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**The Marketing Firm as a Metacontingency: Revealing the Mutual Relationships
between Marketing and Finance.**

Rafael Porto and Gordon Foxall

Abstract

This paper reveals the mutual relationship between a firm's marketing behavior and its financial consequences. With panel data from publicly traded companies covering 17 years, we obtained the total expenditures in marketing of each company to represent marketing behavior and five financial outcomes, depicting the reinforcers. Each metric was composed of frequency, magnitude, and delay dimensions. The results show mutual effects between investments in marketing activities (aggregate product of interlocking behavioral contingencies of the firm) and the firm's financial reinforcements (consequences of this product), thus corroborating the existence of metacontingencies in the marketing to finance relationship and undermatching in the finance to marketing relationship.

Keywords: metacontingency; generalized matching law; marketing investment; financial performance; firm.

Introduction

Marketing activities lead to consequences for consumers and firms. For firms, they can drive revenue and profits, but they generate expenses, which raises doubts about the actual effectiveness of these organizational actions (Hanssens & Pauwels, 2016; Katsikeas, Morgan, Leonidou, & Hult, 2016; Moorman & Day, 2016). When analyzed at the firm level, a company that performs marketing activities can be called a marketing firm (Foxall, 1999), characterized by a product derived from a set of interrelated behaviors of several individuals, within the firm (Foxall, 2015). This product generates financial consequences for the firm and, once it achieves these consequences, it can use the surplus to remunerate its owners or use it in the next fiscal year by injecting more money into all business activities.

Although the relationship between marketing and finance has long been a “hot topic” in marketing, whether in the academic or managerial fields (Ambler, Kokkinaki, & Puntoni, 2004; Capon, Farley, & Hoenig, 1990; Katsikeas et al., 2016), it lacks a total measure of marketing efforts and empirical demonstrations of the marketing and finance junction phenomenon (marketing investment → financial consequences → marketing investment). For instance, capturing everything a company does in terms of marketing requires it to record and account for all of its activities, thus allowing a comparison between what it implements from marketing versus what it implements from other activities. In addition, it requires the recording and availability of the firm’s outcome data, such as financial outcomes, to ascertain whether these activities were effective in achieving the firm’s desired consequence.

On the other hand, in order to demonstrate how financial consequences can feed back into marketing activities by enabling the company to perpetuate in the market, a theoretical complement is needed that is able to explain how the outcomes influence subsequent organizational behaviors. The Generalized Matching Law (GML) can help in understanding

how this feedback occurs (Baum, 1974; Davison & McCarthy, 2016). Firms that achieve satisfactory financial outcomes are reinforced to perform the same action (investing in marketing activities) in a subsequent situation. Hence, those companies that are weakly reinforced cannot maintain these activities and are forced to change the level of effort expended on them, either by reducing them and in turn decreasing the size and existence of the company, or by seeking different sources to fund the level of marketing activities (Lukas, Whitwell, & Doyle, 2005; Malshe & Agarwal, 2015).

However, each reinforcement dimensions (frequency, magnitude, and immediacy - Poling, Edwards, Weeden, & Foster, 2011; Todorov, 1973) can alter marketing behavior differently. The company that often gets financial reinforcers (frequency) can be able to divide the marketing investment over time. If the company gets a high amount (magnitude), it can put more resources in marketing and if it obtains the financial reinforcers sooner, it can anticipate the marketing activities. The combination of these three dimensions of reinforcers can leverage a company's marketing behavior and thereby get it into a continuous cycle of growth and value appropriation (Aspara & Tikkanen, 2013; Porto, 2016).

Complementarily, marketing investments can have allocation frequency, magnitude, and immediacy dimensions and depending on the combination of these dimensions, the investment can affect how much the company gets its financial gains. Under a social and economic context, the implementation of marketing activities can not only generate financial returns to the company, but also generate externalities (Biglan, 2011). This externality refers to the cost of executing business activities, including marketing, which are not reflected in the selling price of the company's products and services (Biglan, 2009).

In this way, an approach that aggregates metacontingency relationships becomes necessary (Glenn & Malott, 2004). It includes: cultural-organizational milieu, socio-interlocked behaviors, aggregate product, consumer practices, and group rule generation

(Houmanfar, Rodrigues, & Ward, 2010). In an organizational culture, leaders and managers can organize the work behavior done by professionals, to deliver a particular product, which is sold to the consumer. This remunerates the company in a commercial exchange relationship and the consumer enjoys the product acquired. The way in which this consumer responds to the aggregate product of the company generates organizational group rules (Fagerstrøm, Stratton, & Foxall, 2015; Houmanfar, Alavosius, Morford, Herbst, & Reimer, 2015). Leaders, managers, and investors learn how to accomplish more of these exchanges that are beneficial to both. This relationship is perpetuated because both are reinforced by the exchange. For the company the exchange generates financial returns and for the consumer the use of the product.

However, it is fundamental as a first step to show the real influence that marketing generates on financial returns. Marketing is not capable of changing any firm's financial reinforcer, just as it is not any financial reinforcement that feeds marketing investments. Demonstrating the breakdown of marketing investments into their dimensions (frequency, magnitude, and immediacy) can demonstrate more complete effects on financial reinforcers for the company. Simultaneously, the decomposition of financial reinforcers also in terms of frequency, magnitude and immediacy may reveal what the company is valuing in its exchanges with consumers. This would be a starting point for the metacontingency research that addresses the consequent selection of new aggregate products. Therefore, the overall goal of this paper is to present an empirical study capable of explaining the mutual relationship between a firm's marketing behavior and its financial consequences. This goal is divided into two parts: (1) to show the predictive relationship regarding the effects of the marketing behavior dimensions on the firm's financial consequence measures, and (2) to show the predictive relationship concerning the impact of the firm's financial reinforcement dimensions on its marketing behavior. The first test aims to empirically demonstrate the

effectiveness of marketing expenditures, breaking down the size of the investment (frequency, magnitude, and immediacy) that is most effective in generating financial outcomes. Test (2) aims to detect, using the Generalized Matching Equation, whether the reinforcement dimensions influence the amount of expenditures in marketing. The second test aims to see the feedback of the dimensions of the financial gains (frequency, magnitude and immediacy) in new investments in marketing, which can contribute if there are sustainable marketing investment cycles.

For instance, if marketing efforts generate value appropriation (more profit and/or more sales) for the company and if that value generates new marketing investments in the same proportion, marketing is sustainable and company managers will want to maintain them. However, if marketing generates value appropriation, but is converted into lower levels of new marketing investments, marketing is not sustainable, and relies on extra external funding (new financiers) to maintain marketing activities. That is, the company pays dearly to maintain the marketing, even it being beneficial to the profitable company. In contrast, if marketing does not generate value appropriation, but this value is converted into more marketing, it is a sign that the company has wasted money with wrong activity. We hope this research can be a step forward in investigating the metacontingent marketing-finance interface at the organizational level.

Metacontingency and marketing behavior at the firm level

A firm is a “contextual system”, which means that its behavior embraces the combined repertoires of its members (Foxall, 2018). All the marketing activities within a firm are behavior programs that denote the salient actions of the organizational marketing system (Foxall, 2015). Concretely, marketers are paid to bring outcomes to the company in terms of revenue and profit ratios by planning and executing the scope of the consumption scenario

and the reinforcers that shape and maintain consumer choice (Foxall, 2015). Some activities carried out by these professionals are marketing planning (including how to allocate financial resources to marketing activities), brand management (how to make a strong brand in the market), market and business development (how to grow sales of the company's products), telemarketing, advertising, and promotion (Gök & Hacıoglu, 2010). All of them result in expenses, which reduce the final outcome generated.

Taken together, these activities are the product of interlocking behavioral contingencies performed by marketers and characterize the marketing behavior of the firm (Foxall, 2018; Vella & Foxall, 2013). This behavior is a choice by the firm that may prioritize running it with the aim of attracting consumers or performing other non-marketing activities (e.g., administrative activities and general activities such as contracting insurance, stock-based compensation, lease and rent, etc.). This choice is a multidimensional behavior since it has frequency of occurrence, can be made in advance (or delayed), and has magnitude (or effort). Each of these dimensions can be increased or reduced and it is up to the main marketing manager to implement it.

How marketing activities lead to financial consequences for the company relates to how products (marketing activities) coming from interlocking behavioral contingencies (work done by marketing professionals) generate commercial cycles for the firm (Porto, 2016), remunerate the firm's owners and shareholders (Demsetz, 1983; Edeling & Fischer, 2016; Feng, Morgan, & Rego, 2015; Shah, Kumar, Kim, & Choi, 2017), and, subsequently, how these financial reinforcers select or maintain those products. Theoretical proposals on metacontingency have tried to demonstrate the effects of the products of interlocking behavioral contingencies on the outcomes and how these outcomes select the products (Borba, Tourinho, & Glenn, 2017, Ludwig, 2017, Marques & Tourinho, 2015).

The relationship between the products of interlocking behavioral contingencies and the consequences of the firm as an operant entity in its own right requires empirical demonstration based on the actions of firms in natural settings. Such research is expected to demonstrate the reality of the firm as an operant system that requires understanding at a “supra-personal level of analysis” (Foxall, 2015). This is the level that one can analyze the combined behaviors of the members of the firm. Accordingly, our approach in this paper relies on the statistical analysis of publicly-available aggregate marketing investment data that describes corporate outputs (their products) and their consequences for the firm (e.g. profit). The thrust of the metacontingencies approach to the nature of the firm is to establish the consequences of corporate behavior over and above those of the individual behaviors of members of the firm (Foxall, 2014; Glenn, 2004; Ludwig, 2017; Mallot, 2016; Mawhinney, 1992; Smith, Housmanfar, & Louis, 2011).

One of the great challenges of marketing-finance research is to empirically demonstrate the effects of the efforts of marketers on financial outcomes for the firm and how these financial outcomes increase or sustain marketing efforts (Hanssens & Dekimpe, 2017; Hanssens & Pauwels, 2016; Rust et al., 2004). This challenge is an opportunity to overcome the empirical difficulties of metacontingency research. In addition, the incidence of this phenomenon is very recurrent in business practice (doing marketing to generate sales and profit and these driving more marketing), which makes it an opportunity to test firm level metacontingency and its sustainability.

The Bilateral Contingency Model (Foxall, 1999; Foxall, 2015) helps explain how marketing activities influence firm revenue and profit. When acquiring brand products or services, consumers pay and, in the aggregate of total purchases from the company, provide its revenue (Porto, 2016). However, there are numerous activities that generate expenses, fees, and taxes, affecting whether the offer of products and services is feasible. These subtract

from revenue, leading to profit or loss (Horngren & Harrison, 2015). Thus, consumers are responsible for delivering, at least in part, reinforcers to companies or generating losses by not buying from them. Marketing activities may generate consequences in multiple financial indicators simultaneously (Ambler & Roberts, 2008). However, some specifications are needed to clarify how expenditures on marketing activities affect financial performance indicators.

All marketing activities generate expenses and their execution may impact consumers' purchases. If the brands of a company's products or services are chosen more than competing brands of another firm, the revenue of that company will be higher than that of others in the same industry. Revenue-based market share takes this into account (Banerjee, Prabhu, & Chandy, 2015). Net income margin is also based on consumer sales revenue as the denominator part of the indicator (Clain, Liberatore, & Pollack-Johnson, 2016). Its numerator is the end result, subtracting all expenses, costs, depreciations, interests, and taxes from all operations. The numerator part of this indicator can be distributed among common stock holders as dividends, if it has a positive value (profit).

In addition, the numerator of the free cash flow margin is the financial result that is effectively used by the company for its operations during the following year, that is, the amount of cash the company has left remaining in each year (Currim, Lim, & Zhang, 2016; Fayed & Dubey, 2016; Joseph & Richardson, 2002). It is stored and can be used as an input, with a positive sign indicating a cash inflow or a negative sign indicating a cash outflow. As a margin ratio, it is also based on revenue coming from sales to consumers (divided by revenue).

However, there are other firm outcome indicators that are not based on revenue, but rather on assets, that is, on the value of everything the company owns (Edeling & Fischer, 2016; Katsikeas et al., 2016). This does not depend directly on the reinforcers delivered by

consumers, but on the accumulation of goods, rights, and goodwill, which can be used for transactional purposes. That is, they are potential financial benefits, not yet used for transactions or received from transactions.

Two complementary asset-based indicators can help reveal these financial outcomes (Germann, Lilien, & Rangaswamy 2013; Hughes, Hughes, Yan, & Sousa, 2018). Return on assets (ROA) is the company's operating income divided by the average value of the assets of the previous year and the current year. It reports how much earnings a company can make with its total assets. Tobin's Q is the total value of the enterprise on the stock exchange market divided by total assets. It considers the aggregate valuation of the company based on its last closing share price and the last closing number of outstanding stocks, plus total debt, preferred stock, and minority interest, minus cash and equivalents. The ROA indicator represents what the company has earned or lost financially, in relation to what it has. Additionally, Tobin's Q represents what the company actually pays for the expected earnings or loss in relation to what it has.

As a whole, these financial indicators are the consequent ratios of organizational activities. They reveal earnings, profitability, and competitiveness, triggering many companies to seek to increase the values of these ratios, which have become synonyms for healthy, rich, and perpetuating companies. They help the economic growth of firms (Ferreira, Fayolle, Fernandes, & Raposo, 2017; Wang, Li, & Chen, 2015).

Generalized Matching Law: How financial reinforcers influence marketing expenditure

The allocation of money among activities is a managerial choice and it is quite routine in business decisions (Farris & West, 2007; Larcker & Tayan, 2015; Reilly, Souder, & Ranucci, 2016). Marketing expenditure is a choice of how much money is allocated in activities that attract consumers to the company's products versus other non-marketing

activities such as salary and administrative expenses (Ptok, Jindal, & Reinartz, 2018; S&P Capital IQ, 2018). Spending on marketing activities brings financial consequences to the company through the consumption scenario elaborated by the firm, which can reinforce future spending choices regarding those activities (Foxall, 2015). In this sense, the choice of how much to spend on any activity can be influenced by its financial effects (Currim et al., 2016; Joseph & Richardson, 2002).

The Generalized Matching Law or the Generalized Matching Equation (Baum, 1974; Davison & McCarthy, 2016; Sutton, Grace, McLean, & Baum, 2008) has been used to explain allocations of behavioral rate in choice alternatives for decades, demonstrating its relevance to the area of behavioral economics (Kubaneck, 2017; Rachlin & Laibson 1997; Reed & Kaplan, 2011). The basic formulation of Herrnstein (1961) received additions from Baum (1974) on bias and undermatching, Baum (1979) on overmatching, plus complements in the form of reinforcement parameters or dimensions - frequency, amount, and delay or immediacy (Logue & Chavarro, 1987).

Discussions based on laboratory studies have proposed variations in reinforcement schedules, quantitative analyses (equations), the psychological implications of individuals' self-control and performance, and applications outside the laboratory environment (Davison & McCarthy, 2016). In general terms, researchers try to find matching relationships between choice responses and reinforcement rates, but due to the different contexts of each topic studied, adaptations to the original formulation have been made. Some topics studied in an applied environment involve problem behavior, sports, academic performance, and social dynamics (Reed, 2009), and the GML has been adapted to explain consumer brand choices (Foxall, James, Oliveira-Castro, & Ribier, 2010).

The adaptations are due to differences in contexts between the laboratory environment versus the natural environment, differences in natural environments, in arrangements between

choices, in the quantity of alternatives to be chosen, in response topographies, and also due to the possibility of having multiple responses and corresponding reinforcers simultaneously (Fisher & Mazur, 1997).

Basic laboratory research on choice has shown the frequency of the reinforcer as being the main dimension affecting choice (Grace, 1999; Todorov, 1973). But research at the level of the firm has not used this theoretical framework (Currim et al., 2016), which limits this prior generalization. Therefore, to deal with the firm-level contextualization between marketing investments as a choice and their reinforcers, adaptations to the GML are necessary. An adaptation is needed with regard to bias reduction, which implies the insertion of new parameters into the GML either by including dimensions of the same reinforcer or by adding new financial reinforcers and statistical control variables. A second adaptation implies using the logarithmic transformation of all the reinforcer variables in the equation to match the interpretation of matching and anti-matching. And an adaptation is required in the selection of which dimension of the marketing response is most relevant to the empirical tests of organizational performance.

Although the relationship between marketing activities and corporate financial reinforcers has not been formally investigated by behavior analysts (Poling et al., 2011), it is to be expected that the dimensions of the financial reinforcers for the firm are delivered in a concurrent schedule of intermittent reinforcement (Sigurdsson & Foxall, 2015). That is, the frequency, magnitude, and immediacy of different qualities of financial reinforcers for each firm do not occur continuously (the reinforcer is not delivered for each expenditure incurred), but rather from time to time and with simultaneous reinforcement schedules available. The concurrent schedule is characterized by the availability of financial reinforcement in one schedule that affects the response (expenditure) in another schedule. In the relationship between business activities, the changeover delay occurs naturally, since switching between

expenditures does not happen quickly and each activity tends to generate sunk costs (Cabral, 1995).

The previous financial performance and subsequent marketing expenditure relationship occurs in a concurrent variable ratio for both schedules (concurrent VR VR), which means that the delivery of all financial reinforcer dimensions follows the volume of the expenses. Indeed, some reworking is necessary to interpret the formulation of the reinforcers, since the firm's financial results indicators (Dossi & Patelli, 2010; Rappaport, 1999) are not separated for each activity, but are aggregated at the firm level. Reinforcers are financial outcome indicators, but instead of varying for concurrent expenditures, they vary according to (1) their bases in revenue or total assets and (2) their foci in net or operating profitability, relative to revenue or stock market value. The combinations of foci (numerator) with bases (denominator) set up financial reinforcers that are consequences from different activity expenditures. Thus, the different outcome ratios show different reinforcement qualities.

Each outcome ratios can have dimensions (frequency, magnitude, and immediacy) that influence marketing behavior differently. This study proposes that the frequency of the financial reinforcer is the number of times the company has positive outcome (e.g. profit) in its operations for a year. Every quarter of the year the company checks its results and they can be positive or negative. These are occurrences of growth in the financial outcome indicators selected to be priorities and reinforcers by the managers and shareholders (Epstein & Manzoni, 1998). Because of the instability of financial performance over the years (Simerly & Li, 2000), the financial reinforcers can often be detected as peaks in visual dashboard performance (Bititci, Cocca, & Ates, 2016).

The magnitude of the reinforcer is the amount of money earned or obtained from the company's operations, whether based on revenue or assets. A high amount indicates that the company has been able to increase the retention of surplus value from the transactions or that

has the potential to do so (Schumpeter, 2017). Whatever the quality of the financial reinforcement, the higher the magnitude, the greater the capacity will be to reinvest in the activities responsible for the company's growth.

The reinforcer may come immediately or be delayed (Davison & McCarthy, 2016). During a company's fiscal year, the outcome of its performance is determined quarterly (Ptok, et al., 2018; S&P Capital IQ, 2018). Therefore, if the firm presents a positive peak since the first quarter, the outcome is immediate and reinforces the main activity that generated it in that period. Or, in contrast, if the indicator shows a positive peak only during the last quarter, the reinforcer is delayed.

In sum, this research shows the achievement of financial reinforcers coming from investments in marketing activities that reach the consumer. In turn, it can help managers to plan their investment choices by revealing the moments, frequencies, and amount that financial reinforcers influence future investments (Mintz & Currim, 2013).

Method

Design and sample

Data for the study was obtained from the S&P Capital IQ platform, a financial tool of S&P Global Market Intelligence. Using a longitudinal design, we built an unbalanced data panel covering 11,950 publicly traded companies in the United States of America and United Kingdom from the years 2000 to 2017. We chose these companies due to the availability of at least four years' data containing marketing expenses, general and administrative expenses, and financial indicators, such as: enterprise revenue, industry revenue, return on assets, net income margin, levered free cash flow, total assets, and total value of the company in the stock market.

Most of the sample is composed of companies based in the United States (83.9%), with the remainder based in the United Kingdom (16.1%). Most have a large amount of total assets (the Log of total assets presented an average of 4.12 with a Standard Deviation of 3.75). Companies operating in consumer staples (food distributors, tobacco, etc) represent 4.0% of the total, the consumer discretionary sector (movies and entertainment, computer and electronics retail, etc) represents 15.6%, industrials (industrial machinery, office services and supplies, etc) 12.6%, information technology 16.7%, healthcare 12.3%, energy 6.9%, materials (specialty chemicals, diversified metals and mining, etc) 6.2%, financials 22.7%, utilities (water utilities, renewable electricity, etc) 1.3%, and real estate accounts for 1.8%.

The sample varied for each statistical model set, with a minimum of 4,779 data items coming from 986 companies in the model containing levered free cash flow as the dependent variable, and a maximum of 15,924 data items coming from 2,459 companies in the model containing marketing behavior as the dependent variable. The sample power of the smallest sample (4,779) was in the order of 99.99%, which is good enough to avoid the Type 2 Error.

Measure

For each independent variable, we developed and calculated measures of magnitude, frequency, and delay fractions. They represent the dimensions of each independent and dependent variable that was measured. Magnitude describes the amount or strength of the behavior (or reinforcement). Frequency characterizes the amount of occurrence of the behavior (or reinforcement). Delay means how long it takes for the behavior (or reinforcement) to occur.

In the magnitude aspect of marketing behavior, the numerator is the amount of investment in all marketing activities the company performed in a given year. Thus, it covers expenses in marketing fees, advertising, market development, marketing and business

development, promotion, telemarketing, and brand marketing. The denominator of the magnitude of marketing behavior is general, administrative, and sales expenses, minus marketing expenses. Thus, it covers expenditure on equipment, salaries and other employee benefits, occupancy, insurance, stock-based compensation, general and administrative expenses, net rent, lease and rent, other general and administrative expenses, and other rental expenses. Thus, the numerator represents spending on marketing activities and the denominator is spending on non-marketing activities. Thus, it is a choice behavior regarding investment: investing more in marketing or in other organizational activities.

In the frequency aspect of marketing behavior, the numerator is the quantity of positive growth of the marketing behavior magnitude during all quarters per year. The denominator is the quantity of quarterly data made available per year. Thus, the measure represents the frequency of growth spikes in marketing behavior.

In the delay aspect of marketing behavior, the numerator is the first quarter of the year in which the company showed positive growth in the magnitude of marketing behavior. The denominator is the quantity of quarterly data made available per year. The variable was recoded so that the measure represents the furtherance of marketing behavior growth spikes. This was because an earlier occurrence of investment is expected to have a positive relationship with financial outcome measures.

We calculated the following firm financial consequence measures: market share, return on assets, net income margin, Tobin's Q, and levered free cash flow. We formulated the magnitude, frequency, and delay dimensions of each one of them to calculate the reinforcement measures. In the magnitude aspect, we considered the original metrics as measures of the firm's financial outcome. Thus, the magnitude of market share is the company's total revenue in the year divided by the total revenue of the industry in that same year. It is a measure of the firm's competitiveness.

The magnitude of return on assets is the company's operating income divided by the average between the assets of the current year and the previous year. It is one of the most used measures of profitability in business performance research. The magnitude of net income margin is the company's net income in a particular year divided by its total revenue in that year. The magnitude of Tobin's Q is the total enterprise value in the stock market each year divided by the company's total assets in that year. It is an economic-financial indicator that ascertains the firm's performance. The magnitude of levered free cash flow is the amount of cash a company has left each year after paying all its financial obligations in that year divided by the revenue.

The procedures used to calculate the frequency metrics of each reinforcement measure were as follows: (1) the percentage growth rate of each indicator (e.g. Tobin's Q) was calculated from one quarter to the next during the year, (2) we counted the amount of positive growth spikes for the same company in each year, and (3) we divided the frequency by the quantity of quarterly data made available per year.

Similarly, the procedures used to calculate the delay metrics of each reinforcement measure were as follows: (1) we calculated the percentage growth rate of each indicator (e.g. Tobin's Q) from one quarter to the next over the year, (2) we recorded the quarter containing the first positive growth spike for the same company in each year, (3) we divided the number by the quantity of quarterly data made available per year, and (4) this metric was recoded to represent the furtherance of the reinforcement growth spikes.

All the independent and dependent variables are described in Table 1 with their means and standard deviations. Some variables showed high standard deviations, which means they have a high dispersion for these measures among all companies over time. This indicates that a data structure that can reduce this dispersion should be considered in the statistical analyses.

Table 1. Measures of the dependent and independent variables and descriptive analysis.

Variable	Measure	Mean	Std. Deviation
Marketing behavior magnitude ratio ¹²	Total marketing expenses of firm i in time t divided by the total selling, general, and administrative expenses of firm i in time t minus total marketing expenses of firm F in time t.	0.90	8.36
Marketing behavior frequency ratio	Number of growth spikes of marketing behavior magnitude of firm i on a quarterly basis during the year divided by the quarterly data made available per year.	0.47	0.21
Marketing behavior delay ratio ³	First quarter of the year to show an increase in marketing behavior magnitude of firm i divided by the quarterly data made available per year.	0.77	0.24
Market share magnitude ratio	Total revenue of firm i in time t divided by the total revenue of the industry in time t.	17.38	30.75
Market share frequency ratio	Number of growth spikes of market share magnitude of firm i on a quarterly basis during the year divided by the quarterly data made available per year.	0.49	0.20
Market share delay ratio ³	First quarter of the year to show an increase in market share magnitude of firm i divided by the quarterly data made available per year.	0.77	0.23
Return on assets magnitude ratio	Operating income of firm F in time t divided by the average total assets (t, t-1) of firm i in time t.	10.85	232.39
Return on assets frequency ratio	Number of growth spikes of return on assets magnitude of firm i on a quarterly basis during the year divided by the quarterly data made available per year.	0.48	0.20
Return on assets delay ratio ³	First quarter of the year to show an increase in return on assets magnitude of firm i divided by the quarterly data made available per year.	0.80	0.23
Net income margin magnitude ratio	Net income of firm i in time t divided by the total revenue of firm i in time t.	0.13	0.13
Net income margin frequency ratio	Number of growth spikes of net income margin magnitude of firm i on a quarterly basis during the year divided by the quarterly data made available per year.	0.42	0.18
Net income margin delay ratio ³	First quarter of the year to show an increase in net income margin magnitude of firm i divided by the quarterly data made available per year.	0.78	0.24
Tobin's Q magnitude ratio	Total enterprise value in stock market of firm F in time t divided by the total assets of firm i in time t.	549.21	42629.76
Tobin's Q frequency ratio	Number of growth spikes of Tobin's Q magnitude of firm i on a quarterly basis during the year divided by the quarterly data made available per year.	0.51	0.23
Tobin's Q delay ratio ³	First quarter of the year to show an increase in Tobin's Q magnitude of firm i divided by the quarterly data made available per year.	0.82	0.24
Levered free cash flow magnitude ratio	Operating income multiplied by (1 - statutory rate) + Interest Expense * (1 - Tax Statutory Rate) + (Depreciation & Amortization - Cash Flow) + (Amortization of Deferred Charges - Cash flow) + Capital Expenditure + Sale (Purchase) of Intangible Assets + Total Stock-Based Compensation - Change In Net Working Capital of firm i in time t divided by the total revenue of firm i in time t.	14.32	26.72
Levered free cash flow frequency ratio	Number of growth spikes of levered free cash flow magnitude of firm i on a quarterly basis during the year divided by the quarterly data made available per year.	0.47	0.18
Levered free cash flow delay ratio ³	First quarter of the year to show an increase in levered free cash flow magnitude of firm i divided by the quarterly data made available per year.	0.78	0.23

Note. ¹Expenses in marketing represent those incurred in: marketing consultancy fees, advertising, market development, marketing and business development, promotion, telemarketing, and brand marketing

²Selling, general and administrative expenses represent those incurred in equipment, salaries and other employee benefits, occupancy, insurance, stock-based compensation, general and administrative, net rental, lease and rent, other general and administrative expenses, and other rental expenses.

³The variable was recoded to be the immediacy of the measure (additive invert of delay).

Model and data analysis

Equation 1 illustrates the set of the first five statistical models elaborated for this research. Each of these models differs in relation to the dependent variable, the firm's financial consequence measures: market share, return on assets, net income margin, Tobin's Q, and levered free cash flow. Equation 2 illustrates the set of five more statistical models elaborated in this research. Each of these last five models differ only in relation to the independent variable, the firm's reinforcements measures.

In both equations, the aspect of magnitude is a dependent variable. In equation 1 we opted to prioritize illustrating the effect on these magnitude variables because they have the original formulas used in the marketing-finance interface and, thus, it allows for a comparison with other studies. In equation 2 we prioritized using magnitude as a dependent variable due to the typical investment concerns by managers - financial resources are limited by their magnitude (amount) and this is the main limitation in the discussion about investment.

In addition, the dependent variable of equation 1 is in the current period (and the independents are in lag 1) and in equation 2 the dependent variable is in the subsequent period (and the independents are in the current period). We chose to make the temporal chained connection between the equations ($t - 1 \rightarrow t \rightarrow t + 1$) in order to allow for logical inferences of causes and consequences.

$$\text{LgFconsmag}_{i,t} = \text{Lg}\beta_{0i,t} + \beta_1 \text{LgBehmag}_{i,t-1} + \beta_2 \text{LgBehfreq}_{i,t-1} + \beta_3 \text{LgBehdel}_{i,t-1} + \beta_4 \text{C1}_{i,t} + \beta_5 \text{C2}_i + \epsilon_{i,t} \quad (1)$$

$$\text{LgBehmag}_{i,t+1} = \text{Lg}\beta_{0i,t} + \beta_1 \text{LgReinmag}_{i,t} + \beta_2 \text{LgReinfreq}_{i,t} + \beta_3 \text{LgReinfdel}_{i,t} + \beta_4 \text{C1}_{i,t} + \beta_5 \text{C2}_i + \epsilon_{i,t} \quad (2)$$

Note: $LgFconsmag_{i,t}$ indicates the magnitude of each financial consequent variable of firm i in time t . $LgBehmag_{i,t-1}$ indicates the magnitude of marketing behavior variables of firm i in time $t-1$. $LgBehfreq_{i,t-1}$ indicates the frequency of marketing behavior variables of firm i in time $t-1$. $LgBehdel_{i,t-1}$ indicates the delay of marketing behavior variables of firm i in time $t-1$. $LgBehmag_{i,t+1}$ indicates the magnitude of marketing behavior variables of firm i in time $t+1$. $LgReinmag_{i,t}$ indicates the magnitude of each reinforcement variable of firm i in time t . $LgReinffreq_{i,t}$ indicates the frequency of each reinforcement variable of firm i in time t . $LgReinfdel_{i,t}$ indicates the delay of each reinforcement variable of firm i in time t . $C1_{i,t}$ indicates the control variable (log of assets) of firm i in time t . $C2_i$ indicates the fixed control variables (sector, firm, and time dummies) for each firm. $\beta_{0i,t}$ is the constant term. $\varepsilon_{i,t}$ is the error term.

Before we assessed the performance of each of the 10 models, we transformed all the ratio independent and dependent variables into logarithms, making log-log models. Thus, all results are expressed in elasticities. We performed some preliminary tests for each statistical model in order to check the assumptions for regressions with panel data. Initially we ran a basic model (pooled OLS) and made the diagnoses before running the panel regression.

The initial model, with no control variable, showed that we had a specification problem in almost all models (RESET F test ranged from 1.9 to 92.60, with $p \leq 0.01$). This required us to specify the models using control variables. The Wald joint test of time dummies indicated that we did not have problems inserting them as controls (Chi-square ranged between 92.59 and 323.44, with $p \leq 0.01$). The Pesaran CD test showed that we had problems with cross-sectional dependence (asymptotic test statistic z ranged from 65.22 to 68.03, with $p \leq 0.01$). When we inserted some control variables, such as the company and the sector, the problem was solved.

The joint significance F and the Breusch-Pagan were all significant ($p \leq 0.01$), but the Hausman tests ($p > 0.05$) showed that the random model was more predictively adequate compared with the pooled OLS and the fixed models. We opted for the random alternative to

maintain comparison patterns across all models. However, there was a problem of heteroskedasticity (White test LM ranged from 350.24 to 1.784.84, all with $p \leq 0.01$), including groupwise heteroskedasticity (Wald test Chi-square ranged from 2.4082×10^7 to 3.65664×10^8 , with $p \leq 0.01$). This required the use of a more efficient estimator that would allow these problems to be solved.

Thus, we used the groupwise weighted least square (WLS) estimator for panel data, a specific case of feasible GLS estimators (Wooldridge, 2010). Its weights are calculated based on per unit error variances and it does not require any knowledge concerning the source of heteroskedasticity. It seemed to be appropriate for our data. But since we had multicollinearity problems in the equation 2 models, we chose to break down the single model into five, each containing the three dimensions of the same firm's reinforcement variable.

Results

The results are divided into two parts. Initially, we show the effects of the firm's marketing behavior dimensions on each one of its consequent measures. Subsequently, we show the effects of the firm's reinforcement dimensions on the magnitude of marketing behavior.

Effects of marketing behavior on the firm's financial consequence measures

Initially, we performed analyses with statistical models containing only the control variables for each dependent variable. These models served as base models for comparisons with the models that included control variables plus independent variables (dimensions of marketing behavior). All models containing the measures of financial consequences as dependent variables were very satisfactory when we inserted the independent variables

(dimensions of marketing behavior). For market share, the model with the independent variables presented an 82.69% reduction in the Bayesian information criterion (BIC), with an adjusted R^2 of 95.83%. For return on assets, the model with the independent variables presented an 81.42% reduction in the BIC, with an adjusted R^2 of 93.90%. For the net income margin, the model with the independent variables presented an 80.39% reduction in the BIC, with an adjusted R^2 of 78.05%. For Tobin's Q, the model with the independent variables presented an 84.78% reduction in BIC, with an adjusted R^2 of 83.55%. For levered free cash flow, the model with the independent variables showed an 82.44% reduction in BIC, with an adjusted R^2 of 34.14%.

The interpretation in Table 2 is given in elasticities. Thus, a 1% increase in magnitude and 1% increase in frequency of marketing behavior_{t-1} significantly raise market share_t by 0.39% and 0.03%, respectively. The delay ratio is not significant. A 1% increase in magnitude and 1% increase in frequency of marketing behavior_{t-1} significantly raise return on assets_t by 0.10% and 0.09%, respectively. The delay ratio is not significant. A 1% increase in frequency and 1% increase in delay of marketing behavior_{t-1} significantly raise net income margin_t by 0.04% and 0.02%, respectively. The magnitude ratio is not significant.

Also in Table 2, a 1% increase in magnitude, 1% increase in frequency, and 1% increase in delay of marketing behavior_{t-1} significantly raise Tobin's Q_t by 0.04%, 0.14%, and 0.05%, respectively. None of the marketing behavior dimensions_{t-1} was a significant predictor of levered free cash flow.

Independent variable	Market share _t ^a			Return on assets _t ^a			Net income margin _t ^a			Tobin's Q _t ^a			Levered Free cash _t ^a		
	B	SE		B	SE		B	SE		B	SE		B	SE	
Constant	-3.84	0.14	**	1.62	0.12	**	-3.05	0.05	**	1.63	0.08	**	1.67	0.11	**
Marketing behavior magnitude ratio _{t-1} ^a	0.39	0.01	**	0.10	0.00	**	-0.01	0.01		0.04	0.00	**	0.00	0.00	
Marketing behavior frequency ratio _{t-1} ^a	0.03	0.02	**	0.09	0.01	*	0.04	0.01	*	0.04	0.01	*	0.00	0.02	
Marketing behavior delay ratio _{t-1} ^a	0.00	0.02		-0.01	0.01		0.02	0.01	**	0.05	0.01	*	0.01	0.01	
Adjusted R ²	95.83% (N=10,653)			93.90% (N=7,344)			78.05% (N=6,128)			83.55% (N=7,820)			34.19% (N=4,779)		

Table 2. Effects of the dimensions of marketing behavior on the firm's financial consequence measures

Note. * $p \leq .10$; ** $p \leq .05$; *** $p \leq .01$

^a Variables are in log.

The control variables log of assets, year, sector, geographic location (USA 0 and UK 1), and company are not shown due to space.

The combined effects of the three dimensions of marketing behavior in each dependent variable of financial consequences (in log) are displayed in Graph A (Figure 1). Taken together, marketing behavior exerts a positive effect on all measures, being greatest for market share, then Tobin's Q, followed by return on assets, net income margin, and levered free cash flow, respectively.

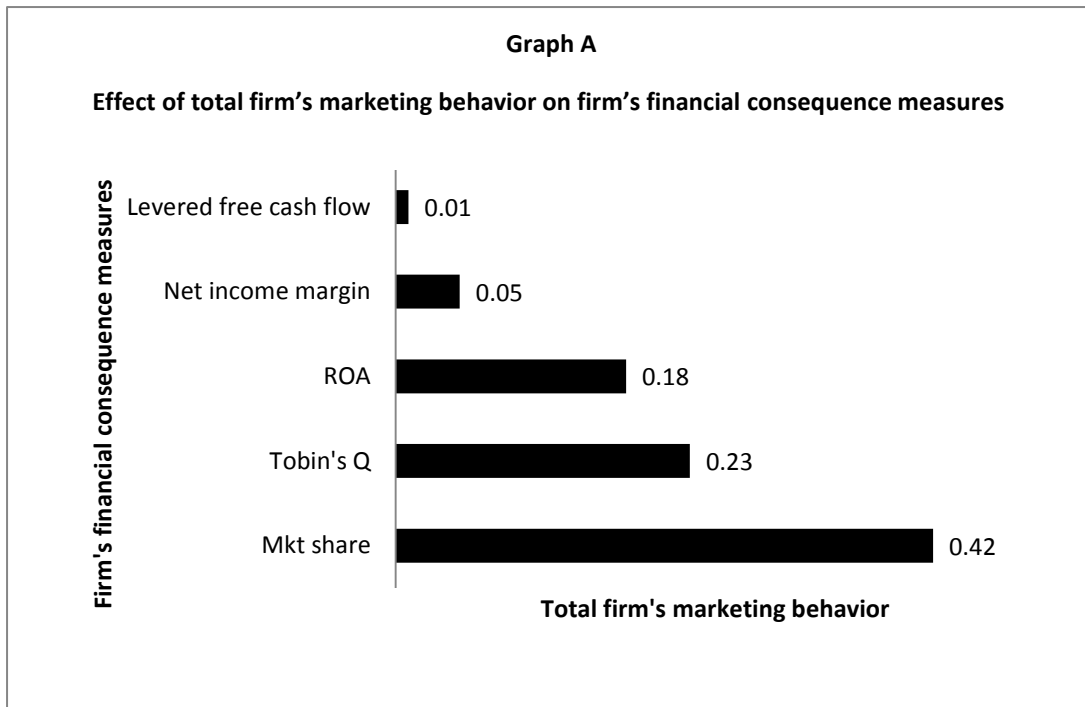


Figure 1. Effect of total marketing behavior on firm's financial consequence measures

In Graph B (Figure 2), we can see that among the dimensions of marketing behavior, magnitude (0.52%) is primarily responsible for increases in financial consequence measures. However, there is a considerable influence of frequency (0.30%) and a marginal influence of delay (0.07%) on the total for the measure (in log).

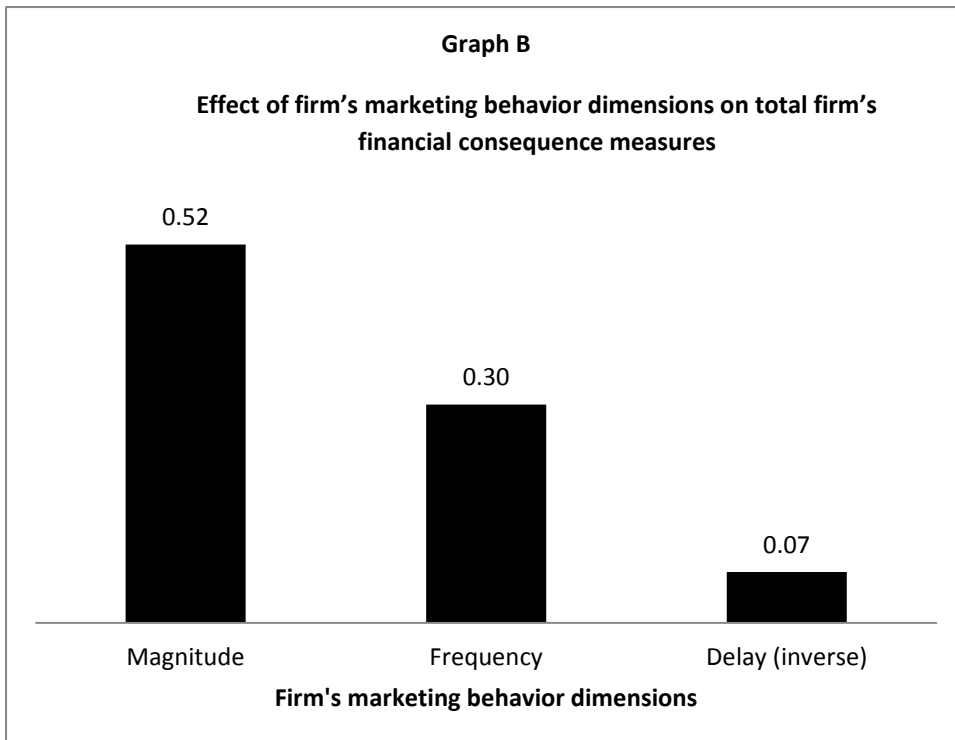


Figure 2. Effect of marketing behavior dimensions on firm's financial consequence measures

Effects of reinforcements dimensions on marketing behavior magnitude

All models containing the magnitude of marketing behavior as a dependent variable were very satisfactory when we inserted the independent variables (dimensions of each reinforcement measure). For the market share dimensions as independent variables, the model presented a 34.53% reduction in the Bayesian information criterion (BIC), with an adjusted R^2 of 89.97%. For the return on assets dimensions as independent variables, the model presented a 51.73% reduction in BIC, with an adjusted R^2 of 92.66%. For the net income margin dimensions as independent variables, it presented a 60.33% reduction in BIC, with an adjusted R^2 of 93.67%. For the Tobin's Q dimensions as independent variables, it presented a 51.34% reduction in BIC, with an adjusted R^2 of 87.66%. For the levered free cash flow dimensions as independent variables, it showed a 67.41% reduction in BIC, with an adjusted R^2 of 72.19%.

The interpretation in Table 3 is also given in elasticities. Thus, a 1% increase in magnitude, 1% increase in frequency, and 1% increase in delay of market share_t significantly raise marketing behavior_{t+1} by 0.06%, 0.12%, and 0.03%, respectively. A 1% increase in the magnitude of return on assets_t significantly raises marketing behavior_{t+1} by 0.06%. The frequency and delay ratios are not significant. A 1% increase in magnitude, 1% increase in frequency, and 1% increase in delay of net income margin_t significantly raise marketing behavior_{t+1} by 0.01%, 0.05%, and 0.06%, respectively.

Also in Table 3, a 1% increase in frequency and 1% increase in delay of Tobin's Q_t significantly raise marketing behavior_{t+1} by 0.03% and 0.11%, respectively. The Tobin's Q magnitude ratio is not significant. A 1% increase in the magnitude of levered free cash flow_t significantly raises marketing behavior_{t+1} by 0.10%. The levered free cash flow magnitude and frequency ratios are not significant.

Table 3. Effects of the dimensions of reinforcements on marketing behavior magnitude

Independent variable	Mkt beh. magn. _{t+1} ^a			Mkt beh. magn. _{t+1} ^a			Mkt beh. magn. _{t+1} ^a			Mkt beh. magn. _{t+1} ^a					
	B	SE	*	B	SE	*	B	SE	*	B	SE	*			
Constant	2.25	0.3	*	2.61	0.05	*	2.35	0.08	*	2.62	0.06	*	2.48	0.06	*
Market share magnitude ratio _t ^a	0.06	0.0	*												
Market share frequency ratio _t ^a	0.07	0.0	*												
Market share delay ratio _t ^a	0.04	0.0	*												
Return on assets magnitude ratio _t ^a				0.06	0.00	*									
Return on assets frequency ratio _t ^a				0.01	0.01										
Return on assets delay ratio _t ^a				0.01	0.01										
Net income margin magnitude ratio _t ^a							0.01	0.00	*						

Net income margin frequency ratio _t ^a	0.05	0.01	*	*	*		
Net income margin delay ratio _t ^a	0.05	0.01	*	*	*		
Tobin's Q magnitude ratio _t ^a				0.0	0		
Tobin's Q frequency ratio _t ^a				0.0	3	*	
Tobin's Q delay ratio _t ^a				0.1	1	**	
Levered free cash flow magnitude ratio _t ^a							0.0 0.0
Levered free cash flow frequency ratio _t ^a							1 0
Levered free cash flow delay ratio _t ^a							0.0 0.0
							0 2
							0.1 0.0
							0 2
							*
							*
							*
Adjusted R ²	89.97%	92.66%	93.67%	87.66%	72.19%		
	(N=15,924)	(N=11,242)	(N=9,604)	(N=11,774)	(N=7,859)		

Note. * p ≤ .10; ** p ≤ .05; *** p ≤ .01.

^a Variables are in log.

The control variables log of assets, year, sector, geographic location (USA 0 and UK 1), and company are not shown due to space.

The combined effects of the three dimensions of each reinforcement measure in marketing behavior magnitude (in log) are displayed in Graph C (Figure 3). Taken together, the reinforcement measures - market share, Tobin's Q, net income margin, levered free cash flow, and return on assets, respectively - exert a positive effect on marketing behavior magnitude.

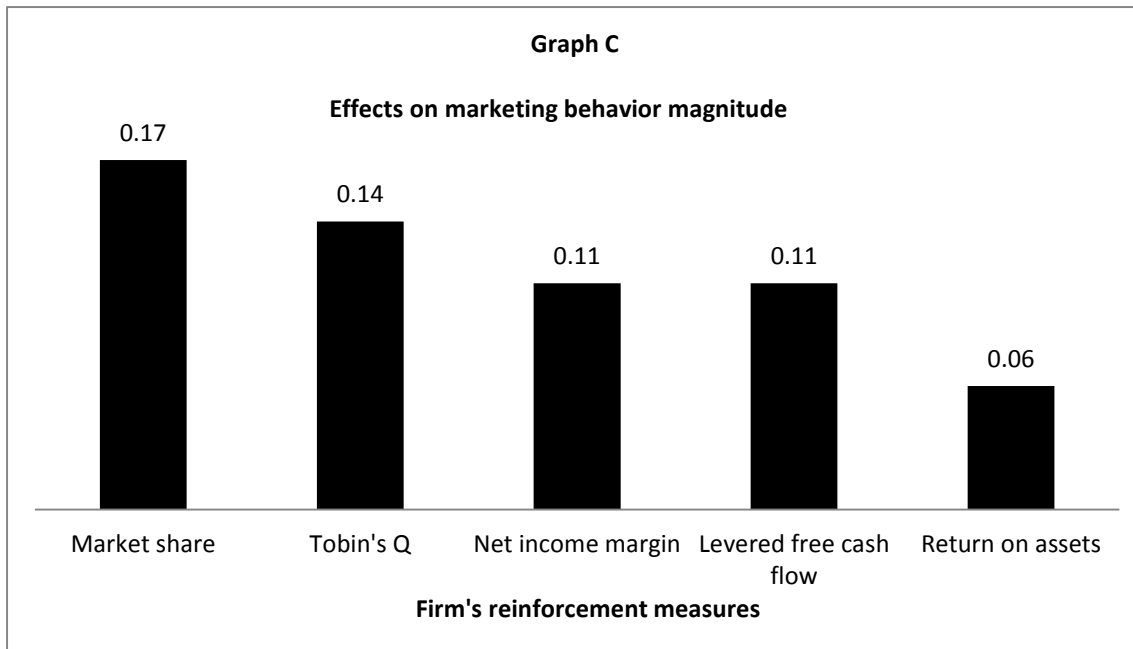


Figure 3. Effect of firm's reinforcement measures on marketing behavior magnitude

In Graph D (Figure 4), we can see that among the dimensions of total reinforcement measures, delay (0.29%) is primarily responsible for increases in marketing behavior magnitude. However, there is a medium-low influence of both frequency (0.16%) and magnitude (0.14%) on marketing behavior.

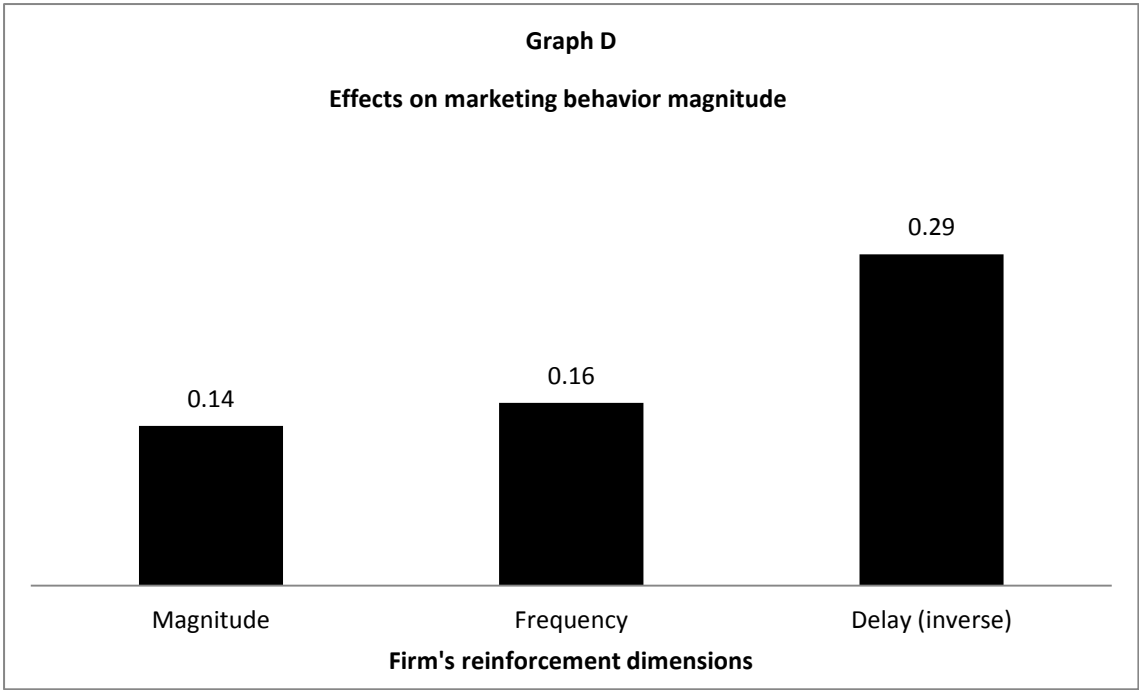


Figure 4. Effect of firm's reinforcement dimensions on marketing behavior magnitude

An example of the mutual relationship between marketing behavior and the firm's financial consequences (and reinforcements) is displayed in Figure 5. This is a result applied to one company in the sample. Graphs E to H exhibit the effect of total reinforcements on the magnitude of marketing behavior.

For this company, we found an undermatching relation, either for the sum of the means of all reinforcers of all dimensions (Graph E), or for the mean of all reinforcers in the same dimension (magnitude Graph F, delay Graph G, and frequency Graph H), with the magnitude of marketing behavior. It can be seen that all relations in the log-log equations are below one and that the bias (constant) is still present.

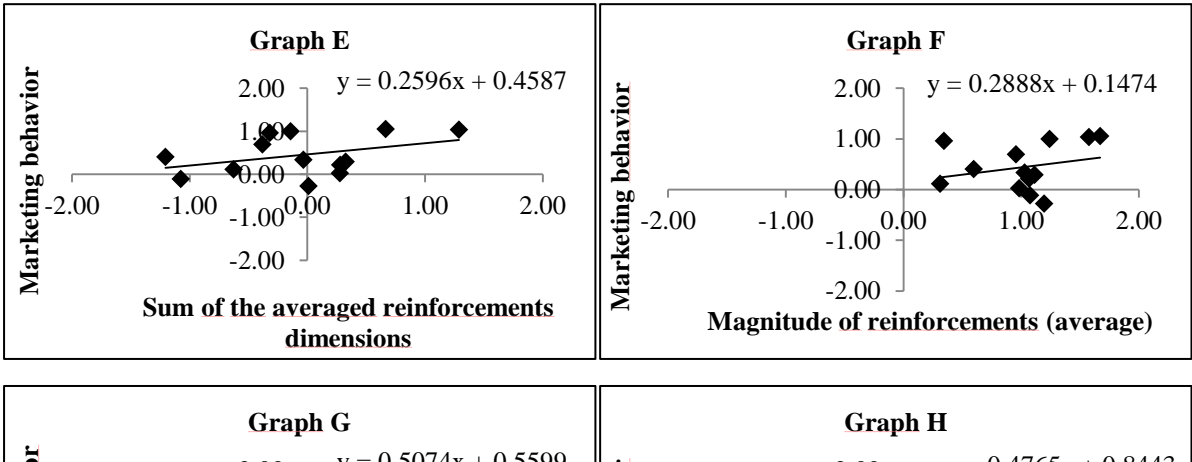


Figure 5. Applied effects on a specific firm.

Discussion

The results show mutual effects between investments in marketing activities (aggregate product of interlocking behavioral contingencies of the firm) and some of the main indicators of firm financial performance (consequences of this product), thus corroborating the existence of a metacontingency relation (Borba et al., 2017; Ludwig, 2017; Marques & Tourinho, 2015). At the firm level and in the time horizon analyzed (a subsequent year), the effect is greater for marketing behavior on financial indicators than for financial reinforcers on marketing behavior. This means that (1) marketing activities generate appropriate value for the company and provide its economic growth (Ferreira et al., 2017; Wang et al., 2015) and, less strongly, (2) this appropriate value is reinvested in more marketing activities (Joseph & Richardson, 2002), thus perpetuating a cycle of firm activity. That is, marketing investments generate value appropriation, but are not sustainable, and relies on extra external funding (new financiers) to maintain them.

The fact that the influence on reinvestment in marketing activities is not as high requires the company to allocate more money for this activity in the next fiscal year, should it want to maintain or increase its financial indicators later. If this is the firm's choice, the

mutual relationship may resemble an evolutionary wavy cycle of corporate sustainability. Otherwise, if the firm invests the same amount or less in marketing, there is evidence that it resembles an involutive undulating cycle. Thus, this research demonstrates selective roots based on the environmental conditions of gains or losses at the supra-personal level, corroborating with the marketing firm theoretical proposal of Foxall (2015).

Broadly speaking, the effects of the dimensions of marketing behavior on the consequent financials in a subsequent year are positive, with the effect of the magnitude of the behavior being greater than that of the other dimensions, especially on market share and Tobin's Q. That is, it is more important for the manager to increase the amount of investment than to worry about the frequency of investment or immediacy. However, an exception should be mentioned for two indicators. Even though to a lesser extent than in the two financial indicators mentioned above, the effect of the frequency of marketing investment on net income margin and return on assets is greater than that of the other dimensions of marketing behavior. Thus, it is more important to generate some investment peaks per year than to raise the amount of investment in order to increase these two ratios. In addition, when evaluating the effectiveness of marketing expenditures, the denominator (revenue or assets) of the financial indicator does not appear to be relevant, but rather its numerator, such as revenue, market value, and profitability (Banerjee et al., 2015; Clain et al. , 2016; Curry et al., 2016; Edeling & Fischer, 2016; Fayed & Dubey, 2016; Katsikeas et al., 2016).

Furthermore, even when controlling firm, sector, and time variables, the statistically significant relationships of marketing behavior are positive in all indicators of financial outcome, even if they are low ($LgB < 1$), thus remunerating the shareholders or owners (Edwards & Fischer, 2016; Feng et al., 2015; Shah, et al., 2017). This means that the product of the interlocking marketing effort has positive financial consequences for the company. An exception occurs in the effect of free cash flow, for which we did not find a significant

relationship. That is to say, marketing generates value appropriation, but it does not leave money for the next fiscal year (free cash flow). Nevertheless, the allocation of financial resources in marketing can be managed to plan the amount to be spent, the frequency of its contribution, and the time of its implementation (Larcker & Tayan, 2015; Reilly et al., 2016).

In turn, we found that the financial outcomes act as reinforcers of marketing behavior, which corroborates the use and principles of the Generalized Matching Law (Baum, 1974; Davison & McCarthy, 2016; Sutton et al., 2008). Thus, the amount of marketing investment in relation to the amount of investments in non-marketing activities is positively influenced by the financial reinforcers in each company. However, although this influence is significant for the panel of companies over the period from 2000 to 2017, it is not strong. In other words, undermatching effects were found: a high degree of financial reinforcements, whatever they are, is needed to increase marketing investments in the subsequent year. Finding an undermatching relationship means that the company needs to get a very high value so that the marketing behavior occurs at some minimal level. This is the first empirical research to demonstrate effects that emerge from considerations of matching to explain firm-level investment choice behavior based on financial reinforcers (Poling et al., 2011).

Specifically, it should be noted that the delay (immediacy) dimension of Tobin's Q and levered free cash flow margin exerted a greater influence on marketing behavior. The delay and magnitude dimensions of the net income margin reinforcer exerted the same influence on this behavior; the frequency dimension of the market share reinforcer was the main influencer on it; and the magnitude dimension of the return on assets reinforcer was the main influencer on it. Therefore, we did not find a pattern of influencing dimensions nor a pattern of reinforcer quality, contradicting generalizations based on laboratory research (Grace, 1999; Todorov, 1973) for this research context. Rather, the result favors using multiple metrics to measure marketing effectiveness (Ambler & Roberts, 2008).

But even so, due to the (total) strength of the influence, market share and Tobin's Q were slightly more influential than the other financial indicators in the choice of marketing investments, which is not surprising, since many companies decide the amount of these investments for the following year based on the appropriate value by shareholders (Tobin's Q) and also due to market share in previous years (Banerjee et al., 2015; Farris & West, 2007). So in this sense, our result signals that the relationship may be stronger than that detected by Joseph and Richardson (2002) with another indicator.

Still considering the total force of influence, the delay dimension of the reinforcer was the main predictor of the choice to invest in marketing. This means that the earlier the company obtains the reinforcer, especially Tobin's Q and free cash flow margin, the greater the marketing investment in the subsequent year will be. This is because the sooner the company obtains financial reinforcers, the easier it can manage surplus value to reinvest in the subsequent year (Currim et al., 2016; Fayed & Dubey, 2016; Joseph & Richardson, 2002). It is fundamental for the manager to generate fast reinforcers for the company to justify greater marketing investments. If the manager finds that the financial consequences are due to previous marketing activities implemented toward consumers (Foxall, 2015), then he or she can re-allocate more money for subsequent marketing.

The variance explained is high for each generalized matching equation statistical model, which shows good adjustments to the data, but this is partly due to the fact that there are few cases for each company in this longitudinal study. Thus, for a given firm with a t-1 lag in the independent variables, there can be a maximum of 16 points to compose a line and this facilitates adjustment. Even after inserting more dimensions into the GML applied to the marketing-finance interface and control variables, the bias [constant - Reed & Kaplan, (2011)] is still negatively high. This suggests that in addition to companies spending more on

non-marketing than on marketing, there are other uninvestigated variables that influence investments in these activities.

Research in this area, however applied to advertising (Farris & West, 2007), has shown that budgeting methods are either arbitrary or rule of thumb based, such as matching competition or sales percentages from the previous year. There are some modern techniques in digital media to pay for advertising based on result (cost per conversion - Bucklin & Hoban 2017). The present research is in favor of this proposal, but at an aggregate level (for the company as a whole and for all marketing investments, including advertising). Even so, there are other predictors of the effectiveness of marketing investments. Therefore, studies that point to predictors of reinvestments in marketing are still scarce and this remains an open field of research. The present research suggests that they can be based on the elasticity of traditional financial indicators, since they are predictors, but which receive other influences.

Hence, in demonstrating this reinforcing effect on the firm's choice, it is revealed to what degree (low) corporate financial consequences select the aggregate marketing product (Borba et al., 2017, Ludwig, 2017, Marques & Tourinho, 2015). This research thus demonstrates cycles that sustain marketing spending on corporate financial performance through an Operant Behavioral Economic approach (Foxall, 2016).

However, some limitations may hinder generalizations. The research used samples of only large publicly traded companies and in only two countries. In this sense, future research could investigate the same relationships in other countries or even with smaller companies that are absent from stock exchanges. The result of research with small firms can enrich the findings by demonstrating that the metacontingency phenomenon occurs even with a small group of marketers who engage in marketing to increase profits. That is, it could compare if the marketing products of a large firm generate greater financial consequences than in a small firm or the differences due to the size of the firm. In addition, future research can ascertain

the externalities generated from marketing investments, not just those reflected in economic exchanges.

Another limitation relates to the calculation of financial indicators. Although we adopted the accepted financial accounting conventions that best represent these metrics, they do not accurately represent the original proposals derived from the GML, coming from laboratory studies. But this study proposed using them to better characterize the real environment about firms' financial reinforcements. Adaptations of the laboratory environment to the real environment (business market) were necessary and are common in the area (Rutherford, 2009), including the formula for capturing the variables that make up the matching law (Oliveira-Castro, Foxall, & Wells, 2010). By according them a behavioral interpretation we legitimized their inclusion in the study. This was partly because, at the firm level, the financial indicators are aggregated and do not allow a calculation derived exclusively from a specific activity. Hence, we employed statistical methods in part to aid interpretation.

A third limitation refers to the time horizon (in just one year later) of the investigation of the financial consequences. Frequent increases in marketing investments can have permanent effects or move the financial indicators to another level. Therefore, future research could ascertain the dynamic effects of marketing impulse response function on the financial indicators, and also how much they generate impulses in marketing investments using a behavioral interpretation.

Managerial implications

The results of the research show that the amount of marketing investment has generated financial results, mainly on the market share and Tobin's Q, but the financial gains partially feedback the investments in the subsequent year. Thus, despite the existence of a

cycle (marketing investment → financial consequences → marketing investment), it does not occur in the same proportion, which would require the company to finance the new marketing investments externally. Thus, marketing is effective in generating financial gains, but it is not a sustainable activity, requiring managers to inject more money to do more marketing.

In addition, the earlier the company makes financial gains, the greater the subsequent investment. This means that the company that generates quick gain can maintain the level of marketing investment subsequently. This is possible because the marketing effect becomes clearer in the financial gains and then the company bets on doing more marketing to generate new gains. Overall, the results help business managers know the effectiveness of marketing efforts.

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