

ECONOMIC DEVELOPMENT STRATEGY

UDC 330.88(045)

DOI: 10.18372/2306-1472.81.14604

Mohammad Heydari¹
Zhou Xiaohu²
Kin Keung Lai³
Zheng Yuxi⁴
Lin Chen⁵

INVESTIGATING THE IMPACT OF CRISIS ON CORPORATE COSTS AND SALES USING ECONOMETRICS METHOD

^{1,2,5}School of Economics and Management, Nanjing University of Science and Technology, Nanjing,
Jiangsu, China

³College of Economics, Shenzhen University, Shenzhen, China

⁴Faculty of Economics and Management, East China Normal University, Shanghai, China

E-mails: ¹Mohammad_Heydari@njust.edu.cn, ²njustzxh@njust.edu.cn, ³mssklai@outlook.com,
⁴xyzsoey@126.com

Abstract

Background: this article seeks to complement the previous literature and clarify the importance of paying attention to the acceleration of globalization, and the global economic crisis that all countries will be affected directly and indirectly, through the crisis is important for the companies and one way out of the crisis, manages the marketing costs. **Aim:** this article seeks to identify the determinants, to find the Impact of Crisis on Corporate Costs and Sales with the using dynamic panel econometrics method and also, finding crisis effect on the costs and sales of companies. **Setting:** this article examines the effect of marketing costs on net sales; data from the 25-company's active in the Tehran Stock Exchange (TSE) during 11 years (2002-2012) have been used. **Methods:** in order to test the hypothesis of the research, we analyze the information by econometric methods. In this research econometrics methods are respectively: (Panel data, static panel data, fixed effects, and random effects, fixed effects model, random effects model, Hausman test, static panel data model, dynamic layout data, Wald test). Also, it should be noted for data analysis in this research we used from (F Lieber test and Hausman test and Wald test). Software used in this study was Stata software, the first order difference method is used to eliminate the static effects, and the interrupted values of the dependent variable are used as tool variables. **Results:** research hypothesis test results shows the first and second researcher hypothesis is confirmed and the zero hypotheses are rejected. Also, the third and fourth and fifth researcher hypothesis is rejected, and the zero hypotheses are confirmed. **Conclusion:** the results indicate a significant impact on net sales of company's marketing costs estimates indicate that costs 1 Rial in marketing, leading to increased sales of 58 Rials, and even during the global economic crisis, this figure is equivalent to 26 Rials. The analyses notice the importance of marketing expenditures on sales in Iran. Especially during the crises periods and after, marketing expenditures are found as having significant effects on sales.

Keywords: econometrics; marketing; sales; economic crisis

1. Introduction

One of the main goals of the countries is to achieve sustainable economic growth and development. In economic literature, capital is considered to be the economic arena and has been considered as the main economic determinant of economic growth and development. Also, today, risk has become widespread, and all small and large firms are continuously faced with a variety of risks. Therefore, in order for the economy of the society to grow and develop, it is necessary to provide the necessary

conditions both in the field of financing of capital and financing as well as in the subject of risk and management. One of the dimensions of the risk of global financial and economic crises is that the proper confrontation with these crises and their consequences for countries is of particular importance [1].

The global financial crisis, which began in the late months of 2008, has caused most economists to predict a recession for most economies in the world in the short term. This crisis has affected many sectors. The US financial crisis has lowered returns

and increased turbulence in international stock market indices, but the effect of its exposure to the stock market in Iran has always been controversial [1].

Increasing marketing costs is one of the suggested ways. In particular, during the financial crisis and after the recession, research has shown that companies that increase activities or concentrate on marketing also increase sales, earnings, and market share of the company [2].

One of the most important market behavior variables that can affect the structure and functioning of the market is marketing and advertising, while advertising can also affect the market function and the profitability of the advertising agency. Advertising can increase the degree of concentration to monopolies or by reducing the degree of concentration of competition [3].

In general, the present research seeks to answer these question does the crisis affect the costs and sales of companies?

Questions and research hypotheses.

Research questions:

1. Is there a meaningful and positive relationship between the number of costs associated with marketing and the sales of companies during the period of economic stability?
2. Is there a meaningful and positive relationship between the number of marketing costs and the sales of companies during the global financial crisis?
3. Does inflation have a meaningful relationship with the sales of companies during the economic crisis?
4. Does exchange rates have a significant relationship with the sales of companies during the economic crisis?
5. Does the country's economic growth rate have a significant relationship with the sales of companies during the economic crisis?

Research hypotheses:

1. There is a significant and positive relationship between the number of costs associated with marketing and the sales of companies during the period of economic stability.
2. There is a meaningful and positive relationship between the number of costs associated with marketing and the sales of companies during the global financial crisis.
3. The inflation rate has a meaningful relationship with the sales of companies during the economic crisis.
4. The exchange rate has a significant relationship

with the sales of companies during the economic crisis.

5. The economic growth rate of the country has a significant relationship with the sales of companies during the economic crisis.

2. Theory and literature

2.1. Literature

Net sales. In a comprehensive management culture, the total sales, minus the discounts, interest, or return on capital over a given period, are called net sales.

Marketing. The wider definition that the American Marketing Association introduced in marketing in 1985 is: (marketing, the process of planning and implementing the concepts of pricing, upgrading and distributing thoughts and ideas, products and services so that through the exchange They have organizations and individuals accessing their goals.)

Although there are very limited empirical prove in existence, Constantinides (2006) argued that several studies had confirmed it is still trusted conceptual platform for practitioners tackling operational/tactical-marketing issues [4]. The author further reiterates that, wide acceptance of such concepts to the practitioners of marketing due to profound exposure during college years [5, 6]. Also, it is more eloquent, and memorable practical framework by practitioners proved to be useful for study analysis in business schools for many years [7]. These have been the mantras that make 4Ps unchallengeable in the 1950s-1960s up until the emergence of marketing concepts, at least [8].

Amid unstoppable evolution of marketing thoughts and practices, it is essential that both marketing practitioners and educators are rethinking the 4Ps¹ approach to suit the ever-changing business environment. This is due to the fact, revisiting such concept has led to new adaptation, re-conceptualization and even to a shifting new paradigm. This is a result of the discovery and re-discovery of essential aspects of marketing environments that lead to the introduction of several

¹ "Marketing mix" is a general phrase used to describe the different kinds of choices organizations have to make in the whole process of bringing a product or service to market. The 4Ps is one way – probably the best-known way – of defining the marketing mix, and was first expressed in 1960 by E. J. McCarthy [9]. The 4Ps are: (Product (or Service), Place, Price, Promotion)

additional new P's and even total rejection of such concepts. Some authors have attacked the concepts due to its inability to adapt and its flexibility to be applied in the expanding marketing realm [10-16]. It is a fact that the original concept was just a conceptual frame, a guideline to execute the market plan. It was never a scientific model. Borden (1964) contended that it would remain largely in the realm of art rather than science until such time comes where such mixes can be a valid phenomenon [17].

Marketing activity is characterized as being a management task that involves planning the conception of products, their price, promotions, and distributions to meet consumer demand [18]. It is a set of entrepreneurial actions that are part of the management process that connects a business with its consumers and can be configured in several ways [19]. It is generally measured as an amount of managerial work executed in sales, converting the input into output. In short, it is what marketing professionals do and is central to the marketing concept from a managerial perspective [20].

Marketing activities are generally analyzed via the execution of the marketing mix – product, price, place, and promotion [21]. They are part of marketing capacities (an, e.g., adaptation of marketing process, use of market information to develop marketing processes, etc. [22]).

Marketing costs. Marketing costs can be easily allotted to marketing investments, which include market research, product development, advertising, sales, and services in all areas of product supply. Most companies allocate a certain amount of their budget to marketing costs.

Marketing research itself includes the costs that are included in market research and market research, but the bulk of marketing costs typically include print, television, radio and Internet advertising, and, moreover, payments for customer loyalty programs and deliverables the reward is added to the marketing costs [23].

Economic growth rate. Economic growth is a multi-dimensional process of long-term transformation that manifests itself by increasing the capacity of economic production and the diversification of social structures. Economic growth is the ultimate goal of all economic systems.

Economic growth cannot be understood unless it can be measured quantitatively. Economic growth in the general form means measuring or estimating the quantitative and qualitative results of products and

its factors. In other words, economic growth means increasing the natural capacity of the nation to promote the power of the nation, the country, and the region [24].

As part of this process, efforts to address socio-economic inequalities in more comprehensive ways were introduced at the state level. According to Costas and de Lavra Pinto ([25], [26]), the Lula and Rousseff governments in Brazil managed to significantly improve key indicators of poverty, unemployment, and access to social welfare. Likewise, as [27]. Indicates, the Chávez government quickly reduced the country's poverty rates as well as the Gini-indicator between 2004 and 2012, before the economic crisis struck. In that period, Venezuela's poor and marginalized enjoyed unprecedented access to healthcare, education, and pensions, as well as significant improvements in housing and infrastructure. Bolivia, Ecuador, and Argentina also introduced or expanded targeted welfare programmes, leading to notable reductions in poverty levels [28].

The economic growth rate, as shown in Fig. 1, fluctuated sharply between 2007 and 2008, with a growth rate of 4.4 in 2012, down from a negative 4.8.

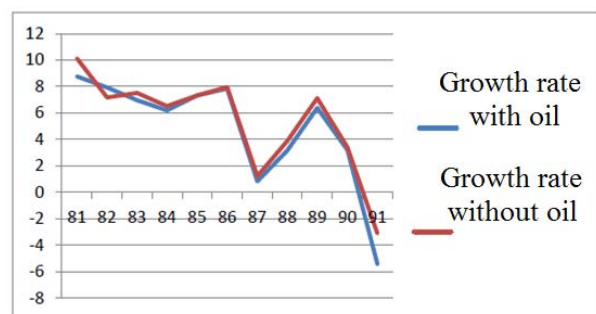


Fig. 1. Economic growth rate during the period (2002-2012)

Inflation. Inflation is a general increase in the level of prices, so the main feature of inflation, continuity, and generality is price increases, so increasing the prices of products, as well as rising prices for one or more specific goods, is not inflation, and to measure inflation, an index called the inflation rate is used to measure the volatility of prices for goods and services in a given year relative to the base year [29].

Inflation rate during the period (2002-2012) is shown in Fig. 2.

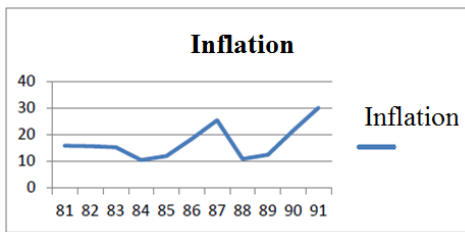


Fig. 2. Inflation during the period (2002-2012)

Currency. In a given culture, the currency is defined by the value, price, price, or value of the domestic currency with foreign currency. In today's trade and economic conversations, the currency is used to mean foreign currency. It is also possible to determine the exchange rate, the value of the equivalent of one foreign currency to the domestic currency [30].

The exchange rate in the period (2002-2012) is shown in Fig. 3.

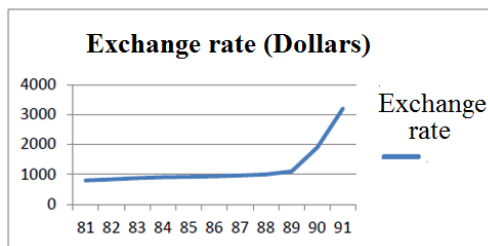


Fig. 3. Exchange Rate During the Period (2002-2012)

Economic crisis. The first economic crisis is the finding (over-production) that means filling the market with goods that the customer does not have the power to pay. When the market is not in the market and the goods are not sold, the production of goods will naturally be reduced and stopped, followed by the closure of factories and the large and massive unemployment of workers, which in turn will make the sale of goods even more difficult and add to the depth of the crisis. The credit system of capitalism is out of work; debtors lose their ability to repay their debt at an early date. Stock companies' stock prices are falling in the market; capitalist institutions are going bankrupt one after another.

2.2. Literature reviews

Marnik G. Dekimpe; Dominique M. Hanssens (1995) in this study explores how long-lasting marketing activities affect sales of sports cars in the US (Porsche) [31].

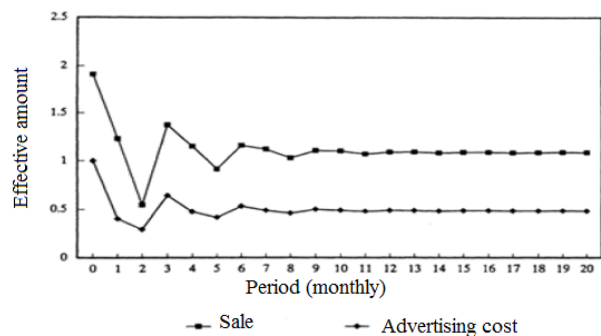
The findings are different from the results of Clarke (1976), which states that 90% of the measurable impact of advertising on sales in a few months is realized, but the findings of this study

show that Clarke's results and estimates may be in a stable, but it's not public, and maybe these short-term effects are somewhat true to radio and television advertising, but it's not true for marketing that builds on brand-building.

The model presented in this study is as follows:

$$\Delta S_t = \gamma \Delta ADV_t + a(L)\Delta S_{t-1} + \beta(L)\Delta ADV_{t-1} + e_{s,t} \quad (1)$$

The dependent variable S of the company's sale and the independent ΔS variable ΔADV is the cost of advertising and marketing. The result of the research in Fig. 4 illustrates the full impact of marketing costs on sales of car sales companies.



Reference: "The persistence of marketing effects on sales" *Marketing Science*, Vol.14, No.1 (1995), 1-21.

Fig. 4. The Effect of Business Activity on the Sales of Sports Car Companies in the United States

Hui Tong (IMF) and Shang-Jin Wei (2009) the effects of the financial crisis in 2007 and 2008 on non-financial companies in different countries involved in the exchange [32].

$$Stock\ Return_{ijt} = a_j + \beta_1 Financial\ Dependence_{ij,t-1} + \epsilon_{it} \quad (2)$$

Which i is the base rate of the stock exchange, j represents the type of country, and α is the same as the constant effects of the economic crisis, which is presented using the dynamic data of the model as follows:

$$\begin{aligned} Stock\ Return_{ijt} = & a_j + \beta_1 Financial\ Dependence_{ij,t-1} \\ & + \gamma_1 Demand\ Sensitivity_{ij} + \gamma_2 Size_{ij,t} + \\ & + \gamma_3 Market\ / Book_{ij,t-1} + \gamma_4 Beta_{ij,t-1} * \\ & + \gamma_5 Momentum_{ij,t-1} + \epsilon_{ijt} \end{aligned} \quad (3)$$

Finally, according to the model presented above, financial and nonfinancial firms need to consider the contractile policies of costs, including advertising costs, but ultimately, they see different reactions in different countries and demand an examination of the economic crisis. In any particular country.

Jesus Crespo-Cuaresma – Matthias Stoeckly (2012) according to a study based on data collected in Germany, 30 models of Audi, Porsche, Mercedes, and BMW cars, based on dynamic panel data 46 data, analyzed the relationship between vehicle sales and marketing costs [33]:

$$S_{it} = \phi S_{it-j} + \lambda_0 m_{it} + \lambda_1 m_{it-1} + \theta_0 m_{it} + \theta_1 m_{it-1} + \sum_{j=1}^5 \beta_j x_j + \varepsilon_{it} \quad (4)$$

Which s_{it} is the same as the dependent variable of sales, and m_{it} advertising costs of the companies under review and m_{it}^* are the same as the cost of competing companies.

The results of the studies show that the relationship between sales and marketing costs is significant and positive, but variables such as competitor advertising and product life cycle as well as intervening variables have a significant impact. Ahmadpour, Sepehr Dost and Salehpour (2013) In this study, we investigated the relationship between the growth rate of sales and the profitability of 40 companies in the stock market using the dynamic wall panel test model for the period of 7 years from 2004 to 2010 [34].

The obtained model:

$$PR_{it} = a + \beta_1 SG_{it} + \beta_2 SG(-1)_{it} + \beta_3 MS_{it} + \beta_4 LEV_{it} + \mu_{it} \quad (5)$$

PR is the profit variable dependent variable, SG is the independent variable of the company's sales growth rate, and the variable LEV debt leverage is recorded as the control variable that is calculated by dividing the total debt into the book value. The results showed that the rate of growth of sales of the past and current year had hurt the profitability of this year in the four pharmaceutical, chemical, and food industries except for Sugar and sugar production. Given the research hypotheses and model estimation, the result shows that the negative effect of the growth rate of the current year, the growth rate of the past year, as well as the debt leverage on profitability, while the market share has a positive impact on the profitability process.

Lee and Yu (2010); Yu et al. (2008) have proposed bias corrected QML estimators for a dynamic model with spatial and time fixed effects [35, 36]. However, these estimators are based on the assumption of only exogenous covariates except for the time and spatial lag terms. Kukenova and Monteiro (2008) have suggested using System-GMM estimator Blundell and Bond (1998) for dynamic spatial panel model with several endogenous variables [37, 38]. More specifically,

they have investigated the finite sample properties of different estimators for spatial dynamic panel models (namely, spatial ML, spatial dynamic ML, least-square-dummy-variable, Diff-GMM, and System-GMM) and concluded that, in order to account for the endogeneity of several covariates, spatial dynamic panel models should be estimated using System-GMM.

Piras (2010) have developed the *splm* package. It includes a set of functions able to estimate a full range of static spatial panel data models including fixed or random effects; spatial lags for the error term or dependent variable and, possibly, serial correlation in the noise of the model [39]. Millo (2014) provides an extensive overview of these models including algorithms to estimate them using MLE [40]. These packages can also be used to estimate the SAR-CCEP (Mixed Geographically Weighted Regression Simultaneous Auto-Regressive models). Unfortunately, there is not a freely available R package for the estimation and inference of dynamic spatial panel data models. Some functions are available in MATLAB [41, 42]. For the estimation of the new models, Geniaux and Martinetti (2017) resort to the Spatial Two-Stage Least Squares (S2SLS) technique. In particular [43], they use a 5-step approach, a local linear estimator (a variant of the GWR¹) and Cross-Validation for the selection of the bandwidth parameter.

3. Methodology

3.1. Panel data

In statistics and econometrics, the panel data set contains observations for several sectors (households, firms, etc.) that have been gathered over time. That is, a panel data model containing information in time and space that contains N components at time T . If the number of time observations for all components in the panel is the same, it is called a balanced panel. However, if the missing observations exist for some of the components, we call the panel unbalanced.

Here, our number of observations is increased to NT , which results in more efficient estimates of variables. This can be seen in the calculation of the

¹ First, following Brunson et al. (1996), [44]; Cho et al. (2010), [45]; have proposed an approach that combines geographically weighted regression (GWR) and spatial auto regression (Spatial Error Model: SEM) methods, called GWR-SEM.

variance of society. In the time series data, this variance is presented as:

$$\sigma^2 = \sigma \frac{2}{N-K} \quad (6)$$

Calculated but in the panel data as:

$$\sigma^2 = \sigma \frac{2}{NT-N-K}. \quad (7)$$

Because the denominator of the second fraction is larger than the first fraction, then the variance of the panel data is less, and therefore, it will have a good estimate. A simple model for describing the behavior of variables in this type of data can be as follows:

$$Y = a_i + \beta X_{it} + U_{it}, \quad (8)$$

where β is a vector $k * 1$ of the parameters, X_{it} is a $k * 1$ vector of observations of the explanatory variables, $t = 1, 2, \dots, T$ and $i = 1, 2, \dots, N$. It is also assumed that the sentence is a disturbance of white noise.

3.2. Static panel data. Test the ability to estimate the pattern as a panel

To select the heterogeneity of units, F Lieber can be used. If heterogeneous units are verified, the template will be estimated from panel data. Otherwise, it will be estimated using the normal Ordinary Least Squares (OLS) or Pooling Data method. The F statistic is defined as:

$$F = \frac{(PRSS - URSS) / N - 1}{URSS / NT - N - K} \cong F[(N-1), (NT - N - K)]. \quad (9)$$

In the above relationship, the $PRSS$ represents the sum of the squared waste residues and the $URSS$ is the sum of unconnected waste residues. N is the number of sections and T is the number of years of the period, and K is the number of parameters.

Green can also define the F statistic. Of course, with a simple mathematical transformation, this relationship can be obtained from the previous relationship. As a result, both relations are equivalent to each other.

$$F = \frac{(R_{LSDV}^2 - R_{Pooled}^2) / N - 1}{(1 - R_{LSDV}^2) / NT - N - K} \quad (10)$$

In which R_{LSDV}^2 is the non-binding pattern determination coefficient, and R_{Pooled}^2 is the non-binding pattern determination coefficient. In the test of reliability as a data panel, the hypothesis of zero is based on the lack of coordination between units or sections, and the opposite hypothesis indicates an

inconsistency between sections or units, we have statistical significance:

$$\begin{aligned} H_0 : \mu_1 = \mu_2 = \dots = \mu_N = 0 \\ H_1 : \text{At least one of } (\mu) \text{ is zero} \end{aligned} \quad (11)$$

The μ s represent individual effects or heterogeneity.

In the test of hypothesis zero, if F is calculated from the F table with a degree of freedom of $N-1$ and $NT-N-K$, then the H_0 hypothesis is rejected. Therefore, the regression model is estimated using panel data method. Otherwise, the OLS method (polling data) is used to estimate the model.

3.3. Fixed effects and random effects (FE and RE)

If the statistical data were such that the sections had different reactions and considered for each section of the width from a separate source, then the source of the errors due to the estimation should also be determined. In other words, it should be determined that the error caused by the estimate has occurred over time or that the error mentioned above has also occurred due to changes in the sections over time. There are fixed and accidental effects on how to consider such errors with two effects. In fixed effects, the estimated error is due to the change in sections in the width of the origin, but in the random effects model, such errors are considered randomly. In statistical terms, it can be explained as follows: If we write the following sentences ε_{it} as follows:

$$\varepsilon_{it} = \mu_i + \eta_{it}. \quad (12)$$

In which η_{it} is a partial error that is not correlated with observations, and μ_i is related to the sections, which may not be correlated with observations.

In the approach of the fixed effects of μ_i , the correlations with observations are correlated, but in the approach of random effects, μ_i are not correlated with observation. The random effect pattern assumes that μ_i is a random sequence for each group, but in each period, this random distribution of μ_i only enters an event in the same regression pattern in each period. In the pattern of fixed effects, the width of the origin in the regression pattern is different for individuals because each person or section unit has its characteristics. In the random effects pattern, it is assumed that the width from the origin of a single unit is a random selection of a larger population with a constant mean. Thus, the width of the single origin is expressed in deviations from the constant mean.

If the zero hypotheses of F Lieber's polynomial statistics is rejected, there is no reason to accept the

zero hypotheses. The opposite hypothesis is based on the data availability panel of statistical data to be accepted. The Hausman test is used to choose between constant effects and random effects.

3.4. Fixed effects model

In this model, each component has its fixed value, and since one is considered a virtual variable to work with each of these constant values, the constant effects estimator is also called the least square dummy variables (LSDV) estimator. Gets This model can be written as follows:

$$Y = Da + X\beta + u, \tag{13}$$

where D is a matrix of virtual variables with $NT * N$ dimensions. Moreover, the X matrix of explanatory variables with dimensions $NT * k$ and β is also the matrix of coefficients with dimensions $k * 1$.

The recent model is a classic regression model, and no new conditions for its analysis are needed, and the model can be estimated using *OLS*.

The advantage of the model with constant effects is that it can show effects that vary in each of the components but do not change over time. Of course, after the formation of the other model, it is not possible to add that variable, which does not change over time, because it will be fully matched with the constant effects. On the other hand, the disadvantage of such a model is that it should estimate a coefficient for each of the virtual variables and a total of N coefficients. This is problematic when the number of components, N , is very large, which is usually the case.

To solve this problem, one way is to reduce the average of each of the variables from their original value. By doing this, we arrive at a model that lacks the width of the origin, and we can run the least squares method for it, the technical steps of which are given below:

$$\begin{aligned} y_{it} - \bar{y}_i &= (X_{it} - \bar{X}_i)\beta + (v_{it} + \bar{v}_i) \\ \bar{X}_i &= \frac{1}{T} \sum_{t=1}^T X_{it} \\ \bar{v}_i &= \frac{1}{T} \sum_{t=1}^T v_{it} \end{aligned} \tag{14}$$

3.5. Random effects model

An alternative method for estimating the static effects model is to estimate the random effects model. The difference between such a model with constant effects is that in the width of the origin of each of the variables are not constant values, but are randomly chosen. Therefore, the value of a_i in the

overall model is equal to $a_{it} = \mu_i + v_{it}$, where v_i is a random variable of white noise with mean zero and a σ^2 variance. An important assumption is that the v_i variable must be independent of the explanatory variables and the components of the u_i error. If v_i are correlated with the explanatory variables, then estimates of oblique and incompatible women will be obtained. On the other hand, the advantage of this model to the fixed effect model is that the number of fewer parameters should be estimated. The general form of this model is as follows:

$$Y_{it} = \mu + \beta^1 X_{it} + v_{it} + v_{it} \tag{15}$$

In order to estimate this model, it should be noted that in this case, the variances of the different sections are not the same and our model has a heterogeneity variance that should be estimated using the Generalized Least Squares (GLS) estimator. As follows:

$$\begin{aligned} \hat{\beta} &= (X^1 \Omega^{-1} X)^{-1} (X^1 \Omega^{-1} Y), \\ \hat{\Omega} &= I \otimes \Sigma \end{aligned} \tag{16}$$

where Σ is the variance u_{it} and I is the unit matrix, and Ω is the variance, covariance. By introducing these two methods, the question that arises is, in practice, which one of our methods should be used. To help us decide on the Hausman test.

3.6. Hausman test

If based on the F Lieber test, the panel data method is selected, the question is whether the difference in the origin of the unit units is constant, or that random operations can more clearly explain this difference between the units, which both the methods of fixed effects and random effects are called respectively. Hausman's test is used to diagnose this issue.

This test states that under the assumption of the lack of correlation between cross-sectional data and other explanatory variables, both the estimators of the constant effect and the random effect are incompatible, but the estimator of the ineffective effect is ineffective, but in the case of a correlation between the cross-sectional data and other explanatory variables, the effect is consistent. The random effect is inconsistent.

Hausman's statistics with a chi-square distribution with degree of freedom (K) The number of explanatory variables is as follows:

$$W = (b_s \beta_s)' (M_1 - M_0)^{-1} (b_s - \beta_s) \cong \chi^2(\gamma). \tag{17}$$

In the above relation, γ is the number of parameters, w is the distribution of 2 with χ degrees

of freedom, the number of parameters in M_1 is the covariance matrix for the coefficient of the fixed pattern b_s and M_0 of the covariance matrix by the random effects method β_s . If M_0 and M_1 are correlated, b_s and β_s can be significantly different, and this is expected to be reflected in the test. In the Hausman test, its zero hypothesis M_0 is based on the random effects of statistical data in the model. If the zero hypotheses are rejected and there is no reason to accept it, then the H_1 hypothesis is based on the random effects of the statistical data.

$$\begin{cases} H_0 : b_s = \beta_s \\ H_1 : b_s \neq \beta_s \end{cases} \quad (18)$$

H_0 : the two estimators should not be distinctly different, but at the same time, the random effect model is preferable.

H_1 : the existence of a constant effect model and a random effect rejection.

In a combination of data method whose time series is noticeable, in order to ensure that the estimated regression is false, it is necessary to examine the reliability of the model variables, which should be considered in the case of unsteadiness of the coherent tests. However, considering that the number of years studied in this study in the data panel method is less than the level that can be used to examine the reliability of the variables, then the reliability and coherence issues in the data panel method will not be addressed.

3.7. The static panel data model

In order to evaluate the impact of marketing and advertising costs, the country's growth rate, inflation rate and exchange rate on sales by Iranian industry companies, the following econometric model has been used for estimation:

$$NS_{it} = a_1 + \beta_1 Me_{it} + \beta_2 Growth_{it} + \beta_3 Inf_{it} + \beta_4 Usd_{it} + \varepsilon_{it} \quad (19)$$

$$i = 1, \dots, N \quad t = 1, \dots, T$$

NS_{it} is the Net Sales Rate of Companies; Me_{it} – Rate of Marketing Costs; $Growth_{it}$ – Economic Growth Rate; Inf_{it} – Economic Rate of the Country, and Usd_{it} is the US Dollar.

Recently, spatial econometric models have been extended to deal with spatial panel data, that is data with both a spatial and a temporal dimension [46].

The two-dimensional structure of the data allows us to control for unobserved spatial and time heterogeneity by including individual (spatial) and time effects on the r.h.s. of the model [47].

3.8. Dynamic Layout Data

Most economic researchers are looking at the dynamics of economic relations. The advantage of panel data and dynamic models in this series of data is that the dynamics of relationships are better understood. Dynamic models have many applications, including estimating the household consumption equation, firm cost modulations, economic growth models and value creation, and so on.

The Generalized Method of Moments (GMM) dynamic data panel method is used when the number of cut-off variables (N) is greater than the number of times and years (T), the number of companies more than the number of times and years [46]. In general, the GMM method is more than the methods the other benefits are as follows:

- the main advantage of the dynamic GMM estimation is that all regression variables, which are not correlated with the component (including lagged variables and differential variables), can be categorized as a function of the variables. Potential variables are tools. (Green, 2008);
- reducing or eliminating the coherence in the model: using interrupted dependent variables eliminates the coherence in the model. The probability that the interrupted difference and the interrupted level of market variables are interrupted by interruptions and interrupted levels of variables such as growth rates and inflation rates are very small.

3.9. Wald test

In statistics, the Wald test is a parametric parsing test with various applications to test whether the parameter is estimated by the sample equal to the desired parameter.

With the help of the Wald test, the $\hat{\theta}$ value of the estimate obtained by the maximum magnitude correction can be compared to θ_0 the proposed value. The comparison is based on the assumption that the difference between these two values is the normal distribution and the second power of this difference in the distribution of the chi-square. In a single-variable mode, the parent's statistics are defined as:

$$\frac{(\hat{\theta} - \theta_0)^2}{Var(\hat{\theta})} \quad (20)$$

Moreover, compared to the chi-square distribution. The following statistics can be defined and compared with normal distribution:

$$\frac{\hat{\theta} - \theta_0}{Se(\hat{\theta})} \tag{21}$$

In which $Se(\hat{\theta})$ the standard deviation is estimated. A reasonable estimate of the standard deviation of the error by $\frac{1}{\sqrt{I_n(MLE)}} I_n$ which the

Fisher notification is a parameter. Expression ratio test is another method for testing the statistical hypothesis, which is shown to be equal in the paradigm with the Wald test.

3.10. Introducing the model and description of the research variables

In this study, in order to explain the effect of marketing costs on net sales, data from the company’s active in the stock market during the period of 2002-2012 have been used. The model used in this study is based on theoretical foundations and the experimental study of Satan, Crespo, Katler, Hans Silvarosio, Kandemir Zaloglu and ... The other researchers have stated as follows:

$$NS = f(Me, Inf, Growth, Usd). \tag{22}$$

In which the variable NS of net sales of companies is a function of Me 's marketing cost, Inf inflation rate, $Growth$ of the country's economic growth rate and Usd exchange rate. Table 1 shows expectations of the relationship between independent variables with the dependent variable based on theoretical foundations and empirical studies referred to.

Table 1

Description of the statistical data and expected marks in the model

| Expected sign | Variable defining | Variable |
|--------------------|-----------------------------------------|----------|
| Dependent variable | Net sales | NS |
| + | Marketing costs | Me |
| + | The economic growth rate of the country | Growth |
| + | Inflation | Inf |
| + | Exchange rate | Usd |

3.11. Dynamic Panel Data Model

To estimate the model, Dynamic Data Panel is used, which briefly describes this method.

One of the main constraints facing researchers in various sectors of the industry sector in Iran is the statistical constraint due to the lack of information about workshops in the years 2002 to 2012.

One of these methods is the first-order difference

of variables, and the other method is using orthogonal deviations. Since the software used in this study was *Stata software*, the first order difference method is used to eliminate the static effects, and the interrupted values of the dependent variable are used as tool variables.

By moving the interrupted value of the dependent variable (net sales) to the right:

$$NS_{it} = \varphi + \alpha \sum_{i=1}^n NS_{it-1} + \beta_1 Me_{it} + \beta_2 Growth_{it} + \beta_3 Inf_{it} + \beta_4 Usd + \varepsilon_{it}. \tag{23}$$

NS_{it} – net selling rate of companies; Me_{it} – rate of marketing costs; Inf_{it} Economic rate of inflation; Ed_{it} of the US dollar; NS_{it-1} – net selling rate of companies with interruptions; ε_{it} – uncertain random effects; α and β_1 are regression coefficients of variables and φ are constant coefficients.

In the above $E(\varepsilon_{i,t}, \varepsilon_{i,t-1}) = 0$ equation, and $E(X, \varepsilon_{it}) = 0$ we assume that x is the vector of the explanatory variables of the model. This means that the covariance between the sentences of the disorder in two consecutive periods is zero and the covariance of the explanatory variables with the sentences of the disorder is also zero in the Arellano, M. and S. Bond. Method, the instrument variables matrix is used to create compatible estimators, and the Sargan test statistic is used to determine the exact equation. In this test, if the null hypothesis is accepted, it indicates that the equation is too specific and the model needs instrumental variables. Therefore, we must use the interrupted values of the dependent variable as the instrument variables to resolve the correlation between the explanatory variables and the sentences of the disorder. Besides, since in the first-order difference-differentiation method, the disorder sentences follow the first-order self-healing process, therefore, for the Arellano and Band method to lead to consistent model estimators, the self-regression of the disordered sentences must be tested. Take up (Arellano, M. and S. Bond., [48], [49], p. 286).

4. Analysis of data

4.1. F Lieber test and Hausman test

Using the F Lieber, one can determine the dissonance between the sections. The zero hypothesis of the F -statistic is based on the homogeneity of the sections (Poling is the data being statistical data). If the hypothesis is rejected, then the opposite hypothesis will be accepted for the

dissonance between the sections (the panel of data being statistical data). The results of the *F* Lieber test are reflected in Table 2. The results of the table represent the rejection of the zero hypotheses, and the existence of inconsistency of the sections at a significant level of 5% and indicates the suitability of the data panel for estimating the model in each of the three sections.

Table 2

***F* Lieber test results**

| | Before the crisis | After the crisis | Complete course |
|------------------|-------------------|------------------|-----------------|
| <i>F</i> Lieber | 1.38 | 55.74 | 85.39 |
| Prob | 0.000 | 0.000 | 0.000 |
| Estimated status | panel | panel | panel |

It now needs to be determined that the estimation error is due to a change in the sections or that occurred over time. Indeed, panel data models are considered as models with fixed effects and random effects. For this purpose, the Hausman test is used. In the Hausman test, its zero hypotheses are based on the randomness of estimated errors, the results of which are reflected in Table 3. The results of the Hausman test show that:

- it is confirmed in the seven years before the economic crisis that the zero hypothesis is based on randomness;
- the four years after the economic crisis is confirmed by the zero assumption that the estimate is random;
- during the whole eleven years of age, from 81 to 91, the results indicate that the hypothesis is zero and the effect is constant to estimate the model.

Table 3

Hausman Test Results

| | Before the crisis | After the crisis | Complete course |
|------------------|-------------------|------------------|-----------------|
| Chi2 (X^2) | 1.38 | -6.53 | 222.82 |
| Prob | 0.70 | 0.54 | 0.000 |
| Estimated status | Random | Random | Fixed |

4.2. Estimate the static panel model and interpret the results

The results of model estimation using the static panel method for 25-member companies of Tehran Stock Exchange during the seven years before the economic crisis (2002-2008), the four years after the economic crisis (2008- 2012) and the total estimated 11 years (2002 - 2012) is presented in Table 4.

Table 4

Estimates of Static Model and Measuring Variable Coefficients on Net Sales of Companies in the Stock Market Tehran Stock Exchange

| | Model estimation coefficients before the financial crisis (2008 - 2002) | Model estimation coefficients for the after-crisis period (2012 - 2008) | Model estimation coefficients for the whole period (2002 - 2012) |
|--------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
| Me | 96.785 *** (8.45) | 117.37 *** (20.89) | 125.012 *** (8.83) |
| Growth | 8.59e+9 1.33e+10 | 1.09e+10 (3.63e+10) | -2.59e+10 * 1.41e+10 |
| Inf | 1.16e+10 *** (5.49e+9) | -4.75e+9 (4.68e+10) | 2.71e+9 (7.17e+9) |
| Usd | 2.31e+9 *** (5.08e+8) | 2.64e+8 (5.46e+8) | 6.77e+7 (8.26e+7) |
| -Cons | -2.10e+12 *** (5.41e+11) | -9.48e+9 (3.06e+11) | 1.97e+11 (1.89e+11) |

* The numbers in brackets are the standard error.

The *, **, *** profiles indicate the significance of the coefficient, respectively, at the level of 1%, 5%, 10%. By examining the results and estimates based on the static model, Table 4 shows that:

1. The coefficients of economic growth, inflation rate and exchange rate in the period after the global financial crisis do not show a significant relationship with net sales of companies.
2. The effect of some variables on sales has been achieved contrary to expectations of economic theory. For example, the age-old coefficients of the eleven-year period, which include the pre-and post-crisis period, have a negative economic growth with the net sales of companies, which is associated with economic hypotheses Does not match Therefore, the results of the static model are not approved for the reasons mentioned, and cannot be cited.

4.3. Wald test

According to the results, for determining the causality test between marketing cost and macroeconomic components with the sales performance of the companies, the parent's statistics are calculated, and the results are presented in Table 5.

The results of the Wald test indicate that marketing costs can significantly increase sales in all three tested periods, before the financial crisis, after the financial crisis and the total 11-year period, and in fact, with increased marketing costs even at times Financial crises, in which signs of a recession are

substantial, will lead to increased sales for corporations. Meanwhile, the estimation of coefficients has been calculated concerning the standard or robust standard (Robust standard error¹) deviation. The standard error of the mean for correcting the calculation method introduces a valid standard error or a rigidity.

Table 5

Results of the Estimation of Dynamic Ratio of Marketing Costs on Net Sales of Companies in Tehran Stock Exchange

| | Model estimation coefficients before the financial crisis (2008 - 2002) | Model estimation coefficients for the after-crisis period (2012 - 2008) | Model estimation coefficients for the whole period (2002 - 2012) |
|-------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
| NS _{t-1} | 0.85 *** (0.12) | 1.24 *** (0.09) | 1.022 *** (0.05) |
| Me | 59.10 *** (5.48) | 26.68 * (19.77) | 41.13 *** (11.49) |
| Growth | 1.78e+10 ** (6.42e+9) | 1.63e+10 (1.65e+10) | 3.05e+10 * (1.69e+10) |
| Inf | 4.07e+9 (3.77e+9) | 2.69e+9 (2.25e+10) | 1.18e+10 ** (2.84e+9) |
| Usd | 1.41e+8* (7.90e+7) | 1.38e+7 (1.95e+7) | 1.80e+8 * 9591768 |
| -Cons | -1.47e+12 * (3.47e+11) | -5.12e+11 ** (2.48e+11) | -6.18e+11 ** (2.89e+11) |
| Wald Test | Chi ² : 4069.21 *** | 2691.25 *** | 9528.55 *** |

* The numbers in parentheses are the robust standard error.

- The *, **, *** profiles indicate the significance of the coefficient, respectively, at the level of % 1, 5%, 10%.

- The probability of the cost of marketing during the financial crisis is equal to 0/121.

5. Discussion and Conclusion

In summary, the results of the research hypotheses are as follows:

The test result of the first hypothesis. In the pre-2008 global financial crisis, the zero assumption that there was no link between the independent variable of sales costs and net sales of companies was rejected, and the assumptions of the researcher were confirmed, and the impact of each rial (IRR) on marketing expenditure in this period on sales Net Companies is 59 Rials (IRR) which is significant.

Test results in the second hypothesis. In the era of the global financial crisis that began in 2008, the zero assumption that there was no link between the independent variable of sales costs and net sales of companies was rejected, and the researcher's assumption was confirmed, but the effect was reduced by a price of 33 rials per share rials (IRR) has been spending on marketing affairs, which indicates a reduction in the relationship of the most influential factor affecting the sale of companies.

The test result of the third hypothesis. During the global financial crisis, the zero assumption that there was no relation between the independent variable of the economic growth rate and the dependent variable of net sales of firms was confirmed, and the assumptions of the researcher were rejected, indicating that the model of communication at this point is a financial crisis or a recession. If this relationship has been quite meaningful, positive, and effective in the pre-crisis period, which is the period of stability.

The test result of the fourth hypothesis. The scholar rejects the zero assumption that there is no correlation between the inflation rate and net sales of companies during the global financial crisis. This indicates the economic recession and the separation of macroeconomic data with the activities of companies during the financial crisis, if this relationship is fully specified in economic models and compared with the results of the 11-year test, the positive and significant correlation of this variable the economy is in line with the level of company activity and net sales.

The test result of the fifth hypothesis. In the five years after the global financial crisis, the assumption that the dollar does not correspond to the value of the dollar to the rial (IRR), with the net sales of companies, is confirmed and the assumption of the researcher is rejected. If this relationship has been meaningful and positive during the period of

¹ Regression methods are said to have stable and consistent behavior against unusual data. Some commonly used regression methods, such as least squares, work well if they are truthful, but may not work well for data that violates their assumptions. In particular, the least squares method is sensitive to the false data. Another issue is the existence of a non-variance in data that has occurred in the estimation of the statistics of this research.

economic stability or before the 2008 financial crisis. Besides, this connection and impact have been highlighted in the economic models.

Research suggestions. In order to express the model and the question that Iran is a member of the organization of trade, Iran has been facing extraordinary situations, and although global financial crises have had the most direct impact on Iran's economy, but after Iran's entry into the market the global commodity (W.T.O.) world trade organization will undoubtedly receive positive or negative effects directly. Hence, research on the effects of economic crises on developing countries, which are currently also members of the global market, seems indispensable for taking the Iranian economy to the big market and preventing its negative consequences in the future. It should be noted that in this research, examples of companies related to the tile and ceramic industry, food industry and rubber and plastic industries have been used during an 11-year period, which can be considered as a proposal in later studies, and to other the industry expanded over a longer period of time and examined the long-term effects of marketing costs on sales of firms.

References

- [1] Furceri, D., Zdzienicka, A., (2012). The Real Effect of Financial Crises in the European Transition Economics. *GATE-CNRS*, University of Lyon.
- [2] Candemir, A. & Zalluhoglu, A.E., (2011). The effect of marketing expenditures during the financial crisis: the case of Turkey. *Procedia social and behavioral sciences* 24(2011), pp. 291-299.
- [3] Fallahi and Dehghan. (2013). Evaluating the Effect of the Degree of Focus and Advertising Costs on Profitability in Iran's Industrial Sector. *Journal of Economic Growth and Development Studies*, First Year, No. 1, Winter 9.
- [4] Constantinides, E. (2006). The marketing mixes revisited: Towards 21st-century marketing. *Journal of Marketing Management*, 22(3-4), pp. 407-438.
- [5] Kent, R. A. (1986). Faith in the four Ps: An alternative. *Journal of Marketing Management*, 2, pp. 145-154.
- [6] Cowell, D. W. (1984). *The Marketing of Services, Institute of Marketing and the CAM Foundation*. Heineman.
- [7] Jobber, D. (2001). *Principles and Practice of Marketing*. Third Edition, McGraw Hill.
- [8] Johari Bin Abdullah (2017). Revisiting Exchange Concept A Rationale for Marketing Mix in Islamic Marketing. Revised version JIBE, *Journal of International Business, Economics and Entrepreneurship*, Volume 2, (1), pp. 1-12.
- [9] McCarthy, E.J. (1960). *Basic Marketing: A Managerial Approach*. Homewood, IL: Richard D. Irwin.
- [10] Booms, B.H and Bitner, M.J. (1981). *Marketing Strategies and Organization Structures for Service Firms*. Marketing of Services. Donnelly J.H and George W.R. Chicago: American Marketing Association, pp. 47 – 51.
- [11] Bruner, G. C. (1988). The marketing mix: A retrospective and evaluation. *Journal of Marketing Education* 10 (spring), pp. 29-33.
- [12] Bruner, G C. (1989). The marketing mix: Time for reconceptualization. *Journal of Marketing Education* 10 (summer), pp. 72-77.
- [13] Grönross, C, (1994). From marketing mix to relationship marketing: towards a paradigm shift in marketing. *Management Decision*, 32(2), pp. 4-20.
- [14] Gummesson, E. (1994). Making relationship marketing operational. *International Journal of service industry management*, 5(5), pp. 5-20.
- [15] Gummesson, E. (1997). Relationship marketing as a paradigm shift: some conclusions from the 30R approach. *Management decision*, 35(4), pp. 267-272.
- [16] Van Waterschoot, W., & Van den Bulte, C. (1992). The 4P classification of the marketing mix revisited. *The Journal of Marketing*, pp. 83-93.
- [17] Borden, Neil H. (1964). The concept of the marketing mix. *Journal of Advertising Research* 4 (June), pp. 2-7.
- [18] Wilkie, W. L., & Moore, E. S. (2007). What does the definition of marketing tell us about ourselves? *Journal of Public Policy & Marketing*, 26(2), pp. 269-276.
- [19] Finkelstein, S., & Peteraf, M. A. (2007). Managerial activities: A missing link in managerial discretion theory. *Strategic Organization*, 5(3), pp. 237-248.
- [20] Nicolau, I. (2013). The evolution of the marketing concept. *Knowledge Horizons-Economics*, 5(3), pp. 154-156.
- [21] Asgarnezhad Nouri, B., Sanayei, A., Fathi, S., & Kazemi, A. (2015). The effect of marketing tactical capabilities on the financial performance of the firms: a Meta-analysis approach. *Iranian Journal of Management Studies*, 8(1), pp. 73-96.
- [22] Vorhies, D. W., Orr, L. M., & Bush, V. D. (2011). Improving customer-focused marketing capabilities and firm financial performance via

- marketing exploration and exploitation. *Journal of the Academy of Marketing Science*, 39(5), pp. 736-756.
- [23] Kokemuller, (2013). *What Is a Marketing Expenditure*. Available at: <http://smallbusiness.chron.com/marketing-expenditure-61198.html>.
- [24] Azad Gholam Reza, (2000). *Development Economics of Translation*. (Publication of Ney).
- [25] Lavra Pinto, Michele de, and Janie K. Pacheco. (2009). *Consumo, moralidade e o Programa Bolsa Família: padrões e percepções de um grupo de baixa renda*. In *Juventude, Consumo & Educação 2*, ed. Michele de Lavra Pinto and Janie K. Pacheco. ESPM: Porto Alegre. (in Portuguese)
- [26] Lavra Pinto, Michele de. (2013). *O público e o privado: o 'baralhamento' no cotidiano das famílias beneficiárias do Programa Bolsa Família*. *Política & Trabalho. Revista de Ciências Sociais* 38(4). (in Portuguese)
- [27] Strønen, I. Å. (2018). *Political Polarisation, Colonial Inequalities and the Crisis of Modernity in Venezuela. The Social Life of Economic Inequalities in Contemporary Latin America: Decades of Change*. M. Ystanes and I. Å. Strønen. Cham, Springer International Publishing, pp. 153-181.
- [28] Grugel, Jean, and Pía Riggirozzi. (2012). *Post-neoliberalism in Latin America: Rebuilding and Reclaiming the State after Crisis*. *Development and Change* 43 (1), pp. 1–21.
- [29] Zahedi Mohammad Jawad (2005), *Social Science Culture Translation* (Maziar Publishing), Second Edition, pp. 278-279.
- [30] Rahmani Timur. (2011). *Macroeconomics*, Baradaran Publishing, Sept. 17, 21 p.
- [31] Dekimpe, M.G., M.Hanssens, D., (1995). The persistence of marketing effects on sales. *Marketing Science*, Vol.14, No.1 (1995), pp. 1-21.
- [32] Tong H, & Wei S.J., (2009). *Real effects of the 2007-08 financial crisis around the world*. Available at <http://www.financeinnovation>.
- [33] Crespo, J. & Cuaresma & Stock Storck, M., (2012). *The effect of marketing spending in the premium Car segment: new evidence from Germany*” Working Paper No 201202.
- [34] Ahmadpour Ahmad, Sepehrrdost Hamid, Salehpour Azadeh. (2013). *“The Relationship Between Economic Growth and Accounting Profit in Companies Accepted in Tehran Stock Exchange”*. The Stock Exchange of the 22nd, Summer 92, Sixth.
- [35] Lee, L.-F., Yu, J. (2010). A spatial dynamic panel data model with both time and individual fixed effects. *Economy. Theory* 26(02), pp. 564–597.
- [36] Yu, J., De Jong, R., Lee, L.-F. (2008). Quasi-maximum likelihood estimators for spatial dynamic panel data with fixed effects when both n and T are large. *J. Econom.* 146(1), pp. 118–134.
- [37] Kukenova, M., Monteiro, J.A. (2008). *Spatial dynamic panel model and system GMM: a Monte Carlo investigation*. Unpublished article.
- [38] Blundell, R., Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *J. Econ.* 87 (1), pp. 115–143.
- [39] Piras, G.: sphet (2010). Spatial models with heteroskedastic innovations in R. *J. Stat. Softw.* 35(1), pp. 1–21.
- [40] Millo, G. (2014). Maximum likelihood estimation of spatially and serially correlated panels with random effects. *Comput. Stat. Data Anal.* 71, pp. 914–933.
- [41] Elhorst, J. (2014). Matlab software for spatial panels. *Int. Reg. Sci. Rev.* 37(3), pp. 389–405.
- [42] Elhorst, J., Zandberg, E., de Haan, J. (2013). The impact of interaction effects among neighboring countries on financial liberalization and reform: a dynamic spatial panel data approach. *Spat. Econ. Anal.* 8(3), pp. 293–313.
- [43] Geniaux, G., Martinetti, D. (2017). A new method for dealing simultaneously with spatial autocorrelation and spatial heterogeneity in regression models. *Reg. Sci. Urban-Econ. Forthcoming*.
- [44] Brunson, C., Fotheringham, A.S., Charlton, M.E. (1996): Geographically weighted regression: a method for exploring spatial non-stationarity. *Geograph. Anal.* 28(4), pp. 281–298.
- [45] Cho, S.-H., Lambert, D.M., Roberts, R.K., Kim, S.G. (2010). Moderating urban sprawl: is there a balance between shared open space and housing parcel size? *J. Econ. Geogr.* 10 (5), pp. 763–783.
- [46] Elhorst, J. (2014b). *Spatial Econometrics. From Cross-Sectional Data to Spatial Panels*. Springer Briefs in Regional Science. Springer, New York.
- [47] Basile, R. and R. Mínguez (2018). *Advances in Spatial Econometrics: Parametric vs. Semiparametric Spatial Autoregressive Models. The Economy as a Complex Spatial System: Macro, Meso and Micro Perspectives*. P. Commendatore, I. Kubin, S. Bougheas et al. Cham, Springer International Publishing, pp. 81-106.
- [48] Bond, S., (2002). *Dynamic panel models: a guide to micro data methods and practice institute for Fiscal Studies, Department of Economics, UCL,*

CEMMAP (Centre for Microdata Methods and practice) Working Paper. CWPO9/02. Available at: <http://cemmap.ifs.org.uk/wps/cwp0209.pdf>.

[49] Arellano, M. and S. Bond, (1991). Some

tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of Economic Studies* 58, pp. 277-297.

М. Гейдари¹, Ч. Сяоху², К. К. Лай³, Ч. Юйси⁴, Л. Чен⁵

Дослідження впливу кризи на корпоративні витрати та продажі із застосуванням економетричного методу

^{1,2,5}Нанкінський університет науки і техніки, Нанкін, Цзянсу, КНР

³Коледж економіки, Університет Шеньчжень, Шеньчжень, КНР

⁴Східно-китайський педагогічний університет, Шанхай, КНР

Постановка проблеми: стаття доповнює попередні дослідження і фокусується на питаннях прискорення глобалізації і глобальної економічної кризи, який зачепить більшість країн прямо або побічно. Оскільки криза зачіпає компанії то в статті розглядається один із шляхів виходу з нього шляхом управління витратами на маркетинг. **Мета:** в статті робиться спроба виявити детермінанти, встановити вплив кризи на корпоративні витрати і продажу з використанням методу динамічної панельної економетрики, а також дослідити вплив кризи на витрати і продажу компаній. **Вхідні дані:** в статті розглядається вплив маркетингових витрат на чисті продажі; були використані дані від 25 компаній, що діють на Тегеранській фондовій біржі протягом 11 років (2002-2012 роки). **Методи:** для перевірки гіпотези дослідження ми аналізуємо інформацію економетричними методами. У цьому дослідженні методи економетрики наступні: (дані панелі, дані статичної панелі, фіксовані ефекти і випадкові ефекти, модель фіксованих ефектів, модель випадкових ефектів, тест Хаусмана, модель даних статичної панелі, дані динамічного компонування, тест Вальда). Крім того, слід зазначити, що для аналізу даних в цьому дослідженні ми використовували тест F Лібера, тест Хаусмана і тест Вальда. У дослідженні використовувалося програмне забезпечення Stata, метод різниці першого порядку використовується для усунення статичних ефектів, а перервані значення залежної змінної використовуються в якості змінних інструменту. **Результати:** результати перевірки гіпотези показують, що перша і друга гіпотеза дослідника підтверджуються, а нульові гіпотези відкидаються. Крім того, третя, четверта і п'ята гіпотези дослідника відкидаються, а нульові гіпотези підтверджуються. **Висновок:** результати вказують на значний вплив на чисті продажі оціночних маркетингових витрат компанії, показують, що витрати на 1 риал в маркетингу призводять до збільшення продажів на 58 риалів, і навіть під час глобальної економічної кризи ця цифра еквівалентна 26 риалах. Аналіз наголошує на важливості маркетингових витрат на продажу в Ірані. Особливо в періоди криз і після них маркетингові витрати мали значний вплив на продажу.

Ключові слова: економетрика; маркетинг; продажу; економічна криза

М. Гейдари¹, Ч. Сяоху², К. К. Лай³, Ч. Юйси⁴, Л. Чен⁵

Исследование влияния кризиса на корпоративные расходы и продажи с использованием эконометрического метода

^{1,2,5}Нанкинський університет науки і техніки, Нанкін, Цзянсу, КНР

³Коледж економіки, Університет Шеньчжень, Шеньчжень, КНР

⁴Восточно-китайський педагогічний університет, Шанхай, КНР

Постановка проблемы: статья дополняет предыдущие исследования и фокусируется на вопросах ускорения глобализации и глобального экономического кризиса, который затронет большинство стран прямо или косвенно. Поскольку кризис затрагивает компании то в статье рассматривается один из путей выхода из него путем управления расходами на маркетинг. **Цель:** в статье делается попытка выявить детерминанты, установить влияние кризиса на корпоративные издержки и продажи с использованием метода динамической панельной эконометрики, а также исследовать влияние кризиса на издержки и продажи компаний. **Исходные данные:** в статье рассматривается влияние маркетинговых затрат на чистые продажи; были использованы данные от 25 компаний, действующих на Тегеранской фондовой бирже в течение 11 лет (2002–2012 годы). **Методы:** для проверки гипотезы

исследования мы анализируем информацию эконометрическими методами. В этом исследовании методы эконометрики следующие: (данные панели, данные статической панели, фиксированные эффекты и случайные эффекты, модель фиксированных эффектов, модель случайных эффектов, тест Хаусмана, модель данных статической панели, данные динамической компоновки, тест Вальда). Кроме того, следует отметить, что для анализа данных в этом исследовании мы использовали тест F Либера, тест Хаусмана и тест Вальда. В исследовании использовалось программное обеспечение Stata, метод разности первого порядка используется для устранения статических эффектов, а прерванные значения зависимой переменной используются в качестве переменных инструмента. **Результаты:** результаты проверки гипотезы показывают, что первая и вторая гипотеза исследователя подтверждаются, а нулевые гипотезы отвергаются. Кроме того, третья, четвертая и пятая гипотезы исследователя отвергаются, а нулевые гипотезы подтверждаются. **Вывод:** результаты указывают на значительное влияние на чистые продажи оценочных маркетинговых затрат компании, показывают, что затраты на 1 риал в маркетинге приводят к увеличению продаж на 58 риалов, и даже во время глобального экономического кризиса эта цифра эквивалентна 26 риалам. Анализ отмечает важность маркетинговых расходов на продажи в Иране. Особенно в периоды кризисов и после них маркетинговые расходы оказали значительное влияние на продажи.

Ключевые слова: эконометрика; маркетинг; продажи; экономический кризис

Mohammad Heydari. PhD student. School of Economics and Management, Nanjing University of Science and Technology, Nanjing, Jiangsu, China
E-mail: Mohammad_Heydari@njust.edu.cn

Zhou Xiaohu. Professor. School of Economics and Management, Nanjing University of Science and Technology, Nanjing, China
E-mail: njustzxh@njust.edu.cn

Kin Keung Lai. Professor. College of Economics, Shenzhen University, Shenzhen, China
E-mail: mskklai@outlook.com

Zheng Yuxi. Professor. East China Normal University, Shanghai, China
E-mail: xyzzoey@126.com

Lin Chen. Associate professor. Nanjing University of Science and Technology, Nanjing