

Newspapers in Times of Low Advertising Revenues^{*}

Reproduce the Paper: A Difference-in-Differences Analysis

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Abstract

In 2019, researchers Charles Angelucci and Julia Cagé have done the analysis of the relationship between the newspapers' content and the reduction in advertising revenues. They found robust evidence which demonstrated that a reduction in advertising revenues lowers newspapers' incentives to produce journalistic-intensive content through the difference-in-differences analysis. In this work, the same dataset was used and the difference-in-differences analysis was applied as well to reproduce their work. In general, similar results were obtained by this work compared to the published paper.

Keywords: Newspapers; Difference-in-Differences Analysis; Causal-Inference; Newspapers' Content; Advertising Revenues; Number of Journalists;

Introduction

It has been argued that the information revolution is destroying the traditional newspaper industry around the world right now, from local newspaper to national newspaper. It has been demonstrated that, with the rise of the Internet, the revenues, the advertisers and even the number of journalists employed of the newspaper industry has been steadily decreased, roughly since 2005 (Angelucci and Cage 2015). Therefore, there is a growing concern that the quantity of high-quality content might decrease as well (Angelucci and Cage 2015). However, the direct accurate causes of the declination of the newspaper remain debatable. Although it is obvious that there is a strong negative correlation between the trend of the Internet and the trend of traditional newspaper industry. One could still argue that, there might exist a third factor such as the changing customer preferences driving both trends (Angelucci and Cage 2015). Similarly, the causality between the decrement in number of journalists employed and the decrement in the advertising revenues remains uncertain as well. To answer this question, specific hypothesis must be well proposed, theoretical framework must be set up and empirical analysis must be conducted properly .

In their study, they focused on the effects of the decline in advertising revenues on the quality of the newspapers' content (Angelucci and Cage 2015). To investigate this relationship, they built a model based on several conditions and assumptions, including using a monopoly newspaper which is able to choose the prices of subscription and advertisement, letting readers to be heterogeneous in the types of high-quality content, assuming that more journalist-intensive content increases more costs (Angelucci and Cage 2015). Moreover, it is assumed that the newspaper is able to decide the size of its newsroom, which means the quality of its content. Based on those assumptions and the two-sided market model, a theoretical profit model of the newspaper was set up. By solving the associated system of first-order condition, solutions to maximize the profits of the newspaper were derived (Angelucci and Cage 2015). Particularly, the authors found that a decrease in advertising revenues leads to decreased size of the newsroom, the lowered price of the advertisement , the lowered price charged to readers or increased price charged to readers and a less affluent and educated readership (Angelucci and Cage 2015). A positive correlation between the reader's ideal content and the advertising revenues was also discovered by this theoretical model.

^{*}Code are available at: <https://github.com/Chelsea-Cheng99/STA304/tree/master/Final>

To further prove the predictions generated by the theoretical framework, the difference-in-differences (DID) analysis was applied with the dataset of the French daily newspaper industry to derive the causality (Angelucci and Cage 2015). The French newspaper data has a unique empirical setting, because the introduction of advertising on French television around 1967 gave a significant immediate negative shock to the advertising side of the newspaper industry. Moreover, this impact was heterogeneous where the national daily newspaper was impaired more severely than local newspapers. In this way, the national newspaper was considered as the treatment while the local newspaper was considered as the control group, and the two time periods, “pre” and “post” were set up around 1967.

With all above framework and the empirical analysis, they were trying to prove that a decline in advertising revenues may cause a decrement in the amount of high-quality content produced, a drop in reader subscription prices and a change in the composition of readership toward a less wealthy readership, which can be considered as a cause-effect chain during the economic turmoil of the newspaper industry (Angelucci and Cage 2015). Through this work, a monopoly newspaper was modeled with a two-sided market model where the revenues of the newspaper come both from readers and advertisers. Eventually, this cause-effect chain of the newspaper industry was proved by both theoretical proof and “quasi-natural” experiment, the DID analysis (Angelucci and Cage 2015).

Data

The dataset was not allowed to be distributed by this project, but can be found in the original source of the literature (Angelucci and Cage 2015). The study was conducted in the form of a survey, with data being gathered via digitized paper data and integrated from miscellaneous historical sources. And the annual balanced panel dataset was constructed on France’s local and national newspapers, which the time was between 1960 and 1974 (Angelucci and Cage 2015). The criteria for selecting the subjects were as follows: Prices, Circulation, and Revenues; Number of Journalists; Advertising Prices and Quantity; Newshole; Readership Data.

As for the data on prices, revenues and circulation, it was from French Ministry of Information’s non-publicly available records in the National archives (Angelucci and Cage 2015). Newspapers are required to report their annual revenues and prices to the Ministry of Information. By having direct access to the responses to the queries above allows the author to collect the data for this study. The data collection contains the information as follows: the unit price, the subscription price (annual subscription price divided by the total number of issuances within a year), the number of annual issuances, sales revenue and advertising revenue, the information about the issuance volume, unit purchaser’s share and subscriber’s share (Angelucci and Cage 2015). The dataset that has been collected contains data from 68 local newspapers. The sample of national newspapers includes all 12 national newspapers issued between 1960 and 1974. These newspapers are newspapers for which data can be obtained in the archive. As for the data on number of journalists, annual data was being used on the number of newspaper-level journalists from non-public paper records from the “Commission de la carte d’identité des journalistes professionnels” (CCIJP), which has issued news cards to French journalists in 1936 (Angelucci and Cage 2015). The CCIJP provides a news card to “anyone whose main, regular and paid professional activities are related to one or more daily or regular publications or news agencies” (Angelucci and Cage 2015). And journalists must renew their news cards every single year. The data set contains data for 63 of the 68 local newspapers and 11 of the 12 national newspapers for which we have income data (Angelucci and Cage 2015). For each of these newspapers, the annual number of journalists (including monthly salary increase workers and freelancers) and their compensation has been known. In settled time period, newspapers employ an average of 63 reporters (Angelucci and Cage 2015).

As for the data on advertising prices and quantity, the official price per inch of advertising space is the first source of information about advertising prices. The dataset was digitized from “Tarif Media”, which is an annual publication that provides information about advertising rates (Angelucci and Cage 2015). The data on the number of advertisements in each issue has been collected directly from the paper version of the French National Library. One disadvantage of using the listed market price is that in the newspaper industry, discounts are very common: the listed mark price is not the actual transaction price, it usually lower than

the actual transaction price (Angelucci and Cage 2015). Considering this problem, another common method was being used which was mentioned in the literature to measure the price of advertising, that is, the total advertising revenue divided by the newspaper circulation (Angelucci and Cage 2015). These two measures are closely related. Furthermore, the authors specifically distinguished between national advertising and local advertising. The collected content data also allows to calculate news holes, which are dedicated news spaces. Extra information was collected for the 37 local newspapers and all national newspapers in the sample set (Angelucci and Cage 2015). The last considered dataset of this study was readership data. The data used in this study comes from the Centre d’Etude des Supports de Publicité (CESP), which is composed of all major companies active in the advertising industry (Angelucci and Cage 2015). The authors also obtained information about the characteristics of readers from some newspapers included in the sample.

The revenues, the advertisers and even the number of journalists employed of the newspaper industry has been steadily decreased, these trends were illustrated in Figure 1 with data of the United States newspaper industry. This figure demonstrated the rapid decreases of the advertising revenues and number of journalists.

Table. 1: Characteristics Summary of National Daily Newspapers

	Overall (N=181)
Unit buyer price	
N-Miss	29
Mean (SD)	3.592 (1.255)
Range	2.395 - 9.345
Subscription price	
N-Miss	33
Mean (SD)	2.807 (0.739)
Range	1.925 - 5.630
Ad rate (listed price)	
N-Miss	60
Mean (SD)	121.135 (80.959)
Range	17.535 - 274.200
Total revenues (€)	
N-Miss	19
Mean (SD)	424970741.802 (403009767.658)
Range	18918480.000 - 1482414336.000
Revenues from advertising (€)	
N-Miss	20
Mean (SD)	228134652.270 (257993642.079)
Range	6683565.500 - 864369088.000
Number of journalists	
N-Miss	23
Mean (SD)	116.671 (80.562)
Range	21.000 - 326.000
Newshole (nonadvertising space)	
N-Miss	43
Mean (SD)	13.198 (4.082)
Range	6.320 - 24.657

Table. 2: Characteristics Summary of Local Daily Newspapers

	Overall (N=1016)
Unit buyer price	
N-Miss	105
Mean (SD)	3.175 (0.790)

	Overall (N=1016)
Range	0.818 - 5.700
Subscription price	
N-Miss	120
Mean (SD)	2.770 (0.735)
Range	0.682 - 4.687
Ad rate (listed price)	
N-Miss	328
Mean (SD)	80.333 (72.623)
Range	3.757 - 327.200
Total revenues (€)	
N-Miss	128
Mean (SD)	145562770.985 (176075111.269)
Range	809563.625 - 1025858560.000
Revenues from advertising (€)	
N-Miss	125
Mean (SD)	66848228.204 (79245513.189)
Range	549717.250 - 416419200.000
Number of journalists	
N-Miss	109
Mean (SD)	53.401 (57.895)
Range	1.000 - 297.000
Newshole (nonadvertising space)	
N-Miss	108
Mean (SD)	12.345 (3.932)
Range	1.860 - 34.435

As shown in Table 1 and Table 2, the characteristics summary of the national daily newspapers and local daily newspapers was demonstrated here. There are around 100 daily newspapers included in the dataset, including 12 national newspaper at the end and around 90 local newspapers. The unit buyer price, subscription price, advertisement listed price, total revenues, advertising revenues, number of journalists and newshole (nonadvertising space) were summarized in these tables. Overall, national daily newspapers generate €425 million in total revenues each year, whereas local daily newspapers generate €145 million.

As shown in Figure 2, between 1967 and 1974, as the introduction of the advertisement on TV, national newspapers' advertising revenues decreased while local newspaper advertising revenues increased during the same period. The negative shock of TV advertisement placed on national newspapers was further illustrated on Figure 3. Between 1964 and 1972, the TV replaced a huge part of the national newspapers on OTC drugs advertisement (Figure 3). Figure 4 illustrated that the quality of TV did not have sharp changes around 1967, where the number of total transmitters and the number of journalists hired by TV remained almost same around 1967.

Model

The authors set up a theoretical framework first, with the assumption of a monopoly newspaper and a two-sided market. The framework was built up with parameters including reader i , newspaper content q , read price p^R , advertising price p^A , readers' content-independent taste ϵ , readers' sensitivity to the content change γ and advertisers' willingness to pay α .

Then profits of the newspaper can be calculated by a equation based on three variables, including newspaper content q , read price p^R and advertising price p^A . The equation was shown as below:

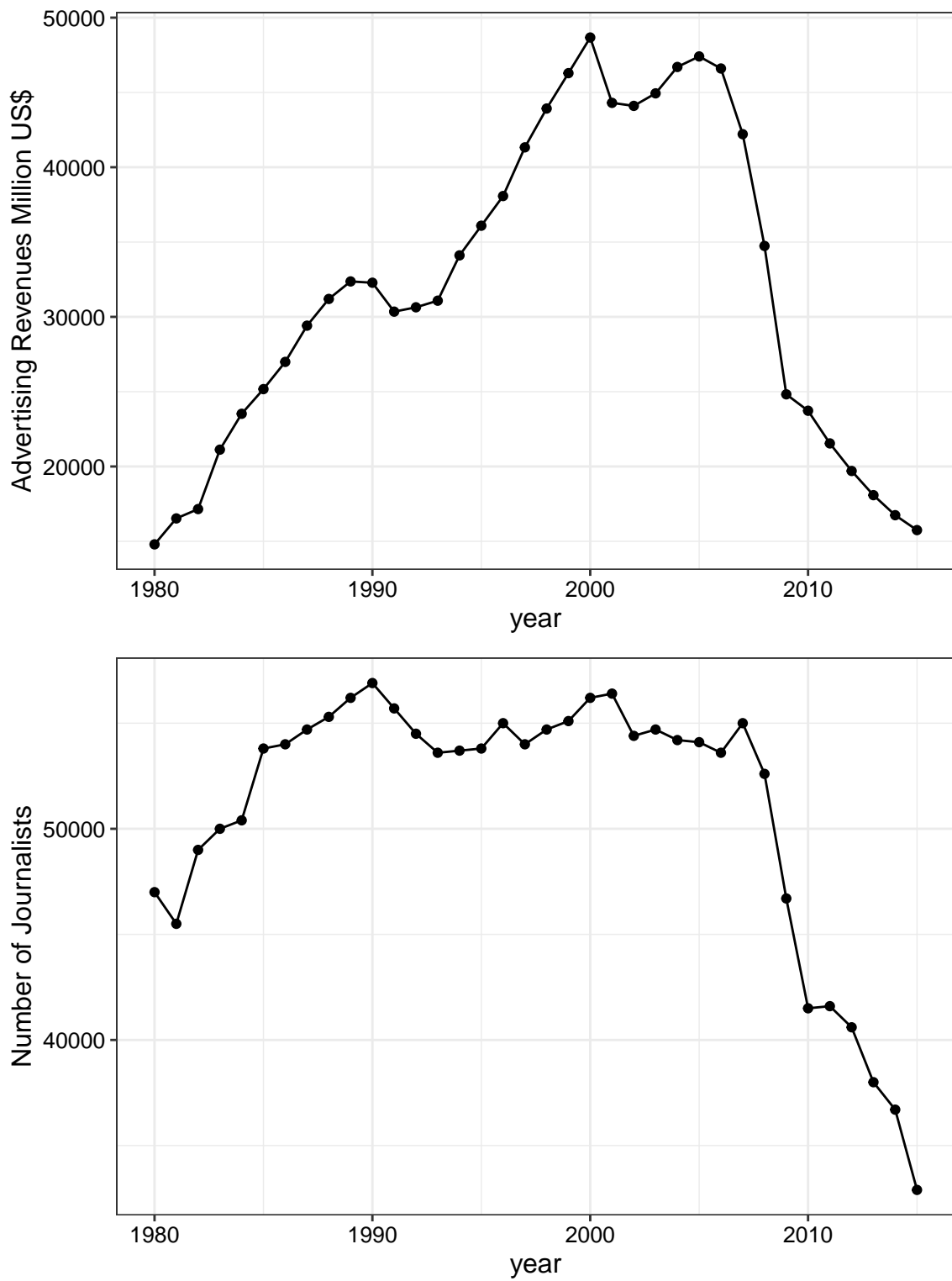


Figure 1: Newspaper Advertising Revenues (in dollars) and Number of Journalists in the United States, 1980-2015

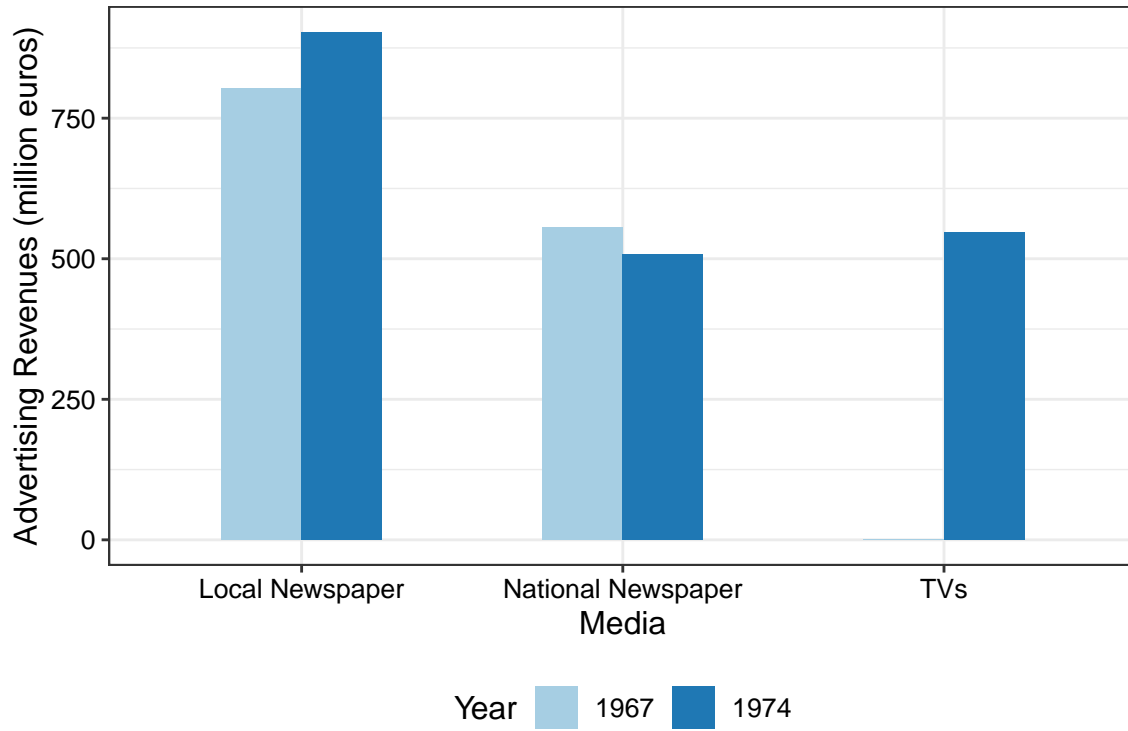


Figure 2: Advertising Revenues in France by Media Outlets

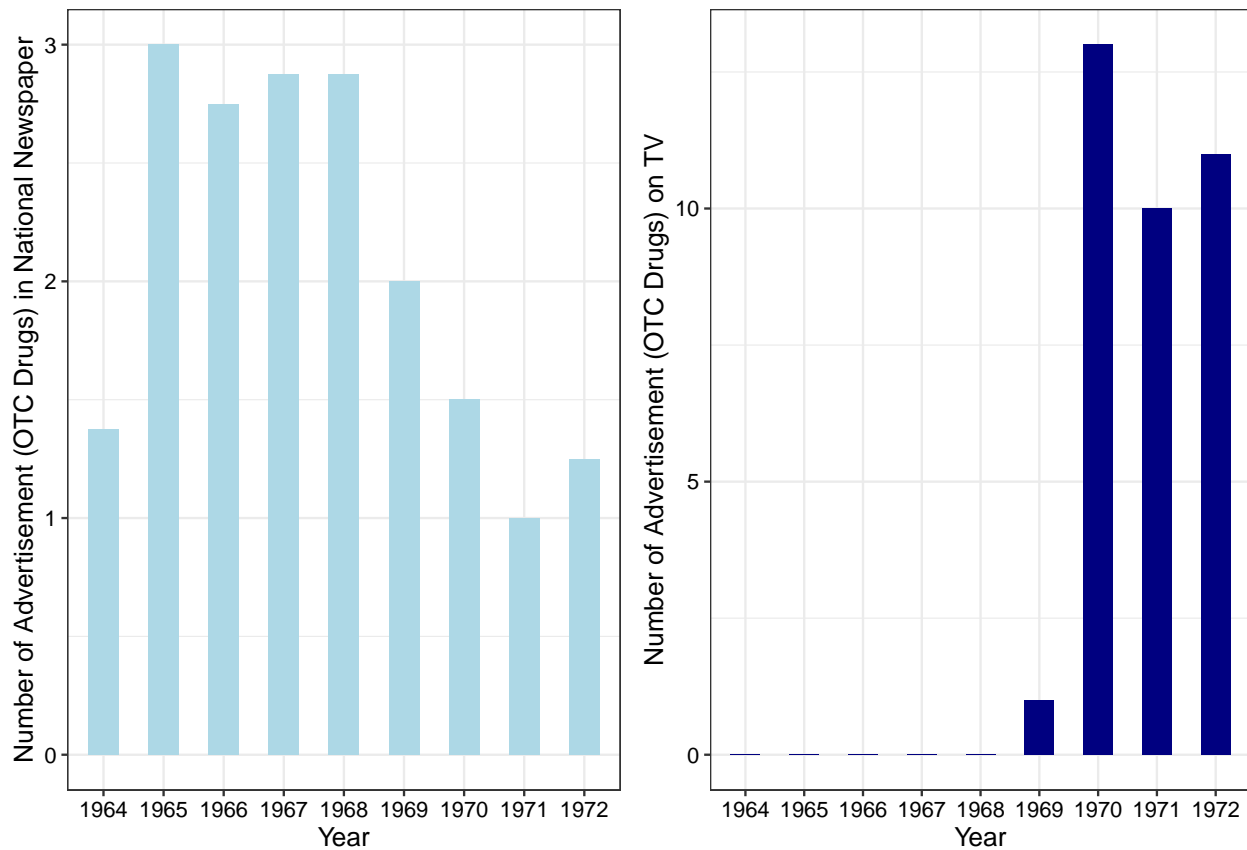


Figure 3: Effects on National Newspaper from Advertisement on TV

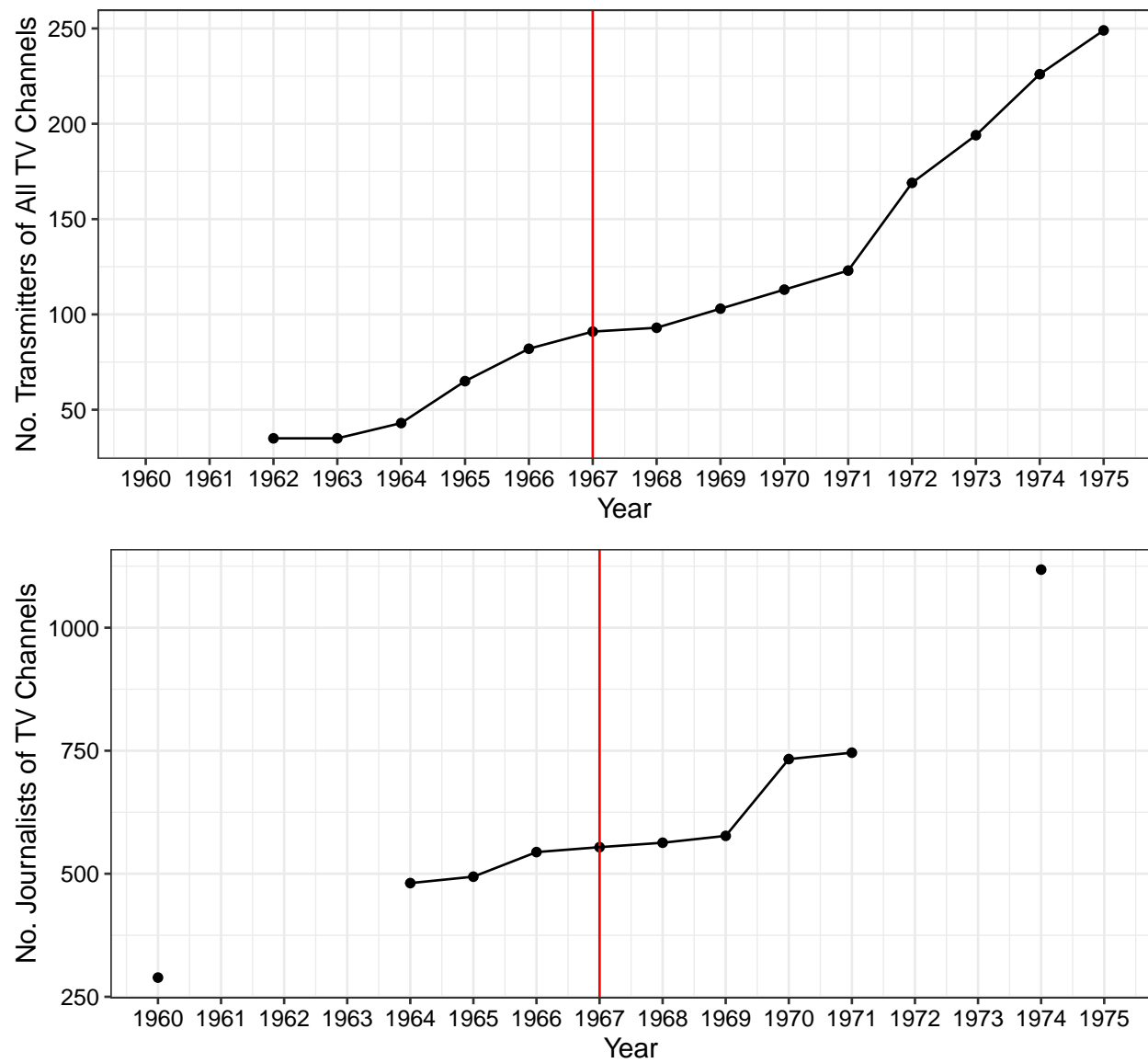


Figure 4: Measure of Television Quality

$$\prod(p^R, p^A, q) = p^R\gamma(\epsilon + q - p^R) + p^A(\alpha\gamma(\epsilon + q - p^R) - p^A) - q^2/2 \quad (1)$$

Equation (1) represents the complete theoretical model.

The empirical analysis was done using the DID analysis framework. As the negative shock which introduced by the television on advertising revenues has affected mostly national daily newspapers, the national newspapers were used as the “treated group”, while the local newspapers were used as the “control group”. Then the variables of interests were compared based on pre-1967-to-post-1967 of national newspaper to the local newspaper over the same time period. This is a canonical DID model setting which contains two time periods, “pre” and “post”, and two groups, “treatment” and “control”. The DID model is based on one key assumption, the parallel trend assumption, which is the trends of the dependent variables would be same for both groups in the absence of the treatment. The DID model also requires three other assumptions, including treatment is unrelated to outcome at baseline, composition of treatment and comparison groups is stable for repeated cross-sectional design and there are no spillover effects. Finally, ordinary least squares (OLS) linear regression models were fit in R with the basic `lm` function (R Core Team 2020). The model was shown as below:

$$y_{n,t} = \alpha + \beta_1(D_{after} \times D_{nationalnews}) + \lambda_n + \gamma_t + \epsilon_{n,t} \quad (2)$$

where $D_{nationalnews}$ is the indicator variable of national newspapers and D_{after} is the time indicator variable of post 1967, n indexes newspapers and t indexes years ($t = 1960, \dots, 1974$), λ_n represents fixed effect of newspaper, β_1 is the coefficient of interest measuring the annual effect on national newspapers with the negative shock compared to local newspapers, γ_t represents time dummies and $\epsilon_{n,t}$ are standard errors clustered at the newspaper level. Particularly, $y_{n,t}$ is the outcome of interest, which is the logarithms of the dependent variable. For instance, $y_{n,t}$ can be the variable of the advertising revenues, price and quantity when focusing on the advertising side of the market. When focusing on the reader side, the $y_{n,t}$ can be subscription price and newspaper unit price. When focusing on the reader side, the $y_{n,t}$ can be the number of journalists and the size of newshole.

All work were done in R (version 4.0.2) (R Core Team 2020) and Rstudio (version 1.3.1093). Tidyverse (version 1.3.0) was used for data wrangling and the ggplot2 of the Tidyverse was used for visualization (Wickham et al. 2019). R package Haven was used to import the dataset. There are other packages used, including `captioner`, `gridExtra`, `broom`, `stargazer`, `RColorBrewer`, `Haven`, `magrittr`, `knitr`, `labelled` and `arsenal` (Alathea 2015; Hlavac 2018; Heinzen et al. 2020; Xie 2020; Wickham and Miller 2020; Auguie 2017; Robinson, Hayes, and Couch 2020; Bache and Wickham 2014; Larmarange 2020; Neuwirth 2014; Wickham and Pedersen 2019). Code are available at: <https://github.com/Chelsea-Cheng99/STA304/tree/master/Final>.

results

Table 3 reported the effects on the advertising side of the market. The model shown by Equation 2 was fit with the French newspaper data to test whether national daily newspapers were affected more severely. The outcomes of interest are advertising revenues (column 1), prices (columns 2 and 3), and quantity (column 4). By linear regression and t-test of the primary coefficients, there is a 24% significant decrease in the advertising revenues of national newspapers compared to the revenues of local newspapers, $p < 0.05$ (column 1). P value less than 0.05 provides strong evidence against the null hypothesis, which means the chance of observing as least as extreme as the observational values under the null hypothesis is very small. This decrease is driven by the decreases in advertisement prices not by the quantity.

Table 4 illustrated the effects on the reader side of the market. There is a 11% significant decrease in the subscription price of national newspapers compared to local newspapers as the introduction of advertising on television, $p < 0.05$ (column 1). There is no statistically significant change in the unit price (column 2). The national newspapers had more subscribers, $p < 0.05$ (column 4), but the overall revenues from sales still decreased, $p < 0.05$ (column 5).

Table 5 illustrated the effects on the quality of the newspaper. The number of journalists and newshole are widely used as the measure of newspaper quality (Angelucci and Cage 2015). As the introduction of advertising on television leads to a 21 percent decrease in the number of journalists, $p < 0.05$ (column 1), but there is no change in the newshole.

Table. 3: Advertising Side

Table 3:

	<i>Dependent variable:</i>			
	Ad Revenues	Ad Revenues (per)	Ad Listed Price	Ad Space
	(1)	(2)	(3)	(4)
National \times Post-TV ad	-0.239 t = -7.596***	-0.146 t = -5.284***	-0.395 t = -5.408***	-0.030 t = -0.540
Intercept	17.867 t = 339.540***	6.251 t = 134.804***	3.874 t = 28.439***	1.874 t = 21.516***
Observations	1,052	1,051	809	1,046
R ²	0.986	0.911	0.897	0.869
Adjusted R ²	0.984	0.902	0.885	0.857

Note: *p<0.1; **p<0.05; ***p<0.01

Table. 4: Reader Side

Table 4:

	<i>Dependent variable:</i>				
	Sub. Price	Unit Price	Circulation	Share of Sub.	Revenues (sales)
	(1)	(2)	(3)	(4)	(5)
National \times Post-TV ad	-0.111 t = -8.337***	0.004 t = 0.346	-0.075 t = -3.515***	0.234 t = 7.214***	-0.133 t = -5.252***
Intercept	0.809 t = 37.147***	0.954 t = 49.746***	11.644 t = 326.374***	4.633 t = 87.372***	18.145 t = 420.562***
Observations	1,044	1,044	1,070	1,044	1,046
R ²	0.943	0.953	0.991	0.974	0.991
Adjusted R ²	0.938	0.948	0.991	0.971	0.990

Note: *p<0.1; **p<0.05; ***p<0.01

Table. 5: Quality

Discussion

The idea used in this research is to model the impact of reduced advertising revenue on newspaper content and prices (Angelucci and Cage 2015). With the advent of the Internet, the advertising revenue of traditional newspapers has fallen sharply. This study also established a unique dataset in French newspapers between 1960 and 1974 and used the introduction of TV advertisements to conduct a difference-in-differences analysis

Table 5:

	<i>Dependent variable:</i>			
	No. Journalists	Average Payroll	No. Pages	Newshole
	(1)	(2)	(3)	(4)
National \times Post-TV ad	-0.211 t = -6.958***	0.057 t = 1.137	-0.026 t = -1.229	-0.045 t = -1.986**
Intercept	3.828 t = 77.314***	7.571 t = 104.484***	3.039 t = 93.916***	2.631 t = 75.182***
Observations	1,046	723	1,046	1,046
R ²	0.979	0.567	0.933	0.902
Adjusted R ²	0.977	0.524	0.926	0.893

Note:

*p<0.1; **p<0.05; ***p<0.01

(Angelucci and Cage 2015). This difference has a greater impact on local newspapers than local newspapers. It is proved that the reduction in advertising revenue reduces the motivation of newspapers to produce news-intensive content. Research evidence shows that the amount of news-intensive content produced, and subscription prices have fallen. The most obvious finding to emerge from this study is that the newspaper industry is in a serious crisis. Newspapers choose the size of their newsroom/quality of content, and readers differ in the relative amount of news-intensive content they prefer (Angelucci and Cage 2015). The decline in advertising revenue will cause newspapers to reduce the quality of their content, which changes the composition of the readership at the same time as the subscription price drops. By leveraging annual data and advertising on TV, the research compared the changes in national daily newspaper advertising revenue before and after TV advertising with the changes in local daily newspaper advertising revenue (Angelucci and Cage 2015). In addition, the study also showed that advertising on TV would lead to a sharp decrease in the number of journalists hired, but the number of news remained unchanged. Taken together, these results suggests that national newspapers responded to the decline in advertising revenue by either reducing the quality of content or reducing the production of hard news (Angelucci and Cage 2015). Before this , there is little empirical evidence on the consequences of declining advertising revenue on media pricing and quality choices. In this case, if advertising revenue continues to decline, the media's investment motivation in journalism will decrease. Meanwhile, the results also shows that readers based on subscribers are increasing. The Internet has made advertisers less willing to pay for the attention of newspaper readers and has also changed the structure of the media industry in other ways (Angelucci and Cage 2015). The results of the research distinguish between the consequences of the decline of advertisers' willingness to pay readers' attention and the consequences of other powerful changes by introducing advertisements from French television stations, thereby achieving the effect of clarifying important issues (Angelucci and Cage 2015).

Together these results above provide important insights into four fields to discuss, which is comparability of national and local newspaper markets, subsidies, external validity and robustness. Referring to the comparability of national and local newspaper markets, it can be said that the national newspaper market and the local average newspaper market are oligarchs, and it was assured of the comparability of these two parts (Angelucci and Cage 2015). However, one might think that the degree of competition in these two market segments is still different, which may be due to the fact that local newspapers have also been affected by advertising on TV, although the degree is much smaller (Angelucci and Cage 2015). There are two ways to address this issue. First of all, it shows that the results are strong and reliable for deleting several newspapers that were monopolized from 1960 to 1974, thereby making the two sections more similar (Angelucci and Cage 2015). Secondly, based on the theoretical framework, it is believed that the price of readers and the number of journalists in a highly competitive market should have relatively small changes, mainly because the market is more fragmented. If many people believe that competition in the national newspaper industry as a whole is more intense (for example, as implied by the smaller operating profit margins of national

newspapers), then the resulting deviation will not be benefit, and the findings will underestimate the actual influences (Angelucci and Cage 2015). For the subsidies, daily newspapers were subsidized by lowering the value-added tax rate, subsidizing paper prices (also by lowering the value-added tax rate) and lowering the rates of transportation services provided by the national postal and train agencies. Therefore, people may worry about the discrepancy trend of postage and train fare. To solve this problem, the annual data was collected on postage and training rates from annual industry publications. From a cost perspective, the evolution of the two charging rates shows that, compared to local newspapers, the temptation of readers who use subscribers to read national newspapers must be less than that after 1967 (Angelucci and Cage 2015). The French government introduced subsidies in 1973 for newspapers with low advertising revenue and/or low circulation. There is no information about the recipients of these direct subsidies. But it shows that the results are very strong for focusing on the 1960-1971 period (Angelucci and Cage 2015). The analysis in this study relies on French data and events that took place about 50 years ago, so it may raise concerns about our ability to understand current trends. And this brought out the thought on external validity. Every place is heavily relying on advertising revenue. Advertising revenue is also declining everywhere. In addition, the ability to purchase newspapers via subscription or at newsstands is also common in different countries. Without a doubt, the online migration of news companies has led to major changes in the news market (Angelucci and Cage 2015). Although many journalists are already independent, it is believed that the need to share resources, the need to build brand or reputation, the benefits of specialization, and the returns that can be brought by bundling various content, all of which indicate that news companies are not It may disappear in the next few years (Angelucci and Cage 2015). Another topic that values to be discussed emerges from the findings is the robustness. There are several robustness checks that has been tested from different perspective, and they are bootstrap, dropping 1968, focusing on 1960–1971, dropping paris jour and Paris presse, industry-specific time trend, large regional newspapers, weighting newspapers by their circulation and balanced sample (Angelucci and Cage 2015). Considering the high degree of autocorrelation in the considered outcome variables, the small number of national newspapers may pose a potential threat to the empirical estimates. The estimation is reliable and robustness for considering autocorrelation. In 1968, he was in trouble in France, after a period of civil strife, demonstrations and many strikes (Angelucci and Cage 2015). In addition, our results are also convincing, and can further reduce the historical window used to capture the effects of TV advertising, although the number of observations is much smaller. If focus on the years from 1964 to 1971 (the years when both the first and second TV channels are broadcasting), the results will remain the same (Angelucci and Cage 2015). During the period of 1972 and 1970 that this study focused on, two national daily newspapers, “Paris Jour” and “Paris Presse” exited (Angelucci and Cage 2015). This study proved that the results are powerful for deleting these two national newspapers. The growth of subscriber share is stronger. As an additional robustness check, this study proved that the results obtained are reliable for controlling industry-specific time trends. By introducing these industry-specific time trends, it is possible to process and control newspapers to follow different trends in a limited but potential way. Many local daily newspapers in the dataset can be considered “regional” newspapers because they are located in many counties (Angelucci and Cage 2015). The estimation is strong for deleting these large regional newspapers. In the main analysis, each newspaper is given the same weight in the regression. It is not difficult to see from the summary statistics that some newspapers are much larger than others. As an additional check, the estimate was recalculated at the beginning of the period by weighting the circulation of the newspaper (Angelucci and Cage 2015). Another robustness check that has been used is that the result recalculated the estimated value for each sample in which the dependent variable is not missing.

In this research, the canonical Difference-in-Differences (DID) methodology has been used largely. It is a statistical technique in a way that attempts to imitate observational research data to simulate experimental research design by observing the differential effect of treatment data (Donald and Lang 2007). In details, the way that DID works is by comparing the average change of the outcome variables of the treatment group over time, the effect of the explanatory variable/independent variable on the response variable/dependent variable is calculated to obtain the result (Donald and Lang 2007). Most DID applications will take advantage of the differences between groups of units receiving treatment at different times. Compared with the time series estimation of the analysis subjects and the cross-sectional estimation of the treatment effect, the difference-in-differences is the use of panel data to measure the difference between the treatment group and the control group over time. Panel data is the multi-dimensional data involving measurement over time. In

panel data, each observation is for the same object, and this makes a panel data is a subset of longitudinal data (Goodman-Bacon 2018). Hence, research that is using panel data is either called longitudinal research or panel research.

All statistical modeling has two frames: the small world of the model itself and the large world we hope to deploy the model in, where the small world is the self-contained logical world of the model and the large world is the broader context in which one deploys a model (McElreath 2016). Through theoretical proof and empirical analysis of French newspaper data, the authors successfully derived robust cause-effect conclusion, not just for the French newspaper industry but for the newspaper industry of other countries.

In this study, the readership effects and heterogeneous effects were not reproduced, mainly due to the error iterns in the model. In the original work, the standard errors of the linear model were clustered at the newspaper level. This clustering effect was not fully reproduced in this work. Thus, the R^2 , adjusted R^2 and the t statistics results generated in this paper were not exactly the same as the original paper published. In the future work, the cluster of standard deviation should be explored and compared with the current model.

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