
1. Media as multi-sided platforms

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Media are among the most influential institutions in modern societies. Media outlets – press, TV, Internet, radio, cinema – have become the leading players in the production and diffusion of information.¹ Universal access to information, knowledge and pluralism of opinions are fundamental vectors for promoting a democratic and free society.

However, the production of information is costly and the survival of media outlets crucially depends on the possibility of financing their activities. To avoid overloading consumers with all the costs of information production and promote as much as possible a universal access to information, media outlets have long relied² on the combination of circulation/subscription revenues and advertising revenues (sometimes complemented by public subsidies³) to finance their activities.

The conventional business model used by media firms exploits their role as platforms of interaction between two categories of users: audiences (consumers) and advertisers. Exchanges arising in media markets often generate cross network externalities (between advertisers and consumers, and vice versa), producing interactions between the demand for advertising and the demand for media content. Accordingly, traditional media outlets naturally appear as two-sided platforms.

In light of all changes carried by the digital disruption and the convergence phenomenon, the frontiers of media markets are going through a process of deep transformation. The cost of information provision and diffusion has become much lower and the speed of information exchange has enormously increased. This process has immensely expanded the possibilities to create value. Conventional media are now “coopeting”⁴ with a variety of new media outlets, predominantly based on the existence of Internet (e.g. online press, online TV, social networks, news aggregators, blogs, and many others). In this context, new important players, like telecommunication companies or “Internet giants” (Apple, Google, Amazon) are consolidating their positions in the media markets. In particular, telecommunications companies see their activity no longer restricted to the provision of telephone or Internet connections. Nowadays these companies present themselves as service

providers who integrate several activities in the value chain of media markets (connection, provision of content services⁵ and, even, production of media content).

Given all the striking changes that are presently taking place in the media markets, the firms involved in these markets are rethinking their business model. New approaches to the market are being designed and media firms are embracing the model of multi-sided platforms, relying on multiple interaction channels (such as press, social networks, blogs, applications for smartphones, TV, radio, cinema, content distribution online platforms) and serving multiple categories of agents, such as Internet service providers, different categories of content producers, advertisers, and consumers, who also produce content.

In this chapter, we highlight the role of media as multi-sided platforms, in the context of both traditional and new media. Surprisingly, the economic aspects of the theory of media markets have escaped the attention of economists for a long time. The theoretical foundations of the field of media economics, formally modelling media markets as two-sided platforms, have only been set up in the late nineties, even if various interesting contributions have already been made before the expansion of the literature on two-sided markets (e.g. Corden, 1953; Owen et al., 1974; Picard, 1989; Owen and Wildman, 1992; Albarran, 1996, among others). Some of the pioneering theoretical approaches to media markets as two-sided platforms include the works by Sonnac (2000, 2002), Gabszewicz et al. (1999, 2001, 2002) and Anderson and Coate (2005). At the same time, the fast development of the general theory of two-sided markets (for example Rochet and Tirole, 2003; Armstrong, 2005; Caillaud and Jullien, 2003) has played an important role in promoting the field of media economics, and has provided a systematic and unified framework for the analysis of traditional media markets.

In the last decade, the theoretical literature investigating the economics of media platforms has grown immensely. In particular, in the field of Economics, scholars have been very interested in (i) studying the specific interactions occurring in media markets due to cross network externalities, as described, for example, by Gabszewicz et al. (1999), Sonnac (2000), Ferrando et al. (2008), Resende (2008) or Anderson et al. (2012); (ii) analyzing the optimal price structure in media markets and the behavior of advertising and circulation/subscription revenues, as in the works by Peitz and Valletti (2008), Manduchi and Picard (2009) or Reisinger (2012); (iii) investigating the nature of competition in media markets and its effects on the provision of quality and diversity (as in Gabszewicz et al., 2001 or Dukes and Gal-Or, 2003); (iv) exploring the

profit-maximizing and the socially optimal price structure (advertising rates *vis-à-vis* subscription fees) and the resulting content allocation between advertising and media content, as in Anderson and Coate (2005); (v) designing an appropriate regulatory framework for media markets (among others, Yoo, 2002; de Bijl and Peitz, 2010; Economides and Tag, 2012).

In light of the recent developments of the sector, the scope of cross network externalities became wider and wider, and the field of media economics now intersects with the fields of economics of information (Shapiro and Varian, 1999; Gensollen, 1998), economics of networks (Jackson, 2008; Page and Wooders, 2009, 2010), economics of telecommunications (Laffont and Tirole, 2000) and economics of the Internet (Illing and Peitz, 2006; Peitz and Waldfogel, 2012).

This chapter focuses only on the economic aspects of media viewed as multi-sided platforms. We start by describing the specific economic features of media markets, namely the specific nature of the “commodity” information and the role of network externalities. Then, we characterize the business model of conventional and new media outlets, and describe the main challenges arising in the media markets as a result of convergence and digital disruption.

1. TWO-SIDED PLATFORMS AND TRADITIONAL MEDIA

1.1 Information: Specific Economic Features

Information can be conceived as a commodity with very specific features. First, information can be (at least partially) conceived as a public good. Following Samuelson (1964), rivalry and exclusion are the two essential characteristics distinguishing public and private goods. Public goods are said to be non-rival (consumption by one agent does not preclude consumption by other agents) and non-exclusive (consumers cannot be excluded from the market through prices). Although the consumption of information may be excluded through prices (in that case, information is said to be a club good), its consumption is always non-rival. This specific feature of information may raise several issues such as the underproduction of information or the issue of the aggregation of consumers’ preferences over different contents.

Second, the technology behind the production of information often leads to very extensive economies of scale. The cost of producing the first copy tends to be very high but the marginal cost of bringing an extra

copy to the market is almost zero. Since the vast majority of the costs are fixed, the conventional rule of pricing at the margin (setting the price equal to marginal cost) may lead to economic losses for the information producers (Sonnac, 2009).⁶ Accordingly, media firms often rely on less conventional business models, which exploit additional sources of revenues (like advertising or public subsidies). The digital revolution has accentuated this problem even further: the cost of reproduction is now virtually zero, enhancing firms' difficulties in raising money from the distribution of media content only. In addition, piracy activities have become much easier. Together, these phenomena may reduce firms' incentives to invest in content production (and assure its quality). Hence, business models exclusively based on the sales of media content are being challenged more than ever before.

Finally, information also exhibits characteristics of an experience good (see Caves, 2002), meaning that its quality can only be ascertained after experimentation.⁷ Consequently, the distribution of information often involves specific procedures of signalling and selection of contents (for example newspaper titles, journalists' reputation, media brands), increasing the weight of marketing and promotion expenditures (Sonnac, 2009).

1.2 The Business Model of Traditional Media

According to the recent literature on media economics, the basis of the business model of traditional media is explained by the theory of two-sided markets. Rochet and Tirole (2006) define two-sided markets as follows: *“Two-sided (or more generally multi-sided) markets are roughly defined as markets in which one or several platforms enable interactions between end-users, and try to get the two (or multiple) sides ‘on board’ by appropriately charging each side.”* In two-sided markets, the interactions among end-users often engender network externalities. This type of externalities arises when the utility of an agent is enhanced by the number of agents participating in the same market (in the case of direct network externalities) or in a related market (in the case of indirect network externalities).⁸ Due to non-internalized network externalities, the business models arising in two-sided markets have some idiosyncrasies. The platforms acting on those markets need to figure out how to bring both sides of the market on board and, as pointed out by Rochet and Tirole (2006), *“managers devote considerable time and resources to figure out which side should bear the pricing burden, and commonly end up making little money on one side (or even using this side as a loss-leader) and recouping their costs on the other side”*.

Traditional media constitute one of the sharpest examples of two-sided market structures. First, media outlets can be conceived as platforms of interaction between audiences (“eyeballs”) and advertisers. Furthermore, the interaction between these two groups of agents often engenders cross network externalities. On the one hand, the eyeballs (the size and the composition of the audiences) have a positive effect on advertisers’ payoffs. When firms rely on a mass advertising strategy (as it is often the case with traditional media), the larger the potential audience of a certain ad, the higher the expected profit generated by it. On the other hand, outcomes in the advertising market also have some influence on consumers’ payoffs. However, in this case, the sign of the network externality is not as obvious as in the previous case. In many situations (for example TV or radio), advertisements are a nuisance for consumers, engendering a negative network externality (Dukes and Gal-Or, 2003; Anderson and Coate, 2005). In other situations, consumers may actually benefit from more advertising, as with classified advertisements and commercials in newspapers or ads in specialized magazines⁹ (Kaiser, 2006; Kaiser and Wright, 2006; Gabszewicz et al., 2007; Ferrando et al., 2008; Resende, 2008; Kaiser and Song, 2009).

Due to the network externalities between audiences and advertisers, media outlets often face interdependent demands, meaning that the demand in each side of the market (by audiences and advertisers, respectively) depends on the number of agents participating in the other side of the market. This aspect of media markets is illustrated in Figure 1.1.

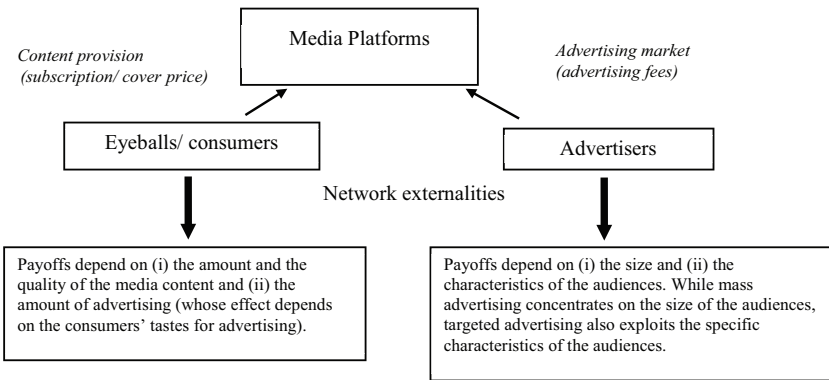


Figure 1.1 The business model of traditional media

In light of the intricate nature of network externalities arising in traditional media platforms, the design of an appropriate business model constitutes a complex task. In particular, media firms face three important challenges: (i) choosing an adequate pricing structure to assure their ability to reach the critical mass of eyeballs and advertisers;¹⁰ (ii) choosing the profit maximizing advertising rates and subscription/cover prices; (iii) choosing the optimal mix of advertising/media content. These three challenges are obviously interrelated. For example, a TV channel may choose to include a considerable amount of advertising in its programming schedule. Considering that advertising is a nuisance to consumers, the subscription price charged on the viewers' side should be low enough: for example, it would be zero in the case of free-to-air TV. The pricing structure used by free-to-air TV channels is such that these outlets are entirely financed by advertising revenues (sometimes complemented by public subsidies). By charging a zero price on the viewers' side, the TV channel attracts more viewers, which should attract more advertisers (or, at least, allow the TV channel to increase its advertising rates). Of course, other business models are possible as well. In the case of pay-TV, channels usually devote less time to advertising, charging a positive subscription price on viewers. Thus, the pricing structure arising in this business model supposes two sources of revenues: subscription and advertising.

Due to the indirect network externalities arising in media markets, the pricing structure chosen by media platforms is certainly not neutral. The price level charged in one side of the market affects the profitability of the other side of the market and vice versa. As a result, the optimal pricing structure is often asymmetric (Rochet and Tirole, 2003, 2006; Armstrong, 2005; Caillaud and Jullien, 2003; Wauthy, 2008). To bring both sides of the market on board, one of the sides is often subsidized to enlarge the number of users joining the platform on that side of the market and, at the same time, stimulate the demand on the other side of the market (due to indirect network externalities).

Of course, the specific characteristics of the profit maximizing price structure will differ from market to market. The elasticity of demand in each side of the market (more precisely, the price elasticity of advertising demand and the price elasticity of the demand for content) and the ratio of advertisements to media content distributed by the media platform are two important determinants of the optimal pricing structure. The market structure (for example monopoly versus oligopoly) and the nature of strategic interaction are other important determinants of the equilibrium pricing structure.

In the following subsection, we present a simple economic model representing the business of traditional media. Despite its simplicity, the model allows us to characterize the optimal pricing structure and derive some implications regarding the impact of network externalities phenomena on the diversity of media contents.

1.3 A Formal Model of Traditional Media Markets

The interactions taking place in traditional media platforms can be formally modelled in light of the two-sided market theory. This section derives a simple illustrative model applied to the newspaper industry.¹¹ The model considers a simplified version of Gabszewicz et al. (2001) and it proceeds as follows.

Consider a duopoly newspaper industry in which two outlets participate in two interrelated markets: (i) the press market, in which the firms sell horizontally differentiated¹² newspapers to the readers; and (ii) the advertising market, in which the firms sell advertising space to advertisers. Horizontal differentiation is modelled *à la* Hotelling (1929). Readers have heterogeneous tastes regarding the content of the newspapers. The set of tastes is represented by the Hotelling line $[0,1]$. To each point in the interval corresponds a specific reader for whom that specification of the newspaper content would be the ideal one. The further existing newspapers are from the readers' ideal specification, the higher the disutility of this specific reader, which is given by $tx_i + p_i$, where p_i stands for the price of newspaper i , x_i denotes the distance between the content specification effectively selected by newspaper i and the reader's ideal specification. Finally, the parameter t measures the magnitude of horizontal differentiation. Concerning the positioning of the two newspapers on the Hotelling line, we assume that newspapers are located at the extreme of the line: one of the newspapers (say newspaper 1) is located at point 0, while the other (newspaper 2) is located at 1. To keep the analysis as simple as possible, we assume readers are neutral to advertising, which seems to be particularly suitable for offline press.¹³ If readers were averse to advertising, readers' demand on the press market would incorporate the negative indirect network externality engendered by advertisers (Dukes and Gal-Or, 2003; Gabszewicz et al., 2004; Anderson and Coate, 2005). In contrast, if the newspapers' advertising content pleases readers, a positive network externality should be incorporated on readers' demand (Resende, 2008). In the context of neutral readers, the readers' demands for each newspaper are respectively given by:

$$D_1(p_1, p_2) = \frac{p_2 - p_1}{2t} + \frac{1}{2} \quad \text{and} \quad D_2(p_1, p_2) = \frac{1}{2} - \frac{p_2 - p_1}{2t}.$$

In the advertising market, newspapers sell “eyeballs” to advertisers. Firms have different propensities to advertise: while some firms are quite optimistic with respect to the advertising’s effectiveness, others are rather pessimistic. The size (density) of the population of advertisers is equal to $4k$, corresponding to each existing propensity. Advertisers are price-takers and the continuum of firms is assumed to be uniformly distributed on the interval $[0,1]$ according to firms’ propensity to advertise (θ). When firms decide to advertise their products, they might either (i) buy an ad-insertion from only one of the existing newspapers (single-homing) or (ii) buy an ad-insertion from both of the newspapers (multi-homing). The advertisers’ payoff when buying an ad-insertion in newspaper i is given by $\Theta D_i(p_1, p_2) - s_i$.

Considering that each newspaper is produced at a constant marginal cost equal to $c > 0$, the total profits of newspaper i can be written as $\pi(p_1, p_2) = (p_i - c) D(p_1, p_2) + s_i D_i^a(s_i, D_i(p_1, p_2))$, where s_i denotes the advertising rate charged by newspaper i and $D_i^a(s_i, D_i(p_1, p_2))$ stands for the demand for advertising in newspaper i , which depends not only on the advertising rates but also on the size of the newspaper’s readership, given by $D_i(p_1, p_2)$. This last effect is caused by the cross network externalities of audiences over advertisers and it analytically shows the interdependence of demands arising in media markets.¹⁴

The timing of the interactions among newspapers, readers and advertisers is assumed to be as follows. In the first stage, newspapers strategically compete in prices on the press market. Afterwards, given the resulting newspapers’ audiences, they sell the advertising space to advertisers, setting the price s_i . The subgame perfect Nash equilibrium of the above game is fully characterized by Gabszewicz et al. (2001).¹⁵

In the advertising market, they show that the equilibrium amount of advertising content is always equal to $4k(1/2)$, whatever the audience of the newspaper. All the effects of indirect network externalities on the advertising market are then conveyed by the equilibrium advertising rates, which are increasing on the size of the newspapers’ audiences $s_i^* = D_i(p_1, p_2)/2$. Since, on the second stage, the newspapers are able to anticipate the effect of audiences on the price of advertising, newspapers’ profits can be rewritten as $\pi(p_1, p_2) = (p_i + k - c) D_i(p_1, p_2)$. When both newspapers are active in the market, equilibrium subscription prices are obtained from the system of first order conditions: $\frac{\partial \pi_i(p_1, p_2)}{\partial p_i} = 0$, $i = 1, 2$.

As shown by Gabszewicz et al. (2001), equilibrium prices are equal to $p_1^* = p_2^* = c - k + t$. Comparing these subscription prices with the ones that would arise if the newspapers were *not* involved in the advertising market, $p_1^* = p_2^* = c + t$, we observe that the participation of newspapers in the latter entails lower subscription fees on the press market. Accordingly, the optimal pricing structure in this market differs from the conventional rules, requiring the subsidization on the side of readers. The rationale for this divergence lies precisely on indirect network externalities. Since newspapers anticipate the positive effect of audiences on the advertising revenues (through higher advertising rates), they rely on a more aggressive pricing policy on the readers' side as a means of enhancing their audiences. The expressions obtained for the equilibrium price levels show that the discount on the readers' side is increasing on the size of the advertising market (eventually, if k is very large, the newspapers could even be sold at a price below the marginal cost).¹⁶ Again this is driven by the interdependence between demands in the advertising and the press market. As the advertising market becomes larger (k increases), the marginal profitability of reaching an additional reader increases and, consequently, competition in the press market becomes tougher.

It is worth noting that the presentation of this simple model was mainly chosen with a pedagogic purpose. Of course, the model remains highly stylized, omitting some relevant features of the business model of traditional media. Other characteristics of the media markets can be easily accommodated in the model by relaxing the appropriate assumptions. The following subsections illustrate how this two-sided market model can be extended to analyze other key issues of traditional media markets (besides the optimal pricing structure) like (i) readers' attitudes towards advertising; (ii) the endogenous mechanisms favoring concentration in media markets; (iii) the impact of advertising markets on the diversity of media content; (iv) the impact of regulation on the diversity of media content; or (v) the effects of advertising on media bias.

1.4 Readers' Attitudes Towards Advertising

The basic model presented in the previous section assumes that readers' utility is unaffected by the amount of advertising displayed in the newspaper. However, advertising may be beneficial (or detrimental) to readers, generating a positive (negative) network externality and an additional source of demand interdependence. This possibility can be easily incorporated in the model, as in Ferrando et al. (2008). The authors extend the previous model to accommodate the possibility of having a

proportion γ of readers who are “ad-avoiders” (negative network externality), while the remaining readers are “ad-lovers” (positive network externality).

The authors show that, when the model is extended to accommodate readers’ tastes towards advertising, new equilibrium outcomes may arise. When the majority of readers dislike advertising, at least one of the newspapers may find it profitable to eliminate the advertising content, adopting a very different type of business model. When the majority of readers benefit with advertising and the intensity of the corresponding network externality is weak enough (i.e. the marginal utility delivered by an additional ad is sufficiently low), both newspapers remain active. The newspaper enjoying the largest audience is more expensive and it also charges higher advertising rates than the rival. When the intensity of the network externality advertising exerts on readers is very strong, there is only room for one newspaper in the market. This result illustrates how network externalities arising in media markets may engender endogenous mechanisms favoring concentrated market structures. This issue is analyzed in more detail in the following section.

1.5 Endogenous Concentration Mechanisms

Traditional media industries often present a substantial degree of concentration. Frequently, a relatively small number of media platforms serves a large fraction of the audiences and, simultaneously, attracts the vast majority of advertising revenues. For example, several studies have provided factual evidence pointing out the high concentration levels observed in the press industry: for example Rosse (1967); George and Waldfogel (2003); and Genesove (2004).

One unquestionable source of concentration in traditional media markets is the extent and relevance of economies of scale in the production of media contents (recall that in these markets costs are mostly fixed and the marginal production costs are very low). However, this supply side mechanism may not be the only determinant favoring concentration in the media markets. In particular, the demand interdependence caused by network externalities may lead to a “circulation spiral” that favors newspapers with larger audiences. Note that this circulation spiral mechanism does not necessarily require readers to be ad-lovers. As pointed out by Furhoff (1973) newspapers with narrower audiences may simply find it difficult to match the quality standards of economically stronger newspapers (see Resende, 2008 for a more detailed analysis of this argument). Then, the amount of advertising has a positive (though indirect) externality over readers.

Gustafsson (1978) described the mechanisms underlying the circulation spiral as follows:

The larger of the two competing newspapers is favored by a process of mutual reinforcement between circulation and advertising, as a larger circulation attracts advertisements, which in turn attracts more advertising and more readers. In contrast, the smaller of two competing newspapers is caught in a vicious circle; its circulation has less appeal for advertisers, and it loses readers. (p. 1)

The results of Ferrando et al. (2008) illustrate the circulation spiral effect in a static set-up. When the majority of readers are ad-lovers and their marginal benefit from advertising is strong enough, the cross network externalities arising in the media market reinforce each other, leading to the eviction of the smaller newspaper. However, it should be noticed that the circulation spiral mechanism is intrinsically dynamic. Not only are demands interdependent across the two sides of the market, they also tend to yield inter-temporal interdependence (see Garcia and Resende, 2011 for a survey on the dynamic aspects of network externalities). Gabszewicz et al. (2007) provide a dynamic extension of the basic model used in this chapter. They compute the equilibrium trajectories of the newspapers' market shares, showing that eventually the minority newspaper may indeed be evicted from the market when the network externality over readers is large enough. Amir et al. (2014) also raise the problem of minority's survival in two-sided markets. When we apply their model to the specific case of media markets, it would predict that the degree of concentration of media markets depends on the relative strength of network externalities over readers *vis-à-vis* the network externalities over advertisers.

1.6 Diversity of Media Content

Another extremely important question in the context of media markets refers to the promotion of diversity of media content. The diversity and pluralism of content is considered to be essential to society. Media are key vehicles in the diffusion of information and cultural principles, shaping the values and beliefs of societies themselves (for example, the European Commission has endorsed several initiatives to discuss and promote media pluralism in the European Union¹⁷).

When governments aim at promoting content diversity and pluralism of ideas, a first important question is to know whether less concentrated market structures always lead to more diversity. In other words, is it the case that an increase in the number of media voices always entails more

diversity of content? Steiner (1952) was one of the first to analyze this question. He considered the competition between two radio or TV channels, comparing (i) the case in which they are owned by independent firms and (ii) the case in which a monopoly firm owns the two channels. He concluded that competition might actually be harmful for diversity. The intuition behind this paradox lies on the specifics of the business model of traditional media, which often depends substantially on the advertising revenues (recall that media platforms may have to subsidize readers to attract more advertisers). Accordingly, when aiming at maximizing audiences, two independent media owners may choose to offer the same content (the one aligned with the tastes of the majority). In contrast, a monopoly media platform would prefer to specialize each channel on a different type of content, serving all the consumers in the market. Therefore, in the model of Steiner (1952), competition may be harmful for consumers. Evidently, this result is driven by the specific assumptions of the referred model.

Other studies dealing with the relation between competition and content duplication include Blank (1966), Greenberg and Barnett (1971), Levin (1971), Baxter (1974), Berry and Waldfogel (2001), George (2007), McDonald and Shu-Fang (2004), and Van der Wurff (2005).

Among the studies dealing with content diversity, it is worth mentioning the analysis by Gabszewicz et al. (2001). These authors study the problem of diversity of the political content of newspapers by extending the basic duopoly model presented in section 1.3. To this end, they introduce an extra stage in the beginning of the game. In this extra stage, newspapers are allowed to choose their positioning on the Hotelling line, which defines the political slant of the news dispatched by each newspaper. While in the standard Hotelling model, the maximum differentiation principle should prevail (see d'Aspremont et al., 1979), this might no longer be the case when the interactions between advertising and press markets are taken into consideration. Gabszewicz et al. (2001) find that in a newspaper industry with the characteristics described in section 1.3, the maximum differentiation only prevails if the unit value t attached by readers to the political differentiation of newspapers is high enough, and/or the dimension of the advertising market is relatively limited (k is small). When these conditions do not hold (the advertising market is large enough and/or the readers do not sufficiently value the political differentiation between the newspapers), minimum differentiation is the equilibrium choice of newspapers. In that case, newspapers provide news with similar political slant and the landscape of political opinions conveyed in the press can be qualified as “*La pensée unique*”. This result is a reminiscence of the well-known median voter result (Downs, 1957).

Other authors have also highlighted the tendency towards “*La pensée unique*” due to the interdependent demands faced by traditional media platforms (even before the advent of the analytical models of two-sided markets). For example, Bagdikian (1992, 129–30) states:

As mass advertising grew, the liberal and radical ideas – in editorials, in selection of news, and in investigative initiatives – became a problem. If a paper wished to attract maximum advertising, its explicit politics might create a disadvantage. To obtain more advertising it needed readers of all political persuasions ... The answer in the news was a technique called “objectivity”. The doctrine of “objectivity” ... has given American standard news a profoundly establishmentarian cast.

All the previous models emphasize that content diversity may be reduced due to media dependence on advertising revenues. However, this is not always necessarily the case. There are other models in which the interdependence of demands by audiences and advertisers does not preclude content diversity (Niven, 1999). McChesney (1987) also argues that newspaper publishers do not necessarily benefit from sensational events.

1.7 Diversity, Regulation and Programming

Given the crucial importance of media in the transmission of information, in the shaping of opinions and in the promotion of democracy, traditional media sectors in Europe have been highly regulated in the last decades. In the case of traditional media, the existing regulation aims to, among other things: restrict the amount of advertising displayed by the media platforms; and promote the diffusion of national content. In relation to the last aspect, regulators can define rules that force media platforms to display a certain amount of nationally produced content. For example, in France, TV channels must devote 60 per cent of their programming time to European content, among which 40 per cent should be of French origin.

Regarding the first objective, regulators often define a cap on the amount of advertising content of several media outlets.¹⁸ The rationale for this measure lies on the theory that the quality of content may be reduced when media platforms are excessively exposed to the outcomes in advertising markets. This question has raised the attention of many scholars. Economists in particular have developed several models to investigate the role of advertising revenues on the quality of content. Relevant works include Spence and Owen (1977), Coase (1966), Beebe (1977), Cancian et al. (1995), Motta and Polo (1997), Berry and

Waldfoegel (1999), Brown and Cave (1992), Owen and Wildman (1992), Dukes and Gal-Or (2003), Wright (1994), and Anderson and Coate (2005).

Gabszewicz et al. (1999) develop a two-sided market model to study the problem faced by a regulator who may impose quotas on the advertising shares of TV programming. They show that such quotas affect the structure of newspapers' revenues and in consequence also affect the characteristics of the media content integrating the programming schedules of the media platforms. They conclude that the imposition of quotas leads media platforms to deliver homogeneous media content (while they would prefer maximum differentiation if the quotas were not imposed).

1.8 Media Bias

The promotion of content diversity and pluralism of ideas is not the only concern of public authorities regulating media markets. The problem of media bias and its impact on the accuracy of information also constitutes a central question in the media economics literature (Gentzkow and Shapiro, 2006; Baron, 2006; Mullainathan and Shleifer, 2005; Stromberg, 2004; Ellman and Germano, 2009). The literature on media bias investigates what may drive media platforms to manipulate the information they distribute, either by slanting the content of their media, or by selecting some pieces of information to the detriment of others.

The literature has provided several justifications for the existence of media bias: (i) journalists' own incentives and beliefs (Baron, 2006), (ii) pressure from the government and other external entities (Besley and Prat, 2006; DellaVigna and Kaplan, 2007), (iii) the need to build reputation as a provider of accurate information (Gentzkow and Shapiro, 2006), and (iv) the fact that readers are pleased to confirm in the news their own views and beliefs about reality (Mullainathan and Shleifer, 2005).

A particularly relevant study is Ellman and Germano (2009), who analyze how the two-sided market structure of the media platforms may produce media bias. They take into consideration not only the relevance of advertising revenues on the business of traditional media, but also the fact that advertisers may be sensitive to the content dispatched by media platforms.¹⁹ They conclude that "advertising can actually raise accuracy by increasing the intensity of competition for readers". If advertising is sufficiently large, the newspapers are fully accurate. This is no longer the case if advertisers are able to commit to withdraw advertising from media platforms that are too accurate in relation to certain topics.

2. DISRUPTIVE TECHNOLOGY AND CONVERGENCE

The digital revolution brought a paradigm change in media markets. Internet is a disruptive innovation in its capacity to generate value. First, it drove a technological innovation in the production of contents. It pushed the digital revolution, which not only affected content production itself – disrupting media and cultural industries – but also allowed for the appearance of new media supports, like tablets, computer screens, smartphones, and connected TVs. In addition to the technological revolution, a deep sociological change has been taking place. Modern societies are characterized by the universal access to the Internet, the accelerated penetration of new communication tools, new types of consumption behavior for new types of services, like video on demand or streaming, new types of content, like promotional videos and targeted advertising. These phenomena are on the basis of a non-stop increasing consumption of media content (mostly in digital format).

In this context, new categories of economic agents are becoming increasingly relevant to media markets: Internet providers and telecommunications companies, Internet giants (Google, Apple, Amazon), new platforms dedicated to the provision of specific streaming²⁰ services (for example Netflix, Hulu and Lovefilm), social networks (Facebook, LinkedIn). The arrival of these new operators is fostering the adoption of new business models, integrating the specific features of the Internet economy.²¹

The business model of two-sided markets, which used to be specific to media industries, has invaded the whole Web. Media companies have become multi-sided platforms as they constitute an interface for several kinds of interactions (content (self)-production, content consumption, target advertising, e-commerce) and they serve multiple groups of agents (not only advertisers and audiences). Traditional media are facing a challenging environment and they are struggling to accommodate their business models to the new players and the new phenomena brought by the Internet (see Osterwalder and Pigneur, 2010): audience fragmentation; piracy and free access to digital contents (see Belleflamme and Peitz, 2012 for a survey); viral networks; co-production of media content; (in)compatibility among platforms and the imposition of standards; reduction of (re) production and distribution costs; globalization of content distribution; and so on.

These new features of the media markets raise several exciting questions: how to charge for the distribution of media contents whose reproduction marginal cost is virtually zero? Can media platforms find

alternatives to raise the money needed to subsidize consumers, despite audiences' fragmentation? What is the impact of the digital disruption on the diversity and the quality of contents? What is the optimal market structure?

In the second part of the chapter, we aim at providing a systematic characterization of media firms as multi-sided platforms, highlighting the main challenges currently arising in this market.

2.1 Information Networks, Disintermediation and Value Chain

In media markets, the old paradigm of industrial information economics has been replaced by the concept of information networks (Benckler, 2009). The advent of information networks results from (i) the major role played by information and cultural products on modern societies, together with (ii) a new communicational environment based on agents' interconnectivity sustained by new technologies with increasingly high computing capabilities.

In this subsection, we briefly analyze the effects of digital disruption on the production of information itself, stressing the role of information networks. Then, we identify the changes arising in the value chain of information consumption in the digital era.

Internet access (and broadband penetration) has increased enormously worldwide. More and more people are participating in media platforms, producing and diffusing information through the Web. This new trend has a strong impact on media markets. The information is consumed less vertically and it is no longer exclusively distributed through traditional media (nor even through media professionals). Multiple sources of information are now available and social networks are playing a very significant role. Consumers are now valuing more the recommendations made by experts or friends rather than the opinions of professional journalists in traditional media. Accordingly, the role of producers and consumers of media content becomes intermingled, with both of them intervening in the (co) production of contents. This gives rise to the user-generated content, so profuse on the Web through forums, blogs, wikis and other social networks (see Goyal, 2012 for an analysis of social networks in the digital era).

The new technologies and the rise of information networks have also brought deep changes to the information value chain. All traditional media (press, publishing, audiovisual, TV, cinema) have been affected by the transition to digital. The digital revolution has transformed each link in the value chain of information. Some activities have been removed, fostering "disintermediation" processes.²² Consider, for example, the case

of press. In this market, the production of a newspaper or a magazine used to require five actions: creation, edition, print, distribution and commercialization. With the digital revolution, several actions of the value chain can be easily “disintermediated”. For example, the transition to digital has remarkably changed the journalists’ working practices. Internet allows them to speak directly to their audiences, enabling them to publish content without going through the filter of the newspaper’s editors.

While it is true that the growing connectivity in media markets has brought the disintermediation of some activities, it should also be noted that intermediation remains essential to the media markets, even if now it takes new forms. Considering the example of newspapers, we observe that editors start to find themselves in a completely different business ecosystem, facing the competition of platforms like Google News. These platforms are intermediaries themselves. They are involved in the aggregation, indexing, archiving, alerts, and so on, of information produced by the others. In a world where information abounds, the new “info-mediaries”²³ are important players in gathering and selecting information.

2.2 Convergence, Vertical Integration and Exclusivity

One of the most important trends currently arising in media markets refers to the convergence among media, telecommunications and information industries (see, for example, Jenkins, 2001). In fact, the Internet and the whole industrial sector of information and communication can be viewed as an ecosystem based on four basic components. The first component consists in the equipment production. It includes the producers of equipment (Alcatel, Cisco), the cell and telephone manufacturers (Nokia, Motorola, Sony) and firms specialized in the production of electronic equipment (Microsoft, Apple, Dell, Samsung). The second component embodies network operators (France Telecom, Deutsch Telekom, ATT), mobile phone operators (Vodafone), Internet providers (Free, Orange), cable (Numericable, Time Warner) and satellite operators (Canal+France, BSkyB). The business firms operating in the third component are service providers, consisting in interconnected platforms centering their economic activity on intermediation. These platforms can be subdivided into three categories:²⁴ (i) exchange platforms, associated with electronic markets, like Amazon or PriceMinister, referencing sites and price comparison sites, whose objective is to interconnect agents in order to allow for direct or indirect commercial transactions; (ii) audience platforms, such as research engines (Google, Bing), portals (Yahoo, MSN), online websites of traditional media (radio, newspapers),

online sales (eBay, Cdiscount), personal (Facebook, Flickr) or professional (LinkedIn, Viadeo) social networks, whose objective is to raise “audiences” and, eventually, sell them to advertisers; and (iii) exploitation platforms, like Windows Mac OS, Android or Linux, whose objective consists in providing generalized access to multiple applications. Finally, the last component, located upstream in the ecosystem, includes all the producers of digital content, embodying all existing editorial sectors (NBC, Canal plus) as well as all content produced by the consumers themselves (user-generated content, UGC) and invading the Web via websites like YouTube or Dailymotion.

Until the arrival of the digital revolution, the four components were clearly identified and fully separated (Curien, 2000; Barua et al., 1999). The convergence phenomenon that recently arose in the media markets resulted in the intersection of the industries of telecommunications, computer sciences and audiovisual. A given platform may now integrate several components of the ecosystem. Thus, the four components are no longer separated. Nowadays, the ecosystem is endowed with a global coherence in which R&D performed at the level of one component is diffused into the firms of the others (open innovation). Following the convergence phenomenon, the borders of traditional markets for content are now being redefined. This is, in particular, the case of the audiovisual market (Baranès and Encaoua, 2002; Vogel and Vogel, 2009; Sonnac, 2012).²⁵

In light of the new configuration of the information ecosystem, media companies are no longer the exclusive providers of information and media content. Platforms with different characteristics are also playing a very important role, including telecom, ISPs (Internet Service Providers), Internet users (who also generate content), online social networks, equipment producers, and application developers. In the digital world, the media content available to consumers is immense and extremely diversified (Anderson, 2006). Also, the patterns of substitution among media platforms are now completely different (Motta and Polo, 1997). For example, twenty years ago, the substitutability between TV and cinema was relatively limited since the former could only broadcast movies much later than their release in the movie theaters. The reality is completely different nowadays. The introduction of VoD, “home cinema” and the appearance of TV channels specialized in cinema has considerably reduced the degree of differentiation between the two platforms.

Accordingly, traditional media platforms have been forced to revise their business models. At the moment, given the heterogeneity of media platforms (including traditional media, telecoms, application developers, equipment producers, ISPs, and cable firms) several business models

co-exist in the ecosystem. In the next subsection, we identify the more prevalent business models currently adopted by media platforms. Regardless of the business model, the success of a platform depends on its capacity of raising communities of users and offering them tools and services to facilitate their virtual social interactions via certification and recommendation systems.

2.3 Business Models in the Digital Era

Earlier we showed how the business model of traditional media relied on the strategic interaction between audiences and advertisers. The network externalities underlying this strategic interaction often led to asymmetric price structures, with the audiences being subsidized by advertisers.

Following the digital disruption, new business models are arising in media markets. Given the complex typology of firms participating in these markets nowadays, several models have been developed. For example, Google relies on an open source ecosystem (Android) and makes money from advertising revenues. In contrast, Apple relies on a closed and proprietary ecosystem.

In addition, the arrival of telecoms and ISPs in media markets has introduced further complications. By providing access to the Internet, these platforms are in control of an input that is essential for network formation, and they want to charge media platforms on the Web for that.²⁶ In addition, these companies are often vertically integrated, being involved in the production and distribution of content themselves.

In the remainder of this section, we provide a non-exhaustive description of some business models currently adopted in media markets. We start by briefly describing the main ingredients of three business models frequently adopted by audience platforms: (i) free content; (ii) paid content; and (iii) freemium.

In the first model, firms deliver the media content for free (for example GoogleNews, Facebook, YouTube, Wikipedia). The business model is then financed by an alternative source of revenue, such as advertising, crowd-funding (Belleflamme et al., 2011) or cross-selling. The free content model is commonly adopted when the protection of content is very difficult, and/or media platforms need to expand their base of users to generate sufficiently strong network externalities.

In contrast, in the pay content model, audiences do not have access to free content. Even if firms may (or not) rely on additional sources of revenue, audiences must pay for access to information. This model is more common for media content whose protection is easy or inexpensive. It is also more common when media platforms already benefit from a

sufficiently large base of users, meaning they already generate sufficiently strong network externalities.

Finally, the freemium model is based on a mixed strategy. It provides free access to a considerable amount of content but it charges a positive price for premium exclusive contents (for example editorial news, exclusive interviews, recent movies or TV series, and high resolution content). The freemium model uses free content to expand the base of users and generate network externalities. Once network externalities are launched, the media platforms may exploit their base of users to sell (at least to some users) higher-quality content at a positive price. The “freemium” model allows media platforms to price discriminate among consumers, without precluding media platforms to generate strong network externalities. Examples of media platforms relying on the freemium business model include Hulu, Deezer and Spotify.

Comparing the three business models, it becomes evident that they endorse a very different role for content revenues: while they are irrelevant to free content models, they can be vital to paid content models. Content pricing is indeed one of the most central aspects in the previous business models. When media platforms sell their content at a positive price, they may meet (at least) two types of problems. First, the fact that content is paid may deter some consumers from participating in the market, reducing the scope of network externalities and the attractiveness of the corresponding media platform. Second, given the characteristics of digital content (whose reproduction marginal cost is virtually zero), media platforms may face competition from piracy activities, P2P networks, and so on. To minimize the impact of these problems, media platforms may have to design new pricing schemes, and/or exploit other competitive dimensions such as versioning, bundling, cross-selling, crowd-funding, and advertising markets. When the protection of media content is feasible and relatively inexpensive (for example through DRM technologies), firms may also sign exclusivity contracts that give them the monopoly provision of certain media contents.

In the following subsections, we provide further details regarding the characterization of business models adopted by media platforms, starting with the issue of content pricing.

2.4 Content Pricing Schemes

Content pricing has become quite sophisticated in modern media markets. The media firms have a huge range of possibilities when it comes to choosing their pricing schedule. For example, they may either opt for a subscription based model (like Netflix) or for a transaction based model

(like i-Tunes music). The former enhances the level of consumption of media content, while the latter might be able to attract a wider base of consumers (when the transaction fee is not combined with the payment of an access fee). In addition, media platforms may choose between adopting a uniform price strategy, in which all consumers pay a similar price (for example i-Tunes music) or, instead, adopting a price discrimination strategy. In the case of first-degree price discrimination, the consumers of information may pay different prices for the same content, reflecting differences in their willingness to pay for such content (Esteves and Resende, 2012). The adoption of this type of pricing strategy is very demanding since media platforms need to be informed about the specific preferences of their consumers. While that was extremely difficult in the case of traditional media (tailored to mass audiences), it has become easier in the context of some new media interactive platforms (such as social networks, online press, Hulu). As consumers interact through these platforms, they reveal information about their tastes and preferences, amplifying the range of possibilities to effectively implement price discrimination strategies (Esteves, 2010).²⁷

When first-degree price discrimination is not possible, firms may opt for less sophisticated price discrimination strategies. These include second-degree price discrimination, in which media platforms propose a menu of contracts which specify the access to different types of content (quality and quantity) at different rates; and third-degree price discrimination, in which firms set different prices to different groups of consumers (for example according to their age, job, income and so on).

In the context of modern business models for media platforms, the sophisticated pricing rules described above are being complemented with additional strategic actions aimed at improving network externalities without hindering firms from extracting surplus from consumers with higher willingness to pay. These additional strategies include versioning, bundling, cross-selling, exclusive dealing and so on.

2.5 New Strategies

Versioning strategies refer to the possibility of offering differentiated variants of a given media content, such as base, premium or family packages. These strategies are often used as a price discrimination device. On the one hand, platforms use basic content to attract more consumers, boosting network externalities. On the other hand, they rely on more sophisticated contents to extract surplus from consumers with higher willingness to pay.

Bundling strategies²⁸ consist in promoting the joint sale of several different products. Examples of these strategies include channel bundles sold by TV cable companies, triple play contracts (Internet, telephone and TV) or quadruple play contracts (Internet, fixed and mobile phone, and TV) by telecom/ISP operators. Through bundling practices firms may get higher revenues due to the cross subsidization among the products in the bundle.²⁹

Cross-selling strategies arise when media platforms use certain contents, which are freely distributed, as a device to sell other products to their audiences (or their networks). For example, a music distribution platform may allow the free download of music as a device to sell more tickets to concerts (Regner et al., 2009).

Finally, exclusive dealing arises when platforms have the exclusive right to distribute certain contents. There is a vast economics literature dealing with the effects of exclusive dealing (for example, Rasmusen et al., 1991; Bernheim and Whinston, 1998; Segal and Whinston, 2000). In the case of media markets, two effects of exclusive dealing have been stressed. On the one hand, exclusive dealings may reduce static efficiency by distorting competition in the market, slowing down the distribution of media content through new platforms and eventually increasing the prices charged to consumers (Nicita and Ramello, 2007). Harbord and Ottaviani (2001) show that exclusive dealings on premium content may imply higher prices and a loss of welfare for the consumer. On the other hand, the rents from exclusive content distribution may be crucial to promote investment in new content (and promote high quality standards). This is particularly relevant for premium content that is riskier, has greater entry barriers and often requires more investment than base content³⁰ (Gerardin, 2005).

When exclusivity contracts exist, differentiation becomes a key dimension of competition among media platforms.

2.6 New Dynamics in Advertising Markets

In the context of new media markets, interactivity and interconnectivity are two dominant features. The new possibilities offered by modern media platforms have also changed the advertising market considerably (see Anderson, 2012). Advertisers are no longer investing in mass advertising strategies, which were dominant in the context of traditional media. The new technologies not only allow advertisers to collect an incredible amount of data about their consumers but also allow them to send different messages to different consumers (Iyer et al., 2005; Brahim et al., 2010; Galeotti and Moraga-Gonzalez, 2008; Esteves and Resende,

2012). Accordingly, advertising strategies above the line are now being replaced by advertising below the line (for example targeted advertising, advertising through social networks, recommendations and reviewing platforms). By tailoring their advertisements to specific audiences, advertisers reduce wasteful advertising and, in addition, they gain an effective instrument to price discriminate among their consumers.

The possibility of targeting advertisements to specific groups also changes the business model of advertisers, and the nature of interactions between audiences and advertisers through media platforms.³¹ These interactions become more complex since advertisers are no longer exclusively interested in the size of the platforms' audiences. They value the specific characteristics of the audience and they are mostly interested in exploiting local network externalities (network externalities arising within a certain category of consumers).

The new possibilities launched by advertising strategies below the line are challenging the traditional approach of media platforms to the advertising market. On the one hand, advertisements must be tailored to specific audiences and they must exploit as much as possible the connectivity among consumers (for example through recommendations systems). On the other hand, the role of consumers in the advertising messages becomes more active (interactivity) and the impact of advertising itself becomes more visible (for example, advertisers can control the number of consumers watching/reading their advertisements; or, they can control how many consumers engage in online commerce after being exposed to their advertisements). In light of all these recent trends, business models of media firms on the advertising market (for example advertising rates pricing, advertisements' characteristics and design) must be redesigned in order to be attractive to advertisers and, simultaneously, generate enough revenue for media platforms, especially the ones adopting free content business models.

2.7 Net Neutrality Debate

At the present moment, Internet is an essential input to access information and media contents. Therefore, ISPs are definitely very relevant players in the media markets. ISPs can themselves be conceived as two-sided platforms connecting Internet users and content providers.³² The traditional approach to the Internet lies in the principle of "net neutrality", according to which all Internet traffic is treated equally and therefore ISPs must provide the same conditions to all Internet platforms. As Internet platforms become more and more relevant (and some of them

attract an increasing amount of money, for example Google or Facebook), ISPs are becoming interested in discriminating among content providers, charging them for the provision of a network of potential users. The ISPs argue that Internet giants (such as Google) are receiving most of the benefits from the network externalities generated on the Web and, therefore, net neutrality is dampening ISPs' incentives to invest in broadband capacity and technological innovation. Whether the future design of the Internet will embody the net neutrality principle or not remains an open question. Both the Federal Communications Commission (FCC), in the USA, and the European Commission have promoted public debates on this issue, but neither the major players in the sector (ISPs, Internet giants, equipment producers, consumers' associations) nor scholars seem to have reached a consensus on this subject.³³

3. CONCLUSION

In this chapter, our main objective was to characterize media firms as multi-sided platforms. In the first part, we have shown how traditional media, like TV, newspapers and radio, can constitute platforms of interaction between audiences and advertisers. Then, in the second part, we have concentrated on new media markets. Due to digital disruption and the convergence phenomenon, media markets have changed drastically. Traditional media are now facing the competition of new media platforms, mostly based on the Internet. The new firms participating in the media market can be viewed as multi-sided platforms, in which several agents interact: audiences, content producers (who might be information consumers themselves), advertisers, ISPs, equipment producers and so on.

In our characterization of the media markets, we have emphasized the major role played by network externalities. They take place when agents' choices are somehow influenced by the choices of other agents in the same or in another related market. For example, in the context of traditional media, network externalities arise due to the influence of audiences on advertisers' expected payoffs and vice versa. Traditional media have often pushed the network externalities that audiences exert on advertisers by fixing an asymmetric price structure in which audiences are (at least partially) subsidized (for example, radio, free-to-air TV, free press).

In the context of modern media platforms, the nature and extent of network externalities becomes much more complex. On the one hand, the interactions among audiences and advertisers remain present but the latter

are interested in exploiting local networks through targeted advertising technologies and/or increasing the speed of diffusion of their messages through viral marketing strategies that rely on network connections built on media platforms. On the other hand, due to the diversity of agents interacting through media platforms, new forms of network externalities take place. For example, the virtual social interactions via user-generated content, certification and recommendation systems are on the basis of new types of network externalities among consumers themselves. In addition, the arrival of new players in the market (e.g. ISPs) has created new levels of network externalities. A first level refers to the service of Internet provision itself (platforms with a larger base of consumers may offer a better service since they have more resources to improve quality – indirect network externalities). Furthermore, when providing access to the Internet, ISPs also enable media platforms to benefit from their installed base of users. This induces network externalities among users, between users and advertisers, and also between media platforms and ISPs.

An additional level of network externalities now arising in media markets refers to the interaction between media platforms, equipment producers and software developers. For example, in the smartphones market, consumers' equipment choices affect the incentives of software developers: the latter will be interested in developing applications for equipment platforms with a larger installed base of consumers. However, when buying their equipment consumers also account for the expected number of applications that will be developed for each available smartphone. As a result, a new form of network externalities arises.

Due to the variety of players and the complexity of network externalities arising in modern media markets, the design of a unique optimal business model is impracticable. Accordingly, the literature on media economics has not yet developed a unified model to study strategic interaction in the new media platforms. For this reason, in the second part of the text, we tried to provide a non-exhaustive review of some models commonly adopted by media platforms. Understanding the basic ingredients of these models opens a new avenue of research for media economists. An important challenge is to develop an analytical framework that allows economists to study in a systematic way the interactions taking place in media markets. Given the characteristics of modern media markets, we believe that the foundations for this framework should accommodate the contributions of the literature on two-sided markets as well as the literature on network formation games.

We believe that the development of this analytical framework is crucial on at least two levels. First, it is important to understand (and measure)

the pros and cons of alternative existing business models in the perspective of media platforms and consumers. Second, it is important to support regulatory authorities in the media sectors. Following digital disruption and convergence, media regulators are now faced with a very challenging ecosystem. Although the analysis of regulation of media markets is beyond the scope of the present chapter, we should note that many important questions remain open: in a world of network externalities, in which media platforms need to reach a critical mass of consumers, is competition always desirable? In the era of convergence, are firms' cooperation and agreements on standards always welfare improving? Should ISPs be able to charge media platforms and other content producers for enabling them to access audiences that they will sell to advertisers afterwards? How to deal with piracy? How to evaluate its impact on the incentives to produce new content? How to set up property rights over downloads and content delivered through streaming? How to regulate exclusivity contracts,³⁴ through which some ISPs or media platforms have the exclusive right to distribute certain content? Are they detrimental to consumers or do they promote innovation and quality?

This non-exhaustive list of questions is sufficient to illustrate the intricacy of regulatory activities in modern media markets. Media economists certainly have a lot to contribute to these open debates and we expect the literature on regulation of media multi-sided platforms to grow in the forthcoming years.

NOTES

1. The Arab Spring revolution illustrates how media and social networks can impact on democracy.
2. For example, already in 1836, the French newspaper *La Gazette* was relying on circulation and advertising revenues.
3. These subsidies are frequent, for example, in the case of public TV channels.
4. "Coopeting" means that they simultaneously compete and cooperate.
5. For example, paid TV channels and VoD.
6. This problem becomes even more evident in the case of new media based on the Internet, where the marginal cost of serving an additional consumer is often zero.
7. In some cases, even after being exposed to the information, consumers may experience difficulties in evaluating its quality (e.g. its accuracy). In that case, information can be classified as a credence good (see, e.g. Gabszewicz and Resende, 2012).
8. Following the seminal papers by Rohlfs (1974) and Katz and Shapiro (1985), a vast literature has studied the economic effects of network externalities (see Farrell and Klemperer, 2007 for a survey). Recent studies on this matter include, for example, Amir and Lazzati (2011).
9. For example, this is usually the case of ad insertions in fashion or car magazines.

10. The ability of reaching a critical mass of advertisers is more relevant in the case of ad-loving audiences. When advertising is a nuisance to consumers, the optimal pricing structure will obviously be different than in the case of ad-loving audiences (see Ferrando et al. 2008).
11. Note that our focus on the newspaper industry is merely pedagogical and the model could be easily extended to represent other traditional media, such as TV or radio.
12. This could be due to their different political slant (Gentzkow and Shapiro, 2006; Mullainathan and Shleifer, 2005; Ellman and Germano, 2009; Gabszewicz and Resende, 2012), or to different type of content (cultural versus entertainment content) or different regional scope.
13. See Kaiser (2006). This assumption was also used in other studies dealing with the newspaper market, e.g. Argentesi and Filistrucchi (2007).
14. Notice that if readers were not ad-neutral, there would be an extra channel of demand interdependence on the readers' side as well.
15. In fact, the model presented in this section is a simplified version of Gabszewicz et al. (2001). While they endogenize the choice of the newspapers' positioning on the Hotelling line, we assume here exogenous locations, with newspapers being located at the extreme of the Hotelling line.
16. It is possible to find real world examples sustaining this type of practices. For example, the offer of DVDs together with the newspaper.
17. See, e.g., the discussions and publications by the EU Media Futures Forum available at: http://ec.europa.eu/information_society/media_taskforce/pluralism/forum/index_en.htm
18. For example, France is one the countries with more restrictive regulation. On public TV channels it is forbidden to interrupt movies to display advertisements, while on private TV channels, movies can be interrupted at most once. The government also regulates the duration of advertising spots on French TV (maximum 6 minutes/hour).
19. For example, polluting firms may be skeptical about advertising in newspapers that are known for dispatching lots of news related to global warming and other environmental concerns.
20. Streaming can be viewed as a delivery method in which content is continuously delivered through the media platform without the need to download it.
21. Interconnectivity is perhaps the most important feature of the Internet, on the basis of free access requested by consumers (Bomsel, 2007), concentration due to network externalities, consumers' interaction, generalization of users' generated content, and increasing importance of recommendations systems.
22. See Gille (2009).
23. The term "infomediaries" combines the words "information" and "intermediaries". According to Rebillard and Smyrnaio (2010), infomediaries aim to (i) assist consumers in the management of information; and (ii) gather information about consumers and sell it to producers of goods and services.
24. See Evans and Schmalensee (2005).
25. For example, in France, LCI, a paid channel specialized on continuous information and news, has recently endured the rivalry of new free information channels (iTele and BFM) broadcast by digital terrestrial television. In light of this, the owners of LCI have requested permission to broadcast programs for free! This simple example illustrates that the traditional dichotomy has become null and void, making obsolete the traditional competitive analysis of the sector. On the audiovisual sector, the classical dichotomy between paid and free channels rested on the underlying business model (based on subscription revenues, for the first, and advertising revenues for the second), as well as on the type of content broadcast (with the first

- proposing an unspecialized content supply while the second provided more specialized or thematic contents). The previous example illustrates that this dichotomy does not necessarily hold any more.
26. The possibility of remunerating ISPs for their role as network enablers gave rise to the “net neutrality debate”. This debate is briefly characterized in subsection 2.7.
 27. The information about consumers’ tastes or preferences is not only useful to facilitate the adoption of price discrimination strategies. In some business models, media platforms sell this information to independent firms. In fact, this constitutes a frequent source of revenue in the context of free content models.
 28. A vast literature has focused on the analysis of bundling practices. For more details on this subject see, for example, Armstrong and Vickers (2010).
 29. Consider the following simple example. Suppose two groups, of S consumers each. In group 1 consumers’ valuations for TV channels A and B are, respectively, 9 and 3. In group 2, the corresponding valuations are 10 and 2, instead. Considering null production costs and no-price discrimination, we observe that, when commercialized separately, channel A would be sold at 9, while channel 2 would be sold at 2, yielding a revenue of $22S$ for the firm. Instead, when the two channels are sold together, the firm can sell the bundle at 12, obtaining a revenue equal to $24S$.
 30. The producers of this type of content tend to offer exclusive long term contracts to media platforms. Buyers often try to negotiate the right to preempt second windows of distribution, in order to have the monopoly provision of the content.
 31. Gal-Or and Gal-Or (2005) study the competitive effects of targeted advertising when a single media content distributor delivers advertising messages on the behalf of firms. Gal-Or et al. (2006) deal with the issue of imperfect advertising tailoring, studying to what extent an advertiser should allocate resources to increase the quality of its targeting.
 32. Content providers are often multi-sided platforms themselves. They connect consumers with each other and in the case of audience platforms they also frequently connect consumers and advertisers.
 33. For example, Economides and Tag (2012) conclude that the “overall effect of implementing network neutrality regulations can still be both positive and negative depending on parameter values”. Bourreau et al. (2012) find that innovation in the discriminatory regime is higher than under network neutrality. Congestion in the network is also managed more effectively under a discriminatory regime. Brito et al. (2012) show that the impact of network neutrality on incentives to invest depends on the nature of the investment as well as on the ability of the ISP to freely allocate its capacity among content providers. They also conclude that the effects of the integration between ISPs and content providers under a discriminatory regime (i.e. no network neutrality) are ambiguous and they depend on the interaction with advertising markets. Jullien and Sand-Zantman (2012) argue that the “cost sharing between the network and content producers has two benefits: it raises efficiency for the paid content and reduces the price charged to consumers due to a waterbed effect.”
 34. For example, some ISPs have the exclusive right to broadcast the official TV channels of some soccer teams.

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