

Lazily Informed: Consumer Inertia and News Diets*

Paul O. Richter[†]

October 13, 2024

Abstract

This paper studies the effect of entertainment shows on the propensity to watch the news through viewers' inertia on channel choice. It uses the legally-induced cancellation of the game-show *Pasapalabra* in 2019 to study audience inertia around news-broadcasts. The cancellation of this popular show is estimated to have decreased news audience by about 28% on the largest Spanish news broadcast, which was emitted on the same channel directly after the cancelled show. This paper proposes a dynamic discrete demand model for audience with consumer inertia to show the impact of entertainment programming on subsequent news broadcasts. It employs a detailed clicker panel-dataset to disentangle heterogeneous consumer preferences from inertia. Additionally, it uses data from the 2019 Spanish national elections that happened before and after the cancellation to provide suggestive evidence that the decrease in viewership of Telecinco's news broadcast can be associated to a decrease in voter participation.

Keywords: Consumer Inertia, Media, News, Voter Participation, Demand Estimation

Preliminary draft, please do not circulate.

*Acknowledgements to be added.

[†]UPF & BSE, E-mail: paul.richter@upf.edu

1 Introduction

The news media play a crucial role in modern democracies by informing and shaping the opinions of citizens, who use information from the news to decide on who will govern them. Different news media outlets vary in both political slant as well as in quality. There is a growing body of literature that documents that the choice of where someone informs themselves (if at all) may have a large impact on his/her future political decisions (e.g. Mullainathan and Shleifer (2005), DellaVigna and Kaplan (2007) Gentzkow et al. (2015) Gerber et al. (2009) Enikolopov et al. (2011)).

In day to day life, people often passively continue with a given activity until they actively make a decision to do something else. This type of behavior is especially prevalent in media contexts with news, such as watching TV or scrolling through social media. While consuming content people are making the decision to continue watching the current channel, often passively. In this paper, I study the implications that this inertia has on how and where audiences inform themselves in the context of Spanish TV. I show that through viewing inertia, non-political entertainment TV shows have a large effect on how people inform themselves.

In Spain around 89% of the population still regularly watches TV today. Additionally, according to political surveys, TV news is still the most used source of information in Spain. Therefore, changes in the TV market, even to non-news programming, can have large impacts on how people inform themselves. Over the last years, streaming services and other entertainment products have led to a decline in TV viewership. People who watched news due to their viewing inertia, may now become less informed as they switch the entertainment options without news (or without cross-programming inertia). Therefore, it is critical to study TV inertia, in order to fully understand what effect this transition has on the population's news diet.

In the setting of media demand, correlated preferences for content can be erroneously interpreted as structural state-dependence Heckman (1981). It is important to properly

identify the strength of state-dependence in choices, if one wants to predict how viewers will react to changes in the market. Most changes in programming are endogenous to consumer preferences, so many situations lack the sufficient variation needed to disentangle inertia from preferences. In this paper, I use a change in programming legally enforced as a result of a copyright lawsuit. The copyright claim was made by a company not competing in the Spanish market, making it reasonably exogenous to viewer preference shocks. The cancelled show was the most popular show in the time-slot preceding the main national news broadcasts. Using minute-level individual level panel data of of Spanish viewers, I am able to estimate the level of viewer inertia in the Spanish market, controlling for individual preferences. Additionally, I am able to estimate the effect the cancellation had on the news broadcast in the following time-slot, which is the most watched news broadcast in the country.

The effect that this shock had on news watching behavior provides a unique opportunity to study the effect of news watching behavior on political outcomes. The cancellation of the popular show was a result of a copyright infringement claim coming from a British media conglomerate, and is reasonably assumed to have no political motivation. The cancellation happened in between two Spanish national elections. This allows me to use geographical variation on market penetration, to see whether the shock and its possible impact on news watching behavior was related to political outcomes such as voter turnout.

The rest of the paper is organized as follows: Section 2 discussed related literature, Section 3 describes the setting of the analysis, Section 4 reviews the data used, Section 5 performs reduced form analysis on the effect of the shock on viewership, Section 7 looks at political outcomes, Section 6 estimates viewer inertia using a structural demand model and includes various counterfactuals regarding news watching behavior, and Section ?? concludes.

2 Literature

This paper is related to the literature empirically estimating consumer inertia. Both economics and marketing literature has studied the tendency of consumers to repeat consumption choices from one time period to the next. This phenomenon has been documented in the literature as early as Frank (1962) and Massy (1966). Heckman (1981), differentiated between two possible explanations for inertia: *structural state-dependence*, where the state (choice) in one period directly affects subsequent periods; and *spurious state-dependence* where inertia is observed in the data due to serially correlated preferences and heterogeneity in preferences amongst consumers. It is very important to distinguish between these two mechanisms, since they have drastically different implications when doing counterfactual analysis.

Dube et al (2010), use consumer purchase data to differentiate between different possible mechanisms behind inertia. They estimate a random utility model, allowing for heterogeneity in consumer's preferences. Similar to this paper, and to many models in the literature, they model structural state-dependence using a lagged choice indicator, and assume that consumers are myopic in their decisions¹. Dube et al (2010) model consumer heterogeneity with great flexibility by using mixed normal distributional assumptions on consumer preferences, and estimate their model using a bayesian approach. In this paper, I account for consumer heterogeneity by estimating preferences coefficients for every consumer in my panel. This is similar to the approach utilized in Dubois et el (2020). In contrast to Dube et al (2010), this allows me capture consumer heterogeneity, without making any distributional assumptions on preferences.

There are many other recent papers that estimate inertia. This often takes other names such as brand loyalty or switching costs. Inertia has found to be relevant in many industries such as consumer packaged goods (Shum 2004, Dube et al 2010), health insurance (Handel

¹Consumers are assumed to not take into account the affect of their purchase on future purchases and utility through inertia.

2013), auto insurance (Honka 2014), consumer electricity markets (Hortacsu 2017). Bronnenberg et al. (2012) and Eizenberg and Salvo (2015) study habit formation in the soft drink market. Shcherbakov (2016) uses aggregate data to estimate switching costs in cable television subscriptions. Mackay and Remer (WP) estimate inertia in gas stations and show the importance of including inertia in merger counterfactuals².

This paper also relates to literature estimating television demand using discrete choice models. Wilbur (2008) estimates consumer preferences using a random coefficient logit model from Berry et al (1995). He further studies the advertiser side of the market to study how channels combine advertiser and viewer preferences when choosing what content to emit. Ivaldi and Zhang (2022) and Ivaldi and Zhang (2021) estimate audience demand for the French free-to-air TV market using a nested logit demand model from Berry (1994). Their papers study the effect of a merger on the advertiser side of the French TV market. To the best of my knowledge, there is no paper that uses random utility discrete demand models to study consumer inertia in the television industry.

The shock to programming in this paper, is unrelated to the content of the News, however, it affects the news diet of a sizable portion of the Spanish population. This provides a unique setting to test the effect of TV-news on political outcomes. This contributes to the literature studying the effect of differing TV-News on political decisions (DellaVigna and Kaplan 2007; Enikolopov, Petrova, and Zhuravskaya 2011). Additionally, in this paper, I present a new mechanism for how non-News programming may have an impact on political outcomes. Durante et al (2019) show that the introduction of Mediaset's entertainment TV in Italy was related to tendencies to vote for Berlusconi's populist party. However, they do not consider the effect this had on audience news consumption through consumer inertia.

²This is just a small subset of papers that empirically estimate consumer inertia

3 Setting

3.1 General Market Characteristics

Free-to-air TV remains one of the main forms of media consumption in Spain, with around 85% of the adult population watching TV on an average day in the time frame of the analysis. An even larger portion, 96% of the adult population, watches TV at least once a month³. On any given day, the peak viewership is between 8pm and midnight. The TV News programs of the most popular channels are broadcast towards the beginning of primetime, around 9 pm. TV News is still the most widely used medium for political information in Spain today; it is relied on more than radio, social media, or the traditional press in either print and digital formats.⁴

Consumers can choose between close to a hundred different channels free of charge. Despite this large selection, only a handful of channels capture the majority of the audience share. Many of these channels are commonly owned by a small number of large media conglomerates. The two largest media conglomerates are Atresmedia and Mediaset España. The channels that belong to either Atresmedia or Mediaset capture more than half of all viewership. The majority of this 60% market share can be attributed to the 4 main private TV channel; Mediaset España controls Telecinco (14%) and Cuatro (6%); Atresmedia controls Antenna 3 (12%) and La Sexta (7%). In addition to the big private channels, the Spanish TV market also has public TV on both the regional and national level⁵. The national broadcasting agency captures 17% of the market, with the majority of that coming from their main channel, La 1 (10%). Regional channels capture about 10% of the national viewership, however, the tendency for viewers to watch regional channels has some geographic variation. In Catalonia, for example, the Catalan TV channel, TV3, is the most watched channel with a market share of over 14% viewers in the region. A table with more detailed market shares

³These numbers refer to the propensity to watch TV on a physical TV set.

⁴From CIS Political Survey

⁵Regional channels make content tailored to regional audiences, however, they are still available to all viewers across Spain.

can be found in Appendix A (Section: 7.5).

3.2 National TV News Broadcasts in Spain

The three most watched TV news broadcasts in Spain are the evening news of La 1, Antenna 3, and Telecinco. All three channels start broadcasting their evening news around 9pm. During the time of the analysis, no major change was made to news anchors, or the format of the news on these channels. The aim of this paper is to find what impact the programming before the news has on TV news consumption using the forceful cancellation of the popular TV show Pasapalabra.

3.3 The Cancellation of Pasapalabra

Before October 2nd, 2019, Telecinco broadcasted the show Pasapalabra right before their news programming every single weeknight⁶. Pasapalabra was, by far, the most successful show in its programming slot, with average daily viewership numbers of over 3.5 million viewers (nearly 10% of the Spanish population)⁷. Pasapalabra is a game show consisting of two parts: in the first part two contestants complete different challenges to win time for the second part; in the second part contestants are given hints and must guess words starting with each letter of the alphabet in the limited time they earned in the first part. This format allows viewers to enjoy watching the show, even if they missed prior parts of the show. It is common for viewers to only watch the second part of the show, with the peak viewership occurring in the last 10 minutes⁸.

The success of the show drew the attention of the British media company ITV Global, who sued Telecinco for copyright infringement, claiming Pasapalabra violate the copyrights of the British TV show “The Alphabet Game.” This case went all the way to the Spanish

⁶The show is purely made for entertainment purposes, and does not include any information related to current political events.

⁷On record breaking days, viewership numbers reached almost double this amount.

⁸Aggregate viewing patterns are discussed in more detail in the data section below

Supreme Court, who forced Telecinco to cease all broadcasts of Pasapalabra less than a week after the ruling. In response, Telecinco had to find a show to fill the broadcasting slot of Pasapalabra. The show replacing Pasapalabra, “Salvame Banana”, was not nearly as popular, causing an exogenous change in programming quality. This new show, was a show that already existed, but was usually shown at a less competitive time-slot. Other large competing channels, such as Antenna 3, La 1, and La Sexta, did not change their programming as a response to the change in Telecinco Programming. Creating new shows and large programming changes usually requires months of prior planning. After the shock, the resulting programming changes remained unchanged for the remainder of the year. This cancellation provides a shock to programming which is reasonably unrelated to unobserved audience demand characteristics. In the following sections, I use this programming change to estimate the impact that popular programming can have on the viewership of subsequent TV news programs.

4 Data

In my analysis I use datasets on the Spanish TV Market from Kantar Media for the months of September to December for 2017, 2018, and 2019. This data contains high frequency information on both the channels and viewers.

For viewership, the data consists of minute by minute viewing behavior for a panel of viewers over time. It tracks the minute-level viewing behavior of over 10,000 viewers over the time-period of the dataset, as well as the demographics of the viewer at a daily level⁹. When an individual watches multiple channels in a minute, the data attributes the viewing behavior to the longest watched channel in that minute. Additionally, this data includes individual viewer weights, which are calibrated in order to be able to aggregate viewer behavior to estimate national viewership behavior. The data collection process is very rigorous; viewers

⁹Demographics characteristics that change over time, such as age or education, are recorded at a daily level.

are contacted anytime there seems to be any anomalous viewing behavior to confirm whether data was collected accurately¹⁰.

For channels, the data consists of second-by-second¹¹ programming data for the whole time period of the dataset for all channels available in the Spanish free-to-air TV market. This includes the title of the programming as well as a classification of the programming into different genres. Within each genre, it further classifies the programming into different specialties, and within each specialty it classifies the data further into different sub-specialties. In addition, the programming data also contains advertising data for the different channels. This includes information on what companies are advertising, when, on what channels, and for how long. The second-by-second channel data is aggregated to the minute level, in order to later match it with the minute-level viewing data

4.1 Descriptive Overview of the Shock

On a typical weeknight in 2018 and 2019, Telecinco showed their news from 9:10 to 9:40. The first 10-15 minutes of the News typically contain a short 1-2 minute summary of the news followed by reports on political events. Later sections of the news then cover weather, sports, and cultural issues. In 2018, Telecinco broadcast Pasapalabra before the News, with the important “disc” section of the show starting after the 20:30 - 20:45 advertisement break. In 2019 after the cancellation, Telecinco broadcast the show Salavame instead. One can see the effect of the shock on the general trends in Telecinco’s viewership of a typical weeknight in Figure 1 below. The figure shows the average minute-level viewership in comparison to 20:00 for the month of November¹².

Pasapalabra was cancelled at the beginning of October 2019, so the viewership in Novem-

¹⁰Erroneous data is not included in the dataset, creating an unbalanced panel. The weights of individual is adjusted accordingly to maintain accurate estimates of aggregate viewing behavior

¹¹This means the data contains channel information at any given second of time in the period of the dataset.

¹²Differences with respect to 20 are taken in order to remove the slight differences in overall television viewing between 2018 and 2019, and focus on viewers’ channel switching behavior. The main effect of the shock happens after the 20:30 ad-break, which is the second part of Pasapalabra, where contestants attempted finishing the Alphabet Disc.

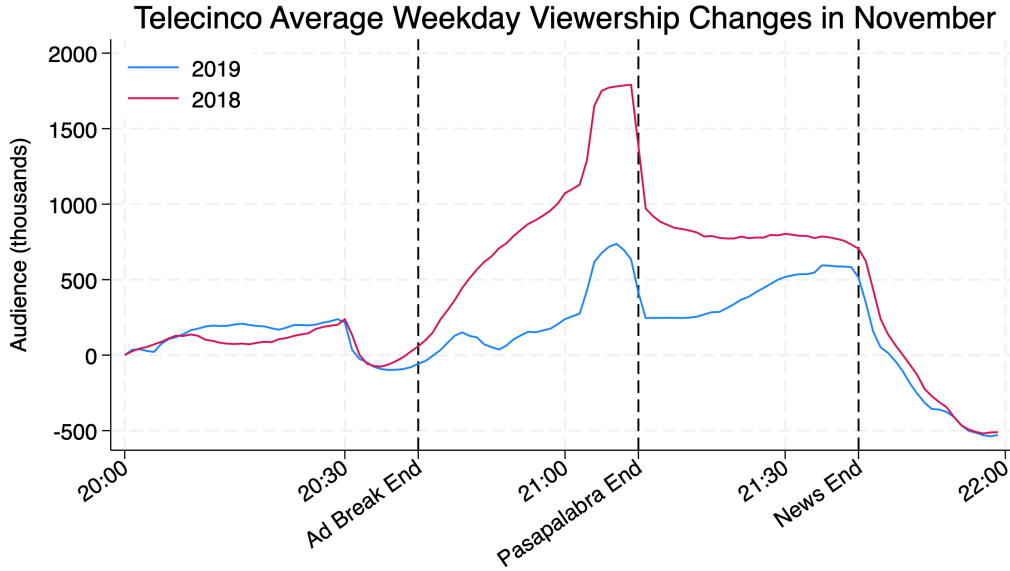


Figure 1: Minute-by-minute Telecinco audience averages of Nov 2018 and Nov 2019 (difference with respect to audience at 20:00)

ber 2019 should give an idea of consumer behavior once viewers have adjusted to the new equilibrium¹³. Additionally, November was the month of the Spanish national elections discussed in Section XX. Before the 20:30 ad-break, Telecinco’s viewership followed a similar pattern in 2019 than in 2018. However, after the ad-break, one can see a huge relative drop in viewership in 2019. At 21:00, there is jump in viewership in both years. This is most likely due to viewers switching to Telecinco from shows that ended at 21, or have ad breaks during this time¹⁴ The overall spike in Telecinco viewership in 2018 between 20:40 and 9:10 corresponds to the time of the Alphabet disc. The difference in viewership between 2018 and 2019 carries over into the time-period of the news broadcast at 21:10. In November, 2019 news viewership was lower than 2018 news viewership. There was no notable change in the format of the Telecinco News broadcast, so the drop in News viewership appears to be driven mainly by the drop in viewership from the previous programming. In 2019, viewership steadily increased during the News time, especially towards the end of the broadcast. How-

¹³October’s viewership patterns are qualitatively identical and can be seen in the appendix

¹⁴None of the main News channels shows have longer advertising breaks at this time, however, many medium and small channels such as Cuatro and La Sexta show ads at 21.

ever, this increase happened more towards the part of the news broadcasts focusing on soft news and weather. At the end of the news broadcast at 21:40, many people switched away from Telecinco. This switching behavior shows that viewers are still actively consuming TV and don't just have the TV running in the background. The large difference in audience during the news appears to come from the shock to the previous programming and consumer inertia. Generally, consumers who aren't engaged in the content would not switch in general, and would therefore not contribute to any of the changes shown in the figure.

The viewer patterns in Figure 1 described above are qualitatively the same for October and December¹⁵. Additionally, unlike the months after the shock, viewer switching patterns for September¹⁶ are qualitatively identical in 2018 and 2019. This further indicates that the differences are likely to be the result of changes in pre-news programming. This also indicates that 2018 viewership may be a good control for viewership in 2019¹⁷.

¹⁵The equivalent figures for November and December are included in the appendix

¹⁶The equivalent figure for September is included in the Appendix

¹⁷Other than the cancellation of Pasapalabra, the main three TV channels, which also have news broadcasts, did not have any other programming change.

5 Reduced Form Analysis

In this section, I estimate the impact the cancellation of Pasapalabra had on the news watching behaviors of Spanish consumers. In the first part of this section, I estimate the drop in viewership of Telecinco, the channel that was showing Pasapalabra before the cancellation. I consider both the time frame where Pasapalabra was shown, as well as the time slot of the news broadcast that was emitted directly afterwards. At the end of the section, I estimate the effect of the shock on other channels, including the remaining mainstream news channels; this shows the substitution patterns of viewers, as well as the effect of the shock on viewership of mainstream TV news broadcasts.

5.1 The Effect of the Cancellation on Telecinco Viewership

This section estimates the overall effect that cancelling Pasapalabra had on the viewership of Telecinco, the channel that originally emitted Pasapalabra. In order to estimate the effect of the shock, I compare viewership after the shock to a counterfactual level of viewership absent the shock. This counterfactual level of viewership is constructed using viewership time trends from the year before, 2018, as well as other variables effecting television viewership, such as weather¹⁸ and football games.¹⁹ With the exception of the cancellation of Pasapalabra, all of the leading channels broadcast the same programs at the same time periods across both years during the months included in the sample, at the time surrounding the prime time news. The average minute by minute trends for Telecinco in September are extremely similar between 2018 and 2019, as seen in Figure 8 in the appendix. I test the robustness of this approach by applying it to Telecinco viewership on weekends, whose programming was unaffected by the Pasapalabra shock.²⁰ The event study specification shows whether this

¹⁸Weather variables, including rain, wind, and temperature, are matched to observations by the day of the observation and the province of the viewer.

¹⁹In Spain, the football (soccer) games of the national team are broadcast on the public channel and often happen at the same time as the prime time news. There is a significant change in viewer behavior during these games.

²⁰Pasapalabra was only shown on weekdays, and weekend programming was not changed as a result of the cancellation. On weekends, where there were no programming changes, there was no significant difference

counterfactual matched observed viewership closely in the weeks before the shock and shows the effect of the shock over time in the weeks following the cancellation.

5.1.1 Specification

The estimation of the effect of the shock on a given time slot is done using individual daily viewing data with the following specification:

$$W_{it} = \alpha + \beta \mathbf{1}_{Shock} + \psi T_t + \gamma X_{it} + I_{it} + \varepsilon_t. \quad (1)$$

$$W_{it} = \alpha + \sum_{\tau=35}^{52} \beta_{\tau} \mathbf{1}_{\tau}^{2019} + \psi T_t + \gamma X_{it} + I_{it} + \varepsilon_t. \quad (2)$$

Equation (1) estimates the average effect of the shock across all treated weeks and Equation (2) is an event study which estimates the magnitude of the effect of the shock week by week²¹. The dependent variable W_{it} is the proportion of the time-slot that a specific viewer i watched Telecinco on day t . Vector I_{it} contains individual viewer fixed effects; the baseline results use individual by day-of-week fixed-effects to control for each individuals viewing patterns across different weekdays. Vector T_t , contains time controls; the baseline specification includes year fixed effects and week of year fixed effects. Vector X_{it} , contains other factors that are related to changes in TV watching behavior, such as whether there is a national football game or the weather in the province of the viewer on the day of the observation. In equation (1), $\mathbf{1}_{Shock}$ is an indicator of whether Pasapalabra is cancelled. The analysis uses all viewers in the panel, even the ones that never watched Telecinco. It also includes all observations where viewers are not watching television at all. The coefficient β captures the average treatment effect across all possible viewers, even the ones choosing to not watch television. Therefore, the coefficient can be interpreted as the average percentage drop in Telecinco viewership across the entire viewing population²². In equation (2), the indicators, $\mathbf{1}_{\tau}^{2019}$, are 1 for week τ in

between the viewership predicted by the counterfactual and actual viewership.

²¹Weeks are defined so that the first day of the shock happens at the beginning of the week.

²²In Spain in 2019, 96% of the population above the age of 15 watched TV on a physical TV set at least once a month. The viewer panel data is constructed so that the adults in the panel are to representative of

2019. They estimate the average difference in viewing behavior between a given week in 2019 and the counterfactual, predicted viewing behavior.²³ In the weeks before the shock, these coefficients should be insignificant if the counterfactual predicts actual viewing behavior well. In the weeks during the shock, these coefficients estimate the effect of the shock during that week in 2019.

5.1.2 Estimated Changes in Telecinco Viewership

The results of the specification shown in equation (1) applied to Telecinco viewership are shown in the Table 1. The first column shows the estimated percentage point drop in average viewership for Telecinco in the 10 minutes preceding the news. As seen in Figure 1 above, these ten minutes are the peak viewership time for the Pasapalabra program, with many viewers switching to watch only this section of the show. I also focus on this time slot directly preceding the new, since it is the relevant slot to see the what portion of the shock carries over into the news slot²⁴. The second column shows the estimated percentage point drop in average viewership for the first part of Telecinco’s news broadcast, which includes a summary of the news as well as the main political news for the day. By comparing the two numbers, one can see the portion of the shock that carries over to the news slot.

In the first column of Table 1, one can see the estimated drop in viewership in Telecinco’s pre-news programming is 2.44 percentage points of all possible viewers above the age of 14. This is the estimated drop in average watch time for all of these Spanish television consumers on a given day, *not conditional on watching TV*²⁵. This would imply a drop in

this 96% of the adult Spanish population.

²³The observations used for the analysis are on a daily level. However, a subset of viewers do not watch TV daily and tend to watch TV on certain weekdays more than others. Coefficients on a daily level would therefore suffer from selection effects and depend on the subset of viewers that watch TV on that weekday. By focusing on week level effects, the specification better captures the average effect across all viewers over an average week without selection coming from weekday viewing habits.

²⁴Viewers who switch to Telecinco early purely to view the news would also be included in this time slot. However, viewers that have no interest in the previous programming should not be effected by the programming shock, and therefore would not change before and after the shock. This means they would be included in the predicted counterfactual viewership and not effect the coefficient of the shock indicator.

²⁵Consumers who don’t watch TV on a day are included to also capture viewers choosing to not watch

Changes in Average Weekday Telecinco Viewership (% of all Viewers Aged 15+)

	Before News	News
Programming Shock	-2.4401*** (0.0617)	-1.8949*** (0.0598)
Week FEs	✓	✓
Year FEs	✓	✓
Football Match FEs	✓	✓
Weather Controls	✓	✓
Viewer X Day of Week FEs	✓	✓
R-squared	0.4325	0.3981
Number of individuals	15,863	15,863
Number of observations	1,847,825	1,847,825

Note: This table shows the estimated changes in average viewership over all possible Spanish TV viewers above the age of 14 for weekdays. The programming shock variable captures the estimated change in viewership during the time period where Pasapalabra was cancelled. The left column shows estimated change in average viewership for the time slot before the News, which showed Pasapalabra before the cancellation. The right column shows the estimated change in viewership for the first part of the news, which was shown directly following the time slot where Pasapalabra was shown. Observations are at an individual by day level. The outcome variable is in terms of average market share of all possible viewers, including those choosing not to watch TV on a certain day. *** : $p < 0.01$, ** : $p < 0.05$, * : $p < 0.1$.

Table 1: Baseline Results

average viewership of about 1 million people aged 15 years or older.²⁶ This is the average effect across all weekdays.

In the second column of Table 1, one can see the estimated drop in viewership Telecinco’s news broadcast is 1.89 percentage points of all viewers. As above, this is the average drop on an average weekday across all consumers. This coefficient would suggest a drop in average viewership of about 730,000 people²⁷. Using the estimates from the analysis, I compare the predicted viewership expected absent the shock, to the actual viewership. The estimates state that the cancellation lowered the viewership of Telecinco’s news broadcast by 28% of what would have been expected absent the shock²⁸. This is a very large drop in viewership on the largest Spanish national news channel. Comparing the size of the shock to the American News context, the size of the drop in viewership is larger than the total average prime time TV due to the shock

²⁶The Spanish population aged 15+ in 2019 was 40 million. Of this subsection of the population, 96% watched TV on a physical TV set at least once a month. Of this population, there was an average drop of 2.44% during the peak viewing time of the programming preceding Telecinco news.

²⁷Calculated just as in the previous footnote

²⁸This was calculated in the following way $\frac{\Delta\text{shock}}{T5\ \text{News Viewership During Shock} + \Delta\text{shock}}$

viewership of Fox News, CNN, and MSNBC combined in the same year normalizing for total population size²⁹.

Comparing the sizes of the drop from one period to the next is very indicative of the level of inertia present in this context. The drop in T5 news viewership is 78% the size of the drop in viewership in the previous slot. This suggests that consumer inertia plays a very large role in television audience.

5.1.3 Placebo Test

Although, there was no change to the format of Telecinco's news broadcast, nor to the other main competing channels, there may still be other factors driving the results. Pasapalabra was broadcast only on weekdays. Therefore, the analysis above uses only weekday observations. Telecinco's news broadcast on the weekends was not preceded by Pasapalabra, so its audience should not change during the time of the shock. To test the validity of the analysis a placebo regression was done, repeating the analysis for the weekend news time-slots, instead of weekdays. The results of this placebo test can be found in Table 2 below.

When only focusing on the weekend time-slots the coefficients indicating the time period where Pasapalabra was cancelled become statistically indistinguishable from 0³⁰. This shows that it is unlikely that there was any other specific taste shock to Telecinco News that drives the main result. It also supports the validity of the counterfactual control, since, there was no statistical difference between predicted and actual viewership on untreated days in 2019 for Telecinco news broadcasts.

²⁹According to Pew Research, average primetime news viewership in 2019 for Fox News, CNN, and MSNBC was 1.92, 1.05, and 1.25 million viewers respectively. According to the US Census, the American population above the age of 14 in 2019 was 267 million. This would imply an average viewership of 1.58%. The actual proportion of viewers is even lower since the viewership numbers include viewers below the age of 15.

³⁰Not only do the coefficient become insignificant, they also shrink by more than 10 fold in magnitude

Changes in Average Weekend Telecinco Viewership (% of all Viewers Aged 15+)

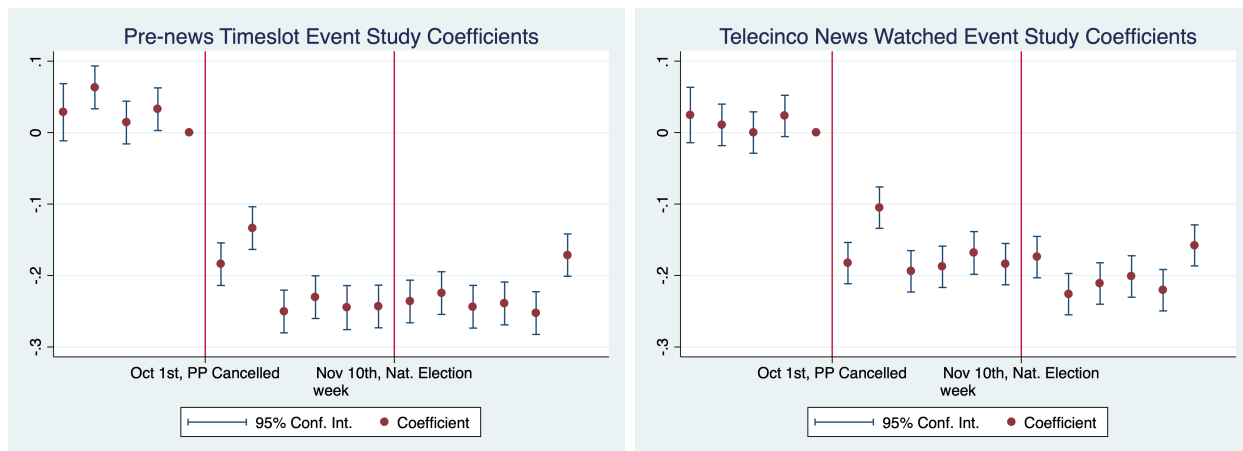
	Before News	News
Placebo Programming Shock	-0.0516 (0.0813)	-0.1323 (0.0857)
Week FEs	✓	✓
Year FEs	✓	✓
Football Match FEs	✓	✓
Weather Controls	✓	✓
Viewer X Day of Week FEs	✓	✓
R-squared	0.3146	0.3113
Number of individuals	15,863	15,863
Number of observations	755,514	755,514

Note: This table shows the estimated changes in average viewership over all possible Spanish TV viewers above the age of 14 for weekends. Telecinco did not show Pasapalabra on weekends, so one would expect weekend viewership to be unaffected by the programming shock. The programming shock variable captures the estimated change in viewership during the weeks where Pasapalabra was cancelled. The left column shows estimated change in average viewership for the time slot before the News on weekends. The right column shows the estimated change in viewership for the first part of the news on weekends. Observations are at an individual by day level. The outcome variable is in terms of average market share of all possible viewers, including those choosing not to watch TV on a certain day. *** : $p < 0.01$, ** : $p < 0.05$, * : $p < 0.1$.

Table 2: Weekend Placebo Results

5.1.4 Telecinco Viewership Event Study Results

In the following figures one can see the event study coefficients for both the Pasapalabra time-slot, and Telecinco News in the time-slot right after. The coefficients preceding the shocks are all close to zero, showing that the counterfactual predictions do well at predicting actual viewership in 2019 in the untreated weeks. After the cancellation of Pasapalabra, there is a very clear drop in Telecinco viewership in both the Pasapalabra time-slot as well as the following Telecinco news broadcast. The drop persists at a stable level for the weeks after the cancellation. This is consistent with what is expected, since Telecinco did not make any further changes in programming after they switched from showing “Pasapalabra” to the shows replacement, “Salvame.”



Note: Graphics showing week level event study coefficients for Telecinco viewership on weekdays. The left figure shows results for the time period right before the news, where Pasapalabra was shown before the cancellation. The right figure shows the time period of the News, corresponding to the time right after the time slot where Pasapalabra was emitted before it was cancelled. The first red line indicates the time where Pasapalabra stopped being shown. The second red line indicates the time of the Spanish national election.

Figure 2: Event study graph for main prime time news channels

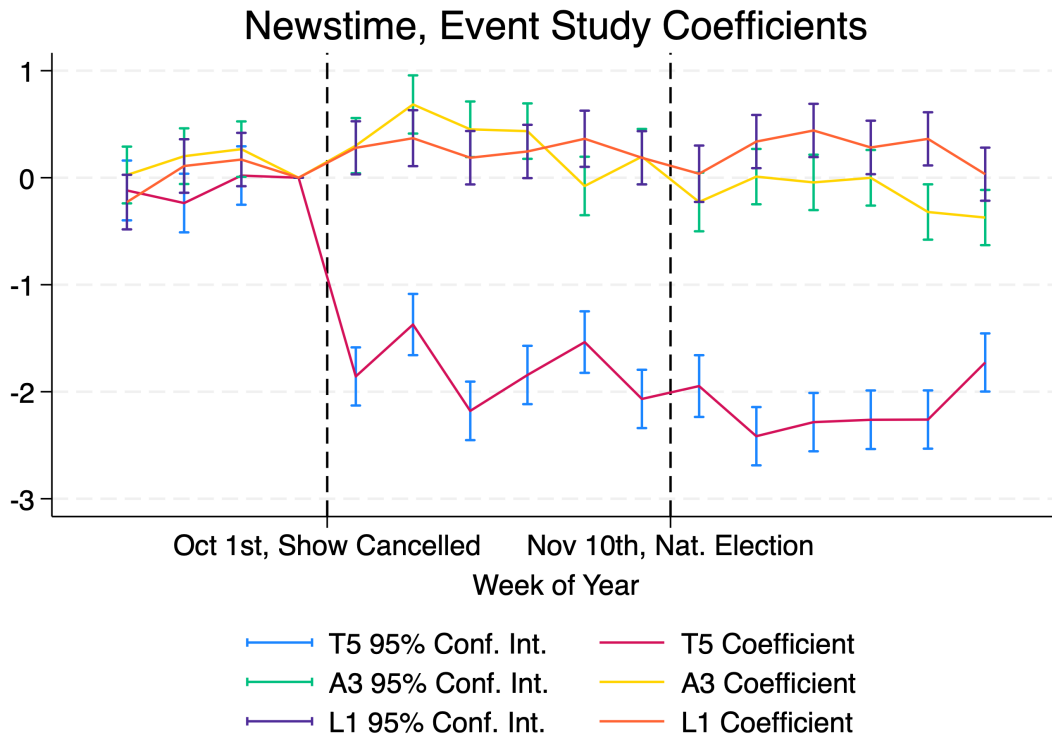
5.2 Changes in Viewership of Other Channels

The results above indicate a clear sustained drop in Telecinco News viewership after the shock. A large portion of the Spanish audience switched from watching the Telecinco news broadcast. In this subsection, I focus on the changes in viewership in other channels. This shows whether viewers switched to an activity other than watching TV, or if they just switched to watching a different channel. Moreover, I look at the changes to other mainstream News channels, to see if people switched to other news broadcasts or if they decreased their propensity to watch mainstream TV news broadcasts.

5.2.1 Event Study of Prime-time News Channels

To analyze the general effect on the shock on the main prime time news channel, I employ the event study specification in Equation 2 above applied to the viewership of the prime time news broadcasts. This specification used viewing trends from the previous year as well as weather and football match controls to predict counterfactual viewership absent the shock. The event study coefficients show the estimates of the deviation of this counterfactual from actual viewership on a weekly level, which captures the effect of the shock. The event study

coefficients for these news broadcasts are depicted in Figure 3 below.



Note: Graphic showing week level event study coefficients for viewership of the main TV news channels on weekdays. The first dashed line indicates the time where Pasapalabra stopped being shown. The second dashed line indicates the time of the Spanish national election. The drop in viewership in Telecinco News is not compensated by an increase in viewership in the other two news programs.

Figure 3: Event study graph for main prime time news channels

The figure above depicts the event study coefficients for the public news broadcast, La 1; Telecinco; and the competing private news broadcast, Antenna 3. In the weeks before the shock, the coefficients for all three news broadcasts are insignificant, showing that the counterfactual predictions do a good job estimating viewership absent the shock. After the cancellation of Pasapalabra, the viewership for the Telecinco news broadcast dropped by around 2 percent of all possible Spanish viewers, as discussed above. However, the viewership of the other two main news broadcasts did not change at the same magnitude. The viewership of the public channel, La 1, increased a slight amount, about a quarter of a percent, in all of the weeks following the shock. The other competing private news channel, also had a slight increase in viewership in the first month after the programming change, however, in the

remaining weeks of the year it did not have a significant increase in viewership. This event study graph shows that the shock had a negative impact on overall viewership of mainstream prime time news broadcasts.

In order to quantify the average effect on the other news channels, I apply the specification in Equation 1 to the other news channels. Additionally, I look at the effect on overall Television viewership, in order to see if viewers are watching less TV during the programming shock, or whether they switch to other channels not showing national news broadcasts. The results are shown in Table 3 below.

Changes in Average Weekday Viewership (% of all Viewers Aged 15+)					
	All TV	A3	TVE1	La Sexta	Cuatro
Programming Shock	-0.1666 (0.1283)	-0.0515 (0.0568)	0.2706*** (0.0546)	0.2422*** (0.0371)	0.1847*** (0.0342)
Week FEs	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓
Football Match FEs	✓	✓	✓	✓	✓
Weather Controls	✓	✓	✓	✓	✓
Viewer X Day of Week FEs	✓	✓	✓	✓	✓
R-squared	0.3820	0.3438	0.3196	0.2012	0.2017
Number of individuals					
Number of observations	1,847,825	1,847,825	1,847,825	1,847,825	1,847,825

Note: This table shows the estimated changes in average viewership over all possible Spanish TV viewers above the age of 14 for weekdays during the News time slot. The programming shock variable captures the estimated change in viewership during the time period where Pasapalabra was cancelled. The first column corresponds overall viewership across all free to air TV channels. The A3 column shows the results for Antena 3 News viewership and the TVE1 column shows results for the public channels News viewership. The La Sexta and Cuatro columns show results for the 4th and 5th most watched channels during the prime time news time slot, which both do not show news at that time. Observations are at an individual by day level. The outcome variable is in terms of average market share of all possible viewers, including those choosing not to watch TV on a certain day. *** : $p < 0.01$, ** : $p < 0.05$, * : $p < 0.1$.

Table 3: Estimates of Other Channels

In the table above one can see that the public channel had an average increase in viewership of 0.27% of all possible Spanish viewers 15 years or older in the time of the programming change. The other large privately run news broadcast, A3, did not have a significant difference in viewership across the time of the programming shock. Overall TV viewership did not differ significantly from the counterfactual predicted viewership in the time period of the shock. This analysis suggests that the programming shock did not have a significant impact

on whether people watched TV or not. Instead it suggests that viewers continued watching TV, with a higher propensity to watch channels that did not emit mainstream national news coverage.

From this analysis, I am unable to make any conclusions about overall information consumption of individuals. Viewers could be informing themselves more using other media, such as online or print media. However, at the very least the analysis shows a significant change in where viewers inform themselves. It is also very plausible that consumers who watch news due to passive choices, would not put in active effort to seek out additional information to offset the decrease in mainstream TV news consumption from the shock.

6 Structural Analysis

In the reduced form analysis above, I show the large effect the cancellation of Pasapalabra had on the news diets of Spanish citizens. It demonstrates that a significant portion of the viewership were watching Telecinco news as a result of viewing inertia and preferences for the preceding show, Pasapalabra, and not just because of their innate preferences for news. This raises the question: across the mainstream prime time news broadcasts, what portion of the audience is attributable to the popularity of preceding shows and viewing inertia? In other words, how many people are watching the news as a result of the preceding shows, instead of their actual preferences for the different news programs? Do viewers actually want to watch the news or are they just not switching away from the news?

In the setting of media demand, correlated preferences for content can often be erroneously interpreted as structural state-dependence Heckman (1981). It is not always immediately clear if people continue watching a channel across shows because of a structural dependence of channel or because preferences for shows on the same channel are correlated. In this section, I employ a structural model to disentangle consumers' viewing inertia from their preferences for news and other programming in order to analyze the role viewer inertia

plays in viewership of prime time news broadcasts.

6.1 Model

Viewers are only able to watch one channel at a time. I model viewers' discrete-choice watching decisions using a random utility framework. I assume that consumer i receives utility $u_{i,c,t}$ from consuming channel c at time t . At any given time during prime-time viewing hours, the consumer faces a choice set $\Omega_{i,t}$. This choice set includes the three main channels³¹, which all show news in the prime time slot, a composite channel capturing all other channel, and the option of not watching free-to-air TV.³² In every single time period, the viewer chooses the option that provides them with the highest utility, given the other options that are in their choice set at that time. Choices are defined on 10 minute time blocks, where the consumers choice is the most watched option in those 10 minutes. Focusing on 10 min blocks ensures that the viewer is consuming a significant portion of the news or other tv-show in their defined choice.³³

The aim of the analysis is to properly identify preferences and inertia surrounding and including prime time news broadcasts in order to see what portion of news viewership is attributable to inertia and the popularity of preceding shows. I focus on choices made between 8:50 and 9:20 to capture in detail the preferences and inertia surroundings the news. In this time period all three of the main channels do not have any significant advertisement breaks.³⁴ Focusing on this time frame allows the model to capture preferences and inertia in the relevant time period while remaining tractable.³⁵ As is standard in discrete choice

³¹These channels are the public channel, La 1, and the private channels Antena 3 and Telecinco. These are the channels with the largest market share.

³²This option includes related activities such as online streaming as well as something completely different, such as grabbing drinks with friends.

³³If a viewer switches to a channel right before a show starts, this would not show up as watching the slot right before the show they were intending to watch. Additionally, if a viewer switches away from a show in the first couple minutes, they would not be registered as watching that show. This also excludes viewers who are just browsing through channels.

³⁴There are no ad-breaks longer than two minutes, and often these channels do not show any ads during this time period. The public channel does not show advertisement by law.

³⁵The model aims to capture heterogeneity and correlations in preferences across all the relevant shows

demand models, I assume that viewers are aware of all the alternatives in their choice set, as well as their preferences for those alternatives. The popularity of the main channels, along with the repetitive nature of their programming in the time period of the analysis³⁶ makes this a realistic assumption.

The utility the consumer, i , would receive from watching one of the main channels during time, t , is modeled as:

$$U_{ict} = \underbrace{\Lambda_{ict}}_{\text{inertia}} + \underbrace{\Gamma_{ict}}_{\text{preference}} .$$

The first part, Λ_{ict} , captures the structural dependence on the previous time-period, and the second part, Γ_{ict} , corresponds to consumer i 's preference/base utility for consuming channel c . Consumers preferences are modelled to be heterogeneous across consumers and time.

One can interpret the inertia component as a threshold for how much more a consumer must like a different alternative over the current channel before they switch. I am agnostic on the underlying cause of this inertia. In the data, there are times where a channel is showing the same programming in consecutive time slots as well as times where one show ends and another begins. Viewers may have a preference for continuity, where they prefer to continue watching a show that they started watching, implying a change in inertia during a show compared to at the end of the show. Once viewers start watching TV on a given day, they have the tendency to continue watching TV in general across all channels. Formally, channel inertia for the main channels is modelled in the following way.

$$\Lambda_{ict} = 1_{ict}^{prev} \left(\lambda^{chan} + 1_{ct}^{show} \lambda^{cont} \right) + 1_{it}^{TV} \lambda^{TV} ,$$

where 1_{ict}^{prev} indicates whether consumer i was watching channel c in the previous period;

in the time period modelled. Looking at a larger time period would require to capture preferences of even more shows, making the model intractable, especially when allowing for correlation between preferences. Additionally, looking at a larger time window would require either assuming viewer inertia to be constant throughout the night, or it would require more complex modeling of how inertia differs in different parts of the day.

³⁶As explained in the sections above, the only programming change from the fall of 2018 to 2019 on the main channels was the cancellation of Pasapalabra.

1_{it}^{show} indicates whether channel c showed that same show in the previous period; and 1_{it}^{TV} indicates whether consumer i was watching TV in the previous period.

The TV inertia component, λ^{TV} , is the same for all TV channels. It only impacts the comparison between TV channels and the outside good; it does not affect utility comparisons between different TV channels. This inertia component captures the general tendency to continue watching TV, once a viewer starts watching. The general channel inertia, λ^{chan} , captures the inertia to stay on one of the main channels. This inertia is incremented by λ^{cont} whenever a channel continues to show the same program. As an example, if a viewer watched Pasapalabra on Telecinco in the 9:00 to 9:10, then in the 9:10 to 9:20 slot they would have an inertia component of $\lambda^{chan} + \lambda^{TV}$ on Telecinco's News and an inertia component of λ^{TV} on all other TV channels. If Telecinco would have continued showing Pasapalabra in the 9:10-9:20 slot, the inertia component would be $\lambda^{chan} + \lambda^{cont} + \lambda^{TV}$, since the show emitted on the channel did not change. Other papers in the literature studying inertia³⁷ employ a similar approach, modeling inertia as an additive component in a random utility choice model. As is done in these papers, I assume that consumers are myopic in their decisions and do not consider the effect of their current choice on their future choices.

The second part of the utility capturing consumer preferences is further broken up into a consumer i 's preference for the show, s , being emitted on channel c at time t and a taste shock, ϵ_{ict} , in the following way:

$$\Gamma_{ict} = \gamma_{si} + \epsilon_{ict}.$$

Each consumer i has show specific preferences for all shows that are emitted on the main channels.³⁸ Additionally, at each time period, t , consumers have an additional taste shock, ϵ_{ict} , for each channel.

There are almost 100 different channels available that with a lower market share much

³⁷E.g. MacKay and Remer (WP), Dube et. al. (2010), Erdem (1996), Johannesson and Lundin (2000), etc.

³⁸The model allows for consumer heterogeneity in preferences for Telecinco News, Pasapalabra, and Salvame, which are all shows broadcast by the channel Telecinco as well as shows broadcast by the other main channels such as Boom!, Antena 3 News, La 1 News, etc.

lower than the main three channels. For the sake of parsimony, minor channels are grouped together into a composite channel with utility:

$$u_{i,C,t} = \lambda^{comp} 1_{i,C,t} + 1_{it}^{TV} \lambda^{TV} + \gamma_{i,C,t} + \epsilon_{i,C,t}.$$

The first term, λ^{comp} , captures inertia of choosing a channel within the group of composite channels. This differs from the previous inertia components, since switching between channels within the group of channels in the composite good is considered as choosing the same option. Additionally, consumers may exhibit a different level of inertia for less popular channels. Since watching the composite good is still watching TV, the composite alternative also has the same TV inertia component, λ^{TV} as the main channels. The last two terms capture an individual's preferences for the composite channel. The penultimate term, $\gamma_{i,C,t}$, is constant across days for an individual within a given timeslot and captures fixed preferences for shows on the composite channel for a given viewer i . The preference for the composite good, $\gamma_{i,C,t}$, is allowed to change across time slots, and captures trends in general attractiveness of the composite good across time slots. The last term, $\epsilon_{i,C,t}$, captures choice specific taste shocks for the composite channel.

The utility of not watching any television is

$$u_{i,0,t} = \beta^0 X_{0,t} + \epsilon_{i,0,t}.$$

The first term captures the value of alternative choices to watching TV. The vector X_0 includes the weather, the time slot, the day of the week, the month of year, and the year. This captures seasonal changes to the propensity to watch television as well as within week habits of watching television.

6.2 Estimation Procedure

In the model above individual viewers' inertia is captured by $\lambda = (\lambda^{chan}, \lambda^{cont}, \lambda^{comp}, \lambda^{TV})$. The differences in the outside good are captured by β^0 . Viewers' have heterogeneous preferences across shows captured by the vector $\gamma_{\mathbf{i}}$, of all of the show specific preferences, γ_{si} , as well as time slot specific preferences for the outside good, $\gamma_{i,C,t}$. Given these preferences and assuming that $\epsilon_{i,0,t}$, $\epsilon_{i,C,t}$, $\epsilon_{i,c,t}$ are all independent idiosyncratic shocks independently distributed type I extreme values, this model turns into a multinomial logit. Explicit probabilities that an individual i chooses each alternative in the choice set given the vector of parameters $(\beta^0, \gamma_{\mathbf{i}}, \lambda)$ are shown in the appendix.

In order to do counterfactual calculations about the whole population of viewers, I need to estimate β^0 , λ , as well as the population distribution of the heterogeneous preferences $\gamma_{\mathbf{i}}$. I estimate the heterogeneous distribution of preferences using a finite mixture approach. In the finite mixture approach, I assume there are R finite types of viewers. Each type of viewer, r , occurs with probability p_r and has fixed preferences $\gamma_{\mathbf{r}}$. The distribution of viewers is then summarized by the different preferences of each type $\gamma = (\gamma_{\mathbf{1}}, \gamma_{\mathbf{2}}, \dots, \gamma_{\mathbf{R}})$ as well as their corresponding probabilities $p = (p_1, p_2, \dots, p_R)$.

The model above then has parameters, $(\gamma, p, \lambda, \beta)$ that can then be estimated using Maximum Likelihood estimation. Let $y_{i,t}$ denote the choice of viewer i at time t , and y_i be the vector of all the choices made by viewer i . Then the likelihood of observing the choices in the data of one viewer conditional on his or her preferences is:

$$\mathcal{L}_i(\beta^0, \gamma_{\mathbf{i}}, \lambda | y_i) = \prod_{t \in T_i} P_{i,t}(y_{i,t} | \beta^0, \gamma_{\mathbf{i}}, \lambda)$$

The log likelihood of the total sample, y , is calculated by summing over the finite distribution of types:

$$\mathcal{L}(\gamma, p, \lambda, \beta | y) = \sum_{i=1}^N \log \left(\sum_{r=1}^R p_r \mathcal{L}_i(\beta_r^0, \beta_r, \gamma_{\mathbf{r}}, \lambda) \right)$$

Estimation of the parameters given R is done by numerically maximizing the log likelihood

function. This maximization procedure is repeated at least 100 times at different randomly selected starting points, in order to ensure that the maximization procedure did not end at a local maximum, instead of the global maximum. As R increases, model fit in terms of maximum likelihood will increase. In order to choose the right number of types, without over fitting the model, I chose the R to minimize the Bayesian Information Criterion (BIC), a common model selection tool. This criterion weights gains in the maximum likelihood against the number of additional parameter added to the model.

7 Pasapalabra and Election Outcomes

Given the results in the previous section, the cancellation of Pasapalabra is estimated to have changed the News viewing behavior of a large portion of the Spanish population. This brings the natural question of whether this had any measurable effects on political outcomes. More specifically, this section explores whether the cancellation of Pasapalabra is related to any changes in political outcomes. Pasapalabra itself does not contain current political information. Instead, a possible mechanism³⁹ would be that the cancellation of Pasapalabra has an effect on political outcomes through the change in news viewership through viewer inertia. The first 10 minutes of the national news broadcasts in Spain often focus on national politics. Decreased exposure to this political information and discourse may result in people being less politically active, ei decrease voter participation. Other possible explanations and possible confounding factors are discussed with the results below.

7.1 Election Setting

Telecinco broadcasted Pasapalabra the last time on Oct 1st, 2019. Six weeks later, on November 10th, 2019, Spain held national elections. These were not the first elections that year. In April 2019, Spain had held national elections, however, these elections needed to be repeated in November due to the inability of any party to form a government. In my analysis below, I look at the differences in election outcomes between the April and November election across all Spanish municipalities. This differencing removes any constant, municipality-level effects on the outcome variables from the analysis.

7.2 Pasapalabra Penetration

The objective of this section is to see if Pasapalabra and its cancellation are related to any changes in election outcomes. In an ideal setting, one would have data on an individual level,

³⁹This analysis does not attempt to make any causal claims, the mechanisms discussed are not causally identified

with an both an individual’s daily viewing habits and voting behavior. However, the detailed TV audience dataset does not have information on voting behavior. As a second best option, I use the viewership data to predict the probability of being treated⁴⁰ for every Spanish citizen using their gender, age, province, and the size of the municipality where they reside. Using aggregated Spanish census data on municipal-level demographics⁴¹, I aggregate these individual level predictions to estimate the expected proportion of people in each municipality who regularly watched Pasapalabra. This municipality-level Pasapalabra penetration is then connected to changes in voting behavior after the shock using municipality-level differences in voting behavior.

7.2.1 Estimated Pasapalabra Penetration

I use the viewing behavior of viewers in the months before the cancellation to classify them as Pasapalabra viewers or not and calculate the proportion of viewers who are considered regular viewers in each region. In the analysis below a viewer is a regular viewer if they watched Pasapalabra at least once a week on average⁴². This at the very least should be a good proxy for the overall interest in the Pasapalabra in the area; the results are also robust to different cutoffs for the classifying people as regular Pasapalabra watchers. After classifying the $\tilde{12,000}$ viewers in my dataset who are old enough to vote, I then estimate a logit model using the age, sex, province, and municipality size of the viewer. The results are shown in the table below. As discussed in section above, the typical Pasapalabra viewer is female, older, and living in a rural area or a mid-sized city.

In the map on the right, you can see the geographic variation in Pasapalabra penetration across the different Spanish provinces. There seems to be plenty of variation within Autonomous Communities.⁴³ There also appears to be some relation to the drop in voter

⁴⁰The treated population are people who regularly watch Pasapalabra

⁴¹The closest census data to the shock that is publicly available is from 2021. The ages in the census data were adjusted to reflect this change. However, the higher death rates for the older population may introduce a small amount of bias into the estimates

⁴²I run robustness checks to alternate definitions of Pasapalabra viewers

⁴³In Spain there are 52 provinces which are subsets of 19 Autonomous Communities

	Pasapalabra Viewer
Female	0.4069*** (0.0496)
24 < age < 35	0.6509*** (0.1625)
34 < age < 45	0.7757*** (0.1527)
44 < age < 55	1.3598*** (0.1471)
54 < age < 65	1.8241*** (0.1462)
age \geq 65	2.2088*** (0.1417)
2,000 \leq Mun. Pop. < 10,000	-0.2998*** (0.1123)
10,000 \leq Mun. Pop. < 50,000	-0.2589** (0.1066)
50,000 \leq Mun. Pop. < 200,000	-0.1746 (0.1073)
200,000 \leq Mun. Pop. < 500,000	-0.0610 (0.1212)
500,000 \leq Mun. Pop.	-0.3368*** (0.1280)
Province FEs	YES
Constant	-3.3023*** (0.3119)
R-squared	
Number of individuals	11,671

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

turnout, which is shown in the map to the left. I have a dataset showing how many men

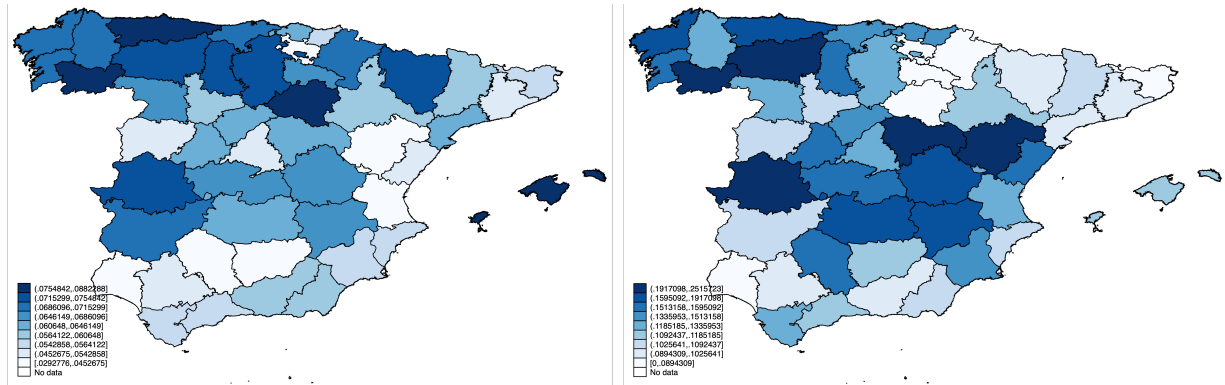


Figure 4: Left: 2019 Drop in Voter Turnout, Right: Pasapalabra Penetration
 Darker shades correspond to a greater drop in turnout and higher Pasapalabra penetration

and women of each age live in each municipality. Using the logit model estimated above, I predicted the probability that each age, gender group within a municipality was a pasapalabra viewer, also using the municipality size and province of the municipality. I then aggregate these predictions on the municipality level to attain a predicted proportion of Pasapalabra viewers within each municipality. The histogram below shows the distribution of the predicted Pasapalabra penetration across municipalities.

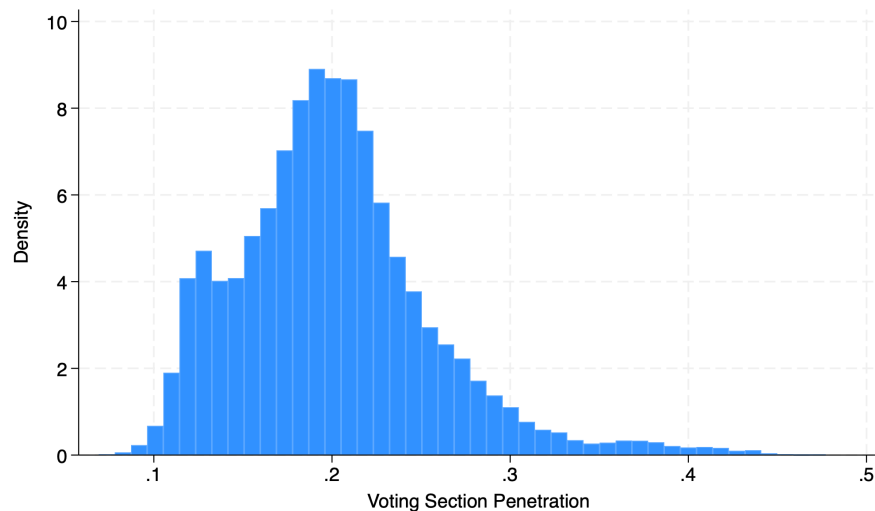


Figure 5: Histogram of estimated Pasapalabra penetration across voting sections in Spain

7.3 Specification

The identification strategy relies on variation in Pasapalabra penetration across different municipalities⁴⁴. If the shock had a larger effect on people who regularly watched Pasapalabra than on those who didn't watch Pasapalabra, then municipalities with higher watch rates should experience a higher aggregate effect. When regressing the proportion of people who are regular viewers onto the difference in vote outcomes, the coefficient of the penetration variable can be interpreted as the difference between someone who is a regular consumer of Pasapalabra with respect to someone who is not classified as a regular watcher of Pasapalabra. The regression below is employed for this difference in difference analysis.

$$V_{m,Nov19} - V_{m,Apr19} = \gamma P_m + \beta X_m + \varepsilon_m,$$

where $V_{m,Nov19}$ is the percent voter turnout in November 2019 in municipality m , P_m is the Pasapalabra penetration in municipality m , and X_m are municipality level controls.

Taking the difference in voter turnout between the November and April elections removes all municipality-level confounding factors that remain constant across the two elections. However, there still may be confounding factors that effect the change in voter turnout from one election the the other. Party dynamics between the elections as well as strategic voting may cause people who originally voted for a certain party change their voting behavior from one election to the next. To control for this, the vote shares of all the major political parties⁴⁵ were individually included. Additionally, the percentage point drop in voter turnout may depend on the voter turnout in the first election, as well as previous elections that happened before the shock. The average voter turnout for each municipality for the three elections prior to the shock are included as additional controls.

⁴⁴More specifically it relies on variation in penetration across provinces combined with variation on age, gender and municipality size across municipalities

⁴⁵This include PSOE, PP, Cs, Podemos, VOX, which accounted for 85% of all votes in the April 2019 election

7.4 Results: Voter Participation and Pasapalabra

The table are the results of the regressing Pasapalabra penetration onto differences in voter turnout. Overall, voter participation dropped in all provinces. There is a strong relationship with the magnitude of the drop and the level of Pasapalabra being watched in the region. Based on the results, one would predict that a regular Pasapalabra viewer would have had a 8.5 percentage point drop in the probability of voting in the November elections after the cancellation relative to an individual who is not classified as a regular Pasapalabra viewer, while controlling for previous voter turnout and political party vote shares.

Regarding voter turnout in the three prior elections, it was positively correlated with the difference in voter turnout. One would expect municipalities with a higher political engagement to have a less severe drop in voter turnout. This would be supported by these results, if one interprets prior voter participation as an indicator for how politically engaged a municipality is.

Regarding the political parties, the difference in voter participation was significantly correlated to the vote share of some of the political parties. The drop in voter turnout was higher in municipalities that had a higher vote share for the center right (PP) and center left (PSOE) parties; these are the largest parties in Spain. The vote share for the far left party (Podemos) and the liberal party (Cs) were not significantly correlated to drops in voter turnout across municipalities. The vote share for the far right party (VOX) was correlated with a low drop in turnout.

TRIPLE DIFFERENCE and discussion on trend vs level mechanisms

USE MOST TREATED 20%

7.5 Changes in Voting Shares of Political Parties

Telecinco news is known to have a centrist editorial bias. The shock may have caused viewers to change their news diet in a way which changes the bias of the news that they consume. This means, this shock may have had an impact on the vote-share of certain political parties.

Difference in Voter Participation, April/November 2019 Elections					
	Pen. Alone	Prev Turnout	Vote Shares	All Cont.	w/o Catalonia
Pasapalabra Pen.	-0.0558*** (0.0038)	-0.0812*** (0.0040)	-0.0474*** (0.0043)	-0.0695*** (0.0044)	-0.0542*** (0.0050)
Prev. turnout		0.0792*** (0.0031)		0.0738*** (0.0034)	0.0709*** (0.0037)
PSOE share			-0.0447*** (0.0019)	-0.0298*** (0.0020)	-0.0274*** (0.0022)
PP share			-0.0243*** (0.0030)	-0.0317*** (0.0031)	-0.0257*** (0.0035)
Podemos share			-0.0137*** (0.0037)	-0.0097*** (0.0035)	-0.0028 (0.0043)
VOX share			0.0591*** (0.0045)	0.0815*** (0.0047)	0.0958*** (0.0050)
Cs share			0.0145*** (0.0043)	-0.0223*** (0.0042)	-0.0222*** (0.0045)
Constant	-0.0467*** (0.0008)	-0.0997*** (0.0022)	-0.0377*** (0.0010)	-0.0874*** (0.0025)	-0.0932*** (0.0030)
R-squared	0.0078	0.0384	0.0454	0.0659	0.0664
N	36,035	35,684	35,471	35,120	30,103

Note: *** : $p < 0.01$, ** : $p < 0.05$, * : $p < 0.1$.

Appendix A.

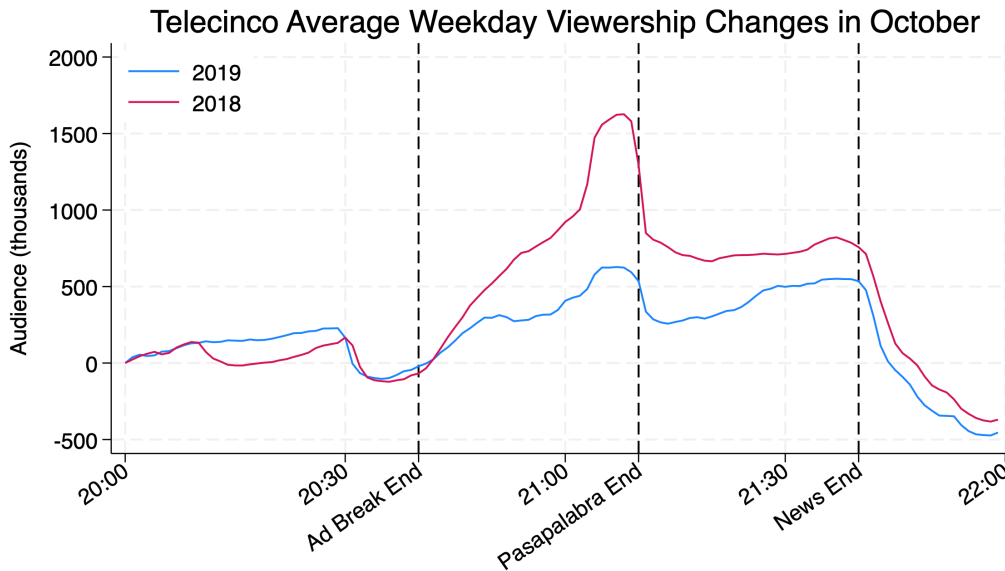


Figure 6: Minute-by-minute Telecinco audience averages of Oct 2018 and Oct 2019 (difference with respect to audience at 20:00)

Telecinco Ad Frequency in November. The proportion of time Telecinco played an advertisement at each minute.

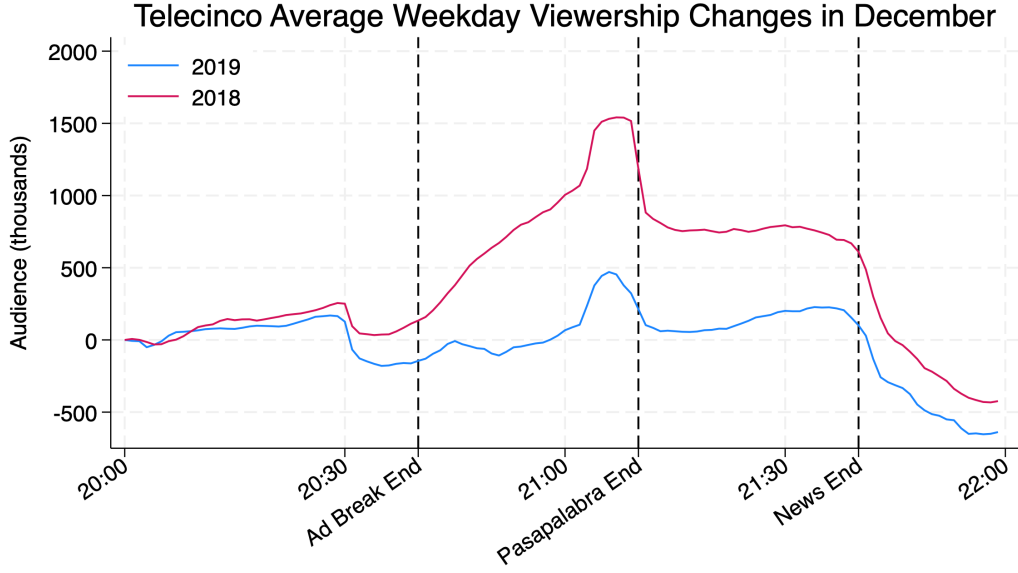


Figure 7: Minute-by-minute Telecinco audience averages of Dec 2018 and Dec 2019 (difference with respect to audience at 20:00)

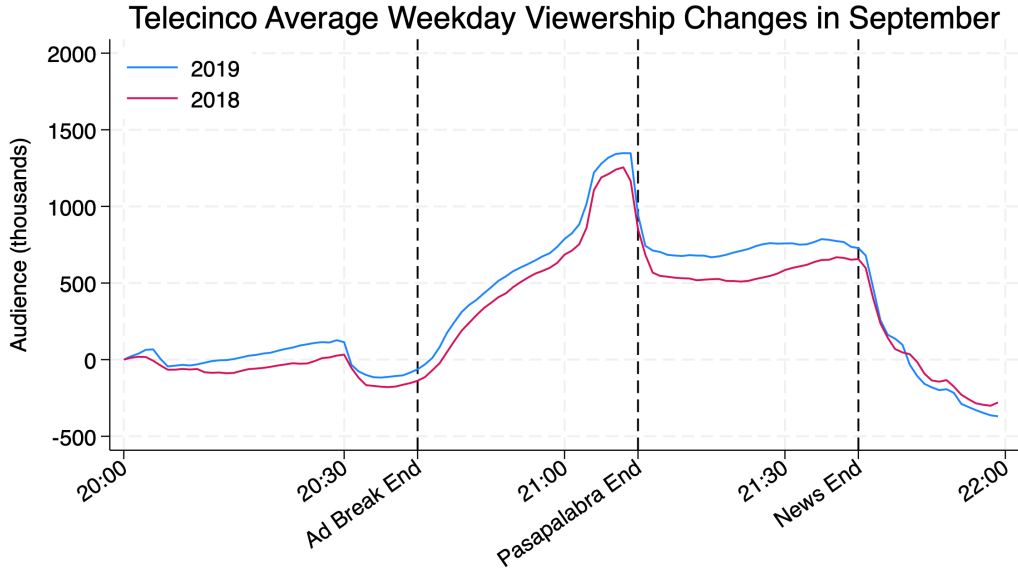
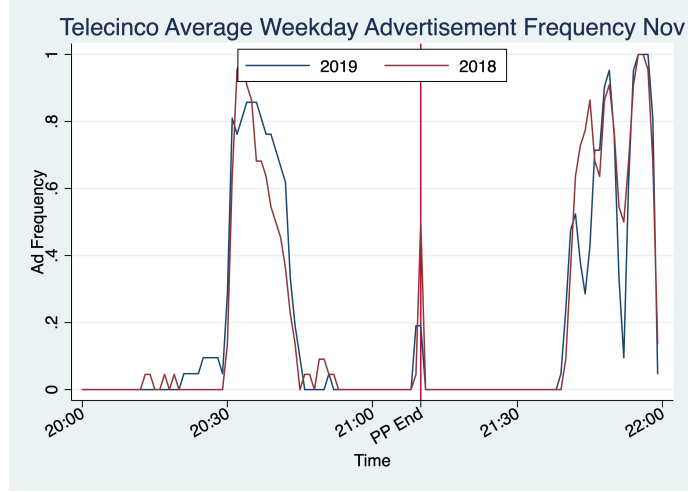


Figure 8: Minute-by-minute Telecinco audience averages of Sep 2018 and Sep 2019 (difference with respect to audience at 20:00)

Appendix B.

The probability of choosing one of the main channels, c , is

$$\mathbb{P}_{i,t}(c|\beta_i^0, \beta_i, \gamma_i, \lambda) = \frac{\exp(\Lambda_{ict} + \gamma_{i,c,t})}{\exp(\beta_i^0 X_{0,t}) + \exp(\lambda \sum_{i,C,t}^v \Lambda_{i,C,t} + \gamma_{i,C,t}) + \sum_{j \in \Omega_{it}} \exp(\Lambda_{i,j,t} + \gamma_{i,j,t})}$$



The probability of choosing the composite channel is

$$\mathbb{P}_{i,t}(C|\beta_i^0, \beta_i, \gamma_i, \lambda) = \frac{\exp(\lambda_3 1_{i,C,t}^v + \gamma_{i,C,t})}{\exp(\beta_i^0 X_{0,t}) + \exp(\lambda_3 1_{i,C,t}^v + \gamma_{i,C,t}) + \sum_{j \in \Omega_{it}} \exp(\Lambda_{i,j,t} + \gamma_{i,j,t})}.$$

The probability of choosing the outside option is:

$$\mathbb{P}_{i,t}(0|\beta_i^0, \beta_i, \gamma_i, \lambda) = \frac{\exp(\beta_i^0 X_{0,t})}{\exp(\beta_i^0 X_{0,t}) + \exp(\lambda_3 1_{i,C,t}^v + \gamma_{i,C,t}) + \sum_{j \in \Omega_{it}} \exp(\Lambda_{i,j,t} + \gamma_{i,j,t})}.$$