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The Impact of Advertising on Consumption: Industry-Level Evidence from European Panel Data

Marco Gambaro[1], Tong Wang[2], Yingchao Zhang[3*]

[1]School of Political Science, Università degli Studi di Milano, Milano, Italy
[2]College of International Relations, Ritsumeikan University, Kyoto, Japan
[3]Business School, Durham University, Durham, UK
Email: *yingchao.zhang@durham.ac.uk

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Abstract

This paper investigates the relationship between advertising and consumption with panel data at the industry level for some European countries. At the macroeconomic level, consumption can increase only if saving decreases. However, the competition effect of advertising is better captured at the industry level, which allows for interaction between firms. We explore possible relationships with a unique dataset of consumption and advertising spending in 27 sectors across 9 years for 5 European Union countries. Our results show that consumption has a significant influence on advertising, but the reverse does not apply. Our findings also suggest that business stealing is the dominant effect of advertising relative to consumption increasing.

Keywords

Consumption, Advertising, Panel Data, Media

1. Introduction

In modern society, advertising has evolved into a critical industry with substantial economic significance. Over recent years, global advertising spending has been on an upward trajectory: reaching $504 billion in 2016, $590 billion in 2018, and $732 billion in 2021, with a minor slowdown in 2020 due to the COVID-19 pandemic. In many countries, advertising represents between 0.5% and 1% of GDP. This increasing trend is predominantly driven by the rise in advertising spending in Asian economies, such as China and India. In 2021, the United States led global advertising spending, contributing $284 billion, followed by China and Japan. According to Zenith (2021), global advertising expenditure as a percentage of world

GDP was approximately 0.77% in 2021, which remains remarkably consistent with the 0.7% - 0.9% range observed during our sample period (1998-2006) in Western Europe. Also, a longitudinal study by Deloitte (2017) covering 1998-2014 demonstrates a consistent multiplier effect in Europe, where every Euro of advertising spend generates roughly 7 Euros of GDP value through stimulated consumption. These findings suggest that while platforms have shifted (e.g., to digital), the underlying economic elasticity remains robust.

Firms invest in advertising with the belief that disseminating product information can promote sales by influencing consumer preferences and persuading customers to purchase the advertised product (Elliott, 2004). This holds particularly true from a microeconomic perspective for specific brands, but at the aggregate level, the relationship becomes more uncertain. Advertising can increase sales through various channels, reflecting diverse perspectives on its effects. It may persuade consumers to purchase a product by altering consumer preferences, effectively shifting the demand curve rightward. Additionally, advertising plays an informative role, reducing search and transaction costs for consumers. Lastly, a business-stealing effect may emerge if advertising primarily shifts sales from one brand to another.

The narrower the framework of analysis, the more apparent the perceived effect of market expansion. If analyzing a single product, the eventual market share effect is captured by expanding consumer demand. However, our results indicate that, at the industry level, the market expansion effect diminishes, with increased consumption of advertised products occurring mainly at the expense of other products within the same category or sector. In contrast, from a macroeconomic perspective, when one product gains market share at the expense of others, all replacement effects cancel out, leaving only a potential role for global demand expansion, which is more challenging to measure. Various studies have observed a positive relationship between advertising and consumption from both macro- and microeconomic perspectives. For example, statistics from the United States (1950-1960) show that advertising increased as the economy expanded and decreased during periods of contraction (Simon, 1970). Hu and Sanyal (2006) analyzed U.S. data from 1900 to 2007 and found that, at the aggregate level, as GDP rises, advertising expenditure increases at a faster rate than GDP growth. Similar results were obtained for Germany (Lischka, Kienzler, and Mellman, 2014) and China (Chan-Olmsted and Su, 2017).

Despite these findings, the debate over whether advertisements influence consumption or vice versa remains unresolved. Both causality narratives seem plausible: consumers may buy more of a brand because increased advertising draws attention and enhances willingness to purchase, holding price constant; alternatively, consumption may drive advertising, as firms are more inclined to advertise when demand for their products increases. Firm-level data show that companies often base their advertising budgets on product sales (Kotler, 1976; Schmalensee, 1972). As a result, empirical analyses examining the effect of advertising on consumption may yield mixed results, where both advertising and consumption

jointly influence consumption (Siegel, Ross, Albers, et al., 2016). Misleading conclusions on the effects of advertising could lead to inappropriate advertising strategies and misguided public policies regarding advertising.

Economics and management disciplines approach this issue with different perspectives and methodologies. In management and microeconomics, advertising costs are viewed as selling expenses that can be redistributed across firms within an industry without influencing total market size. This perspective primarily focuses on consumer behavior, arguing that advertising increases consumption by changing preferences. However, evidence suggests that advertising may impact total demand in a dynamic manner (Molinari & Turino, 2018). In contrast, macroeconomists typically use time-series data on consumption and advertising spending in multiple countries to examine whether advertising spending positively influences consumption. Esteve and Requena (2006) showed that macroeconomic structure significantly impacts the effect of advertising, emphasizing the importance of considering the broader economic context when assessing the effect of advertising.

The literature on the relationship between consumption and advertising dates back to the 1960s (Blank, 1962). Much of the early literature lacked formal models or hypothesis testing (Simon, 1970; Schmalensee, 1972). Microeconomic theories, such as Becker and Murphy's (1993) model, portray advertising as a means to adjust the price elasticity of a product, thereby encouraging consumers to purchase more, even at higher prices. Erdem, Keane, and Sun (2006) used microdata from various TV brands to analyze how advertising influences consumer demand for specific brands. However, empirical studies using microdata typically focus on a single product or brand, limiting the representativeness of findings. Additionally, much of the literature has explored advertising's effects on prices (Rauch, 2013) and market value (Garcia-Zambrino, Rodriguez, & Garcia-Merino, 2018), as well as its potential relationship with economic development (van der Wurff, Bakker, & Picard, 2008). Driver (2017) reviewed the diverse economic effects of advertising. Tuchman et al. (2018), using household level data, showed a jointly determined relationship between consumption and advertising.

A representative body of macroeconomic literature includes studies by Ashley, Granger, and Schmalensee (1980), who tested the causality between advertising and consumption by applying the methodology of Granger (1969). Related works include Jung and Seldon (1995). Research on advertising also discusses the substitutability of different advertising media and its impact on industry growth and broader economic development (Frank, 2008). However, most studies have used data from a single country or industry, presenting a notable limitation. The lack of sector-level data complicates the task of disentangling the effects of advertising and competition among industries. For instance, vehicles and public transportation may serve as substitutes to some extent, meaning that increasing vehicle sales could reduce public transportation demand, ceteris paribus. In such cases, relying on country-level data without considering industry-level interactions prevents us from fully understanding whether changes in overall consumption are driven by changes in advertising inputs or by the competitive interactions between indus-

tries.

To address the mutual influences of advertising and consumption, this paper uses a rich dataset spanning five European countries. Our data encompass 27 industry sectors that represent the entire economy, allowing us to capture both macroeconomic effects on consumption and the competitive dynamics within specific industries. To the best of our knowledge, this is the first study to explore the relationship between advertising and consumption while maintaining an industry-level focus on competitive dynamics.

Our dataset differs from existing literature in two key ways. First, we utilize time-series data across multiple countries and sectors, incorporating interactions among industries and variations across countries. Second, our dataset includes macroeconomic variables for each country, such as GDP, purchasing power, and lending rates, allowing us to control for macro-level factors that may influence consumption and advertising. These features substantially enhance the reliability of our results compared to previous studies.

Our empirical results show that consumption drives advertising, but not vice versa. Past consumption has a significant effect on current advertising expenditures, even after accounting for macroeconomic conditions and country-fixed effects. This finding aligns with common management practices where advertising budgets are set as a percentage of previous years' sales. Conversely, past advertising expenditures have no significant effect on consumption at the sector level. This suggests that advertising primarily shifts consumption within categories, redistributing consumer spending between brands and potentially across related product categories. Our results are robust across different sectors and countries, further supporting the notion that consumption plays a more substantial role in driving advertising. We also find no significant evidence that the integration of EU countries or differences in industrial structures among these countries substantially affect advertising spending.

Given the complex interactions between advertising and consumption, potential endogeneity remains a concern. Although our data does not allow for the use of instrumental variables or natural experiments, we mitigate endogeneity through a panel data approach that accounts for time, industry, and country dimensions. Additionally, we employ the Arellano-Bond panel estimation to further address endogeneity concerns.

The paper is structured as follows: Section 2 describes the dataset, presents summary statistics, and discusses their advantages. Section 3 outlines the model and methodology employed in the analysis. Section 4 presents the empirical results. Section 5 discusses the implications of our findings for firms and policymakers. Finally, Section 6 concludes the study.

2. Data Description and Summary Statistics

To address our research questions, we collected comprehensive data on advertising and consumption at the industry level. Consumption data were sourced from

Eurostat, covering 27 sectors in five European countries—France, Germany, Italy, Spain, and the UK—over the period from 1998 to 2006. Advertising expenditure data were obtained from Nielsen Media Research, which includes expenditures across mainstream media channels: television, radio, newspapers, magazines, outdoor advertising, cinema, and the internet. The use of time-series data across sectors and countries provides key advantages over previous studies, particularly by allowing us to capture inter-sector relationships, such as complementary or substitute effects in consumption. This granular approach enables a more accurate representation of the dynamics between advertising and consumption at the sectoral level, which may differ significantly across industries.

Macroeconomic variables for each year and country were also collected from Eurostat. These variables include the price index, deposit rate, household consumption, GDP, government expenditures, the inflation rate, and household consumption levels. Given that both consumer behavior and firm advertising decisions are heavily influenced by macroeconomic conditions, incorporating these variables allows us to reduce omitted variable bias and improve the robustness of our estimations.

Advertising data are reported net of discounts for Italy and the UK. However, for France, Spain, and Germany, advertising data are available only at gross (list) prices. To standardize the data across countries, we estimated average discounts by media type to convert the gross figures into net values. For France, we used IREP net figures; for Spain, we obtained average discount rates by media and year from Publiespana; and for Germany, we applied discount rates derived from ZAW and European Advertising and Media Forecast figures.

The use of net data is critical in advertising markets, where discounts are commonly employed at various stages to manage seasonality in demand and to engage in first-degree price discrimination. Contracts typically prevent arbitrage, meaning that each purchase is made on behalf of a specific client, which further underscores the importance of using net figures for accurate comparison and analysis.

Consumption data from Eurostat are classified according to the Classification of Individual Consumption by Purpose (COICOP), which categorizes consumption into 47 groups at the 3-digit level. Nielsen, however, uses a proprietary sector classification that is more detailed than COICOP and is widely accepted within the advertising industry. To align the consumption and advertising data, we reconciled the two taxonomies, ensuring that the sectors in both datasets matched as closely as possible.

Several sectors were excluded from our analysis due to the absence of advertising data or because the consumption figures were not relevant to the study. These include sectors such as secondary education, housing rentals, postal services, prostitution, primary education, narcotics, and tobacco. As a result, these sectors were omitted from both the consumption and advertising datasets.

Additionally, we excluded smaller advertising categories aimed at the professional sector that lacked corresponding consumption figures. These categories include professional services, machinery, information technologies, and institu-

tional advertising, which together represent approximately 8% of total advertising spending. Despite this exclusion, our analysis still encompasses a broad and representative range of sectors.

In certain key advertising sectors, such as banking and retail, where consumption data were unavailable from Eurostat, we estimated turnover using alternative data sources. For telecommunications, we relied on data from the European IT Observatory. For banking, turnover was approximated using the banking intermediation margin, which includes net interest income and service revenues. For retail, we used Eurostat's value-added data, which captures the difference between sales and the cost of sales. For the insurance sector, turnover was approximated as the sum of premiums paid by clients.

In these instances, we acknowledge a lack of homogeneity between the Eurostat consumption figures and the alternative turnover data used. Some of the figures may include transactions not directly related to final consumption. Nonetheless, we focused on turnover data that reflect the actual industry investment in advertising, which provides a more accurate representation of sectoral advertising dynamics. Ultimately, our dataset includes 27 sectors with homogeneous advertising and turnover data, covering approximately 94%.

2.1. Data Integration and Sectoral Coverage

The final dataset integrates the advertising, consumption, and macroeconomic data for each sector in each country for each year. Each observation represents a specific sector within a given country for a particular year, including information on advertising expenditures across different media sources, sectoral consumption, and relevant macroeconomic conditions. Notably, all sectors within a country share the same values for macroeconomic variables within any given year.

2.2. Trends in Advertising Spending

Figure 1 illustrates the trend in total advertising spending across the five EU countries from 1998 to 2006. Between 1998 and 2000, advertising expenditures increased across all five countries. However, a brief period of decline occurred between 2000 and 2003, before a steady recovery and growth in advertising spending. The year 2000 marks a notable peak in advertising expenditures across all countries. This phenomenon can be partially attributed to the increased incentives for advertising at the turn of the millennium, coupled with the sharp decline in advertising expenditures following the bursting of the dot-com bubble. The 2001 drop in advertising spending is likely a direct consequence of the economic downturn triggered by the collapse of the internet bubble, contributing to the observed peak in 2000.

Figure 2 displays the trend of total consumption in the 5 EU countries from 1998 to 2006.[1] Here, we do not observe such a "peak" in consumption in 2000. In general, total consumption spending is increasing for all 5 countries with minor

[1]Data for consumption in Spain in year 2006 is missing.

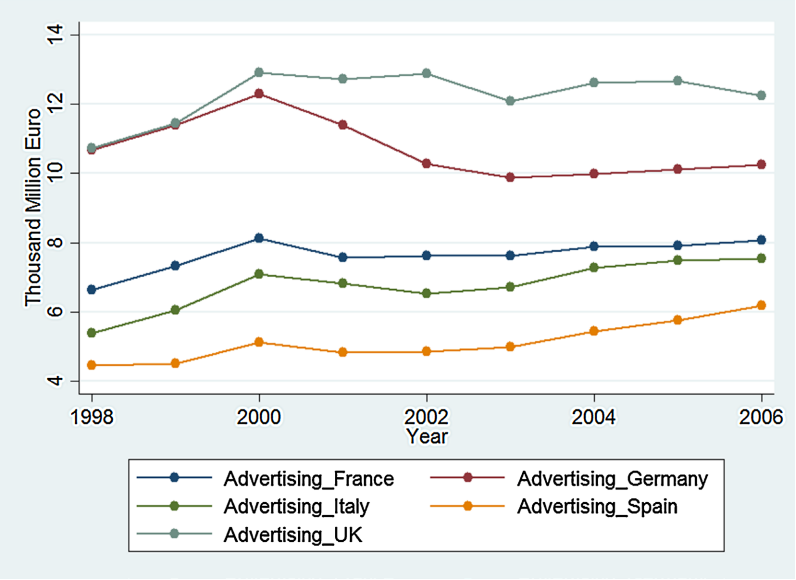

Figure 1. Advertising for 5 EU Countries from 1998 to 2006.

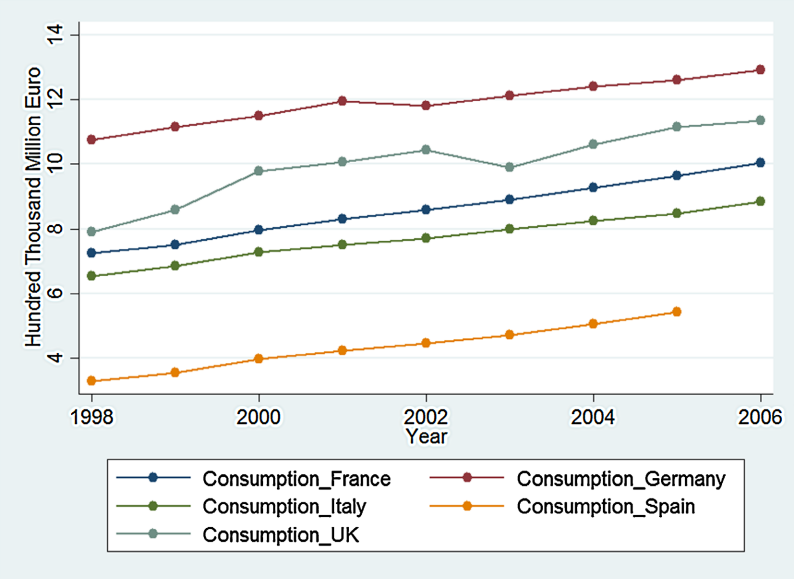

Figure 2. Consumption for 5 EU countries from 1998 to 2006.

fluctuations. Therefore, we find little evidence that the new millennium provides a special incentive for consumption because the growth of the world economy was generally persistent over the 9 years, creating a relatively stable impetus for growth in consumption. Henceforth, 2000 can be used as a "special break" for our analysis because trends approaching 2000 are independent of consumption, creating a greater incentive for advertising spending than for consumption. However, in the two to three years after 2000, there was not as strong an incentive as for the period from 1998 to 2000, so comparing the results using data for before and after 2000 offers us some insight into the effect of advertising on consumption.

Advertising intensity is measured as the share of advertising on consumption

for a sector. Mathematically,

$$AI_{it} = \frac{\text{Advertising Expenditure}_{it}}{\text{Total Sectoral Consumption}_{it}}$$

Advertising intensity varies greatly by sector, as shown in Table 1. In Table 1, each cell denotes the average advertising intensity for a sector in a country over the 9 years. Each row represents a sector, and each column represents a country. The last row shows the average advertising intensity for a certain country, and the last column shows the average advertising intensity for a certain sector.

There is a minimum level for fuels, catering services, insurance and footwear, all under 0.5% on sales, and some sectors with advertising over 2% on sales such as the personal care, soft drinks and automotive industries. A possible explanation for a low level of advertising is that in a sector such as clothing, a large proportion of sales is made for unbranded products without advertising. Consequently, the more brand strategies gain space, the more advertising intensity grows. Another factor that can explain differences in advertising intensity is the structure and concentration of retailing, at least for industries whose sales go through independent retail organizations. Large retailers with important market share exert significant countervailing power over producing firms, and a possible answer is an increase in advertising expenses to increase brand loyalty relative to store loyalty.

Advertising intensity also varies by country, although not as much as the variation in sectors, as shown in Table 2. Among the 5 EU countries, Italy has the lowest advertising intensity of 0.88%, while the UK has the highest at 1.24%. In general, countries with better economic performance tend to have lower advertising intensity.

Following Dorfman-Steiner theorem (1954), advertising intensity depends positively on gross margins and consumption elasticity to advertising. At the industry level, another reason can be the different diffusion of branded goods, which are more advertising intensive relative to total consumption. Despite economic convergence, these five European countries exhibit significant differences in advertising intensity in the various industries. In clothing, the high advertising intensity in Italy (double the average) and low level in Germany (half the average) can probably be explained by differences in consumption: Italians spend more than Germans on clothing. The same reason can explain the low advertising expenses of Italy and Spain for books and newspapers. Sometimes the difference is related to external factors, such as the higher summer temperatures of Italy and Spain, which justify a high level of advertising intensity dedicated to beverages. However, the level of product differentiation and the nature of competition at the industry level seem appropriate to explain the low level of advertising in Italy for banking and insurance and the contemporary high levels in the UK and Germany.

Table 2 shows the mean and standard deviation of the advertising intensity for each country across the 9 years in the 28 sectors. We find that for the five EU countries, the mean and standard deviation were similar—Spain had higher advertising intensity and a larger standard deviation. Summary statistics are as follows:

Table 1. Advertising intensity by sector (advertising spending for the sector divided by consumption for the sector).

Sector	France	Germany	Italy	Spain	UK	Average
Alcoholic beverages	0.0088	0.0172	0.03	0.06	0.0196	0.0255
Clothing	0.0049	0.0027	0.0085	0.0056	0.0044	0.0052
Footwear	0.0028	0.0027	0.005	0.0013	0.0037	0.0032
Electricity/fuels	0.0017	0.0012	0.0005	0.0029	0.0018	0.0015
Furniture	0.0028	0.0015	0.0071	0.0059	0.0149	0.0065
Household appliances	0.011	0.0061	0.0129	0.0154	0.013	0.0115
Glassware/tableware	0.0031	0.0019	0.0047	0.024	0.0029	0.0065
Tools/house equipment	0.0051	0.0007	0.0022	0.01	0.0059	0.0031
Household maintenance	0.0105	0.0137	0.014	0.0136	0.030	0.0164
Medical products/equipment	0.0034	0.0064	0.0074	0.0096	0.0119	0.0076
Vehicle	0.0203	0.015	0.0246	0.0253	0.0196	0.0208
Personal transport equipment	0.0003	0.0011	0.0005	0.0014	0.011	0.0009
Transport Service	0.0054	0.0061	0.0055	0.0068	0.007	0.0061
Information processing equip.	0.0267	0.0129	0.023	0.0352	0.0231	0.0237
Equipment gardens/pets	0.0106	0.0074	0.0123	0.0172	0.0096	0.0111
Recreational/cultural services	0.0196	0.0128	0.011	0.0234	0.0183	0.0167
Newspaper books	0.032	0.0478	0.0189	0.0403	0.0177	0.0309
Package holidays	0.0103	0.017	0.0101	0.0007	0	0.0101
Catering services	0.0013	0.0013	0.0003	0.0008	0.0014	0.0011
Accommodation services	0.0012	0.0023	0.0008	0.016	0.003	0.0018
Personal care	0.0296	0.0276	0.0277	0.0362	0.029	0.0298
Insurance	0.0013	0.0013	0.0003	0.0013	0.012	0.0011
Bank	0.0029	0.0076	0.0037	0.0055	0.0099	0.0055
Beverages	0.0225	0.0143	0.0365	0.0373	0.0232	0.0263
Distribution and Retail	0.0078	0.01	0.0032	0.0059	0.0104	0.0074
Food	0.007	0.008	0.0101	0.0065	0.0106	0.0085
TLC	0.0137	0.0119	0.0144	0.015	0.0146	0.0139
Country Average	0.0089	0.009	0.0088	0.0117	0.0124	0.0113

Table 2. Summary Statistics of Advertising intensity by country.

	France	Germany	Italy	Spain	UK
Mean	0.0089	0.009	0.0088	0.017	0.0124
Std	0.01	0.01	0.01	0.015	0.009

Table 3 shows the summary statistics of the macroeconomic variables across countries. The table shows the average value of the price index, the real value GDP, the current value GDP, real value household consumption and the unemployment rate of the 9 years for each of the five EU countries. We find that for all five countries, household consumption accounts for more than half of GDP. Table 4 shows the mean of these variables across the 5 EU countries for each year. From this table, we can see that the economic situation from 1998 to 2006 was quite stable, and in particular, the price index and GDP both showed an increasing trend. Therefore, the relationship between consumption and advertising becomes an increasingly important research question.

Table 3. Summary Statistics of macroeconomic variables (average across years).

	France	Germany	Italy	Spain	UK
PriceIndex	94.66	95.79	93.45	91.35	92.96
GDP (constant)	1.55×10^{12}	2.14×10^{12}	1.29×10^{12}	7.42×10^{11}	1.00×10^{12}
GDP (current)	1.48×10^{12}	2.08×10^{12}	1.21×10^{12}	6.71×10^{11}	1.02×10^{12}
HHCons (constant)	8.41×10^{11}	1.22×10^{12}	7.2×10^{11}	4.02×10^{11}	6.77×10^{11}
Unemployment	9.66	9.41	9.41	12.2	5.23

3. Hypothesis and Methodology

We test whether advertisement causes consumption or consumption causes advertisement. Both variables are time-series, so we apply the concept of Granger causality. The idea is that if consumption predicts advertising rather than the other way around, it is evidence that consumption causes advertising, and vice versa.

Since there is endogeneity in our panel data, we need to apply the method by Arellano and Bond (1991) to test for Granger causality. To use this methodology, the key requirement is that the two time series, i.e. consumption and advertising, are both stationary. Let stochastic process $\{X_t, Y_t: t = 1, 2, \ldots\}$ be consumption and advertising, respectively, and for every collection of time indices $1 \le t_1 \le t_2 \le \ldots \le t_m$, let $f(x_t^1, x_t^2 \ldots x_t^m)$ and $g(y_t^1, y_t^2 \ldots y_t^m)$ by the joint distribution of $\{x_t^1, x_t^2 \ldots x_t^m\}$ and $\{y_t^1, y_t^2 \ldots y_t^m\}$, respectively.

We use 4 different tests to test the stationarity of the two time series: the Levin, Lin and Chu t^*-test, Im-Pesaran-Shin test, ADF-Fisher Chi-square test and PP-Fisher Chi-square test. At the beginning of next section, we will present the results. If both advertisement and consumption are stationary time series, we test their causal relationships. Our dataset is panel data as we introduced in last section, and accordingly, our regression model to test whether advertisement causes consumption is (Table 4):

$$X_{ijt} = \sum_{l=1}^{m} \alpha_l X_{ijt-l} + \sum_{l=1}^{m} \delta_l Y_{ijt-l} + \theta Z_{jt} + \mu_j + u_{ijt} \quad (1)$$

Table 4. Summary Statistics of macroeconomic variables (average across countries).

Year	PriceIndex	GDP (const.)	GDP (curr.)	HHCons (const.)	Unempl.
1998	86.08	1.18×10^{12}	1.16×10^{12}	7.01×10^{11}	11.76
1999	87.19	1.21×10^{12}	1.20×10^{12}	7.26×10^{11}	10.84
2000	89.27	1.26×10^{12}	1.26×10^{12}	7.49×10^{11}	9.68
2001	91.37	1.28×10^{12}	1.31×10^{12}	7.66×10^{11}	8.24
2002	93.28	1.30×10^{12}	1.36×10^{12}	7.75×10^{11}	8.56
2003	95.46	1.31×10^{12}	1.40×10^{12}	7.86×10^{11}	8.66
2004	97.75	1.34×10^{12}	1.46×10^{12}	8.00×10^{11}	8.68
2005	100	1.36×10^{12}	1.51×10^{12}	8.13×10^{11}	8.32
2006	102.4	1.39×10^{12}	1.58×10^{12}	8.28×10^{11}	7.94

Mathematically, for regression model (1), we test the following hypothesis:

Hypothesis 1: $\delta_l = 0$, for all $l = 1, 2, \ldots, m$.

To get a consistent estimate of the parameters in time series models with panel data, one of the most important issues involves addressing endogeneity. Examples of such studies include Arellano and Bond (1991), Hartwig (2010), Dumitrescu and Hurlin (2012) and Lopez and Weber (2017). In this paper, we follow the two-step GMM estimator proposed by Arellano and Bond (1991) and implemented in Hartwig (2010).

As Arellano and Bond (1991) pointed out, such methodologies require data to be stationary, and the resulting time series is tested for the existence of unit roots. The results of such tests are tested in the next section. When the tests reject the hypothesis that there are unit roots, we can set up the panel data model, for which the restriction of identical coefficients of lagged X_{ijt} and Y_{ijt} variables is imposed. Thus, we estimate a time series VAR model adapted to the panel context, which is similar to Hartwig's (2010) model but also unlike it and other literature using data with structures similar to ours, and we control for the country-level macroeconomic time-varying variables.

X_{ijt} and Y_{ijt} are respectively consumption and advertising spending on sector i in country j in year t. Five countries are included in our dataset: France, Germany, Spain, Italy and UK. In each of these five countries, there are 28 sectors.[2] Therefore, 140 observations are observed in each of the $T = 9$ years (1998-2006).

We include Z_{jt} as a vector of country-level macroeconomic time-varying variables. Z_{jt} includes the price index, GDP (both constant and current prices), the unemployment rate, and household consumption (current price). All of these variables can impact both consumption and advertising, and to control for purchasing power and inflation, we include GDP for both constant and current prices.

We also add country fixed effects as μ_j, which is a vector of country dummy

[2]These include a "sector" named "total", which denotes the sum of advertising spending on all sectors. In our data analysis, we do not use the "total" sector.

indicators, using the UK as the base country. Disturbance u_{ijt} is assumed to be independently distributed across countries with a zero mean.

We wish to test whether influence runs in both directions. Therefore, in addition to testing whether advertisement drives consumption, we also test whether consumption drives advertisement, and we estimate Model (2).

$$Y_{ijt} = \sum_{l=1}^{m} \beta_l X_{ijt-l} + \sum_{l=1}^{m} \gamma_l Y_{ijt-l} + \sum_{l=1}^{m} \lambda_{t-l} \bar{X}_{it-1} + \zeta Z_{jt} + \eta_i + \nu_{ijt} \quad (2)$$

Hypothesis 2: $\beta_l = 0$, for all $l = 1, 2, \ldots, m$.

When estimating Equations (1) and (2), we pay special attention to the coefficients associated with vector Y_{ijt-l} in Equation (1) and vector X_{ijt-l} in Equation (2). The most important problem is that Equations (1) and (2) are subject to endogeneity because if the country-specific dummy variable impacts consumption in Equation (1) or if advertising in Equation (2) in one period may also have an impact in previous periods, then the dummy variables will be correlated with the unobservables in previous periods. To solve the endogeneity problem, Arellano and Bond (1991) proposed using the lagged dependent variable from at least two periods earlier and the lags of variables on the right-hand side as instrument variables in a General Method of Moments (GMM) estimator. We estimate Equations (1) and (2) using three different methods: pooled OLS, Arellano and Bond (1991) one-step GMM and Arellano and Bond (1991) two-step GMM. Based on the estimation results, we test whether the coefficients associated with Y_{ijt-l} in Equation (1) and with vector X_{ijt-l} in Equation (2) are jointly zero by presenting the Wald tests.

One point we must emphasize is that in Model (2), we include one more variable than Equation (1): $\sum_{l=1}^{m} \lambda_{t-l} \bar{X}_{it-1}$. We expect more advertisement to be spent on larger industries than on smaller industries. Therefore, we include the lagged average consumption of an industry to capture the effect of an industry's size on advertising spending on it. When the size of an industry changes, it is important to distinguish whether the change in advertising in the industry is driven by the change in consumption or in industry size.

4. Results

4.1. Test for Stationary Time Series and Appropriate Lags

Table 5 shows the results of testing stationarity, using four different methodologies, namely, the Levin, Lin and Chu t^*-test, Im-Pesaran-Shin test, ADF-Fisher Chi-square test and PP-Fisher Chi-square test. All 4 tests show that neither consumption nor advertising is unit root at the significance level of 0.01.

We therefore do not find evidence to reject the hypothesis that both consumption and advertising are stationary time series, so conservatively speaking, we are not able to find evidence to refute the capability to test the direction of influence. Therefore, it is appropriate for us to use Arellano-Bond two step GMM method to test Hypothesis 1 and 2, i.e. causal relationship between consumption and ad-

vertisement.

Because the results are very sensitive to the number of lags of X_{ijt} and Y_{ijt} on the right-hand side of Equations (1) and (2), we next examine how many lags we should choose. We run the OLS regression for Equation (1), including different numbers of lags of advertising and consumption, and similar to Deweter and Heimeshoff (2017), we compare the two models using two information criteria, namely, the Akaike Information Criteria (Akaike 1974) and Bayesian Information Criteria (Schwarz, 1978). **Table 6** shows the results.

Based on these two criteria, the results are consistent: the model including 5 lags of X_{ijt} and Y_{ijt} on the right-hand side of Equation (1) yields AIC and BIC values closer to zero; that is, for our analysis, the optimal length of lags is 5.

Table 5. Test for unit root.

Test	Stat.	Prob.	Obs.
Levin, Lin and Chu t^*			
Consumption	-1.0×10^{13}	0.0000	1170
Advertising	-3.1×10^{13}	0.0000	1260
Im, Pesaran and Shin W-stat			
Consumption	−2.9775	0.0015	1170
Advertising	−8.1836	0.0000	1260
ADF - Fisher Chi-square			
Consumption	25.1413	0.0000	1170
Advertising	42.9400	0.0000	1260
PP - Fisher Chi-square			
Consumption	14.6889	0.0000	1170
Advertising	23.4206	0.0000	1260

Table 6. Optimal lag length for Equation (1).

Lag	2	3	4	5
AIC	−2820.083	−2656.587	−2134.137	−1691.343
BIC	−2767.58	−2596.719	−2068.059	−1620.675

4.2. Relationship between Advertising and Consumption

We first explore whether advertising is a significant driving force behind consumption. **Table 7** shows the results of traditional panel data regression with fixed effects for Equation (1). Columns 1 to 4 show results that include 2, 3, 4 and 5 lags, respectively.

We find that when we regress the logarithm of consumption on past years' logarithmic consumption and past years' logarithmic advertising, previous years' consumption is always significant, especially past one-year consumption. How-

ever, past years' advertising is not significant, and the coefficients are small as well. This result casts doubt on whether advertisement causes consumption. To find further evidence, we estimate Equation (1) by Arellano-Bond two-step GMM, and test Hypothesis 1 using the F-test. Table 8 shows the results.

According to these results, if we include 2 lags in our model, we reject the hypothesis that past years' advertising has a joint zero effect on consumption at the significance level of 0.05 but fail to reject this at the significance level of 0.01. If we include 3, 4 or 5 lags in our model, we cannot reject the hypothesis at the significance level of 0.1. Therefore, we find little evidence that advertising is a significant driving force behind consumption.

Table 7. Coefficient Estimation Results for Equation (1) Using fixed effects model.

Variable	(1) logconsumption	(2) logconsumption	(3) logconsumption	(4) logconsumption
L. logconsumption	0.951***	0.919***	0.900***	0.843***
	(0.0338)	(0.0317)	(0.0424)	(0.0455)
L2. logconsumption	0.0469	0.121**	0.132*	0.169**
	(0.0340)	(0.0437)	(0.0528)	(0.0602)
L3. logconsumption		−0.0398	−0.177***	−0.132*
		(0.0316)	(0.0496)	(0.0586)
L4. logconsumption			0.148***	0.0166
			(0.0375)	(0.0551)
L5. logconsumption				0.105**
				(0.0388)
L. logadvert	−0.0199*	−0.00647	−0.0124	−0.00294
	(0.00787)	(0.00829)	(0.0101)	(0.0124)
L2. logadvert	0.0142	−0.00686	−0.00101	0.000280
	(0.00765)	(0.00924)	(0.0114)	(0.0150)
L3. logadvert		0.0107	0.00515	−0.00757
		(0.00701)	(0.00995)	(0.0112)
L4. logadvert			0.00604	0.000242
			(0.00782)	(0.0103)
L5. logadvert				0.0101
				(0.00789)
Price index	−0.00345	0.00494	0.00120	0.00675
	(0.00248)	(0.00256)	(0.00321)	(0.00375)
GDP constant	−2.81e−13	8.19e−13**	8.63e−13*	1.79e−12***
	(2.58e−13)	(3.12e−13)	(3.99e−13)	(4.78e−13)

Continued

Unemployment	−0.00202	−0.00234	−0.00273	−0.00726
	(0.00269)	(0.00280)	(0.00343)	(0.00402)
GDP current	3.60e−13	−1.70e−12**	−1.53e−12*	−2.26e−12**
	(4.28e−13)	(5.26e−13)	(6.41e−13)	(7.67e−13)
HHCons (curr)	−3.75e−13	1.33e−12**	1.14e−12	2.20e−12**
	(3.83e−13)	(4.71e−13)	(6.24e−13)	(8.29e−13)
Constant	0.597**	−0.329	−0.0663	−1.549**
	(0.229)	(0.236)	(0.346)	(0.485)

*Significant at 10%; **Significant at 5%; ***Significant at 1% [cite: 263].

Table 8. Test for past year advertising have jointly zero effect on consumption.

	2 lags	3 lags	4 lags	5 lags
Stat.	3.99	1.14	0.73	0.42
P-value	0.0189	0.3308	0.5699	0.8326

Since we also want to test whether consumption drives advertising, i.e. Hypothesis 2, we run the panel data regression with fixed effects for Equation (2) and conduct an F-test using the same technique as that for Equation (1). In the F-test, we test whether the coefficients associated with past years' consumption are jointly zero. Table 9 shows the results of the panel data regression for Equation (2) - Columns 1 to 4 show the results that include 2, 3, 4 and 5 lags, respectively. Additionally, we control for average sector-level consumption across years. Table 10 shows the results of the F-test for Hypothesis 2. For the models that include 4-year lags in consumption, we can reject the null hypothesis at a significance level of 0.01, while in the models that include 2-year and 3-year lags in consumption, we can reject the null hypothesis at a significance level of 0.05, and we fail to reject the null hypothesis only for the model that includes 5-year lags.

Therefore, we find evidence that gives us reasons to suspect that the coefficients associated with consumption are not jointly zero, which is also possible evidence that consumption significantly drives advertising. However, further evidence needs to be analyzed. We also find that none of the coefficients associated with a sector's size in past years are significant. This is evidence that when making their decisions on advertising, firms consider consumption in their country in past years rather than the size of the sector.

Some other facts from Table 7 and Table 9 are worth mentioning. First, when we run the OLS regression for Equation (1), that is, using consumption as the dependent variable, in general, the country fixed effect is not significant. Note that we select the UK as the base country. Second, GDP has a significant effect on advertising after controlling for past years' consumption and advertising, but the effect of GDP on consumption is not significant after controlling for past years'

Table 9. Coefficient estimation results for equation (2) Using fixed effect model.

Variable	(1) logadvert	(2) logadvert	(3) logadvert	(4) logadvert
L. logconsumption	0.0713	0.107	0.338*	0.284
	(0.134)	(0.136)	(0.157)	(0.151)
L2. logconsumption	−0.0123	0.109	−0.101	−0.226
	(0.135)	(0.198)	(0.208)	(0.211)
L3. logconsumption		−0.162	−0.155	−0.0561
		(0.148)	(0.206)	(0.217)
L4. logconsumption			−0.0209	0.124
			(0.158)	(0.206)
L5. logconsumption				−0.0865
				(0.146)
L. logadvert	0.727***	0.705***	0.839***	0.939***
	(0.0304)	(0.0348)	(0.0373)	(0.0409)
L2. logadvert	0.190***	0.189***	−0.0215	−0.108*
	(0.0295)	(0.0390)	(0.0423)	(0.0498)
L3. logadvert		0.0467	0.0297	0.0508
		(0.0298)	(0.0374)	(0.0375)
L4. logadvert			0.0792**	0.0283
			(0.0292)	(0.0345)
L5. logadvert				0.0454
				(0.0263)
price index	−0.00277	−0.000712	−0.0218	−0.00320
	(0.00959)	(0.0107)	(0.0120)	(0.0126)
GDP constant	2.20e−12*	1.41e−12	−6.44e−13	5.07e−13
	(9.96e−13)	(1.31e−12)	(1.47e−12)	(1.57e−12)
unemployment	−0.0130	−0.00320	0.00657	−0.00807
	(0.0104)	(0.0117)	(0.0127)	(0.0134)
GDP current	−1.85e−12	−6.00e−13	1.60e−12	1.86e−12
	(1.65e−12)	(2.20e−12)	(2.36e−12)	(2.51e−12)
hhcons(current)	−3.76e−13	−1.65e−12	−3.24e−12	−3.09e−12
	(1.48e−12)	(1.98e−12)	(2.30e−12)	(2.73e−12)
L. logconsumption(mean)	−0.0115	−0.0309	0.172	0.0156
	(0.199)	(0.198)	(0.195)	(0.183)
L2. logconsumption(mean)	0.201	−0.204	−0.438	−0.819
	(0.224)	(0.382)	(0.384)	(0.446)

Continued

L3. logconsumption(mean)		0.209	−0.151	0.616
		(0.307)	(0.420)	(0.466)
L4. logconsumption(mean)			0.112	−0.181
			(0.305)	(0.399)
L5. logconsumption(mean)				0.435
				(0.286)
cons	−1.645	0.566	6.244	−0.831
	(2.344)	(3.032)	(3.826)	(4.687)

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

consumption and advertising (See Simon et al. (2009) for a synthetic analysis.). Third, the unemployment rate and household consumption have a significant effect on advertising but no significant effect on consumption. To summarize, advertising is more sensitive to macroeconomic conditions, but when past years' consumption is controlled, other macroeconomic conditions do not have a significant effect on consumption. These phenomena are partly due to consumption representing one part of GDP (Rehme & Weisser (2007) tested the causal relationship between consumption and GDP), while other facets of GDP, such as exports, government spending and investment, do not have a significant impact on consumption.

As we have pointed out, the fixed effect estimator for Equations (1) and (2) is subject to endogeneity, and therefore, we apply Arellano-Bond one-step GMM and Arellano-Bond two-step GMM to Equations (1) and (2). Note that in this case, the country dummy variables are dropped because of collinearity. **Table 11** shows the estimation results for Equation (1) using Arellano-Bond two-step GMM. **Table 12** shows the F-test of the hypothesis that the coefficients associated with the logarithm of advertising are jointly zero. The results achieved by using both methodologies cannot lead us to reject the hypothesis that past years' advertising has a jointly zero effect on consumption. Therefore, we still find no evidence that advertising drives consumption.

Table 13 shows the estimation results for Equation (2) obtained using Arellano-Bond two-step GMM, and **Table 14** shows the F test of the hypothesis that the coefficients associated with the logarithm of consumption are jointly zero. Note that we control for average consumption each year. Based on the results, we reject the hypothesis that the values jointly zero at a significance level of less than 0.05. Therefore, we find more evidence that consumption drives advertising rather than advertising driving consumption. **Table 14** also shows the F-test of the hypothesis that the coefficients associated with the logarithm of the size of the sector in past years on advertising are jointly zero. We fail to reject the null hypothesis at a significance level of 0.1, which shows that the change in advertising in a sector is driven by the change in consumption in the past year rather than by the sector's size.

In the above regressions (Table 9), we control the consumption and advertising of different sectors, so to a large extent we have taken into account relationships between industries when analyzing the effects of advertising. However, we wish to check whether the results are robust to the changes in the sectors included, that is, to what extent the positive influence between consumption and advertising is robust to the changes in the relationships between the sectors. Additionally, we wish to check whether the results are robust to changes in the specific conditions of countries. Therefore, for the robustness check, we estimate Equations (1) and (2) by dropping each of the 27 sectors in turn and then estimate Equations (1) and (2) by dropping each of the 5 countries in turn.

Table 10. Test for past year consumption have jointly zero effect on advertising.

	2 lags	3 lags	4 lags	5 lags
Stat.	4.36	3.03	3.81	1.48
P-value	0.0131	0.0287	0.0046	0.1960

Our results in Table 10 show that past years' advertising has a jointly zero effect on consumption, regardless of using Arellano-Bond one-step GMM or Arellano-Bond two-step GMM, and regardless of excluding each of the 27 sectors. Similarly, the test results do not change regardless which country is excluded. The estimation of Equation (2) using both Arellano Bond one-step GMM and Arellano-Bond two-step GMM shows that past years' consumption has a jointly significant positive effect on advertising, regardless of which sector or country is excluded. Therefore, our result is robust to changes in both countries and sectors.

Table 11. Estimation for Equation (1) using Arellano and Bond (1991) two step method.

Variable	logconsumption
L. logconsumption	−0.360
	(0.240)
L2. logconsumption	0.0113
	(0.0905)
L3. logconsumption	−0.0264
	(0.150)
L4. logconsumption	−0.0484
	(0.0696)
L5. logconsumption	0.0915
	(0.0723)
L. logadvert	0.0234
	(0.0307)
L2. logadvert	0.00647
	(0.0126)

Continued

L3. logadvert	0.00592
	(0.0169)
L4. logadvert	0.00159
	(0.0151)
L5. logadvert	0.0193*
	(0.00959)
PriceIndex	0.00554
	(0.00662)
GDPConstant	−3.47e−14
	(2.98e−13)
unemployment	−0.00837*
	(0.00363)
GDPCurr	−4.51e−13
	(3.77e−13)
HHconsCurr	1.65e−12**
	(5.34e−13)

*Significant at 10%; **Significant at 5%; ***Significant at 1% [cite: 308, 309].

Table 12. Test for past year advertising has jointly zero effect on consumption.

	Advertising
Stat.	4.80
P-value	0.4402

Table 13. Estimation for Equation (2) using Arellano and Bond (1991) one step and two step method.

Variable	logadvertising
L. logadvert	−0.0176
	(0.424)
L2. logadvert	−0.0519
	(0.0710)
L3. logadvert	−0.0742
	(0.0898)
L4. logadvert	−0.0199
	(0.0617)
L5. logadvert	0.0726
	(0.0442)

Continued

L. logconsumption	0.130
	(0.337)
L2. logconsumption	0.286
	(0.197)
L3. logconsumption	−0.0380
	(0.255)
L4. logconsumption	0.242
	(0.218)
L5. logconsumption	0.409*
	(0.203)
PriceIndex	−0.0108
	(0.0133)
GDPConstant	−1.24e−12
	(1.27e−12)
unemployment	−0.0321*
	(0.0156)
GDPCurr	2.00e−12
	(1.73e−12)
HHconsCurr	−1.96e−12
	(2.05e−12)
L. logyearconsum	−0.238
	(0.145)
L2. logyearconsum	−0.301
	(0.353)
L3. logyearconsum	0.0813
	(0.444)
L4. logyearconsum	−0.383
	(0.349)
L5. logyearconsum	0.388
	(0.340)

*Significant at 10%; **Significant at 5%; ***Significant at 1% [cite: 320, 321].

Table 14. Test for past year consumption and lagged consumption have jointly zero effect on advertising (two step GMM).

	Consumption	Lagged Average Consumption
Stat.	11.43	6.75
P-value	0.0435	0.2402

Another issue that need to be taking into consideration is the collinearity problem in the model specification. Since we include both constant GDP and current GDP, and also consumption and advertising variables are likely to be time-dependent, we can imagine that these variables are highly correlated. The reason we add both constant GDP and current GDP is that we have to take inflation into account. For robust check, we try three other specification of the model: 1) including only the current GDP; 2) replacing constant GDP and current GDP as their logarithm; 3) including only the logarithm of current GDP. For all these specifications, the coefficients associated with the lag consumptions and advertising do not change much, especially, the signs and significance of the coefficients have no change. Therefore, these results are evidence showing that our results on the causal relationship between consumptions and advertising is robust. Table 15 & Table 16 for F-test for the three different specifications are presented as follows:

Table 15. Robustness check: stability of granger causality tests (5 Lags).

Macro Control Variables	F-statistic	*Prob > F*	Inference
GDP_{curr}, $HHCons_{curr}$	0.76	0.5807	Insignificant
$\ln(GDP_{const})$, $\ln(GDP_{curr})$, $\ln(HHCons_{curr})$	0.67	0.6495	Insignificant
$\ln(GDP_{curr})$, $\ln(HHCons_{curr})$	0.68	0.6368	Insignificant

Note: All models include price index, unemployment, and country dummies. The null hypothesis (H_0) is that the coefficients of lagged advertising are jointly zero. An insignificant p-value (>0.05) indicates a failure to reject H_0.

Table 16. Robustness check: consumption granger-causing advertising (5 Lags).

Macro Control Variables	F-statistic	*Prob > F*	Inference
GDP_{curr}, $HHCons_{curr}$	5.82	0.0000	Significant***
$\ln(GDP_{const})$, $\ln(GDP_{curr})$, $\ln(HHCons_{curr})$	5.81	0.0000	Significant***
$\ln(GDP_{curr})$, $\ln(HHCons_{curr})$	5.83	0.0000	Significant***

Note: All models include price index, unemployment, and country dummies. ***Denotes significance at the 1% level. The stability of the F-statistic across specifications confirms that our causal inference is not affected by the multi-collinearity of control variables.

5. Discussion and Managerial Implications

Our findings contribute to the ongoing debate on the reciprocal relationship between advertising and consumption. Consistent with prior research, our results provide compelling evidence that consumption predominantly drives advertising, rather than the reverse. The strength of our findings is reinforced by the unique advantages of our dataset, which allows for a comprehensive analysis across multiple industries and countries. This suggests that advertising primarily reacts to existing consumption trends rather than serving as a direct catalyst for increased consumption at the industry level. Fridriksson and Zoega (2012), using data from Iceland, found that advertising predicts investment, yet the driving force of adver-

tising comes more from consumption.

These insights have significant implications for both firms and policymakers. From a managerial perspective, the absence of a market expansion effect at the industry level indicates that the observed benefits of advertising largely stem from a business-stealing effect rather than an overall increase in total consumption. Dubois et al. (2018), using consume-level data, displayed business-stealing, indicating that reducing advertising only made consumers switch brands rather than reduce the total consumption. This finding suggests that firms should exercise caution in allocating advertising budgets, particularly in competitive markets where excessive advertising may result in diminishing returns. In oligopolistic industries, aggressive advertising strategies may simply neutralize each other, leading to substantial expenditures without tangible gains. Prior research (Squalli, 2010) has highlighted the risk of overinvestment in advertising, especially when firms fail to differentiate their strategies effectively. Furthermore, collective advertising campaigns aimed at increasing overall industry demand should be carefully evaluated, as they may not yield the intended expansionary effects. Tremblay et al. (2013), for instance, demonstrated that firms in the automobile sector may either under- or over-invest in advertising, depending on its ability to shape consumer preferences.

Moreover, following the theoretical framework of Mankiw and Whinston (1986), if advertising serves primarily to expand the total market (market-scale effect), we would expect a significant positive correlation between aggregate advertising and total industry growth. However, our results show that while advertising correlates with individual consumption patterns, it does not significantly expand the total market size in mature European sectors. This "zero-sum" outcome strongly implies that advertising functions as a tool for market share redistribution—where one firm's gain is a competitor's loss—rather than primary demand creation. We have added this nuance to the manuscript to acknowledge that industry-level data serves as a robust proxy for these firm-level competitive dynamics.

From a policy perspective, governments should recognize the nuanced relationship between advertising and consumption when formulating economic policies or regulatory measures. Given that advertising responds to, rather than drives, consumption, policymakers should carefully assess the effectiveness of advertising incentives. Encouraging firms to invest in advertising as a mechanism for stimulating economic growth may not yield substantial macroeconomic benefits. Instead, policies that promote product innovation and differentiation—which have a stronger influence on industry vitality—may be more effective in fostering sustainable economic growth.

Our results are robust to the exclusion of specific countries or sectors, reinforcing the validity of our findings. If substitute or complementary relationships between sectors played a significant role in shaping the advertising-consumption dynamic, we would expect variations in our results when certain industries were removed from the analysis. However, our robustness checks confirm that con-

sumption remains the primary driver of advertising across different contexts. Moreover, the consistency of our findings across multiple European countries suggests that national economic structures and institutional differences do not significantly alter the fundamental relationship between advertising and consumption.

Additionally, our dataset provides granular insights by capturing advertising expenditures across different media channels. Our analysis finds no evidence that specific media types (e.g., television, radio, print, or digital) exert a significant influence on overall consumption trends. Bursztyn and Cantoni (2016) find similar results that exposure to TV has insignificant impact on people's consumtion behaviors. This suggests that the medium of advertising is less critical than previously assumed in determining consumption behavior.

From a strategic management standpoint, our findings underscore the need for firms to focus on innovation and product differentiation rather than relying solely on advertising to drive growth. While advertising can effectively redistribute market share among firms, it does not create new demand at the industry level. Long-term competitiveness is more likely to be sustained through investments in product development, technological advancements, and superior consumer experiences rather than through excessive reliance on advertising expenditure.

Finally, an interesting aspect of our dataset is that it spans the turn of the millennium, a period marked by heightened advertising activity. While the year 2000 provided firms with significant advertising opportunities, external factors such as the dot-com bubble may have also influenced advertising dynamics. Whether major economic or technological events can amplify advertising's impact on consumption remains an open question. However, due to data limitations, we are unable to draw definitive conclusions on this matter, leaving room for further research on the role of extraordinary events in shaping advertising effectiveness.

6. Conclusion

In conclusion, this paper contributes to the debate on whether advertising influences consumption or whether consumption drives advertising using a unique macrolevel dataset from EU countries. Our data allow us to control relationships between the consumption of different sectors and the relationships between spending on different types of media on advertising. Our empirical results demonstrate that consumption positively and significantly drives advertising, but advertising does not significantly drive consumption. Our results imply that advertising is more likely to reflect a reaction to consumers' behaviour rather than a means to change consumers' behaviour. Additionally, the effect of advertising is more related to business stealing from competitors rather than market expansion. Therefore, a firm's marketing strategy should be coordinated with its innovation, which distinguishes its products from other firms, and advertising should be used as a way to help consumers understand the uniqueness of different products. We believe that this is the best way to develop the leading firm in an industry.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies, 58,* 277-297. https://doi.org/10.2307/2297968

Ashley, R., Granger, C. W. J., & Schmalensee, R. (1980). Advertising and Aggregate Consumption: An Analysis of Causality. *Econometrica, 48,* 1149-1167. https://doi.org/10.2307/1912176

Becker, G. S., & Murphy, K. M. (1993). A Simple Theory of Advertising as a Good or Bad. *The Quarterly Journal of Economics, 108,* 941-964. https://doi.org/10.2307/2118455

Blank, D. M. (1962). Cyclical Behavior of National Advertising. *The Journal of Business, 35,* 14-27. https://doi.org/10.1086/294463

Bursztyn, L., & Cantoni, D. (2016). A Tear in the Iron Curtain: The Impact of Western Television on Consumption Behavior. *Review of Economics and Statistics, 98,* 25-41. https://doi.org/10.1162/rest_a_00522

Elliott, C. (2004). Vertical Product Differentiation and Advertising. *International Journal of the Economics of Business, 11,* 37-53. https://doi.org/10.1080/1357151032000172228

Chan-Olmsted, S. M., & Su, L. (2017). Relationship between Advertising and Consumption in China: Exploring the Roles of Economic Development and Mass Media. *Global Media and China, 2,* 232-250. https://doi.org/10.1177/2059436417744368

Deweter R., & Heimeshoff, U. (2017). Predicting Advertising Volumes Using Structural Time Series Models: A Case Study. *Economics Bulletin, 37,* 1644-1652.

Dorfman, R., & Steiner, P. O. (1954). Optimal Advertising and Optimal Quality. *American Economic Review 44,* 826-836.

Driver, C. (2017). Advertising's Elusive Economic Rationale: Public Policy and Taxation. *Journal of Economic Surveys, 31,* 1-16. https://doi.org/10.1111/joes.12122

Dubois, P., Griffith, R., & O'Connell, M. (2018). The Effects of Banning Advertising in Junk Food Markets. *The Review of Economic Studies, 85,* 396-436. https://doi.org/10.1093/restud/rdx025

Dumitrescu, E., & Hurlin, C. (2012). Testing for Granger Non-Causality in Heterogeneous Panels. *Economic Modelling, 29,* 1450-1460. https://doi.org/10.1016/j.econmod.2012.02.014

Erdem, T., Keane, M. P., & Sun, B. (2006). The Impact of Advertising on Consumer Price Sensitivity in Experience Goods Markets. *SSRN Electronic Journal,* 49 p. https://doi.org/10.2139/ssrn.965468

Frank, M. W. (2008). Media Substitution in Advertising: A Spirited Case Study. *International Journal of Industrial Organization, 26,* 308-326. https://doi.org/10.1016/j.ijindorg.2007.01.002

Fridriksson, K. S., & Zoega, G. (2012). Advertising as a Predictor of Investment. *Economics Letters, 116,* 60-66. https://doi.org/10.1016/j.econlet.2011.12.079

García-Zambrano, L., Rodríguez-Castellanos, A., & García-Merino, J. D. (2018). Impact of Investments in Training and Advertising on the Market Value Relevance of a Company's Intangibles: The Effect of the Economic Crisis in Spain. *European Research on Management and Business Economics, 24,* 27-32. https://doi.org/10.1016/j.iedeen.2017.06.001

Granger, C. W. J. (1969). Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica, 37,* 424-438. https://doi.org/10.2307/1912791

Hartwig, J. (2010). Is Health Capital Formation Good for Long-Term Economic Growth? —Panel Granger-Causality Evidence for OECD Countries. *Journal of Macroeconomics, 32,* 314-325. https://doi.org/10.1016/j.jmacro.2009.06.003

Hu, B., & Sanyal, A. (2016). Advertisement Spending and Income: An Aggregative Analysis. *Theoretical Economics Letters, 6,* 356-366. https://doi.org/10.4236/tel.2016.62040

Squalli, J. (2010). Advertising Expenditure, Enplanement, and Market Concentration. *International Journal of the Economics of Business, 17,* 147-166. https://doi.org/10.1080/13571516.2010.483084

Jung, C., & Seldon, B. J. (1995). The Macroeconomic Relationship between Advertising and Consumption. *Southern Economic Journal, 61,* 577-587. https://doi.org/10.2307/1060982

Kotler, P. (1976). *Marketing Management: Analysis, Planning, and Control.* Prentice-Hall International.

Lischka, J. A., Kienzler, S., & Mellmann, U. (2014). Sales Drive Advertising Expenditures: Evidence for Consumer Packaged and Durable Goods in Germany. *International Journal of Marketing Studies, 6,* 31-44. https://doi.org/10.5539/ijms.v6n1p31

Lopez, L., & Weber, S. (2017). Testing for Granger Causality in Panel Data. *The Stata Journal: Promoting communications on statistics and Stata, 17,* 972-984. https://doi.org/10.1177/1536867x1801700412

Mankiw, N. G., & Whinston, M. D. (1986). Free Entry and Social Inefficiency. *The RAND Journal of Economics, 17,* 48. https://doi.org/10.2307/2555627

Molinari, B., & Turino, F. (2018). Advertising and Aggregate Consumption: A Bayesian DSGE Assessment. *The Economic Journal, 128,* 2106-2130. https://doi.org/10.1111/ecoj.12514

Rauch, F. (2013). Advertising Expenditure and Consumer Prices. *International Journal of Industrial Organization, 31,* 331-341. https://doi.org/10.1016/j.ijindorg.2013.05.001

Rehme, G., & Weisser, S. (2007). *Advertising, Consumption and Economic Growth: An Empirical Investigation.* Darmstadt Discussion Papers in Economics Nr.178.

Schmalensee, R. (1972). *The Economics of Advertising.* North Holland.

Schwarz, G. (1978). Estimating the Dimension of a Model. *The Annals of Statistics, 6,* 461-464. https://doi.org/10.1214/aos/1176344136

Siegel, M., Ross, C. S., Albers, A. B., DeJong, W., King, III, C., Naimi, T. S. et al. (2016). The Relationship between Exposure to Brand-Specific Alcohol Advertising and Brand-Specific Consumption among Underage Drinkers—United States, 2011-2012. *The American Journal of Drug and Alcohol Abuse, 42,* 4-14. https://doi.org/10.3109/00952990.2015.1085542

Simon, H., Tellis, G. J., & Tellis, K. (2009). Research on Advertising in a Recession. *Journal of Advertising Research, 49,* 304-327. https://doi.org/10.2501/s0021849909090400

Simon, J. (1970). *Issues in the Economics of Advertising.* University of Illinois Press.

Tuchman, A. E., Nair, H. S., & Gardete, P. M. (2018). Television Ad-Skipping, Consumption Complementarities and the Consumer Demand for Advertising. *Quantitative Marketing and Economics, 16,* 111-174. https://doi.org/10.1007/s11129-017-9192-y

van der Wurff, R., Bakker, P., & Picard, R. G. (2008). Economic Growth and Advertising Expenditures in Different Media in Different Countries. *Journal of Media Economics, 21,* 28-52. https://doi.org/10.1080/08997760701806827

Esteve, V., & Requena, F. (2006). A Cointegration Analysis of Car Advertising and Sales Data in the Presence of Structural Change. *International Journal of the Economics of Business, 13,* 111-128. https://doi.org/10.1080/13571510500520036

Tremblay, V. J., Tremblay, C. H., & Isariyawongse, K. (2013). Cournot and Bertrand Competition When Advertising Rotates Demand: The Case of Honda and Scion. *International Journal of the Economics of Business, 20,* 125-141. https://doi.org/10.1080/13571516.2012.750045