Advertising expenditures in Brazil and its connection with the international economy

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Abstract

The strong performance of the Brazilian economy during the 2000s allows the expansion of various sectors, including the advertising market, associated with the growth of the domestic market and the intensification of trade relations with other countries. The main objective of this study is to test the Relative Constancy Principle (RCP) in the context of greater integration with international economy, controlling for several factors that may exhibit some influence on the performance of the advertising market. We adopt a panel data of two periods for 49 countries and estimate a linear fixed effects model with dummies, controlling for the heterogeneity and unobserved factors of the countries. The results suggest that the advertising market of China, the United States and India have significant patterns above the average. The study does not support the RCP, yet they identify important regularities in those countries in relation to the advertising market. The level of activity and international reserves have a significant effect on the advertising market in countries; the higher the share of industry and services (urbanization), the higher the expenses on advertising; the inflation rate is nonlinearly related to the advertising market performance; the economic freedom index and the presence of Generations X and Y are associated with a reduction in advertising expenditure.

Keywords: Advertising Expenditures; Fixed Effects; Principle of Relative Constancy.

Introduction

The Brazilian economy has followed a route of increasing internationalization in recent years. Since its trade liberalization, intensified during the decade of 1990, Brazil has increased its presence abroad, while a greater number of Brazilian citizens have settled in foreign lands. Different sectors have noticed these phenomena, specially the financial sector. However, other areas have also verified changes resulted from larger foreign capital contribution to the Brazilian economy. In this sense, when analyzing the current performance of the domestic advertis-

ing market, it is expected that its behavior might be going through significant changes as well, and that it may incorporate the new moment in the Brazilian economy.

The present study represents a segment of *advertising economics*. This field explores the relation between advertising and economic theory, specifically Microeconomics. Particularly, Pindyck and Rubinfeld (1999, p.447) observe that advertising frequently influences the price elasticity of demand of a given good, creating a cumulative consumption effect. This tends to provoke changes in the price elasticity of demand for a merchandise. For these reasons, companies, as a rule of thumb, spend a fixed percentage of sales in advertising. *Ceteris paribus*, the higher the participation of manufactured goods and the tertiary sector in the economy, the higher the fixed expenditures in advertising (Wurff et al., 2008). As such, by virtue of the rule of thumb followed by companies, the greater the income and the consumption levels, the greater the advertising expenditures in an economy. Therefore, important changes in the macro environment may affect managerial decisions, as a contraction of sales levels resulted from crises or recessions may reduce demand companies' goods, there for affecting their advertising expenditures.

Thus, in the face of these important phenomena that have changed Brazilian macroeconomic scenario – its incremental participation worldwide and its domestic market expansion –, the objective of this study is to test the PRC in the context of the international economy between 2002 and 2012.The literature concerning macroeconomic aspects and the advertising market – the main scope of this article –, is limited. Chiefly, the main concept discussed in the macro environment is the Principle of Relative Constancy (PRC), which hypothesizes an empirical relation between the enterprises' advertising expenditures and the Gross Domestic Product (GDP).[1]

By strictly considering the national advertising market in the context of other countries, the purpose is to amplify results stemmed from previous studies (Pesavento and Marques, 2012; Wurff etal., 2008, Picard, 2001), adopting a more flexible methodology, in addition to the introduction of new macroeconomic data for a sample of 49 countries. In face of the above described objective, and with the methodological discussion presented below, the hypotheses to be tested in this study comprise:

H1.1: Advertising expenditures (a) are proportional to countries' income and development levels; (b) they decrease when there is a surge in inflation rates; (c) they increase according to the performance of the external sector; (e) they increase with the reduction of unemployment levels; (f) they increase according to the urbanization level of the economy; (g) they decline when there is a negative effect on economic freedom[2]; (h) they increase according to the performance of the main exports sector; (i) they decrease with the incremental participation of the generation Y, whose effects of mainstream, traditional media vehicles are less felt due to the predominantly virtual environment in where social interactions occur[3] and; (j) they are positively related to the number of individuals from the Generation X[4], the share of

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[1] Doyle (2002).

[2] The Index of Economic Freedom has been used in several works with samples derived from heterogeneous countries. In this respect, this study follows the suggestion of Chang and Chan-Olmsted (2005). In economics, the recent discussion regarding the observed trend of drop in wages participation in overall income is also measured by the inclusion of the economic freedom variable. See Sala and Trivin (2014).

[3] The Generation Y comprises people born between the years of 1977 and 1994. Also named as *Millennium* Generation, in general, they are between 18 and 35 years old and, in principle, do not react in a traditional fashion to the mainstream marketing actions and channels, despite actively participating as consumers in virtual environments. (Coelho and Las Casas, 2013). The cited study by these authors shows that this generation spends in average 19 hours per week online, more than 12 hours watching television, more than 6 hours listening to music, etc.

[4] The Generation X is comprised of individuals born between 1965 and 1976, considered by some authors as one of the most educated generations in history. It is assumed that these persons respond conventionally to traditional sales and advertising strategies adopted by enterprises (Coelho and Las Casas, 2013).

consumers most likely to respond to traditional media vehicles. From the estimation of a model with a non-linear effect to inflation, two sub-hypotheses to be tested are:

H1.2: the advertising expenditures respond in a non-linear pattern to inflation in different countries, where the effect of price increases will be positive or negative, depending on the inflation threshold value;

H1.3: countries present significant unobserved factors that contribute to the performance of the advertising market, in relation to other markets.

The results of the study present a managerial implication, contributing to the understanding of the Brazilian advertising market and that of several other countries, measuring its sensibility to macroeconomic variables and to the presence of several different generations of consumers[5]. In particular, the practical rule of advertising expenditures[6], pointed out by Pindyck and Rubinfeld (1999, p.446) – in the context of low inflation below the threshold value estimated by the study – will need to be reformulated by the entrepreneur. This suggests that a rise in prices tends to reduce the portion of sales addressed to advertising, not only considering Brazil's domestic market, yet also among other countries studied in the sample.

In this sense, macroeconomic factors such as activity levels, price stability and trade balance may determine the advertising expenditures of companies, since they impinge on the income level, which subsequently interferes with the volume of sales. Hence, there is the identification of an important connection between individual strategies of companies, consumers' behavior (income level) and favorable or adverse overall macroeconomic conditions in countries (important features in globalized economies). Furthermore, when two different generations (X and Y), with highly distinct educational backgrounds and habits are taken into account, it is fair to expect that companies might show interest in knowing whether the two generations exert differentiated effects on the advertising market of the 49 countries researched throughout the sample.

The present work is organized in five sections. Following this introduction, this paper proceeds with a literature review, followed by the description of collected data and the methodology used for the present study. In section 4, a discussion of the results found is presented, concluding with final comments.

Literature review

Advertising economics explores the relationship between advertising and economic theory, seeking to determine the effect of investments in advertisement on consumers' decisions. It also studies its effects on sales volume, product prices, profitability and market power of a company. Its first developments occurred between the end of the 19th and the beginning of the 20th century, by pioneer works of Marshall (1890, 1919) and Chamberlain (1933). In a period where marketing was an ascending phenomenon in the United States[7], these authors

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[5] In previous research, Pesavento and Marques (2012) identified the importance of the decrease of unemployment levels and the increase of credit rates on the raise of advertisement expenditures in Brazil. The current project seeks to find new evidences with positive reflexes on the strategies of companies that act in the advertising market.

[6] The practical rule derived by authors from the condition of maximum profit, where marginal revenue must equal marginal cost, is represented by: $\dfrac{A}{P.Q} = -\dfrac{E_A}{E_p}$, where A represents the value of expenses in advertising, P the product price, Q the quantity sold, E_A the elasticity of demand in relation to advertising expenditures, and E_p the price elasticity of demand for a product.

[7] See Walton and Rockoff (2005).

pointed to the power that advertising could exert on consumers' choices and on levels of market competition. Reflecting the expansion and the increasing sophistication of the advertising market – particularly when related to economic subjects – that developed during the second half of the XX century, there was an incremental surge of original works on the field. Among these, the following authors stand out: Kaldor (1950), Nelson (1970 and 1974), Baumol (1958), Hawkins (1970), Tesler (1964), George (1974) and Schmalansee (1978). All these authors underline, to a higher or lesser degree, the microeconomic aspect of advertising investments by the firm[8].

The implication of this literature points to three interpretations on how advertising influences the behavior of the economic agent. The first would be a persuasive vision, that is, advertisement would alter the consumer's choices, changing the preferences that he constituted before being subject to the advertising play. This, in turn, would lead him to purchase a different quantity than that initially planned – usually, he ends up buying more than he needs (Braithwaite, 1928). In particular, advertising actions, by rendering consumer demand more *inelastic*, may also result on higher prices and lesser quantities, consequently concentrating the market and forming barriers to its entry (maintenance of the *Market Share*).

Another interpretative line is the informative concept, represented by the pioneer works of Ozga (1960) and Stigler (1961). According to their view, advertisement acts as an important way for companies to transmit information to consumers regarding their products or services. In this case, companies would be endogenously responding to a market imperfection (information asymmetry). In this case, when investing in advertising, companies would be enhancing the market's competitiveness and transparency. In addition, demand would actually be *less* inelastic in relation to the price, leading the economy to a less concentrated, more competitive structure.

In contrast with the two perspectives, Bagwell (2005, p.6) observes: "*The persuasive and informative views, in particular, offer conflicting assessments of the social value of advertising. It is of special importance, therefore, to subject these views to rigorous empirical and theoretical evaluation.*" This last line of thought is called complementary, which assumes that consumers already have their preferences formed, hence advertisement would only complement their choices. Such interpretation is associated to the Chicago School (Stigler and Becker, 1977).

In the macroeconomic field, the Principle of Relative Constancy (PRC) represents the main relation between economics and advertising[9]. According to this interpretation, each country presents a constant relation between advertising expenditures and Gross Domestic Product (GDP)[10]. McCombs (1972) was responsible for the original formulation of the PCR concept. It states that, the higher is the level of economic activity, probably the higher the volume of investments in advertisement verified in several media vehicles (newspapers, magazines, books, cable television, Internet, public television, movies, etc.).

However, results of works that have investigated the PRC are heterogeneous and do not lead to a consensus among authors. Whilst for McCombs (1972), McCombs and Eyal (1980), and Noyal (1992), the PRC is consistent with empirical evidence, Dupagne (1994) and (1994), Noh (1997), Glascock (1993), Wood (1986), Wood & O'Hare (1991), and Rehme and Weisser (2007) point to the contrary. In face of such a diversity of results, there is enough

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[8] See Costa (2006).
[9]Its application in the Brazilian economy is found in Lins (2007). A similar approach is also found in Fortunato, Ness, and Motta (2009).
[10] Doyle (2002).

room to enhance the comprehension of this field, testing the PRC with data for a sample of 49 countries, with a more flexible model than the ones frequently used by mainstream literature.

On the other hand, Chang and Chan-Olmsted (2005), when analyzing a sample of 70 countries, employed GDP data on their analysis – population, direct investment, economic freedom index and freedom of the press. The results achieved suggest that, besides GDP, for all the different types of studied media, only the economic freedom indicator could hold any sort of explanatory power, exerting statistically significant negative influence widely felt among all media channels.

Alternatively, Picard (2001) underlines the effects of investments in advertising when the economy goes through a recession[11].The results point to a decrease in the volume of investments (especially in press media)[12]. When it comes to Brazil, based on a series of macroeconomic data and on information regarding investments on media by firms, Pesavento and Marques (2012) did not found any sufficient evidence to support the PRC.

Methodology

The study is based on works of Wood and O'Hare (1991) and Chang and Chan-Olmsted (2005), who proposed two tests for the PRC, depending on the nature of provided data[13]. In order to compare with other countries, the Figure 1 below presents the performance of sample countries selected by Picard (2001), in face of the performance of Brazil. It takes into account two key variables: the growth rate of expenditures in advertising in real terms (Growth ADV) and the evolution of life standards, measured by the growth of the *per capita* income, between years of 2000 and 2011 (Per Capita Output Growth).

Two main important findings are observable. First, when compared in terms of advertising market expansion, Brazil presented the largest surge in advertisement expenditures, in real terms, during the 2000s decade (18.9%), placing itself ahead of mature economies such as France and Sweden. This shows an advertising market in unmistakable expansion. The strong, negative growth of advertising market in industrialized countries (United States, Germany, Spain, Japan and Italy) suggests that it might have diminished its participation in those countries (closure of agencies and reduction of the allocation of expenditures in media vehicles when related to global expenditures), or that there has been a change of route in international location.

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[11] See Kamer (2002).
[12] See Costa (2006).
[13]The most recent discussion involving Brazil can be found in Pesavento and Marques (2012) and Lins and Mueller (2011).

Figure 1: Evolution of the advertising market and the *per capita* income in a decade – sample of Picard (2001), compared with Brazil in the period 2000-2011.
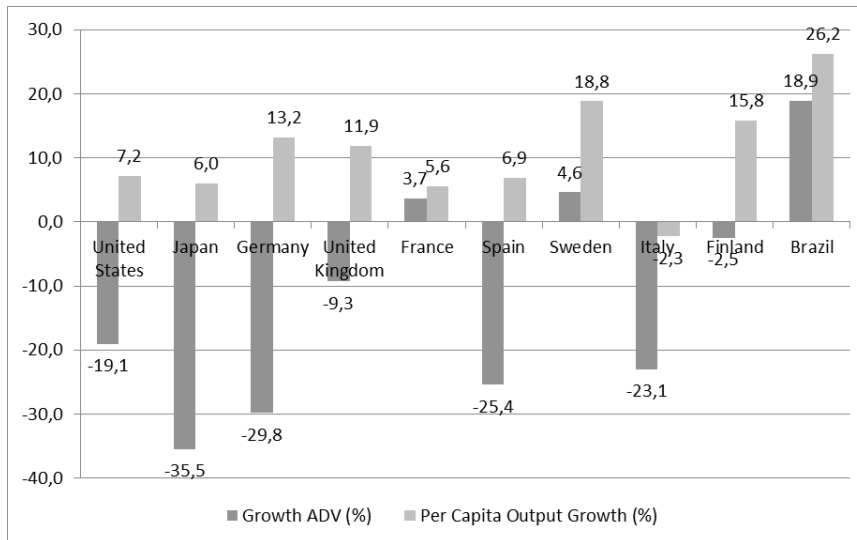
Note: the consumer price index for industrialized countries (2005=100) was used for the sample provided by Picard (2001) and the consumer price index for developing countries (2005=100) was used to Brazil. Both indexes were calculated by the International Monetary Fund. In Brazil's case there was no data available for the year 2011, therefore, the consumer price index for year 2010 was used.

Source: compiled by the authors from data obtained through the World Band, the *Euromonitor International* and the International Monetary Fund.

In this sense, emerging countries experiencing an open expansion, such as China and India, would be strong candidates to serve as new platforms for advertising companies and to the advertising market in general. This seems to be the case for the Brazilian economy, considering the vigorous expansion of its domestic market, whose *per capita* income has increased 26.2%.

When analyzing the evolution of life standard of those countries, Brazil also presented the largest expansion of *per capita* real income (26.2%). In virtue of the consumer expansion's close relation to the increase in advertising expenditures, among the other economies there has been a low growth in income (and subsequently, in consumption), and an ensuing shrinkage in the advertising market[14]. Another observation is that these data suggest a narrow correlation between both, where advertising expenditures usually accompany the growth rate of the period.

In this work, the database was organized for 49 countries, comprising the years between 2000 and 2012, allowing us to investigate the PRC based on a linear unobserved effects model, which accommodates the heterogeneity of countries (unobserved factors, pertinent to each country). The database was organized by using the available data in the *Euromonitor International*, the Macrodados, the International Monetary Fund, and the World Bank online resources. The decision to use the 2000s decade in order to test the PRC was justified by studies of Kose et al. (2006) and Lane and Milesi-Ferreti (2003; 2006).

According to their observations, the acceleration of the globalization phenomenon, through its measures towards financial and commercial integration, had gained momentum in the year of 1995, when using a sample of 71 countries (both industrialized and developing).

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[14] Pearson's correlation coefficient calculated for this sample is of 0.68 with a p-value of 0.02986. This suggests that advertising expenditures are positively correlated to income growth, and that such association is statistically significant at 5%.

As such, it is expected that results coincide to the PRC, considering an increasing commercial and financial interdependence between economies that has only built up during the decade of 2000.

Observations, in an annual basis, for countries (two periods) consist on (1) nine countries, analyzed by Picard (2001), for comparison purposes. (2) The others were selected from studies of Chang and Chan-Olmsted (2005, p.353), according to data availability for viable expenditure in advertisement, since *Euromonitor International* does not provide complete information for this variable for all countries between 2000 and 2012[15].

Table 1 below describes the selected countries that are in accordance to criteria (1) and (2), which compose the sample and contains the data availability for the variable advertising expenditures in *Euromonitor International.* The macroeconomic variables suggested in former studies are widely publicized in the mentioned sources.

Table 1: list of countries selected from research made by Picard (2001) and Chang& Chan-Olmsted (2005).

1. United States	11. Italy	21.South Africa	31. Denmark	41. Venezuela
2. Japan	12. Russia	22. Argentina	32. Costa Rica	42. Israel
3. China	13. Spain	23. Sweden	33. Philippines	43. Portugal
4. Germany	14. Mexico	24. Thailand	34. New Zealand	44. Hungary
5. UK	15. Indonesia	25. Norway	35. Finland	45. Bulgaria
6. Brazil	16. Switzerland	26. Turkey	36. Greece	46. Saudi Arabia
7. Australia	17. India	27. Malaysia	37. Ireland	47. Uruguay
8. France	18. Netherlands	28. Poland	38. Chile	48. Peru
9. Canada	19. Belgium	29. Hong Kong	39. Colombia	49. Luxemburg
10. South Korea	20. Austria	30. Singapore	40. Czech Republic	

Source: compiled by the authors.

When computing the 49 countries with the eleven variables described below, a sufficient sample size was obtained for the fixed effects regression model, amounting for 98 observations for the two-period model. The selected variables used as reference was based in the research made by Pesavento and Marques (2012), in which the authors found significant influence of several macroeconomic factors on the advertising market's performance, regarding the Brazilian case. In addition, suggestions made by Demers (1994) and Chang and Chan-Olmsted (2005) who recommended the inclusion of other macroeconomic variables such as the degree of urbanization (participation of the service sector), were also included. All variables described in Table 2 are available for a large sample of countries in World Bank's webpage[16].

Table 2: description of variables.

Variable: description (unit of measurement)	
1.	**Y:** advertising expenditures (US$).
2.	**R:** international reserves (US$ million).
3.	**g:** real output growth (%).
4.	**P:** inflation rate (%).
5.	**UR:** unemployment rate(%).
6.	**FREE:** index of economic freedom.
7.	**EX:** exports (excludes services) (%).
8.	**GY:** number of Generation Y residents.
9.	**GX:** number of Generation X residents.
10.	**SV:** participation of services in GDP (%).
11.	**IND:** participation of industry in GDP (%).

Source: compiled by the authors.

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[15]There is a lack of information for several countries such as Iceland, Egypt, Ecuador, etc.
[16] Data available in http://www.worldbank.org/en/country

After careful investigation throughout several periodicals, it was concluded that the most recent study on this matter, which includes 21 OECD countries and follows Chang and Chan-Olmsted (2005) approach, is the one proposed by Wurff et al. (2008). However, as hereinafter described, the methodology adopted by these authors may have engendered estimates embedded with heterogeneity bias and, likewise, the results achieved by the authors are difficult to explain theoretically (see below).

Concerning the relation between the variable of interest in the study and the other variables described above in Table 2, concisely, the following outcomes are expected: the advertising expenditures positively depend on the growth rate of the economy, as microeconomics presupposes that an income increase causes an increase in the demand for the product (Wurff et al., 2008, p.30). Moreover, according to the same authors, enterprises, as a rule of thumb, allocate a portion of their sales in advertisement expenditures.

Alternatively, macroeconomic theory posits that a more restrictive monetary policy, generally speaking, tends to curb consumption, therefore, expenditures in advertising are inversely correlated with a contraction in domestic credit markets. Bearing in mind the relations with the external sector, the adopted variable used to synthetize the countries' conditions of domestic credit availability was the level of reserves, which conditions the monetary policy actions, in a context of an open economy embedded in a highly integrated financial system.

Inflation, on the other hand, beclouds the planning horizon of firms, which subsequently tend to postpone their investments, contributing to reduce the demand of the economy. Therefore, when higher inflation rates occur, a decrease in advertising expenditures is expected[17]. This inverse, linear relationship, however, was tested before a specific alternative. Following the suggestion of Wooldridge (2002, p. 187) and the results achieved by Levine and Zervos (1992) for a sample of 102 countries during the 1960-1989 period, the specified alternative model can reasonably describe the nonlinear behavior of inflation on countries' advertising market.

Levine and Zervos (1992) exposed a nonlinear relation between inflation rates and income growth. According to the authors, despite the unanimity among economists and international institutions such as the World Bank and the International Monetary Fund regarding the necessity of low inflation for economies, "*no empirical evidence strongly supports the contention that countries of higher inflation rates tend to have slower long run rates ceteris paribus*" (Levine and Zervos, 1992, p. 15). The analyses conducted by the authors reveals that it is not easy to discover an inverse, linear relationship between inflation and income growth for a sample of 104 countries, as the majority of analysts and international institutions suggest. Therefore, in the present work, an alternative model to the conventional one was specified, with the nonlinear effect of inflation on advertising expenditures.

In the context of an open economy and, consequently, in a scenario of greater interdependence, expenditures in advertisement are positively related with the external sector, measured by the accumulation of total foreign reserves, and inversely correlated with the unemployment rate of the country. Wurff et al. (2008) argue that it is advisable to decompose the effects of different sectors of the economy on the advertising expenditures. This would be justifiable mainly due to the assumption that a greater degree of industrialization leads to a higher level of differentiation among products in the market. The specified model takes into

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[17] Regarding the Brazilian case, on the inception of Plano Real (Real Plan in English), for a discussion concerning the effect of inflation on economic activity, see Bacha (1998).

account the participation of the services and the industry sectors in the GDP, in order to study the sectorial effect of the economy on the advertising market of countries. As the contribution of the industrial and service sectors to the economy increases, so do expenditures in advertising. Demers (1994) argues that the more complex and urbanized the society, the greater the media and advertising spaces, contributing to an increase on the contribution of advertising expenditures to GDP.

Econometric model

The econometric, model, in its general form to be applied in this study, is specified by the expression,

$$y_{it} = \alpha_i + \beta_1 x_{it1} + ... + \beta_k x_{itk} + \varepsilon_{it}$$

(1)

Where y_{it} represents the advertising expenditures of the country i, during period t; α_i represents the specific features of the advertising market of country i, which are not directly observable and may be considered constant in the medium term, influencing expenditures in advertisement, y_{it}. The weight of such unobserved historical and cultural factors (exclusively pertinent to country i) may be measured by estimating the coefficient α_i to each country i of the sample and its significance can be tested.

The coefficients $\beta_1...\beta_k$ measure the sensitivity of the advertising market to the macroeconomic factors $x_{it1}...x_{itk}$, measured in each country i, $i = 1,...,49$. Finally, ε_{it} represents all unobserved factors that vary over time and do not systematically affect y_{it}. The specification for the following model to be presented is based on Wooldridge (2002, Ch. 13) and on study conducted by Levine and Zervos (1992), which detected a nonlinear relation between inflation and economic growth for a panel of 104 countries. From a database on 49 countries in a span of time between the years 2000 and 2012, in addition to the adoption of the variables found in Table 2, the following regression model, with fixed and nonlinear (quadratic) effects of inflation on advertising expenditures, was specified:

$$\ln(Y_{it}) = \beta_0 + \delta_0 DU + \alpha_i + \beta_1 \ln(R_t) + \beta_2 P_t + \beta_3 (P_t)^2 + \beta_4 UR_t + \beta_5 SV_t + \beta_6 IND_t + \beta_7 FREE_t$$
$$+ \beta_{8t} EX + \beta_{9t} GY + \beta_{10} GX_t + \beta_{11} g_t + \varepsilon_{it}$$

(2)

Where,

$$\delta_0 \neq 0, \alpha_i \neq 0, \beta_1 > 0, \beta_2 < 0, \beta_3 > 0, \beta_4 < 0, \beta_5 > 0, \beta_6 > 0, \beta_7 \neq 0, \beta_8 > 0, \beta_9 \neq 0, \beta_{10} \neq 0, \beta_{11} > 0.$$

$$\text{Where } DU = \begin{cases} 1, & t = 2012 \\ 0, & t = 2000. \end{cases}$$

With this new specification, besides controlling the heterogeneity of countries that *did not* change throughout the period (fixed effects), measured by coefficient α_i, the model also controls unobserved factors that *did* change throughout the period and hence affect the expenditures in advertisement, represented by the coefficient δ_0. This can be explained as the

secular, evolutionary trend of the advertising market, observed during the decade in question. Important changes in demographic and sociocultural features of the population, such as family size, gender, race, professional qualification levels, *inter alia*, explain the ongoing development and adaptability of the advertising industry.

For comparison purposes, the model described by equation (2) was also specified so that inflation has a linear effect on advertising expenditures of countries, in accordance with the following expression:

$$\ln(Y_{it}) = \beta_0 + \delta_0 DU + \alpha_i + \beta_1 \ln(R_t) + \beta_2 P_t + \beta_3 UR_t + \beta_4 SV_t + \beta_5 IND_t + \beta_6 FREE_t \\ + \beta_7 EX_t + \beta_8 GY_t + \beta_9 GX_t + \beta_{10} g_t + \varepsilon_{it} \tag{3}$$

$$\text{Where: } \delta_0 \neq 0, \alpha_i \neq 0, \beta_1 > 0, \beta_2 < 0, \beta_3 < 0, \beta_4 > 0, \beta_5 > 0, \beta_6 \neq 0, \beta_7 > 0, \beta_8 \neq 0, \beta_9 \neq 0, \beta_{10} > 0.$$

As a result, in order to test whether specification (2) was more appropriate to the data at hand, the specification test suggested by Wooldridge (2002, p.264) was applied to verify whether the fixed effects model was adequate to the sample data. The null hypothesis is that of equality for the coefficients of all countries in the sample or, likewise, the absence of unobserved effects in the sample. Another conventional specification test applied in the current study was the Hausman test, in which its null hypothesis of random effects best describes the sample data. For comparison purposes, and in order to provide satisfying results, a model of fixed effects with linear influence of inflation on advertising expenditures was also estimated. In the following section, the obtained results in this work are presented and discussed.

Presentation and discussion of the results

In this session, the results found in this study are presented and discussed. Initially, the results derived from the specification tests are presented in order to elect the best model. Following, the results are discussed and compared with other works. Table 3 below presents the result for the specification test for the null hypothesis of absence of unobserved effects in the sample of 49 countries, based on the estimates from equations (2) and (3)[18].

Table 3: specification test for the absence of unobserved effects in the sample – results

Model	z-statistic	p-value
Nonlinear (2)	3.3928	0.0007
Linear (3)	3.3888	0.0007

Source: compiled by the authors.

The conclusion that may be derived from Table 3 is that for both specifications, the results suggest that the fixed effects model is the most adequate one, that is, the one that considers unobserved effects and the countries' heterogeneity. Once the model of random effects competes with the model of fixed effects, it is important to test which one of the two best describes the data above. For this purpose, the Hausman test was used, in which the rejection of the null hypothesis suggests that the fixed effects model is preferable in relation to the

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[18] For a complete description of the test for the inexistence of unobserved effects, see Wooldridge (2002, p. 264).

random effects one. Table 4 synthetizes the result of such test regarding the choice of the best fitted model for the data subject to analysis.

Table 4: specification test for the absence of correlation between independent variables and errors – results.

Model	Statistic	Degrees of freedom	p-value
Nonlinear (2): H0: random effects model	346.5297	12	0.0000
Linear (3): H0: random effects model	80.6101	11	0.0000

Source: compiled by the authors.

The main conclusion to be derived from results of the specification tests displayed in Tables 3 and 4 is that, for the 49 countries that were analyzed, there is strong evidence of unobserved fixed effects, and that these substantially sway firms' advertising expenditures. Based on these observations, Table 5 below incorporates the results obtained from the estimates of the fixed effects model, with unobserved factors for both specifications (linear and nonlinear). The results presented in Table 5 below allows for some important conclusions.

First, when comparing the two models, the one that best describes the database in the 49 sample countries, by the higher coefficient of determination and by the residual sum of squares, is the model with non-linear specification to inflation. In this case, the model explains 82.6% of the advertising expenditures variability, a substantially large value when compared to the other previously mentioned studies, where a significant number of comparisons of the squared sum of the residuals lead to the same conclusion.

The F statistic in both models suggests the global significance of coefficients in a 0.01 probability rate. The following remarks are based on the preferred model for this work, considering the non-linear effect of inflation on advertising expenditures, as defined by eq. (2).

Second, when results of projected coefficients are individually analyzed, all of them present the expected sign and are statistically significant – with the exception of exports in general -, to the participation of the generation X and to the aggregate production's growth rate.

Third, the not significant exports sector can be interpreted as due to a substantial change in the structure of Chinese and Indian exports (Woo, 2012) during the first decade of the 2000s, when technology-intensive investments started to play an incremental role in the exports sector, whose behavior our model does not account. These effects, in addition, have spilled over the domestic segment, affecting the labor and goods markets (Woo, 2012).

Table 5: Estimation of models (2) and (3) – results

Dependent Variable: $\ln(Y_{it})$	Model (2)	Model (3)
DU	0.425** [0.1766]	0.451** [0.1806]
$\ln(R_t)$	0.248** [0.1034]	0.214** [0.1043]
P_t	-0.068** [0.0309]	-0.018 [0.0122]
$(P_t)^2$	0.001* [0.0010]	-----------
UR_t	-0.050** [0.0228]	-0.053** [0.0234]
SV_t	0.058* [0.0314]	0.043 [0.0314]
IND_t	0.056** [0.0226]	0.042* [0.0216]
$FREE_t$	-0.046*** [0.0144]	-0.035** [0.0133]
EX_t	0.001 [0.0025]	-0.001 [0.0024]
GY_t	-5.7693×10^{-8}** [2.1706×10^{-8}]	-6.2180×10^{-8}*** [2.2123×10^{-8}]
GX_t	-1.3875×10^{-7}*** [4.7902×10^{-8}]	-1.5129×10^{-7}*** [4.8612×10^{-8}]
g_t	0.017 [0.0260]	0.014 [0.0266]
Observations	98	98
R²	0.8258	0.8115
F statistic	14.6143 (0.0000)	14.8691 (0.0000)
SSR	4.6506	5.0325

Note: Standard error of coefficients are disclosed between brackets; (***) statistically significant at1%; (**) statistically significant at 5%; (*) statistically significant at 10%. Standard errors of estimates between brackets. *P*-value between parentheses. SSR: sum of squared residuals of the regression.

Source: compiled by the authors.

Fourth, the Generation X, on the other hand, although being traditionally more sensitive to conventional advertisement instruments, may be slowly adopting Generation Y behaviors, on an advertising market basis, mainly due to the emergency of easy-to-use technologies and the formation of new consumer habits. This may help to explain its negative influence on advertising expenditures. In accordance with former studies, such as Wurf et al. (2008), the growth rate of the aggregate production does not significantly influence advertising expenditures in this sample of countries.

Fifth, the results found do not support the Principle of Relative Constancy (once the coefficient on the growth rate of aggregate production was not statistically significant), which postulates that an increase in the aggregate growth rate of countries' GDP is associated by a proportionate, significant, increase in advertising expenditures. However, when proceeding to the breakdown of the sectorial structure of production in different countries, as recommended by Wurff et al. (2008), measured by the participation of industries and services in GDP (urbanization and development), the positive effect is significantly higher and statistically significant.

Sixth, in relation to the significant and positive influence of international reserves, the traditional medium of influence is similar to that described in Pesavento and Marques (2012), although the current study considers an open economy scenario. This channel is related to the possibility of an expansion in domestic credit and to an expansionist monetary policy through

Central Banks interventions in the foreign exchange market. Recently, however, both portfolio and foreign direct investments have been identified as channels of influence for the recent sustained expansion that has occurred throughout the years in China and India (Woo, 2012).

Seventh, another interesting result is the significance and the obtained sign for both inflation and inflation-squared coefficients, which were theoretically proposed in the model, following the Wooldridge (2003) and Levine and Zervos (1992) approach. In order to explain the inflation coefficients, which encompass the possibility of a threshold effect through a U-shaped curve, it is necessary to calculate the threshold from the moment where its effect on advertising expenditures becomes positive. This threshold is obtained by the $\left| \frac{\hat{\beta}_2}{2\hat{\beta}_3} \right|$ part of equation (2). In the present case, for the minimum value of expenditures in advertising in a U-shaped curve, the threshold is 32.24% for the inflation rate (see Wooldridge, 2003, p.187). That is, for increases in inflation rate between the intervals of values approximately from zero up to 32.24%, its effect is *to reduce* companies' advertising expenditures among several countries analyzed in the sample, which is customarily expected by analysts and international institutions.

However, for values above 32.24% per year, surges in the inflation rate are associated to *expansions* in advertising expenditures. Apparently, only in environments experiencing high inflation (with rates above 32.24% per year) expenditures in advertising would positively respond to inflation, a rare phenomenon for most countries during the latest years[19]. The explanation for such positive effect of inflation on advertising expenditures may be because firms, in a highly inflated environment, do not possess a broad array of prices and, consequently, find themselves constrained to index wages and other costs such as primary goods, in order to protect themselves from inflation. In this scenario, prices would be rigid in the down side, showing a typical asymmetry of non-linear patterns of behavior.

In these circumstances, firms would tent to allocate efforts in sales strategies, raising their costs in advertising, in the same direction as the inflation rate. It remains unknown whether there would be another work that registers this result or suggests an alternative explanation for such behavior.

Eighth, in relation with the unemployment rate variable, the coefficient is statistically significant and indicates the importance of the negative influence that unemployment rate impinges on advertising expenditures. In the face of the association between employment and income of countries, the dimension of the coefficient suggests a general behavior for companies in different countries. Firms, according to such view, forecast a decrease on the demand for their products, when there is an incremental increase of unemployment rates.

This result is coherent with evidences presented in Figure 1, where real income (and employment) growth and advertising expenditures of economies are associated. Likewise, this result coincides with results found for Brazil by Pesavento and Marques (2012), with monthly data for the period 1997-2010.

Ninth, in relation to the negative – and statistically significant – influence of the index of economic freedom, the achieved results are similar to those obtained by Chang and Chan-Olmsted (2005): *ceteris paribus*, a smaller state intervention in the economy ("more capitalism", that is, higher competition in goods and factors market) would lead to a reduction in advertising expenditures.

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[19] For a study of hyperinflation experiences in several countries, see Dornbusch et al. (1990).

The most satisfying theoretical explanation for this result is that, at the threshold, in a perfect competition market structure, given the preferences, no firm would be in a position to impose entry barriers, or to keep high profit margins through advertising expenditures, as the product would be homogeneous and information would be complete (market transparency). Hence, such market structure would turn expenditures in advertising into an illogical cost, since in perfect competition they would not affect the price elasticity of demand for the product[20].

As previously noted and according to the informative perspective thoroughly discussed in Bagwell (2005), the index of economic freedom should have a positive effect on advertising expenditures. Nevertheless, when confirming the formerly obtained results for all media (Chang and Chan-Olmsted, 2005), results above support the persuasive view of expenditures in advertising, since more economic freedom and less regulation and state participation has a negative effect on advertising expenditures.

This interpretation is coherent with the idea that firms wish to keep their *Market Share* and, by the use of advertising, they reduce the price elasticity of demand, rendering the demand *more* inelastic to price and, as a consequence, raising entry barriers. Table 6 below presents a synthesis of results obtained from the fixed effects for both projected models (2) and (3).

Table 6: fixed effects estimation – difference around overall mean of advertising expenditures – results.

		Model (2)			Model (3)	
	Country	Estimation	P-value	Country	Estimation	P-value
China		58.369	0.0076***	CHN	63.543	0.0040***
	USA	11.092	0.0907*	USA	11.716	0.0747*
	India	44.253	0.0108**	IN	47.943	0.0062**

Source: compiled by the authors.
Note: (***) significant in at1%; (**) significant in at5%; (*) significant in at10%. Results concerning other countries were not presented due to practical constraints and as their fixed effects do not significantly differ from the average.

It is important to note that fixed effects were computed as deviations in relation to the overall average retrieved from the sample, and *p-value* indicates the exact probability of the test for null hypothesis – that is, there is no difference in country *i* when compared to countries' overall average. Results presented in Table 6 indicate that three countries significantly differ from the others (above the overall average obtained from the sample), in terms of fixed effects: China, United States and India. This suggests that, in these countries, unobserved factors (cultural, religious, historical, etc.) play an important role on the performance of the advertising market, placing them above the overall average observed among other countries. It is important to notice that the analysis conducted in the present work is based on the assumption of normality for residuals. The degree of adjustment of the model its global significance and the residual sum of squares suggest that the nonlinear effect model of inflation is well adjusted. Nonetheless, the test for null hypothesis for residuals normality was performed, and its results are presented in the following Table 7.

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[20]Demand would be infinitely elastic. More detail in Bagwell (2005).

Table 7: Test for the normality of residuals - results.

Model	Shapiro-Wilk statistic	P-value
Nonlinear (2)	0.9738	0.0470
Linear (3)	0.9802	0.1458

Source: compiled by the authors.

In Table 7, it can be inferred that in at 1% of significance, the residuals may be considered as approximately normal. According to related literature, Chang and Chan-Olmsted (2005), in a sample comprising 70 countries, estimate the response coefficient of the advertising market in relation to GDP (β_1) in approximately **0.02**. On the other hand, Wurff et al. (2008) assess this value as **-0.288**, which is severely higher (in module) and bears an *inverse* correlation with the dynamism of the advertising environment: the higher income *lowers* the advertising expenditures.

This incorrect sign (and large magnitude) may reflect a heterogeneity bias due to a lack of control for fixed effects in the regression model. When comparing other adjustment coefficients between models, it is noted that despite the fact that Wurff et al. (2008) adopt *ten* explanatory variables, the regression model used by the authors *only* explains 23% of the advertising expenditures variables. Apparently, there are signs that the authors' estimates are subject to heterogeneity bias, considering the dimension and the inexplicable sign of coefficient obtained in the authors' estimates. The adjustment degree of 82.58% is comparable to that obtained in estimations produced by Chang and Chan-Olmsted (2005), suggesting a satisfying adjustment degree when compared to other works.

Conclusions

Considering the context of Brazil's higher economic openness and its increased financial interaction with other countries, the objective of this study was to test the Principle of Relative Constancy (PRC) in the context of the international economy. Using as reference the period comprising the years between 2002 and 2012, the analysis adopted a more responsive methodology and considered the heterogeneity of countries composing the sample and, in addition, introduced new macroeconomic data for a sample of 49 countries found in *advertising economics* literature.

Similarly to other studies in the area, the PRC hypothesis was not supported by achieved results, yet the present study still suggests important conclusions: (a) the activity level and international reserves, overall, greatly effects the advertising markets of countries; (b) expenditures in advertising are proportionate to the participation of industry and services in the economy (urbanization) by reflecting the greater differentiation in product markets.

The results also allow inferring that the inflation rate holds a nonlinear relation with the performance of the advertising market: in a low inflation environment, firms decrease their expenditures in advertising when inflation rises, while during periods of high inflation, the reverse occurs, supporting one of the sub-hypotheses proposed by the study. In addition – and backing preceding studies –, increased levels of economic freedom (represented by the index of economic freedom) are associated to an overall decrease of advertising expenditures.

Results also indicate that three sample countries significantly differ from the others, in terms of fixed effects (above average unobserved factors): China, United States and India. This suggests that in these three countries, factors such as culture, history, religion, among others,

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explain an important part of the performance of advertising market performance, placing them above the overall average obtained from other countries.

Regarding Generations X and Y, results suggest that advertising expenditures are inversely proportional to their market participation. That is, expenditures in advertising decrease as these two generations increase their share in the consumer market. The most reasonable explanation for this result is that Generation X would be turning less reactive to conventional sales strategies, thus behaving in the same manner as Generation Y individuals.

A future study may provide a more thorough analysis on the behavioral changes that these generations have experienced and why unobserved factors have so greatly impinged on Chinese, American and Indian advertising markets, making them so distinct from other sample countries, taking into account the dimension and dynamism of their domestic market.

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