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Competition, efficiency and market structure in online digital markets. An overview and policy implications

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As the Internet develops into a robust channel for (e)commerce, many experts state that in online markets competition would be stronger, prices would be much lower and so the market seems to approximate the competitive paradigm. Is this view correct? In this paper we review the growing literature on e-commerce and its market structure, and we analyze, in particular, how the typical ex-post intervention of competition policy could be applied in order to increase digital markets efficiency.

E-commerce, Market Efficiency, Competition Policy

1. Introduction

The 1990s have witnessed an explosive growth of electronic markets and the rise of the so-called e-commerce. Online markets are dramatically changing the way products are bought and sold and, as the Internet is increasingly taking on a crucial role in the sale of goods and services, it has become essential to better understand the fundamental mechanisms ruling electronic markets. At the time of the advent of the Internet, many experts thought that the fall of geographical distances between retailers and consumers would have rendered online markets closer to the perfect competition paradigm. Indeed, consumers' ability to compare prices with irrelevant additional searching costs should imply tougher price competition, leading to lower and more uniform prices amongst different retailers. Thus, frictionless commerce should arise, leading e-commerce to both allocative and productive efficiency.

In 1999, a frequently cited article of *The Economist* stated:

“[...] The explosive growth of the Internet promises a new age of perfectly competitive markets. With perfect information about prices and products at their fingertips, consumers can quickly and easily find the best deals. In this brave new world, retailers profit margins will be competed away, as they are all forced to price at cost.”

The fundamental function of a marketplace is to facilitate demand and supply matching, by making the information flowing more smoothly between buyers and sellers. In this respect, early research on electronic marketplaces (Bakos, 1997; 2001) highlighted the multiple advantages that both buyers and sellers could obtain

by making online transactions platforms. We can summarise these advantages as follows.

- Consumers are able to find information about prices and products very easily and quickly, only with a “click”.
- Internet retailers are able to see and compare the price strategies of other Internet retailers, hence the market is more transparent.
- Internet retailers can change their prices without incurring relevant (menu) costs.
- Internet retailers can reach consumers that are located in many different countries and, at the same time, consumers can reach Internet retailers that are far from their homes, that is, spatial and search costs are reduced by the use of the Internet.

In sum, low consumer search costs, the absence of spatial product differentiation and the possibility to switch supplier at potentially zero cost (“*competition is just a click away!*”) altogether promote competitive pricing. In addition, the efficiency of consumer search can highly benefit from the use of *search intermediaries*, i.e. Internet search engines that find and compare all commercial conditions on products (prices, delivery time, availability, shipping costs, etc.). These search intermediaries are sometimes referred to as *infomediaries*, *shopbots* or *gatekeepers*. Low set up costs – the website and distributional systems – promote low concentration. Thus, compared to traditional brick-and-mortar retailing, Internet retailing seems to be much more efficient, to the point that the expressions “*frictionless market*” and “*nearly perfect market*” have been used to refer to it.

Is this view correct? Or is the online marketplace also characterised by some frictions that limit efficiency? And if so, is there any scope for ex post intervention at this stage of development of electronic markets? In the remainder of the paper we attempt to answer all of the above questions. We will review the rapidly growing Industrial Organization literature on e-commerce and its market structure, pointing out all the sources of inefficiencies and failures that characterise electronic markets. Our purpose is to analyse how the typical ex post intervention of competition policy could be applied to digital markets and limit the inefficiencies that arise in Internet retailing.

The paper is organized as follows. In Section 2 we analyse the economic characteristics of digital markets in terms of price levels, price elasticity and menu cost with respect to the traditional brick-and-mortar retailing. The evidence shows that electronic markets are more efficient than conventional markets. Section 3 is dedicated to a branch of the literature showing the presence of substantial and persistent price dispersion and a high level of concentration in the digital markets, which reduces the competitive pressure in the market. Section 4 focuses on the role of the information intermediaries, the so called shopbots or gatekeepers – like Dealpilot.com, mySimon, eBay, and many other B2B websites – whose role is to facilitate transactions between sellers and buyers through the web. Section 5 gives an overview on the problems related to the treatment of consumers data to target online advertising. In Section 6 we will discuss examples of online product markets where high concentration and price collusion represent a relevant inefficiency. Section 7 concludes with considerations on the way competition and regulatory policies could be applied in electronic markets.

2. Efficiency in online digital markets

There are different ways to measure the relative efficiency of electronic markets compared to conventional outlets. Following Smith et al. (1999), we consider three main dimensions in this section: a) price levels; b) price elasticity; and c) menu costs. A fourth dimension, price dispersion, will be analysed in more details in the next section.

2.1. Price levels

A well established result in the economic literature, dating back to Diamond's (1971) and Salop's (1979) seminal papers, is that the mere presence of search costs can prevent perfect competition, in an otherwise frictionless market, even when products are homogeneous. When consumers do not find it worthwhile to make an additional search in order to find a better deal, firms hold a local monopoly power on them and are thus able to charge a higher price. In such circumstances, a decrease in search costs translates into a consequential decrease in product prices, and the effect is stronger if those products are homogeneous.

The advent of the Internet has been primarily read as an opportunity to strike down the importance of search costs and information asymmetries in retailing markets. Since buyers can easily check prices at alternative outlets, Internet retailers are supposed to be under higher competitive pressure than traditional brick-and-mortar retailers. Therefore, we can expect more efficiency and lower prices to appear in electronic markets (Bakos, 1997).

Contrary to these statements, one of the pioneering studies on price levels on the Internet, conducted by Lee (1997) using second-hand car market data, finds that prices in traditional brick-and-mortar markets are lower than in electronic markets and the price differential seems to increase over time. This result could be related to the fact that the study is based on data from an auction market, which is purposely designed so as to sell goods to those consumers who are willing to pay the highest price amongst all.

Bailey (1998) carries out a study using data from sales of books, CDs and softwares, which eventually confirms the result found by Lee. He finds that prices in the electronic market are higher for every product. However, according to the author, the reason why we observe higher prices could be the early stage of market development, when competition is still not fully deployed. Also Friberg et al. (2000) analyses the online market for books and find that online and offline prices are substantially the same, once the shipping costs are taken into account.

This evidence raised an apparent paradox, which stimulated further research. A study by Brynjolfsson and Smith (2000) confirmed that prices on the Internet are indeed lower than prices in traditional brick-and-mortar markets, as economic theory suggests. In this paper, the authors use data on prices of books and CDs extracted from Yahoo!'s search engine. Yahoo! was believed to be both comprehensive and unbiased, because retailers were listed at no charge. Books and CDs were chosen because they are homogeneous products: books can be uniquely identified by their ISBN number, and CDs can be uniquely identified by a record label catalog number. The result found by Brynjolfsson and Smith shows that the differences in the

characteristics of the distribution channels prevent traditional retailers from competing on prices, whereas online retailers, who do not experience such differences, are more price competitive. Books and CDs's prices on the Internet turn out to be 15-16% lower than prices in conventional outlets, once all opportunity costs are taken into account.

Brown and Goolsbee (2002) perform an empirical study using data from the life insurance market, focusing on the price variation due to consumers' different intensities of Internet usage. It turns out that a 10% increase in consumers' Internet usage causes up to a 5% decrease in price. Zettelmeyer et al. (2003) provide evidence that consumer use of Internet referral services lowers purchase prices in the retail auto industry. Using a large dataset of transaction prices for new automobiles and referral data from Autobytel.com, they find that the use of comparison websites reduces the price paid by consumers by approximately 2.2%. The authors estimate that savings for the web users are at least \$240 million per year. In particular, they show that consumers choosing to use Autobytel.com are the ones that would do poorly in the traditional channel in terms of bargaining capacity, perhaps because they have a high personal cost to collecting information. This group disproportionately uses Autobytel.com because its members are the ones with the most to gain using the electronic markets. In a companion paper, Scott Morton et al. (2003) show that 15% of the savings comes from making the purchase at a low-price dealership affiliated with the web service. The remaining 85% of the savings seem to be due to the bargaining power of the referral service and the lower cost of serving an online consumer.¹

Several studies show that online prices are lower than brick-and-mortar prices for the same goods, implying that digital market efficiency is higher. However, the price level is not the only measure that should be analysed when considering the efficiency of a digital market. In another paper, Brynjolfsson et al. (2003) indicate that the gain in consumer welfare coming from the increased product variety of online bookstores is ten times as large as the consumer welfare gain coming from inherent increased competition and lower prices. In fact, limited shelf space in conventional retail outlets constrains the types of products that can be discovered, evaluated and easily purchased by consumers. On the Internet, such limitations are absent. Retailers are able to increase the online availability of previously hard-to-find products, highly enhancing consumers' surplus, producers' surplus and, consequently, the overall welfare. Brynjolfsson et al. (2003) assert that the most important benefits of Internet retailing are not fully reflected in lower prices but are rather due to the new goods and services made readily available to consumers.

2.2. Price elasticity

Demand price elasticity measures how sensitive consumers are to price changes. Higher demand elasticity is a signal of market efficiency: consumers are going to switch sellers for a smaller price increase, consequently firms are more constrained in the price they can charge. Taken to the extreme case, with infinite demand elasticity, even a 1 cent price increase from the prevailing market price would

¹ Evidence of lower price levels in online markets is also derived in Clay et al. (2001) whose focus is on price dispersion in the web (see Section 3).

deprive the firm of all of its demand. The online marketplaces are in theory supposed to be characterised by higher demand elasticity with respect to the corresponding brick-and-mortar ones, thanks to lower search costs and lower switching costs.

Goolsbee (1999) finds that consumers on the Internet market are highly sensitive to local tax. Customers who are subject to high local sales taxes are more likely to buy online.

Using data from the computer components' market, Ellison and Ellison (2001)'s result is a striking confirmation of the hypothesis that price search on the Internet may lead to extremely elastic demand. They estimate that the firm faces a demand elasticity of -50 for its lowest quality good (memory modules for PC). Such high demand elasticity, the largest empirically estimated by the authors, would lead to a "Bertrand paradox". Indeed, using the standard Lerner formula, $(P - MC)/P = -1/\eta$, these values of demand elasticity imply an equilibrium mark-up between 2.5% and 4%, which is so low as to prevent retailers from covering their fixed operating costs.

Chevalier and Goolsbee (2003) compare specific products at Amazon.com and Barnesandnoble.com and use sales data to estimate own and cross price elasticity for the two retailers. They show that Barnesandnoble.com faces much stronger competition from Amazon.com than Amazon.com does from Barnesandnoble.com. Probably due to a reputation effect, it turns out that the demand elasticity at Barnesandnoble.com is higher than it is at Amazon.com. Brynjolfsson et al. (2004) find a similar result in the online book market, showing that consumers not always choose the best deal available and that market leader face a lower demand elasticity.

When considering differentiated products, though, price sensitivity on the Internet could turn out to be lower than in conventional retailers. Several studies on price sensitivity in the grocery market, comparing price sensitivity of groceries sold through online and conventional outlets, find that the online shoppers' demand is less price sensitive than it is for the brick-and-mortar shoppers (Degeratu et al., 2000; Danaher et al., 2003; Pozzi, 2008). This phenomenon can be due to several factors (Pozzi, 2008): consumers choose to buy online mostly when they are under time pressure, so they are less keen to experiment new products in the first place; there is more uncertainty with regards to new sellers and brands launched online; the website interface and procedures make it often easier to continue buying from the same sellers rather than switching to new ones.

2.3. Menu costs

Menu costs are costs that sellers must incur in order to change their posted price. They play an important role in the overall efficiency of a market because high menu costs can lead to price stickiness (Smith et al., 1999). Efficiency in a market requires the equilibrium price to match demand and supply. Retailers should optimally make price adjustments in response to shifts in supply and demand conditions. If menu costs are high and the price adjustments to be made are small, retailers will be less willing to make these changes. Brick-and-mortar outlets have menu costs caused, for example, by the need to physically re-label prices onto products. On the Internet, instead, the cost to change a single product title of a good in a database is

substantially null. Therefore, we expect more frequent and smaller price changes in online markets.

Two empirical studies analyse size and frequency of price changes. The study mentioned above by Bailey (1998) first validates this hypothesis finding that prices change more frequently online than in conventional retailers and concluding that menu costs are lower. In a later article, Brynjolfsson and Smith's (2000) analysis confirms Bailey's result. Price adjustments over time by Internet retailers turn out to be up to 100 times smaller than conventional retailers' price adjustments. In particular, the smallest online price adjustment is \$0.05 for books and \$0.01 for CDs, whereas off-line it is \$0.35 for books and \$1.00 for CDs. The authors point out that Internet retailers may have a higher incentive to make small price changes than conventional retailers because competition amongst firm is stronger, thus increasing the relative benefit from promptly adjusting prices.

3. Price dispersion and competition in electronic markets

3.1. Empirical evidence

In the classic Bertrand model of price competition, consumers are informed of all products' prices, search costs are absent, no retailer has any spatial advantage in attracting consumers, and all products are perfectly homogeneous. In such a context, the equilibrium price is uniquely determined and uniform across all retailers. In the real world though, markets seldom present these characteristics. Violation of one or more of Bertrand model's assumptions causes price dispersion to arise in equilibrium. As stated by Stigler (1961), price dispersion is a manifestation – and indeed it is a measure – of ignorance in the market. As the economic literature has shown (Varian, 1980; Burdett and Judd, 1983; Salop and Stiglitz, 1977; Stahl, 1996), price dispersion arises for two main reasons: the presence of both high search costs and imperfect information about prices, product quality, as well as the existence of alternative retailers.

Since search costs in the Internet are very low and consumers are readily informed about prices, we would expect price dispersion to be absent or very limited in electronic markets. Somehow counterintuitively, empirical evidence on digital markets does not support this hypothesis.

Using data from books, CD and software Internet retailers, Bailey (1998) show that price dispersion in electronic markets is not lower than in conventional outlets. Brynjolfsson and Smith (2000) discover that price differences of identical goods are on average \$5.98 (33%) for books and \$4.45 (25%) for CDs. In order to evaluate the books' and CDs' relative price dispersion, the authors compare different measures of price dispersion and eventually show that price dispersion is higher on the Internet than in conventional outlets for books, while it is lower for CDs. Brynjolfsson and Smith (2000) associate the presence of price differences for identical products to the importance consumers attribute to brand. Consumers use brand as a proxy for retailer credibility in non-contractible aspects of the product and service bundle, such as shipping reliability. Clemons et al. (1998, 2002) show that price dispersion is important in online travel agencies for airline tickets. Prices for airline tickets can

differ by as much as 20% across online travel agencies. However, contrary to Brynjolfsson and Smith (2000), they attribute the observed price dispersion to retailer segmentation strategies and price discrimination despite brand recognition.

Johnson et al. (2004) have analysed how online searching behaviour changes depending on the type of product consumers are looking for. The authors focus in particular on the number of different websites a consumer visits before purchasing the good. It turns out that consumers search longer when they want to buy a travel than a book or a CD. In particular, the percentage of people visiting only one website is 70% for books and CDs, while it is 36% for travels. The authors' interpretation of this result is that, since consumers have to incur a cost to search online, they will be more willing to undertake a search the higher the benefit from doing so, in terms of lower prices. Given that the potential savings for books and CDs are very limited, consumers do not search for long for such goods. This result is in line with a previous important article by Clay et al. (2001).

Clay et al. (2001) analyse both price level and price dispersion in online book markets, focusing particularly on the competitiveness of the digital retailing markets. The authors use data on pricing in the online book industry from August 1999 to January 2000 including: New York Times current and previous bestsellers, computer books current and previous bestsellers, a random selection drawn from all the other books. The stores included well-established Internet retailers such as Amazon.com, Barnesandnoble.com, Borders.com, as well as smaller Internet retailers as Wordsworth and BCY Bookloft. The main results of Clay et al.'s analysis can be summarised as follows.

- Bestsellers and previous bestsellers cost less than the other types of books. This can be explained with the fact that online retailers usually select these items for targeted discount. This evidence can be related to Johnson et al. (2004)'s observation on consumers searching habits, according to which consumers are more keen to search longer for goods they attribute more value to, such as bestsellers. The more intense search for these goods makes competition tougher and drives prices down.
- The more consumers search, the higher the potential cost savings: a consumer can save up to 24.8% if she doesn't buy from Amazon.com, the best known Internet retailers worldwide.
- Prices of previous bestsellers and random books are higher than recent bestsellers, meaning that as far as books leave the bestseller list, Internet retailers stop using special discount.

Interstore price dispersion is considerable, especially for bestseller books. In addition, the authors find that for both types of stores, more competition leads to lower standard deviation meaning that competition at least partially reduces price dispersion. However, they show that there are significant differences between the types of stores. The big three stores have a very similar price level overall, showing a lower standard deviation. In contrast, fringe stores offer very different prices. This increase in standard deviation is higher for categories with low average prices, like bestsellers, than for categories with higher average prices. Then, widely advertised books, especially bestseller books, present the highest standard deviation in prices. Clay et al. also analyse the different pricing strategies among Internet retailers and find a very different scenario to the one expected in a perfectly competitive market. In particular, data show that the presence of one of the biggest retailers lead the

fringe retailers to limit price cutting, just opposite to what would be reasonable to happen in a nearly-competitive market. The reason is that biggest stores charge on average higher prices, benefiting from brand and reputation effects. Smallest retailers anticipate such pricing decisions, thus they have the incentive to price less aggressively as well.

3.2. Sources of price dispersion in electronic markets

The existence of significant price dispersion in digital markets and its persistence over time raise important questions on the future of competition in electronic markets. It is then fundamental to understand what are the sources of such phenomenon. The economic literature has identified the main sources of price dispersion in the following factors:

- **Product heterogeneity:** Evidence suggests that online consumers care not only about price levels but also about non-price attributes, like delivery time, shipping costs, availability. For these reasons, even an *a priori* homogeneous good becomes a differentiated one, when bundled with such additional non-price attributes. Firms are thus able to differentiate their prices for identical goods, and price differentiation becomes an important potential source of price dispersion. In line with this idea, the empirical studies by Clemons et al. (1998), Brynjolfsson and Smith (2000) and Brynjolfsson et al. (2009), mentioned above, show that the fundamental cause of online price dispersion is not the mere product differentiation, but rather factors different from inherent product differences.
- **Brand, trust and awareness:** Unobserved retailer-specific factors such as brand, trust and awareness really matter in electronic markets. Trust may take an extraordinary importance in electronic markets because of the spatial and temporal separation between buyers and sellers imposed by the Internet. As a consequence, a firm with a good reputation is able to charge a premium, thereby generating price dispersion. Smith and Brynjolfsson (2000) show that the dominant position of Amazon.com in Internet book retailing is due not only to the fact that everyone knows Amazon.com but also to the fact that consumers trust Amazon.com very much. This is the main reason why Amazon.com is able to charge prices that are 7-12% higher than lesser-known retailers (Brynjolfsson and Smith, 2000), increasing price dispersion in the market.
Furthermore reputation acquires an especially important role in electronic markets also because the digital technology allows consumers to save on *absolute* search costs, but it actually increases *relative* search costs, thereby raising the differences in search costs among different retailers (Kauffman and Walden, 2001). Take the example of a firm that has gained a good online reputation. Consumers transacting with this firm will encounter relatively lower search costs with respect to a new entrant, who has no reputation. Consumers may even consider visiting first the brick-and-mortar corresponding store of an online new retailer, if there exists any. If this is true, consumers may decide to stick to the already established online retailer, even in the event that this latter charged higher prices. Empirical evidence confirms this hypothesis (Degeratu et al., 2000; Danaher et al., 2003; Pozzi, 2008). Results show that consumers' willingness to experiment new products, switching brands or sellers, is online lower than in conventional retailing.
- **Lock-in and switching costs.** Switching costs are defined as the costs that consumers have to incur when they switch brand or provider. Internet technologies may have a two-fold role in this respect. On the one hand, they reduce switching costs by decreasing the costs of searching for new retailers

and brands. On the other hand, they allow firms to set up much better tailored “loyalty programs”, thanks to the observation of consumers online behaviour (Varian, 2000). Other sources of switching costs may be represented by familiarity with a retailer’s website: many Internet retailers develop different interface designs in order to lock consumers in with the use of their website and make it more costly to switch to another unfamiliar website. However, the main source of lock-in effect is the customisation techniques, which increase the opportunity cost that a customer faces in switching to a new retailer. A customer who had a “one click” ordering account at a particular retailer may face relevant switching costs when deciding to shop elsewhere, also considering that people are reluctant to give their credit card details for safety reasons. This example extraordinarily fits to the Amazon.com case: after the first acquisition, a customer does not have to provide Amazon.com with his credit card number and all his personal data again, thereby facilitating access and the subsequent use of its webstores.

- **Price discrimination and market segmentation.** Another plausible explanation for the existence of price dispersion in electronic marketplaces is the use of market segmentation techniques by online firms. E-commerce offers firms the opportunity to use new personalisation technologies enabling them to exploit information about individual consumers in order to tailor both products and prices to individual requirements. Shapiro and Varian (1999, ch. 3) provide several examples of how price discrimination is pervasive in digital economy. Thanks to digital technologies, such as click-stream tracking, cookies, subscriptions on websites and online payments that store individual customers information, firms are able to engage in price discrimination more successfully, using *versioning* and *bundling* strategies. Shapiro and Varian (1999) show that product bundling and quality degradation, in the form of offering different versions of the same good, namely “versioning”, represent the typical ways to discriminate among buyers on the Internet. Ulph and Vulkan (2000) show that the greater the degree of customisation adopted by firms, the stronger will be their incentives to adopt first degree price discrimination, and so, mass customisation becomes a dominant strategy. Such form of price discrimination can often be efficient and beneficial for welfare. However, it can also create competition distortions by increasing price dispersion.
- **Imperfect information and consumers’ limited rationality:** Imperfect information and consumers’ limited rationality are other two sources of price dispersion on the Internet. Bakos (1997) raises the point that the increased consumers’ ease to find their own preferred seller can exert not only a downward pressure on the general price level, but also confer to the preferred firm a certain market power to raise their prices. As mentioned above, the preference a consumer gives to a certain seller on the Internet is composed of non-price factors as well. A study by Lynch and Ariely (2000) confirms the theoretical predictions put forward by Bakos. They find that in the online wine market, the product information provided to the customers increases their brand loyalty, influencing, in effect, the degree of price competition among producers. As shown by Baye and Morgan (2004), limited rationality can also play a role in boosting price dispersion on the Internet. In particular, the authors show that bounded-rationality-based theories of price dispersion fit experimental data from sellers and buyers behaviour remarkably well.

4. The role of shopbots (or gatekeepers)

The word “shopbot” comes from the union of the words “shopping” and “robot”. In particular, shopbots are Internet based services that provide on click access to

price and product information from numerous competing retailers and reduce buyer search cost for product and price information (e.g. Smith and Brynjolfsson, 2000).

In modern markets of information, shopbots, otherwise called *gatekeepers*, are thus search engine that assist consumers in their decision making process on the Internet, by providing consumers with information on prices, availability, and all other relevant product and seller characteristics and firms with the opportunity to transmit information on their products. In other words, shopbots act as information intermediaries (*infomediaries*), by charging access or usage fees to buyers and sellers for, respectively, transmitting and acquiring information on their platform. Shopbots can be specialised in one or few market, or be generic. Examples are: BestBooksBuys, DealTime.com and AddAll (for books), and Yahoo!Shopping, MySimon and PriceScan (for other varieties).

4.1. Economic theory on shopbots and pricing in electronic markets

It has been noted how important the role of gatekeepers can be in making the market more smooth, by allowing firms to reach a wider cohort of potential consumers and giving consumers the chance to search more rapidly and efficiently among sellers. In this section we will review the theoretical results of Baye and Morgan (2001) on how a shopbot organises its business activities of infomediation and then we will show the empirical evidence on how the effects of shopbots on markets.

As platforms facilitating the sellers and buyers transactions, gatekeepers are able to charge fees to firms for listing prices and to consumers to access the list of advertised prices. The structure and magnitude of such fees affect the market outcome to a great extent. In a theoretical work, Baye and Morgan (2001) focus on this question, analysing the way gatekeepers' fee decision in an electronic market impact (and is impacted by) the competitiveness of the overall product market. In their model, there are two local markets of a homogeneous good, each served by a monopolistic firm. Transaction and travel costs preclude consumers living in a town from moving to shop on the other town. By creating a virtual market for information, a gatekeeper gives customers and firms the opportunity to expand their transactions by eliminating the physical distance between towns, thus creating a "global" market instead of two "local" different markets. The gatekeeper essentially acts as the owner of a central clearinghouse for information, and, as such, it can set the fees firms and consumers must pay to transmit and acquire information to and from its platform. In setting such fees, the gatekeeper should take different aspects into account:

- a. the higher is the number of firms joining the platform and transmitting information on their prices and other non price product attributes, the higher the number of consumers that decide to access the gatekeeper's site. In other words, consumers willingness to pay for the infomediary services will be higher, the higher are the benefits consumers expect to get from it;
- b. firms are more willing to join the gatekeeper's platform if they expect the number of consumers using the website to be high, because they can potentially sell their products to more consumers;

- c. the greater the number of firms joining the gatekeeper's platform, the stronger the competition in the retail market. This implies that prices, and consequently profits, will decrease, reducing the firms' willingness to pay to enter the site.

The gatekeeper's optimal pricing decision is determined by balancing these countervailing effects. Baye and Morgan find that the gatekeeper's profits are maximized in a dispersed price equilibrium in which all consumers access the gatekeeper's site, but not all firms do so. Interestingly, it turns out that the gatekeeper optimally designs its fee structure to prompt full consumer participation, but only partial firm participation, in order to avoid a Bertrand paradox in the product market, that would cannibalise its own profits too. The gatekeeper finds it optimal to charge firms a higher fee than the socially optimal one, thereby inducing price dispersion: advertised prices are lower than unadvertised prices – meaning that online trading increases competition between firms, guarantees less expensive products, and so increases consumers' surplus –, but still higher than marginal price.

Shopbots, as infomediaries, are a typical example of a two-sided platform, characterised by the presence of two groups of agents (buyers and sellers) who use one or more intermediaries to interact with each other. The presence of indirect network externalities implies that the benefit accruing to agents on one-side increases the more agents of the other side are reachable through the platform. What distinguishes a two-sided market from a one-sided one is that agents are unable to internalise such externalities, thereby the need for an intermediary (Evans, 2003; Armstrong, 2006; Rochet and Tirole, 2006). The success of a two-sided platform is directly related to its ability to attract the highest number of agents from each group. In recent years, scholars have studied the characteristics of such markets, particularly focusing on pricing decisions and typical business practices. The research has shown that two-sided platform set their price levels, and more importantly, their price structure, in order to balance the indirect intergroup externalities and each group's own demand elasticity. Depending on circumstances, platforms may charge a usage fee, per transaction, or a membership fee, or both. The typical price structure often involves cross-subsidisation between groups, in order to prompt participation of one side and henceforth attract the other. Such apparent imbalance is actually welfare improving in that it is designed to better internalise the intergroup externalities (Jullien, 2004; Armstrong, 2006). Furthermore, Jullien (2004) shows how the use of tying strategies, like tying shipping and purchasing together, helps two-sided platforms attracting agents from a group to, in turn, attract also the other group's agents. Such strategies are broadly used in online markets for this purpose, as found also by Bakos and Brynjolfsson (1999), because of the peculiar cost structure characterising information goods, with very high fixed costs and almost zero variable costs (Shapiro and Varian, 1999).

4.2. Empirical evidence

Several empirical studies have attempted to measure the impact of intermediaries' activities on electronic markets. Using the data collected from DealTime.com website (once called EvenBetter.com), Brynjolfsson and Smith (2000) analyse the customers' choice behaviour on gatekeepers and what induces consumers to click on a specific offer when they are faced with a list of alternatives. In particular, the

authors econometrically analyse how customers respond to various aspects of the product bundle, such as price, brand, shipping time and the allocation of total price in its various components, including tax and shipping costs. Although each retailer offers a homogeneous product, Brynjolfsson and Smith (2000) find that brand is an important determinant of consumer choice. Consumers use brand as a proxy for retailer credibility in non-contractible aspects of the product and service bundle, such as shipping reliability. Thus, even if – at least in principle – the usual prediction seems to suggest that Internet reduces the role of differentiation, these results state that differentiation and brand recognition is important even for homogeneous goods like books. Obviously, not all customers care about brand equally, but brand is extremely important for customers who care more about the non contractible aspects of the product bundle, especially as far as it concerns shipping times. In this case, most customers greatly prefer well-known brand even if the total price is higher. The authors' results also suggest that consumers are sensitive to how the total price is allocated between the item price, shipping price, and tax. In particular, customers appear to be more sensitive to changes in sales tax and shipping cost than they are to changes in the item price, even when the total price they must pay remain unaffected.

In a companion paper, Brynjolfsson et al. (2009) explore the magnitude of consumer search benefits from using shopbots. Using data obtained from DealTime.com of 10,627 consumer searches for books offers over a 12 month period resulting in 460,814 separate retailer offers, Brynjolfsson et al. (2009) show that, for the median consumer, the benefits to searching lower screens are \$6.55, while the cost of an exhaustive search across all the offers brings a maximum of \$6.45 benefit. Furthermore, online price elasticity is relatively high compared to offline markets, with a decrease in demand of 7% to 10% for a 1% increase in price. More interestingly, the authors show that consumers who search more intensively are less-price sensitive than other consumers, reflecting the weight they put on retailer differentiation in non-contractible aspects, such as delivery time and reliability. This implies that even in the nearly perfect market supported by the activity of shopbots, price dispersion still exists due to the consumer preferences both on price and non-price attributes.

These results are also confirmed in Ellison and Ellison (2009), Baye et al. (2004) and Tang et al. (2007). In the first article mentioned, the authors find evidence of both extraordinary strong price competition but also obfuscation strategies on behalf of retailers on shopbots websites. Obfuscation strategies are created by online retailers in order to increase buyers search costs, and, consequently, competitive pressure. A typical obfuscation strategy used by online retailers consists in offering an (inefficiently) low quality product at a very low price to attract customers and then trying convincing them to pay extra to get the product they really wanted in the first place.

Interestingly, Baye et al. (2004), using data from Shopper.com shopbot website, show how price dispersion is not a transitory phenomenon and observed levels of price dispersion vary systematically with the number of firms listing prices. In particular, the difference between the two lowest prices averages 23% of the price and falls to 3.5% in markets where 17 firms list prices. This result testifies how

important it is to control for market structure and effective level of competition when performing comparisons between levels of price dispersion in different product markets or across time. Finally, Tang et al. (2007) show the effectiveness of shopbots in reducing price level, in line with theoretical analysis on consumers search. They study the correlation between consumers use of a certain shopbot with the shopbot's price levels and find that a 1% increase in use causes an average price decrease of \$0.41.

5. Online privacy and use of web surfing data

A major engine of online business activities is given by the opportunity to collect data on websurfers and their behaviour. For a search engine, such as Google for example, the fundamental business asset is represented by the search algorithm, which is continuously nurtured by the new coming information that each user provides by performing a new search: the system records what users click on when they enter a certain query and shape future results for the same query accordingly, both at individual level, when cookies are allowed on a personal computer, and at general level. In other businesses, the role of consumers' data as an input might be less obvious, or less relevant, but the phenomenon is absolutely widespread.

Getting content for free is most of the time the fruit of an illusion: websites use the information on their users' browsing behavior and often their personal data information in order to target them by selling space on their web pages and getting profits through advertising. Content is not for free, content is given in exchange for data and attention. Consumers are not always aware of this mechanism, and, although they seem to be quite reluctant to disclose personal information, most of the time they are willing to give it away for a very small reward.

Advertising space can be sold directly by publishers to advertisers or by intermediaries. Intermediation services are offered by "ad networks" or "ad exchanges" and, to some extent, by "media agencies". An ad network is a two-sided platform connecting publishers (websites) selling available space on their web pages, and advertisers that want to run ads on those websites. An ad exchange provides a marketplace where advertisers and publishers buy and sell ad space on a real-time basis. While ad networks tend to be "closed" systems with a finite number of buyers and sellers, ad exchanges tend to be "open" systems whereby any buyer or seller can access the platform and trade. Media agencies are the traditional consulting companies for media campaign planning, some of which have integrated online advertising in their services.

Intermediaries store a significant amount of data about web-surfers' behaviour, from each publisher's website and advertisers' campaigns, through the so-called ad serving tools, needed in order to run and monitor the campaign. In addition, ad networks attach specific cookies to users' surfing on websites of publishers belonging to the network in order to recognise them when they come back to the same website or when they visit another website in the network. Such practices or similar ones have raised the attention of consumer protection associations, websurfers, academia and regulators.

As Varian (1996) pointed out in his seminal paper on the economics of privacy: "When firms learn about consumers' preferences, they can also offer them products

that better meet their needs and thereby lower their search costs. However, the disclosure of information on consumer preferences involves a trade-off between a reduction of search costs and extraction of consumer surplus.” What is the actual final impact of such practices on consumers’ welfare? Is such use of consumers’ data fair? Is a regulation needed to ensure a lawful and fair treatment of online data on consumers’ habits?

In this section we will review the narrow, but rapidly growing, economic literature on online privacy. In Section 7, instead, we will briefly mention possible policy interventions in relation to online privacy protection.

5.1. Literature on economics of online privacy

Articles on consumer online privacy relate to diverse areas of the literature. We can distinguish three types of models: models of behaviour-based price discrimination; models comparing different possible consumer privacy policies; behavioural models. Fudenberg and Villas-Boas (2006) offer a survey of this literature.

In models of price discrimination, firms want to elicit consumers’ type (or simply use the information collected by observing their behaviour which serves as an imperfect signal of their type) and then use the information to price discriminate. The information can come from the observation of previous purchases (Taylor, 2004; Taylor and Wagman, 2008; Acquisti and Varian, 2004; Calzolari and Pavan, 2005); previous searches, or just previous browsing behaviour (Armstrong and Zhou, 2010). This literature relates closely to the one on targeted advertising on the Internet (Klein, 2009; Decorniere, 2009).

Calzolari and Pavan (2005) study contracting environments with two merchants that interact sequentially with one consumer. They assume that the consumer’s tastes for the goods sold by the merchants are perfectly correlated and find that the exchange of information about the consumer between merchants may lead to increases in welfare and consumer surplus when the goods are complements. Taylor (2004) studies specifically the market for customer information. He also finds that the welfare implications of the various technologies depend on the sophistication of the consumers. In particular, consumers fare poorly and firms fare well under an “open privacy” regime (where sale of customer information is permitted) when consumers are myopic. When customers are more sophisticated, firms benefit from keeping their customers’ information private. His analysis, however, does not focus on the possibility that the ‘anonymity’ regime can be made endogenous through the consumer’s decision process. Consumers could indeed opt for or against using privacy enhancing technologies, as Acquisti and Varian (2004) suggest. The latter focus on optimal monopoly pricing when previous consumers purchases information is available, in a setting where a buyer’s tastes for two goods are perfectly correlated. They find that dynamic pricing is optimal for the monopolist when consumers are naive but not when they are sophisticated. However, if the monopolist cannot commit to dynamic pricing, demand for the first good becomes more elastic, which may lead, in equilibrium, to a low price for the first good and a high price for the second.

Not surprisingly, these models on behavioural price discrimination predict that targeted advertising has an ambiguous impact on consumer welfare, and this greatly depends on consumers' awareness of the use of their data.

Another part of the economic literature on online privacy compares different possible privacy regimes (Tang et al., 2005; Bouckaert and Degryse, 2006; Taylor and Wagman, 2008). In Taylor and Wagman (2008), a monopolistic firm can use customer information to price discriminate in a two-period model, consumers can opt out of being identified, possibly at a cost. The authors find that when opting out is costless, all customers opt out, since it is individually optimal to do so. But this leads to a prisoner's dilemma, since when nobody opts out the monopolist faces a higher elasticity of demand (all consumers are sophisticated and thus aware of the consequences from revealing their preferences), so first period prices will be lower. Second period prices will be better tailored due to price discrimination. As a result, welfare is higher. Surprisingly, obscure privacy policies here work as a welfare-enhancing tool.

Bouckaert and Degryse (2006) generalise the setting defined by Taylor and Wagman (2008) by allowing horizontal differentiation competition and free entry *à la* Vickrey-Salop and examine three different firms' data retention policy settings, or privacy regimes: opt out, opt in and anonymity. With opt-out systems, information flows unrestrictedly in the economy (internally to the firm, transacted with and to third parties) when consumers do not actively exercise the right to opt out. With opt-in, consumers can decide whether the firm can sell information to third parties, but the information stays within the firm if they do not actively opt in. Market entrants cannot rely on having the information on consumer through the market for consumer data. With anonymity, information does not even stay within the firm. The main conclusions drawn are that, given free entry in the market and very costly choices, as anecdotal evidence suggests,² they find that opt-out dominates anonymity which in turn dominates opt-in. Armstrong, Vickers and Zhou (2008) depict a theoretical model which is related to this literature. They analyse what is the impact of consumer protection policies on the incentive to become informed of the best deal available in the market, in a setting with search costs and with a population divided into informed consumers and uninformed consumers. When more consumers are aware of the best deals available in the market, there is a positive externality on the less informed ones in terms of increased price competition. Consumer policies, such as imposing a price cap or allowing consumers to opt out of advertising, which act to reduce the incentive to search for better deals, may have the unintended consequence to actually harm consumers.

A group of papers (Vila et al., 2003; Tang et al., 2005; Lizzeri, 1999; Edelman, 2010; Larose and Rifon, 2009) assume that consumers pay a cost to search for better privacy standards in websites (they have to exert effort to find out the signal), while firms have to decide how strong their engagement in respecting privacy will be. Here the context is different from price discrimination models since the asymmetry of information stems from firm types, not consumer types. This literature generally

² Following evidence, Bouckaert and Degryse (2006) suppose that it is too costly for consumers to be active, so they analyse each of these policies in the case no consumers actually exercise their power but they do take into account of second period pricing by firms.

predicts adverse selection in certification intermediaries, which are currently the way through which websites show their commitment to respect certain privacy standards (websites join the private seal-of-approval organisation, such as TRUSTe). Vila et al. (2003) find that the privacy seal-of-approval organisations are a market for lemons, because there is no relevant difference in the cost of joining for defecting and respecting sites. The reason is that even if we suppose that complying with a privacy seal requirement is more costly for the defecting site, once it has joined the program, it will still have the chance to cheat given the very low probability of being detected. In Larose and Rifon (2009) and Edelman (2010) papers, the existence of a market for lemons in online privacy certification is shown empirically by comparing the intrusiveness and data protection level of sealed sites against non-sealed sites.

Other papers on consumer privacy, mainly based on experimental data, focus on consumers limited rationality in approaching the problems connected to the use of data. In fact, even though consumers claim to value privacy a great deal, they most of the time give it away for very low rewards. One possible explanation is based on behavioural models of immediate gratification, hyperbolic discounting (Acquisti et al, 2007; Hann et al., 2007).

6. Price dynamics and collusion in online digital markets

As shown in section 4, web-based price comparison sites, like shopbot or gatekeepers, have been generally viewed as being beneficial to consumers, because they decrease the importance of search costs. However, this is not so obvious since shopbots not only allow consumers easy access to other firms' prices, but they also allow each firm to monitor others firms' price movements. This aspect raises the question of potential price collusion from online retailers.

In general, a firm has an incentive to cut rivals' prices if by doing so it can sell more and increase its market share. However, the incentive to price cutting strictly depends on how fast the rivals react to the price cut. If consumers move more rapidly than firms, then the price cutter can obtain a benefit (in terms of profits) from price reduction; vice versa, though, this may not be the case. Using an example mentioned by Varian (2000), suppose that a firm matches the rival firm's price change *before* consumers can respond. In this case, there is no flood of consumers from cutting price, and the incentives to cut price are dramatically reduced. If both firms pursue the same price-matching strategy, the equilibrium price is the same as if there were a single monopolist.

Does this sort of price matching occur in electronic markets? In this direction, some suggestive evidence is provided by Varian (2000) regarding pricing strategies for bestsellers on Amazon.com and Barnesandnoble.com. This evidence seems to suggest that online retailers – the biggest operators at least – tend to adopt pricing strategies and price variations that are inconsistent with a perfect price competition setting. This kind of price dynamics could partly be explained by the important upfront sunk costs that are prominent in online industries.

Using data from online book retailers, Latcovich and Smith (2001) show for example that Amazon.com spends 20-30% of its revenues in advertising,

Barnesandnoble.com over 40%, while the advertising/sales ratio of Fatbrain.com has increased by more than 70% over the period 1995 to 2000. However, in absolute terms, Amazon.com outspends rivals by as much as 300%! In this context, there would be no possibility for firms to recover those initial upfront investments if competition was so intense as to really drive prices down to marginal costs. High upfront sunk costs raise entry barriers and favour concentration (Sutton, 1991). In the reference period of this study, the UK and the US presented a similar situation where the online market for books was extremely concentrated, the 4 biggest retailers – which were also the firms spending more in advertising – holding a market share of about 90%, against about 40% in the traditional book market.

According to Latcovich and Smith (2001), the high level of concentration and therefore the high market power lead book retailers to tacitly collude on prices. Using data from New York Times and The Times bestseller selection, the authors show that inter-firm price variation contradicts the law-of-one-price implied by perfect price competition in case of homogeneous goods, and, most importantly, price variations appear in many cases to be coordinated, at least among the biggest retailers.³

The evidence reported above shows that the online book market is far from being competitive and that the collusive phenomenon seems to be quite common. The book market is just an example, but similar conditions can be found in other developing online markets. It is likely that these conditions will change as electronic markets reach a more mature stage of development. However, in this growing phase of electronic markets, some form of ex post antitrust control on pricing behaviour is strongly advisable in order to prevent collusion from limiting the beneficial effects of these new markets.

7. E-commerce and its implication for competition and regulatory policies

Previous sections have shown that – despite its technical and organisational differences from traditional brick-and-mortar retailing – e-commerce does not give rise to any entirely new form of anti-competitive behaviour or new issues that are not included in the existing competition law framework. However, as pointed out also by the Office of Fair Trading (OFT), there are some aspects that require a careful monitoring in order to prevent possible market abuses or anticompetitive conducts that could limit the positive and beneficial effects of electronic transactions.

Following the traditional competition policy framework, the first question to address is *market definition*. Antitrust authorities should consider whether e-commerce creates a new market separated by traditional retailing or whether e-commerce is essentially a new and powerful channel in the competition with conventional brick-and-mortar retailing. From a geographical point of view, the relevant market including e-commerce should be widened, since the geographical location of transactions completely loses significance in digital markets. According

³ Latcovich and Smith (2001) show several examples like the sale prices for the book “Hannibal” by T. Harris which are particularly suggestive of some form of coordination at least between the largest online bookstores.

to the OFT (2000), the hypothetical monopolist test or SSNIP test still remains the most effective tool to evaluate the relevant market, even if the presence of huge price dispersion, price discrimination and the importance of non pricing issues make the test implementation very complex.

As far as the *assessment of market power* is concerned, the economic characteristics of e-commerce make barriers to entry into both B2C and B2B marketplaces very small compared to traditional retailing. The main relevant entry barriers characterising e-commerce are:

- a) the presence of relevant switching costs and lock-in effects;
- b) the importance of brand recognition and trust in the seller; and
- c) the presence of network externalities that can lead to an increase in e-retailers network dimensions and eventually market tipping.

The above elements show that sunk entry costs are not irrelevant in online markets. Antitrust authorities should analyse whether such sunk entry costs effectively induce market power. As stated by the OFT (2000, p. 3), “High barriers to entry for e-commerce operators will not confer market power on incumbents if e-commerce operators compete in a wide product market that includes traditional commerce, and if barriers to entry into the traditional service are low. Likewise, even if the relevant market includes e-commerce operators only, high barriers relating to branding for “pure-play” e-commerce operators (i.e. companies without any traditional market position) need not imply market power, so long as there are sufficient mix-play operators that are willing to leverage their existing brand name into an e-commerce context”.

In contrast, antitrust authorities should intervene in order to avoid that the anticompetitive behaviour of the dominant retailers limit the current and the future competitiveness of digital markets when these barriers impede the competitive development of the market and provide dominant retailers with an advantageous position in the market.

Finally, the *anticompetitive agreements and conducts* that typically characterise e-commerce do not substantially differ from what we can observe in traditional retailing. Overall these can be classified as follows.

- **Collusive agreements.** Collusion is facilitated when parties are able to communicate, share information and repeatedly interact. All these factors help enacting a prompt punishment, should any deviation from the collusive agreement take place. As previously shown, empirical evidence shows how relevant the collusive phenomenon is, at least concerning some specific marketplaces and online industries such as books and digital entertainment markets. The long-run relationship and the repeated interaction among e-retailers, facilitated by the digital technology, seem to favour collusion. Especially in B2B, where online marketplaces are also co-owned by market participants, the latter can use the platform to communicate (through private chat rooms, for example). In addition, market concentration and relatively high entry barriers facilitate collusion. Antitrust authorities should evaluate whether to monitor separately each online industry (especially perfectly homogeneous goods market, where sustaining collusion is easier) and whether to develop a proprietary search engine that collects and compares data on publicly available prices in the Internet.
- **Price discrimination.** As shown earlier, price discrimination is pervasive in digital economies, both in B2B and B2C marketplaces. Its effects could at times be positive and welfare enhancing, at times competition-distorting. E-

commerce presents two characteristics that may render the evaluation of an anticompetitive price discrimination strategy difficult: the presence of large numbers of narrow markets, that make market definition problematic due to its width; moreover, economies of scope make price to cost comparison extremely complex. However, traditional tools of competition policy are nonetheless able to face these difficulties and identify anticompetitive price discrimination.

- **Predation.** It is always difficult to distinguish low prices that are signal of fierce competition, from those generated by an anticompetitive behaviour of a dominant firm. In e-commerce, especially as far as platforms pricing behaviours are concerned, the evaluation of predation is even more complex, since the special two-sided feature of the electronic markets could lead the managers of a marketplace to cross subsidise among groups of agents (sellers and buyers) in order to internalise inter group externalities.
- **Online privacy protection.** Internet users rarely look for higher privacy standards by reading through websites privacy policies; firstly, because website privacy policies are lengthy and obscure; secondly, because there is a feeling that there is no way to escape an all too intrusive information requirement, at least for services of a similar kind⁴. As in Diamond (1971), where in equilibrium there is no search and all firms charge the monopoly price, in this context there is no search and websites tend to provide the lowest privacy protection, which is still lawful. Moreover, some websites may not even care about their data treatment policy being entirely lawful, given the very unlikely detection by public enforcement bodies as well as by private reputation systems, which are very common tools for consumer protection in the Internet.⁵ Regulators have begun to seriously take this problem into account. The Federal Trade Commission has recently published a report (Federal Trade Commission, 2010), which proposes a special choice mechanism for online behavioural advertising: a “Do Not Track” option which would allow websurfers to generically opt out of being tracked. The European Union is also taking action in order to protect online consumers’ privacy and has recently published a communication (European Commission, 2010) stating that all the problems regarding personal data protection, particularly related to Internet, will be the subject of a forthcoming specific regulation. Both documents aim at increasing transparency, ensuring constant respect of personal data treatment, providing consumers with the tools to control the use of their data, increasing awareness, clarifying rules on consent, pursuing an active infringement policy. Self regulation is welcomed and stimulated through roundtables and hearings with industry representatives and stakeholders, but authorities must be able to find ways to ensure real enforceability which proves technically difficult.⁶ The topic is extremely relevant for our current and future society and further research is needed to sustain policy action in protection of online privacy. At the same time, a sustainable development of this model must involve ways to connect the power of technology with the safeguard of individuals’ rights to privacy. Ex post intervention is not viable due to the difficulty of violation detection.
- **Access to essential facilities.** Since in an online marketplace (say a shopbot or a gatekeeper) the value created within the platform strictly depends on the number of agents belonging to *both* sides of the market, i.e. sellers and buyers, it is less likely that a marketplace refuses access to its platform. Nonetheless,

⁴ For example, email services always require registration or quick checkout services imply the use of cookies.

⁵ Evidence of breaches are shown by Benjamin Edelman on his website, <http://www.benedelman.org/>.

⁶ Advertisers have set up the Network Advertising Initiative (NAI), which is aimed at safeguarding online privacy.

there exist specific forms of discrimination in access, such as for example access to portals. Portals are the main tool used by customers to reach different marketplaces and start a transaction and so they play a crucial role in the development of e-commerce. Other anticompetitive behaviour could consist in denying access to a specific technology (i.e. software) needed to perform the online transactions on certain marketplaces.

- **Joint ventures and exclusive dealing agreements.** Joint ventures and strategic alliances are pervasive across different online business areas. Such agreements can have several pro-competitive reasons: online firms might want to put complementary skills together for certain projects, share risks connected to investing in newly-born markets, exploit relevant scale and scope economies. At the same time, joint ventures might also be motivated by collusive purposes, or create barriers to entry for other actual or potential competitors. Exclusive dealing agreements are subject to the same competitive concerns. Amazon.com, for example, has numerous exclusive dealing agreements for selling books online with ISPs (Internet Service Providers) and this reinforces its market position.

Evaluating such behaviours is difficult per sé but it is even more complex when they are related to a growing and highly innovative market such as e-commerce. Antitrust authorities should take particular care in taking their decisions. As the OFT (2000) points out, on the one hand, where there are likely to be first-mover advantages, anti-competitive behaviour over the short-term can deliver significant long-term effects. Any delayed reaction to foreclosure by competition authorities could therefore have substantial and prolonged implications. On the other hand, the area of e-commerce is highly innovative. Premature intervention by competition authorities could in some cases inhibit innovation and the development of new markets, especially when these markets are characterised by the presence of strong network externalities, which is the case for most online marketplaces.

Acquisti, A. and H. R. Varian (2005), *Conditioning Prices on Purchase History*, “Marketing Science”, vol. XXIV, p. 367-381.

Acquisti, A. (2004), *Privacy in Electronic Commerce and the Economics of Immediate Gratification*, Proceedings of the ACM Electronic Commerce Conference (ACM EC), ACM, 21-29.

Armstrong M. (2006), *Competition in Two-Sided Markets*, in “RAND Journal of Economics”, vol. XXXVII, n. 3, p. 668-691.

Armstrong M., Vickers J. and Zhou J. (2009), *Consumer Protection and the Incentive to Become Informed*, “Journal of the European Economic Association”, vol. VII, n. 2-3, p. 399-410.

Armstrong M. and Zhou J. (2010), *Conditioning prices on search behaviour*, MPRA Working Paper, Unpublished.

Bailey J.P. (1998), *Electronic Commerce: Prices and Consumer Issues for Three Products: Books, Compact Discs, and Software*, Organisation for Economic Co-Operation and Development, OECD/GD(98), n. 4.

Bakos Y. (1997), *Reducing Buyer Search Cost: Implications for Electronic Markets*, in “Management Science”, vol. XLIII, n. 12, p. 1676-1692.

Bakos Y. (2001), *The Emerging Landscape for Retail E-commerce*, in “Journal of Economic Perspectives”, vol. XV, n. 1, p. 69-80.

Bakos Y., Brynjolfsson E. (1999), *Bundling Information Goods: Pricing, Profits and Efficiency*, in “Management Science”, vol. XLV, n. 12, p. 1613-1630.

Baye M., Morgan J. (2001), *Information Gatekeepers on the Internet and the Competitiveness of Homogeneous Markets*, in “American Economic Review”, vol. XCI, n. 3, p. 454-474.

Baye M., Morgan J. (2004), *Price Dispersion in the Lab and on the Internet: Theory and Evidence*, in “RAND Journal of Economics”, vol. XXXV, n. 3, p. 449-466.

Baye M., Morgan J., Scholten P. (2004), *Price Dispersion in the Small and in the Large: Evidence from an Internet Price Comparison Site*, in “Journal of Industrial Economics”, vol. LII, n. 4, p. 463-496.

Bouckaert, J. and Degryse H. (2006), *Opt In Versus Opt Out: A Free-Entry Analysis of Privacy Policies*, CESifo Working Paper Series 1831, CESifo Group Munich.

Brynjolfsson E., Smith M. (2000), *Frictionless Commerce? A Comparison of Internet and Conventional Retailers*, in “Management Science”, vol. XLVI, n. 4, p. 563-585.

Brynjolfsson E., Yu H., Smith M. (2003), *Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Booksellers*, in “Management Science”, vol. IL, n. 11, p. 1580-1596.

Brynjolfsson E., Dick A.A., Smith M. (2009), *A Nearly Perfect Market?*, mimeo.

Brown J.R., Goolsbee A. (2002), *Does the Internet Make Markets More Competitive? Evidence From the Life Insurance Industry*, in “Journal of Political Economy”, vol. 110, p. 481- 507.

Burdett K., Judd K. (1983), *Equilibrium Price Dispersion*, in “Econometrica”, vol. LI, n. 4, p. 955-969.

Buzzacchi L., Cambini C. (2004), *La competizione nei mercati dell’intermediazione informativa: il caso dei repertori telefonici*, in “L’Industria”, n. 1, p. 121-152.

Calzolari G. and Pavan A. (2006), *On the Optimality of Privacy in Sequential Contracting*, “Journal of Economic Theory”, vol. CXXX, n. 1, p. 168–204

Chevalier J., Goolsbee A. (2003), *Measuring Prices and Price Competition Online: Amazon and Barnes and Noble*, in “Quantitative Marketing and Economics”, vol. 1, n. 2, p. 203-222.

Clay K., Krishnan R., Wolff E. (2001), *Prices and Price Dispersion on the Web: Evidence from Online Book Industry*, in “Journal of Industrial Economics”, vol. IL, n. 4, p. 521-539.

Clay K., Krishnan R., Wolff E., Fernandes D. (2002), *Retail Strategies on the Web: Price and Non-price Competition in the Online Book Industry*, in “Journal of Industrial Economics”, vol. L, n. 3, p. 351-367.

Clemons E.K., Hann I.-H., Hitt L. M. (1998), *The Nature of Competition in Electronic Markets: An Empirical Investigation of Online Travel Agent Offerings*, The Wharton School of the University of Pennsylvania. Working Paper.

Clemons E.K., Hann I.-H., Hitt L. M. (2002), *Price Dispersion and Differentiation in Online Travel: An Empirical Investigation*, in “Management Science”, vol. IIL, n. 4, p. 534-549.

- Danaher P.J., Wilson I.W., Davis R.A. (2003), *A Comparison of Online and Offline Consumer Brand Loyalty*, in “Marketing Science”, vol. XXII, n. 4, p. 461-476.
- De Cornière, A. (2009), *Targeted Advertising with Consumer Search: an Economic Analysis of Keyword Advertising*, Working Paper 48, Mimeo, Paris School of Economics.
- Diamond P. (1971), *A Model of Price Adjustment*, in “Journal of Economic Theory”, n. 3, p. 156-168.
- Dillard M. (1999), *The Economics of Electronic Commerce: A Study of Online and Physical Bookstores*, Bachelor’s honors thesis, University of California, Berkeley.
- Degeratu A., Rangaswamy A., Wu J. (2000), *Consumer Choice Behaviour in Online and Regular Stores: The Effects of Brand Name, Price, and Other Search Attributes*, in “International Journal of Research in Marketing”, vol. XVII, n. 1, p. 55-78.
- Edelman B. G. (2010), *Adverse Selection in Online ‘Trust’ Certifications and Search Results*, “Electronic Commerce Research and Applications”.
- Ellison G., Ellison S. (2009), *Search, Obfuscation and Price Elasticities on the Internet*, in “Econometrica”, vol. LXXVII, n. 2, p. 427-452.
- European Commission (2010), *Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions*, Com (2010)609 final.
- Evans D. (2003), *Some Empirical Aspects of Multi-sided Platform Industries*, in “Review of Network Economics”, vol. II, n. 1, p. 1-20.
- Federal Trade Commission (2010), *Protecting consumers privacy in an era of rapid change*, Report December 2010.
- Friberg R., Ganslandt M., Sandstrom M. (2000), *E-commerce and Prices: Theory and Evidence*, SSE/EFI Working Paper Series in Economics and Finance, n. 389, Stockholm School of Economics.
- Fudenberg, D. and J. M. Villas-Boas (2006). *Behavior-Based Price Discrimination and Customer Recognition*, in Handbook on Economics and Information Systems, Hendershott, T. (ed.), Elsevier Science Ltd.
- Goolsbee A. (2000), *In A World Without Borders: The Impact of Taxes on Internet Commerce*, in “Quarterly Journal of Economics”, vol. CXV, n. 2, p. 561-576.
- Hann, I., Hui, K., Lee, S. T and I. Png (2007), *Overcoming Online Information Privacy Concerns: An Information-Processing Theory Approach*, “Journal of Management Information Systems”, vol. XXIV, n. 2, p. 13–42.
- Idate (2008), *DigiWorld Yearbook 2008. The digital world’s challenges*, DigiWorld Publishing.
- Janssen M.C.W., Moraga-Gonzalez J.L., Wildenbeest M.R. (2007), *Consumer Search and Pricing Behavior in Internet Markets*, in Brousseau E., Curien N. (a cura di) *Internet and Digital Economics*, Cambridge, Cambridge University Press.
- Johnson E., Moe W., Fader P., Bellman S., Lohse G. (2004), *On the Depth and Dynamics of Online Search Behavior*, in “Management Science”, vol. L, n. 3, p. 299-308.

Jullien B. (2004), *Two-Sided Markets and Electronic Intermediaries*, CESifo Working Papers n. 1345.

Kauffman R.J., Walden E.A. (2001), *Economics and Electronic Commerce: Survey and Directions for Research*, in “International Journal of Electronic Commerce”, vol. V, n. 4, p. 5-116.

Klein J. (2009), *Targeted Advertising on Internet Websites*, Working Paper, Mimeo.

LaRose, R., N. Rifon (2003), *Your privacy is assured – of being invaded: web sites with and without privacy seals*, mimeo, available at <http://www.msu.edu/~larose/es2003post.htm>.

Latcovich S., Smith H. (2001), Pricing, Sunk Costs, and Market Structure Online: Evidence From Book Retailing, in “Oxford Review of Economic Policy”, vol. XVII, n. 2, p. 217-234.

Lee H.G. (1998), *Do Electronic Marketplaces Lower the Price of the Good?*, in “Communications of the ACM”, vol. XLI, n. 1, p. 73-80.

Lee H.G., Westland C.J., Hong, S. (1999), *The Impact of Electronic Marketplace on Product Prices: An Empirical Study of AUCNET*, in “International Journal of Electronic Commerce”, vol. IV, n. 2, p. 45-60.

Lizzeri, A. (1999), *Information Revelation and Certification Intermediaries*, “RAND Journal of Economics”, vol. XXX, n. 2, p. 214–231.

Lynch J.G., Ariely D. (2000), *Wine Online: Search Costs Affect Competition on Price, Quality, and Distribution*, in “Marketing Science”, vol. XIX, n. 1, p. 83-103.

Office of Fair Trading (2000), *E-Commerce and Its Implications for Competition Policy*, Discussion paper 1, August.

Rochet J.C., Tirole J. (2006), *Two-Sided Markets: A Progress Report*, in “RAND Journal of Economics”, vol. XXXVII, n. 3, p. 645-667.

Pozzi A. (2008), *Shopping Cost and Brand Exploration in Online Grocery*, mimeo.

Salop S. (1979), *Monopolistic Competition with Outside Goods*, in “Bell Journal of Economics”, vol. 10, p. 141-156.

Salop S., Stiglitz J.E. (1977), *Bargains and Ripoffs: A Model of Monopolistically Competitive Price Dispersion*, in “Review of Economic Studies”, vol. XLIV, p. 493-510.

Scott Morton F., Zettelmeyer F., Silva Risso J. (2001), *Internet Car Retailing*, in “Journal of Industrial Economics”, vol. IL, n. 4 p. 501-519.

Shapiro C., Varian H.R. (1999), *Information Rules. A Strategic Guide to the Network Economy*, Boston (MA), Harvard Business School Press.

Smith M.D. (2002), *The Impact of Shopbots on Electronic Markets*, in “Journal of the Academy of Marketing Science”, vol. XXX, n. 4, p. 442-450.

Smith M.D., Bailey J., Brynjolfsson, E. (2000), *Understanding Digital Markets: Review and Assessment*, in Brynjolfsson E., Kahin B. (a cura di), *Understanding the Digital Economy*, Cambridge (MA), MIT Press.

Smith M.D., Brynjolfsson E. (2001), Consumer Decision-Making at an Internet Shopbot, in “Journal of Industrial Economics”, vol. IL, n. 4, p. 541-558.

Stahl D.O. (1996), *Oligopolistic Pricing with Heterogeneous Consumer Search*, in “International Journal of Industrial Organization”, vol. XIV, n. 2, p. 243-268.

Stigler G. (1961), *The Economics of Information*, in “Journal of Political Economy”, vol. LXIX, n. 3, p. 213-225.

Sutton J. (1991), *Sunk Costs and Market Structure*, Cambridge (MA), The MIT Press.

Tang, Z., Hu, Y., and M. Smith (2005), *Protecting online privacy: Self-regulation, mandatory standards, or caveat emptor*, mimeo.

Tang Z., Smith M.D., Montgomery A. (2007), *The Impact of Shopbot Use on Prices and Price Dispersion: Evidence from Online Book Retailing*, mimeo.

Taylor, C. (2004), *Consumer Privacy and the Market for Customer information*, “RAND Journal of Economics”, vol. XXXV, p. 631-650.

Taylor, C., L. Wagman (2008), *Who benefits from Online Privacy?*, NET Institute Working Paper, n. 08-26.

Tsai, J., Egelman, S., Cranor, L. and A. Alessandro (2007), *The Effect of Online Privacy Information on Purchasing Behavior: An Experimental Study*, Proceedings of the International Conference of Information Systems (ICIS).

Ulph D., Vulkan N. (2000), *E-commerce, Mass Customization and Price Discrimination*, UCL and University of Bristol, mimeo.

Varian H.R. (1980), *A Model of Sales*, in “American Economic Review”, vol. LXX, n. 4, p. 651-659.

Varian H.R. (2000), *Market Structure in the Network Age*, in Brynjolfsson E., Kahin B. (a cura di), *Understanding the Digital Economy*, Cambridge (MA), MIT Press.

Vila, T., Greenstadt R. and D. Molnar (2003), *Why we can't be bothered to read privacy policies models of privacy economics as a lemons market*, ICEC: Proceedings of the 5th international conference on Electronic commerce.

Waldeck R. (2005), *Prices in a Shopbot Market*, in “Electronic Commerce Research”, vol. V, n. 3-4, p. 367-381.

Zettelmeyer F., Scott Morton F., Silva-Risso J. (2003), *Cowboys or Cowards: Why are Internet Car Prices Lower?*, mimeo.