

**DIRECTORATE FOR FINANCIAL AND ENTERPRISE AFFAIRS  
COMPETITION COMMITTEE****Implications of E-commerce for Competition Policy - Note by Brazil****6 June 2018**

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## Brazil

### 1. Introduction

1. The digital economy has brought new challenges for competition law and policy. The technological advances materialized in the internet, mobile apps and smartphones enabled the gradual development of e-commerce and online platforms. These structures have provided the means for the purchase and sale of products and services online and for the connection of different types of users, reducing information asymmetries and transaction costs, while contributing to revolutionize different traditional markets.

2. In this context, new questions arise: How to define the relevant market in the e-commerce sphere? How to investigate the interplay between online and offline businesses? How to analyze market power of a multi-sided platform? These questions do not have trivial answers and prompt antitrust authorities to adapt rapidly in order to safeguard competition in this new environment.

3. In Brazil, e-commerce is still relatively small, when compared to traditional offline commerce. However, as shown in graph 1, it presents an increasing tendency. The solid line demonstrates that the proportion of internet users who have already made purchases online has grown in the last decade, reaching 38.0% in 2016. The dashed line, on the other hand, represents the percentage of consumers who use the internet to check prices, indicating that more consumers are comparing prices online, but that many of those are not shopping online. This signals that there is considerable room for e-commerce to grow among Brazilian consumers.

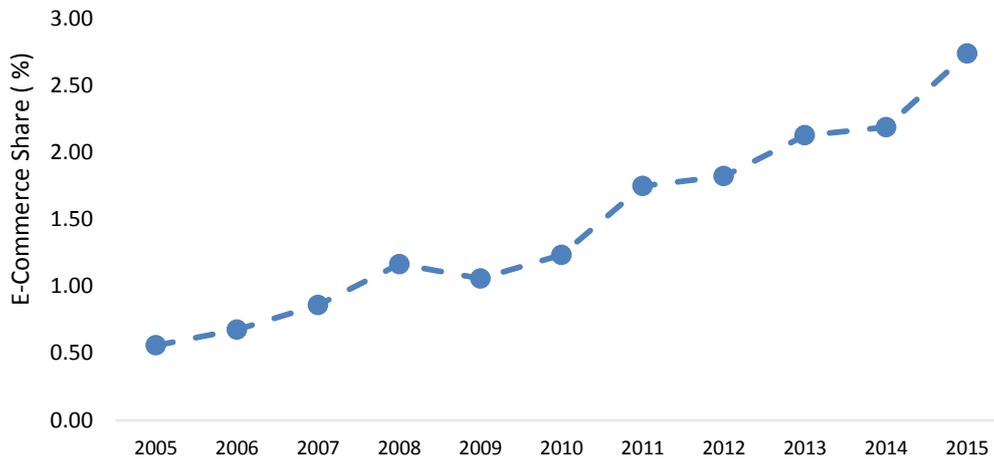


Graph 1: Proportion of consumers comparing prices online and proportion of consumers shopping online.  
Source: CGI-TIC. Elaboration: CADE.

4. The share of e-commerce on total retail sales revenue is also not expressive, as graph 2 illustrates. There is, however, a clear growth tendency, with this share jumping

from 0.5% to close to 3.0% in a decade. In addition, the more pronounced growth of online sales revenue compared to the growth of online shoppers might be revealing that, on average, consumers are spending more online, that is, the average sales revenue on online shopping is increasing.

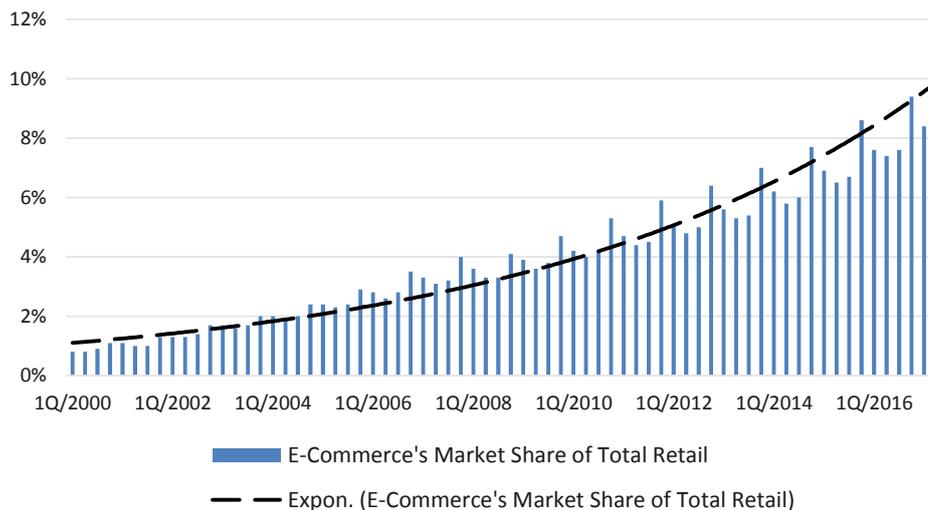
### E-Commerce Retail Share in Total Retail



Graph 2: E-Commerce retail market share in Brazil. Source: IBGE-PAC. Elaboration: CADE.

5. In addition, when compared to more developed countries, such as the United States, Brazilian e-commerce market is also incipient. As shown in graph 3, at the beginning of 2015, the share of e-commerce in retail in the United States was already around 7.0%, while in Brazil, as indicated in the previous graph, this percentage did not surpass 3.0%.

### E-Commerce's Market Share



Graph 3: E-Commerce retail market share on total retail in the U.S. Source: U.S-Census Bureau. Elaboration: CADE

6. However, the small share of e-commerce in Brazil has not prevented CADE from having reviewed different cases in the sector. Actually, in view of the growth trend of this

market, CADE expects the number of cases involving e-commerce and associated industries to rise.

7. Under this perspective, the purpose of this written contribution is to share how CADE has been dealing with the new challenges brought by e-commerce, by examining related cases in three areas: retail (as the sale of physical goods in an online environment), education (as the online provision of services), and advertisement (as an important activity associated with e-commerce). In particular, the paper will discuss how relevant market was delimited in the context of online/offline product/service offerings, how CADE has analyzed the interdependencies between online and offline markets, and how the concept of multi-sided platforms has been applied. Finally, this document provides preliminary insights on the challenges and opportunities created by e-commerce and associated developments for competition authorities.

## 2. Antitrust Cases Involving E-Commerce in Brazil

### 2.1. Retail

8. This section analyzes two mergers on the retail market, which took place in 2011 and 2014 in Brazil. Both cases involved retailer Magazine Luiza, which has physical stores distributed throughout the country, as well as an online store delivering to all the national territory. The first case<sup>1</sup> refers to the acquisition of 121 physical stores owned by Baú da Felicidade and the second<sup>2</sup> to the operation transfer of 15 Via Varejo's physical stores<sup>3</sup>. In both cases, these stores were distributed in different Brazilian municipalities.

9. In the analysis of these cases, CADE defined the relevant market as the retail market for durable goods, restricted to physical stores that offered a standard basket of products, which included the main product groups offered by Magazine Luiza. There was thus a segmentation between online and offline activities in two different relevant markets. The decision was based on arguments presented in the analysis of other mergers<sup>4</sup>, as well as on the fact that, at the time, e-commerce was significantly small when compared to the off-line retail market. The modest size of e-commerce, in turn, was justified by reasons such as limitations on internet access, reduced online shopping culture, and logistical limitations related to delivery.

10. Therefore, CADE did not find a clear substitution between online and offline sales, especially in view of the national territory, which eventually includes more remote regions. Thus, it considered the online and markets as distinct. However, reports and studies produced at the time indicated that this scenario could change, signaling that, in the near future, it would be possible to identify a more discernible substitution between online and offline retail, leading the antitrust authority to define a single relevant market that combined both the offline and online markets.

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<sup>1</sup> Merger file no. 08012.006107/2011-03

<sup>2</sup> Merger file no. 08100.005931/2014-22.

<sup>3</sup> This operation was part of an antitrust remedy related to another merger.

<sup>4</sup> Cases such as no. 08012.004168/2010-47, no. 08012.004857/2009-18 and no. 08012.010473/2009-34.

11. Since then, Magazine Luiza has taken a leading role in selling products online. Even during a period of recession in the Brazilian economy, Magazine Luiza was able to improve its results by adopting an aggressive e-commerce strategy<sup>5</sup> that combined its own marketplace, on the online side, with operations in physical stores<sup>6</sup>. The company provided services such as the "Retira Loja", in which customers could withdraw products purchased online at one of the physical stores<sup>7</sup>, giving the option for consumers to avoid or reduce the cost of delivery.

12. This relationship between physical stores and virtual stores can also be verified in other retail companies, such as Via Varejo. One of the largest retail companies in Brazil, Via Varejo plans<sup>8</sup> to turn 200 to 220 physical stores into small depots that will be used to increase the delivery speed of products purchased online. The greater integration between online and offline retail is also expressed in the announcement that Walmart intends to integrate e-commerce and physical stores in Brazil<sup>9</sup>. Apparently, Walmart aims at taking advantage of the synergies between the two different forms of sales, in a strategy similar to the one adopted by competitors Magazine Luiza and Via Varejo.

13. This trend has a certain parallel with the acquisition of Wholefoods by Amazon in 2017. As is well known, Wholefoods has a strong presence in offline grocery sales, while Amazon is an important player in e-commerce. However, after the acquisition, changes are being made that suggests the intention to take advantage of the possible benefits of an integration between e-commerce and offline commerce. Among other changes, Amazon has been offering the delivery of Wholefoods' products in selected cities through its Prime Now two-hour delivery service. At the time this paper was written, this service was still in a trial phase, but intended for expansion<sup>10</sup>. The strategy is similar to the one adopted by Magazine Luiza and Via Varejo, with WholeFoods using stores as a depot.

14. Taking this scenario as a whole, since the review of the cases analyzed in the beginning of this section, the relationship between online and offline retail has been narrowing in Brazil. The crucial point in understanding this narrowing seems to be that online retailing necessarily requires some physical infrastructure for logistics, involving the storage and delivery of goods. Therefore, as online commerce continues to grow and take up more space in the market, retailers appear to be using or considering using a portion of their physical stores to enhance their online sales service through improved delivery and storage.

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<sup>5</sup><http://economia.estadao.com.br/noticias/negocios,aposta-no-e-commerce-faz-acao-do-magazine-luiza-saltar-550-em-um-ano,70001856400>

<sup>6</sup> <http://www.valor.com.br/empresas/5220725/trajano-magazine-luiza-vem-ficando-sozinho-na-venda-direta-na-web>

<sup>7</sup><https://ecommercenews.com.br/noticias/balancos/magazine-luiza-tem-o-melhor-trimestre-da-historia-e-commerce-ja-representa-1-3-do-faturamento-total/>

<sup>8</sup> <http://www.valor.com.br/empresas/5256479/varejo-vai-transformar-ate-220-lojas-em-minigalpoes>

<sup>9</sup> <https://g1.globo.com/economia/noticia/walmart-brasil-anuncia-integracao-de-lojas-fisicas-e-comercio-eletronico-no-pais.ghtml>

<sup>10</sup> <http://www.businessinsider.com/amazon-delivers-groceries-directly-from-whole-foods-2018-2>

15. Thus, currently the strict relevant market delimitation, in which offline and online retailing are separate relevant markets, may end up not capturing the possibility of substitution and complementarity between these two activities. In cases similar to the acquisition of Wholefoods by Amazon, for example, if the merging companies are considered to act in distinct relevant markets, the antitrust authority may run the risk of approving the operation by understanding that there is no horizontal overlap. The point made here is not that such operations should or should not be approved. The point is that it seems more and more relevant to investigate with caution the possible synergies that may arise in operations involving e-commerce, and which may contribute to the attainment of market power.

16. As discussed earlier, retailers seem to be using physical stores to support and enhance online shopping. Thus, such operations might actually disguise a kind of vertical integration (likely with efficiencies involved) in the sense that, in a first analysis, the purchase of physical stores might seem as a horizontal merger when, in fact, the infrastructure of these physical stores might be used as an input to improve online shopping's logistics.

17. In conclusion, when analyzing relevant market in e-commerce, it seems important not to lose sight of the bigger picture, and to scrutinize the possible competitive pressures between online and offline retail. In Brazil, companies have been pursuing synergies between online and offline activities, and consumers seem to have gradually increased their willingness to buy online. These two effects seem to be generating competitive pressure of e-commerce over offline retail in Brazil.

## 2.2. Education

18. The education sector is another area that can provide useful insights on the definition of relevant market in the online and offline segments. From this perspective, this section analyzes a case reviewed by CADE in 2016, which consisted in the acquisition<sup>11</sup> of Estácio by Kroton.

19. Kroton became a giant conglomerate of education companies after an intense history of acquisitions, especially in the higher education sector<sup>12</sup>. Kroton started as a primary and secondary school called Pitágoras and gradually made different acquisitions from other education companies such as IUNI in 2010, Unopar in 2012, Anhanguera in 2014, and tentatively Estácio in 2017.

20. All three companies, Kroton, Anhanguera and Estácio, operate primarily in higher education, both in the face-to-face segment as well as in the distance education segment. Thus, when establishing its verdict on the two cases, CADE necessarily had to analyze the interrelationship between the online and offline education service and their substitutability.

21. In addition, it is important to emphasize that distance-learning education has a large share in the private higher education market in Brazil and exhibits a growing trend. In the analysis carried out by CADE at the time, students in distance education represented 20.0% of total students in private higher education, while classroom offline

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<sup>11</sup> Merger file no. 08700.006185/2016-56.

<sup>12</sup> See, for instance, merger case no. 08700005447/2013-12 between Kroton and Anhanguera.

education amounted to 80.0%. In addition, projections for year 2025 indicated distance learning to further increase in participation, reaching 30% of students, while face-to-face education would enroll 70.0% of the number of students in private higher education.

22. This high share of the online segment pictures a different scenario than the one for the retail sector. As previously identified, in the retail sector, the share of online sales is still characterized as incipient when compared to the share of offline sales. However, in the private higher education market, the percentage of participation in online education is much higher, which prompted the antitrust authority to analyze online and offline markets with greater caution.

23. Therefore, in the case involving the acquisition of Estácio by Kroton, CADE produced an empirical study to test if the offer of face-to-face courses brought benefits to companies that already offered distance education. The analysis questioned if companies that operate in face-to-face education could use benefits obtained from operating in the offline market to gain competitive advantage in the online market. These benefits include brand prestige and scale gains in terms of infrastructure and professionals. This question was relevant to the case because both companies had business in the face-to-face segment and the offline business could boost growth of the online segment.

24. CADE conducted a difference-in-differences estimation, using data related to the acquisition of Unopar by Kroton in 2012. Before this operation, Kroton operated only in face-to-face education and Unopar was the largest institution in Brazil to provide distance education. The empirical study attempted to verify the impact the operation had on the ability of Unopar to attract new students, considering the fact that Unopar started to have access to Kroton's face-to-face infrastructure after the acquisition.

25. The treatment group was the set of municipalities in which there was an overlap between online courses from Unopar with face-to-face courses from Kroton. The control group were the municipalities in which Unopar offered online courses, but in which there was no overlap with Kroton's face-to-face courses. The regression indicated that offering face-to-face courses increased the number of new students in distance education, evidencing the interrelationship between online and offline education.

26. Despite this, in both cases analyzed, face-to-face education and distance education were considered different relevant markets. This decision followed the recurrent jurisprudence in CADE on the relationship between online and offline education, and was justified by the perception that the profile of consumers of face-to-face and distance education was considerably disparate in Brazil, and that there was little substitution between these two forms of education.

27. Among other factors, it was argued that the profile of distance education students in Brazil consists of students who have lower income, who work, and who have to support their families. In this sense, in Brazilian literature, distance education is often considered as a "second chance university"<sup>13</sup>. Thus, distance education, as found in CADE's survey, offers greater flexibility of schedules and has, on average, lower prices. Therefore, for this group of students, distance-learning education presented itself as a more viable path than face-to-face education.

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<sup>13</sup> MORAES, Reginaldo. Educação a distância e ensino superior. Introdução didática a um tema polêmico. São Paulo, Editora Senac, 2010.

28. In conclusion, unlike in the case of retail, online education has a large share of the market, which prompted the antitrust authority to exercise caution in delimiting separate online and offline relevant markets. Although the jurisprudence recognized online and offline market as separate, CADE decided to deepen the study on the relationship between those forms of education. This was motivated by the fact that the merging companies operated on both markets, which could constitute a relevant competitive advantage. Thus, CADE carried out a quantitative study, providing evidence of interrelationship between the online and offline market. Finally, the operation was blocked by CADE.

### 2.3. Advertising

29. This section discusses the virtual advertising market, which has acquired great relevance with the spread of the Internet. The business of virtual advertising consists in providing online space for advertisers. Almost all websites display ads and, as will be discussed throughout this document, advertising plays an important role in monetizing online businesses. Because it is not the end-use activity of most online websites, advertising ends up involving a platform structure for most agents in the segment. On one side of the platform, agents seek to attract users to their services, which can be music streaming, search tools, social network and so on. On the other side, agents negotiate their online spaces with advertisers. This structure, now called two-sided markets or multi-sided markets, bring further complexity to antitrust analysis and inserts new elements, such as network effects, that could make traditional methodologies obsolete. The next paragraphs discuss how CADE has defined the virtual advertising relevant market and how antitrust instruments have been adapted to the structure of multi-sided markets.

30. One of the first steps when studying the virtual advertising market is to define the extension of the relevant market. Past decisions at CADE began by distinguishing online content/entertainment production from the sale of online advertising spaces. CADE's jurisprudence has considered the provision of virtual advertising space as a relevant market itself, distinct from the markets of online advertising production and entertainment/online service production. However, there were no recent mergers among large internet companies in Brazil that would elicit a thorough discussion around this characterization of the relevant markets.

31. A second distinction when defining relevant market was that between virtual advertising and physical advertising. In this respect, the peculiarities of the Internet have served as justification for the two types of advertising to be analyzed separately. Online ads present high interactivity and dynamism, besides allowing the personalization of advertising offers. On physical media, however, it is not possible for advertisers to create a different ad for each person or to verify how many people got interested in a specific ad. The vote of Commissioner Alessandro Octaviani Luis<sup>14</sup> provided extensive jurisprudential research supporting that the relevant market of offering space for virtual advertising were not to be confused with that of traditional advertising.

32. Regarding the geographic dimension of the relevant market, there is reasonable consensus at CADE around the national scope of the market. Although older cases<sup>15</sup>

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<sup>14</sup> Merger no. 08012.005394 / 2012-15.

<sup>15</sup> See, for instance, merger case no. 08012.005304 / 2007-11.

presented the possibility of understanding the market globally, given the global breadth of the Internet, the concept that ads are produced at a national level have currently been prevalent.

33. Already in 2006, the virtual advertising market was the object of analysis in a merger case involving two of the biggest price comparison sites in Brazil: Buscapé and Bondfaro. In this case, two relevant markets were defined: the national virtual advertising market and the national search and price comparison through Internet. The relevant market was then classified as a "dual market", and the existence of network effects and the pressures that one side of the market would have on the other were highlighted. Network effects were regarded as a barrier to entry for new competitors, who did not have many advertisers or many users. On the other hand, it was considered that network effects could also boost entry into the search market of those who were already dominant in other virtual markets. UOL, a major news website at the time, had acquired significant participation in the search market after only six months of activity, what served as an example of the ambiguous consequences of network effects. CADE approved the operation because the applicants' share in the market was less than 10.0% and because, despite having a share of more than 20.0% in the search and price comparison market, entry of new competitors such as UOL was not considered difficult.

34. More recently, in 2013, Google acquired stakes from VEVO and once again the virtual advertising market was analyzed. In this occasion, the online entertainment delivery market was regarded as the other side of the two-sided platform, since VEVO offers free entertainment to users, and profits from advertisers. Google was considered the main player in the online advertising market, with revenues close to 60% of the market, while its share of the online entertainment market was considered small. Despite Google's high share in one of the markets, the case was approved because of the size of VEVO and the fact that Google would not have the right to vote.

35. As seen by the cases examined, one can realize that CADE has been taking the dual or platform character of companies linked to the production of online content into account since at least 2006. The greater market that interconnects many of the cases involving these companies is the virtual advertising market, because it is through this market that these companies monetize their operation. However, CADE has not defined specific guidelines for cases involving multiple-sided markets, such as virtual advertising. Only in more recent cases, not related to the virtual advertising market, were deeper analyzes carried out regarding the particularities of markets classified as multi-sided.

36. Last year, a new case involved in-depth analysis of a two-sided market, this time the market for the distribution of investment products<sup>16</sup>. Network effects were considered as a relevant barrier to entry for competitors and there was significant concern that the platform could establish exclusive contracts with agents on one side of the market. At the end, CADE approved the operation with remedies.

37. These mergers reveal that CADE has increasingly incorporated the concepts and methods of the literature on multi-sided markets. The internet has allowed the expansion of the range of markets that have network effects and platforms of multiple sides, and CADE has not been unresponsive to these changes. Despite the progress observed in

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<sup>16</sup> Merger file no. 08700.004431/2017-16.

recent years, there are still many challenges to be faced by this antitrust authority in these non-traditional markets. The next section will address many of these.

### 3. Insights on E-commerce and Competition

38. This section provides insights from CADE on e-commerce and competition. While the ideas hereby presented are based on the authorities' experience, they should be regarded as preliminary thoughts on the challenges and opportunities brought by the evolving digital marketplace for competition policy.

39. Monetization of e-commerce can rely on different revenue models. In the most traditional way, an online merchant sells a product online for a higher value than its cost, herein referred to as the mark-up revenue model. Monetization can also occur by means of transaction fees, such as the payment of a commission as a percentage of sales or a fixed amount per transaction. Matchmaking platforms such as online marketplaces, Uber and AirBnb are examples of this model. As discussed in the previous section, advertising is another important revenue model for e-commerce, which can be illustrated by companies such as Google and Facebook. A further revenue model involves charging subscription or membership fees, as is the case of Netflix, for example. One innovative revenue model worth mentioning is the one based on microtransactions, i.e., the sale of virtual goods or services, which is largely used in the mobile app market as a monetization model for developers. Microtransactions' revenue come from in-app purchases, which allow access to different app functionalities, for example, or the purchase of virtual goods in a game environment.

40. Businesses can and usually do rely on different revenue models. Amazon, for instance, monetizes in various ways: when it sells its own products (mark-up model); when it charges a commission over sales undertaken through its website with third-party sellers (transaction fee model); or when a consumer clicks on an advertisement on its page (advertisement model). Spotify gives the user the option of paying for the service by listening to ads (advertisement model) or by paying a subscription fee. Google monetizes through advertising, but also by charging fees over the microtransactions sold through in-app purchases in its app store (transaction fees over microtransactions), for instance.

41. For antitrust authorities, understanding the revenue models of the firms involved in the case under analysis is of crucial importance. Hand-in-hand with this understanding comes the need to face the complexities of e-commerce business models, which encompasses identifying the crucial price and quantities to analyze, examining the interrelations among the different aspects of the business, and considering evolving revenue models.

42. Interestingly, many of the revenue models involved in e-commerce are based on multi-sided platforms. As is well established in the literature, multi-sided platforms exhibit network effects. Once a critical mass of users has been reached, through positive feedback loops between the different sides, such platforms may exhibit exponential growth. This potential for exponential growth amplifies the impact of antitrust decisions, suggesting that authorities be particularly careful with operations involving multi-sided platforms, even when market shares are low.

43. What this does not mean is that through network effects and a winner-takes-it-all phenomenon, a platform will necessarily dominate a market, raising anticompetitive concerns. Just as much as network effects can amplify growth, they can amplify the

decline of a platform<sup>17</sup>. In this regard, competition authorities might benefit, for example, from analyzing the possibility of multi-homing and the existence of entry barriers related to reaching a critical mass of users in each of its sides.

44. Another insight on e-commerce and competition is that the economy as a whole may be regarded as a network, where multi-sided platforms might be important hubs linking consumers and the different sides of the platform. As such, failure in these hubs can have cascading effects, rendering the network – that is, the economy - vulnerable. Consequently, beyond efficiencies, resilience of the system might be an aspect for antitrust authorities to take into consideration when analyzing welfare effects.

45. Although network effects, feedback loops, tipping points and the like are relatively new in the antitrust arena, they have long been studied under the field of complexity science. In this sense, methods from complexity science, such as network analysis, computational modeling, dynamic system analysis, machine learning, and artificial intelligence, may provide useful insights for antitrust analysis. As Downey (2012, p. 5)<sup>18</sup> states, “while classical models are often linear or use approximations to non-linear systems; complexity science is more friendly to non-linear models.” Complexity models tend to be simulation-base, as opposed to equation based, and implemented as computation, as opposed to solved by analysis. As such, they might provide an interesting framework to analyze antitrust issues in non-linear multi-sided platforms presenting multiple interdependencies and dynamism.

46. Finally, while multi-sided platforms and other technologies related to the digitalization of the economy bring challenges for antitrust authorities, they also provide new opportunities. Regarding blockchain technologies, for example, Tulpule (2017, p. 2)<sup>19</sup> states that one of blockchain most pertinent utilities in competition enforcement is likely to be “the provision of large volumes of transactional and non-transactional data which has been generated contemporaneously with underlying commercial transactions and enjoys a high level of reliability.” These datasets might provide valuable material for antitrust authorities both for the analysis of cases as well as for the enforcement of decisions.

47. Clearly, antitrust authorities have a long way to go to take full advantage of these possibilities. At CADE, one of the steps taken in this direction consisted in hiring external consultants to analyze how machine learning, complexity theory and dynamic systems might enhance the analysis of antitrust cases. At the same time, CADE is taking part in the BRICS digital economy working group and promoting internal discussions on the theme. Finally, CADE believes international collaboration to be an essential means to help antitrust authorities keep up with the pace of technological development and enforce competition in the digital markets.

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<sup>17</sup> Evans, David S., and Richard Schmalensee. "Network Effects: March to the Evidence, Not to the Slogans." (2017).

<sup>18</sup> Downey, Allen B. *Think complexity: complexity science and computational modeling*. " O'Reilly Media, Inc.", 2012.

<sup>19</sup> Tulpule, Ajinkya, Enforcement and Compliance in a Blockchain(ed) World (January 16, 2017). CPI Antitrust Chronicle, Volume 1, page 45, Winter 2017. Available at SSRN: <https://ssrn.com/abstract=2906465>.

## 4. Conclusion

48. This paper has given an overview of E-commerce in Brazil and provided some examples of cases involving e-commerce at CADE in the retail, education and advertisement sector. It showed that e-commerce is growing rapidly and consistently in Brazil, but that it still constitutes a very small percentage of retail sales in the country. It also described how CADE defined relevant market in each of the cases discussed, and how it treated the competitive relationship between online and offline providers. Finally, it offered some preliminary insights into e-commerce and competition.

49. In the case of retail, the paper argued that online and offline markets can compete with each other, complement each other, or both. In the case of retail, there seems to be an important complementarity between online and offline sales, given that a physical part related to the delivery/storage of the good is necessarily involved in the retail transaction. In this regard, analyzing a merger under different lenses might be important. Although there might be no horizontal overlap between online and offline sales in an operation, such an operation might actually encompass vertical integration aspects.

50. This might be the case when offline stores are actually going to be used for storage and distribution purposes, ‘filling in’ the physical part involved in online sales. This, of course, does not mean that such an operation should be rejected. It means that the definition of relevant market seems to be a good starting point for the operation analysis, but that one should not let it hinder a wider perspective of the operation.

51. The education case showed how a quantitative analysis can shed light on the potential synergies between online and offline markets. With an econometric differences-in-differences method, CADE found evidence that offering face-to-face courses in higher education in Brazil increased the number of students in distance education. The case illustrated some of the tools used by CADE to analyze the relationship and synergies between online and offline service providers.

52. The section on the virtual advertising market discussed the definition of relevant market in the sector and explored how CADE has been applying multi-sided markets concepts in recent cases. It connected the definition of a virtual advertisement relevant market as opposed to a traditional advertising market to the fact that online ads enable personalization. This, in turn, relates to the use of big data in association with machine learning techniques, which enable the reduction of targeting costs in virtual ads. Furthermore, it showed that antitrust analysis at CADE has increasingly incorporated the concepts and methods of the literature on two-sided markets. However, it highlighted that CADE still regards operations involving such markets as challenging.

53. Furthermore, the paper provided preliminary insights on e-commerce and competition. It underlined some of the complexities of analyzing antitrust cases involving e-commerce, which are related to the diversity and dynamism of revenue models used to monetize these businesses. In addition, it pointed out that such revenue models are usually associated with multi-sided platforms and suggested that antitrust authorities be particularly careful with operations involving such markets, as multisided platforms are prone to exponential growth, which can greatly amplify the impact of antitrust decisions. Among other points, CADE argued that complexity science can provide relevant insights and methods for antitrust analysis and explained how CADE is trying to explore these possibilities. Finally, the paper highlighted the role of international cooperation in helping antitrust authorities evolve and adapt to face the challenges and opportunities brought by the rapidly changing e-commerce ecosystem.