

METEOROLOGY AND TV AUDIENCE : A FRENCH REGIONAL PANEL DATA BASED APPROACH

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Abstract : Recently, French government allowed French TV channels to target viewers at home thanks to internet boxes. In a context of European regulation surrounding the use of private user data, it is increasingly difficult for TV channels to obtain consumers' consent to the use of their personal data. If TV viewers refuse to have personalized advertising on television, TV channels could use more aggregated targeting criteria such as localization. This article illustrates the interest of a regional approach by studying the effect of weather variables on the daily time that viewers spend watching television in metropolitan France. The analyses are carried out using a database from the Médiamétrie's panel (26 million observations) and the company Météo France. The main result is that there is a weather-sensitivity of audiences which differs according to the regions and to the weather parameter, due to the local climate.

Keywords : Television viewing ; Weather conditions ; Climate ; Advertising

I: Introduction

In France, since Law 86-1067 of September 30, 1986, television channels have been required to broadcast all content (programs, advertising screens, etc.) simultaneously throughout France. In other words, a television channel had to broadcast, at a given time t , the same program or advertising screen over the entire territory, which had two consequences for advertising. First, a television channel could not vary the advertising's price according to regional criteria. Second, advertisers were not allowed to make personalized television advertising at the level of the viewer's household. Decree n°2020-983 of August 5, 2020 now gives television channels the possibility of offering advertisers to target advertising at the level of the viewer's household. Concretely, on the same channel, a household living on the 3rd floor of a building would not see at the same time the same advertising as a household living on the 4th floor of the same building, but both households would see exactly the same programs. This new possibility of targeting would be done thanks to Internet boxes. According to Médiamétrie, more than 60% of French households receive television via one of these boxes. Players in the French television market expected this possibility of targeting viewers more precisely in a context of strong competition in the video market with the GAFAND (Google, Amazon, Facebook, Apple, Netflix, Disney). French Competition Authority also encouraged it, in a notice dated February 21, 2019, recognizing that players such as Google and Facebook took advantage of personalized advertising to the detriment of traditional television operators. This competitive advantage was made possible thanks to the development of very high-speed broadband in France since 2008. However, since the entry into force of the GDPR on May 25, 2018, and the ePrivacy regulation in 2020, companies (including television channels) have difficulties to obtain consumer's consent for the use of their personal data. Recent research in privacy economics has shown that the effectiveness of digital advertising targeting was diminished under these regulations (see Goldfarb and Tucker (2011c)) but also when consumers' sense of intrusiveness was present (see Goldfarb and Tucker (2011a)). While TV viewers can opt out of receiving personalized television advertising based on their personal history, television channels still have the option of offering advertisers the use of more aggregated and privacy-friendly targeting criteria, such as location, for example. This article illustrates the interest of a regional approach by studying the effect of weather variables on the daily time viewers spend watching television in metropolitan France. The analyses are based on a database of the Médiamétrie's panel (26 million observations) and the company Météo France. The main result is that there is a weather-sensitivity of audiences that differs according to the region and the weather parameter, due to the local climate. This empirical result is consistent with the work of Chenevaz, Escobar and Rousset (2019) showing that firms would benefit from adapting controllable variables (price, advertising...) according to uncontrollable variables (temperature, rain duration...).

II : Literature Review

There are several studies that have investigated the determinants of the price of television advertising. These include GOETTLER (1999) (audience composition), KIESCHNICK et al. (2001) (mode of cable and over-the-air television broadcasting), BEL ET DOMÈNECH (2009) (number of viewers), BROWN and CAVAZOS (2005) (audience share, number of viewers (expost), percentage of households with incomes over \$50,000 per year, percentage of young viewers (18-34), genre of viewers, program content) and WILBUR (2008) (advertising time broadcast). Unfortunately, we do not have the price of these ads in France. On the other hand, we do have data that allow us to model the audience of French television through the viewing time per individual, which allows us to indirectly model part of the price of the advertisements. While there are few works that have focused on the study of television audience (FREY and

BENESCH (2008) and VAN REETH (2013)), it is possible to cite a few works that have sought to study the effect of weather variables on the audience (BARNETT et al. (1991), ROE and VANDEBOSCH (1996), EINSINGA et al. (2011)). Other work has addressed the issue of modelling the duration of television viewing, but without taking into account meteorological variables. We can cite BRYANT and GERNER (1981) which shows the importance of socio-demographic variables in explaining the time spent watching television, as well as LIEBOWITZ and ZENTNER (2012) which prove, based on annual US regional data, that the development of the Internet has a negative and significant impact on television viewing. Compared to this literature, this article contains five contributions. The first is to use the daily data from the company Médiamétrie from a large audience panel (24,334 individuals) and representative of the regional dimension, which, to our knowledge, has never been carried out to model the television audience. The second contribution concerns the simultaneous consideration of explanatory variables linked to the characteristics of individuals and weather variables in the explanation of the audience. The third contribution is to compare, according to regions, the coefficients associated to weather variables in order to highlight regional disparities in television viewing time, with equal individual characteristics. The fourth is, for this article, to be the first to model television audience in metropolitan France. Finally, the fifth contribution is to better guide the professionals of the television market in France (advertisers, agencies, television channels) towards the use of an effective advertising targeting criterion that better respects the privacy of consumers.

III : Data and Econometric Model

The audience data for French television comes from the Médiamat panel of the company Médiamétrie over the period from 03/01/2011 to 02/03/2019 (2981 days). This database contains the individual measurement of daily television consumption (on the main household screen) of 24,334 panelists over the period, covering metropolitan France. The database is anonymized in order to comply with French and European regulations. More formally, using an autoregressive fixed-effects model, we estimate the daily individual consumption devoted to watching live television in each French region by the following regression :

$$y_{it} = \omega y_{i,t-1} + Diff_{it} \psi + Tvon_{it} \gamma + \sum_{k=1}^K X_{itk} \beta_k + \sum_{m=1}^M M_{ijtm} \beta_m + \sum_{p=1}^P month_{ip} \beta_p + \sum_{d=1}^D day_{id} \beta_d$$

where y_{it} is the daily television viewing time (in minutes) of individual i on the day t . More specifically, it is the total time each panelist spends each day watching live television (including programs and commercials). The indices vary as follows: $t = 1, \dots, T$, $i = 1, \dots, n$. In our database, $T = 2981$ and covers the period from 03/01/2011 to 02/03/2019; $n = 24,334$. We also have the total daily duration (in mn) devoted to the deferment ($Diff_{it}$) and the total daily duration (in minutes) ($Tvon_{it}$) devoted to doing something other than watching TV on the TV screen (Video Games, SVOD...). For each of these 24,334 panellists, we have information characterizing it (X_{itk}) such as gender, age group, socio-professional category, average weekly working time, gross monthly household income, type of Internet connection. Concerning meteorological data (M_{ijtm}), they come from more than 90 stations spread over the French territory and belonging to the company Météo France. We have at our disposal the daily average temperatures¹ (in C°), sunshine duration (in mn), rainfall duration (in mn), average rainfall (in mm) and wind speed (in km/h). For each region and for each meteorological parameter, we calculated the average of all the stations. $month_{ip}$ is an indicator variable for each individual i that reports the month

¹ Average of the minimum and maximum temperature observed daily.

over the period from 03/01/2011 to 02/03/2019 to neutralize the seasonal component present in our data. $month_{it}$ is an indicator variable for each individual i that reports the month over the period from 03/01/2011 to 02/03/2019 to neutralize the seasonal component present in our data. day_{id} is an indicator variable for each named day of the week (i.e. 7 days) in order to take into account programming that is not the same depending on the day of the week. u_{it} is the error term.

IV : Results et Discussion

The coefficient associated with temperature (see FIGURE 1) for the Basse-Normandie region can be interpreted as follows: a one-degree increase in temperature reduces television viewing time by 50 s (0.841 mn). Overall, we can distinguish a group of regions (Basse-Normandie, Haute-Normandie, Bretagne, Picardie, Nord-Pas-de-Calais) in the North-West of France for which panelists are more sensitive to a variation in temperature (the coefficient varies between 0.54 and 0.64 mn). These regions have an oceanic climate characterized, according to Météo France, by mild temperatures and relatively abundant rainfall. Next comes a second group of regions, which is slightly less sensitive than the previous group (Pays-de-la-Loire, Poitou-Charentes, Centre, Franche-Comté, PACA). The coefficient associated with temperature varies between 0.44 mn and 0.55 mn. A third group is composed of the Aquitaine, Limousin, Auvergne and Lorraine regions, regions for which the coefficient associated with temperature varies between 0.34 and 0.44 mn. Finally, the last group is the least sensitive to a rise in temperature (Midi-Pyrénées, Languedoc-Rousillon, Rhône-Alpes, Burgundy, Alsace, Ile-de-France) with coefficients lower than 0.34 mn.

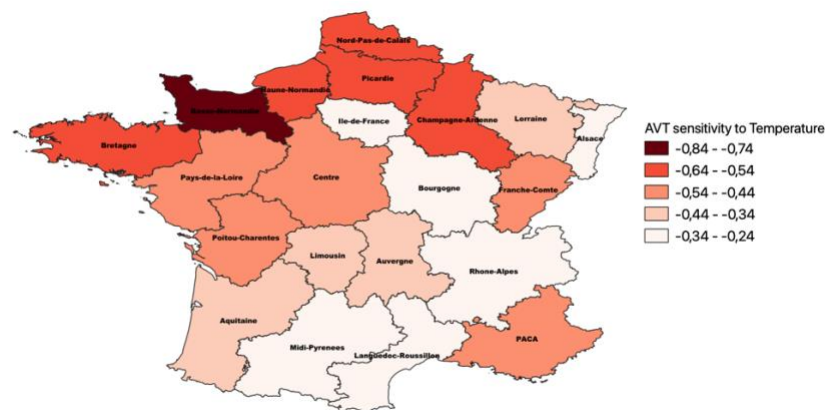


FIGURE 1 – Temperature Sensitivity of Television Audiences
Source : Author's calculation

V : Conclusion

The results of this article show that there is a regional disparity in the sensitivity of the television viewing time per individual of home TV related to variations in weather parameters. These disparities are more or less strong depending on the climate in which the regions are located. This proves that climate-related regional disparities in metropolitan France can have an influence on the amount of time viewers spend watching television. The immediate consequence is that audience indicators are affected. The indirect consequence is that the advertising rates charged by TV stations to advertisers for advertising screens should also be affected. Not all regions will be equivalent in terms of GRP. Thus, Decree 2020-983 represents an economic interest to all the players in the French television market, in particular by allowing advertisers to use location criteria to target TV viewers, in order to prevent them from being

subjected to climatic hazards that they cannot control. Furthermore, aggregated location is a targeting criteria that is more respectful of consumers' privacy than targeting them according to their Internet browsing history. The decision for an advertiser to launch an advertising campaign is often made six months before the advertisement is aired. This is the subject of a contract between the advertiser and the agency that has been selected for the media plan. French contract law applies. The rates for advertising screens are announced by the television channels two months before the spot is broadcast, and are the subject of a contract between the agency and the television channels' control room. These rates are associated with a theoretical GRP which is guaranteed by the agency based on past audience results. An advertiser can very well obtain the theoretical GRP that he signed with an agency by overpaying or underpaying the rate of the advertising screens, especially in case of climatic hazards. More generally, this article raises the question of revising the advertising schedule of the television market in France, in particular by developing the parametric pricing of advertising screens. Currently, an advertising campaign that is broadcast on a television channel is done with a contract that will be based on past audience performance (5-6 months before, 1 year before, 4 years before...). Forecasting models are specific to each agency. Taking into account past weather data would increase the accuracy of these forecast models. This revision of the advertising calendar would make it possible to develop parametric insurances (that is to say insurances linked to an objectivable parameter such as a climatic index (temperature, rainfall...)) for the actors of the television market, similar to what is practiced in agriculture or in the tourism sector.

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