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Research article

Cyclical vulnerability and resilience in advertising firms: A regional financial perspective

Brenda Vázquez-La Hoz, Jessica Fernández-Vázquez, Aida Galiano and Juan Manuel Martín-Álvarez*

Departments of Quantitative Methods for Economics and Business and Marketing and Market Research, Faculty of Economics and Business, Universidad Internacional de La Rioja, Logroño, Spain

* **Correspondence:** Email: juanmanuel.martin@unir.net.

Abstract: In this paper, we examined how macroeconomic cycles shape the financial outcomes of advertising firms in Spain. Using population-level firm data for all Spanish provinces over 2000–2024, we combined province-level Toda–Yamamoto Granger causality and Hatemi-J asymmetric causality tests with panel-level evidence based on the heterogeneous panel causality framework of Emirmahmutoglu and Kose (2011). All causality specifications incorporated controls for the scale of the local advertising market, including firm-size proxies and aggregate advertising activity. The results revealed strong business-cycle asymmetries and substantial geographical heterogeneity. However, the uneven distribution of statistically significant provincial effects was not random. Ridge-penalized logistic models showed that the probability of observing significant first-stage effects is systematically related to provincial macroeconomic scale and financial structure, and that these determinants differ sharply across business-cycle regimes. During expansions, significant effects concentrate primarily on balance-sheet outcomes (solvency and equity), whereas during recessions, significance shifts to operating-performance outcomes (revenues and EBITDA). Overall, the findings refine the procyclicality debate in advertising by linking cyclical sensitivity to regional macro-financial structures and state-dependent mechanisms governing operating outcomes and balance-sheet resilience.

Keywords: advertising firms; business cycles; macroeconomic shocks; solvency and equity; marketing communications; regional heterogeneity

JEL Codes: C32, E32, E44, G32, M37, R11

1. Introduction

Economic cycles profoundly shape corporate behavior, particularly in industries where revenues depend on discretionary expenditures and strategic investment decisions. In the economic analysis of advertising, firms' advertising intensity is modeled as an endogenous choice influenced by market structure, demand elasticities, and expected profitability (Bagwell, 2007). Within this framework, advertising is not merely a residual marketing expense, but a strategic variable that responds systematically to aggregate demand conditions and competitive pressures over the business cycle.

A growing macroeconomic literature has documented that aggregate advertising expenditure is strongly procyclical. Hall (2012) showed that advertising-to-GDP ratios move positively with output fluctuations, challenging theories of countercyclical profit margins and supporting models based on product-market frictions. Similarly, Silk and Berndt (2021) provided comprehensive evidence on the evolution of aggregate advertising expenditure in the United States, documenting a substantial elasticity of advertising with respect to GDP and highlighting structural changes associated with the digital transformation of the industry. Beyond reduced-form evidence, Molinari and Turino (2018) incorporated advertising into a Bayesian DSGE framework and showed that advertising amplifies aggregate consumption dynamics, reinforcing its macroeconomic relevance.

Taken together, this literature establishes that advertising expenditure co-moves with macroeconomic activity in a systematic and theoretically grounded manner. However, while this macroeconomic literature has extensively documented the behavior of aggregate advertising expenditure, it has given limited attention to how business cycle fluctuations affect the financial structure and balance-sheet vulnerability of firms operating within the advertising industry.

Importantly, the procyclicality of aggregate advertising expenditure should be conceptually distinguished from the cyclical behavior of the financial performance of firms operating within the advertising industry. While downturns typically reduce client firms' demand for advertising services, the financial outcomes of advertising agencies, such as revenues, operating profitability, solvency, and equity, also depend on cost structures, balance-sheet positions, competitive dynamics, and local market characteristics. These dimensions are related but analytically distinct, and understanding the transmission of macroeconomic fluctuations to the financial resilience of advertising firms remains an open empirical question.

Most researchers focus on how advertising affects consumer goods firms, overlooking how advertising firms navigate economic turbulence. Crises, from the Great Recession to the COVID-19 pandemic, demonstrate the urgency of analyzing the financial structures of these firms, including revenues, EBITDA, solvency, and equity, in relation to macroeconomic fluctuations. To our knowledge, no researcher has explicitly integrated the macroeconomic literature on aggregate advertising dynamics with a firm-level analysis of the financial structure and balance-sheet vulnerability of advertising agencies. By bridging these strands of research, we extend the macro advertising literature beyond expenditure measures and contribute to the broader debate on the transmission of business cycle fluctuations to sector-specific financial outcomes.

In this paper, we also provide the first province-level evidence on the regional heterogeneity of advertising firms' financial responses to the business cycle in Spain. Researchers have largely focused on aggregate advertising expenditures or consumer goods firms' responses, rather than examining the regional financial heterogeneity of advertising firms. The geographical dimension is particularly relevant in the advertising industry because advertising services are largely supplied and contracted in regional markets. Spanish provinces differ markedly in sectoral composition, exposure to cyclical industries, and the local distribution of advertising firms by size and market concentration. These structural differences may shape the intensity and timing with which macroeconomic shocks are transmitted into firms' revenues, profitability, and balance-sheet adjustments, motivating a province-level analysis. Our study is novel in two respects. First, we investigate firm-level financial outcomes, including revenues, EBITDA, solvency, and equity, rather than treat advertising solely as an external input. Second, we explore regional variation across provinces, highlighting heterogeneous causal relationships between macroeconomic indicators and firms' financial performance. By doing so, we provide fresh insights into the resilience and vulnerabilities of the advertising industry. We test these hypotheses using a province-level asymmetric panel VAR framework.

Based on this reasoning, we develop the following hypotheses:

Hypothesis 1 (H1). GDP growth Granger-causes revenues of advertising firms in a positive direction, whereas unemployment Granger-causes them in a negative direction.

Hypothesis 2 (H2). GDP growth and unemployment Granger-cause EBITDA, but the magnitude of these effects is weaker than for revenues.

Hypothesis 3 (H3). Unemployment Granger-causes solvency ratios, leading to deterioration in downturns.

Hypothesis 4 (H4). GDP growth and unemployment Granger-cause equity, with expansions strengthening equity and recessions eroding it.

1.1. Literature review and hypothesis development

1.1.1. Business cycles and firm-level financial performance

A large and well-established body of literature documents that firms' financial performance is systematically influenced by macroeconomic conditions. Early and seminal contributions show that profitability, growth, and financial outcomes respond to business cycle fluctuations, with firm-level heterogeneity becoming particularly pronounced during economic downturns (Geroski and Machin, 1993). This evidence highlights that cyclical dynamics affect firms not only through changes in demand but also through structural characteristics that condition their capacity to absorb macroeconomic shocks.

Subsequent research further demonstrates the procyclical nature of firms' financial performance across industries. Albertazzi and Gambacorta (2009) show that profitability exhibits a strong cyclical pattern, reflecting variations in revenues, margins, and provisioning behavior over the business cycle. From a conceptual perspective, Oxelheim (2003) emphasizes that macroeconomic fluctuations introduce a source of "macroeconomic noise" into firm-level outcomes, suggesting that corporate performance cannot be fully understood without accounting for aggregate economic conditions.

Moreover, empirical evidence confirms that macroeconomic variables such as GDP growth and unemployment significantly affect firm-level financial indicators, including profitability and returns on assets. Issah and Antwi (2017) provided evidence for UK firms, showing that economic activity and labor market conditions shape operating performance, with heterogeneous effects across sectors. Similarly, Egbunike and Okerekeoti (2018) found that macroeconomic conditions play a crucial role in explaining variations in firms' financial performance, even after controlling for firm-specific characteristics. Ibrahimov et al. (2025) reinforced this view by developing a theoretical framework and empirical analysis linking macroeconomic fluctuations to firm profitability and capital structure across industries.

Taken together, this literature establishes a robust theoretical and empirical foundation for analyzing how macroeconomic cycles translate into firm-level financial outcomes. However, most researchers focus on manufacturing or broad industrial sectors, devoting limited attention to service-based industries and, in particular, to advertising firms.

1.1.2. Advertising activity, cyclicality, and the transmission to firm performance

Parallel to the literature on firm performance, a substantial strand of research documents the cyclical behavior of advertising activity. Early descriptive studies documented the cyclical sensitivity of advertising expenditure (e.g, Gröndal et al., 1987; Etayo-Pérez, 2010), complementing more recent macroeconomic evidence on aggregate advertising dynamics. This evidence reflects firms' marketing budget decisions and primarily captures the demand-side dynamics of advertising over the business cycle.

Classical contributions emphasize advertising's dual character as a discretionary cost and a potential stabilizer of demand. Callahan (1986) and Unwin (1986) highlighted that advertising expenditures are often among the first items to be reduced during downturns, while empirical studies show that firms maintaining advertising during recessions may experience stronger post-crisis performance (Tellis and Tellis, 2009; Van Heerde et al., 2013). These findings reveal an apparent paradox: Advertising is procyclical in aggregate, yet potentially countercyclical at the firm level.

Importantly, as emphasized in the Introduction, the cyclical behavior of aggregate advertising expenditure should be conceptually distinguished from the cyclical behavior of the financial performance of firms operating in the advertising industry. While reductions in advertising demand during recessions directly affect agencies' revenues, the financial outcomes of advertising firms also depend on cost structures, operating leverage, balance-sheet positions, and competitive dynamics. Consequently, macroeconomic shocks may be amplified or mitigated depending on firm size, liquidity, and regional market conditions.

Industry-level evidence shows that major economic downturns generate sharp contractions in advertising revenues, corporate restructuring, and employment losses in media and communication firms (Román and García, 2013; Bonales-Daimiel and Mañas-Viniegra, 2021). The COVID-19 crisis reinforced these patterns while accelerating structural shifts toward digital and ICT-enabled advertising formats (Corredor-Lanas et al., 2021; Rojko et al., 2011; Baquerizo-Altamirano and Córdova-Aldás, 2022). Together, these findings highlight the cyclical sensitivity of advertising activity and the role of structural characteristics in shaping firms' resilience beyond aggregate expenditure measures.

Firm-level resilience to macroeconomic shocks is heterogeneous. Smaller advertising agencies often face tighter liquidity constraints and more limited access to external financing, which may amplify the impact of downturns on revenues, solvency, and equity positions (Amaro-Hernández et al., 2017; Nikbin et al., 2022). In contrast, larger firms with stronger balance sheets and diversified client portfolios may better absorb temporary demand contractions. Empirical evidence further suggests that structural characteristics, such as size, leverage, and market concentration, shape financial performance in advertising-related industries, implying that macroeconomic shocks may have uneven balance-sheet effects across firms and regions (Chagmana-Ases et al., 2023; Chandra and Weinberg, 2018).

1.1.3. Macroeconomic cycles, revenues, and profitability of advertising firms

In economic models of advertising under imperfect competition, advertising intensity is an endogenous strategic choice determined by an optimality condition equating marginal cost and marginal benefit (Bagwell, 2007). Firms do not increase advertising mechanically simply because aggregate demand is higher. Rather, advertising is chosen to maximize profits, and its marginal return depends on the expected profitability of shifting demand, building market share, and influencing competitive interaction.

Formally, the marginal benefit of advertising depends on expected sales volumes, profit margins, demand responsiveness (elasticities), and competitive incentives. It may also be affected by uncertainty and financial constraints. Therefore, the theoretical effect of business-cycle fluctuations on optimal advertising is not mechanically driven by the level of demand. In principle, the sign of the response may be ambiguous: For example, advertising could increase when demand becomes more responsive ("steeper") rather than simply larger. What matters for optimal advertising is the expected marginal profit generated by advertising, not the aggregate size of demand per se.

However, macroeconomic expansions systematically affect the determinants of the marginal return to advertising. Higher expected sales, stronger margins, lower financial constraints, and reduced uncertainty during expansions tend to increase the expected payoff from demand-shifting and market-share strategies. Conversely, downturns reduce expected profitability, tighten financing conditions, and increase uncertainty, thereby lowering the marginal benefit of advertising relative to its cost. Within this micro-founded framework, procyclical advertising emerges not as a mechanical consequence of higher demand, but as the outcome of changes in expected profitability and strategic incentives over the business cycle.

Consistent with this mechanism, modern macroeconomic evidence documents a strongly procyclical behavior of aggregate advertising expenditure. Hall (2012) shows that advertising-to-GDP ratios move positively with output fluctuations, and argues that the cyclical response of advertising is consistent with models featuring product-market frictions. Silk and Berndt (2021) provide comprehensive evidence on the evolution of aggregate advertising expenditure in the U.S. economy, documenting a substantial elasticity of advertising with respect to GDP and highlighting structural changes in the digital era. Beyond reduced-form evidence, Molinari and Turino (2018) incorporated advertising into a Bayesian DSGE framework and showed that advertising can amplify aggregate consumption dynamics. Taken together, this literature provides theoretical and empirical support for a procyclical response of advertising budgets at the aggregate level.

For firms operating within the advertising industry, cyclical adjustments in advertisers' optimal budgets constitute the primary transmission channel from macroeconomic conditions to firm-level financial outcomes. Advertising agencies derive revenues from client contracts and campaign spending that reflect advertisers' optimal decisions. Consequently, aggregate shocks to GDP growth and unemployment are expected to affect advertising firms' revenues directly and relatively quickly.

The response of operating profitability, however, may differ from that of revenues. While revenues reflect changes in advertising demand, profitability indicators such as EBITDA depend on firms' cost structures, operating leverage, and their ability to adjust expenditures. The broader literature on firm performance over the business cycle shows that profitability is generally procyclical but often less volatile than revenues due to cost rigidities and adjustment frictions (Albertazzi and Gambacorta, 2009; Issah and Antwi, 2017). These mechanisms imply that macroeconomic shocks may translate more strongly into revenue fluctuations than into profitability changes.

In the context of advertising-related industries, empirical evidence further indicates that financial performance is shaped by structural characteristics such as firm size, leverage, and efficiency (Zavalii et al., 2024, 2025). Revenue responses to macroeconomic shocks may therefore be relatively immediate, while profitability responses depend on firms' capacity to absorb demand contractions and adjust operating costs.

Based on this micro-founded and macro-consistent framework, we expect macroeconomic conditions to exert a direct and strong influence on advertising firms' revenues, while their impact on EBITDA is present but comparatively weaker.

Hypothesis 1 (H1). GDP growth Granger-causes revenues of advertising firms in a positive direction, whereas unemployment Granger-causes them in a negative direction.

Hypothesis 2 (H2). GDP growth and unemployment Granger-cause EBITDA, but the magnitude of these effects is weaker than for revenues.

1.1.4. Business cycles, solvency, and equity

From Beyond revenues and operating profitability, macroeconomic cycles are also expected to affect the balance-sheet structure and financial resilience of advertising firms. From a macro-financial perspective, recessions are typically associated with weaker cash flows, tighter financing conditions, and higher default risk, which can accelerate balance-sheet deterioration in firms exposed to demand volatility.

From a corporate finance standpoint, solvency and equity dynamics are closely linked to internal cash-flow generation and access to external finance. In downturns, negative demand shocks reduce operating cash flows and retained earnings, weakening firms' capacity to self-finance and increasing their reliance on debt. Since liabilities and quasi-fixed costs often adjust more slowly than revenues, short-run leverage ratios may increase mechanically, deteriorating solvency measures even when firms attempt to cut expenditures. Furthermore, recessions tend to coincide with tighter credit conditions, which raises refinancing costs and restricts external funding, further amplifying balance-sheet vulnerability, particularly among smaller firms with limited collateral and weaker bargaining power in credit markets (Geroski and Machin, 1993; Oxelheim, 2003).

These mechanisms imply that labor market deterioration and higher unemployment should be associated with weaker solvency positions. Rising unemployment is a robust indicator of prolonged demand contractions and adverse macroeconomic conditions, and therefore captures the type of persistent negative shock that is most likely to translate into higher leverage, weaker asset coverage, and increased financial fragility.

Equity dynamics may also respond systematically to the business cycle, but through a distinct channel. Equity accumulation is largely driven by retained earnings and the gradual rebuilding of balance-sheet buffers. In expansions, higher revenues and profitability strengthen equity over time through reinvestment and profit retention. In downturns, however, equity may erode more rapidly due to losses, reduced retained earnings, and the leverage effect induced by falling revenues and asset values. This suggests potential asymmetry: Balance-sheet deterioration during recessions may occur faster than balance-sheet rebuilding during recoveries.

Empirical evidence further supports the relevance of balance-sheet characteristics in shaping firms' resilience to adverse shocks. Issah and Antwi (2017) and Ibrahimov et al. (2025) showed that macroeconomic conditions influence firms' capital structure and long-term financial performance across industries. In the context of advertising-related industries, Zavalii et al. (2024, 2025) provided evidence that solvency, leverage, and equity-related indicators play a central role in determining financial outcomes, with substantial heterogeneity across firms and regions.

Taken together, these macro-financial transmission mechanisms provide a theoretical foundation for expecting that adverse macroeconomic conditions deteriorate solvency ratios, while economic expansions support equity accumulation over the business cycle.

Hypothesis 3 (H3). Unemployment Granger-causes solvency ratios, leading to deterioration in downturns.

Hypothesis 4 (H4). GDP growth and unemployment Granger-cause equity, with expansions strengthening equity and recessions eroding it.

2. Materials and methods

2.1. Data

In this study, we drew on administrative data extracted from the SABI (Sistema de Análisis de Balances Ibéricos) database, one of the most comprehensive sources of firm-level information in Spain and Portugal. SABI is maintained by Informa D&B and updated regularly to include the full population of legally registered companies in both countries. For this project, we accessed the most recent update (version 310, dated June 13, 2025), which provides extensive coverage of business entities, including legal name, geographic location, sector classification, financial statements, employment figures, and foundation dates.

The dataset comprises 26,432 advertising firms founded in Spain between 1975 and 2024, belonging to the following CNAE 2009 categories: 7021 (Public Relations and Communication), 73 (Advertising and Market Research), 731 (Advertising), and 7311 (Advertising Agencies). These categories were selected because they represent the core of the advertising and communication industries, where creative and symbolic activities are central to business operations. Importantly, this is not a sample but the entire population of firms in the sector, ensuring that our analyses were not subject to sampling bias.

For this study, we constructed an unbalanced panel dataset covering the period 2000–2024. For each firm and year, we collected financial information on four key variables:

1. Revenues: Capturing the firm's turnover and market activity.
2. EBITDA: Measuring operational profitability after operating costs but before taxes, depreciation, and amortization.
3. Solvency ratio: Assessing the ability of firms to meet their long-term obligations.
4. Equity: Reflecting the firm's net worth and accumulated reserves.

These variables were chosen to capture current performance (revenues, EBITDA) and structural financial stability (solvency, equity). Provincial and regional identifiers available in SABI enabled us to disaggregate the analysis at a fine-grained territorial level. Moreover, this spatial dimension enabled us to explore not only average effects of the business cycle but also the regional heterogeneity of causal relationships between macroeconomic indicators and firm-level outcomes.

In addition to firm-level data, we incorporated macroeconomic indicators from the National Institute of Statistics (INE). Specifically, we used annual real GDP and unemployment rates for the period 2000–2024. These variables served as proxies for the business cycle and were matched to the firm-level panel at the provincial level to assess causal linkages between macroeconomic fluctuations and the financial performance of advertising firms.

The dataset thus provides a unique longitudinal and population-level perspective on the financial dynamics of advertising firms in Spain. By combining temporal depth (25 years of annual observations) with territorial granularity (provincial breakdowns), it offers an unprecedented opportunity to examine how the business cycle shapes both operational and structural dimensions of firm performance across heterogeneous regional contexts.

To investigate the dynamic relationship between macroeconomic conditions and the financial outcomes of advertising firms, we employed two complementary Granger causality approaches: The Toda-Yamamoto (1995) method for robust causality testing with potentially non-stationary data and the Hatemi-J (2011) asymmetric causality test to capture differential effects of positive and negative economic shocks. These approaches enabled us to examine whether changes in GDP and unemployment precede variations in firm-level financial variables (revenues, EBITDA, solvency, and equity), and whether expansions and contractions in the business cycle exert asymmetric effects.

2.2. Panel Granger Causality Approach: Emirmahmutoglu and Kose (2011)

While standard Granger causality tests based on VAR models are widely used in time-series econometrics, they are not well suited for panel datasets characterized by multiple cross-sectional units and heterogeneous dynamics. In our setting, Spanish provinces differ substantially in economic structure, firm composition, and the size and specialization of the local advertising industry. These differences may generate heterogeneous causal relationships across provinces, implying that a pooled VAR for the whole country could be misleading and may conceal relevant cross-sectional variation.

To provide an aggregate panel-level assessment while enabling heterogeneity across provinces, we adopted the panel Granger causality methodology proposed by Emirmahmutoglu and Kose (2011). This approach extends the Toda and Yamamoto (1995) augmented VAR framework to heterogeneous panels. Importantly, it enables each cross-sectional unit (province) to follow its own optimal lag structure and its own maximal order of integration without requiring pre-testing for unit roots or cointegration.

For each province $i = 1, \dots, N$, we estimated an augmented VAR in levels. First, the model assessing the effect of GDP growth on the financial outcome is specified as:

$$y_{i,t} = \alpha_i + \sum_{j=1}^{p_i} \beta_{i,j} y_{i,t-j} + \sum_{k=1}^{p_i} \gamma_{i,k} GDP_{i,t-k} + \varepsilon_{i,t}, \tag{1}$$

Similarly, the model assessing the effect of unemployment on the financial outcome is specified as:

$$y_{i,t} = \alpha_i + \sum_{j=1}^{p_i} \beta_{i,j} y_{i,t-j} + \sum_{k=1}^{p_i} \gamma_{i,k} U_{i,t-k} + \varepsilon_{i,t}, \tag{2}$$

where $y_{i,t}$ denotes the financial outcome of advertising firms in province i (revenues, EBITDA, solvency, or equity), $GDP_{i,t}$ denotes GDP growth, $U_{i,t}$ denotes the unemployment rate, p_i is the optimal lag length selected for each province, and $d_{max,i}$ is the maximal order of integration in the system for province i. The augmented structure corresponds to the Toda–Yamamoto approach, where additional lags are included to ensure valid Wald inference even under nonstationarity.

To test for Granger causality from the macroeconomic variable ($GDP_{i,t}$ or $U_{i,t}$) to $y_{i,t}$, we evaluated the null hypothesis:

$$H_0 : \gamma_{i,1} = \gamma_{i,2} = \cdots = \gamma_{i,p_i} = 0, \forall i. \tag{3}$$

Rejection of H_0 implies that the corresponding macroeconomic variable Granger-causes the financial outcome in province i.

Following Emirmahmutoglu and Kose (2011), the panel-wide evidence is obtained by combining the individual p-values using the Fisher-type meta-statistic:

$$F = -2 \sum_{i=1}^{N} \ln{(p_i)}, \tag{4}$$

where p_i is the p-value of the province-specific Wald statistic. Because cross-sectional dependence across provinces may invalidate the standard asymptotic distribution of the Fisher statistic, Emirmahmutoglu and Kose (2011) proposed using bootstrap critical values. We therefore relied on bootstrap inference to ensure robust panel-level conclusions in the presence of cross-sectional correlations.

This panel causality approach provides a rigorous way to evaluate aggregate causality across Spanish provinces while preserving heterogeneous dynamic structures at the provincial level (Martín-Álvarez et al., 2020). It complements our province-by-province asymmetric causality analysis, which is developed in the next subsection.

2.3. Toda-Yamamoto Granger Causality

A key limitation of traditional Granger causality tests is their assumption of stationarity. Economic and financial series such as GDP, unemployment, or solvency ratios often contain unit roots. Differencing the data to achieve stationarity can lead to a loss of long-run information and potential misspecifications if the integration order is misidentified.

The Toda-Yamamoto (1995) procedure addresses this by estimating a vector autoregressive (VAR) model in levels with an augmented lag structure. Specifically, let d_{max} denote the maximum order of integration among the variables under study, and let k be the optimal lag length determined by the Akaike Information Criterion (AIC). The Toda-Yamamoto approach estimates a VAR with $k + d_{max}$ lags, but tests for causality are conducted only for the first k lags, ensuring asymptotic validity.

For example, when testing whether GDP Granger-causes firm revenues, the model is:

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i Y_{t-i} + \sum_{j=1}^{k} \beta_j GDP_{t-j} + \sum_{m=k+1}^{k+d_{max}} \theta_m GDP_{t-m} + \varepsilon_{i,t} \tag{5}$$

For unemployment affecting university enrollments, the model follows:

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i Y_{t-i} + \sum_{j=1}^{k} \beta_j U_{t-j} + \sum_{m=k+1}^{k+d_{max}} \theta_m U_{t-m} + \varepsilon_{i,t} \tag{6}$$

where Y_t denotes the financial variable (revenues, EBITDA, solvency, or equity) and GDP_t and U_t represent GDP and unemployment, respectively.

The hypothesis test is formulated as:

$$H_0\colon \beta_1 = \beta_2 = \ldots = \beta_k = 0 \tag{7}$$

which is tested using a modified Wald test (MWALD). Rejection of H_0 indicates that GDP (or unemployment) Granger-causes the financial variable under consideration.

2.4. Hatemi-J Asymmetric Causality

Traditional causality tests assume symmetric responses to macroeconomic shocks, meaning that expansions and recessions are treated as mirror images. However, financial outcomes of advertising firms may react differently to positive and negative shocks. For instance, revenues may decline sharply in recessions but increase more moderately during expansions.

The Hatemi-J (2011) test builds upon Granger and Yoon (2002) by decomposing the explanatory variables into cumulative positive and negative shocks. For GDP, this decomposition is:

For GDP:

$$GDP_t^+ = \sum_{i=1}^{t} max(\Delta GDP_i, 0)\,, GDP_t^- = \sum_{i=1}^{t} min(\Delta GDP_i, 0) \tag{8}$$

For unemployment:

$$U_t^+ = \sum_{i=1}^{t} max(\Delta U_i, 0)\,, U_t^- = \sum_{i=1}^{t} min(\Delta U_i, 0) \tag{9}$$

where GDP_t^+ represents cumulative positive GDP shocks (economic expansions), GDP_t^- cumulative negative GDP shocks (recessions), U_t^+ increases in unemployment, and U_t^- decreases in unemployment.

Granger causality tests are then estimated separately for each component. For example:

$$E_t = \alpha_0 + \sum_{j=1}^{p} \beta_j Y_{t-j} + \sum_{k=1}^{q} \gamma_k GDP_t^+ + \varepsilon_{i,t} \tag{10}$$

and analogously with GDP_t^-, U_t^-, and U_t^+.

The null hypothesis for each decomposition is formulated as follows:

$$H_0 : \gamma_1^+ = \gamma_2^+ = \ldots = \gamma_p^+ = 0 \quad (11)$$

$$H_0 : \gamma_1^- = \gamma_2^- = \ldots = \gamma_p^- = 0 \quad (12)$$

Rejection of H_0^+ but not H_0^- (or vice versa) implies asymmetric causality, where expansions and contractions affect the financial variables differently.

In addition to the province-level estimations reported in the paper, we also estimated country-level benchmark models for Spain based on aggregated financial outcomes and national macroeconomic indicators. These benchmark estimations serve as a reference point for assessing whether national-level dynamics capture the relationships observed at the regional level.

We also examined the sensitivity of the baseline results to proxies for firm size and market structure constructed at the province-year level. These additional checks did not affect the qualitative conclusions and are therefore not reported in the main text.

2.5. Second-Stage Modeling of Cross-Provincial Heterogeneity in significant effects

A recurrent feature of the province-level asymmetric causality results is that statistically significant effects arise only in a subset of provinces, and that this subset differs across business-cycle regimes and across financial outcomes. Rather than interpreting this limited incidence of significance as a purely statistical artifact, we explicitly investigated whether provinces exhibiting significant coefficients share systematic macro-financial characteristics.

To do so, we constructed a second-stage province-level indicator that captured whether a statistically significant first-stage effect was detected. For each province i, each regime (expansion or recession), each financial outcome (revenues, EBITDA, solvency, equity), and each sign (positive or negative), we defined a binary variable:

$$S_i = \mathbb{1}(p_i < 0.10), \quad (13)$$

where p_i denotes the province-specific p-value associated with the Hatemi-J asymmetric causality test. Hence, $S_i = 1$ if the province exhibits a statistically significant macro-to-financial causal effect and $S_i = 0$ otherwise. This transformation enabled us to directly model the probability that a province displayed statistically detectable macro-financial sensitivity.

We then estimated ridge-penalized logistic regressions of the form:

$$\Pr(S_i = 1) = \Lambda(\alpha + X_i'\beta), \quad (14)$$

where X_i includes macroeconomic scale and financial structure variables. Importantly, the set of regressors was rotated across specifications to avoid mechanical overlap between the dependent variable and its own explanatory proxies. For instance, when modeling the probability of observing significant revenue effects, GDP and financial variables (EBITDA, solvency, and equity) were included as predictors; when modeling EBITDA-related significance, revenues replaced EBITDA in the covariate set, and so on. All regressors were standardized to facilitate comparability.

Ridge regularization was particularly suitable in this context for three reasons. First, the cross-sectional sample was small ($N = 50$). Second, several outcome categories corresponded to rare events, generating quasi-separation risks under standard logit estimation. Third, the macro-financial covariates were moderately correlated, which could inflate coefficient instability in unpenalized models. The ridge penalty stabilized estimation while retaining interpretability. The penalty parameter was selected via cross-validation, and we reported predictive diagnostics (event rate, AUC, and Brier score) to summarize model performance.

This second-stage approach provided a disciplined way to rationalize why only certain provinces displayed statistically significant first-stage effects. This enabled us to link the incidence of significant causal relationships to identifiable macro-financial characteristics, and to test whether the determinants of significance differed systematically between expansionary and recessionary regimes.

3. Results

In this section, we present the empirical results on the relationship between business cycles and the financial performance of advertising firms in Spain. We first report the asymmetric causality tests, which provide detailed insights into how expansions and recessions affect revenues, EBITDA, solvency, and equity. These results are complemented by the global Toda–Yamamoto causality tests, which serve as a robustness check and are provided in the Appendix.

3.1. Panel Granger causality results: Aggregate Evidence Across Provinces

Using the panel Granger causality framework of Emirmahmutoglu and Kose (2011), we provide an aggregate panel-level assessment of the macro-to-firm transmission mechanism across Spanish provinces while enabling heterogeneous provincial dynamics. Importantly, and in line with the referee's suggestion, all panel causality specifications included a size control variable to improve identification and reduce omitted-variable bias.

Specifically, we controlled for the lagged level of provincial revenues (log of aggregate net turnover), which captured the overall scale of the local advertising industry in each province. This is a natural proxy for firm size and market thickness: Larger provincial advertising markets may display different financial dynamics and adjustment capacities than smaller ones, independently of macroeconomic conditions.

Table 1 reports the Fisher-type meta-statistics combining province-specific Wald tests for the null hypothesis of no Granger causality from GDP growth and unemployment to each financial outcome. Overall, the panel evidence supports the existence of a statistically significant macroeconomic transmission mechanism affecting the financial performance and balance-sheet conditions of advertising firms. In particular, GDP growth and unemployment display strong panel-wide Granger causality for EBITDA, solvency-related indicators, and equity, even after controlling for the size of the provincial advertising market.

Importantly, the fact that the panel test rejects the null at the aggregate level does not imply homogeneous effects across provinces. Rather, the Emirmahmutoglu and Kose (2011) methodology was designed to enable heterogeneous lag structures and causal patterns across cross-sectional units. Therefore, while the panel results confirm that the macroeconomic cycle matters at the national level, they also motivate a deeper province-level investigation of regional heterogeneity, which is developed in the next subsection.

Table 1. Global effects for panel data (Emirmahmutoglu and Kose).

Variable	GDP Þ Variable	Unem ⇒ Variable
Revenues	121.408* (0.072)	119.050* (0.094)
EBITDA	412.161*** (0.000)	459.971*** (0.000)
Solvency	440.200*** (0.000)	524.513*** (0.000)
Equity	442.860*** (0.000)	542.435*** (0.000)

Notes: Values are Fisher-type meta-statistics with p-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. All panel specifications include a size control measured as the lagged log level of provincial revenues (aggregate net turnover), capturing the scale of the local advertising industry.

3.2. Revenues

Table A1 and Table A2 report the asymmetric causality results for revenues. Table A1 focuses on expansions, defined as positive GDP shocks and decreases in unemployment, while Table A2 examines recessions, characterized by GDP contractions and increases in unemployment. The reported statistics correspond to F-tests from the asymmetric Granger causality framework, with significance levels indicated in the tables.

Overall, revenues emerge as the most macro-sensitive financial variable in the sample. Significant causal effects are observed in a substantial number of provinces, particularly during recessions, suggesting that revenue dynamics react more immediately and more visibly to macroeconomic shocks than other financial indicators.

During expansionary periods (Table A1), many provinces display procyclical behavior: Positive GDP shocks or reductions in unemployment are associated with increases in revenues. Provinces such as Baleares, Cantabria, Córdoba, Granada, Las Palmas de Gran Canaria, Santa Cruz de Tenerife, Valladolid, and others show statistically significant positive responses. These findings are consistent with classical theories of advertising cyclicality, according to which advertising revenues expand during periods of economic growth.

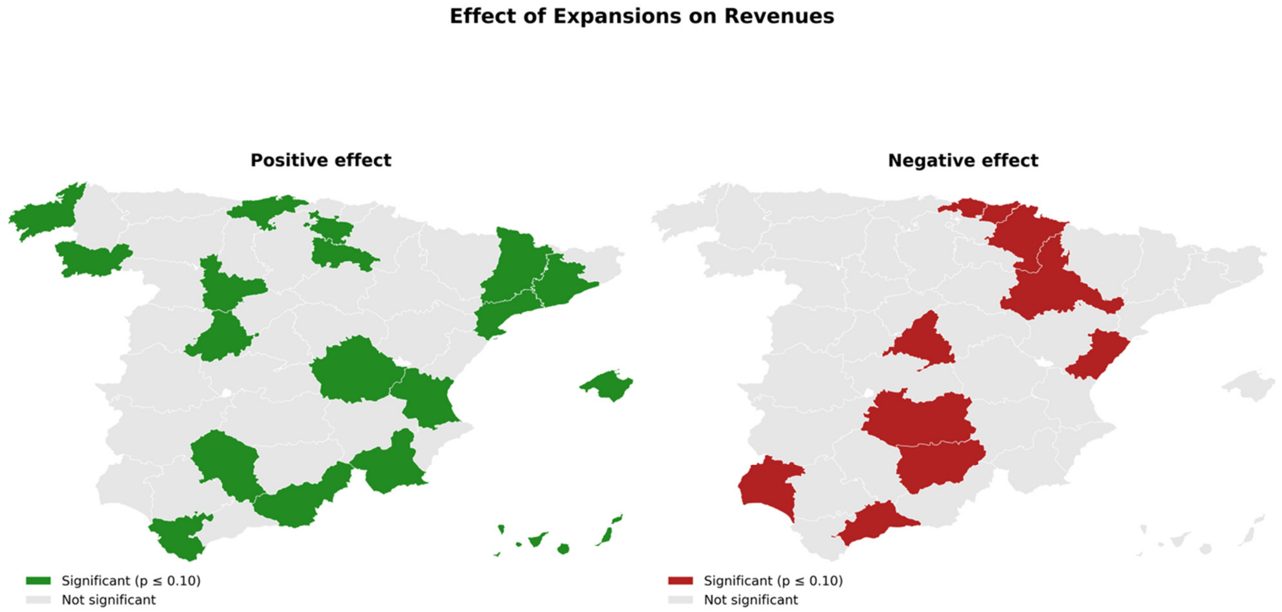

Figure 1. Geographical distribution of the effect of expansions on revenues.

However, expansionary asymmetries are not uniformly positive. In several provinces, positive GDP shocks are also associated with significant negative revenue effects, indicating heterogeneous adjustment mechanisms. For example, A Coruña, Castellón, Madrid, Málaga, and Zaragoza exhibit statistically significant negative revenue responses to positive GDP shocks. This suggests that, even in periods of aggregate growth, local structural conditions may lead to differentiated sectoral dynamics.

The geographical aggregation presented in Figure 1 synthesizes these results by classifying provinces according to whether expansions generate a statistically significant positive or negative effect on revenues, irrespective of whether the underlying shock originates from GDP or unemployment. The map reveals a clear spatial clustering of procyclical responses in several coastal and tourism-intensive regions, while negative or mixed effects appear more dispersed. This geographic pattern underscores the presence of structural regional heterogeneity.

The recession regime (Table A2) exhibits a stronger and more pervasive response. GDP contractions and increases in unemployment generate significant negative revenue effects in many provinces, including A Coruña, Almería, Baleares, Barcelona, Jaén, Madrid, Valencia, Valladolid, and Zaragoza. This widespread significance reinforces the view that revenues are highly sensitive to adverse macroeconomic conditions.

Furthermore, recessionary asymmetries are not purely negative. In several provinces, such as Álava, Cádiz, Girona, Granada, Las Palmas de Gran Canaria, and Pontevedra, GDP declines are associated with increases in revenues. Similarly, unemployment shocks generate positive revenue effects in some territories. These countercyclical patterns indicate that the relationship between macroeconomic downturns and advertising revenues is not mechanically uniform. In certain provinces, firms may intensify advertising during downturns, potentially reflecting competitive strategies or sectoral composition effects.

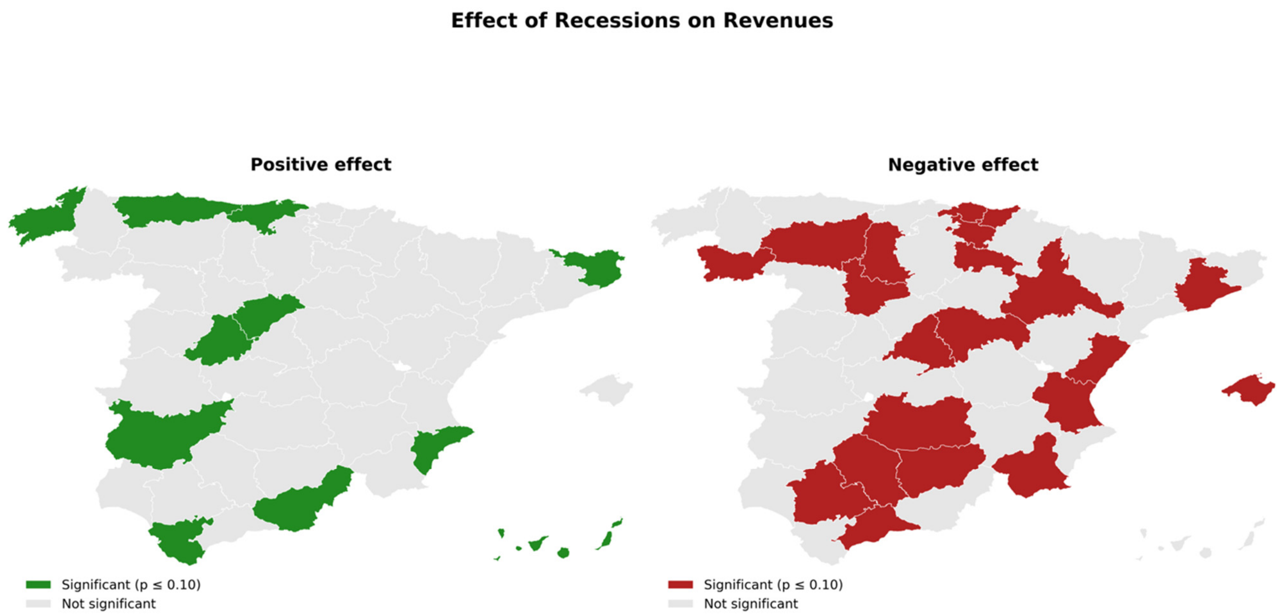

Figure 2. Geographical distribution of the effect of recessions on revenues.

Figure 2 provides the geographical representation of recessionary effects, again aggregating positive and negative significant responses regardless of whether they stem from GDP or unemployment shocks. The map reveals that negative effects dominate across much of the territory, but positive responses are geographically concentrated rather than random. This spatial distribution suggests that countercyclical behavior is associated with specific regional economic structures rather than idiosyncratic noise.

Taken together, the evidence indicates that revenues display strong cyclical sensitivity, particularly during recessions, but with substantial regional heterogeneity and occasional countercyclical responses. The coexistence of procyclical and countercyclical effects challenges the assumption of homogeneous national dynamics and highlights the importance of accounting for regional macro-financial structures when analyzing advertising-sector cyclicality.

3.3. EBITDA

Table A3 and Table A4 report the asymmetric causality results for EBITDA. Table A3 focuses on expansions (GDP growth and decreases in unemployment), while Table A4 examines recessions (GDP contractions and increases in unemployment). Overall, EBITDA displays fewer significant causal relationships than revenues, suggesting that profitability reacts to macroeconomic shocks in a more heterogeneous and less immediate way. This is consistent with the idea that operating margins incorporate adjustment mechanisms, such as cost flexibility, pricing, and managerial responses, that may dampen contemporaneous macro effects relative to topline revenues.

During expansions (Table A3), significant effects are present but relatively scattered across provinces and shock types. A subset of provinces exhibits procyclical responses, where positive GDP shocks or decreases in unemployment precede increases in EBITDA (e.g., Álava and Santa Cruz de Tenerife for GDP+ → EBITDA+; Baleares for Unem− → EBITDA+). Furthermore, there is also evidence of negative effects in expansions, where favorable macro conditions precede EBITDA contractions (e.g., Cádiz, Ciudad Real, and Toledo show significant results in the negative EBITDA direction). This mixture suggests that expansionary phases do not generate uniform profitability dynamics across provinces, potentially reflecting differences in cost structures, competitive environments, and local firm composition.

Figure 3 provides a geographical synthesis of Table A3 by aggregating significant positive and negative expansionary EBITDA effects regardless of whether they originate from GDP or unemployment shocks. The map highlights that expansionary profitability effects are not evenly distributed and tend to appear in specific provinces rather than form a pervasive national pattern.

Recessionary dynamics (Table A4) show a clearer and more frequent response of EBITDA to macroeconomic deterioration, although less widespread than for revenues. Several provinces exhibit significant links between recessionary shocks and EBITDA outcomes, including cases where GDP declines or rising unemployment precede profitability contractions (e.g., A Coruña for GDP− → EBITDA−; Cádiz and Ciudad Real for GDP− → EBITDA−; Segovia for Unem+ → EBITDA−). Countercyclical responses are also visible in some provinces, where recessionary shocks precede improvements in EBITDA, underscoring the role of restructuring, cost cutting, or shifts in demand composition.

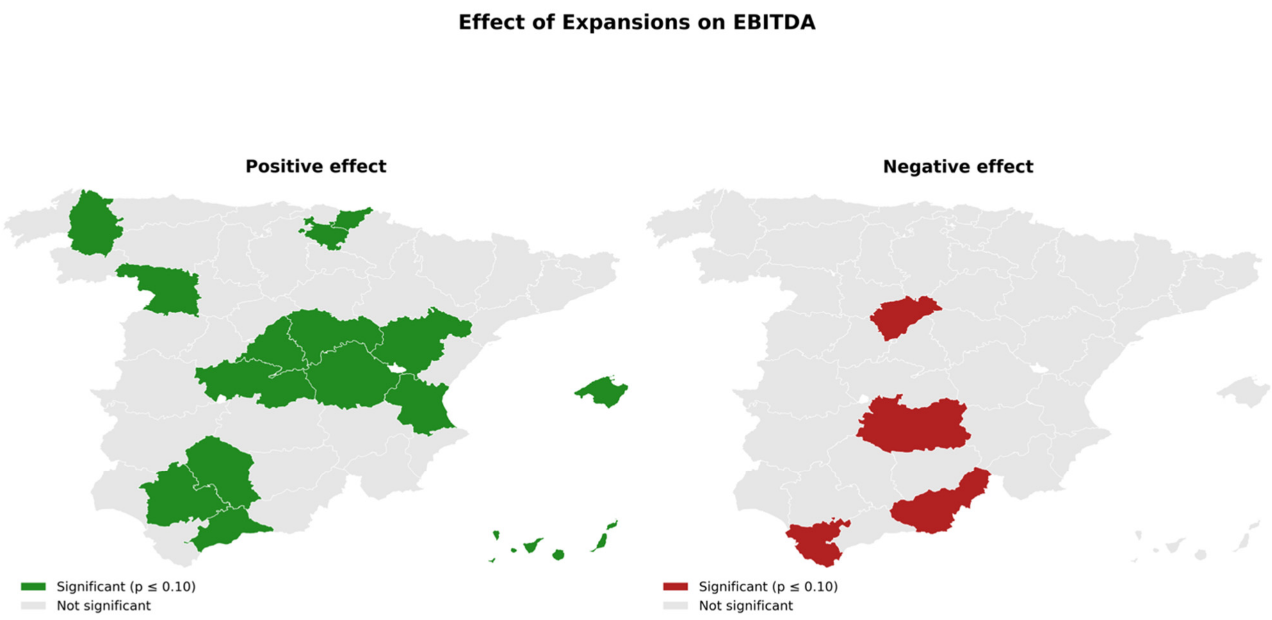

Figure 3. Geographical distribution of the effect of expansions on EBITDA.

Figure 4 complements Table A4 by mapping the aggregated recessionary effects on EBITDA (positive vs. negative, irrespective of shock origin). The geographical distribution suggests that recession-induced profitability effects are concentrated in identifiable areas rather than being random, reinforcing the interpretation of meaningful regional heterogeneity in operating adjustment mechanisms.

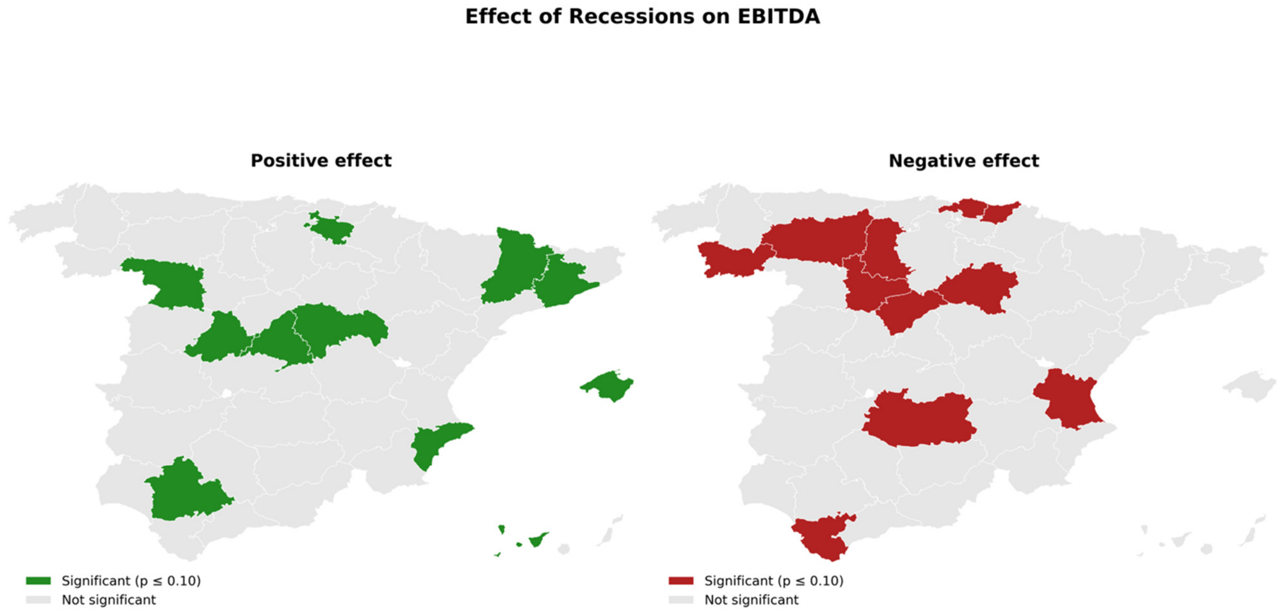

Figure 4. Geographical distribution of the effect of recessions on EBITDA.

3.4. *Solvency*

Table A5 and Table A6 report the asymmetric causality results for solvency. Solvency outcomes are conceptually closer to balance-sheet adjustment and financial resilience than to immediate operating performance. As a result, significant effects are generally less pervasive than for revenues but may reflect deeper structural conditions related to financing constraints, debt burden, and liquidity management.

During expansions (Table A5), significant effects arise in a number of provinces, often linked to unemployment decreases rather than GDP growth. Several provinces show evidence that improving labor market conditions precede solvency improvements, consistent with strengthening cash flows and reduced financial stress in good times. Furthermore, there are provinces where expansionary conditions are associated with solvency deterioration, suggesting that growth periods may coincide with increased leverage, investment, or risk-taking that weakens balance-sheet ratios in certain local contexts. This reinforces the idea that solvency dynamics in expansions depend critically on financial policies and the local composition of firms.

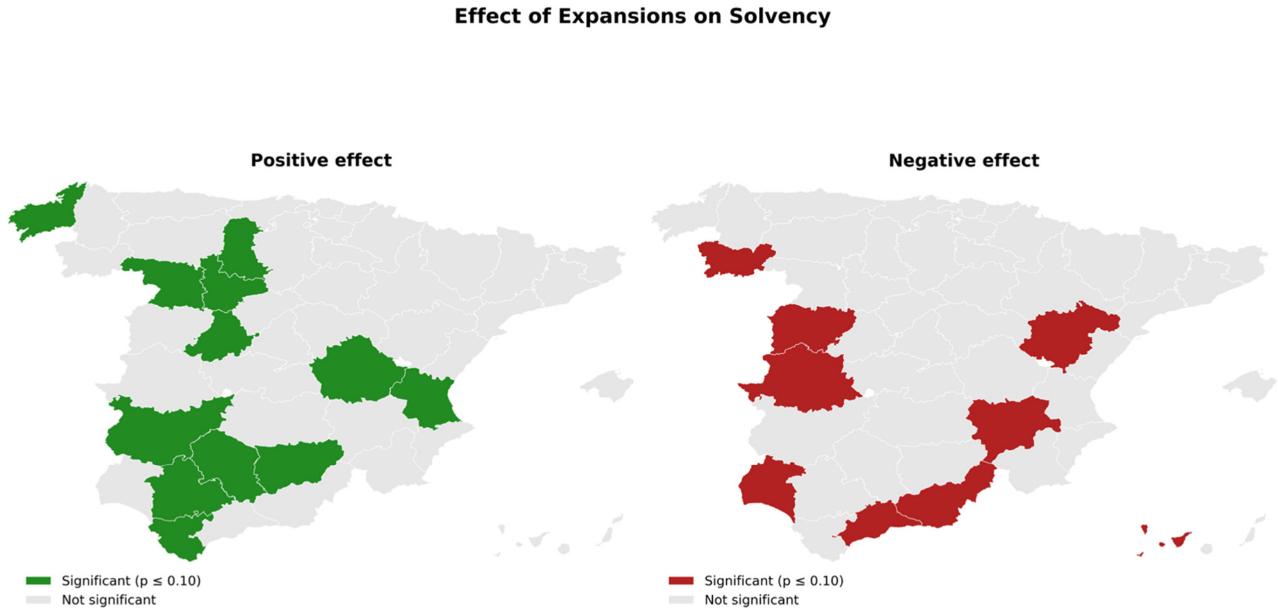

Figure 5. Geographical distribution of the effect of expansions on solvency.

Figure 5 maps the expansionary solvency effects by aggregating significant positive and negative outcomes regardless of whether they stem from GDP or unemployment shocks. The map reveals that expansionary solvency improvements and deteriorations coexist geographically, suggesting that balance-sheet adjustments in good times are not mechanically procyclical and may reflect province-specific financial strategies or constraints.

In recessions (Table A6), significant solvency effects are comparatively limited but economically informative. Several provinces exhibit statistically significant links between recessionary shocks and solvency deterioration (e.g., Cádiz and Ciudad Real in GDP-related channels; and Sevilla and Zaragoza in GDP-related negative solvency effects). Notably, solvency responses do not appear uniformly negative across all provinces, which is consistent with the fact that solvency ratios can adjust through numerator and denominator movements, and because firms may actively manage liabilities, renegotiate debt, or reduce exposure during downturns.

Figure 6 complements Table A6 by showing the geographical distribution of recessionary solvency effects, aggregating positive and negative outcomes independently of shock type. The map emphasizes that recessionary solvency deterioration is concentrated in specific provinces, pointing to localized vulnerability rather than uniform national balance-sheet stress.

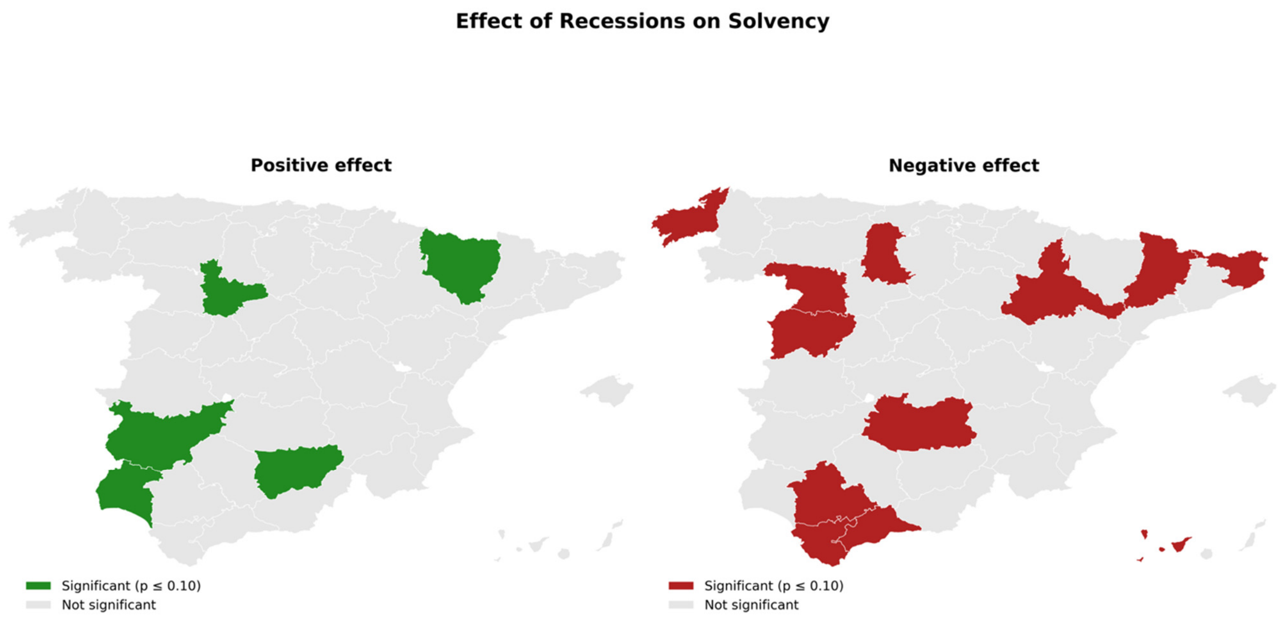

Figure 6. Geographical distribution of the effect of recessions on solvency.

3.5. Equity

Table A7 and Table A8 report the asymmetric causality results for equity. Equity is a balance-sheet item that can react to operating shocks and financial-policy choices (e.g., recapitalizations, retained earnings, and write-downs), and therefore it is expected to display heterogeneous responses across provinces and regimes.

During expansions (Table A7), significant effects are present in several provinces, with positive and negative directions depending on the shock type and local conditions. Some provinces exhibit procyclical equity patterns, where expansionary improvements precede equity strengthening, consistent with retained earnings accumulation or capital inflows. However, expansionary phases can also coincide with equity weakening in some provinces, potentially reflecting dividend policy, investment surges financed through liabilities, or valuation adjustments. This combination suggests that equity responses in expansions are shaped by financial decisions and accounting dynamics rather than purely by contemporaneous macro conditions.

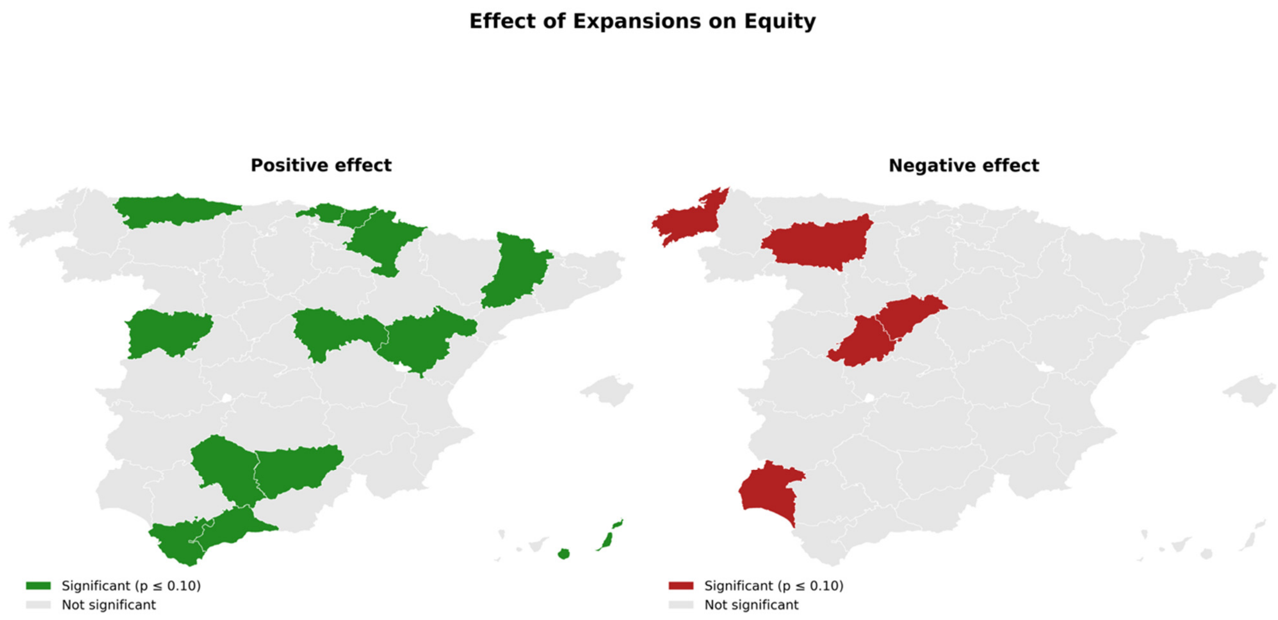

Figure 7. Geographical distribution of the effect of expansions on equity.

Figure 7 maps the aggregated expansionary effects on equity (positive vs. negative), irrespective of whether the underlying shock originates from GDP or unemployment changes. The resulting pattern indicates that equity adjustments are geographically uneven and tend to cluster in certain provinces, consistent with differences in local firm financial structures.

Recessionary equity dynamics (Table A8) also display heterogeneity, with significant effects concentrated in specific provinces and channels. In some cases, rising unemployment or GDP contractions precede equity strengthening, which is consistent with deleveraging, restructuring, or recapitalization episodes, while in others, recessionary shocks precede equity deterioration, which is consistent with losses, write-downs, or capital erosion. This reinforces the interpretation that equity is an adjustment margin in downturns and may reflect distress and active balance-sheet repair.

Figure 8 provides the geographical synthesis of Table A8, aggregating recessionary equity effects into positive versus negative outcomes regardless of shock origin. The map highlights that recessionary equity responses are not uniformly distributed and appear systematically related to province-specific conditions, strengthening the case for substantial regional heterogeneity in balance-sheet dynamics.

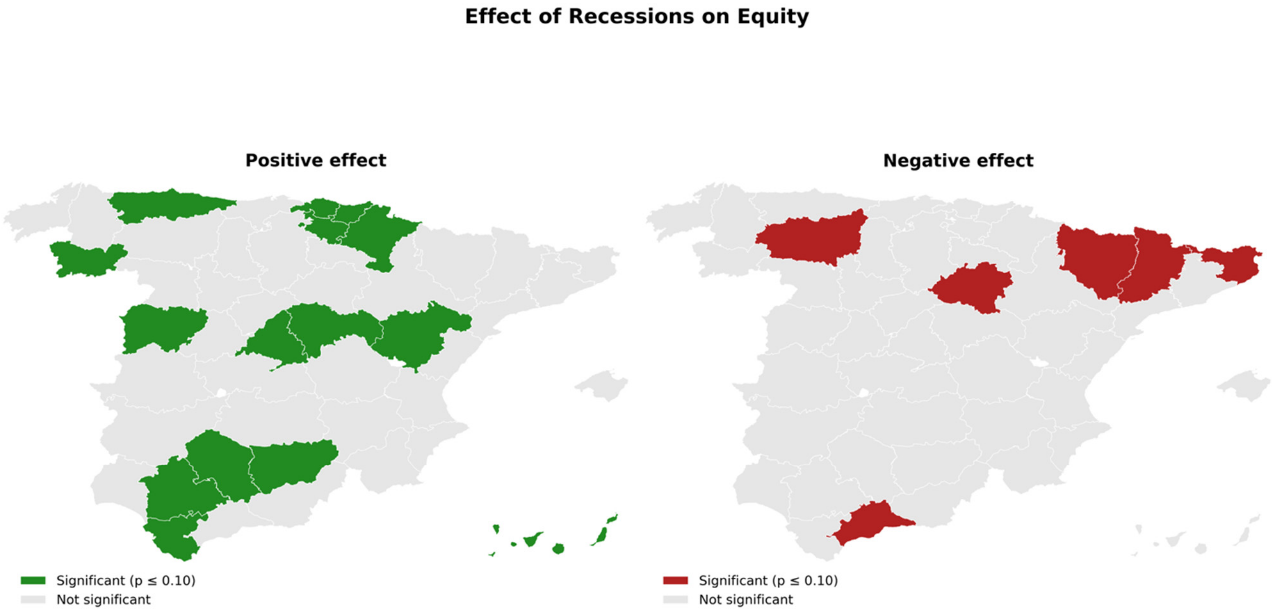

Figure 8. Geographical distribution of the effect of recessions on equity

3.6. Business-cycle asymmetries in the determinants of significant provincial effects

A central question raised by the empirical analysis concerns the uneven distribution of statistically significant first-stage effects across provinces. Rather than treating the limited number of significant cases as a purely statistical artifact, we explicitly investigated whether provinces exhibiting significant coefficients share systematic macro-financial characteristics. To this end, we modeled the probability that a province displays a statistically significant effect ($p < 0.10$) as a function of macroeconomic scale and financial structure variables using ridge-penalized logistic regressions. This approach was particularly suitable in our setting given the small cross-sectional dimension ($N = 50$) and the presence of rare events in several outcome categories. Ridge regularization ensured stable estimation while preserving interpretability.

Tables 2 and 3 reveal a clear and economically meaningful asymmetry across business-cycle regimes. The distribution of statistically significant coefficients differs sharply between expansions and recessions, and the determinants of significance are regime-dependent.

During expansionary periods (Table 2), statistically significant relationships are concentrated almost exclusively in the Solvency and Equity specifications, while the Revenues and EBITDA models exhibit virtually no robust significance. This pattern suggests that, in favorable macroeconomic environments, cross-provincial heterogeneity primarily manifests through balance-sheet adjustments rather than operating performance. Provinces characterized by stronger macroeconomic conditions and higher profitability are less likely to exhibit negative solvency outcomes, and financial structure variables play a meaningful role in explaining equity-related effects. By contrast, revenue and operating-profit outcomes do not display systematic significance across provinces. In expansions, therefore, differences across provinces appear to be expressed predominantly through capital structure and solvency dynamics rather than through core operating performance.

Table 2. Ridge-penalized logistic models – expansion regime.

	Revenues		EBITDA		Solvency		Equity	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
GDP	0.82	0.78	0.88	−1.67	−0.44	−2.12*	−0.93	−4.24
	(0.96)	(0.60)	(0.79)	(2.15)	(0.49)	(1.28)	(1.04)	(3.79)
EBITDA	−0.51	0.94	1.15	−0.84	−0.44	−0.93*	−1.11*	−0.90
	(0.69)	(0.66)	(0.71)	(0.70)	(0.29)	(0.52)	(0.58)	(0.56)
Solvency	0.07	1.38	0.84	−2.79	−0.63	−0.48	−0.90	−4.91*
	(0.96)	(0.84)	(0.76)	(2.06)	(0.47)	(1.63)	(1.18)	(2.70)
Equity	−1.07	1.12	1.21	−0.06	−0.38	−0.58	−0.80	−0.04
	(0.73)	(0.70)	(0.76)	(0.16)	(0.29)	(0.51)	(0.58)	(0.21)
N	50	50	50	50	50	50	50	50
C (ridge)	0.02	0.02	0.02	1.00	0.02	0.10	0.05	1.00
CV folds	5	5	5	4	5	5	5	5
CV neg logloss	−0.672	−0.556	−0.615	−0.274	−0.556	−0.498	−0.594	−0.361
Event rate	0.38	0.24	0.30	0.08	0.24	0.20	0.28	0.12
AUC	0.63	0.73	0.63	0.61	0.55	0.59	0.42	0.67
Brier score	0.23	0.17	0.20	0.07	0.18	0.16	0.20	0.10

Notes: Entries report average marginal effects (percentage-point changes). Bootstrap standard errors are reported in parentheses. All regressors are standardized. The dependent variable equals one if the province exhibits a statistically significant first-stage coefficient ($p<0.10$). AUC denotes the area under the ROC curve. The Brier score measures mean squared prediction error. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

The recession regime presents a markedly different picture (Table 3). In downturn periods, statistically significant coefficients are concentrated in the Revenues and EBITDA specifications, in sharp contrast to the expansion regime. In particular, GDP significantly increases the probability of observing negative revenue effects, while EBITDA is strongly associated with revenue and profitability outcomes. Leverage emerges as a key predictor of negative EBITDA effects, highlighting a financial fragility channel that amplifies downturn dynamics.

Unlike expansions, where statistical significance appears primarily in solvency and equity models, recessions activate the operating-performance transmission mechanism. Provincial heterogeneity becomes visible mostly through revenue contraction and profitability deterioration rather than through balance-sheet restructuring alone. The concentration of statistically significant coefficients in Revenues and EBITDA during recessions, and in Solvency and Equity during expansions, indicates that different economic mechanisms dominate across business-cycle phases.

This regime-dependent shift is economically coherent. In expansions, operating conditions are relatively homogeneous across provinces, and heterogeneity manifests through financial positioning and balance-sheet management. In recessions, however, operating exposure and financial fragility become central, and provinces characterized by greater economic scale or more leveraged firm structures are systematically more likely to exhibit statistically significant adverse effects.

Table 3. Ridge-penalized logistic models – recession regime.

	Revenues		EBITDA		Solvency		Equity	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
GDP	−0.67	28.50**	7.55	11.57	−10.19	−4.69	0.49	−2.15
	(1.40)	(11.80)	(6.77)	(16.52)	(6.65)	(4.94)	(0.79)	(2.74)
EBITDA	−1.23*	8.88***	5.37**	6.66	−2.93	−5.18**	1.01	−0.56
	(0.67)	(3.34)	(2.35)	(6.35)	(1.94)	(2.45)	(0.75)	(0.48)
Solvency	−1.61	9.16	3.22	−29.66***	−9.04*	8.71	0.94	−2.46
	(1.83)	(12.37)	(6.75)	(9.58)	(4.94)	(6.09)	(0.85)	(1.87)
Equity	−0.88	0.09	0.58	−2.98	0.06	−2.79	1.29	−0.28
	(0.71)	(0.75)	(1.58)	(3.37)	(0.04)	(2.52)	(0.80)	(0.41)
N	50	50	50	50	50	50	50	50
C (ridge)	0.10	2.00	1.00	5.00	5.00	0.50	0.02	0.50
CV folds	5	5	5	5	5	5	5	5
CV neg logloss	−0.553	−0.631	−0.504	−0.543	−0.305	−0.552	−0.649	−0.367
Event rate	0.24	0.46	0.22	0.24	0.10	0.24	0.34	0.12
AUC	0.44	0.71	0.62	0.60	0.65	0.56	0.63	0.61
Brier score	0.18	0.21	0.15	0.17	0.09	0.17	0.22	0.10

Notes: Entries report average marginal effects (percentage-point changes). Bootstrap standard errors are reported in parentheses. All regressors are standardized. The dependent variable equals one if the province exhibits a statistically significant first-stage coefficient ($p<0.10$). AUC denotes the area under the ROC curve. The Brier score measures mean squared prediction error. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Importantly, these findings directly address the concern that only a subset of provinces exhibit significant coefficients in the first-stage estimations. The incidence of statistically significant outcomes is not random. Rather, it is systematically associated with macroeconomic size, profitability, and balance-sheet structure, and its distribution varies predictably across business-cycle regimes. The consistent clustering of significant coefficients in distinct outcome categories, such as financial structure during expansions and operating performance during recessions, suggests that the observed asymmetry reflects underlying economic mechanisms rather than statistical noise or small-sample artifacts.

Taken together, the evidence supports a state-contingent interpretation of provincial heterogeneity. Expansions are dominated by balance-sheet adjustment channels, whereas recessions are governed by operating-performance and financial-fragility mechanisms. This structural asymmetry constitutes a central contribution of the paper.

3.7. Summary

Overall, the results provide consistent evidence that macroeconomic conditions shape the financial performance of advertising firms in Spain, but in an asymmetric and geographically heterogeneous way. The panel Granger causality tests confirm a statistically significant macro-to-firm transmission mechanism at the aggregate level, while the province-level asymmetric causality results show that the direction and strength of the effects vary substantially across territories.

Revenues emerge as the most macro-sensitive outcome, particularly during recessions, when negative effects become widespread across provinces. EBITDA displays fewer significant relationships than revenues, but recessionary effects are more frequent and clearer than expansionary ones. By contrast, solvency and equity exhibit fewer significant causal links overall, but their significant responses tend to be concentrated in specific provinces and are more closely related to balance-sheet adjustment mechanisms.

Finally, the second-stage ridge-penalized logistic models indicate that the uneven distribution of statistically significant first-stage effects is not random. Instead, it is systematically associated with macroeconomic scale and financial structure, and it differs sharply across regimes: Significance concentrates in solvency and equity during expansions, while it concentrates in revenues and EBITDA during recessions.

4. Discussion

The results provide new evidence on how business-cycle conditions shape the financial dynamics of advertising firms in Spain, a sector that sits at the intersection of creative services and market intermediation. While researchers have largely focused on the cyclicality of advertising expenditure, comparatively little attention has been given to the financial performance and balance-sheet adjustment of advertising firms themselves. By combining population-level firm data with province-level macroeconomic indicators and applying panel and asymmetric causality frameworks, the analysis documents not only that macroeconomic conditions matter, but also that the transmission mechanism is heterogeneous across space and state-contingent across the business cycle.

A first implication is that aggregate evidence and province-level dynamics are complementary rather than redundant. The panel Granger causality results confirm a statistically significant macro-to-firm transmission mechanism at the national level even after controlling for the size of the local advertising market. However, the province-by-province asymmetric tests reveal that this aggregate causality masks substantial heterogeneity in both the direction and the prevalence of significant effects. In practical terms, national-level relationships capture an overall sensitivity of the sector to macroeconomic conditions, but they do not describe a uniform provincial response: The cycle "shows up" in different ways across territories and across regimes.

In the province-level asymmetric results, revenues emerge as the most visibly macro-sensitive outcome, particularly in downturns, where significant negative effects become widespread. This is consistent with the view that advertising activity is closely tied to demand conditions, sentiment, and firms' discretionary spending, which tend to contract sharply during adverse macroeconomic episodes. Furthermore, the evidence also indicates that cyclical responses are not mechanically uniform. Even during expansions, a subset of provinces exhibits significant negative revenue effects, and during recessions some provinces display countercyclical revenue responses. These patterns suggest that regional composition, competitive strategies, or sectoral specialization can meaningfully reshape how macro shocks translate into advertising-sector outcomes. Rather than overturning the traditional procyclical view of advertising, the results qualify it: Procyclicality is common, but it is not universal, and it coexists with localized countercyclical dynamics.

EBITDA shows fewer significant relationships than revenues, which is consistent with the idea that profitability is an adjustment margin shaped by cost flexibility, pricing, and managerial responses that may dampen contemporaneous macro sensitivity. Moreover, the recession regime exhibits clearer EBITDA responses than the expansion regime, indicating that adverse conditions are more likely to generate detectable profitability adjustments. This asymmetry is economically plausible: Downturns often force faster operational restructuring, pricing pressure, and margin compression, while expansions may enable more diverse firm-level strategies that weaken the uniformity of profitability responses across provinces.

The balance-sheet indicators, solvency and equity, display comparatively fewer significant causal links overall, but their role becomes sharper once the analysis moves from describing effects to explaining where significant effects occur. This is where the ridge-penalized logistic models provide a key interpretive step. Motivated by the referee's concern that only a subset of provinces exhibits significant first-stage coefficients, the second-stage results directly evaluate whether significance is systematically related to macro-financial conditions rather than being a statistical artifact. The evidence supports a clear conclusion: The incidence of significant provincial effects is not random. It is systematically associated with macroeconomic scale and financial structure, and, crucially, it changes across the business cycle.

This regime dependence strengthens the economic interpretation of regional heterogeneity. In expansions, statistically significant provincial effects concentrate in solvency and equity, suggesting that favorable macro conditions reveal cross-provincial differences primarily through balance-sheet adjustment channels. In recessions, by contrast, significant effects concentrate in revenues and EBITDA, indicating that downturns activate operating-performance and financial-fragility mechanisms through which provincial heterogeneity becomes more visible in topline and profitability dynamics. This state-contingent pattern provides a coherent rationale for the uneven distribution of significant coefficients across provinces: Provinces differ in macroeconomic scale, profitability, and leverage exposure, and these characteristics matter differently depending on whether the economy is expanding or contracting.

From a managerial perspective, the findings imply that short-term performance and balance-sheet resilience do not move in lockstep, and that the relevant margin of adjustment depends on the cycle. During downturns, operational exposure and fragility channels become central, so liquidity management, cost flexibility, and client diversification are likely to be critical for resilience. During expansions, balance-sheet positioning becomes a more prominent margin through which provinces differ, which is consistent with the idea that financial policy, investment decisions, and capital-structure choices shape vulnerability even in favorable macro conditions. For policymakers, the combination of widespread recessionary operating effects and localized balance-sheet sensitivity underscores that one-size-fits-all interventions are unlikely to be optimal. Countercyclical support aimed at preventing operating collapses may be most relevant in recessions, whereas measures encouraging prudent financial strengthening and sustainable balance-sheet management may be more appropriate in expansions. More broadly, the results highlight that regional structure matters: The same macro shock can generate different outcomes across provinces, and those differences are systematic rather than idiosyncratic.

Finally, the study also speaks to method. The combined use of heterogeneous-panel causality, asymmetric causality, and second-stage regularized classification offers a structured way to move beyond documenting heterogeneity and toward rationalizing it. Furthermore, the analysis remains reduced-form and predictive in nature: It identifies systematic regime-dependent associations and province-level patterns, but it does not isolate structural causal mechanisms. Researchers could build on these findings by explicitly linking provincial responses to observable features such as sectoral client composition, firm size distributions, or the degree of digitalization, and by testing whether the state-contingent transmission pattern generalizes to other service industries.

5. Conclusions

We examined how business-cycle conditions affect the financial outcomes of advertising firms in Spain using a comprehensive panel dataset covering the population of firms over 2000–2024. By integrating firm-level financial indicators with provincial macroeconomic data and applying panel and asymmetric causality methods, we document a macro-to-firm transmission mechanism that is geographically heterogeneous and state-contingent across the business cycle.

The evidence indicates that macroeconomic conditions shape advertising firms' outcomes in an asymmetric way and with substantial regional variation. Revenues show the most pervasive and immediate cyclical sensitivity, especially in downturns, while EBITDA responses are more selective and consistent with profitability acting as an adjustment margin influenced by local cost structures and strategic responses. Solvency and equity display fewer significant causal links in the asymmetric Granger tests, but they remain central for understanding how firms adjust financially across provinces and over the cycle.

A key contribution of the updated analysis is to explain why only some provinces exhibit statistically significant first-stage effects. Using ridge-penalized logistic models, the study shows that the incidence of significant provincial effects is not random. Instead, it is systematically related to macroeconomic scale and financial structure, and it differs sharply across regimes. In expansions, significant provincial effects concentrate in solvency and equity, consistent with balance-sheet adjustment channels dominating cross-provincial heterogeneity. In recessions, significant effects concentrate in revenues and EBITDA, consistent with operating-performance and financial-fragility mechanisms becoming the major channels through which heterogeneity is expressed. This regime-dependent shift provides a coherent economic rationale for the uneven distribution of significant coefficients and directly addresses the referee's concern about why certain provinces, and not others, display significant relationships.

Overall, the findings imply that advertising firms are exposed to the cycle, but the form of that exposure depends on geography and the state of the economy. Downturns tend to make heterogeneity more visible in operating outcomes, while expansions reveal differences more strongly through balance-sheet dynamics. These results reinforce the importance of spatially disaggregated approaches for understanding the cyclical behavior of service industries and suggest that managerial strategies and policy interventions should be sensitive to regime-dependent transmission channels rather than assuming a uniform national response.

Author contributions

Brenda Vázquez-La Hoz: Validation, Writing – original draft (introduction), Writing – review & editing, Investigation (literature on the topic).

Jessica Fernández-Vázquez: Validation, Writing – original draft (introduction), Writing – review & editing, Investigation (literature on the topic).

Aida Galiano: Methodology, Formal analysis, Writing – review & editing (quantitative analysis), Investigation (literature on the topic).

Juan Manuel Martín Álvarez: Writing – review & editing, Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft (quantitative analysis).

Use of AI tools declaration

The authors declare that they have not used Artificial Intelligence (AI) tools in the creation, drafting, analysis, or editing of this article. All research, data processing, statistical analysis, and writing were conducted manually by the authors using standard academic methodologies and software packages intended for econometric analysis.

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Conflict of interest

The author declares no conflict of interest.

Data Availability Statement

The data that support the findings of this study were obtained from the SABI (Sistema de Análisis de Balances Ibéricos) database and the Spanish National Statistics Institute (INE). Restrictions apply to the availability of SABI data, which were used under license for this study. Publicly available INE data can be accessed through the official website of the Spanish National Statistics Institute.

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