policy and strong competition laws are important to help such an economy. The paper further aims to analyze the position of big data scrutiny from antitrust dimension in major Asian jurisdictions and EU.

INTRODUCTION

A digital economy is an internet based economy. Such an economy focuses on making the world a smaller place where communication is easier, and jobs are burgeoning, thereby fuelling economic growth. A digital economy, though very clear in its principles, poses certain challenges when put into practice. It threatens to upset the spirit of competition, as the reliance on digital economy continues to grow. As cartels begin to be formed, and big data starts to be manipulated by the more powerful players, we start moving further away from realizing the full potential of the benefits of a digital economy. The users globally remain concerned about the leverage drawn by multinational data based companies like Facebook and Google in relation to possible storage and utilization of data. Although the initial investigations focused on the breach of data security from privacy perspectives, a continuous lead in the matter compelled the global anti-trust authorities to have a common idea of such Big Data and its possible nuances in interfering with markets.ⁱ

The digital economy is not restricted to just the use of internet, but how well we are able to use technology to perform our tasks better and with more precision, more efficiency and sometimes, how differently we are able to do it. The technologies encompass a whole lot of things like hyper-connectivity, big data, advanced analytics, mobile devices and social media.ⁱⁱ

Every local region needs to keep up with the global digital economy as its future success depends on how well it adapts to the growing pace of digitalization. To achieve a digital economy, we need to bring closer our digitally exposed business community and our government to find areas where technological innovation can be blended with a digital focus in planning and policy making.ⁱⁱⁱ If we do not do so, we risk being left behind compared to other countries who are trying to position themselves as being supportive of digitization, technological focused innovation and business development.

DEFINING BIG DATA

The proliferation of electronic and communication technologies led to an exponential growth of data. This ubiquitous data is “big” on the scales of- variety and quantity. Just as with “data”, there also does not exist any universally accepted definition of “Big Data”.^{iv} The term elicits an understanding which is different to different fields of work. Therefore, it must be understood contextually. It is, generally, understood to mean huge volumes of varied data sets procured from different sources and processing them with the aid of technology to derive meaningful information.^v Speaking of its hallmark features, the three “V”s or “Volume” (referring to the massive size of data); “Velocity” (referring to the speed at which the data is generated, analyzed and disseminated); “Variety” (indicative of varying sources and types of data) are its distinguishing characteristics.^{vi} Therefore, premising on its features, Big Data can be defined as *“information asset characterized by such a high volume, velocity and variety to require specific technology and analytical methods for its transformation into value.”*^{vii}

Apart from the data, other technological advancements like Artificial Intelligence^{viii}, Internet of Things^{ix} and Machine learning^x also form part of this Big Data ecosystem.

However, data alone is not of much significance unless it is processed to generate meaningful patterns which make it valuable.^{xi} This process is known as “Data Analytics”^{xii} and is achieved through the phenomenon of “deep learning”. Therefore, any and every strand of information, ranging from one’s highly sensitive personal biometric information, contact details, financial history to grocery purchases, YouTube history and even sleep and exercise routine (recorded through fitness bands), is vital for it helps businesses discern pattern of behavior of individual consumers so as to customize its services to suit the consumer preference or taste.^{xiii} This helps the businesses target their consumers individually and improve the quality of their services thereby attracting more consumers to its network which results in generation of additional data, resulting in creation of a “user feedback loop”. Furthermore, with an increasing consumer base the company can exploit and monetize its platform (through advertisements, etc.) in a better way thus swelling its revenues-“monetization feedback loop”^{xiv}. Big Data analytics thereby allows the businesses to expand systematically and exponentially.^{xv}

BIG DATA AND INTERFACE WITH COMPETITION REGIME

The current developments have showed that such big data had a lot of unrealized potential of arm twisting a market from neutral to highly influenced market where a consumer loses the bargaining power unknowingly which has concerned the EU officials. The anti-trust authorities have globally been concerned with the mode of data collection and storage at one stage and the devastating use of such data for individual benefits at another stage. The key features of such behavior remain data oriented and data driven mergers and foreclosure of competition towards other less capable players in field of data generation.^{xvi} The EU Authorities have decide to look into both Data protection Laws and Competition Regime to strike a balance towards a naïve consumer in a highly advanced and sophisticated market.

ROLE OF ANTITRUST REGULATIONS IN DIGITAL ECONOMY: POSITION OF EU

In a digital economy, the two major challenges that Competition law hopes to counter are: Big Data and Cartel.

Big data can be best described as a large volume of data which can either be structured or unstructured that confronts a business on a day-to-day basis. Big data describes the generation of data from different sources ranging from social networking sites to messages on Alexa and the research you perform on internet. The data so collected when put to use for fulfilling business decisions and generating a highly influenced market for oneself brings out the actual concern of competition authorities.^{xvii} Analysis of data sets can find new correlations to "spot business trends, prevent diseases, and combat crime and so on."^{xviii}

In this evolving landscape of data utilization, it's imperative to consider the challenges and opportunities associated with managing diverse data sources effectively. The work by M. Muniswamaiah, T. Agerwala, and C. C. Tappert in the paper titled 'Approximate Query Processing for Big Data in Heterogeneous Databases' provides valuable insights into optimizing query processing in the context of heterogeneous data sources, making it highly

relevant to the discussion of Big Data in the digital economy and its impact on competition regulations in the European Union.^{xix}

However it's not the amount of data that matters. We need to be able to determine what firms intend to do with such data. As like in other simpler data segments such big data also has structured and unstructured segments though the real concern for our research lies in the generation of unstructured data which often go un-noticed.^{xx}

The utilization of this data is done to provide customized services and advertising to influence the choices of consumers.^{xxi}Big data has immense potential. It can help with climate change, or with helping an economy get bigger and better.

On 10 May 2016, the German Federal Cartel Office and French Competition Authority published a joint report on "Competition Law and Data" in which they analysed the link between big data, market power and exploitation. The joint report shed light over misuse of data and foreclosing the markets for genuine competitors. The report also talks about merger control activities like the merger of two firms who collect and sell data leading to data based conduct by dominant firms.

Similarly, the issue of Cartel prohibition which has always been a hot issue for competition authorities is gaining ground in the digital age. A cartel is a group of independent producers who collude to fix prices, limit supply and indulge in other trade practices.

The Cartel prohibition clauses were formed in a day and age, when there was little or no digitization. It has become increasingly clear that competitors do not need to communicate in person to fix prices, or have cartel agreements in this digital age. This is a looming and continuing challenge for competition authorities to deal with what comes along with a digitized economy.

In the case of U.S v. Topkins^{xxii}, it was deemed to be the first case where criminal prosecution attacked conspiracy in the e-commerce space. According to the facts of the case, David Topkins who was employed and involved in the online selling of posters and framed art, and other persons who were involved in the same conspiracy, conspired to fix the price of certain posters sold online through Amazon Marketplace. It was further alleged that Topkins had written the

software programming was targeted in order to achieve pre-decided terms in a complicated algorithm which looks like real time calculations. Section 1 of Sherman Act was violated as posters had not been sold at competitive prices. In this case, algorithms were used to fix the prices, and hatch the conspiracy of the agreement. It can safely be said that eventually more such sophisticated technology may be used to trespass the cartel prohibitions.

Eventually, Topkins agreed to the charges framed on the aspects of price fixation, pay a \$20,000 fine, and further co-operation with the continued investigation. The agreement though remained a subject of court's approval.^{xxiii}

Recently, the European Union fined search engine giant, Google, a record €2.4billion, for abusing its market dominance, by manipulating search results to favour their building of comparison shopping services. With a market share of over 90 percent in majority of European jurisdictions, the Commission found Google to be guilty of giving preferential treatment to its affiliated services over those of its rivals in the search results.^{xxiv}

Google search engine generates results for its consumers and the price paid by such consumers is exposure of their personal data to the company.^{xxv} Consequently, Google's comparison shopping service gets higher visibility from consumers in Google's search results in comparison to rivals. By artificially and fraudulently promoting its own services, the company has breached the basic norms of competition law. The commission has reached the conclusion that Google has abused a dominant position.

In what was another high profile case, the European Commission fined Facebook €110 million for providing misleading information about its merger with WhatsApp.

The EU guidelines on mergers prescribe a full and transparent data disclosure for clearing out a merger deal in time efficient manner. This duty is continuous irrespective of the outcome of merger deal.^{xxvi}

When Facebook took over the WhatsApp back in 2014, it informed the commission it would not be able to match user accounts on both platforms. Though it actually did so later on. The EU Commission revealed that the Facebook lied about the possibility of data links between

Facebook and WhatsApp during the disclosure at the pre-merger stage. Surprisingly, the deal was still green-flaged by the Commission.

Commissioner Margrethe Vestager, in charge of competition policy, said: "*Today's decision sends a clear signal to companies that they must comply with all aspects of EU merger rules, including the obligation to provide correct information. And it imposes a proportionate and deterrent fine on Facebook. The Commission must be able to take decisions about mergers' effects on competition in full knowledge of accurate facts.*"^{xxvii}

The big debate has just started over whether big data manipulation by bigger companies affects the smaller companies in how they can compete with the bigger companies. The concentration of market power is determined by merger control. How much market share is owned by a merged entity determines whether it seriously affects competition or not. Whether or not a merged entity enjoys the power to control a market is assessed on a case by case basis and the dynamics of the market. A new area of grave doubt is the potential use of data for marginalizing the competitors from the markets without being noticed.^{xxviii}

Several quarters have raised the issue that competition law should intervene in the several questions raised on the grounds of privacy and big data. This comes against the backdrop of considering competition law apt for every business concern. The main issue is the ever-growing concentrated online marketplace and the lack of control that users have on their information. But competition law has not been traditionally developed to answer the issues not directly concerned with having an appreciable adverse effect on competition including privacy issues. The European Commission has been reluctant to allow privacy under the aegis of competition law. This has been seen in the merger decisions of Google/DoubleClick and Facebook/WhatsApp where the Commission had said in no uncertain terms that "*any privacy-related concerns which arise because of the increased concentration of data do not fall within the scope of the EU competition law rules but within the scope of the EU data protection rules*".^{xxix}

It has been seen that Competition law authorities have focused on anti-competitive acts and not such acts that may broadly hurt the customers but cannot be classified as having an adverse effect on competition. However, someday there could be an advent of competition law in areas

previously regarded as non-competitive if they have an adverse effect on consumers in particular and businesses in general.

ROLE OF ANTITRUST REGULATIONS IN DIGITAL ECONOMY: POSITION OF ASIA

India

“While concerns about competitiveness associated with net neutrality are still fresh from the Telecom Regulatory Authority’s decision against discriminatory access to data services^{xxx}, Big Data has not come under specific competition scrutiny in India. There were reports which indicated that the Facebook-Whatsapp merger might be looked into^{xxxii} but there were no follow-up reports as to whether an application of approval was made or not and whether an approval came through. There has been an attempt to make out a case for the Competition Commission examining the Facebook/ Whatsapp merger too.^{xxxiii} While the Competition Commission of India is yet to examine Big Data and its impact on competition, it is noteworthy to mention opinion 83/2015 issued by the Competition Commission of India, wherein dominant position of Whatsapp and Google was alleged by the Informant.^{xxxiii} The Commission however observed that the informant had failed to make out a case under section 4 of the Competition Act 2002, under which, imposition of unfair or discriminatory terms has to be shown in sale of goods or service or price in purchase or sale of goods or services.”

Japan

On June 6, 2017 a report was published by the Japan Fair Trade Commission (JFTC). The report pertained to the interface of Big Data in competition scenario. Post the publication of the report there has been an increase in the amount of views expressed on the subject matter. Furthermore, both in Japan and overseas, data issues have gained growing attention.

The report published by the JFTC was the first such study which reflected the viewpoint of the Japanese antitrust regulators upon the digital economy among similar studies conducted by the US and European regulators. It highlighted JFTC's areas of concern relating to digital markets,

including data collection methods, unjust refusals to data access and the potential impact on merger reviews with respect to transactions involving data accumulation.

JFTC'S official view upon the subject matter is not reflected under the Report. It's still not clear if there will be any more action in the shape of an amendment to existing laws. The report has, however, clarified that the digital economy is to be covered under the scope of the competition regime. Additionally, the report renders unjust refusal to access data as unconstitutional in nature.

“While the report did not presume that an oligopoly of digitalized businesses constituted a problem, it recognized that rapid advances in machine learning and data accumulation could boost the power of existing dominant players exponentially and limit opportunities for new market entrants.”^{xxxiv}

JFTC as a regulator has shared the image of being the “*least politically charged*” regulator. However, there exist certain signals to suggest a hidden political agenda which occasionally happens to be nationalistic in nature. No firm opinions have been taken on the anti-competitive effects of Big Data, but political over-regulation in this area would be terrible if it slowed down innovative business models.

According to official statistics, a US-based digital business is more likely to have a greater user base than its Japanese counterparts:

- In comparison to Yahoo! Japan, Google has 14 times more monthly Users;
- Monthly users of Amazon is seven times more than that of Rakuten; and
- Monthly Users of Facebook is 86 times more than that of the Japanese social network Mixi.

The report clarifies that regardless of where the parties are located, Japanese competition law would apply if the competition harmed the Japanese market. However, there is still a potential that the JFTC will regulate US information technology businesses on the grounds that Japanese platforms are inferior to those in the United States, as has already occurred.

WAY FORWARD

Virtual economy has brought players working at both Ex Post and Ex Ante regulations on a common footing. The motive of competition law and its harmonization with other players was to check the players and emerging markets in a transparent manner. A player having existing market power is required to be checked for potential monopolization tactics. Though, such checks are performed on the basis of deep technical expertise in the relevant market segment.

Ex post regulations in competition regime is more suited for dynamic market where the possibility of regulations getting failed is comparatively high. It is also to be noted that our law allows and maintains a player's autonomy in deciding pricing mechanism, in the volatile market clubbed with differential pricing scheme and targeted discount mechanisms.

The habitual practice of Indian jurisdiction prefers *ex post* mode of regulatory tactics barring merger review which falls under *ex ante* domain. Although a data driven market may be hampered by use of such regulations as it de-incentivize R&D investment and discredits a player's investment and time put into them. Contrary to this a dominant player can be put to road by usage of well thought pricing mechanisms and carefully drafted prevention barriers.

1. Common Approach

"In making this revision, we have shifted from a legalistic-based approach to an interpretation of the rules based on sound economic principles." – Mario Monti

In essence, the basic goal of protecting and encouraging economic competition in order to achieve effective market performance is an economic goal in and of itself. Efforts to improve market efficiency contribute to the development of sound competition policy. The competition policy aims at protecting competition not for its own sake but for the purposes of ensuring a consumer friendly environment wherein diversity of products is ensured at a low cost and within the culture of robust innovations.

A proper functioning of the market ensures that the market players are properly incentivized to innovate.^{xxxv} Increase in innovation in the market ensures an improvement in the market standards. Such improvement in market standard, in turn, ensures economic growth. This very aspect makes the market more dynamic in nature.

Static policies go on to have a dire consequence on market benefits when such policies are formulated in an environment where-in the competition happens to be intense and the race to innovate happens to be unrestricted. Economic theories suggest that in such environments market structures have an influence over dynamic efficiency. This has implications upon regulators of market conduct. An examination of competition-related issues necessitates an assessment of market strength. An analysis of this nature cannot be carried out without a thorough comprehension of the underlying economic principles.^{xxxvi}

As far the substantive content of the new approach is concerned, “the ‘more economic approach’ meant an evidence-based look at the specific effects of a given behavior under the circumstances in the relevant market.” Digital Giants generally are capable of deciphering beforehand any changes to occur post-merger situation. So empirical data is crucial to market strategy to the point where availability of high-quality data material can make or break a company's capacity to compete.

2. Global Co-operation and Integrated Mechanism

The International Competition Network's formation demonstrates the global reach of competition legislation. ICN is a virtual organisation that brings together hundreds of competition authorities from across the world in a virtual space. Developing nations may wish to make use of the United Nations Conference on Trade and Development in order to begin modifying their domestic policies (UNCTAD). It is in this regard that the Organization for Economic Cooperation & Development plays an active role. Despite being a member of several committees, India is not a member of the OECD. World Trade Organization (WTO) does not actively cover competition policies.

In spite of the fact that markets are being built under global licence agreements, corporations have a global presence, and complaints relating to regulatory infractions are being raised in a variety of countries, competition commissioners are still restricted to a certain geographical area. There were numerous parallels between the MCases made against Google in India and South Korea as well as the European Union, Russia, Taiwan, Canada and the United States, but they were treated differently in each country. When it comes to transnational mergers, the

situation is particularly difficult because multiple competition authorities are looking at the same transaction and have various perspectives on whether it should be approved or not.

It is vital for reducing disparities and minimizing duplication of state efforts in enforcing competition regulations that there is international collaboration. It helps multinational firms to comply with the competition legislation of many countries in a cost-efficient manner.

The need for international cooperation becomes even more apparent when it comes to dealing with digital economy. International cooperation in a digital economy would account for the globalization of relevant market. Furthermore, it is vital to recognize that decisions taken in one country today are likely to influence the choices made by customers all over the world in the future.

CONCLUSION

When it comes to eliminating practises that harm competition, promoting and maintaining competition, protecting consumer interests, and ensuring free trade, the threat posed by big data requires both structural changes as well as checks on the abuse of dominance by corporate houses with access to big data. Privacy violation as part of M&A transactions would constitute such a practice adversely impacting competition and thereby merit anti-trust regulation to be more flexible and pro-active. International norms codified in the EU GDPR, OECD guidelines and standards for competition regulation set by the European Commission, US FTC, French and German authorities can be contextualised to address the gaping lack of data privacy safeguards in its competition landscape. The juxtaposition of such concerns against international norms and standards provides a starting point to working towards better safeguards and compliance, balancing the interests of all stakeholders, working towards interoperability of the Competition Commission across sectors and a targeted yet holistic approach centred on consumer welfare. The advancements that have occurred thus far indicate that a fresh development is in the works. Data, which was previously overlooked as a source of competitive advantage, is now a substantial source of power. The European Union's regulators are keeping a close eye on how Big Data corporations make use of such information.

Consequently, it will not be surprising to see additional provisions in the merger legislation altering the turnover restrictions in the coming years.

Under a digital economy platforms are generally motivated by forces of network effects. In such an environment the first mover would have the advantage of exploiting the most. Dynamism and contestability are the essential features of such economy. In such an economy the consumers reap the benefits of relentless efforts of the innovators to innovate. However, the incessant scope for the innovators to innovate has the consequence of motivating the innovators to unsettle the regime and strive for systematic abuse of dominant power.

Big Data and Self Learning Algorithms allow market players to collect, use and disseminate large volumes of precious information/data which not only increases the value of such data but, more importantly, also leads to the problem of “Big Analytics”. This so called ‘data advantage’ may allow for manipulation of prices so as to take reap maximum profit. Moreover, Artificial intelligence could also lead to instances of collusive price setting and conscious price parallelism. The problem gets further magnified due to the inability of current competition law regimes to deal with these new complexities largely attributable to its dependence on the factors of human agency and intention, which are either absent or hard to ascertain in case of AIs, through which it has had traditionally dealt collusion prosecutions. Hence, there seems a legit case for revisiting the current Competition policy and legal framework to equip the regulator with necessary tools to ensure that a competition law compliant innovation remains a faithful servant of economic prosperity.

ENDNOTES

ⁱ Allen P. Grunes and Maurice E. Stucke, *No Mistake about it: The Important Role of Antitrust in the Era of Big Data*, University of Tennessee Legal Studies Research Paper No. 269 (2015)

ⁱⁱ Organisation for Economic Co-operation and Development (OECD), Background note on “*Big Data: Bringing Competition Policy To The Digital Era*”, November 2016, available at [https://one.oecd.org/document/DAF/COMP\(2016\)14/en/pdf](https://one.oecd.org/document/DAF/COMP(2016)14/en/pdf)

ⁱⁱⁱ Newman, Nathan, Search, Antitrust and the Economics of the Control of User Data, *Yale Journal on Regulation*, Vol. 30, No. 3, 2014

^{iv}The Cambridge Dictionary defines ‘Big Data’ as “*very large sets of data that are produced by people using the internet, and that can only be stored, understood, and used with the help of special tools and methods*”, <https://dictionary.cambridge.org/dictionary/english/big-data>. Hu, Han et al., *Toward Scalable Systems for Big*

Data Analytics: A Technology Tutorial, IEEE Access, Vol. 2 (2014), https://secure.edps.europa.eu/EDPSWEB/edps/Consultation/big_data

^v Kate Crawford and Jason Schultz, ‘*Big Data And Due Process: Towards A Framework To Redress Predictive Privacy Harms*’, 55(1) Boston College Law Review 93 (2014); European Data Protection Supervisor, https://secure.edps.europa.eu/EDPSWEB/edps/Consultation/big_data.

^{vi} The three “V” feature of Big Data was first introduced in 2001 by Doug Laney in “*3D Data Management: Controlling Data Volume, Velocity and Variety*”, Meta Group (Gartners Blog post), posted on 6 February 2001, available at <http://blogs.gartner.com/doug-laney/files/2012/01/ad949-3D-Data-Management-Controlling-Data-Volume-Velocity-and-Variety.pdf>. Thereafter, a fourth “V” i.e. *Value* (“*is related to the increasing socioeconomic value to be obtained from the use of big data. It is the potential economic and social value that ultimately motivates the accumulation, processing and use of data.*”) was added to the definition by Stucke, M. E., & Grunes, A. P. (2016), *Big data and competition policy*, Oxford, United Kingdom, Oxford University Press. These characteristics have been accepted and endorsed in various important committee reports on the subject matter across jurisdictions. See, OECD (2013), *Supporting Investment in Knowledge Capital, Growth and Innovation*, OECD Publishing ; Exec. Office Of The President Of United States Of America, President’s Council of Advisors on Science & technology, *Big Data: Seizing Opportunities, Preserving Values*, (2014), available at https://bigdatawg.nist.gov/pdf/pcast_big_data_and_privacy_-_may_2014.pdf [also known as *The White House Big Data Report*]; Joint paper published by French Competition Authority ((*Autorité de la concurrence*) and German Competition Authority (*Bundeskartellamt*), *Competition Law and Data* (2016), available at https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Big%20Data%20Papier.pdf?__blob=publicationFile&v=2 [hereinafter referred to as “*The French-German Data Report*”]

^{vii} De Mauro, A., M. Greco and M. Grimaldi (2016), *A Formal Definition of Big Data Based on its Essential Features*, Library Review, Vol. 65., No. 3, pp. 122-135

^{viii} Information Commissioner’s Office (UK), *Big Data, Artificial Intelligence, Machine Learning and Data Protection*, defines Artificial Intelligence as “*giving computers behaviours which would be thought intelligence in human beings*”.

^{ix} Article 29, Data Protection Working Party, ‘*Opinion 8/2014 on the on Recent Developments on the Internet of Things*, European Commission, observes that “The concept of the Internet of Things or IoT refers to an infrastructure in which billions of sensors embedded in common, everyday devices – ‘things’ as such, or things linked to other objects or individuals – are designed to record, process, store and transfer data and, as they are associated with unique identifiers, interact with other devices or systems using networking capabilities”

^x Ministry of Electronics and Information Technology (MEITY), Government of India, *Report of Committee on Platforms and Data for Artificial Intelligence*, July 2019, available at https://meity.gov.in/writereaddata/files/Committee_A-Report_on_Platforms.pdf (“algorithms and techniques that allow computers to “learn” from and make predictions on data. It is the science of getting computers to act without being explicitly being programmed.”)

^{xi} Daniel Sokol and R.E. Comerford, “*Antitrust and Regulating Big Data*”, 23 George Mason Law Review 1129, 1135 (2016). See also, Marina Lao, *infra* 11, pg. 515 observing that “*a large online platform’s competitive edge arguably comes from its engineers’ sophisticated know-how and analytical tools, and not its possession of big data itself.*”

^{xii} Data Analytics is generally understood to be a method of deriving meaningful information from large and diverse set of data through the aid of advanced techniques. See The White House Big Data Report, *supra* 6 (“Data analytics discovers patterns and correlations in large corpuses of data, using increasingly powerful statistical algorithms”); See also, National Research Council, *Frontiers in Massive Data Analysis*, National Academies Press, 2013; Thill, Brent and Nicole Hayashi, *Big Data = Big Disruption: One of the Most Transformative IT Trends Over the Next Decade*, UBS Securities LLC, October 2013 (“Analytics is what creates the new value in big datasets, vastly more than the sum of the values of the parts”); EMA White Paper, “*Making sense of Big Data*” (2017) (prepared for IBM); Paul C. Zikopoulos *et al*, *Harness the Power of Big Data: The IBM Big Data Platform*, McGraw-Hill Companies (2013).

^{xiii} The French-German Data Report, *supra* 6, observes that “*record actions [of a large part of the population] in such a precise way that detailed and individualised conclusions on their receptiveness to specific sales messages can be drawn*”

^{xiv} Marina Lao, “Erring on the Side of Antitrust Enforcement When in Doubt in Data-Driven Mergers”, in *Douglas H. Ginsburg, An Antitrust Professor on the Bench - Liber Americorum - Vol. I* (Institute of Competition Law,

2018), p. 509 notes that “the large platforms’ ability to monetize large amounts of data that has given them an almost insurmountable competitive edge over small rivals or new entrants.”.

^{xv} Roger Parloff, ‘Why Deep Learning is Suddenly Changing your Life’, Fortune Magazine (28 September 2016), available at: <http://fortune.com/ai-artificial-intelligence-deep-machine-learning>

^{xvi}The French-German Data Report, *supra* 6

^{xvii} What is Big Data and why it matters, What Is Big Data? | SAS US, https://www.sas.com/en_us/insights/big-data/what-is-big-data.html

^{xviii} Roger Parloff, *supra* 15

^{xix} Muniswamaiah, Manoj, Tilak Agerwala, and Charles C. Tappert. "Approximate query processing for big data in heterogeneous databases." *2020 IEEE International Conference on Big Data (Big Data)*. IEEE, 2020.

^{xx}Dedić, N.; Stanier, C. (2017)."Towards Differentiating Business Intelligence, Big Data, Data Analytics and Knowledge Discovery". 285. Berlin ; Heidelberg: Springer International Publishing. ISSN 1865-1356.OCLC 909580101.

^{xxi}Big Data an Ongoing Concern for EU Competition Law, Insights | Skadden, Arps, Slate, Meagher &Flom LLP, <https://www.skadden.com/insights/publications/2017/01/big-data-an-ongoing-concern-for-eu-competition-law> (last visited May 2, 2019).

^{xxii}United States v. Topkins, No. 15 Cr. 201 (N.D. Cal.)

^{xxiii} Former E-Commerce Executive Charged with Price Fixing in the Antitrust Division's First Online Marketplace Prosecution, The United States Department of Justice (2015), <https://www.justice.gov/opa/pr/former-e-commerce-executive-charged-price-fixing-antitrust-divisions-first-online-marketplace>

^{xxiv} Foo Yun Chee, *EU fines Google record \$2.7 billion in first antitrust case*, Reuters (2017), <https://www.reuters.com/article/us-eu-google-antitrust/eu-fines-google-record-2-7-billion-in-first-antitrust-case-idUSKBN191108>

^{xxv}Antitrust: Commission fines Google €2.42 billion for abusing dominance as search engine by giving illegal advantage to own comparison shopping service, http://europa.eu/rapid/press-release_IP-17-1784_en.html

^{xxvi}Legislation, Merger legislation of the EU - European Commission, <http://ec.europa.eu/competition/mergers/legislation/legislation.html>

^{xxvii} Mergers: Commission fines Facebook €110 million for providing misleading information about WhatsApp takeover, http://europa.eu/rapid/press-release_IP-17-1369_en.htm

^{xxviii}Big Data an Ongoing Concern for EU Competition Law, Insights | Skadden, Arps, Slate, Meagher &Flom LLP, <https://www.skadden.com/insights/publications/2017/01/big-data-an-ongoing-concern-for-eu-competition-law>

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