BBR
BRAZILIAN BUSINESS REVIEW

ARTICLE

The Effects of Business Strategy and Product Market Competition on Real Earnings Management

Luiza Dazzi Braga[1]
luiza.dazzi@gmail.com | 0000-0002-1856-0220

Luiz Cláudio Louzada[2]
louzadalvi@gmail.com | 0000-0002-2626-8203

Carolina Magda da Silva Roma[3]
carolina.magda.adm@gmail.com | 0000-0003-1156-7558

ABSTRACT

This research investigated the singular and combined effects of firm-level business strategy (BS) and industry-level market competition (MC) on real activities-based earnings management (REM). A composite strategy score based on Miles and Snow's framework was used to empirically assess BS, while MC was measured through three distinct metrics, and REM was calculated based on Roychowdhury's (2006) models of abnormal level of production, sales, and discretionary expenditures. Archival data from United Stated (U.S.) non-financial public listed firms in the period 1987-2020 was analyzed using Ordinary Least Squares (OLS) regressions, controlled for industry and year fixed effects. Findings suggested that firms following an innovation-oriented prospector strategy are associated with lower levels of REM than firms following an efficiency-oriented defender strategy. While MC alone did not have a significant effect on REM, the combined effect of BS and MC reveals that prospectors in more competitive markets engage less in REM activities, which confirms the relevance of competition in the relationship between BS and REM. This research contributes to earnings management literature by documenting that REM practices are affected not only by internal choices of resource allocation in accordance with a business strategy, but also by exogenous determinants of market competition.

KEYWORDS

Real earnings management; business strategy; market competition.

[1]Escola de Administração de Empresas de São Paulo (FGV EAESP), São Paulo, SP, Brasil

[2]Universidade Federal do Espírito Santo (UFES), Vitoria, ES, Brasil

[3]Universidade Federal do Rio Grande (FURG), Rio Grande, RS, Brasil

Received: 03/14/2022.
Revised: 07/27/2022.
Accepted: 09/15/2022.
Published: 08/01/2023.
DOI: https://doi.org/10.15728/bbr.2022.1254.en

1. INTRODUCTION

This study investigates the effects of firm-level business strategy (BS) and product market competition (MC) on real earnings management (REM). Agency theory postulates the conflict between principals and agents due to informational asymmetry and contract failure (Jensen & Meckling, 1976). In this context, earnings management refers to the managerial use of judgment in structuring financial reports and transactions to manipulate reported outcomes. It can occur in two forms: based on the accounting measurement system (accruals), or through real activities, which is harder to be detected, but costly, as it decreases firm value over the long-term (Roychowdhury, 2006). This study focuses on the latter, as it involves the manipulation of important operational activities for BS, as reducing sales, general, and administrative (SG&A) expenses, rising price discounts, or overproducing inventory items. Thus, it violates the best business practices, while compromises firms' strategic positioning and future performance (Gunny, 2010; Wu et al., 2015).

BS is an important component of organizational structure and processes (Miles & Snow, 1978, 2003), influencing operational decisions and internal governance mechanisms, such as executive compensation systems (Balsam et al., 2011), and affecting the overall environment of disclosure information (Bentley-Goode et al., 2017). Several typologies of BS exist in management literature describing how companies compete in their respective markets (Bentley et al., 2013). Two consolidated and compatible approaches are Miles and Snow (1978, 2003) and Porter (1980). Consistent with prior research (e.g. Bentley-Goode et al., 2017; Habib & Hasan, 2017, 2018), this study relies on Miles and Snow's (1978, 2003) typology: innovation-oriented prospectors and efficiency-oriented defenders. These strategies are considered the two ends of a BS continuum, while the middle is formed by analyzers – firms pursuing attributes from both strategies.

On the one side, prospectors tend to rapidly and continuously change their product market mix, and to invest heavily in innovation through research and development (R&D) and in brand-building marketing strategies. On the other side, defenders rarely adjust their product and market portfolios, focusing on production efficiency in a stable product mix. Nonetheless, firms following a BS must deal with the cost of disclosing certain key information (Verrecchia, 1983), thus information can be withheld to protect a firm advantage in its chosen strategy (Bentley-Goode et al., 2017). Therefore, prospectors are more selective when disclosing information about investments in R&D activities, while defenders are more selective in disclosing information regarding investments in technologies that contribute to operational efficiency. Given the different complexities associated with each BS, it is reasonable to argue that strategy-level decisions may influence the management's engagement in REM.

Moreover, competitive pressures also affects managerial decision-making, influencing internal procedures and operational decisions, including the management of earnings (Datta et al., 2013). Even though the effects of product market competition on REM has already been explored in prior literature (e.g. Balakrishnan & Cohen, 2013; Markarian & Santaló, 2014; Shi et al., 2018), theoretical arguments and empirical results point out two directions. On the other hand, high competition is found to be a driver for efficient markets, reducing the likeliness of firms to engage in earnings management as more information are available in these environments, while, on the other hand, high competition is also found to be as a driver for these practices, as it exerts additional pressures on managers to achieve target results (El Diri et al., 2020).

Few studies investigated the association between firms' BS, environmental characteristics, and earnings management together. For instance, Houqe et al. (2013) provides evidence of the link between BS, economic growth, and accrual earnings management (AEM). Relying on a sample of U.S. listed firms and on Miles and Snow (1978, 2003) strategy typology, they found that defenders exhibit higher levels of AEM, though, in high-growth periods, firms exhibit lesser AEM. Moreover, the study of Wu et al. (2015) explored the relationships among Porter's (1980) BS typology, MC, and REM in the Chinese context. Their findings indicate that cost leaders (differentiators) are positively (negatively) associated with REM. Further, the moderator effect of MC was found insignificant for differentiators, while for cost leaders operating in highly competitive markets the engagement in REM is increased. More recently, Widuri and Sutanto (2018) examined the relationships between differentiation strategy, MC, and REM in Indonesia, and results confirmed that differentiators engage less in REM, while in more competitive environments differentiators engage even less in REM.

Thus, as important elements of firms' financial performance and its environment, both BS and industry aspects have been previously associated with earnings management. However, research on the joint effect of these concepts is still incipient. So, this study aims to explore the single and combined effect of both BS and MC on REM by applying different measures than prior literature in a country context also distinct. Therefore, it is proposed the following research question: how does BS and MC affect the level of firms' REM activities?

To give an answer, a sample of U.S. non-financial listed firms for the period of 1987 to 2020 was examined. Following Roychowdhury (2006), engagement in REM activities was captured by calculating abnormal values from production costs, operational cash flows, and discretionary expenditures. BS was calculated using a composite discrete measure based on Miles and Snow's (1978, 2003) framework (Bentley et al., 2013; Habib & Hasan, 2017, 2018), while MC was measured at industry-level using three metrics, namely Herfindahl–Hirschman Index (HHI), Concentration ratio (CR4) and Hall-Tideman Index (HTI) (El Diri et al., 2020). Also, additional measures were used to test the robustness of the results.

This study brings at least three contributions to the literature on earnings management, BS, and MC. First, the results support that BS is a determinant of REM engagement, with each BS leading to different levels of REM. Also, findings indicate that high competition creates a hostile environment where firms engage more in REM. Besides, the existence of a combined effect of BS and MC on REM is confirmed, in which the different effects of BS on REM are intensified according the level of market competition. Second, in constrat to previous literature, this research unit of analysis is U.S. listed firms, which brings evidence from a Western perspective of a traditional market characterized by its high levels of market development and strong legal protection of investors (Chen et al., 2020). Third, compared to prior research, this study uses more robust measures to capture BS with a composite score formed by several indicators of a firm BS, and MC with three distinct measures at industry-level competition.

2. HYPOTHESIS DEVELOPMENT

2.1. Business strategy and real earnings management

Prior literature points out several drivers for the engagement in earnings management, including to raise external financing, to avoid debt covenants restrictions, and to increase managers' job security and compensation (Dechow et al., 1996; Healy & Wahlen, 1999). For instance, Balsam et al. (2011) found that managerial compensation systems differ according to each BS. They identified that operational efficiency-oriented firms are more focused on short-term financial metrics with higher expectations for an increase in sales results, whereas innovation-oriented firms focus on non-financial measures to evaluate performance and place significantly lower weight on accounting measures.

Nevertheless, firms following a prospector strategy have higher agency costs as they face more risk and uncertainty due to the nature of their investments on intangible assets (Banker et al., 2014), leading them to deal more with undesirable financial results and also with a higher level of discretionary (Bentley-Goode et al., 2017). Habib and Hasan (2018) found that prospectors produce less readable narratives than defenders due to their higher information asymmetry and project uncertainty. Also, Bentley et al. (2013) argue that prospectors rely on external funds more than defenders. Thus, while prospectors need to reduce information asymmetry with capital providers, they might incur in avoiding debt covenants via REM.

Nonetheless, uniqueness and products valued by customers, or a strong brand name, enable firms to sustain their superior performance over time, as it is difficult for competitors to imitate such intangible resources (Banker et al., 2014). Also, Datta et al. (2013) argue that product differentiation can lead firms to enjoy a strong pricing power and competitive advantage, thus they are less likely to engage in earnings management to manipulate financial results. Moreover, previous research (e.g. Wu et al., 2015) indicate that innovation-oriented firms are less associated with REM than efficiency-oriented ones. Based on the arguments discussed above, it is proposed the following hypothesis:

- **H1:** Prospectors are negatively associated with REM, whereas defenders are positively associated with this practice.

2.2. Product market competition and real earnings management

To better understand the practice of REM, prior literature indicates that MC is a key determinant. Some studies found that product market competition is a disciplinary mechanism forcing managers to act efficiently and to improve earnings quality (El Diri et al., 2020; Laksmana & Yang, 2014; Marciukaityte & Park, 2009). The research of Laksmana and Yang (2014) gives evidence that both AEM and REM activities are more prevalent among firms in low competitive environments than those in high competition. More recently, El Diri et al. (2020) empirically confirmed that both AEM and REM are greater in concentrated markets, that is, those with low competition.

In contrast, others suggest that such high competition intensifies agency problems and opportunistic behavior (e.g. Datta et al., 2013; Markarian & Santaló, 2014). Markarian and Santaló (2014) found that manipulating earnings by both accrual and real activities is mostly rewarding in highly competitive industries. They argue that competition increases the executive incentive to manipulate earnings since the stock market punishes or rewards in consonance with financial outcomes that indicates a competitive disadvantage/advantage.

There are three channels in which market competition can motivate managers to engage in earnings management activities, according to El Diri et al. (2020): (i) market pricing power, (ii) information disclosure, and (iii) disciplinary effect. First, firms with superior product pricing power engage less in earnings management due to their ability to pass on costs to costumers (Datta et al. 2013). Thus, firms in less (more) competitive environments tend to have less (more) difficulties in protecting their competitive advantages, consequently, they are less (more) motivated to manipulate earnings. The second channel can produce different effects on earnings management. When more companies are competing in a sector, more information is available and is required to reduce capital costs. However, more competition can lead to less companies willing to disclose information due to the threats of competitors and new entrants. Third, the disciplinary channel also causes different effects. As more information circulates in the market, more comparability among firms' performance is possible. However, this dynamic diminishes a firm`s odds of survival, and managers are more exposed to punishment. Thus, to avoid threats that came with high competition, managers can engage in earnings management.

Based on the arguments discussed above, it is proposed the following hypothesis:

- **H2:** Firms in more competitive markets are positively associated with REM, while firms in less competitive markets are negatively associated with REM.

2.3. Business strategy, product market competition and real earnings management

Datta et al. (2013) argument that, for firms with a market pricing power, high market competition stimulates the engagement in earnings management as it is harder to sustain a competitive advantage facing more competitors. However, Widuri and Sutanto (2018) explored the interaction between differentiation strategy and MC on REM, and found that differentiators in more competitive markets are even less associated with REM than in less competitive markets. While, considering both strategies, Wu et al. (2015) showed that the level of opportunistic manipulation by cost leaders increases in high competition. But, for differentiators, the level of earnings management does not change due to differences in market competition. Thus, the third hypothesis is more exploratory and proposes that:

- **H3:** The combined effect of BS and MC exerts influence on REM.

3. METHODOLOGY

3.1. Data and sample

The data used in this research were collected from Thomson Reuters DataStream database of listed firms in U.S. stock markets for a 33 year-period (e.g. Datta et al., 2013; Habib & Hasan, 2018) of 1987-2020. Initially, all industries identified by North American Industry Classification System (NAICS) code (2 digits) were selected. Following previous studies (e.g. El Diri et al., 2020; Habib & Hasan, 2017, 2018), firm year-observations from the regulated (NAICS code 22) and financial institutions (NAICS code 52-53) industries were not included in the final sample due to their unique accounting and financial practices. Also, observations with missing 2-digit NAICS code were eliminated. In line with Datta et al. (2013), firms with both total assets and net sales of less than US$1 million were removed from the database to avoid the effect of small firms. Finally, the continuous variables (REM and control) were winsorized at 1% and 99% levels to reduce the influence of outliers. Table 1 presents the sample procedures in Panel A and the industry distribution in Panel B.

Table 1
Sample selection

Panel A: Sample selection procedure

Description	Observations
Total number of firm-year observations from 1987 to 2020	255,918
Less: regulated industries (22 code) and financial industries (52-53 code) and missing 2-digit NAICS Codes values	(4,771)
Less: Observations without at least $1 million in net sales and total assets	(33,160)
Less: Observations with missing values for dependent and independent variables, including observations lost for estimating lagged variables.	(198,520)
Final sample	19,467

Panel B: Industry distribution

Code	Industry	# Observations	% Observations
72	Accommodation and Food Services	222	1.14%
56	Administrative and Support and Waste Management and Remediation Services	247	1.27%
71	Arts, Entertainment, and Recreation	31	0.16%
23	Construction	176	0.90%
61	Educational Services	61	0.31%
62	Health Care and Social Assistance	160	0.82%
51	Information	1,531	7.86%
31-33	Manufacturing	13,303	68.34%
21	Mining, Quarrying, and Oil and Gas Extraction	413	2.12%
54	Professional, Scientific, and Technical Services	1,735	8.91%
44-45	Retail Trade	1,004	5.16%
48-49	Transportation and Warehousing	177	0.91%
42	Wholesale Trade	407	2.09%
	TOTAL	19,467	100%

Source: Research data

Initially, the sample has 255,918 firm-year observations. Then, after excluding observations for regulated, financial, and missing 2-digit NAICS codes industries, small companies, and missing values of required variables to create dependent and independent proxies, the final sample was constrained to 19,467 firm-year observations and 5,127 unique companies. Due to the estimation of lagged variables for the BS composite score, the final sample period was constrained to 1992 to 2020.

3.2. Variable measurement

3.2.1. Real earnings management

Based on Roychowdhury (2006), an aggregate variable based on three measures was used to proxy REM: the abnormal levels of production, sales, and discretionary expenditures. These were estimated via cross-section regressions, as specified in equations (1)-(3). The abnormal level of productio was assessed through the cost of goods sold (COGS) and changes in inventory. To capture the abnormal level of sales, caused by temporary price discounts or lenient credit terms, cash flows from operations (CFO) were considered, while the abnormal level of discretionary expenditures was measured using R&D and SG&A. Specifically, the following regressions were estimated for each year and two-digit NAICS industry code with at least 15 observations:

$$\frac{PROD_{i,t}}{A_{i,t-1}} = a_0 + a_1\frac{1}{A_{i,t-1}} + a_2\frac{S_{i,t}}{A_{i,t-1}} + a_3\frac{\Delta S_{i,t}}{A_{i,t-1}} + a_4\frac{\Delta S_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

$$\frac{CFO_{i,t}}{A_{i,t-1}} = b_0 + b_1\frac{1}{A_{i,t-1}} + b_2\frac{S_{i,t}}{A_{i,t-1}} + b_3\frac{\Delta S_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (2)$$

$$\frac{DISX_{i,t}}{A_{i,t-1}} = c_0 + c_1\frac{1}{A_{i,t-1}} + c_2\frac{S_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (3)$$

Where $PROD_{i,t}$ is the sum of COGS and change in inventory; $CFO_{i,t}$ is the cash flow from operations; and $DISX_{i,t}$ is the sum of R&D and SG&A expenses for firm i in year t; $A_{i,t-1}$ is the total assets for firm i at the end of year t-1; $S_{i,t}$ is the net sales for firm i in year t; $S_{i,t-1}$ is the net sales of firm i at the end of year t-1; $\Delta S_{i,t}$ is the change in net sales from year t-1 to t, while $\Delta S_{i,t-1}$ is the change in net sales from year t-2 to t-1.

The abnormal level of each activity was estimated as the residual from each regression. For equations 2 and 3 the residuals were multiplied by -1 to generate the abnormal level of sales and discretionary expenditures. In this sense, high values of all three variables indicate more engagement in real earnings management to enhance profits. Finally, an aggregate measure was formed by the sum of the three REM variables, with high values indicating intense engagement in income-increasing REM (Shi et al., 2018).

3.2.2. Business strategy composite measure

By using financial archival data, this study measured firm's realized strategy rather than their intended one (David et al., 2002; Mintzberg, 1987). The intended strategy is the conception of strategy based on a statement of intent, whilst realized strategy is related to a pattern of actions in a stream of decisions which is found by objective indicators such as archival data (Snow & Hambrick, 1980). Thus, following Bentley et al. (2013), a discrete strategy composite score was applied to measure firms' BS. Including variables from Ittner et al. (1997), this strategy composite score is based on the Miles and Snow`s (1978, 2003) framework, and it has been consistently employed by prior researchers (Bentley-Goode et al., 2017; Chen et al., 2017; Habib & Hasan, 2017, 2018). Table 2 presents variable descriptions and measurements, and the procedures for calculating the BS composite measure used in this study are detailed in Appendix I.

Table 2
Business strategy composite measure

Variable	Description	Variable measurement
(1) Research and development to sales (RDS5)	Company's propensity to seek for new products.	Average of research and development expenditures to net sales over the prior five years.
(2) Employees to sales (EMPS5)	Company's ability to produce and distribute products and services efficiently.	Average of the number of employees to net sales over the prior five years.
(3) Employee fluctuations (σ(EMP5))	Company's organizational stability.	Standard deviation of the total number of employees [EMP] over the prior five years.
(4) Change in total revenue (REV5)	Company's historical growth or investment opportunities.	Average of one-year percentage change in net sales over the prior five years.
(5) Marketing to sales (SGA5)	Company's focus on marketing investments.	Average of selling, general and administrative expenses to net sales over the prior five years.
(6) Capital intensity (CAP5)	Company's commitment to technological efficiency and production.	Average of net property, plant and equipment scaled by total assets over the prior five years.

Note: Each variable is measured per firm-year based on the rolling prior five-year average, except the variable σ(EMP5) that considers the standard deviation of the number of employees over the prior five years. In sequence, each of these average variables is ranked into quintiles per industry (two-digit NAICS code) and year. The observations in the highest quintiles are given a score of 5, while the ones in the lowest quintiles are given a score of 1 (except capital intensity which is reversed-scored, meaning that observations in the lowest (highest) quintile are given a score of 5 (1)). Within each firm-year, the scores are summed over the six measures, such that the maximum score that a firm could receive is 30 (prospector-type) and a minimum score of 6 (defender-type). Therefore, the discrete STRATEGY score ranges along a continuum in value from 6 to 30 with defender- and prospector-type companies closer to the endpoints (Bentley et al., 2013).
Source: Research data

3.2.3. Market competition

Herfindahl–Hirschman Index (HHI) – Frequently used in prior literature (Datta et al., 2013; Marciukaityte & Park, 2009; Markarian & Santaló, 2014; Shi et al., 2018; Wu et al., 2015), the Herfindahl–Hirschman Index (HHI) is a consolidated indicator of product market competition. HHI reflects market concentration, in which lower values are closer to a monopoly representing higher market competition.

Concentration ratio (CR4) – Concentration ratio is the second measure for market competition used in this research. CR4 also captures the level of concentration, however it reflects high competition even in concentrated markets (El Diri et al., 2020). CR4 considers only the four firms with the largest market share in each industry. Nevertheless, the interpretation is the same as for HHI, and lower values mean highly competitive markets.

Hall Tideman Index (HTI) – HTI measures the variation of product substitutability, considering the absolute number of firms and their relative sizes, thus, reflecting the entry barriers of an industry (El Diri et al., 2020; Hall & Tideman, 1967). HTI includes the ranks of all firms in a particular industry based on their market share. Like the other two proxies, higher values of HTI indicate that a industry is less competitive. All three variables were multiplied by -1 to facilitate the interpretation of results and were calculated according to Appendix I.

3.3. Empirical Models

The empirical models estimated to investigate the research hypothesis are presented in equations 4, 5, and 6. Ordinary least squares (OLS) regression were performed to test all the empirical models, including industry fixed effects to control for industry-wide common factors, and year fixed effects to control for cross-sectional effects. All regressions are based on standard errors adjusted at firm level (Petersen, 2009).

To test the first hypothesis, the current period REM was regressed on strategy and the control variables in the current period, as follows:

$$\begin{aligned} \mathrm{REM}_{i,t} = {} & \beta_0 + \beta_1 STRATEGY_{i,t} + \beta_2\, \mathrm{ROA}_{i,t} + \beta_3\, \mathrm{LEV}_{i,t} + \beta_4 \mathrm{SIZE}_{i,t} + \beta_5 \mathrm{GROWTH}_{i,t} \\ & + \mathrm{IndustryDummy}_{i,t} + \mathrm{YearDummy}_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{4}$$

Where $\mathrm{REM}_{i,t}$ is the level of REM for firm *i* in year *t*, proxied by the sum of APROD, ACFO, and ADISX, following equations 1-3 above. $\mathrm{STRATEGY}_{i,t}$ is the composite score (continuous), for firm *i* in year *t*, ranging from a minimum of 6 to a maximum of 30 following the procedures explained in 3.2.2. All models include dummies for industry and year, and control variables consistent with prior literature (Datta et al., 2013; Habib & Hasan, 2017; Wu et al., 2015), namely: return of assets (ROA), leverage ratio (LEV), size (SIZE), and growth (GROWTH). The variables definitions are summarized in Appendix I.

$$\begin{aligned} \mathrm{REM}_{i,t} = {} & \beta_0 + \beta_1 \mathrm{STRATEGY}_{i,t} + \beta_2 \mathrm{MC}_{i,t} + \beta_3 \mathrm{ROA}_{i,t} + \beta_4\, \mathrm{LEV}_{i,t} + \beta_5 \mathrm{SIZE}_{i,t} + \beta_6 \mathrm{GROWTH}_{i,t} \\ & + \mathrm{IndustryDummy}_{i,t} + \mathrm{YearDummy}_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{5}$$

Next, equation 5 exhibits the model designed to test the second hypothesis, which regards to the relationship between REM and MC. Market competition is measured using three different indexes, namely HHI, CR4, and HTI, as detailed in 3.2.3. Three regression models were performed, one for each MC proxy. The STRATEGY composite was included in these models to control for its effect.

$$\begin{aligned} \mathrm{REM}_{i,t} = {} & \beta_0 + \beta_1 STRATEGY_{i,t} + \beta_2\, \mathrm{MC}_{i,t} + \beta_3\, STRATEGY_{i,t} * \mathrm{MC}_{i,t} + \beta_4\, \mathrm{ROA}_{i,t} + \beta_5\, \mathrm{LEV}_{i,t} \\ & + \beta_6 \mathrm{SIZE}_{i,t} + \beta_6 \mathrm{GROWTH}_{i,t} + \mathrm{IndustryDummy}_{i,t} + \mathrm{YearDummy}_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{6}$$

Finally, the combined effect of firm's BS and MC on REM is tested through the model exhibited in equation 6, as stated in hypothesis 3. As for the previous models, three different regression models were investigated with each market competition proxy interacting with the STRATEGY score.

4. RESULTS AND DISCUSSION

4.1. Summary statistics

Descriptive statistics of the variables used in the primary analysis are reported in panel A of Table 3. The dependent variable REM presented mean and median values of -0.052 and 0.004, respectively, indicating that, on average, the sample firms engage in low values of REM.

Table 3
Summary statistics

Panel A: Descriptive statistics

Variables	Full sample (n = 19.467)					Prospectors (STRATEGY range of 24-30) (n = 1.444)		Defenders (STRATEGY range of 6-12) (n = 1.756)	
	Mean	Median	1st Quartile	3rd Quartile	Std. Dev.	Mean	Median	Mean	Median
REM	-0.052	0.004	-0.289	0.243	0.466	-0.326	-0.251	0.275	0.298
STRATEGY	17.750	18.000	15.000	21.000	3.904	25.046	25.000	10.886	11.000
HHI	-0.051	-0.026	-0.074	-0.020	0.054	-0.046	-0.026	-0.049	-0.026
CR4	-0.042	-0.020	-0.060	-0.012	0.054	-0.037	-0.020	-0.040	-0.019
HTI	-0.022	-0.009	-0.034	-0.007	0.023	-0.020	-0.009	-0.022	-0.009
ROA	-0.006	0.047	-0.012	0.089	0.216	-0.166	-0.045	0.019	0.045
LEV	0.501	0.483	0.300	0.638	0.298	0.462	0.406	0.564	0.522
SIZE	13.252	13.314	11.706	14.830	2.283	12.703	12.611	13.375	13.291
GROWTH	0.086	0.063	-0.028	0.166	0.270	0.265	0.178	0.023	0.023

Panel B: Correlation analysis

	1	2	3	4	5	6	7	8	9
1 REM	1.00								
2 STRATEGY	***-0.382***	1.00							
3 HHI	0.004	***0.036***	1.00						
4 CR4	0.005	***0.034***	***0.998***	1.00					
5 HTI	-0.010	***0.057***	***0.895***	***0.876***	1.00				
6 ROA	***-0.063***	***-0.211***	***0.047***	***0.047***	*0.014*	1.00			
7 LEV	***0.107***	***-0.142***	***-0.049***	***-0.045***	***-0.057***	***-0.256***	1.00		
8 SIZE	***0.106***	***-0.078***	***0.062***	***0.062***	***0.041***	***0.378***	***0.151***	1.00	
9 GROWTH	***-0.155***	***0.215***	***-0.043***	***-0.043***	***-0.034***	***0.143***	***-0.061***	***0.038***	1.00

Note. The continuous variables REM, ROA, LEV, SIZE and GROWTH were winsorized at 1% and 99% levels to reduce the influence of outliers. Bold and italics variables are significant at $p < 0.01$, bold only variables are significant at $p < 0.05$, and italics for variables significant at $p < 0.1$.
Source: Research data

The mean and median values of STRATEGY score are 17.75 and 18, respectively, which is in consonance with Habib and Hasan (2017, 2018) and indicate that, on average, the firms studied are not clearly positioned strategically. The values of MC variables are comparable with Markarian and Santaló's (2014). The mean values of HHI (-0.051), CR4 (-0.042), and HTI (-0.022) indicate that MC in the industries analyzed is, in general, high, as values range from 0 and -1 and higher values of these variables indicate more competition within an industry.

In addition, firms were classified in accordance with their STRATEGY score. Thus, a sample with prospectors was formed by firms with scores ranging from 24 to 30 (the maximum), whereas, there was a sample of firms with scores ranging from 6 (the minimum) to 12 for defenders (Bentley et al., 2013; Habib & Hasan, 2018). Prospectors represent 7.41% of the full sample, and defenders represent 9.02% of it. The mean value of STRATEGY for the prospector group was 25.046, while for the defender group the mean was 10.889, which is similar to Bentley-Goode et al. (2017) and Bentley et al. (2013). Moreover, for prospectors, the mean value of REM was -0.326, while for defenders, it was 0.275, which indicates initial evidences that the former engages in earnings management less than the latter.

Panel B of Table 3 exhibits the Pearson correlation of the variables used in the final analyses. The correlation analysis indicates that REM is negative and significative correlated with STRATEGY, giving an initial picture that firms pursuing a prospector strategy engage less in REM than firms following a defender strategy. In contrast, the correlation between REM and HHI, CR4, and HTI are not significant, which might be an indicative that MC is not directly associated with REM.

4.2. Main results

Table 4 presents the principal regression results. Model 1 exhibits the findings related to the association between BS and REM. The results show that the coefficient of STRATEGY is negative and significant (coefficient of -0.050, significant at $p < 0.01$), which confirms H1. High scores of STRATEGY represent firms pursing a prospector strategy, while low scores indicate defender strategy. In this sense, this result supports the research hypothesis H1, as it suggests that firms following an innovation-oriented strategy are less likely to engage in REM, whereas firms following an efficiency-oriented strategy are more likely to engage in this practice. That is, as more a firm pursues a prospector strategy, less levels of REM it presents.

Models 2 to 4 (Table 4) show the results of the regression models that tested the relationship between the MC variables and REM. The coefficients HHI (coefficient of -0.104), CR4 (coefficient of -0.103), and HTI (coefficient of -0.065) were not found to be significant. Thus, it does not confirm the research hypothesis H2, that the level of MC is associated with REM. Further, the coefficient of STRATEGY is also negative and significant (coefficient of -0.050, significant at $p < 0.01$), which also confirms H1.

The outputs of models 5 to 7 (Table 4) show that the coefficient of the interaction between STRATEGY and MC – proxied by HHI (coefficient of -0.399, significant at $p < 0.01$), CR4 (coefficient of -0.413, significant at $p < 0.01$), and HTI (coefficient of -0.740, significant at $p < 0.01$) – are negative and significant. Supporting H3, these results confirm the statistical significance of a moderated effect of MC on the relationship between STRATEGY and REM. Specifically, it can be inferred that firms with higher scores of STRATEGY operating in markets with high competition engage less in REM. In this sense, MC can affect the relationship between STRATEGY and REM.

Table 4
Business strategy and market competition models results

	Dependent variable: Real Earnings Management						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
STRATEGY	-0.050***	-0.050***	-0.050***	-0.050***	-0.212***	-0.209***	-0.209***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.011)	(0.010)	(0.011)
HHI		-0.104			-0.149		
		(0.259)			(0.268)		
CR4			-0.103			-0.150	
			(0.251)			(0.260)	
HTI				-0.065			-0.203
				(0.820)			(0.842)
STRATEGY*HHI					-0.399***		
					(0.141)		
STRATEGY*CR4						-0.413***	
						(0.142)	
STRATEGY*HTI							-0.740***
							(0.347)
SIZE	0.034***	0.034***	0.034***	0.034***	0.034***	0.034***	0.034***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
LEV	-0.053	-0.053	-0.053	-0.053	-0.055	-0.054	-0.055
	(0.037)	(0. 037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)
ROA	-0.502***	-0.503***	-0.503***	-0.502***	-0.502***	-0.501***	-0.504***
	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
GROWTH	-0.067***	-0.067***	-0.067***	-0.067***	-0.069***	-0.069***	-0.067***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,467	19,467	19,467	19,467	19,467	19,467	19,467
Adjusted R2	0.206	0.206	0.206	0.206	0.208	0.208	0.207

Note. All variables are described in Appendix I. REM and control variables were winsorized at 1% and 99% levels to reduce the influence of extreme values. FE regards to fixed effects of industry and year. To control for multicollinearity, STRATEGY was centered around the mean for the interaction models, and all VIF values were below 10. ***p<0.01; **p<0.05; *p<0.1.
Source: Research data

In summary, the results evidence that, when considering only STRATEGY, firms with high STRATEGY score are less prone to engage in REM practices than firms with low STRATEGY score. Also, prior research has found innovation-oriented strategy firms to be associated with low values of REM (Widuri & Sutanto, 2018; Wu et al., 2015), whereas cost efficient-oriented strategy firms were found associated with higher values of REM (Wu et al., 2015). These results are in line with the idea that efficiency-oriented firms have greater incentives to engage in earnings management, while prospectors have less motivation to engage in the management of real activities. As defenders tend to focus more on the short term and, also, are more prone to imitation and obsolescence of their processes and resources for operational efficiency, they may engage in higher levels of REM.

Furthermore, when considering the combined effect of BS and MC, the findings reveal that the level of market competition affects the effect of STRATEGY on REM, with negative net effect. These results are partially in line with prior research findings, as Wu et al. (2015) found a positive relationship between efficiency-oriented cost leaders and REM in more competitive markets. However, Wu et al. (2015) found an insignificant effect of MC on the relationship between innovation-oriented firms and REM, whereas Widuri and Sutanto (2018) found that differentiators in highly competitive markets have lower levels of REM.

4.3. Additional analysis

4.3.1. Alternative measure of BS

For additional analyses, an alternative measure of BS was used to test H1 and H3. From the composite measure of BS, firms with STRATEGY score ≥ 24 were classified as PROSPECTORS, and firms with STRATEGY score ≤ 12 were classified as DEFENDERS. Next, a dummy variable was created, in which firm-year observations classified as PROSPECTORS took a value of 1 and zero otherwise (Bentley et al., 2013; Habib & Hasan, 2018). The findings are presented at Table 5 and show that the coefficients of PROSPECTORS are negatively associated with REM, supporting the results of the main analysis for H1. Moreover, the interaction analysis of the alternative measure of BS and each competition measure confirms a negative and significant coefficient for PROSPECTORS. All three models, (2)-(4), confirm MC as an influencer in the relationship between PROSPECTORS and REM. These results are aligned with the main analysis and confirm the research hypothesis H3. Finally, STRATEGY was also replaced by two indicator variables for prospectors and defenders, where analyzers were used as the benchmark. Again, the results supported the findings reported above.

Table 5
Robustness tests – Alternative business strategy measure

Dependent variable: Real Earnings Management				
	(1)	(2)	(3)	(4)
PROSPECTORS	-0.651*** (0.035)	-0.769*** (0.044)	-0.751*** (0.041)	-0.743*** (0.045)
HHI		0.958* (0.534)		
CR4			0.968* (0.527)	
HTI				1.865 (1.562)
PROSPECTORS* HHI		-2.567*** (0.522)		
PROSPECTORS* CR4			-2.675*** (0.523)	
PROSPECTORS* HTI				-4.406*** (1.299)
SIZE	0.030*** (0.008)	0.025*** (0.008)	0.025*** (0.008)	0.027*** (0.008)
LEV	-0.017 (0.048)	-0.016 (0.045)	-0.016 (0.045)	-0.020 (0.047)
ROA	-0.432*** (0.074)	-0.436*** (0.072)	-0.435*** (0.072)	-0.439*** (0.073)
GROWTH	-0.060* (0.031)	-0.068** (0.031)	-0.069** (0.031)	-0.060* (0.031)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3,200	3,200	3,200	3,200
Adjusted R2	0.381	0.393	0.394	0.388

Note. All variables are described in Appendix I. REM and control variables were winsorized at 1% and 99% levels to reduce the influence of extreme values. FE refers to the presence of industry and year fixed effects. To control for multicollinearity, STRATEGY was centered around the mean for the interaction models, and all VIF values were below 10. ***p<0.01; **p<0.05; *p<0.1.
Source: Research data

4.3.2. Alternative measure for earnings management

As firms can engage in both real and accrual earnings management, AEM was tested as a dependent variable for all the three models (see section 3.3) as robustness. Following Kothari et al. (2005), the modified version of Jones' model (Dechow et al., 1995; Jones, 1991) was used to capture discretionary accruals. Table 6 exhibits the results that indicate STRATEGY (coefficient of 0.003, significant at $p < 0.01$) as a determinant of earnings management. However, the singular impact of MC on AEM was found not significant. In turn, the combined effect of STRATEGY and MC on AEM is partially confirmed since only the combined effect of STRATEGY and HTI was found significant (coefficient of 0.112, significant at $p < 0.01$). On the one hand, the findings indicate that prospectors during the high competition are more likely to engage in AEM. On the other hand, it confirms the importance of MC in the relationship between STRATEGY and earnings management in general.

Table 6

Robustness tests - Accrual earnings management, business strategy and marketing competition

	Dependent variable: Accurals Management						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
STRATEGY	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.012*** (0.002)	0.012*** (0.002)	0.013*** (0.002)
HHI		0.044 (0.035)			0.049 (0.035)		
CR4			0.040 (0.034)			0.045 (0.034)	
HTI				0.003 (0.101)			0.039 (0.101)
STRATEGY *HHI					0.036 (0.022)		
STRATEGY *CR4						0.035 (0.022)	
STRATEGY *HTI							0.112*** (0.041)
SIZE	-0.010*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)
LEV	0.039*** (0.008)	0.039*** (0.008)	0.039*** (0.008)	0.039*** (0.008)	0.039*** (0.008)	0.039*** (0.008)	0.039*** (0.008)
ROA	-0.089*** (0.014)	-0.089*** (0.014)	-0.089*** (0.014)	-0.089*** (0.014)	-0.089*** (0.014)	-0.089*** (0.014)	-0.089*** (0.014)
GROWTH	0.044*** (0.007)	0.044*** (0.007)	0.044*** (0.007)	0.044*** (0.007)	0.045*** (0.007)	0.045*** (0.007)	0.044*** (0.007)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,509	20,509	20,509	20,509	20,509	20,509	20,509
Adjusted R2	0.166	0.166	0.166	0.166	0.166	0.166	0.166

Note. All variables are described in Appendix I. The control variables were winsorized at 1% and 99% levels to reduce the influence of extreme values. FE refers to the presence of industry and year fixed effects. To control for multicollinearity, STRATEGY was centered around the mean for the interaction models, and all VIF values were below 10. ***p<0.01; **p<0.05; *p<0.1.

Source: Research data

5. CONCLUSIONS

Little attention has been given on the association between firms' BS, product MC and the engagement in earnings management. However, firms' internal characteristics and environmental aspects are important subjects to understand the drivers for this managerial practice. Thus, this research empirically confirmed that the management of real activities is affected by both the BS that a firm follows, and by the level of competition within its industry.

Relying on a large sample of firms over a 33 years period, this research reveals that even though firms following an innovation-oriented strategy deal with more discretionary, they engage less in REM than firms following an efficiency-oriented strategy. Besides, considering the combined effect of BS and MC, prospectors in highly competitive environments engage less in REM.

The empirical results contribute to both academic and practical understanding of the determinants of earnings management. The search for firm-level and industry-level aspects related to REM, and how their interaction influence on REM occurrence, bring advancements for the fields of accounting, strategy, and economics fields. To understand that prospectors engage in REM less than defenders, and that the level of market competition intensifies these relationships is relevant for the development of theory. Hence, the findings of this research are useful for several stakeholders, as forecast analysts, investors, auditors, regulators, and managers, because it identifies organizational BS and within industry MC as important determinants of real earnings management.

This research is not without its limitations. First, this study relied on Miles and Snow (1973, 2003) BS typology and on the metrics developed by Bentley et al. (2003), that are consolidated in the literature. However, hybrid strategies, as well as additional measures of BS can be aggregated to confirm the findings of this research. Moreover, this study measures the firm's realized strategy. Studying BS, MC, and REM from the point of view of the manager, can bring different perspectives to this discussion. Future research should consider other environmental characteristic beyond MC, such as legal system and investor protection mechanisms, complexity, munificence, and dynamism. Also, a comparison between these relationships in different countries (e.g., emergent and developed markets) and in different firms' contexts (e.g., each firm life cycle) might bring interesting insights about the concepts studied in this research.

REFERENCES

Balakrishnan, K., & Cohen, D. A. (2013). Competition and Financial Accounting Misreporting. *SSRN*, 1–52. https://doi.org/10.2139/ssrn.1927427

Balsam, S., Fernando, G. D., & Tripathy, A. (2011). The impact of firm strategy on performance measures used in executive compensation. *Journal of Business Research*, *64*(2), 187–193. https://doi.org/10.1016/j.jbusres.2010.01.006

Banker, R. D., Mashruwala, R., & Tripathy, A. (2014). Does a differentiation strategy lead to more sustainable financial performance than a cost leadership strategy? *Management Decision*, *52*(5), 872–896. https://doi.org/10.1108/MD-05-2013-0282

Bentley, K. A., Omer, T. C., & Sharp, N. Y. (2013). Business strategy, financial reporting irregularities, and audit effort. *Contemporary Accounting Research*, *30*(2), 780–817. https://doi.org/10.1111/j.1911-3846.2012.01174.x

Bentley-Goode, K. A., Omer, T. C., & Twedt, B. J. (2017). Does Business Strategy Impact a Firm ' s Information Environment ? *Journal of Accounting, Auditing & Finance*, *34*(4), 563-587. https://doi.org/10.1177/0148558X17726893

Chen, C. C. S., Chou, Y.-Y., & Wei, P. (2020). Country factors in earnings management of ADR firms. *Finance Research Letters*, *32*, 101146. https://doi.org/10.1016/j.frl.2019.04.003

Chen, Y., Eshleman, J. D., & Soileau, J. S. (2017). Business strategy and auditor reporting. *Auditing: A Journal of Practice & Theory*, *36*(2), 63–86. https://doi.org/10.2308/ajpt-51574

Cheng, P., Man, P., & Yi, C. H. (2011). The impact of product market competition on earnings quality. *Accounting and Finance*, *53*(1), 137–162. https://doi.org/10.1111/j.1467-629X.2011.00457.x

Datta, S., Iskandar-Datta, M., & Singh, V. (2013). Product market power, industry structure, and corporate earnings management. *Journal of Banking and Finance*, *37*(8), 3273–3285. https://doi.org/10.1016/j.jbankfin.2013.03.012

David, J. S., Hwang, Y., Pei, B. K. W., Reneau, J. H., Smith, J., Yuhchang, D., & Buck, H. (2002). The Performance Effects of Congruence Between Product Competitive Strategies and Purchasing Management Design. *Management Science*, *48*(7), 866-885.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting Earnings Management. *The Accounting Review*, *70*(2), 193–225.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1996). Causes and consequences of earnings manipulations : An analysis of Firms Subjet to Enforcement Actions by the SEC. *Contemporary Accounting Research*, *13*(1), 1–36. https://doi.org/10.1111/j.1911-3846.1996.tb00489.x

El Diri, M., Lambrinoudakis, C., & Alhadab, M. (2020). Corporate governance and earnings management in concentrated markets. *Journal of Business Research*, *108*, 291–306. https://doi.org/10.1016/j.jbusres.2019.11.013

Gunny, K.A. (2010). The Relation Between Earnings Management Using Real Activities Manipulation and Future Performance : Evidence from Meeting Earnings Benchmarks. Contemporary Accounting Research, 27(3), 855–888.

Habib, A., & Hasan, M. M. (2017). Business strategy, overvalued equities, and stock price crash risk. *Research in International Business and Finance*, *39*, 389–405. https://doi.org/10.1016/j.ribaf.2016.09.011

Habib, A., & Hasan, M. M. (2018). Business strategies and annual report readability. *Accounting and Finance*, *60*(3), 2513-2547. https://doi.org/10.1111/acfi.12380

Hall, M., & Tideman, N. (1967). Measures of Concentration. *Journal of the American Statistical Association*, *62*(317), 162–168. https://doi.org/10.1080/01621459.1967.10482897

Healy, P. M., & Wahlen, J. M. (1999). A Review of the Earnings Management Literature and Its Implications for Standard Setting. *Accounting Horizons*, *13*(4), 365–383. https://doi.org/10.2308/acch.1999.13.4.365

Houqe, M. N., Kerr, R., & Monem, R. (2013). *Business Strategy and Earnings Quality*. (Working Paper No. 92). https://www.wgtn.ac.nz/cagtr/working-papers/wp-92.pdf

Ittner, C. D., Larcker, D. F., & Rajan, M. V. (1997). The Choice of Performance Measures in Annual Bonus Contracts. *The Accounting Review*, *72*(2), 231–255.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Jones, J. J. (1991). Earnings Management During Import Relief Investigations. *Journal of Accounting Research*, *29*(2), 193-228. https://doi.org/10.2307/2491047

Karuna, C., Subramanyam, K. R., & Tian, F. (2012). *Industry Product Market Competition and Earnings Management*. (Working Paper).

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics*, *39*(1), 163–197. https://doi.org/10.1016/j.jacceco.2004.11.002

Laksmana, I., & Yang, Y. (2014). Product market competition and earnings management : Evidence from discretionary accruals and real activity manipulation. *Advances in Accounting, Incorporating Advances in International Accounting*, *30*(2), 263-275. https://doi.org/10.1016/j.adiac.2014.09.003

Marciukaityte, D., & Park, J. C. (2009). Market Competition and Earnings Management. *SSRN*, 1–42. https://doi.org/10.2139/ssrn.1361905

Markarian, G., & Santaló, J. (2014). Product Market Competition , Information and Earnings Management. *Journal of Business Finance and Accounting*, *41*(5-6), 572-599. https://doi.org/10.1111/jbfa.12064

Miles, R. E., & Snow, C. C. (1978). *Organizational Strategy, Structure, and Process*. McGraw-Hill.

Miles, R. E., & Snow, C. C. (2003). *Organizational Strategy Structure, and Process*. Standford University Press.

Mintzberg, H. (1987). The Strategy Concept 1: 5 Ps for Strategy. *California Management Review*, *30*(1), 11–24. https://doi.org/10.2307/41165263

Petersen, M. A. (2009). Estimating Standard Errors in Finance Panel Data Sets : Comparing Approaches. *The Review of Financial Studies*, *22*(1), 435–480. https://doi.org/10.1093/rfs/hhn053

Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. The Free Press.

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics*, *42*(3), 335–370. https://doi.org/10.1016/j.jacceco.2006.01.002

Shi, G., Sun, J., & Zhang, L. (2018). Product market competition and earnings management: A firm-level analysis. *Journal of Business Finance and Accounting*, *45*(5–6), 604–624. https://doi.org/10.1111/jbfa.12300

Snow, C. C., & Hambrick, D. C. (1980). Measuring Organizational Strategies: Some Theoretical and Methodological Problems. *Academy of Management Review*, *5*(4), 527–538. https://doi.org/10.5465/amr.1980.4288955

Verrecchia, R. E. (1983). Information quality and discretionary disclosure. *Journal of Accounting and Economics*, *12*(4), 365–380. https://doi.org/10.1016/0165-4101(90)90021-U

Widuri, R., & Sutanto, J. E. (2018). Differentiation Strategy and Market Competition as Determinants of Earnings Management. *Advances in Economics, Business and Management Research*, *69*, 171–176.

Wu, P., Gao, L., & Gu, T. (2015). Business strategy, market competition and earnings management: Evidence from China. *Chinese Management Studies*, *9*(3), 401–424. https://doi.org/10.1108/CMS-12-2014-0225

AUTHOR'S CONTRIBUTION

LB: wrote the paper, collected the data, and performed the analysis; LL: conceived of the presented idea and designed the analysis; CR: contributed data and analysis tools and helped shape de manuscript.

FINANCIAL SUPPORT

This work was carried out with the support of the Coordination for the Improvement of Higher Education Personnel – Brazil (CAPES) – Financing Code 001.

CONFLICTS OF INTEREST

On behalf of all authors, the corresponding author states that there is no conflict of interest.

APPENDIX I

Variable Definitions

Dimension	Variable	Definition
Dependent variable	Real earnings management	The value of real earnings management was calculated by the sum of APROD, ACFO, and ADISX: where APROD is the level of abnormal production costs, ACFO is the level of abnormal cash flows from operations, and ADISX is the level of abnormal discretionary expenses. ACFO and ADISX were multipled by -1.
Independent variables	STRATEGY	Each variable presented at Table 2 was measured per firm-year based on the rolling prior five-year average, except the variable σ(EMP5) that considers the standard deviation of the number of employees over the prior five years. In sequence, each of the six variables was ranked into quintiles per industry (two-digit NAICS code) and year. The observations in the highest quintiles were given a score of 5, while the ones in the lowest quintiles were given a score of 1 (except capital intensity which was reversed-scored, meaning that observations in the lowest (highest) quintile were given a score of 5 (1)). Within each firm-year, the scores were summed over the six measures, such that the maximum score that a firm could receive is 30 (prospector-type) and a minimum score of 6 (defender-type). Therefore, the discrete STRATEGY score ranges along a continuum in value from 6 to 30 with defender- and prospector-type companies closer to the endpoints
	HHI	The HHI was calculated as $HHI = \sum_{i=1}^{N} \omega^2$, where ω is market share for firm i measured by its sales divided by total industry sales, and N is the number of firms per year-industry.
	CR4	The concentration ratio was calculated as $CR4 = \sum_{i=1}^{N=4} \omega^2$, only the largest four firms in the industry were considered.
	HTI	Hall Tideman index (HTI) was calculated as $HTI = 1/(2\sum_{i=1}^{N}(k * \omega) - 1)$, where k represents firm rank according to market share.
	ROA	The return on assets was calculate through the ratio of net income before extraordinary items of year t to total assets of year t.
Control variables	LEV	Leverage was calculated through the ratio of total liabilities of year t to total assets of year t.
	SIZE	Firm size was calculated by the natural logarithm of total assets of year t.
	GROWTH	Growth was calculated by dividing the difference between net sales of period t and net sales of t-1 by the net sales of t-1.

Source: Research data