Newspapers in Times of Low Advertising Revenues*

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Abstract

Newspapers’ advertising revenues have declined sharply in recent decades. We build a model to investigate the consequences on newspapers’ pricing and quality choices of a reduction in advertisers’ willingness to pay for readers’ attention. In our model, selling subscriptions in addition to newsstand issues allows to price discriminate between readers. We show that lower advertising revenues decrease newspapers’ incentives to provide quality, which increases newspapers incentive to price discriminate whenever readers’ sensitivity to quality is sufficiently high. We build a unique dataset on French newspapers between 1960 and 1974 and perform a difference-in-differences analysis using a “quasi-natural experiment”: the introduction of advertising on television in 1968, which affects national newspapers more severely than local ones. We find robust evidence of increased price discrimination and decreased quality as a result of the drop in advertising revenues, which may help rationalize current industry trends.

Keywords: newspaper industry; two-sided markets; price discrimination; advertising; newspaper quality

JEL: L11, L15, M37

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1 Introduction

The pricing and quality choices of media outlets determine how well informed individuals are, thereby influencing voter turnout, political accountability, and social norms, among other things. As a result, concerns exist regarding the current newspaper industry crisis, whose consequences include a tendency for legacy newspapers to increase newsstand prices and employ fewer journalists. In the United States, for example, the average number of journalists per newspaper – arguably a proxy for quality – decreased from 39 in 2001 to 23 in 2013. Declining advertising revenues – following the rise of the internet – are commonly invoked to explain this state of distress. US newspapers’ advertising revenues have decreased from nearly $50 billion in 2000 to less than $20 billion today, and the share of their advertising revenues in total revenues decreased from 82% to 65%.

In this paper, we analyze the relationship between advertising revenues and the choices newspapers make in terms of pricing and quality. Specifically, we investigate the consequences of a decline in the advertisers’ willingness to pay for newspaper readers’ attention triggered by the arrival of new advertising platforms (e.g., social media or television). To this end, we first build a model in which a monopoly newspaper chooses the prices it charges readers and advertisers, as well as the quality of its content, and study the effect on these choices of changes in advertisers’ willingness to pay for readers’ attention. We then carry out an empirical analysis using a “quasi-natural experiment” and a unique dataset on the French daily newspaper industry that we build from historical data.

In particular, we analyze the extent to which advertising revenues affect newspapers’ incentives to charge subscribers an average price per issue lower than the unit price they charge occasional buyers. As in other industries, selling subscriptions allows newspapers to distinguish their most loyal buyers from the buyers with only an occasionally high willingness to pay, that is, selling subscriptions allows newspapers to price discriminate between readers. In recent years, the ratio of the average subscription price divided by the newsstand price – arguably a measure of price discrimination – has decreased (Figure 1). Although straightforward changes in marginal costs and preferences (readers’ or advertisers’) could, in principle,

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1 The total number of journalists has also decreased due to the exit of many publications.
2 Total revenues have declined by 50% since 2000, driven both by the decline in advertising revenues and a decline in the revenues from sales.
3 These new advertising platforms allow advertisers to reach newspapers’ readers when the latter engage in other activities. However, the internet has not only led to new advertising platforms, but also changed consumer habits and decreased print readerships (because of entry in the media market). In this paper, we aim at disentangling the “reader side effect” (changes in reader habits and competition for readers) from the “advertiser side effect” (changes in the willingness to pay for print readers’ attention) in order to focus on the latter effect.
4 We refer to the average subscription price as the total subscription price divided by the number of issues the subscription provides.
5 For instance, in 2014, the newsstand price of the New York Times was 1.6 times higher than the subscription price. Home delivery (Monday to Saturday) cost $492.96, i.e., $1.58 per issue versus $2.50 at the newsstand.
explain this pattern, we propose an alternative rationale that involves changes in newspapers’
quality. Specifically, we provide evidence that newspapers have incentives to decrease their
quality (or at least decrease the size of their newsroom) when advertisers’ willingness to pay
is lower, and that this change in content may affect the demand for subscriptions and the
demand from unit readers in a way that raises the scope for price discrimination. Figure 2
illustrates the co-movement of advertising revenues and the number of journalists for the US
newspaper industry since the 1980s.

We build a simple model in which a newspaper sells content to readers and readers’
“attention” to advertisers. The newspaper chooses the quality of its content in addition
to the prices it charges readers and advertisers. First, ignoring price discrimination, we
show that adding quality provision to the standard framework used to analyze newspapers’
pricing choices generates a rich set of predictions. In particular, a decrease in the advertisers’
willingness to pay for readers’ attention induces the newspaper to decrease the quality of
its content and, depending on readers’ sensitivity to quality, either increase or decrease the
price it charges readers. In an extension of the model, we allow the newspaper to sell both
subscriptions and individual issues, and assume readers are uncertain about their willingness
to pay for future issues. Readers who choose not to subscribe make separate and informed
purchasing decisions on a day-by-day basis. We provide conditions under which it is profit-
maximizing for the newspaper to price discriminate between readers (i) by inducing readers
with a high expected willingness to pay to subscribe and (ii) by charging the readers with a
low expected but high realized willingness to pay a high unit price. As in the baseline model,
lower advertising revenues reduce the newspaper’s incentives to invest in quality, which, we
show, has a more adverse effect on the demand for subscriptions than the demand from unit
buyers. In turn, this distinct effect on the two demand functions increases the newspaper’s
incentives to price discriminate between subscribers and unit buyers whenever readers are
sufficiently sensitive to quality.

A number of factors determine pricing and quality choices, including costs, consumer
preferences, and market structure. The main empirical challenge we face therefore consists of
isolating the effect on quality and prices of a decrease in the willingness to pay for newspaper
readers’ attention. Because of the numerous and far-reaching changes the internet brought
about in terms of competition and consumer habits, establishing causally how its advent led
to advertisers’ lower willingness to pay for newspaper readers and, in turn, how the resulting
decrease in advertising revenues affected newspaper prices and quality, is an intricate endeavor.

*Figure B.1 in the online Appendix represents the evolution of newspaper advertising revenues in the United
States over the same period, as a share of GDP.*
To this end, we exploit history and follow an empirical strategy in the spirit of an event study. Specifically, we exploit the introduction of advertising on French Television in October 1968 by treating it as an exogenous negative shock on the advertising side of the newspaper industry. This introduction leads to an exogenous shock that shifts exclusively newspapers’ reliance on advertising revenues. Indeed, the shock did not affect reader preferences and the various marginal costs of producing and delivering newspapers. To the best of our knowledge, this paper is the first to use this “quasi-natural” experiment.

Our identifying assumption is that the negative shock on advertising revenues has affected national daily newspapers more severely than local daily newspapers. We provide anecdotal evidence supporting this assumption by studying the actual content of the advertisements broadcast on television and those published in newspapers. National newspapers rely to a greater extent on advertisements for brands (“national ads”), whose owners may also wish to advertise on television. By contrast, a large share of advertisements in local newspapers is local in nature (local commercial advertisements and classified advertisements). Moreover, national ads provide a larger fraction of revenue for national than for local newspapers. We thus use national newspapers as our “treated group” and local newspapers as our “control group.”

Using novel annual data on local and national newspapers between 1960 and 1974, we first compare the pre-1968-to-post-1968 change in advertising revenues of national daily newspapers to the change in advertising revenues of local daily newspapers over the same period (difference-in-differences [DD] estimation). We find the introduction of advertising on television leads to a 17% decrease in the advertising revenues of national newspapers compared to those of local newspapers. We next show this drop in advertising revenues propagates to the reader side of the newspaper market. We find a 12% decrease in the price ratio (defined as the average subscription price divided by the unit price), which we interpret as an increase in the extent of price discrimination. In particular, the decline in the price ratio is entirely driven by a decrease in the price charged to subscribers. Moreover, the number of journalists employed by national newspapers decreases by 11% compared to that of local newspapers, and the surface of national newspapers dedicated to news (the so-called newshole) decreases by 7%. To the extent that these features are a good measure of quality (see, e.g., Hamilton, 2004; Berry and Waldofel, 2010; Fan, 2013; Cagé, 2014; Cagé et al., 2015), national newspapers thus react to lower advertising revenues by decreasing the quality of their content. Overall, these changes in price and content lead to a more subscriber-based readership (with a 22% increase in the share of subscribers).

We interpret the decrease in the average subscription price in light of our model’s pre-
diction. Although advertisers’ lower willingness to pay for newspaper readers leads to less “subsidization” of readers through low prices, that is, to an upward pressure on reader prices (the “waterbed effect”), it also leads to less “subsidization” of quality (which also serves to attract readers), that is, a downward pressure on reader prices. Subscribers are compensated with lower prices in case the decrease in quality sufficiently lowers the demand for subscriptions.

Our results are robust to a range of alternative specifications and controls. In particular, they are robust to an alternative estimation strategy in which we compute the reliance on national versus local advertising in 1967 (before the shock) by computing the quantity of national ads versus local ads in the newspapers. We use the newspapers that rely more on national advertising as the treated group and the others as the control group. The results are consistent with the ones we obtain when using national and local newspapers as separate groups.

Our findings have implications for the 21st-century media industry and inform the ongoing debate regarding a possible decline in the quality of information. In particular, our analysis highlights that a decrease in advertisers’ willingness to pay for news readers—whatever its causes—lowers media outlets’ incentives to invest in quality. If, as many believe, advertising revenues will continue to decline in the internet area, the risk exists that the quality of information at the media outlet level will decrease. However, drawing welfare implications from these predictions would be somewhat speculative. Many factors that tend to decrease advertising revenues—such as digitization and changes in reader habits—also work toward reducing the media industry’s barriers to entry and thus increasing the existing number of news outlets.

Finally, the online media industry is relatively young, and many media outlets are still experimenting to discover their optimal pricing policy. Our model suggests the logic behind using subscriptions as a means to price discriminate between readers should also exist online. Coherent with this view, we note that, since 2010, an increasing number of online media have abandoned an exclusively advertiser-financed model to introduce paywalls, and that a large number of these media choose to offer subscribers unlimited access to their content while charging a high price to the readers who purchase only individual stories.

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8 The “waterbed effect” embodies the two-sided market phenomenon mentioned by Rysman (2009) whereby changes in fundamentals (in our case, a decrease in marginal advertisers’ willingness-to-pay) that lead prices to decrease on one side of the market often lead prices to increase on the other side of the market. See also Godes et al. (2009); Hagiu (2009). This phenomenon is related to the “see-saw effect” also specific to two-sided markets (see, e.g., Peitz and Valletti 2008; Anderson and Peitz 2015).

9 Athey et al. (2013) explore the extent to which the changes in readers’ habits triggered by the internet explain the recent collapse in advertising revenues. Similarly, Gentzkow (2014) investigates how the internet has reduced the advertising revenues of news outlets.

10 On the issue of pricing policies by online media, see Chio and Tucker (2013).
**Literature review**  Our analysis builds on the theoretical literature on two-sided markets\footnote{The newspaper industry is a two-sided market because newspapers cater to (at least) two groups of consumers—readers and advertisers—who generate externalities affecting each other.}. For instance, see Caillaud and Jullien (2001), Caillaud and Jullien (2003), Rochet and Tirole (2003, 2006), Armstrong (2006), and Weyl (2010). A strand of this literature has modeled media markets to analyze the relationship between advertising revenues and the extent of “horizontal” differentiation in the market (e.g., ideological or content diversity); for instance, see Gabszewicz et al. (2001, 2004), Gal-Or and Dukes (2003), Anderson and Coate (2005), Armstrong and Wright (2007), Peitz and Valetti (2008), Crampes et al. (2009). By contrast, our model is one of “vertical” quality, in which all readers agree on what constitutes an improvement in quality (see Spence, 1975). In this vein, Armstrong (2005) builds a duopoly model of the TV industry to investigate whether the level of quality provided under two alternative funding mechanisms (advertising-only revenues and both advertising and subscriptions revenues) is socially optimal\footnote{Interestingly, Armstrong also argues that relaxing existing caps on the number of minutes per-day of advertising channels are allowed to air may lead to higher quality. According to his logic, such a policy would give TV channels higher incentives to attract readers with high-quality programs.}. Our paper also contributes to a small but growing literature on price discrimination in two-sided markets. For instance, Liu and Serfes (2013) analyze first-degree price discrimination in a duopoly setting, and Carroni (2015) provides a model of past-behavior-based price discrimination. Instead, we extend Glazer and Hassin (1982)’s model of subscriptions as a means to engage in second-degree price discrimination to two-sided markets (with, moreover, endogenous quality provision).\footnote{On the economics of subscriptions, see also Gabszewicz and Sonnad (1997); Morton and Oster (2003); Resende and Ferioli (2014). Further, the logic behind providing subscribers with several issues of the newspaper is related to the economics of bundling, (see, e.g., Adams and Yellen 1976).}

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A literature also exists on the interplay between bounded rationality and the scope for price discrimination through subscriptions (see Grubb, 2012, for a review). For instance, DellaVigna and Malmendier (2004) investigate contracts in health sports centers and Grubb (2009) study cellular phone service plans. In our model, subscriptions can be used to price discriminate, because readers are uncertain about their future willingness to pay for the newspaper.

of competition between newspapers using US data and finds that greater market concentration increases subscription prices. Seamans and Zhu (2014) analyze the impact of the entry of Craigslist on local US newspapers, and find newspapers react by increasing their subscription prices, as predicted by the standard “waterbed effect.” By contrast, we find newspapers react to the introduction of advertising on French television by decreasing their subscription prices, a finding seemingly contradictory with the “waterbed effect.” However, we also find newspapers react by decreasing their quality, which we argue can rationalize a decrease in subscription prices.

Our paper is related to the growing literature that examines empirically the determinants of price discrimination. A number of papers investigate the role of competition. Seminal contributions include Borenstein (1991) on retail gasoline markets and Borenstein and Rose (1994) on airline tickets. More recent articles include Busse and Rysman (2005), who investigate pricing in Yellow Pages advertising, Gerardi and Shapiro (2009), who reexamine air ticket price discrimination, Dai et al. (2012), who study the non-monotonicity of competition on price discrimination using data from the US airline industry, and Seim and Viard (2011), who study nonlinear pricing in cellular telecommunication markets. With the exception of Gil and Riera-Crichton (2011), who empirically test the relationship between price discrimination and competition in the Spanish local television industry, all these articles study one-sided markets.

Finally, our paper is a contribution to the empirical literature that uses historical data to study the newspaper industry and its impact on society. For instance, using data on US daily newspapers from 1869 to 2004, Gentzkow et al. (2011) find the entry of the first newspaper in a county has a positive effect on political participation. Using French data, Cagé (2014) obtains a negative effect of competition (the entry of the second or third newspaper in the market) on political participation, due to a decrease in the quality of news. Further, exploiting data on the US newspaper industry from the early 20th century, Gentzkow et al. (2014) estimate a model of demand, entry, and choice of ideology, in which newspapers compete to attract readers and advertisers. They show that newspapers differentiate themselves through ideology, and that readers prefer news that is congruent with their own opinions. In this paper, we exploit data on the French Newspaper industry from 1960 to 1974 and a quasi-natural experiment (the introduction of advertising on television) to investigate the effect of a decrease in advertising

\[15]\text{Also exploiting Craigslist’s entry, Kroft and Pope (2014) show that print newspapers react by decreasing their quantity of advertising.}

\[16]\text{Filistrucchi et al. (2012) study the consequences on private television channels of the 2009 partial ban on advertising on French public television.}

\[17]\text{Sun and Zhu (2013) analyze the relationship between the quality of blogs and advertising concerns. They find bloggers exert more effort on content when motivated by advertising revenues.}

\[18]\text{Using evidence from Swedish newspapers, Asplund et al. (2008) show that more competitive markets have a higher incidence on third-degree price discrimination. However, they do not take into account the advertising side of the industry.}\]
revenues on newspapers’ pricing and quality choices.

The remainder of the paper is organized as follows. Section 2 develops a two-sided model of the newspaper industry. Section 3 introduces the new dataset we built for this study and provides descriptive statistics. In Section 4, we discuss the historical context of the introduction of advertising on French television in 1968, and provide anecdotal evidence regarding its impact on the newspaper industry. In Section 5, we estimate the relationship between newspapers’ reliance on advertising revenues and their pricing and quality choices using a difference-in-differences analysis based on the introduction of advertising on French television. Section 6 concludes.

2 Theory section

We extend standard two-sided models of monopoly newspapers in two ways. In Section 2.1, we let the newspaper choose the quality of the content it sells readers. In Section 2.2 we also allow the newspaper to sell both subscriptions and individual issues to readers.

2.1 A simple model of quality provision

Suppose a monopoly newspaper, a mass 1 of readers, and a mass 1 of advertisers exist. The advertisers’ willingness to pay for an advertisement in the newspaper increases with the latter’s readership. For simplicity, we assume readers are indifferent regarding the quantity of advertising in the newspaper. The newspaper chooses not only the price $p^R$ charged to readers and the price $p^A$ charged to advertisers, but also the quality $q$ of the content it produces to attract readers. We show that adding quality provision to the standard framework used to analyze two-sided markets can generate a rich set of predictions regarding the relationship between newspapers’ reliance on advertising revenues and reader prices.

In this version of the model, we ignore the possibility of the newspaper selling both subscriptions and individual issues. Accordingly, one may interpret this model either as one in which the newspaper sells only subscriptions (both to readers and advertisers) or one in which it sells every issue in an “unbundled” manner (again, both to readers and advertisers). In section 2.2 we allow the newspaper to sell both subscriptions and individual issues.

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19We ignore externalities from advertisers to readers to isolate the role quality plays. Assuming readers like/dislike advertisements complicates the analysis and may generate a multiplicity of equilibria. On this issue, see the discussions and techniques in Caillaud and Jullien (2003), Armstrong (2006), Weyl (2010), Filistrucchi and Klein (2013), and White and Weyl (2016).

20Although our leading application is the newspaper industry, our model applies more generally to any two-sided market in which quality provision matters to attract consumers on one side of the market.

21Advertisers “subscribe” by placing an advertisement for more than one issue of the newspaper.
2.1.1 Set-up

Readers Suppose the payoff to reader \( i \) from purchasing the newspaper is \( U_i = \gamma q + \hat{\epsilon} - p^R \), where \( \gamma \geq 0 \) captures readers’ sensitivity to quality, and where \( \hat{\epsilon} \geq 0 \) captures readers’ quality-independent taste for the newspaper\(^{22}\). For simplicity, we assume readers are indifferent about the newspaper’s quantity of advertisements. Finally, readers are heterogeneous in their outside option: each reader \( i \) has an outside option \( u_i \) (e.g., her payoff from leisure) uniformly and independently distributed on \([0, 1]\).\(^{23}\)

Advertisers Suppose the payoff to advertiser \( j \) from purchasing an ad is \( V_j = \alpha d^R - p^A \), where \( d^R \) represents the number of readers who make a purchase (see below). The parameter \( \alpha \geq 0 \) captures the advertisers’ willingness to pay for the readers’ attention, and allows us to carry out comparative statics related to the newspaper’s reliance on advertising revenues. For instance, a decrease in \( \alpha \) can represent the arrival of a new (or the improvement of an existing) advertising platform (e.g., a social media site).\(^{24}\) Finally, advertisers are heterogeneous in their outside option: each advertiser \( j \) has an outside option \( v_j \) uniformly and independently distributed on \([0, 1]\).

Newspaper The newspaper incurs a fixed cost \( \frac{1}{2}q^2 \) to produce content of quality \( q \). Holding prices constant, all readers are better off when \( q \) increases (i.e., \( q \) is a “vertical” attribute, e.g., better printing paper, better coverage of news, etc.).\(^{25}\) The newspaper also incurs a (zero) marginal cost \( c^R = 0 \) to serve readers and a (zero) marginal cost \( c^A = 0 \) to serve advertisers. The newspaper chooses the reader price \( p^R \), the advertising price \( p^A \), and the quality of its

\(^{22}\)One can interpret \( \hat{\epsilon} \) as the expected value of a random shock that affects readers’ willingness to pay for the newspaper (common to all readers and unknown prior to the purchase). In section 2.2, the newspaper exploits such uncertainty to price discriminate between readers.

\(^{23}\)Assuming readers are homogeneous in their outside option but heterogeneous in their taste for quality \( \gamma \) would complicate the expressions for the demand functions without affecting the main insights of our model.

\(^{24}\)One could also model a decrease in the advertisers’ willingness to pay for newspaper readers through an increase in their outside option. This alternative approach yields qualitatively identical insights but complicates some expressions. An alternative justification for the interpretation of a decrease in \( \alpha \) as the consequence of the arrival of a new advertising platform is as follows. Suppose the newspaper readership \( d^R \) can also be reached by advertisers on an alternative platform (and that newspapers do not compete with this platform for readers’ attention because, for instance, of entirely distinct content). Suppose also advertisers can reach these readers by either placing an ad in the newspaper or by advertising on the alternative platform, that is, they cannot advertise (or it is not worth advertising) on both platforms (i.e., they “single-home”). Then, advertiser \( j \) places an ad in the newspaper if and only if \( \tilde{\alpha}d^R - p^R \geq v_j + \beta d^R \), where \( \tilde{\alpha} \) and \( \beta \) capture the benefit of reaching the newspaper’s readers via the newspaper and the alternative platform, respectively. Also, \( v_j \) is an advertiser-specific net benefit of advertising on the alternative platform (independent of the size of the readership). By relabeling \( \alpha = \tilde{\alpha} - \beta \) (and assuming \( \alpha > 0 \)), the decision to advertise on the newspaper becomes \( \tilde{\alpha}d^R - p^R \geq v_j \), that is, this alternative model and our model coincide and a decrease in \( \alpha \) can indeed correspond to the arrival or the improvement of an alternative advertising platform (i.e., an increase in \( \beta \)).

\(^{25}\)In other words, \( q \) does not capture the newspaper’s positioning or ideology/bias for which readers would hold heterogeneous tastes.
content $q$ to maximize its expected profit:

$$\Pi (p^R, p^A, q) = p^R d^R (p^R, q) + p^A d^A (p^R, p^A, q) - \frac{1}{2} q^2, \quad (1)$$

where $d^R (p^R, q)$ and $d^A (p^R, p^A, q)$ represent the demand from readers and the demand from advertisers (computed below), respectively.

**Assumptions** In the Appendix, we show the newspaper’s objective function is strictly concave in $(p^R, p^A, q)$ if and only if $\alpha < 2\gamma < \sqrt{2}$, and $4 - \alpha^2 - 2\gamma^2 > 0$. Moreover, to ensure neither side of the market is covered, we impose the stricter condition $2\hat{\epsilon} < 4 - \alpha^2 - 2\gamma^2$.

### 2.1.2 The newspaper’s problem

We begin by computing the demand functions. Reader $i$ purchases the newspaper if and only if $U_i = \gamma q + \hat{\epsilon} - p^R \geq u_i$. It follows the demand from readers is $d^R (p^R, q) = \gamma q + \hat{\epsilon} - p^R$. Similarly, advertiser $j$ places an ad in the newspaper if and only if $V_j = \alpha (\gamma q + \hat{\epsilon} - p^R) - p^A \geq v_j$. It follows the demand from advertisers is $d^A (p^R, p^A, q) = \alpha (\gamma q + \hat{\epsilon} - p^R) - p^A$. As a result, the newspaper chooses $p^R$, $p^A$, and $q$ to maximize its expected profits:

$$\Pi (p^R, p^A, q) = p^R d^R (p^R, q) + p^A d^A (p^R, p^A, q) - \frac{1}{2} q^2, \quad (2)$$

$$= p^R (\gamma q + \hat{\epsilon} - p^R) + p^A (\alpha (\gamma q + \hat{\epsilon} - p^R) - p^A) - \frac{1}{2} q^2. \quad (3)$$

The associated system of first-order conditions is given by

$$\frac{\partial \Pi (p^R, p^A, q)}{\partial p^R} = 0 \iff 2p^R = \gamma q + \hat{\epsilon} - p^A \alpha, \quad (4)$$

$$\frac{\partial \Pi (p^R, p^A, q)}{\partial p^A} = 0 \iff 2p^A = \alpha (\gamma q + \hat{\epsilon} - p^R), \quad (5)$$

$$\frac{\partial \Pi (p^R, p^A, q)}{\partial q} = 0 \iff q = \gamma (p^R + \alpha p^A). \quad (6)$$

Solving the system of equations (4), (5), and (6) for $p^R$, $p^A$, and $q$ yields the solution to the newspaper’s problem, which we state in the next proposition together with the main comparative statics of interest.
Proposition 1 It is optimal for the newspaper to set

\[
p^R = \frac{(2 - \alpha^2) \hat{\epsilon}}{4 - \alpha^2 - 2\gamma^2}, \quad p^A = \frac{\alpha \hat{\epsilon}}{4 - \alpha^2 - 2\gamma^2}, \quad q = \frac{2\hat{\epsilon} \gamma}{4 - \alpha^2 - 2\gamma^2}.
\]

A decrease in \(\alpha\)—that is, a decrease in the advertisers’ willingness to pay for the newspapers’ readers—(i) always lowers the quality \(q\) of content, (ii) always lowers the price \(p^A\) charged to advertisers, and (iii) lowers the price \(p^R\) charged to readers if and only if readers are sufficiently sensitive to quality (i.e., \(\gamma > 1\)).

Proof. See Appendix Section A.1 □

Not surprisingly, a decrease in the advertisers’ willingness to pay \(\alpha\) lowers the price \(p^A\) the newspaper charges advertisers. More interesting is the relationship between \(\alpha\) and both the choice of quality \(q\) and the reader price \(p^R\). A decrease in the advertisers’ willingness to pay for readers’ attention induces the newspaper to lower the quality of its content. Quality serves to attract readers, and the newspaper has lower incentives to attract readers when advertising revenues decline. Further, a decrease in \(\alpha\) may either increase or decrease the price charged to readers depending on readers’ sensitivity to quality. On the one hand, holding quality constant, a decline in the advertisers’ willingness to pay induces the newspaper to increase the price it charges readers. This result is the standard “waterbed effect” whereby the newspaper has lower incentives to attract readers through low prices when advertising revenues decline.\(^{26}\) On the other hand, the decline in quality that follows the drop in advertising revenues reduces the demand from readers, which pushes \(p^R\) downward. Intuitively, the latter effect dominates—and \(p^R\) decreases—if the demand from readers decreases sharply enough, that is, if readers are sufficiently sensitive to quality (i.e., \(\gamma > 1\)).

2.2 Extending the model to include subscriptions

We now modify the model to allow the newspaper to sell subscriptions as well as individual issues. This generalization allows us to formulate additional predictions regarding the relationship between newspapers’ reliance on advertising revenues and their incentives to charge subscribers and occasional readers different prices. The main modifications are as follows.

A newspaper and a mass 1 of readers exist. The game is finitely repeated in discrete time \(t = 0, ..., n\). The newspaper publishes an issue in every period \(t \geq 1\). Moreover, in period 0, the newspaper chooses the subscription and unit prices it charges readers, as well as the quality \(q\) of its content. Readers are (i) uncertain about their willingness to pay for future issues

\(^{26}\) More generally, the newspaper’s incentives to cater to the marginal advertisers’ preferences decrease when their willingness to pay declines. In our model, the assumption whereby advertisers care exclusively about the number of readers straightforwardly implies the newspaper is better off reducing its readership (through lower quality and/or higher prices).
and (ii) heterogeneous in their expected willingness to pay. In period 0, each reader can either purchase a subscription at price \( np^S \), which provides her with all \( n \) issues, or choose to make \( n \) separate purchasing decisions. The price of each individual issue is \( p^O \). As we show below, the newspaper exploits readers’ uncertainty and heterogeneity by selling subscriptions at an average price lower than the price it charges occasional buyers; that is, the newspaper price discriminates among readers. Finally, for simplicity, we no longer let the newspaper choose the price \( p^A \) of advertising. Instead, we assume a constant marginal advertising benefit of each additional reader\(^27\).

In what follows, we focus on the case of empirical interest in which the newspaper sells both subscriptions and individual issues (as opposed to subscriptions only or individual issues only). Below, we provide sufficient conditions which ensure this policy is profit-maximizing for the newspaper. For the sake of brevity, we do not analyze the case in which it is profit-maximizing to sell individual issues only, nor the case in which it is profit-maximizing to sell subscriptions only.

### 2.2.1 Set-up

**Readers** The gross payoff to reader \( i \) from purchasing the newspaper in period \( t \) is

\[
U_{i,t} = \gamma q + \epsilon_t, \tag{7}
\]

where \( \epsilon_t \) represents a period-specific and quality-independent shock common to all readers. We suppose \( \epsilon_t \in \{\xi, \tau\} \), with \( \Pr(\epsilon_t = \xi) = \frac{1}{2} \forall t \). We denote by \( \hat{\epsilon} \) the expected value of \( \epsilon_t \), where \( \hat{\epsilon} = \frac{1}{2} \xi + \frac{1}{2} \tau \), and by \( \Delta \epsilon = \tau - \xi \) the spread of uncertainty. As before, \( \gamma \geq 0 \) captures readers’ sensitivity to quality and, moreover, each reader \( i \) has a time-invariant per-period outside option \( u_i \) uniformly and independently distributed on \([0, 1]\). We refer to \( \gamma q + \epsilon_t - u_i \) as reader \( i \)’s realized willingness to pay for period \( t \)’s issue, and \( \gamma q + \hat{\epsilon} - u_i \) as reader \( i \)’s expected willingness to pay for a single issue.

Readers decide whether to subscribe (at time 0) before knowing their willingness to pay.

\(^{27}\)Micro-founding the advertising demand as in Section 2.1 would give the newspaper four choice variables, thereby significantly complicating the analysis. Solving the associated system of first-order conditions suggests our results hold in this more general model. However, verifying the global concavity of the newspaper’s profit function becomes rather cumbersome. Finally, we choose to model advertising revenues in a reduced-form because we believe our most interesting empirical findings concern the reader side of the market. For a survey of papers on media markets in which advertising revenues are modeled in a similar fashion, see Anderson and Jullien (2015).
for any single issue. The expected payoff to reader $i$ from subscribing is equal to

$$
E[U_i] = \begin{cases} 
    n(\gamma q + \bar{\epsilon} - p^S) & \text{if } u_i \leq \gamma q + \bar{\epsilon}, \\
    \frac{n}{2} (\gamma q + \bar{\epsilon}) + \frac{n}{2} u_i - np^S & \text{if } \gamma q + \bar{\epsilon} < u_i \leq \gamma q + \bar{\epsilon}, \\
    nu_i - np^S & \text{if } \gamma q + \bar{\epsilon} < u_i.
\end{cases}
$$

(8)

Expression (8) takes into account the expected frequency with which reader $i$ reads the newspaper when subscribing (as a function of the time-invariant per-period outside option $u_i$).

Readers who choose not to subscribe make $n$ separate purchasing decisions. In particular, $\forall t \geq 1$, readers observe $\epsilon_t$ before making their purchasing decision. As a result, the expected payoff to reader $i$ from not subscribing to the newspaper is equal to

$$
E[U_i] = \begin{cases} 
    n(\gamma q + \bar{\epsilon} - p^O) & \text{if } u_i \leq \gamma q + \bar{\epsilon} - p^O, \\
    \frac{n}{2} (\gamma q + \bar{\epsilon} - p^O) + \frac{n}{2} u_i & \text{if } \gamma q + \bar{\epsilon} - p^O < u_i \leq \gamma q + \bar{\epsilon} - p^O, \\
    nu_i & \text{if } \gamma q + \bar{\epsilon} - p^O < u_i.
\end{cases}
$$

(9)

Readers with a high willingness to pay are willing to purchase every issue at price $p^O$. By contrast, readers with an intermediate willingness to pay purchase on average half the issues. In particular, they make a purchase only when $\epsilon = \bar{\epsilon}$. Finally, readers with a low willingness to pay never make a purchase. We refer to the non-subscribers who make a purchase with positive probability as the “occasional buyers.”

Recall our focus on the case in which the newspaper sells both subscriptions and individual issues. By comparing (8) and (9), we note the newspaper must necessarily set $\frac{1}{2}p^O \leq p^S \leq p^O$ to achieve this outcome. When $p^S > p^O$, no reader chooses to subscribe because the subscription price $np^S$ is higher than the total price $np^O$ paid when buying all $n$ issues separately. Therefore, $p^S \leq p^O$ necessarily, and all the readers who would be willing to purchase all $n$ issues separately absent subscriptions are better off subscribing. It follows the only readers left to become occasional buyers are a subset of those willing to purchase only half the individual issues on average. To prevent these potential occasional buyers from subscribing, the newspaper must set the average subscription price at least as high as half the unit price, that is, $\frac{1}{2}p^O \leq p^S$ necessarily. If the newspaper were to set $\frac{1}{2}p^O > p^S$, all occasional readers would be better off subscribing because the subscription price $np^S$ would be lower than the expected newsstand expense $\frac{1}{2}n p^O$.

The condition $\frac{1}{2}p^O \leq p^S \leq p^O$ thus also determines the expected frequency with which subscribers and occasional buyers read. Specifically, readers who subscribe read all $n$ issues (for otherwise they would be better off not subscribing) and readers who do not subscribe

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28The subscription price $p^S$ is irrelevant to a subscriber’s decision regarding whether to read a given issue, because it is sunk by the time the decision is made.
(i.e., occasional buyers) read only half the issues on average (for otherwise they would be better off subscribing). It therefore follows from (8) that $p^S \leq \gamma q + \hat{\epsilon}$ must necessarily hold if some readers are to become subscribers, and from (9) that $p^O \leq \gamma q + \tau$ must necessarily hold if some readers are to become occasional buyers (i.e., if some readers are to make a purchase when $\epsilon = \tau$). To summarize, the newspaper must necessarily set $\frac{1}{2}p^O \leq p^S \leq \min [p^O, \gamma q + \hat{\epsilon}]$ and $p^O \leq \gamma q + \tau$ if it wishes to sell both subscriptions and individual issues.

Finally, we note that, because $np^S > \frac{n}{2}p^O$, it is the readers with a relatively high expected willingness to pay (i.e., a relatively low outside option) who become subscribers, and the readers with an intermediate expected willingness to pay (i.e., an intermediate outside option) who become occasional buyers.

**Advertising revenues** We suppose the newspaper enjoys per-period advertising profits equal to

$$\Pi_A = \alpha \left( bd^R + (1 - b) \hat{d}^R \right),$$

(10)

where (i) $d^R$ denotes the total number of subscribers and occasional buyers and (ii) $\hat{d}^R$ denotes the per-period expected total number of readers. These two quantities do not coincide, because subscribers and occasional buyers read with different frequencies on average.\(^{29}\) This specification assumes advertisers care both about the number of readers who read the newspaper with positive probability—for instance, if they place an ad in more than one issue and/or value a diverse readership—\(^{30}\) and the frequency with which subscribers and occasional buyers read. The parameter $b \in [0, 1]$ represents the weight advertisers attach to $d^R$. As before, the parameter $\alpha \geq 0$ allows us to do comparative statics related to the newspaper’s reliance on advertising revenues. In particular, a decrease in $\alpha$ can be interpreted as a decrease in the advertisers’ willingness to pay for the newspaper’s readers.

**Newspaper** We maintain the assumption whereby producing content of quality $q$ costs $\frac{1}{2}q^2$, and again set $c^R = c^A = 0$ for simplicity.

**Scope for price discrimination** In practice, several factors may induce a newspaper to sell subscriptions in addition to individual issues, and to do so at different average prices; for instance, transaction costs, delivery costs, risk management, advertisers’ preferences for subscribers versus occasional buyers, and so on. Selling subscriptions also allows the newspaper to price discriminate among readers.\(^{31}\) On the one hand, if $p^S \leq p^O$, readers are offered

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\(^{29}\)Recall subscribers choose to read every issue of the newspaper, whereas occasional buyers read only half the issues on average.

\(^{30}\)A large readership implies a diverse readership if readers’ outside option is correlated with other reader characteristics.

\(^{31}\)See Glazer and Hassin (1982) (whose model’s logic we incorporate in our framework) for a detailed discussion on the scope for subscriptions to be used as a means to price discriminate between readers.
a reduced average price $p^S$ for the purchase of a “bundle” of $n$ issues before knowing their willingness to pay for it. On the other hand, they may delay their purchasing decisions to later (once they have discovered their willingness to pay) but then have to pay a higher price $p^O$. Whether selling subscriptions at a lower average price than the price of individual issues (as opposed to either selling them at the same price, selling only subscriptions, or selling only individual issues) is profit-maximizing for the newspaper is a priori ambiguous. A drawback of this pricing policy, for instance, is that the consumers with the highest willingness to pay enjoy a lower total price than what they would pay if subscriptions were not available.\footnote{Such an outcome is common under second-degree price discrimination.} Ultimately, whether the newspaper is better off selling subscriptions at a lower average price than the price of individual issues depends on the price it is able to charge the occasional buyers, that is, the readers with a low expected but high realized willingness to pay. As mentioned earlier, we focus on the case of empirical interest, namely that in which selling both subscriptions and individual issues is profit-maximizing. We prove in the appendix that imposing $\bar{\epsilon} - 2ab \geq \epsilon \geq \alpha (1 - b)$ ensures this outcome, and provide the intuition behind these conditions when commenting on Proposition 2.

Because the incentives to price discriminate are independent of the number of issues $n$, we proceed by setting $n = 1$ to save on notation. The proof in the appendix covers the more general case with $n \geq 1$.

2.2.2 The newspaper’s problem

Above, we identified that it was the readers with a low outside option who choose to subscribe, and those with an intermediate outside option who become occasional buyers. Moreover, we also determined that occasional buyers purchase only half the issues on average: they make a purchase only when $\epsilon = \bar{\epsilon}$. In what follows, we therefore refer to the marginal subscriber as the reader indifferent between subscribing and being an occasional buyer, and the marginal occasional buyer as the occasional buyer indifferent regarding whether to make a purchase when $\epsilon = \bar{\epsilon}$.

Demand Functions We first compute the demand for subscriptions $d^S(p^S, p^O, q)$. To compute $d^S(p^S, p^O, q)$, it is enough to identify the marginal subscriber and exploit the fact that all readers with an outside option lower than that of the marginal subscriber will choose to subscribe. Because $p^O \geq p^S$, we know the marginal subscriber cannot belong to the (possibly empty) interval $[0, \gamma q + \xi - p^O]$ of readers who would be willing to purchase every issue at a price $p^O$ absent subscriptions. Also, because $p^S \geq \frac{1}{2}p^O$, we know the marginal subscriber belongs to the interval $[0, \gamma q + \xi]$ of subscribers who read all $n$ issues. Therefore, the marginal subscriber is necessarily indifferent between subscribing (and reading all $n$ issues) and pur-
chasing on average half the issues. To compute the demand \( d_S (p^S, p^O, q) \), we thus equate (9) (for the case in which \( u \leq \gamma q + \epsilon \)) to (10) (for the case in which \( u \in [\gamma q + \epsilon - p^O, \gamma q + \epsilon - p^O] \)), and rearrange for \( u \), which yields

\[
d_S (p^S, p^O, q) = \max [\gamma q + \epsilon + p^O - 2p^S, 0].
\]  

(11)

Because we focus on the case in which selling subscriptions (in addition to individual issues) is optimal, we anticipate \( p^S \leq \frac{1}{2} (\gamma q + \epsilon + p^O) \) and thus \( d_S (p^S, p^O, q) = \gamma q + \epsilon + p^O - 2p^S \).

As we would expect, note from (11) that the demand for subscriptions is decreasing in the subscription price \( p^S \), increasing in the quality \( q \), and increasing in the price \( p^O \).

We now compute the demand from occasional buyers \( d_O (p^S, p^O, q) \). Because all readers whose outside option \( u \leq \gamma q + \epsilon + p^O - 2p^S \) prefer to subscribe, where \( \gamma q + \epsilon + p^O - 2p^S > \gamma q + \epsilon - p^O \), the newspaper faces no demand from occasional buyers when \( \epsilon_t = \epsilon \) (see equation (9)). When \( \epsilon_t = \epsilon \), all readers whose outside option \( u_t \in [\gamma q + \epsilon + p^O - 2p^S, \gamma q + \epsilon - p^O] \) purchase an individual issue. As a result, the demand \( d_O (p^S, p^O, q) \), when \( \epsilon_t = \epsilon \), is equal to

\[
d_O (p^S, p^O, q) = \max [\Delta \epsilon + 2p^S - 2p^O, 0].
\]  

(12)

Because we focus on the case in which selling individual issues (in addition to subscriptions) is optimal, we anticipate \( p^O \leq p^S + \frac{\Delta \epsilon}{2} \), and thus \( d_O (p^S, p^O, q) = \Delta \epsilon + 2p^S - 2p^O \). Intuitively, \( d_O (p^S, p^O, q) \) is decreasing in \( p^O \) and increasing in \( p^S \). Further, the demand from occasional readers is increasing in \( \Delta \epsilon \) because occasional readers make a purchase only when \( \epsilon = \epsilon \).

Notice also that \( d_O (p^S, p^O, q) \) is independent of quality. On the one hand, an increase in \( q \) increases \( d_O (p^S, p^O, q) \) because it induces more readers to become occasional buyers (i.e., it induces more readers to make a purchase when \( \epsilon_t = \epsilon \)). On the other hand, an increase in \( q \) decreases \( d_O (p^S, p^O, q) \) because it induces some occasional buyers to subscribe. Under the uniform distribution assumption, both effects cancel each other out.

Finally, because occasional buyers make a purchase only when \( \epsilon = \epsilon \), the per-period expected demand from occasional buyers is \( d_O (p^S, p^O, q) = \Delta \epsilon + p^S - p^O. \)

We conclude by computing the newspaper’s total number of readers. When \( \epsilon_t = \epsilon \), the total number is equal to

\[
d_R (p^S, p^O, q) = d_S (p^S, p^O, q) + d_O (p^S, p^O, q) = \gamma q + \epsilon - p^O.
\]  

(13)

When \( \epsilon_t = \epsilon \), the total number of readers coincides with the number of subscribers. Finally,

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\[33\] The demand \( d_O (p^S, p^O, q) \) is decreasing in \( \epsilon \) because a higher \( \epsilon \) makes it more tempting for readers to subscribe (given that \( p^S \leq p^O \)). Indeed, the demand \( d_O (p^S, p^O, q) \) is increasing in \( \epsilon \).

\[34\] However, the feature whereby the demand from occasional buyers is less affected by quality than the demand for subscriptions should continue to hold under more general distributions.
the per-period expected number of readers is equal to

$$d^R (p^S, p^O, q) = d^S (p^S, p^O, q) + d^O (p^S, p^O, q) = \gamma q + \epsilon - p^S. \quad (14)$$

**Assumptions** We suppose $\tau < 1 - \alpha$ to focus on the case in which the market is *not* covered. We show in the appendix that this restriction on the readers’ willingness to pay implies $d^R (p^S, p^O, q) < 1$. Further, we suppose $\gamma \in \left[0, \sqrt{2 - (\tau + \alpha)}\right]$ to limit the number of cases to consider. In Proposition 3, we show this interval is large enough to generate the three possible predictions the model can produce regarding the relationship between reader prices and advertising revenues. We show in the appendix that this restriction also ensures the strict concavity of the newspaper’s objective function in $(p^S, p^O, q)$. Finally, recall our focus on a scenario in which the newspaper sells both subscriptions and individual issues. As we show in the appendix, imposing $\tau - 2ab \geq \epsilon \geq \alpha (1 - b)$ ensures this outcome.\(^{36}\)

When selling subscriptions and individual issues—that is, when setting $p^O, p^S,$ and $q$ such that $d^S (p^S, p^O, q) \geq 0$ and $d^O (p^S, p^O, q) \geq 0$—the newspaper chooses $p^O, p^S,$ and $q$ to maximize its expected profits:

$$\Pi (p^S, p^O, q) = \Pi^O (p^S, p^O, q) + \Pi^S (p^S, p^O, q) + \Pi^A (p^S, p^O, q) - \frac{1}{2} q^2 \quad (15)$$

$$= p^O \left(\frac{\Delta \epsilon}{2} + p^S - p^O\right) + p^S (\gamma q + \epsilon + p^O - 2p^S) + \alpha \left(bd^R + (1 - b) d^R\right) - \frac{1}{2} q^2. \quad (16)$$

The associated system of first-order conditions is given by

$$\frac{\partial \Pi (p^S, p^O, q)}{\partial p^S} = 0 \iff 4p^S = 2p^O + \gamma q + \epsilon - \alpha (1 - b) \quad (17)$$

$$\frac{\partial \Pi (p^S, p^O, q)}{\partial p^O} = 0 \iff p^O = p^S + \frac{\Delta \epsilon}{4} - \frac{\alpha b}{2} \quad (18)$$

$$\frac{\partial \Pi (p^S, p^O, q)}{\partial q} = 0 \iff q = \gamma (p^S + \alpha). \quad (19)$$

Analyzing the direct effect of changes in parameter values and choice variables is instructive. From \(^{37}\) 17, we see that an increase in $p^O$—because it raises the demand for subscriptions—tends to increase the subscription price $p^S$, all else equal. Similarly, equation \(^{18}\) shows that

\(^{35}\)One can verify the set of parameter values for which these constraints jointly hold is nonempty if and only if $\alpha \leq \frac{1}{2 \tau}$.

\(^{36}\)From the construction of the demand functions, we found that the conditions $p^O, p^S,$ and $q$ must satisfy for $d^S (p^S, p^O, q) \geq 0$ and $d^O (p^S, p^O, q) \geq 0$ to hold are $p^O \leq \min \left[\gamma q + \tau, \frac{\Delta \epsilon}{2}, 2p^S\right]$ and $p^S \leq \min \left[\frac{\gamma}{2} (\gamma q + \epsilon + p^O)^2, \gamma q + \epsilon, p^O\right]$. We anticipate these conditions hold, and show in the appendix that they do when $\tau - 2ab \geq \epsilon \geq \alpha (1 - b)$.

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an increase in $p^S$—because it increases the demand from occasional buyers—tends to increase the price $p^O$, again holding everything else equal. The prices on the reader side therefore have a tendency to co-move. To continue, an increase in $q$ tends to increase $p^S$ but has no direct effect on $p^O$. This asymmetric effect on prices occurs because a change in $q$ has a direct effect on the demand for subscriptions, but not on the demand from occasional buyers. As we show below, this asymmetry can sometimes break the tendency for reader prices to co-move. To continue, the direct effect of an increase in advertising revenues (through a higher $\alpha$) is to decrease both reader prices. As in the baseline model, the newspaper has stronger incentives to attract readers when advertisers’ willingness to pay increases (the “waterbed” effect). Finally, and again as in the baseline model, (19) shows that an increase in advertisers’ willingness to pay induces the newspaper to raise the quality of its content.

Solving the system of equations (17), (18), and (19) for $p^O$, $p^S$, and $q$ yields the solution to the newspaper’s problem, which we state in the next proposition.

**Proposition 2** Suppose $\bar{\epsilon} - 2\alpha b \geq \epsilon \geq \alpha (1 - b)$. Then, it is optimal for the newspaper to sell both subscriptions and individual issues by setting

$$p^O = \frac{\hat{\epsilon} + \alpha}{2 - \gamma^2} - \alpha + \frac{\Delta \epsilon}{4} - \frac{\alpha b}{2} > p^S = \frac{\hat{\epsilon} + \alpha}{2 - \gamma^2} - \alpha,$$

and $q = \gamma \frac{\hat{\epsilon} + \alpha}{2 - \gamma^2}$.

**Proof.** See Appendix Section A.2

In the Appendix, we show that selling both subscriptions and individual issues (as opposed to either subscriptions only, or individual issues only) is optimal for the newspaper whenever $\bar{\epsilon} - 2\alpha b \geq \epsilon \geq \alpha (1 - b)$. To gain intuition for these conditions, note we can rewrite $\bar{\epsilon} - 2\alpha b \geq \epsilon$ as $\bar{\epsilon} \geq \hat{\epsilon} + \alpha b$, and recall that selling both subscriptions and individual issues is optimal to the extent that doing so allows the newspaper to charge a relative high price $p^O$ to the occasional buyers, that is, to the readers with a low expected willingness to pay $\gamma q + \hat{\epsilon}$ but a high realized willingness to pay $\gamma q + \bar{\epsilon}$ for the issues with an associated shock $\epsilon = \bar{\epsilon}$. Similarly, recall a drawback of using subscriptions as a means to price discriminate is that readers with a high willingness to pay end up paying a subscription price lower than the total price they would be willing to pay absent the subscription. The condition $\epsilon \geq \alpha (1 - b)$ limits this drawback.

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$^{37}$The condition $\bar{\epsilon} - 2\alpha b \geq \epsilon \geq \alpha (1 - b)$ is sufficient to ensure it is profit-maximizing to sell both individual issues and subscriptions, but may not be necessary. Computing the weakest conditions under which it is profit-maximizing to sell both individual issues and subscriptions would require comparing the newspaper’s expected profits when selling both subscriptions and individual issues to the newspaper’s expected profits when (i) selling only individual issues and (ii) selling only subscriptions. Given our desire to focus on the case of empirical interest (in which the newspaper sells subscriptions and individual issues), we omit these tedious computations and suppose $\bar{\epsilon} - 2\alpha b \geq \epsilon \geq \alpha (1 - b)$. 

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by ensuring the expected willingness to pay \( \gamma q + \hat{\epsilon} = \gamma q + \frac{\epsilon + \tau}{2} \) of subscribers is high enough that the newspaper can charge a relatively high subscription price \( np^S \).

Also, much like in the baseline model, notice the newspaper’s quality is increasing in both (i) the parameter \( \gamma \) capturing readers’ sensitivity to quality and (ii) the parameter \( \alpha \) capturing the advertisers’ willingness to pay. The newspaper reacts to a drop in advertising revenues by lowering the quality of its content. Finally, because \( \gamma q = \frac{\gamma^2 \hat{\epsilon} + \alpha}{2 - \gamma} \), notice that, all else equal, the demand for subscriptions (11) decreases as \( \alpha \) diminishes, where this decrease is larger the larger \( \gamma \) is. This observation is key to understanding the consequences on reader prices of changes in the newspaper’s advertising revenues, which we analyze in the next proposition. In what follows, let \( \bar{\gamma} = \min \left[ \frac{2(1+b)}{2+2b}, \sqrt{2 - (\tau + \alpha)} \right] \), where \( \bar{\gamma} > 1 \).

**Proposition 3** A decline in advertising revenues (a decrease in \( \alpha \)) leads the newspaper to:

1. increase both prices if the readers’ sensitivity to quality is low (i.e., if \( \gamma < 1 \)),
2. increase \( p^O \) but decrease \( p^S \) if the readers’ sensitivity to quality is intermediate (i.e., if \( \gamma \in [1, \bar{\gamma}] \)), and
3. decrease both prices if the readers’ sensitivity to quality is high (i.e., if \( \gamma \in \left[ \frac{2(1+b)}{2+2b}, \sqrt{2 - (\tau + \alpha)} \right] \)).

**Proof.** These results immediately follow from differentiating the expressions stated in Proposition 2 with respect to \( \alpha \). ■

Whether the average subscription price \( p^S \) and the unit price \( p^O \) increase or decrease following a drop in advertising revenues depends on readers’ sensitivity to quality. On the one hand, holding quality constant, the newspaper has an incentive to increase both prices following a drop in advertising revenues (the “waterbed effect”). As in the baseline model, this phenomenon occurs because the newspaper finds it less profitable to achieve a large readership. On the other hand, we know from Proposition 2 that the newspaper also reacts to lower advertising revenues by decreasing the quality of its content. This decrease in quality, all else equal, lowers the demand for subscriptions but leaves the demand from occasional readers unchanged. Moreover, the decrease in the demand for subscriptions is larger the larger \( \gamma \) is. As a result, when \( \gamma \) is low (i.e., \( \gamma < 1 \)), the decrease in quality only slightly lowers the demand for subscriptions, so that the “waterbed effect” dominates and the newspaper raises both reader prices. For intermediate values of \( \gamma \) (i.e., if \( \gamma \in [1, \bar{\gamma}] \)), the decrease in the demand for subscriptions is sufficiently large that the net effect on the subscription price \( p^S \) is negative. However, the decrease in \( p^S \) has only a moderate negative effect on the demand from occasional readers, so that the net change in \( p^O \) is positive. Finally, when \( \gamma \) is high (i.e., \( \gamma \in \left[ \frac{2(1+b)}{2+2b}, \sqrt{2 - (\tau + \alpha)} \right] \)) the decrease in quality significantly lowers the demand.

\[ ^{38} \text{Note this third case may not exist if parameters are such that the interval } \left[ \frac{2(1+b)}{2+2b}, \sqrt{2 - (\tau + \alpha)} \right] \text{ is empty.} \]
for subscriptions, thereby calling for a large decrease in the subscription price $p^S$. In turn, the large decrease in $p^S$ makes the demand from occasional readers fall sharply, inducing the newspaper to also lower the unit price $p^O$.

3 Industry and data characteristics

In this section, we briefly introduce the new dataset we built for this study, and describe the newspaper industry characteristics. We discuss further details of the construction of the data in the online Appendix Section A.

3.1 Newspaper industry characteristics

The French daily newspaper industry is divided into two sub-industries: the local daily newspaper industry and the national daily newspaper industry. We refer to a newspaper as a national newspaper if it can be purchased in the entire French territory. By contrast, the natural news market for a local daily newspaper is a county. By and large, national newspapers have a much greater focus on international events, financial news, and national politics than local newspapers. By contrast, local newspapers tend to cover local politics and local events. Our period of interest (1960-1974) has around 100 (national and local) daily general information newspapers.

Twelve national newspapers exist at the beginning of the period, and 10 at the end. The total national newspaper circulation is stable during this time period, with around 4.2 million copies sold every day. The number of local newspapers during the same period varies around 90, with a total circulation amounting to around 7.8 million copies (see Cagé (2014) for more details on the historical evolution of the French local daily newspapers industry). On average, the circulation of national daily newspapers amounts to nearly 350,000 copies a day, whereas the circulation of local daily newspapers amounts to 100,000. Copies are sold either at the newsstand to unit buyers or through subscription. The average daily share of unit buyers is 70%. As expected, the average price charged to subscribers is lower than the unit price charged to unit buyers. The average price ratio is 0.86. (Table 1 provides descriptive statistics on newspaper prices, revenues, and costs, as well as on circulation and newspaper content for the entire daily newspaper industry.)

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39 A county (“département” in French) is a French administrative division. The median land area of a county is 2,303 sq mi, which is slightly more than three-and-half times the median land area of a county in the United States. A limited number of local daily newspapers circulate in more than one county.

40 Libération, Paris Presse, and Paris Jour exit the industry in 1964, 1970, and 1972, respectively. Libération – same title but entirely distinct newspaper from the aforementioned Libération – enters the industry in 1973. We chose not to include the “first” Libération in the dataset, because it exits four years before the introduction of advertising on television. For the same reason, we exclude the “second” Libération. In Section 5.4, we show our results are robust to dropping Paris Presse and Paris Jour.

41 In the online Appendix, we present these descriptive statistics separately for national – Table C.1 – and
Overall, national daily newspapers generate 67.5 million francs (€71.4 million) in total revenues each year, whereas local daily newspapers generate 19.9 million francs (€20.4 million). Total revenues are the sum of sales/circulation revenues and advertising revenues. On average, between 1960 and 1974, the share of advertising revenues in total revenues is 45%. The quantity of advertising in newspapers represents around three pages per newspaper issue, that is, 19% of the content of the newspaper.

3.2 Data

We construct an annual balanced panel dataset on local and national newspapers in France between 1960 and 1974. The data are paper data that we digitize and merge from various historical sources.

Prices, costs, and revenues We collect data on prices, revenues, and expenses from the French Ministry of Information’s non-publicly available records in the National archives. The Ministry of Information required newspapers to report annually their revenues and paper and printing expenses. We collect data by having direct access to their responses to these queries.

We obtain information on the unit price, the subscription price – defined as the annual subscription price divided by the total number of issues in the year –, the number of issues per year, sales revenues, advertising revenues, and expenses, as well as information on circulation with the share of unit buyers and the share of subscribers. Our dataset includes data for 61 of the local newspapers, that is, more than three quarters of the local daily newspapers industry in 1971. These newspapers are the ones for which the data are available in the archives. They represent on average more than 87% of the total local daily newspaper circulation. Our sample of national newspapers include all 10 national newspapers circulating between 1960 and 1974.

Number of journalists We obtain annual data on the number of journalists at the newspaper level from the non-publicly available paper records of the “Commission de la carte d’identité des journalistes professionnels” (the organization that delivers the press card to journalists).\textsuperscript{42} Our dataset includes data for 57 out of the 61 local newspapers for which we have revenue data, and 8 out of the 10 national newspapers. The number of journalists is one of the variables we use to proxy for newspapers’ quality. On average, newspapers employ 63 journalists during our time period.

\textsuperscript{42}In France, the press card is granted to journalists on an annual basis by the “Commission de la carte d’identité des journalistes professionnels” (CCLJP) since 1936. These data are from Cagé (2016).
Advertising prices and quantity  A change in advertising revenues can be driven by a change in advertising prices and/or a change in advertising quantity. We collect data on both the price and the quantity of advertising to disentangle the two effects.

A first source of information for advertising prices is the official list price per column inch of advertising space. We digitize these data from “Tarif Media,” an annual publication that provides information regarding advertising rates. “Tarif Media” provides information on a menu of prices (specifically, prices vary depending on the page on which the ad is displayed). In this analysis, we use the rate for front-page ads, which is the rate for which we have the highest number of observations.

A downside of using list prices is that discounts are common in the newspaper industry: the official price is not the actual transaction price, which is usually lower (see, e.g., Chandra, 2009). Price lists are hence a relevant measure of advertising prices as long as we assume the potential bias between list prices and actual prices does not differ too much across newspapers and over time.

Given this caveat, we use another measure of advertising price common in the literature, which consists of the total advertising revenues divided by the newspaper circulation. The two measures are strongly correlated (the correlation between them is equal to .5 and is significant at the 1% level).

We collect data on the amount of advertising per issue directly from the paper version of the newspapers available in the French National Library. For each year and each newspaper, we study the content of the newspaper issues during two entire weeks (the third week of March and the third week of December). We measure the quantity of advertising on each page (i.e., the share of the page’s surface devoted to ads), as well as the number of advertisements. We thus have information on the total amount of advertisements in the newspaper, and on the share of the newspaper devoted to advertising.

For the year 1967, we go further and distinguish between national ads and local ads. National ads are defined as advertisements for branded products or services. Local ads mainly consist of classified ads and ads for local shops or events. We use this information to compute newspapers’ reliance on national versus local advertising in our alternative empirical strategy (Section 5.5).

Finally, to provide anecdotal evidence, we collect information for a subset of newspapers (see below) on the category (e.g., food and beverage, cars, household electrical goods, etc.) of each published advertisement.

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43 “Tarif Media” is the French equivalent of the SRDS Newspaper Advertising Source in the United States, a source that has been used in a number of media studies (see, e.g., Seamans and Zhu, 2014).

44 We do so to maximize the number of observations in our sample; our results are robust to constructing an average rate from the menu of prices and are available upon demand.

45 We chose the third week of March because it is the week the INSEE (the French national statistics agency) selected to run its surveys, and the third week of December because Christmas is a suitable time for advertising.
4 Background on the introduction of advertising on French television

In this section, we first present some historical background on the introduction of advertising on French television in 1968, and then provide some anecdotal evidence regarding the impact of the shock on both the advertising revenues of national newspapers and the nature of the advertisements they published.

4.1 French television in 1968

French Television was state-owned from 1945 to 1981. A national agency – the “Office de Radiodiffusion-Télévision Française” (ORTF) – was in charge of providing radio and television content. Only one channel ("La première chaîne" – the “First Channel”) was available until 1963. A second TV channel ("La deuxième chaîne" – the “Second Channel”) was introduced in 1964, and a third one ("La troisième chaîne" – the “Third Channel”) in 1972. TV penetration gradually increased during this period (Figure 3). In 1970, nearly 70% of French households owned a television (Parasie, 2010). Channels were financed mostly through a tax (redevance) until 1968. By law, commercial or brand advertising was forbidden.

The transition to color on the Second Channel and the need to produce an increasing number of programs led the ORTF to experience severe financial difficulties – it was “on the edge of the abyss” (Bellanger, 1969). The French government’s secret decision in March 1965 to introduce advertising on television was made public on October 20, 1967, thereby provoking a strong controversy both in Parliament and within the newspaper industry. The then-Prime Minister George Pompidou argued the ORTF had no choice but to find new sources of revenues to continue developing the Second Channel and eventually create a third one. He also argued that enabling firms to advertise on television would “revitalize the production by giving [them] the possibility to develop their domestic market” (address in Parliament on April 24, 1968).

46During this period, all TV channels in the United States were privately-owned, whereas two TV channels were state-owned (BBC 1 and BBC 2) and one was private (ITV) in the UK.

47The first national agency, the “Radiodiffusion Française” (RDF), was created in 1945. It was renamed “Radiodiffusion-Télévision Française” (RTF) in 1949 and replaced by the ORTF in 1964.

48An exception is “collective advertising,” which promotes products, say, fruits, without mentioning a brand (Duchet, 2005). They were not very important, however. In 1959, for example, the time devoted to collective advertising was only of five hours and 10 minutes per year (Parasie, 2010).

49Commercial advertising was allowed much earlier in almost all other developed countries: 1941 in the United States, 1955 in the UK, 1956 in Germany, and 1957 in Italy and Spain (Parasie, 2010).
4.2 A threat to newspapers?

Left-leaning political parties and the newspaper industry were firmly against the reform. The Federation of the Democratic and Socialist Left (“Fédération de la gauche démocrate et socialiste”) – a conglomerate of French left-wing non-Communist forces – introduced various bills to ban commercial advertising on television by arguing it would lead to a decrease in the quality of television content. More importantly – and consistent with the identification strategy we use in this paper – very much present is the idea that the reform would lead to a decrease in newspaper advertising revenues.[50] In fact, as early as 1964, the then-Minister of Information, Alain Peyrefitte, was aware of this issue and claimed the introduction of advertising on television would be worth considering only if the press could survive it (Bellanger, 1969).

Not surprisingly, newspapers were also against the reform. For instance, the Federation and the Confederation of the French Press estimated in a report that the press would lose between 40% and 50% of its advertising revenues, that is, between 20% and 40% of total revenues depending on the newspaper.

4.3 A substitution effect

The quantity of advertising broadcast on television during our period – as measured by the number of minutes of advertising per day – is limited.[51] The first commercial advertisement was broadcast on French television in October 1968. The time devoted to advertising was two minutes per day in 1968 – and only on the First Channel – four in 1969, eight in 1970 (i.e., 2,720 minutes per year; 1970 is also the year in which advertising is introduced on the Second Channel), and more than 12 in 1971 (Bellanger, 1969). Note that such a low daily quantity of advertising suggests the impact on television viewers likely was limited in practice. Advertising revenues generated by the ORTF increased by 69 million francs (77 (constant 2009) million euros) between 1967 and 1968, and by 197 million francs (€201 million) between 1968 and 1969. In 1971, advertising revenues represented 22% of the ORTF’s total revenues (Bellanger, 1969). Therefore, the limited quantity of advertising the reform introduced on television was manifestly sufficient to generate relative large revenues for the ORTF.

We first provide aggregate evidence at the industry level to give a sense of the magnitude of the effect of the introduction of advertising on television on the advertising revenues of local

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[50]The Federation of the Democratic and Socialist Left argued the government wished to introduce advertising on television so as to weaken newspapers, the only independent media industry (Parasie, 2010). In an address to the Parliament on April 24, 1968, Jacques Chambaz (from the Communist Party) claimed that “the introduction of commercial advertising on television is but a new way to deal a blow to the broadsheet newspapers that you consider not docile and flexible enough.”

[51]Note the maximum number of minutes of advertising per day is regulated.

[52]In the remainder of the paper, we simply use the terminology “euros” when referring to “constant 2009 euros.”

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and national daily newspapers. Total advertising revenues of national daily newspapers decreased by 21 million francs (€45 million) between 1967 and 1968, and then stabilized around 500 million francs. Note that national newspapers' advertising revenues decreased even though the total advertising market was rapidly expanding in France between 1967 and 1974. By contrast, local newspaper advertising revenues increased during the same period (Figure 4). Moreover, the share of national daily newspapers in total advertising revenues decreased from 14% in 1967 to 11% in 1974, as shown in Figure 5.

[FIGURES 4 & 5 HERE]

The introduction of advertising on television in 1968 can be considered a significant negative shock on the advertisers' side of newspaper industry. However, its impact was heterogeneous in that it affected national newspapers more severely than local newspapers. The reason behind this heterogeneous effect lies in the distinct nature of the advertisements published in national and local newspapers. National newspapers rely to a greater extent on advertisements for brands (“national ads”), whose owners may also wish to advertise on television. By contrast, a large share of advertisements in local newspapers is local in nature (local commercial advertisements and classified advertisements).

4.3.1 Classifying advertisements

To provide anecdotal evidence regarding the impact of the introduction of advertising on television on national newspapers, we classify advertisements according to 25 categories (food and beverage, cars, household electrical goods, etc.).

Television  We collect data on all the advertisements broadcast on French television between 1968 and 1974 from the website of the Institut National de l’Audiovisuel (INA – National Audiovisual Institute). For each advertisement, we know the date of its first airing, its length, and its category. Between 1968 and 1974, 7,337 different advertisements were broadcast on television (142 in 1968, 919 in 1969, and over 1,000 per year for every subsequent year, as shown in online Appendix Figure B.3). Online Appendix Figure B.4 illustrates the relative prevalence of the various categories of television advertisements (e.g., 34% of all advertisements broadcast on television in 1971 were about food or non-alcoholic drinks).

Newspapers  To compare the advertisements broadcast on television with those published in newspapers, we similarly classify all the advertisements published in newspapers according

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53In Section 4 we provide econometric evidence of this shock, computing difference-in-differences estimates to show this shock more severely affected the advertising revenues of the national daily newspapers than the revenues of the local daily newspapers.
to the same 25 categories. Specifically, for a subset of newspapers (four national newspapers\textsuperscript{54} and five local newspapers\textsuperscript{55}), we classify all the advertisements published in the newspaper between 1964 and 1972. To do so, we use the same method as the one described above regarding the quantity of advertising (i.e., we select the third week of March and third week of December). In addition, we classify each newspaper advertisement as either local or national. According to our findings, 24\% of the advertisements found in national newspapers were local advertisements, whereas 44\% of the advertisements found in local newspapers were local advertisements.\textsuperscript{56}

4.3.2 Anecdotal evidence

The introduction of advertising on television likely has had an effect on both the intensive and the extensive margins of the advertising side of the newspaper industry (i.e., on the infra-marginal and marginal advertisers). On the intensive margin, the introduction of a new advertising platform may have led to a reduction in the willingness to pay of many advertisers, for instance, those who opt to advertise through both media. On the extensive margin, it may have induced a number of advertisers to advertise exclusively on television. We use the information collected on the nature of advertisements to anecdotally document an effect on the extensive margin for national newspapers. Between 1964 and 1972, this substitution pattern appears clearly, as illustrated in Figure 6 for electronic devices and OTC drugs. In the next section, we provide econometric evidence of a decrease in advertising prices and revenues, which may be due to the effect on both the intensive and extensive margins.

[FIGURE 6 HERE]

5 Empirical analysis

The model we built in Section 2 provided us with a framework with which to think about the determinants of newspapers’ pricing and quality choices. It also analyzed the interplay between advertising revenues and newspapers’ incentives to charge subscribers an average price lower than the unit price they charge occasional “newsstand” buyers. In this section, we study empirically the relationship between newspapers’ reliance on advertising revenues and their pricing and quality choices. In particular, we exploit the introduction of advertising on French Television in October 1968 to treat it as an exogenous negative shock on newspapers’ advertising revenues. To the best of our knowledge, our paper is the first to use this quasi-natural experiment.

\textsuperscript{54}France Soir, L’Aurore, Le Figaro, and Le Monde.

\textsuperscript{55}La Liberté De Normandie, La Marseillaise, Le Maine Libre, Le Méridional, and Le Midi Libre.

\textsuperscript{56}These estimates are consistent with existing aggregate data on revenues: according to IREP, the share of local advertisements in advertising revenues of local daily newspapers was equal to 43\% in 1967.
5.1 Estimation strategy

We use our panel data to compute DD estimates of the effect of the introduction of advertising on television. Our identifying assumption is that the negative shock on advertising revenues has affected mostly national daily newspapers and to a lower extent local daily newspapers. We take advantage of the treatment heterogeneity and use national newspapers as our “treated group” and local newspapers as our “control group.” We then compare the pre-1968-to-post-1968 change in prices of national daily newspapers to the change in prices of local daily newspapers over the same period. Note that because local newspapers may also have suffered from the shock (albeit to a lower extent), our estimates are a lower bound.

Let $D_{\text{national news}}$ be an indicator variable for national newspapers and $D_{\text{after}}$ be a time dummy that switches on for observations post 1968 (i.e., after the introduction of advertising on television). Our analysis is based on the following regression equation:

$$y_{n,t} = \alpha + \beta_1 D_{\text{after}} + \beta_2 (D_{\text{after}} \times D_{\text{national news}}) + \lambda_n + \gamma_t + \epsilon_{n,t},$$

(20)

where $n$ indexes newspapers and $t$ indexes years ($t = 1960, \ldots, 1974$). For all specifications in our analysis, we introduce fixed effects for newspaper ($\lambda_n$) as well as time dummies ($\gamma_t$). This approach prevents cross-sectional variations from driving our results. $\epsilon_{n,t}$ is a newspaper-county-year shock.

$y_{n,t}$ is our outcome of interest. We first investigate the effect of the introduction of advertising on television on the advertising side of the market – log of the advertising revenues, price and quantity –, then turn to prices on the reader side and finally consider quality choices. Due to the inclusion of newspaper and year fixed effects, the coefficient $\beta_2$ – our coefficient of interest – measures the annual effect for national newspapers of the introduction of advertising on television compared to the general evolution of our dependent variable (e.g. the price ratio) for local newspapers. The key identifying assumption here is that price trends would be the same for both categories of newspapers (local and national) in the absence of the treatment. The treatment induces a deviation from this common trend. Figure 7 provides for the price ratio strong visual evidence of treatment and control newspapers with a common underlying trend, and a treatment effect that induces a sharp deviation from this trend.

[FIGURE 7 HERE]

Finally, the unbiasedness of the DD estimates requires the strict exogeneity of the introduction of advertising on television. As we underline above, French television was state-owned from 1945 to 1981. Therefore, no interaction occurred between television owners and newspaper owners, whether national or local. The French government unilaterally decided to
introduce advertising on television to answer the concerns of the ORTF. It is exogenous to the newspaper industry.

5.2 Results

5.2.1 A negative shock on advertising revenues

Our identifying assumption is that the introduction of advertising on television was a negative shock on advertising revenues that more severely affected national daily newspapers than local daily newspapers. Table 2 reports estimates of equation (20). In the upper Table 2a, our outcomes of interest are different measures of this negative shock on the advertising side of the newspaper industry.

We find the shock leads to a 17% decrease in the advertising revenues of national newspapers compared to the revenues of local newspapers. As a result, the advertising share in total revenues also decreases after the shock. The decrease in advertising revenues comes from the decline in the price of advertising. We obtain a 22% decrease following the shock, whether we use the total advertising revenues normalized by circulation (column 3) or the list price measure of advertising prices (column 4). Regarding the content of newspapers, the quantity of advertising stays constant, but the share of the newspaper devoted to advertising increases.

5.2.2 The effect on reader prices

We now analyze how the shock on advertising revenues affects newspapers’ pricing choices. In particular, we investigate whether the scope for price discrimination increases following the shock. We use the price ratio (defined as the average subscription price divided by the unit price) as our measure of price discrimination [Clerides, 2004]. Obviously, differences in costs, in particular, costs of delivery, might drive the difference between the prices charged to unit buyers and subscribers. Moreover, although the content is identical, the utility from consuming the newspaper (ignoring prices) may depend on whether one is a subscriber or a unit buyer (e.g., because of delivery hours), thereby also affecting relative prices. However, our assumption is valid in the DD setting as long as the introduction of advertising on television did not affect these dimensions.

The bottom Table 2b presents the results. Our outcomes of interest are the price ratio (column 1), the subscription price (column 2), and the unit buyer price (column 3). We find a 12% decrease in the price ratio – suggesting an increase in price discrimination – of national newspapers compared to the price ratio of local newspapers following the introduction of advertising on television. This decrease is statistically significant at the 1% level. A decrease
in the subscription price, which drops by 11% (column 2), drives it. We find no statistically significant change in the unit price.

The equation errors may be correlated in this set of price equations. We thus estimate the system of prices using seemingly unrelated regression (SUR) analysis. We find the errors are correlated. Table 3 presents the results. Similar to the results in Table 2, we find that the introduction of advertising on television leads to a decrease in the subscription price and in the advertising price of national newspapers compared to local newspapers. The results are of a similar order of magnitude to the ones we obtain above, and are statistically significant at the 1% level.

TABLE 3 HERE

Timing of the effect The before-after event study approach enables us to control for time-invariant newspaper-specific effects and general time trends. As a validity check of our DD identification strategy, we allow for flexible time-varying effects of the negative shock on advertising revenues (Laporte and Windmeijer 2005). To quantify the dynamics effects of the event and control for lags and leads, we define (“pulse”) variables for two, non-overlapping, three-years-spaced periods around the event and a dummy variable isolating the long-run effect of the shock (see, e.g., Papaioannou and Siourounis 2008).

Our specification is:

\[ \log \text{price ratio}_{n,t} = \alpha + \delta_1 d_{n,t}^1 + \delta_2 d_{n,t}^2 + \delta_3 d_{n,t}^3 + X'_{n,t} \Delta + \lambda_n + \gamma_t + \epsilon_{n,t}, \]  

(21)

where \( d_{n,t}^1 = 1 \) in 1965, 1966, and 1967 for national newspapers (pre introduction of advertising on television); \( d_{n,t}^2 = 1 \) in 1968, 1969 and 1970 for national newspapers (at the time of the introduction and in the following years); and \( d_{n,t}^3 = 1 \) in 1971 and all subsequent post-introduction years (until 1974). Each indicator variable equals zero in all years others than those specified and for local newspapers. Thus, the base period is the years before 1965. Table 4 presents the results. We find no statistically significant effect (with a point estimate close to zero) for the pulse variable \( d_{n,t}^1 = 1 \), whether we consider the price ratio, the subscription, or the unit price. This is reassuring as to the validity of our DD strategy. Moreover, as expected given the results of Table 2, we obtain a negative and statistically significant at the 1% level \( \delta_2 \): a statistically significant decrease occurs in the price ratio of national newspapers compared to local newspapers following the introduction of advertising on television. This effect is long lasting: the \( \delta_3 \) coefficient is statistically significant.

TABLE 4 HERE

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5.2.3 The effect on circulation and revenues

We then estimate the impact of the introduction of advertising on television on total circulation and the share of subscribers. Table 5 presents the results. In columns 2, 4, and 6, we introduce prices as a control. In columns 1, 3, and 5 we perform the estimations without the prices, which are obviously endogeneous controls. Results are robust to both identification strategies.

We obtain a statistically significant increase in the share of subscribers, which increases by 22% to 23% (columns 3 and 4). The total circulation stays unchanged, as well as the revenues from sales.

[TABLE 5 HERE]

5.2.4 The effect on quality

Finally, we investigate the effect of the introduction of advertising on television on newspaper quality. Two features of newspapers have been repeatedly used in the literature as measures of newspaper quality: the number of journalists and the so-called newshole (the amount of space in the newspaper not devoted to advertising) (see, e.g., [Hamilton 2004; Berry and Waldfogel, 2010; Fan, 2013; Cagée, 2014; Cagée et al., 2015]).

We show the introduction of advertising on television leads to an 11% decrease in the number of journalists (Table 6 column 1). Moreover, whereas the number of pages of newspapers is not affected (column 2), we also obtain a 7% decrease in the newshole (column 3), our alternative measure of quality (see, e.g., Gentzkow et al., 2006, who use both the number of stories and the size of the stories as measures of news quality). This decrease in the newshole, for a given number of pages, is consistent with the increase in the amount of space devoted to advertising we obtain above.

Obviously, measuring quality is not straightforward, and news quality may encompass other dimensions we are not capturing here. Nevertheless, our results suggest newspapers decreased the quality of their content following the drop in advertising revenues caused by the introduction of advertising on television.

[TABLE 6 HERE]

57 When controlling for measures of newspaper quality, Gentzkow and Shapiro (2010) similarly use the number of pages in the paper as well as the number of journalists.

58 For example, unlike Gentzkow and Shapiro (2010), we do not have information regarding the number of prizes won by newspapers. We also do not have information on newspaper reputation or on slant, although research has shown consumers tend to rate the quality of news outlets whose slant matches their own views higher (Gentzkow and Shapiro, 2006, 2008).
5.3 Interpreting the results

In Section 2, we built a model that would allow us to carry out comparative statics related to newspapers’ reliance on advertising revenues. To match our data, we explicitly incorporated quality provision as well as the ability to sell both subscriptions and individual issues to readers. Not surprisingly, our desire to carry out comparative statics limited the generality of the model we could construct. In particular, it implied we could accommodate only limited dimensions of heterogeneity in reader and advertiser preferences. In this section, we interpret our empirical findings in light of the predictions of our model and, when necessary, in light of possible extensions of the current framework.

The decline in advertising revenues and advertising prices is consistent with a decrease in the advertisers’ willingness to pay for newspaper readers’ attention. The advent of television as a new advertising platform must have led some companies that would otherwise have advertised through newspapers to advertise exclusively on television. Moreover, to the extent that many readers also watch television, the marginal benefit of advertising through newspapers to the subset of companies advertising through both media must have declined. Finally, the availability of an alternative advertising platform likely has increased the bargaining power (when negotiating prices) of many companies advertising exclusively through newspapers. However, explaining the fact that newspapers would leave their quantity of advertising unchanged (as measured by the space dedicated to advertising) despite lower prices is somewhat less immediate. One possible rationalization is as follows. Suppose companies wishing to advertise not only value large readerships but also exclusivity (i.e., they are willing to pay to prevent their rivals from advertising in the same newspaper). Then, advertisers’ lower willingness to pay for exclusive access to readers’ attention will lower the newspapers’ incentives to grant exclusivity, which may mitigate (or even exceed) the temptation to decrease the quantity of advertising that follows from lower prices.60

To continue, the fact that newspapers would react to lower advertising revenues by decreasing the price ratio (i.e., the average subscription price divided by the unit price) is not difficult to rationalize. Recognizing that newspapers cater to the preferences of the average marginal advertisers (see, e.g., [Weyl 2010]), a decrease in the ratio could occur, for instance, (i) if the “pre-shock” average marginal subscribers prefer occasional buyers to subscribers and (ii) if this relative preference over occasional buyers is not as strong (or even reversed) for the “post-shock” average marginal subscribers. Under such advertiser heterogeneity, newspapers would react to the drop in advertising revenues by readjusting their price ratio downward, that is, by increasing their share of subscribers.60 However, the fact a decrease in the subscription

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59 A simple model in which this effect is at play is available from the authors upon request.

60 A similar but simpler rationale that does not rely on advertiser heterogeneity is as follows. If advertisers prefer the readers who choose not to subscribe, newspapers have incentives to set reader prices in a way that leads to a lower share of subscribers than the one that would prevail in the absence of advertisers. Because
price drives the decrease in the price ratio is striking. Indeed a robust prediction of two-sided models of the newspaper industry (with empirical support; see, e.g., Seamans and Zhu [2014]) is that newspapers should react to lower advertising revenues by increasing reader prices (the “waterbed” effect). In Section 2, we showed that adding quality provision to the standard framework could reverse the waterbed effect. Specifically, we showed that newspapers had incentives to reduce the quality of their content when facing lower advertising revenues, and that this decrease in quality could translate into a lower subscription price to compensate readers. Coherent with this rationale, we find empirical support for a decrease in newspapers’ quality (as measured by the number of journalists and the share of the newspaper dedicated to information).

To continue, we find that newspapers’ changes in prices and quality leave their total readership unaffected, but increase their share of subscribers. Moreover, we can infer from (i) the decrease in quality and (ii) the absence of change in the newsstand price that being an occasional buyer likely has become a less attractive choice to readers. The picture is less clear for subscriptions, but the possibility that newspapers would decrease their subscription price so sharply that existing subscribers would be more than compensated for the decrease in quality seems unlikely. However, one can reconcile these considerations with our empirical findings by noting that, in practice, readers are heterogeneous in their sensitivity to quality. If advertisers with a high willingness to pay prefer readers with strong sensitivity to quality – for example, because this characteristic is positively correlated with income – newspapers have an incentive to attract these readers by providing content of high quality. As advertisers’ willingness to pay decreases, newspapers will decrease the quality of their content and attract the readers with a low sensitivity to quality who were previously deterred by the high prices. Moreover, under such a scenario, newspapers’ share of subscribers will increase because new readers will tend to subscribe rather than become occasional buyers (because subscriptions have become relatively more attractive).

To conclude, we note that both the decline in advertising revenues and the absence of change in sales revenues are consistent with our identifying assumption whereby the introduction of advertising on television represented a negative shock on the advertisers’ side of the industry, with mostly an indirect effect on the readers’ side.

5.4 Robustness

We perform several robustness checks. This section briefly describes them; the detailed results for these tests are available in the online Appendix.

newspapers cater less to advertisers’ preferences when the latter’s willingness to pay decreases, an almost mechanical readjustment toward more subscribers occurs (induced by a decrease in the price ratio).
Sample selection For a small number of newspapers, we were not able to collect information for the entire period 1960-74. Moreover, some newspapers in our sample exited the market before 1974. To check that sample-selection issues do not affect our results, we compute the DD estimation including in our sample only the newspapers for which data are available for the entire period 1960-74. Online Appendix Table D.1 gives the results when the sample is restricted. The effects we obtain are statistically significant and of the same order of magnitude.

Dropping 1968 1968 was a troubled year in France, with a period of civil unrest, demonstrations, and numerous strikes. We show our results are robust to dropping this year from our sample of analysis.

Additional controls We also check that our results are robust to introducing a number of additional controls at the newspaper level, namely, the frequency (the number of issues during the year), the total expenditures, and the total circulation of the newspaper. The effects we obtain are statistically significant and of the same order of magnitude.

Inflation Finally, given the high inflation rate in France in the 60s and 70s (up to 13% in 1974), we check that our results are robust to controlling for annual inflation. First, we replicate the analysis with constant rather than current prices. Second, we control for the annual inflation rate rather than introducing year fixed effects. Online Appendix Table presents the results. They are not significantly different from those presented in Table 2.

5.5 Reliance on advertising revenues

Finally, we consider an alternative empirical strategy to investigate the relationship between newspapers’ reliance on advertising revenues and their pricing and quality choices. We compute the reliance on national versus local advertising in 1967 (before the shock) by computing the quantity of national ads versus local ads in the newspapers. We use the newspapers that rely more on national advertising as the treated group and the others as the control group.

To investigate the effect of a drop in advertising revenues depending on the reliance on national advertising, we estimate the following regression equation:

\[ y_{n,t} = \alpha + \nu_1 D_{\text{after}} + \nu_2 (D_{\text{after}} \times D_{\text{high reliance}}) + \lambda_n + \gamma_t + \epsilon_{n,t}, \]  

where \( D_{\text{high reliance}} \) is an indicator variable equal to 1 for newspapers whose reliance on advertising revenues in 1967 was above the median, and 0 for those whose reliance was below.

\[^{61}\text{Three local newspapers, (L’Echo de la Corrèze in 1971, L’Espoir de Nice, which became a weekly newspaper in 1973, and La Nouvelle Gazette de Biarritz, which merged with another newspaper in 1972) and two national newspapers (Paris Jour in 1972 and Paris Presse in 1970) exited the market before 1974.}\]
Table 7 presents the results. The estimates we obtain are consistent with the ones using the national versus local newspapers empirical strategy. The magnitude of the coefficients is lower (e.g., the price ratio only decreases by 4%), but they are statistically significant at the 5% level or better.

6 Conclusion

The newspaper industry is in the midst of a severe crisis. A factor often invoked to explain this state of distress is the strong drop in advertising revenues legacy newspapers have experienced following the advent of the internet. Concomitant to this decrease in advertising revenues, the industry’s business model is evolving with, among other changes, a tendency for print newspapers to charge subscriptions prices that are increasingly lower than newsstand prices. In this paper, we build a model in which a monopoly newspaper extracts revenues both from readers and advertisers. In particular, the newspaper chooses the quality of its content, and readers can either subscribe to the newspaper or buy individual issues at the newsstand. In our model, selling subscriptions allows the newspaper to price discriminate between readers. We show that a drop in advertising revenues induces the newspaper to decrease the quality of its content, which, in turn, affects more severely the demand for subscriptions than the demand from unit buyers. If readers are sufficiently sensitive to quality, the newspaper reacts by lowering the subscription price relative to the newsstand price.

These predictions are consistent with the empirical evidence we obtain using data on the French daily newspaper industry between 1960 and 1974. Using novel annual data, we compare the pre-1968-to-post-1968 change in advertising revenues of national daily newspapers to the change in advertising revenues of local daily newspapers. We find the introduction of advertising on television leads to a decrease in advertising revenues of national newspapers compared to local newspapers. This drop propagates to the reader side of the newspaper market with a decrease in the subscription price relative to the unit price. We also show the introduction of advertising on television leads to a decrease in the number of journalists and in the newshole (our proxies for quality).

The impact of the internet on advertising markets for news media is receiving increasing attention (see, e.g., Athey et al., 2013). However, despite the intrinsic policy importance of the news industry, empirical evidence regarding the consequences of the drop in advertising revenues on the pricing and quality choices of the media is limited. Although our empirical strategy exploits a moment in French history that ended over 40 years ago, our findings have clear relevance and implications for the 21st-century media industry. Specifically, they suggest each media outlet will have lower incentives to invest in quality if advertising revenues are to
continue to decline. Our results also point toward an increasingly subscriber-based readership.

In addition to reducing advertisers’ willingness to pay for newspaper readers’ attention, the internet has also altered the media industry’s structure in other ways, for instance, with the introduction of targeted advertising technologies (Athey and Gans, 2010), with increasing consumer switching between media platforms (Athey et al., 2013), and with an increasing ability for rival news outlets to appropriate stories (Cagé et al., 2015). Exploiting the introduction of advertising on French television helps us isolate the consequences of a decline in advertisers’ willingness to pay for readers’ attention from the consequences of these other changes, thereby shedding light on a number of important mechanisms at play.
References


A Appendix

A.1 Proof of Proposition 1

We first derive the conditions stated in the main body that ensure $0 \leq d^R(p^R, q) \leq 1$ and $0 \leq d^A(p^R, p^A, q) \leq 1$. Substituting the solution stated in Proposition 1 into $d^R(p^R, q)$ yields

$$d^R(p^R, q) = \gamma q + \hat{\epsilon} - p^R = \frac{2\hat{\epsilon}}{4 - \alpha^2 - 2\gamma^2}.$$

It follows $d^R(p^R, q) \leq 1$ if and only if $2\hat{\epsilon} \leq 4 - \alpha^2 - 2\gamma^2$. Moreover, if $2\hat{\epsilon} \leq 4 - \alpha^2 - 2\gamma^2$, $d^R(p^R, q) > 0$ necessarily.

Substituting the solution stated in Proposition 1 into $d^A(p^R, p^A, q)$ yields

$$d^A(p^R, p^A, q) = \frac{\alpha \hat{\epsilon}}{4 - \alpha^2 - 2\gamma^2}.$$

It follows $d^A(p^R, p^A, q) \leq 1$ if and only if $\alpha \hat{\epsilon} \leq 4 - \alpha^2 - 2\gamma^2$. Moreover, if $\alpha \hat{\epsilon} \leq 4 - \alpha^2 - 2\gamma^2$, $d^A(p^R, p^A, q) > 0$ necessarily.

We conclude the proof by verifying that the objective function (3) is strictly concave in $(p^R, p^A, q)$. The Hessian matrix $H$ associated to (3) is given by

$$H = \begin{pmatrix}
-2 & -\alpha & \gamma \\
-\alpha & -2 & \alpha \gamma \\
\gamma & \alpha \gamma & -1
\end{pmatrix}$$

We verify $H$ is negative definite. Because $H$ is real and symmetric, it has three real eigenvalues. To compute these eigenvalues, we solve for the polynomial $P(\lambda)$ representing the determinant of

$$\begin{vmatrix}
-2 - \lambda & -\alpha & \gamma \\
-\alpha & -2 - \lambda & \alpha \gamma \\
\gamma & \alpha \gamma & -1 - \lambda
\end{vmatrix}$$

We obtain $P(\lambda) = -\lambda^3 - 5\lambda^2 + (\alpha^2\gamma^2 + \alpha^2 + \gamma^2 - 8)\lambda + (\alpha^2 + 2\gamma^2 - 4)$. Let $\lambda_1$, $\lambda_2$, and $\lambda_3$ denote the three real solutions of $P(\lambda) = 0$. By definition, these solutions are the three eigenvalues of $H$. If all three eigenvalues of $H$ are positive, all coefficients in $P(\lambda)$ must either be positive or negative. One obtains that all coefficients are non-positive if and only if $\alpha^2\gamma^2 + \alpha^2 + \gamma^2 < 8$ and $\alpha^2 + 2\gamma^2 < 4$. Pairs of $\alpha \geq 0$ and $\gamma \geq 0$ that satisfy both inequalities exist if and only if $\alpha < 2$ and $\gamma < \sqrt{2}$. Under these restrictions, inequality $\alpha^2 + 2\gamma^2 < 4$ implies inequality $\alpha^2\gamma^2 + \alpha^2 + \gamma^2 < 8$. To conclude, therefore, expression (3) is strictly concave if and only if $\alpha < 2$, $\gamma < \sqrt{2}$, and $\alpha^2 + 2\gamma^2 < 4$. 

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A.2 Proof of Proposition 2

We begin by solving the newspaper’s problem, assuming it wishes to sell subscriptions and individual issues (Section A.2.1). In Section A.2.2, we verify the newspaper is better off selling subscriptions and individual issues rather than individual issues only. In Section A.2.3, we verify the newspaper is better off selling subscriptions and individual issues rather than subscriptions only. Throughout, we maintain the assumptions listed in Section 2.2 (replacing \( \gamma \in \left[ 0, \sqrt{2-(\tau+\alpha)} \right] \) with \( \gamma \in \left[ 0, \sqrt{\frac{2-(\tau+\alpha)}{n}} \right] \)).

A.2.1 Subscriptions and individual issues

We state the newspaper’s problem using expressions (10), (11), and (12). In what follows, we consider the general case with \( n \geq 1 \). The newspaper chooses \( p^O, p^S, \) and \( q \) to maximize

\[
\Pi (p^S, p^O, q) = n\Pi^O (p^S, p^O, q) + n\Pi^S (p^S, p^O, q) + n\Pi^A (p^S, p^O, q) - \frac{1}{2}q^2
\]

subject to

\[
p^O \leq \min \left[ \gamma q + \frac{\Delta \epsilon}{2}, 2p^S \right],
\]

\[
p^S \leq \min \left[ \gamma q + \frac{\Delta \epsilon}{2} \right].
\]

As argued when constructing the demand functions, constraints (25) and (26) must necessarily hold for the newspaper to potentially sell both subscriptions and individual issues (i.e., for \( d^S (p^S, p^O, q) \geq 0 \) and \( d^O (p^S, p^O, q) \geq 0 \)). We proceed by ignoring (25) and (26) and show below that the solution to the unconstrained problem satisfies these constraints whenever \( \tau - 2\alpha b \geq \xi \geq \alpha (1-b) \). Expression (23) also assumes \( d^O (p^S, p^O, q) \leq 1 \), \( d^S (p^S, p^O, q) \leq 1 \), and \( d^R (p^S, p^O, q) \leq 1 \). We show below these conditions are necessarily met when \( \tau + \alpha < 1 \). Similarly, we postpone the proof that (23) is strictly concave in \( (p^S, p^O, q) \).

The associated system of first-order conditions is given by

\[
\frac{\partial \Pi (p^S, p^O, q)}{\partial p^S} = 0 \iff 4p^S = 2p^O + \gamma q + \xi - \alpha (1-b),
\]

\[
\frac{\partial \Pi (p^S, p^O, q)}{\partial p^O} = 0 \iff p^O = p^S + \frac{\Delta \epsilon}{4} - \frac{\alpha b}{2},
\]

\[
\frac{\partial \Pi (p^S, p^O, q)}{\partial q} = 0 \iff q = n\gamma (p^S + \alpha).
\]
Solving the system of equations (27)-(29) for $p^S$, $p^O$, and $q$ yields

\[
p^S = \frac{\hat{\epsilon} + \alpha}{2 - n\gamma^2} - \alpha, \tag{30}
\]

\[
p^O = \frac{\hat{\epsilon} + \alpha}{2 - n\gamma^2} - \alpha + \frac{\Delta \varepsilon}{2} - \frac{\alpha b}{2}, \tag{31}
\]

\[
q = n\gamma \frac{\hat{\epsilon} + \alpha}{2 - n\gamma^2}. \tag{32}
\]

We now verify the constraints (25) and (26) indeed hold. To see $p^O \leq p^S + \frac{\Delta \varepsilon}{2}$, note $p^O = p^S + \frac{\Delta \varepsilon}{4} - \frac{\Delta \alpha}{2}$ and $\frac{\Delta \varepsilon}{4} - \frac{\Delta \alpha}{2} < \frac{\Delta \varepsilon}{2}$. Further, one immediately derives that $p^S \leq p^O$ if and only if $\Delta \varepsilon / 2 \geq 2ab$. To verify that $p^S \leq \gamma q + \hat{\epsilon}$, note $\gamma q - p^S = n(\gamma^2 - 1)(\hat{\epsilon} + \alpha)/2 - \alpha b$. When $\gamma = 0$, $p^S = \frac{\hat{\epsilon} - \alpha}{2} < \hat{\epsilon}$. Because $\gamma q - p^S$ is increasing in $\gamma$, it follows $p^S \leq \gamma q + \hat{\epsilon}$ always. To verify $p^O \leq \gamma q + \hat{\epsilon}$, note $\gamma q - p^O = n(\gamma^2 - 1)(\hat{\epsilon} + \alpha)/2 - \alpha b - \frac{\Delta \varepsilon}{2}$ is also increasing in $\gamma$. Suppose $\gamma = 0$ and recall $p^S < \hat{\epsilon}$ when $\gamma = 0$. Because $p^O = p^S + \frac{\Delta \varepsilon}{4} - \frac{\Delta \alpha}{2}$, it follows that $p^O < \hat{\epsilon} + (\frac{\Delta \varepsilon}{4} - \frac{\alpha b}{2}) < \hat{\epsilon} + \frac{\Delta \varepsilon}{2} = \hat{\epsilon}$. Because $\gamma q - p^O$ is increasing in $\gamma$, it follows that $p^O \leq \gamma q + \hat{\epsilon}$ always holds. Moreover, to see $p^S \leq \frac{1}{2}(\gamma q + \hat{\epsilon} + p^O)$, note $\gamma q + \hat{\epsilon} + p^O - 2p^S = \frac{(\gamma^2 - 1)}{2 - n\gamma^2}(\hat{\epsilon} + \alpha) + \alpha + \frac{\Delta \varepsilon}{2} - \frac{\alpha b}{2}$. Suppose $\gamma = 0$. One immediately verifies $\gamma q + \hat{\epsilon} + p^O - 2p^S \geq 0$ necessarily. Because the left-hand side is increasing in $\gamma$, it follows that $p^S \leq \frac{1}{2}(\gamma q + \hat{\epsilon} + p^O)$ always. One can also verify that $p^O \leq 2p^S \forall \gamma$ whenever $\epsilon \geq \alpha (1 - b)$. To conclude, the solution to the unconstrained problem satisfies (25) and (26) if and only if $\epsilon - 2ab \geq \epsilon \geq \alpha (1 - b)$, where the two inequalities can jointly hold if and only if $\alpha \leq \frac{1}{1+\beta}$.

Finally, by following similar steps, one can show $\alpha + \bar{\epsilon} < 1$ and $\gamma \in [0, \sqrt{\frac{2 - \bar{\epsilon} - \alpha}{n}}]$ together imply $d^R (p^S, p^O, q) \leq 1$, which, in turn, implies $d^S (p^S, p^O, q) \leq 1$ and $d^O (p^S, p^O, q) \leq 1$. One verifies the set of parameter values such that all conditions hold is nonempty if and only if $\alpha \leq \frac{1}{1+\beta}$.

We conclude the analysis of the case in which the newspaper sells subscriptions and individual issues, by verifying the objective function (23) is strictly concave in $(p^S, p^O, q)$. The Hessian matrix $H$ associated to (23) is given by

\[
\begin{pmatrix}
\frac{\partial^2}{\partial p^3 \partial p^3} & \frac{\partial^2}{\partial p^3 \partial p^3} & \frac{\partial^2}{\partial p^3 \partial q} \\
\frac{\partial^2}{\partial p^3 \partial p^3} & \frac{\partial^2}{\partial p^3 \partial p^3} & \frac{\partial^2}{\partial p^3 \partial q} \\
\frac{\partial^2}{\partial q \partial p^3} & \frac{\partial^2}{\partial q \partial p^3} & \frac{\partial^2}{\partial q \partial q} \\
\end{pmatrix}
= \begin{pmatrix}
-4n & 2n & n\gamma \\
2n & -2n & 0 \\
n\gamma & 0 & -1
\end{pmatrix}
\]

We verify $H$ is negative definite. Because $H$ is real and symmetric, it has three real eigenvalues. To compute these eigenvalues, we solve for the polynomial $P(\lambda)$ representing the determinant of

\[
\begin{vmatrix}
-4n - \lambda & 2n & n\gamma \\
2n & -2n - \lambda & 0 \\
n\gamma & 0 & -1 - \lambda
\end{vmatrix}
\]
We obtain $P(\lambda) = (-4n - \lambda)(-2n - \lambda)(-1 - \lambda) - 2n(2n)(-1 - \lambda) + n\gamma(-\gamma)(-2n - \lambda)$. Let $\lambda_1$, $\lambda_2$, and $\lambda_3$ denote the three real solutions of $P(\lambda) = 0$. By definition, these solutions are the three eigenvalues of $H$. If all three eigenvalues of $H$ are positive, all coefficients in $P(\lambda)$ must either be positive or negative. Rewrite $P(\lambda)$ as $P(\lambda) = -\lambda^3 + (-1 - 6n)\lambda^2 + (-6n - 4n^2 + n^2\gamma^2)\lambda + (-4n^2 + 2n^3\gamma^2)$. Because the coefficients associated with $\lambda^2$ and $\lambda^3$ are negative, we verify the other two coefficients are also negative. One immediately shows they are $\forall \gamma \in \left[0, \sqrt{\frac{2-\gamma-a}{n}}\right]$.

### A.2.2 Individual issues only

We now show the newspaper is strictly better off selling both subscriptions and individual issues rather than individual issues only.

To begin with, note that in the problem analyzed in Section A.2.1, the newspaper could have replicated the same expected profits as when selling individual issues only, by setting $p^S = p^O$. To see this, note that when $p^S = p^O$, the readers whose outside option $u_i \leq \gamma q + \epsilon - p^O$ are payoff-indifferent regarding whether to subscribe or purchase every issue separately (so that they generate the same expected revenue $np^O$ independently of their decision regarding whether to subscribe). Thus, if the newspaper sets $p^O > p^S$ in the problem analyzed in Section A.2.1 (which occurs whenever $\Delta \epsilon > 2ab$), it must be better off selling both subscriptions and individual issues rather than selling individual issues only.

### A.2.3 Subscriptions only

We now show the newspaper is strictly better off selling both subscriptions and individual issues rather than subscriptions only. To begin with, note the newspaper can sell subscriptions by either (i) setting $p^S$ high enough that only the readers willing to read all $n$ issues subscribe or (ii) setting $p^S$ low enough that it is also optimal for some readers willing to read only half the issues on average to subscribe. Specifically, the threshold on $p^S$ that determines which of the two cases is the relevant one is $\frac{\Delta \epsilon}{2}$.

Suppose first $p^S \leq \frac{\Delta \epsilon}{2}$, so that some subscribers read all $n$ issues, whereas others read only half the issues on average. Denote by $p^{S*}$ the solution to the associated optimization problem. By an argument similar to that developed in Section A.2.2, we note the newspaper could have replicated the same outcome by setting $p^S = p^O = p^{S*}$ in the problem analyzed in Section A.2.1 but chose not to. It follows that the newspaper is strictly better off selling both subscriptions and individual issues (at different prices), rather than selling subscriptions only by setting $p^S \leq \frac{\Delta \epsilon}{2}$.

Suppose now $p^S \geq \frac{\Delta \epsilon}{2}$. The demand for subscriptions is then equal to $d^S(p^S, q) =$.
\( \gamma q + \hat{\epsilon} - p^S \), and the newspaper chooses \( p^S \) and \( q \) to maximize its expected profits:

\[
\Pi(p^S, q) = n \left( p^S + \alpha \right) \left( \gamma q + \hat{\epsilon} - p^S \right) - \frac{q^2}{2},
\]

subject to \( 0 \leq d^S(p^S, q) \leq 1 \) and \( p^S \geq \frac{\Delta \epsilon}{2} \). One verifies objective function (33) is strictly concave in \( (p^S, q) \) if and only if \( \gamma < \sqrt{\frac{2}{n}} \), which must necessarily hold given that \( \gamma < \sqrt{\frac{2 - \tau - \alpha}{n}} \).

Solving the unconstrained problem yields

\[
p^S = \frac{\alpha (n\gamma^2 - 1) + \hat{\epsilon}}{2 - n\gamma^2} \quad \text{and} \quad q = n\gamma \left( \frac{\alpha + \hat{\epsilon}}{2 - n\gamma^2} \right).
\]

It follows that the newspaper is strictly better off selling both subscriptions and individual issues rather than subscriptions only (by setting \( p^S \geq \frac{\Delta \epsilon}{2} \)) because, in the unconstrained version of the problem analyzed in Section A.2.1, it could have set the objective function (23) equal to the objective function (33) (evaluated at \( p^S = \frac{\alpha (n\gamma^2 - 1) + \hat{\epsilon}}{2 - n\gamma^2} \) and \( q = n\gamma \left( \frac{\alpha + \hat{\epsilon}}{2 - n\gamma^2} \right) \)) by setting \( p^S = \frac{\alpha (n\gamma^2 - 1) + \hat{\epsilon}}{2 - n\gamma^2} \), \( q = n\gamma \left( \frac{\alpha + \hat{\epsilon}}{2 - n\gamma^2} \right) \), and \( p^O = p^S + \frac{\Delta \epsilon}{2} \), but chose not to. Because the solution to the unconstrained problem analyzed in Section A.2.1 was feasible (i.e., it satisfied all the constraints), it follows that the objective function (23) (evaluated at the solution (29)-(30)-(31)) must be strictly higher than the objective function (33) (evaluated at \( p^S = \frac{\alpha (n\gamma^2 - 1) + \hat{\epsilon}}{2 - n\gamma^2} \) and \( q = n\gamma \left( \frac{\alpha + \hat{\epsilon}}{2 - n\gamma^2} \right) \)).
Table 1: Summary statistics: Newspapers

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>sd</th>
<th>Min</th>
<th>Max</th>
<th>Obs</th>
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<tbody>
<tr>
<td><strong>Prices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit buyer price</td>
<td>0.43</td>
<td>0.40</td>
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<td>0.10</td>
<td>2.40</td>
<td>1,067</td>
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<tr>
<td>Subscription price per issue</td>
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<td>0.17</td>
<td>0.08</td>
<td>0.94</td>
<td>967</td>
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<tr>
<td>Price ratio</td>
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<td>0.17</td>
<td>1.25</td>
<td>967</td>
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<tr>
<td>Display ad rate (listed price)</td>
<td>11.96</td>
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<td>50.00</td>
<td>661</td>
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<td><strong>Revenues</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total revenues</td>
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<td>10.12</td>
<td>38.40</td>
<td>0.10</td>
<td>247.12</td>
<td>962</td>
</tr>
<tr>
<td>Revenues from advertising</td>
<td>12.89</td>
<td>4.19</td>
<td>22.03</td>
<td>0.06</td>
<td>181.27</td>
<td>968</td>
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<tr>
<td>Revenues from sales</td>
<td>13.53</td>
<td>5.51</td>
<td>18.45</td>
<td>0.03</td>
<td>123.87</td>
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<tr>
<td>Share of advertising in total revenues (%)</td>
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<td>45</td>
<td>11</td>
<td>6</td>
<td>82</td>
<td>962</td>
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<td></td>
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<tr>
<td>Total expenditures</td>
<td>25.67</td>
<td>9.49</td>
<td>38.04</td>
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<td>949</td>
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<td>Profit</td>
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<td>Total circulation</td>
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<td>57,424</td>
<td>178,502</td>
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<td>Share of unit buyers (%)</td>
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<td>75</td>
<td>23</td>
<td>2</td>
<td>100</td>
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<td>Share of subscribers (%)</td>
<td>27</td>
<td>22</td>
<td>22</td>
<td>1</td>
<td>98</td>
<td>968</td>
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<td>Frequency (issues/52weeks)</td>
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<td>307</td>
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<td>218</td>
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<td>970</td>
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<tr>
<td>Number of pages</td>
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<td>15</td>
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<td>2</td>
<td>66</td>
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<td>12</td>
<td>4</td>
<td>2</td>
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<td>3</td>
<td>4</td>
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<td>32</td>
<td>1,063</td>
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<tr>
<td>Share of advertising</td>
<td>19</td>
<td>17</td>
<td>10</td>
<td>2</td>
<td>62</td>
<td>1,063</td>
</tr>
</tbody>
</table>

**Notes:** The table gives summary statistics. The time period is 1960-1974. Variables are values for newspapers. The observations are at the newspaper/year level. Unit price, subscription price per issue, and list price are in francs. Revenues and costs are in millions of francs. The statistical discrepancy between the share of unit buyers and the share of subscribers – that do not sum up to 100 – stems from the fact that a number of copies are distributed for free every day.
Table 2: Baseline estimation

(a) Advertising

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<tr>
<th></th>
<th>Revenues</th>
<th>Prices</th>
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<tbody>
<tr>
<td></td>
<td>Ad revenues</td>
<td>Ad share</td>
<td>Ad revenues / circulation</td>
<td>Listed price</td>
<td>Ad space</td>
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<tr>
<td>Post-1968</td>
<td>1.35***</td>
<td>0.08***</td>
<td>1.35***</td>
<td>1.18***</td>
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</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.03)</td>
<td>(0.04)</td>
<td>(0.17)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>National x Post-1968</td>
<td>-0.17**</td>
<td>-0.13***</td>
<td>-0.22***</td>
<td>-0.29***</td>
<td>0.09</td>
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<tr>
<td></td>
<td>(0.08)</td>
<td>(0.05)</td>
<td>(0.06)</td>
<td>(0.06)</td>
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<tr>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Year FE</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>R-sq</td>
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(b) Readers’ prices

<table>
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<tr>
<th></th>
<th>Price ratio</th>
<th>Subscription price</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-1968</td>
<td>0.01</td>
<td>1.28***</td>
<td>1.28***</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>National x Post-1968</td>
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<td>-0.11***</td>
<td>0.01</td>
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<td></td>
<td>(0.01)</td>
<td>(0.02)</td>
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<td>Yes</td>
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<tr>
<td>R-sq</td>
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<tr>
<td>Observations</td>
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<td>851</td>
<td>851</td>
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</tbody>
</table>

Notes: * p<0.10, ** p<0.05, *** p<0.01. Time period is 1960-74. Models are estimated using OLS estimations. All the estimations include newspaper and year fixed effects. The dependent variables are in logarithm. Variables are described in more details in the text.
Table 3: Seemingly unrelated regression: Prices

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<th>National x Post-1968</th>
</tr>
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<tbody>
<tr>
<td><strong>Subscription price</strong></td>
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<td><strong>1.26</strong></td>
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<tr>
<td></td>
<td><strong>(0.01)</strong></td>
<td><strong>(0.07)</strong></td>
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<tr>
<td></td>
<td><strong>-0.11</strong></td>
<td><strong>-0.13</strong></td>
</tr>
<tr>
<td></td>
<td><strong>(0.01)</strong></td>
<td><strong>(0.02)</strong></td>
</tr>
<tr>
<td><strong>Unit price</strong></td>
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<td><strong>1.29</strong></td>
</tr>
<tr>
<td></td>
<td><strong>(0.01)</strong></td>
<td><strong>(0.06)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>0.01</strong></td>
<td><strong>-0.01</strong></td>
</tr>
<tr>
<td></td>
<td><strong>(0.01)</strong></td>
<td><strong>(0.01)</strong></td>
</tr>
<tr>
<td><strong>Ad revenues / circulation</strong></td>
<td><strong>1.35</strong></td>
<td><strong>-0.22</strong></td>
</tr>
<tr>
<td></td>
<td><strong>(0.04)</strong></td>
<td><strong>(0.04)</strong></td>
</tr>
<tr>
<td><strong>Listed price</strong></td>
<td><strong>1.85</strong></td>
<td><strong>-0.29</strong></td>
</tr>
<tr>
<td></td>
<td><strong>(0.39)</strong></td>
<td><strong>(0.10)</strong></td>
</tr>
<tr>
<td>R-sq</td>
<td><strong>0.98</strong></td>
<td><strong>0.97</strong></td>
</tr>
<tr>
<td>Observations</td>
<td><strong>851</strong></td>
<td><strong>585</strong></td>
</tr>
</tbody>
</table>

Notes: * p<0.10, ** p<0.05, *** p<0.01. The time period is 1960-74. Models are estimated using Zellner Seemingly Unrelated Regression technique. All the estimations include newspaper and year fixed effects. The dependent variables are in logarithm. Variables are described in more details in the text.
Table 4: Readers’ prices: Timing of the effect

<table>
<thead>
<tr>
<th></th>
<th>Price ratio</th>
<th>Subscription price</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre introduction of advertisement on TV (1965-1967)</td>
<td>0.00</td>
<td>-0.03</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Short-run introduction of advertisement on TV (1968-1970)</td>
<td>-0.09***</td>
<td>-0.11***</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Long-run introduction of advertisement on TV (1971, onwards)</td>
<td>-0.14***</td>
<td>-0.13***</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Newspaper FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-sq</td>
<td>0.56</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Observations</td>
<td>851</td>
<td>851</td>
<td>851</td>
</tr>
</tbody>
</table>

Notes: * p<0.10, ** p<0.05, *** p<0.01. The time period is 1960-74. Models are estimated using OLS estimations. All the estimations include newspaper and year fixed effects. The dependent variables are in logarithm. Variables are described in more details in the text.
Table 5: Baseline estimation: Circulation and revenues

<table>
<thead>
<tr>
<th></th>
<th>Total circulation</th>
<th>Share of subscribers</th>
<th>Revenues from sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-1968</td>
<td>-0.01</td>
<td>-0.09</td>
<td>-0.14</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.06)</td>
<td>(0.16)</td>
</tr>
<tr>
<td>National x Post-1968</td>
<td>0.05</td>
<td>0.23***</td>
<td>0.22***</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Unit price</td>
<td>-0.19*</td>
<td>0.17</td>
<td>0.72***</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.16)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Subscription price</td>
<td>-0.02</td>
<td>-0.13</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.12)</td>
<td>(0.10)</td>
</tr>
<tr>
<td>Newspaper FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-sq</td>
<td>0.99</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>Observations</td>
<td>851</td>
<td>851</td>
<td>851</td>
</tr>
</tbody>
</table>

Notes: * p<0.10, ** p<0.05, *** p<0.01. Standard errors in parentheses are clustered by newspaper. The time period is 1960-74. Models are estimated using OLS estimations. All the estimations include newspaper and year fixed effects. Variables are described in more details in the text.
Table 6: Baseline estimation: Quality

<table>
<thead>
<tr>
<th></th>
<th>Number of journalists</th>
<th>Number of pages</th>
<th>News hole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-1968</td>
<td>0.52***</td>
<td>0.41***</td>
<td>0.36***</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>National x Post-1968</td>
<td>-0.11***</td>
<td>-0.01</td>
<td>-0.07**</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Newspaper FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-sq</td>
<td>0.98</td>
<td>0.91</td>
<td>0.87</td>
</tr>
<tr>
<td>Observations</td>
<td>851</td>
<td>851</td>
<td>851</td>
</tr>
</tbody>
</table>

Notes: * p<0.10, ** p<0.05, *** p<0.01. The time period is 1960-74. Models are estimated using OLS estimations. All the estimations include newspaper and year fixed effects. Variables are described in more details in the text.
Table 7: Reliance on national advertising

(a) **Advertising**

<table>
<thead>
<tr>
<th></th>
<th>Ad revenues</th>
<th>Ad share</th>
<th>Ad revenues / circulation</th>
<th>Listed price</th>
<th>Ad space</th>
<th>Ad share</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-1968</strong></td>
<td>1.38***</td>
<td>0.09***</td>
<td>1.38***</td>
<td>1.19***</td>
<td>0.59***</td>
<td>0.17***</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.03)</td>
<td>(0.05)</td>
<td>(0.17)</td>
<td>(0.07)</td>
<td>(0.06)</td>
</tr>
<tr>
<td><strong>High reliance x Post-1968</strong></td>
<td>-0.12***</td>
<td>-0.05***</td>
<td>-0.11***</td>
<td>-0.11*</td>
<td>-0.07</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.07)</td>
<td>(0.04)</td>
<td>(0.04)</td>
</tr>
<tr>
<td><strong>Newspaper FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Year FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>R-sq</strong></td>
<td>0.98</td>
<td>0.86</td>
<td>0.91</td>
<td>0.87</td>
<td>0.85</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>851</td>
<td>851</td>
<td>851</td>
<td>585</td>
<td>851</td>
<td>851</td>
</tr>
</tbody>
</table>

(b) **Prices**

<table>
<thead>
<tr>
<th></th>
<th>Price ratio</th>
<th>Subscription price</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-1968</strong></td>
<td>0.01</td>
<td>1.29***</td>
<td>1.28***</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td><strong>High reliance x Post-1968</strong></td>
<td>-0.03***</td>
<td>-0.04***</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td><strong>Newspaper FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Year FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>R-sq</strong></td>
<td>0.50</td>
<td>0.97</td>
<td>0.98</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>851</td>
<td>851</td>
<td>851</td>
</tr>
</tbody>
</table>

(c) **Circulation and Revenues**

<table>
<thead>
<tr>
<th></th>
<th>Total circulation</th>
<th>Share subscribers</th>
<th>Revenues from sales</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-1968</strong></td>
<td>0.00</td>
<td>0.28**</td>
<td>-0.10</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.12)</td>
<td>(0.07)</td>
</tr>
<tr>
<td><strong>High reliance x Post-1968</strong></td>
<td>-0.01</td>
<td>0.07**</td>
<td>0.06**</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.03)</td>
</tr>
<tr>
<td><strong>Unit price</strong></td>
<td>-0.15</td>
<td>0.32**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.16)</td>
<td></td>
</tr>
<tr>
<td><strong>Subscription price</strong></td>
<td>-0.07</td>
<td>-0.30**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.12)</td>
<td></td>
</tr>
<tr>
<td><strong>Newspaper FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Year FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>R-sq</strong></td>
<td>0.99</td>
<td>0.99</td>
<td>0.96</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>851</td>
<td>851</td>
<td>851</td>
</tr>
</tbody>
</table>

(d) **Quality**

<table>
<thead>
<tr>
<th></th>
<th>Number of journalists</th>
<th>Number of pages</th>
<th>News hole</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-1968</strong></td>
<td>0.54***</td>
<td>0.42**</td>
<td>0.38***</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td><strong>High reliance x Post-1968</strong></td>
<td>-0.07**</td>
<td>-0.03**</td>
<td>-0.05***</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td><strong>Newspaper FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Year FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>R-sq</strong></td>
<td>0.98</td>
<td>0.91</td>
<td>0.87</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>851</td>
<td>851</td>
<td>851</td>
</tr>
</tbody>
</table>

**Notes:** * p<0.10, ** p<0.05, *** p<0.01. The time period is 1960-74. Models are estimated using OLS estimations. All the estimations include newspaper and year fixed effects. Variables are described in more details in the text.
Notes: This figure represents the average price ratio – the ratio of the average subscription price divided by the newsstand price – computed over the 7 US newspapers for which the information is available annually from 2008 to 2014: the Chicago Tribune, the Denver Post, the LA Times, the New York Times, San Jose Mercury News, USA Today, and the Washington Post. The subscription price is the home delivery price of a Monday to Friday subscription normalized by the number of issues. Data is from the Alliance for Audited Media.

Figure 1: Average annual price ratio over 7 US newspapers, 2008-2014
Notes: This figure represents the evolution of newspaper advertising revenues in dollars (blue square, left axis) and of the number of daily newspaper journalists (red dots, right axis) in the United States between 1980 and 2015. Data on newspaper revenues are from the Newspaper Association of America (NAA). Data on the number of journalists are from the American Society of News Editors.

Figure 2: Newspaper advertising revenues (in dollars) and number of journalists in the United States, 1980-2015
Notes: The figure represents the evolution of television penetration in France between 1960-1974. Data on television equipment is from studies conducted for the advertising market (PROSCOP).

Figure 3: Number of television sets in France, 1960-1974
Notes: The figure shows for 1967 and 1974 the value of advertising revenues in France by media outlets (local and national daily newspapers, and television) in million euros (constant 2009). Data are from the “Institut de Recherches et d’Etudes Publicitaires” (IREP), a French research institute devoted to the study of advertising.

Figure 4: Advertising revenues by media outlets, 1967 & 1974
Notes: The figure shows for 1967 and 1974 the share of total advertising revenues by media outlets (national daily newspapers, local daily newspapers, magazines, television, radio, cinema, outdoor, and others). Data are from the “Institut de Recherches et d’Etudes Publicitaires” (IREP), a French research institute devoted to the study of advertising.

Figure 5: Share of total advertising revenues by media outlets, 1967 & 1974
Figure 6: Anecdotal evidence: Advertisements in national newspapers and on television
Figure 7: Descriptive evidence: Changes in the price ratio