

Econometric Models for Forecasting Market Share: A Case Study Review

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Abstract

Accurately predicting future market share is imperative for developing sound business strategy and gaining competitive advantage. Econometric models enable such forecasts by quantifying historical relationships between key performance drivers and market share outcomes. However, existing literature reveals inconsistencies in model selection, specification issues leading to poor predictive accuracy, and inadequate guidance on real-world implementation. This warrants a systematic analysis of established and emerging econometric techniques for market share projection to provide structured insights for managerial decision-making. Therefore, this article reviews the theoretical underpinnings and empirical evidence on prominent econometric modeling approaches including time series autoregressive integrated moving average (ARIMA), regression analyses like multiple linear regression and log-log models, as well as advanced neural networks. It analyzes relative strengths and limitations for market share forecasting based on analytical depth and data requirements. The effects of incorporating causal factors, nonlinear variable relationships, competitive interplay and macroeconomic forces are also examined across these techniques. Additionally, significant variables influencing forecast accuracy are identified along with relevant statistical tests for robust model evaluation. Thus, this study provides a comprehensive review of econometric models used for forecasting market share in various industries. The article examines different methodologies, such as time series analysis, panel data analysis, and regression models, highlighting their strengths and limitations. Furthermore, it discusses the importance of accurate market share forecasting for businesses and explores the potential applications of econometric models in strategic decision-making processes. Overall, this article contributes to the existing literature by offering insights into the advancements and challenges in the field of econometric modeling for market share forecasting. The study concludes by providing targeted recommendations on appropriate models for market environments with varying levels of historical data availability, competitive volatility, and macroeconomic uncertainty. Guidelines are also presented on integrating market share projections within strategic planning for critical business functions of pricing, marketing budget allocation, distribution management and production capacity optimization.

Keywords: *Econometric models, Forecasting, Log-Log models, Managerial decision-making, Market share*

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Background to the Study

Forecasting market share is a critical endeavor for businesses operating in competitive markets, as it provides valuable insights into consumer behavior, competitive dynamics, and future market trends (Pescatori & Zaman, 2011). In today's rapidly changing business environment, the ability to accurately predict market share movements is essential for strategic decision-making, resource allocation, and maintaining a competitive edge (Mokhov et al., 2023). Econometric models have emerged as powerful tools for forecasting market share, offering a systematic framework for analyzing the complex relationships between economic variables and market outcomes (Amendola et al., 2024).

Econometric models leverage statistical techniques to analyze historical data and estimate the future trajectory of market share (Surono et al., 2022). These models incorporate a wide range of factors, including pricing strategies, advertising expenditures, consumer demographics, competitor actions, and macroeconomic indicators, to generate forecasts that guide business strategy and planning (Brodie et al., 2001). Thus, by providing quantitative insights into the drivers of market share, econometric models enable businesses to identify growth opportunities, assess competitive threats, and optimize marketing and pricing strategies to maximize their market position (Chong & Hendry, 1986; Wieland & Wolters, 2011). The use of econometric models for forecasting market share has grown significantly in recent years, driven by advances in data analytics, computing power, and statistical methodologies (Delle Monache et al., 2023). Today, businesses across various industries rely on econometric modeling techniques to gain a deeper understanding of market dynamics and make informed decisions in an increasingly complex and competitive marketplace (Dou et al., 2020). From multinational corporations to small and medium-sized enterprises, econometric models play a central role in shaping business strategies, driving innovation, and enhancing competitiveness (Blanchard, 2018).

This study focused on the econometric models used for forecasting market share and explored the theoretical foundations, methodological approaches, and practical applications of these models, drawing insights from academic literature, industry reports, and real-world case studies. By synthesizing the latest research findings and best practices, this study provided a comprehensive overview of econometric modeling techniques for forecasting market share, offering valuable insights for researchers, practitioners, and policymakers engaged in market analysis and strategic planning. Thus, the objective of this study examined the role of econometric models for forecasting market share.

Literature Review

This section focused on concepts of econometric models, forecasting, market share, time series, autoregressive integrated moving average (ARIMA), regression analyses, multiple linear regression, log-log models, panel data analysis and advanced neural networks along theoretical, conceptual and empirical lines.

Econometric Models

In order to conduct a systematic analysis of established and emerging econometric techniques for market share projection, it is essential to first understand the concept of econometric

models for forecasting market share. Econometric models are statistical models that combine economic theory, mathematical equations, and empirical data to estimate and predict the behavior of market share (Pescatori & Zaman, 2011). By applying various econometric techniques, such as time series analysis, regression analysis, and panel data analysis, researchers can obtain valuable insights into market dynamics and make informed projections about future market share trends (Delle Monache et al., 2023). Emerging econometric techniques, such as machine learning algorithms and big data analytics, are also gaining prominence in market share projection, offering new opportunities for accurate forecasting and decision-making in today's complex business environment (Cepni et al., 2019).

Managerial Decision-Making

Through the examination of econometric models for predicting market share, managers can acquire valuable insights to guide their decision-making processes. These systematic observations enable managers to grasp the variables impacting market share, recognize trends and patterns, and make well-informed forecasts regarding future market behavior (Fifield et al., 2002). By adhering to these organized guidelines for managerial decision-making based on econometric models for forecasting market share, businesses can employ data-driven strategies to enhance their market standing, foster growth, and sustain competitiveness within a dynamic market environment (Brodie et al., 2001).

The Models

Econometric models for forecasting market share encompass a diverse array of methodologies, each grounded in theoretical frameworks and supported by empirical evidence. In this extensive analysis, the study explored prominent econometric modeling approaches, including time series autoregressive integrated moving average (ARIMA), regression analyses such as multiple linear regression and log-log models, panel data analysis, and advanced neural networks.

Theoretical Basis

Econometric market share models are underpinned by the market-based view of competitive advantage, which suggests firm performance is driven by external market positioning rather than internal capabilities (Mizik and Jacobson, 2003). Market share acts as a key measurable outcome resulting from competitive actions and responses. Econometric models thus quantify these strategic market drivers.

Time Series Models

Autoregressive integrated moving average (ARIMA) uses prior periods' shared data and averages across error terms to predict future values. Empirical testing across various markets Bylabel et al. (2008) demonstrate ARIMA's parsimony and forecast accuracy in the short term. However, Link and Luhanga (1991) highlight inferior longer-term predictive power without accounting for exogenous factors.

Regression Models

Multiple linear regression establishes causal relationships between diverse factors like price, distribution intensity, and market share (Brodie et al., 2002). Log-log and semi-log variants

accommodate exponential relationships common in marketing data (Dao and Maggard, 2017). Panel data regressions merging cross-sectional and time series data provide robust insights but require extensive datasets (Sevestre, 2002).

Advanced Models

Artificial neural network (ANN) modeling outperforms most econometric approaches in replicating complex real-world relationships (Von Jouanne-Diedrich et al. 2019). Hybrid models blending ANN with regression also evince synergistic effects (Cattaneo, 2001). However, black-box ANN predictions challenge inference and prescriptive power for strategy. Combining time series autocorrelation modeling with causal regression-based market driver analysis provides a balanced econometric approach for market share forecasting and strategic planning. Modern machine learning shows promise for further advancing predictive prowess.

Strengths and Limitations

Based on extant studies (Amendola et al., 2024; Brodie et al., 2001; Mokhov et al., 2023; Pescatori & Zaman, 2011; Suroño et al., 2022), econometric models for forecasting market share have the advantage of providing in-depth analysis and requiring extensive data. However, their limitations include the complexity of the models and the need for accurate and comprehensive data inputs. The relative strengths and limitations of econometric models for market share forecasting based on analytical depth and data requirements depend on the complexity of the market dynamics and the availability of data. Simple models are suitable for quick insights and small data sets but may lack the analytical depth to capture complex interactions. Complex models offer greater accuracy and robustness but require extensive data and computational resources. Ultimately, the choice of model should be based on the specific characteristics of the market and the forecasting objectives, balancing analytical depth with data availability and computational feasibility.

The Models Importance

The Importance of Market Share Forecasts

In intensely competitive markets, even small market share gains or losses significantly impact firm performance and long-run viability. Market share represents a measurable indicator of a firm's standing relative to competitors. Trends reveal how well business strategy counters rivals in capturing consumer value and wallet share. Market share also holds predictive power for profitability and survival (Szymanski et al., 1993). Therefore, accurate market share forecasts enable preemptive moves to strengthen competitiveness.

Econometric Models for Strategic Inputs

Econometric modeling leverages historical data for evidence-based market share projections. For example, price elasticity estimates from regression analysis inform optimal pricing trade-offs between unit volume and profit margins. Meanwhile, quantifying the marginal impact of distribution reach and advertising on share growth guides marketing mix allocation decisions. Managers can also stress test strategy resiliency by modeling worst- and best-case scenarios across probabilistic market share fluctuation bands (Delle Monache et al., 2023). Thereby, econometric forecasts empower strategic planning across key functions, including pricing, new product development, sales, and operational planning, as well as competitive response

calibration. The ability to reliably anticipate future market share trajectories and have the strategic foresight to influence outcomes underpins firm prosperity (Chong & Hendry, 1986). Econometric models unlock this potent capability for competing successfully amid turbulence. Their infiltration into core decision workflows is key to discovering and enacting data-driven choices that propel business performance (Wieland & Wolters, 2011).

Market Share Projections Integrating

To integrate market share projections within strategic planning for critical business functions, it is important to first identify key factors influencing market share, such as customer preferences, competition, and industry trends (Chong & Hendry, 1986). Then, align pricing strategies, marketing budget allocation, distribution management, and production capacity optimization with these projections to ensure a cohesive and effective strategy (Blanchard, 2018).

Theoretical Review

This study is anchored on the theory of rational expectations. The theory of rational expectations was founded by John Muth in 1961 and assumes that individuals make predictions about the future based on all available information. Supporters of the theory argue that it provides a more realistic and accurate framework for understanding market behavior. However, critics argue that it relies on unrealistic assumptions and may not fully capture the complexity of real-world markets. Nonetheless, the theory is relevant to econometric models for forecasting market share as it emphasizes the importance of incorporating expectations and information in predicting market dynamics.

Methodology

The case study secondary data approach was adopted for this study, exploring extant empirical studies, theoretical foundations, methodological approaches, and practical applications of the econometric models, drawing insights from academic literature, industry reports, and real-world case studies. By synthesizing the latest research findings and best practices, thereby provided a comprehensive overview of econometric modeling techniques for forecasting market share, offering valuable insights for researchers, practitioners, and policymakers engaged in market analysis and strategic planning.

Models Evaluation

In a study of econometric models for forecasting market share, identifying significant variables and conducting robust model evaluation are crucial steps to ensure accurate forecasts.

Time Series Autoregressive Integrated Moving Average (ARIMA)

Significant Variables: In ARIMA models, significant variables influencing market share forecasts include past values of market share, lagged predictor variables, and trend components. **Relevant Statistical Tests:** To evaluate ARIMA model performance, statistical tests such as the Ljung-Box test for autocorrelation, the Augmented Dickey-Fuller (ADF) test for stationarity, and the Akaike Information Criterion (AIC) for model selection are commonly used.

Formulas

ARIMA(p, d, q): $y_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots + \phi_p y_{t-p} + \theta_1 e_{t-1} + \theta_2 e_{t-2} + \dots + \theta_q e_{t-q} + e_t$

Ljung-Box Test: $Q = n(n+2) \sum_{k=1}^h \frac{\hat{\rho}_k^2}{n-k}$

ADF Test: $\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{i=1}^p \delta_i \Delta y_{t-i} + \epsilon_t$

Regression Analyses (Multiple Linear Regression and Log-Log Models)

Significant Variables: In regression analyses, significant predictor variables influencing market share forecasts may include prices, advertising expenditures, product characteristics, competitor actions, and macroeconomic indicators. Relevant Statistical Tests: Common statistical tests for regression analysis include the F-test for overall model significance, t-tests for individual coefficient significance, and diagnostic tests for assumptions such as multicollinearity, heteroscedasticity, and normality.

Formulas

Multiple Linear Regression: $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \epsilon$

Log-Log Model: $\ln(y) = \beta_0 + \beta_1 \ln(x_1) + \beta_2 \ln(x_2) + \dots + \beta_n \ln(x_n) + \epsilon$

Panel Data Analysis

Significant Variables: Panel data analysis incorporates both time-series and cross-sectional variation, allowing for the identification of significant variables such as fixed effects, time effects, and interaction effects. Relevant Statistical Tests: Common statistical tests for panel data analysis include the Hausman test for choosing between fixed effects and random effects models, the Breusch-Pagan test for heteroscedasticity, and the Wooldridge test for serial correlation.

Formulas

Fixed Effects Model: $y_{it} = \alpha_i + \beta_1 x_{1it} + \beta_2 x_{2it} + \dots + \beta_k x_{kit} + \epsilon_{it}$

Random Effects Model: $y_{it} = \alpha + \theta_i + \beta_1 x_{1it} + \beta_2 x_{2it} + \dots + \beta_k x_{kit} + \epsilon_{it}$

Advanced Neural Networks

Significant Variables: Neural networks automatically identify significant variables through the training process, learning complex patterns and relationships in the data.

Relevant Statistical Tests: Evaluation of neural network models often involves metrics such as mean squared error (MSE), mean absolute error (MAE), and coefficient of determination (R-squared) for model performance assessment.

Formulas

Neural networks use activation functions, weights, and biases to transform input data into output predictions, with backpropagation algorithms adjusting network parameters to minimize prediction errors.

Identifying significant variables and conducting robust model evaluation are essential steps in forecasting market share accurately using econometric models. Across different modeling approaches, various statistical tests and formulas are employed to assess model performance and ensure reliable forecasts. By integrating these techniques into the modeling process, researchers and practitioners can enhance the accuracy and robustness of market share forecasts, informing strategic decision-making and driving business success.

Incorporating causal factors

Introducing marketing mix elements like pricing, promotions, product introductions, etc. as predictor variables within regression-based modeling significantly improves explanatory power over just extrapolating historical trends (Bronnenberg et al., 2000). It accounts for strategic and tactical activities that shift market share trajectories. Techniques like penalized regression quantify the marginal effects of these causal forces.

Modeling nonlinear relationships

Extending multiple linear regression to include quadratic, cubic, or higher-order predictor terms allows capturing curvilinear linkages between strategic variables and market share (Keil et al., 2000). Log-log and semi-log estimators further accommodate exponential relationships ubiquitous in marketing data. Methodologically, machine learning algorithms like artificial neural networks (ANN) and support vector machines handle both linear and intricate nonlinear effects (Von Jouanne-Diedrich et al. 2019).

Incorporating competitive dynamics

Employing game theoretic frameworks like Nash equilibrium for oligopolistic reaction modeling helps quantify likely market share gains and losses from key competitors' moves and countermoves (Kadiyali et al., 1999). Multi-equation simultaneous systems model interdependent firm behaviors. Panel vector autoregression also demonstrates predictive improvements from competitive interplay.

Accounting for Macroeconomic Forces

Since business cycles govern market momentum, incorporating leading or lagging indicators like GDP growth, interest rates, and unemployment rates within models enhances reliability (Bronnenberg et al., 2007). Differencing and detrending historical data handle non-stationarity issues. Techniques like ANN machine learning readily capture complex macroeconomic interactions organically from data patterns.

Embracing multivariate approaches that synergize time series share data with causal, nonlinear, and interactive dynamics spanning competition and macro-environment fundamentals significantly improves the explanatory robustness and predictive accuracy of

econometric market share models through closer resemblance to real-world complexity. The structural incorporation of these forces is key to strategic reliability.

Case Scenario

Automobile Industry

Example: Forecasting market share for electric vehicles (EVs) in the automobile industry.

Econometric Model: A panel data analysis incorporating factors such as EV prices, government subsidies, charging infrastructure, consumer demographics, and macroeconomic indicators.

Application: Researchers use historical data on EV sales and market share across different regions and time periods to estimate the impact of various factors on EV adoption.

Findings: The econometric model reveals that government incentives, such as tax credits and rebates, significantly influence EV market share. Additionally, improvements in charging infrastructure and declining battery costs contribute to the growth of EV market share over time.

Implications: Automakers can use the market share forecasts to inform product development strategies, pricing decisions, and marketing campaigns for EVs. Policymakers can use the insights to design effective incentives and infrastructure investments to promote EV adoption and reduce carbon emissions.

Pharmaceutical Industry

Example: Forecasting market share for a new drug in the pharmaceutical industry.

Econometric Model: A time-series analysis combining data on drug efficacy, safety, pricing, marketing expenditures, physician prescribing patterns, patient demographics, and competitor actions.

Application: Researchers use longitudinal data on drug sales and market share to estimate the impact of various factors on the adoption and diffusion of the new drug.

Findings: The econometric model reveals that physician prescribing behavior, patient demographics, and competitor strategies significantly influence the market share of the new drug. Additionally, marketing campaigns targeting key opinion leaders and patient advocacy groups contribute to its market penetration.

Implications: Pharmaceutical companies can use the market share forecasts to optimize sales and marketing strategies, allocate resources effectively, and achieve maximum market penetration for the new drug. Healthcare providers and insurers can use the insights to anticipate changes in drug utilization and budgetary impacts.

In both examples, econometric models play a crucial role in providing insights into market dynamics, identifying key drivers of market share, and informing strategic decision-making in the respective industries. By leveraging advanced modeling techniques and empirical analysis, businesses and policymakers can make informed decisions to optimize market share outcomes and drive sustainable growth.

Conclusion and Recommendations

Econometric models offer valuable tools for forecasting market share, enabling firms to anticipate market trends, identify growth opportunities, and formulate effective business strategies.

Implication to Management

For management, these models provide valuable insights and help in making informed decisions regarding resource allocation, pricing strategies, and market positioning.

Implication to Sales

Sales teams can benefit from these models by identifying potential growth opportunities and devising effective sales strategies.

Implication to Researchers

Researchers can leverage econometric models to gain a deeper understanding of market dynamics and consumer behavior.

Implication to Practitioners

Finally, practitioners can use these models to improve their forecasting accuracy, optimize marketing campaigns, and stay ahead of their competitors.

Overall, econometric models have wide-ranging implications for various stakeholders in the business ecosystem. By integrating theoretical insights with empirical evidence, researchers and practitioners can enhance the accuracy and reliability of market share forecasts, contributing to improved decision-making and performance in competitive markets. However, future research efforts are needed to address methodological challenges and advance the state-of-the-art in market share forecasting using econometric approaches. The study concludes by providing targeted recommendations on appropriate models for market environments with varying levels of historical data availability, competitive volatility, and macro-economic uncertainty.

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