

Essays on Regulation and Competition in the Digital Markets

*Original*

Essays on Regulation and Competition in the Digital Markets / Congiu, Raffaele. - (2022 May 18), pp. 1-191.

*Availability:*

This version is available at: 11583/2966331 since: 2022-06-09T12:06:21Z

*Publisher:*

Politecnico di Torino

*Published*

DOI:

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## Long abstract

This thesis comprises three essays – a theoretical and two empirical ones – which study the dynamics of digital markets, focusing on regulation and competition. Each chapter analyses a single aspect of this multi-faceted topic: consumer data and competition in the first chapter; the impact of privacy regulation on website traffic and visitor behaviour in the second; how digital markets can affect traditional ones by looking at Airbnb's impact on the housing market in the third.

The first chapter investigates how a Data Broker (DB) can influence firm entry and downstream competition in oligopolistic markets by deciding how much data to sell and to whom. This work contributes to the literature in two ways. First, by modelling an oligopoly market to analyse how the number of competing firms influences the DB's strategy and the market outcomes. Second, by endogenising firm entry.

The results show that the DB has the incentive to limit firm entry in the downstream market, as she benefits from the increased market concentration by extracting firms' profits through the price of data. Moreover, the DB has the incentive to under-serve the market by selling data to a subset of firms, so as to maximise their willingness to pay. Overall, both these effects lead to a reduction in downstream competition. The analysis shows that this reduction outweighs the pro-competitive effect of data highlighted by the previous literature. Consequently, consumer surplus is always lower in the presence of a monopolistic DB. These results are robust to the introduction of a privacy cost and to the reduction of the DB's bargaining power. Moreover, when taking into account the consumers' loss of privacy, the entry barrier effect is mitigated since data become less valuable to firms. As such, raising consumers' privacy awareness can be an effective lever to reduce the consumer harm induced by the DB.

The second chapter assesses the impact on website traffic and visitor behaviour of the introduction of the European Union's General Data Protection Regulation (GDPR). This work adds to the literature by investigating the GDPR's effect on website's ability to attract visitors and on the way those users engage with website content. The analysis exploits the fact that the GDPR only applies to EU residents to perform a difference-in-differences that relies on the geographic origin of website traffic. The treatment assignment identifies the traffic originated from EU countries, using US traffic as control group.

The analysis documents an overall traffic reduction of approximately 15% in the long-run, and it finds a measurable reduction of user engagement with websites. These effects unfold fully with a delay, following the issuance of the first large fine. The overall traffic reduction is broken down into detailed acquisition channels, which are all affected save for paid search traffic. The work finds evidence of an inverted U-shaped relationship between website size and traffic reduction: the smallest and largest websites lost visitors, while medium ones were not affected or even gained from it. The results appear consistent with the view that users care about privacy and may avoid visiting a website in response to its data handling policy. The results also highlight how privacy regulation can impact market structure and may increase dependence on large advertising service providers. Enforcement matters as well: the effects were amplified considerably in the long-run, following the first significant fine issued eight months after full entry into force of the legislation.

The third chapter studies the impact of Airbnb's diffusion on house prices and rents in the Italian cities of Florence, Milan, Naples, Rome, and Turin. This work contributes to the literature by investigating the impact of the platform at different levels – overall, across cities, and in the centre and suburbs – and by estimating the spillover effects of Airbnb presence in the city centre on the rents and house prices in the periphery.

The analysis exploits an instrumental variable obtained from the interaction of an out-of-sample measure of tourist attraction that varies within cities, and a measure of public awareness of Airbnb that varies over time. The results document an increase in rents and, especially, in sale prices due to Airbnb's diffusion. Overall, an increase of 1 percentage point in Airbnb density rises house prices by 0.63%, translating to a 44.24 €/m<sup>2</sup> rise over the period of the analysis. However, the effect varies greatly across and within cities. Across cities, sale prices increase everywhere, from 162.31 €/m<sup>2</sup> in Milan to 19.37 €/m<sup>2</sup> in Rome. Rents are significantly affected in Florence and Naples, with effects that are sizeable when compared to price variations during the period of the analysis. The within-city effect is extremely heterogeneous, with some cities where it interests centre and suburbs and others where only the centre is affected. Whether the effect increases or reduces the gap between them changes on a by city basis, depending on the initial conditions of the two areas. Finally, the work finds evidence that the increase in Airbnb density in central areas has a negative effect on the property values in the suburbs. This is possibly due to the centre's increasing attractiveness at the expense of the suburbs following its increase in localised amenities. The results speak of an overarching effect, but also of differentiated impacts which require context-specific policies and evaluations.