FUNDAÇÃO INSTITUTO CAPIXABA DE PESQUISAS EM CONTABILIDADE, ECONOMIA E FINANÇAS

POLIANO BASTOS DA CRUZ

ESSAYS ON BUSINESS MANAGEMENT

VITÓRIA
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Tese apresentada ao Programa de Doutorado em Ciências Contábeis e Administração de Empresas, da Fundação Instituto Capixaba de Pesquisas em Contabilidade, Economia e Finanças (FUCAPE), como requisito parcial para obtenção do título de Doutor em Ciências Contábeis e Administração de Empresas.

Orientador: Prof. Ph.D. Arilton C. C. Teixeira

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Ao Senhor Jesus e a minha mãe.
To the Lord Jesus and my mom.

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RESUMO

Nesses ensaios, foram abordados três fenômenos distintos que afetam a performance financeira das firmas e que necessitam de mais evidências empíricas que suportem seus efeitos, são eles, o papel do conselho de administração no desempenho das empresas, o efeito da gestão de atividades da cadeia de suprimentos na lucratividade das firmas e se as práticas de gerenciamento de resultados por meio de suavização da receita são verificadas no longo prazo. Nos primeiros tópicos mensurou-se diretamente o impacto do conselho de administração e da gestão de cadeia de suprimentos na performance da firma, medida pelo ROA. No último, forma encontradas algumas evidências empíricas acerca das práticas de gerenciamento de resultados (medidas por suavização de receita) no longo prazo. No geral, os resultados indicam que tanto a composição do conselho de administração quanto a independência dos comitês que o compõe mediam a relação entre a independência do conselho e a performance financeira da firma de forma que os custos de agência derivados de uma composição do conselho focada em prover serviços mitigam o efeito positivo de um conselho independente. Já a independência dos comitês, por sua vez, eleva esse efeito positivo. Também encontrou-se evidências de que as estratégias de gestão de cadeia de suprimentos impactam na lucratividade da empresa e que a lucratividade da empresa impacta nessas estratégias. Especificamente, se uma cadeia de suprimentos escolhe uma estratégia *lean*, como no caso da P&G, então métricas *lean* irão Granger-causar o ROA. De modo complementar, se uma cadeia de suprimentos escolhe uma estratégia *agile*, como no caso da Walmart, então métricas *agile* irão Granger-causar o ROA. Por fim. Os resultados fornecem algum suporte de que as práticas de gerenciamento de resultados não são empregadas no longo prazo. Os testes de cointegração mostraram que o desvio-padrão das receitas não operacionais seguem o mesmo movimento no tempo que as séries de receita bruta e do desvio-padrão do fluxo de caixa operacional. Encontrou-se ainda que o valor absoluto dos accruals totais segue o mesmo padrão no tempo que a receita bruta e o valor absoluto do

fluxo de caixa operacional. Por fim, verificou-se que o desvio-padrão da receita líquida segue o mesmo padrão temporal da receita bruta.

Palavras-chave: performance das empresas; conselho de administração; estratégias de gestão de cadeia de suprimentos; gerenciamento de resultados; suavização de receita.

ABSTRACT

In these essays, I address three distinct phenomena that affect the financial performance of firms and which need additional empirical support, there is the role of the board of directors, the effect of supply chain management activities, and the existence of earnings management in the long-run. In the first two, I directly measure its impact on firm financial performance, measured by ROA, in an attempted to reconcile the strategy literature and the supply chain management literature with the accounting and finance literature. In the latter, I provide some empirical support for the existence of earnings management (by income smoothing) practices in the long-run. The overall results show that both board composition and committees' independence mediate the relationship between the board's independence and firm's financial performance in such way that agency costs derived from a board composed of directors focus in provide services mitigate the positive effect of board independence, and independent committees in turn increase this effect. I also found evidences that supply chain management strategies impact on firm financial performance and firm financial performance also impacts on supply chain management strategies. Specifically, if a supply chain chose a lean strategy such as P&G, then lean metrics will granger-cause ROA. Conversely, if a supply chain chose an agile strategy such as Walmart, then agile metrics will granger-cause ROA. Finally, results provide some support that earnings management practices are not sustainable in the long term. The results pointed out that for the sample and period studied, the Brazilian companies are not adopting income smoothing practices in the long-run. The cointegration tests shown that the standard-deviation of non-operating income follow the same pattern of the gross revenue and the standard-deviation of operating cash flow; that absolute value of total accruals follow the same pattern of the absolute value of operating cash flow and gross revenue; and the standard-deviation of the net income follow the same pattern of the gross revenue.

Keywords: firm performance, board of directors, supply chain management strategies, earnings management, income smoothing.

CONTENTS

INTRODUCTION

Executives and investors share the common view that understand the relevant factors for the firm financial performance are integral to the success of any business. For instance, evidence suggest that firms can use the board of directors as mighty managerial tool. Scholars argue that the basis of competition has been changed given the new dynamic of the economy. Thus, the competition is now of supply chain versus supply chain and no longer firm versus firm. Finally, a significant number of firms present performance results that diverge from the market average. Many of these firms justify the superior performance by stating they use Earnings Management techniques.

In these essays, I address three distinct phenomena that affect the financial performance of firms and which need additional empirical support, there is the role of the board of directors, the effect of supply chain management activities, and the existence of earnings management in the long-run. In the first two, I directly measure its impact on firm financial performance, measured by ROA, in an attempted to reconcile the strategy literature and the supply chain management literature with the accounting and finance literature. By doing this, I intend to show that the business literature “can import and ‘‘borrow’’ elements from economics, but retain its own methodologies, approaches to developing theory, and influence from other disciplines” without any concern that economics will ‘‘take over’’ either the strategy literature or supply chain management literature, recreating these disciplines “in its own orientation” (Grimm, 2008, p.17). In the latter, despite the literature evaluate extensively the impact of earnings management on the investment decisions, I argue that the incentives for managers adopt these practices

in the long-run are not intuitive. Thus, I attempt to provide some empirical support for the existence of earnings management practices in the long-run.

The overall results show that both board composition and committees' independence mediate the relationship between the board's independence and firm's financial performance in such way that agency costs derived from a board composed of directors focus in provide services mitigate the positive effect of board independence, and independent committees in turn increase this effect. I also found evidences that supply chain management strategies impact on firm financial performance and firm financial performance also impacts on supply chain management strategies. Finally, results provide some support that earnings management practices are not sustainable in the long term.

Chapter 1

1. WHY THE BOARD OF DIRECTORS “DOES NOT” MATTER?

1.1 INTRODUCTION

Executives, investors, and directors share the common view that board of directors are integral to the success of any business. For instance, anecdotal evidence suggest that firms can use the board of directors as mighty managerial tool particularly in the case of a hostile takeover demonstrated in an episode of “hostile takeover of Anheuser-Busch, an American Icon”. However, Dalton, Daily, Certo and Roengpitya (2003) were unable to find empirical support for the notion that firms and executives use boards strategically. In short, the literature shows no consensus on the relationship between the board of directors and firm performance (Dalton, Daily, Ellstrand & Johnson, 1998). Furthermore, there has been an inconclusive theoretical debate about independent (outside) directors increasing effectiveness of roles and duties of the board (Johnson, Daily, Ellstrand, 1996).

Taking the results of the meta-analyses together, we observe that studies in strategy lack in consider other factors that influence the impact of the board on firm performance; these works usually focus only on board independence (Dalton et. al., 2003). In this study, I explained the reason why the strategy literature results are not the same found in the financial literature. Specifically, I show different factors influencing (mediating) the effect of board independence on firm performance, which would explain

the misalignment between the findings of the strategy literature and the finance literature.

In this paper, I utilize three theoretical perspectives to frame the relationship among independent (outside) directors and board's roles and duties. On the basis of prior research, independent directors (outside) directors are defined as a non-current employee or a person who has not been an employee of the last three years or past three years' employees, and/or directors non-related to both current executives or the firm-founder. Conversely, non-independent (inside) are defined as either a current employee or a person who has been an employee of the last three years or past three years' employees, and/or directors related to either current executives or the firm-founder (Klein, 1998; 2002a, 2002b). First, grounded on the assumption that executives behave opportunistically, the agency theory advocates in favor of independent (outside) directors. Accordingly, the agency theorists have argued that non-independent (inside) directors seek private perquisites at the expense of shareholders' wealth (McGregor 1960; Williamson 1985). In contrast, the stewardship theory argues that assisting executives should be the main purpose of the directors; and consequently, non-independent (inside) directors have been more qualified due their specific expertise about firms (Donaldson 1985; 1990; Donaldson & Davis 1994; Kiel & Nicholson, 2003). Finally, Resource-based view (RBV) theorists posit that boards consist as a source of fundamental resources for the functioning of firms (Barney, 1990). That said, this study aims to answer the following researches questions: **Does board composition mediates the relationship between the board's independence and firm's financial**

performance? Does committees' independence mediate the relationship between the board´s independence and the firm's financial performance?

Briefly, it can be said that research in strategy generally only analyze the direct effect of board independence on firm performance. I analyze the indirect effects of board independence on firm performance. The strategy literature is usually based on three theories to address this topic, there is Agency theory which assumes that independent boards lead to better performance; Stewardship theory which assumes that dependent boards lead to better performance; and Resource-based view that posits on one hand, independent boards may improve the quality of disclosure. On the other hand, dependent boards are able to provide more accurate information.

I argue that simply measuring the direct effect of board independence on firm performance is not enough to capture the total effect of board independence on firm performance. I also argue that the total effect depends on the indirect effects of Board Independence on firm performance. These indirect effects derived from Board Composition and from Committees Independence.

Despite the bruising findings, executives, and even more directors, agree that boards are an important source of strategic actions for managers who have knowledge of how to exploit them. Boards can define the destiny of an empire, such as in the hostile takeover of Anheuser-Busch. On these grounds, one can argue that boards can make companies run more efficiently, which brings wealth to the shareholders. Conversely, executives might use boards to turn firms into their "private yard" and thereby they may expropriate shareholders' wealth. Taking a middle-ground position, I argue that a simple formal classification of directors as independent (outside) is not

enough to portray the complex relationship between executives and directors. It is worth noting that whether boards are good or bad is clouded by those scholars who have considered board structures in a very narrow manner. An attempt to address these issues in a broader view is necessary in order to consider that "many of the critical processes and decisions of boards of directors do not derive from the board-at-large, but rather in subcommittees (e.g., audit, compensation, nominating, executive)" (Dalton et al., 1998, p. 284).

Notwithstanding, there is insufficient research into committees to draw any firm conclusions on these critical processes and decisions. In this paper, I argue that addressing the boards' roles and duties throughout committees can provide insights into which paths can mitigate possible boards' threats or which can maximize boards' potentialities. Additionally, the discussion will center on which circumstances for firm performance matters to board of directors. Using the lens of agency, stewardship, and resource-based theories, I explore the argument. Specifically, I adopted Johnson's *et al*. (1996) "role typology" to conceptualized rules and duties of committees. The purpose of this study is provide a multi-theoretical model that assess the relation between boards and performance.

I measure the constructs Board Independence, Board Composition, and Committees Independence by latent variables. Latent variables are measurement-error models (Confirmatory Factor Analysis – CFA) composed of observable variables. These variables work similar a Factor in a Factor Analysis. I use observable variables from both the agency theory and the stewardship theory. The analyses were made by using the generalized Structural Equation Modelling (gSEM) which combines the generalized

linear model (GLM) estimation framework (McCullaugh and Nelder, 1989), with the well-known modelling capabilities of SEM. gSEM enables the creation and estimation of models that include latent variables and general response variables that are not continuously measures, such as binary variables.

The data were collected from the MSCIGMI Ratings Companies, MSCIGMI Ratings CEOs, COMPUSTAT, and CRISP databases, accessed by WRDS. The data refer to 568 listed companies, and cover the period from 2004 to 2014. Thus, we have a balanced panel with $\boldsymbol{t}$=**11** e $\boldsymbol{n}$=**568**, totaling 6,248 observations. The results shown that the direct effect of Board Independence on ROA is not statistically significant. The indirect effect of Board Independence on ROA, through Board Composition, is negative. After controlling for the indirect effect, the total effect of Board Independence on ROA is positive. Conversely, the direct effect of Board Independence on ROA is not statistically significant. The indirect effect of Board Composition on ROA, through Committee Independence, is positive. After controlling for the indirect effect, the total effect of Board Independence on ROA is positive.

1.2 LITERATURE REVIEW

The key role played by boards is that the fiduciary duties is the cornerstone for firm strategy (Johnson et al., 1996; Dalton et al., 1998; Dalton et al., 2003). Specifically, committees are the arena in which crucial decisions are made and strategy is built. On these grounds, I argue that the relationship between boards and performance may be better understood by board composition and by board subcommittees. Unlike the traditional approach, in which we evaluate if boards are independents, analyzing board

composition and committees' activities can provide insights into which paths can mitigate possible boards' threats or which can maximize boards' potentialities.

Along similar lines, Anderson, Mansi and Reeb (2004, p. 319) have argued that the accounting setters emphasize the key role of the board in monitoring "the financial accounting process". The authors also posit that "boards comprising mostly employee or employee-related directors may be more willing to conceal negative information to gain private benefits or to limit stakeholder intervention in the firm." However, there is an overwhelming meta-analytic evidence (Dalton et al., 1998; Dalton et al., 2003) that, rather than mixed findings, offers empirical evidence that demonstrates that no relationship between the board of directors and firm performances exist. There is no compelling reason to argue that scholars show no consensus on the relationship between boards and firm performance. The underlying argument in favor of the relevance of this topic is that researchers have shown theoretically that this relation is pivotal for decision making processes. Some scholars (Fama & Jensen, 1983; Beasley, 1996; Dechow, Sloan & Sweeney, 1996) have argued that the independence may provide effective monitoring derived directly from directors' desires to build solid reputations. On the contrary, the stewardship theorists have argued that the directors' main purpose is to assist executives and their own board in the executing of their roles and duties (Donaldson 1985; 1990). Finally, the RBV posits that directors may be a crucial source of specific resource for enhancing firm performance.

However, the empirical evidence provided by Dalton et al. (1998; 2003) are mixed in findings and constitute a strong argument against the relevance of this relation for our field of research. On these grounds, the literature on management have provided

distinct reasons as possible explanations for this lack of findings. For instance, Hillman and Dalziel (2003) have suggested that the prior research does not consider the board's capital to address this relationship. In a similar vein, Khanna, Jones, and Boivie (2014) argue that in general, human capital is a more accurate measure of directors' capabilities, reflecting board effectiveness as compared to traditional metrics that emphasize structure of boards. In general, these authors are suggesting that a multi-theoretical approach should be adopted to cover these inconclusive findings.

In the next section, the three theoretical perspectives are outlined. By leveraging the knowledge from the varied theoretical perspectives, I attempt to align those theories with the concept of independent (outside) directors and non-independent (inside) directors. Regardless of the differences among the three theories in this study, it is not assumed that any of these theories are wrong in the way that each has addressed the relationships between the board of directors and the performance of the company. On the contrary, given certain conditions, one can assume that all of these scholars' perspectives are correct in their assumptions.

1.2.1 Agency theory

Agency theory draws on the concept that individuals are rational and self-interest seeking beings, striving to maximize their individual objective function, i.e. their own utility. If this conceptualization of human beings as individualistic actors holds, then the existence of conflict of interest between owner and executives will also hold (McGregor 1960). On logical grounds, Fama and Jensen (1983, p. 311) posit that the board of directors is the pinnacle "of the decision control systems of organizations in which

decision agents do not bear a major share of the wealth effects of their decisions''. In short, directors are the "common apex" mechanism for monitoring and controlling executives' actions. Classic agency problems require a businesslike mechanism designed to build an efficient contract technology capable of mitigating any deadweight losses from agent and principal problem (Watts, 2003; 2006).

On these grounds, one can argue that directors monitor and legitimize the decision-making process. This schema assumes that it is efficient to segregate the initial stage of strategic decision making in which strategy is formulated and implemented from the latter stages where the decision is evaluated. Specifically, the directors are pillars of corporate governance given that may increase the quality of decision-making and consequently improve firm performance (Monks & Minow, 2011). In short, the board of directors has the duty to define compensation, to hire executives, and even to fire executives. Further, through their expertise, directors advise and approve all core investment decisions and proposed strategies of the executives (Grinstein & Tolkowsky, 2004). Nevertheless, Hermalin & Weisbach (2003) have argued that scholars have provided little empirical evidence to support the assumption that independent boards lead to better performance.

1.2.2 Stewardship theory

Some scholars have identified another theoretical ideology that is somewhat antithetical to the agency theory. Therefore, a different set of studies assumes that distinct incentives drive human behavior, other than individuals' rationality and individuals' self-interest. For instance, MeClelland (1961) and Etzioni (1975) suggest

that instead of a utility-maximization problem, individuals are moved for an intrinsic seeking for satisfaction derived from non-financial motivators such as challenge, responsibility, and self-esteem that provides recognition from their peers. In short, executives are motivated by their own perception of firm performance and their contribution for success or failure of it (Silverman 1970). Thus, we can argue that executives may perceive owners' interests as their own. Following this alternative assumption that contrast agency theory, stewardship theorists have argued that executives seek to maximize the shareholders' wealth, like "stewards of assets entrusted to them" (Donaldson 1990; Donaldson & Davis 1991; Donaldson & Preston, 1995).

Although agency and stewardship theories are opposite extremes of a continuum of possible behaviors, we can identify some common elements between both approaches. The role of information quality as well as the view of board of directors as a source of information is a pillar for both theories. Even though the two theories share a similar view on the information quality being a pillar of board of directors' roles and duties, the agency theory emphasizes on asymmetric-information problems, and the stewardship theory focuses on accuracy of information. Thus, the stewardship theory advocates that insider directors have more accurate information than outsiders (Jensen & Meckling, 1976; Watts and Zimmerman, 1986; Donaldson 1990; Donaldson & Davis 1991; Donaldson & Preston, 1995). Insider directors' skills and knowledge may increase boards' ability to effectively assist executives on the management process (Monks & Minow, 2011; Beasley, 1996). Thus, we can argue that these skills and knowledge can be crucial for boards' roles and duties.

1.2.3 Resource-based view

Similar to the agency and stewardship premises, the RBV has been used to argue that firms are bundles of resources and should be organized strategically to provide competitive advantages and sustain long-term performance (Barney, 1990). To reach this purpose a resource must be *valuable* (Conner, 1991), *rare* (Dierickx & Cool, 1989), *in-imitable* (Rumelt, 1984; Conner & Prahalad, 1996), *non-substitutable* (Dierickx & Cool, 1989) (V.R.I.N) as posited by Barney's (1986; 1990). Aside from the theoretical debate of whether this approach explains competitive advantage, we can argue that the information seems to fulfill the assumptions to be considered a V.R.I.N resource, i.e. information quality is at least a firm's critical-resource. The key aspect of this argument is that directors may be a channel in which to access information like a double-edged sword.

On one hand, inside (non-independent) directors are able to provide more accurate information about companies; for instance, they are able to effectively assist executives in designing better compensation plans for managers. Smith & Watts (1992) have argued that compensation plans based on accounting standards are inefficient compared to plans based on stock market. On the other hand, outsider (independent) directors may improve the quality of disclosure, which, in turn, is crucial in attracting investments (Daley & Vigeland, 1983; Carcello & Neal, 2000; Bushman et al., 2004). High levels of disclosure can decrease the cost of governance mechanisms, which may mitigate both moral hazard and informational asymmetry. Boards of directors are responsible for monitoring lending agreements by auditing the financial statements in

order to protect investors' rights (DeFond & Jiambalvo, 1994; Dichev & Skinner, 2002; Klein, 1998; 2002a; 2002b).

1.3 FRAMEWORK DEVELOPMENT

In this section, I bring to the above discussion the concept of board independence and the role of committees in order to develop research framework. Next, by leveraging the knowledge from the varied theoretical perspectives, I attempt to align the theories discussed with the Johnson´s et. al. (1996) "Role Typology" in order to develop the hypotheses derived from the research framework.

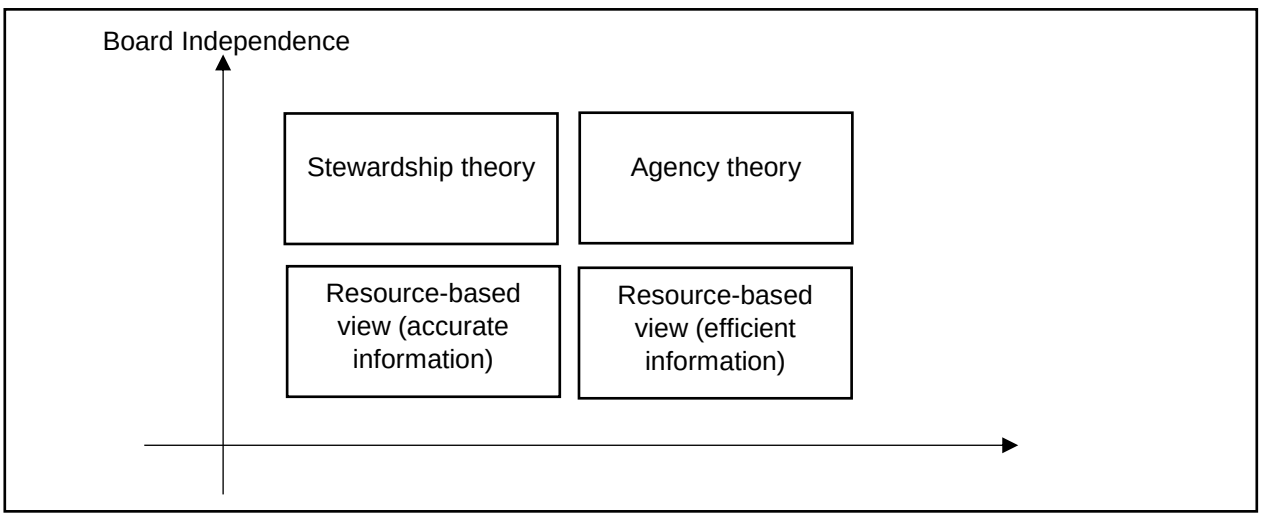
1.3.1 Board of directors and independence

The foregoing discussion has a convergence point that lies at the heart of the discussion on board composition: independence (Beekes et al., 2004; Byrd & Hickman, 1992). It is noticeable that much of the current debate revolves around the idea if directors should be outside (independent) or inside (non-independent). Ahmeda & Duellmanb (2007) have argued that some characteristics of boards define the "strength of outside directors' monitoring incentives," i.e., characteristics of the board define the degree of independence of directors. It is noteworthy that this formal classification as independent (outside) directors or non-independent (inside) directors neither guarantees that independence is in fact effective (if a director is truly independent) (Bebchuk et al., 2010) nor necessarily implies a low monitoring incentive (if a director is truly non-independent) (Ahmeda & Duellmanb, 2007).

On aforementioned discussion grounds, for instance, Klein (1998; 2002a; 2002b) has argued that size of boards impacts the monitoring process as well as the committee assignments. While Klein makes a good argument for the size of the boards' impacts, I argue that the structure also impacts the monitoring process and boards' assignments. Therefore, board´s composition appears to mediate the relationship between independence and the firm's performance in each of theories aforementioned.

According to the agency theory, independence is associated with firms suffering from agency problems. Therefore, shareholders demand high levels of independence of the board to guarantee effective monitoring. On the contrary, stewardship theorists point out that the directors should assist executives in their roles and duties. Thus, low levels of independence, in service-oriented boards, implies an increase in the accuracy of board roles and duties. Another perspective based on RBV posits that the level of independence of the board should be defined according to a firm's resources. In short, distinct resource needs will require distinct levels of independence.

On these grounds, this study defines independence as a bidimensional construct with two conflicting domains: Agency problem domain and Service problem domain. Based on this definition, we can argue that a specific domain will require a different kind of resource.



Performance

Please refer to Figure 1.1: Independence in the lens of theories for an illustration of the relationship between independence and performance. For instance, the figure illustrates that if a board has a high level of independence, then the level of performance will be low in the case of the stewardship theory. As opposed, in accordance of the agency theory, a high level of performance is followed by a high level of board independence.

Despite the confounding among the three theories, based on the aforementioned discussion, I hypothesized that the board of directors' composition can mediate the relationship between directors' independence and the firm's financial performance. Figure 1.2: Board of directors' composition mediates board independence effect on firm´s financial performance illustrates the mediation effect of board composition in the relationship between the board independence and firm's financial performance.

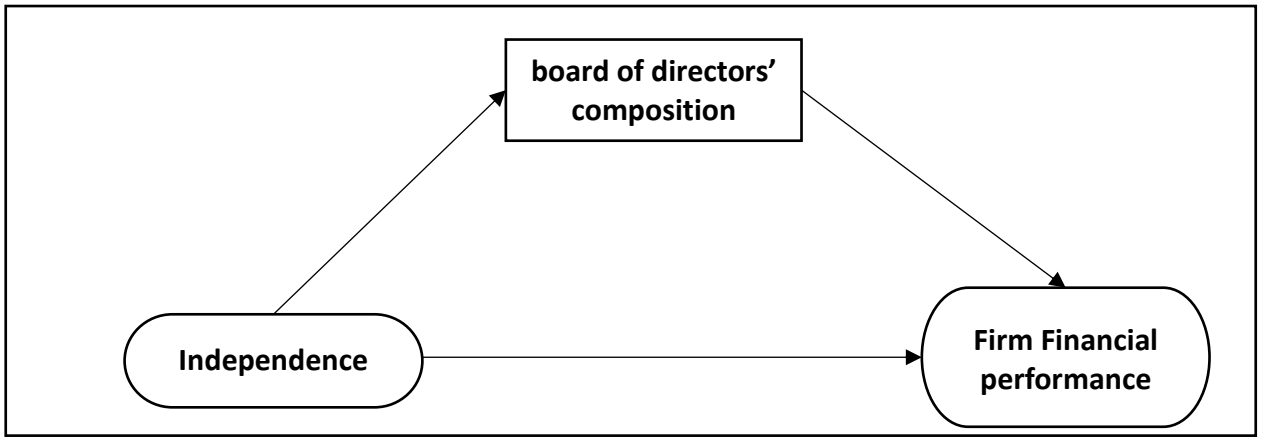


Figure 1.2 Board of directors' composition mediates board independence effect on firm´s performance. Source: The author.

1.3.2 Board of directors and committees

Dalton et al. (1998, p.284) have argued that “many of the critical processes and decisions of boards of directors do not derive from the board-at-large, but rather in subcommittees (e.g., audit, compensation, nominating, executive)”. Despite the relevance of committees seeming to be intuitive, current research is lacking in considering their important role of the relationship between the board of directors and firm performance. Although there is insufficient research to draw any firm conclusions on the impact of board on performance, the cornerstone role played by committees is not a new debate. Harrisons (1987) has pointed out that committees, such as, audit, compensation and nominating have specific roles and fiduciary duties that cope in favor of shareholders’ interests. Harrisons has argued that committees may improve monitoring of corporate functions, and increase objectivity and reliability of all board’s crucial roles.

Along similar lines, Anderson et al. (2004, p. 317) have argued that although boards are responsible for monitor of the financial accounting processes, this task is usually delegated to a committee of the board, the audit committee. This committee “plays an important role because it is concerned with establishing and monitoring the accounting processes to provide relevant and credible information to the firm’s stakeholders.”

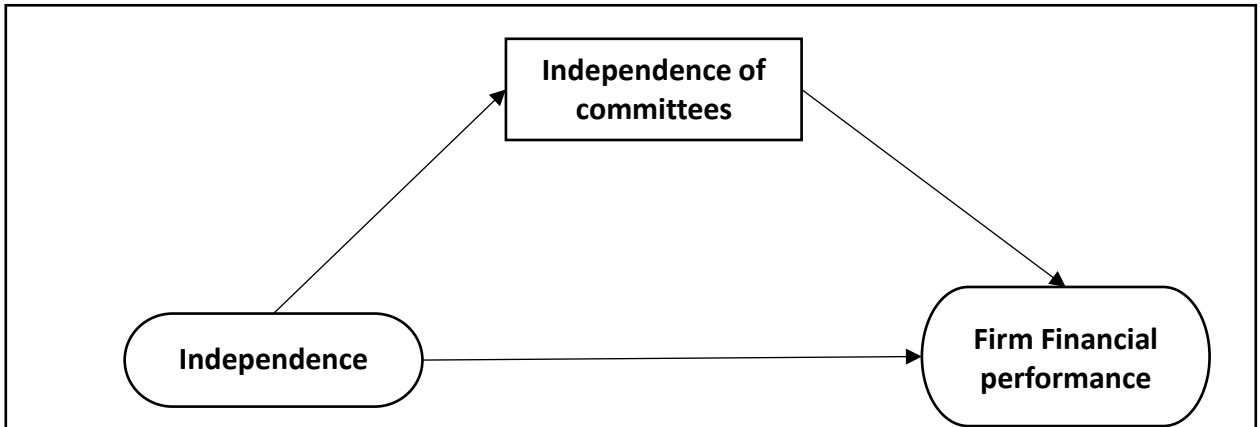


Figure 1.3 Committees' independence mediates the relationship between the board independence and the firm's financial performance.
Source: The author.

Other scholars, (Pincus et al., 1990; Beasley, 1996) agree with this idea. The current literature, as demonstrated, neglects to consider that committees play a crucial function on the central roles and duties of the boards. Therefore, in this paper, I argue that the scholarship should not access just the relevance of the directors throughout the board composition, but also the impact of the committees' independence on performance. If it is the case, seems that the independence of the committees may be a mediator of the relation between the boards' independence and the firm's financial performance.

In order to demonstrate the developing idea, refer to Figure 1.3: Committees' independence mediates the relationship between the board independence and the firm's financial performance.

The underlying argument in favor of this assumption runs as follows in the brief discussion about Johnson's role typology on the subsequent section.

1.3.3 Hypotheses development

Drawing on the research of Johnson et. al. (1996) in which they proposed a "Role Typology" to categorize board activities and duties, I will discuss briefly the three

domains and the committee's influence upon these domains. The typology identifies the three domains based upon an extensive literature review: Directors' Control role; Service role; and Resource Dependence role. On logical grounds, there is no compelling reason to argue that further research in this area may include committees conceptualized in a role typology. This section is concerned with the issue of how to connect board roles with committees' activities. I will discuss briefly the three domains, attempting to address board composition and committee influence in each of them. I also will derive hypotheses to test both the mediation effect of board composition and the mediation effect of committee independence on the relationship of board independence and firms financial performance in each of them.

1.3.3.1 Directors' control role

The basic premises of directors' control role rest on assumptions from agency theory. In this vein, the consensus view seems to be that committees, such as, audit, compensation and nomination, placed a crucial role in monitoring executives. The key aspect of this argument is that using monitoring instruments, the board increases the degree of corporate governance and therefore ensuring that managers and executives will keep their interests aligned with what is best for the shareholders (Vafeas, 1999; Chhaochharia & Grinstein, 2007). The directors' control domain granted that executives are self-interest human beings that make their decisions based only with a rational mindset. From their personal interests comes the need to detach the decision-making regards to compensation (Anderson & Bizjak, 2003), nomination (Vafeas, 1999) and audit (Gendron & Bédard, 2006) from the managerial control. Granted that independent

committees may assist the board duty of control by improving the information quality and reducing the information asymmetry. However, to guarantee that control mechanism will be effective is a necessary condition that committees are endued by a high degree of independence. Clarke (2007) has argued that the board should be considered independent only in the absence of effective relations between managers and free speech either inside or outside of the company, i.e. executives never influence the flow of information. The view that independent boards and committees are more effective gained strength with the US financial scandals in 2000.

Thus, a lack of control might imply that a decrease of firm performance allowing managers to keep control of all central decisions. In short, executives will define the disclosure process of performance indicators to investors (audit committee), their own remuneration package (compensation committee) and who will own the core positions on top management team (nomination committee). The current literature on independent (outside) directors abound with examples that this might mitigate fraud (Farber, 2005; Xie et al., 2003), decrease earnings-management (Peasnell et al., 2000; Bowen et al., 2008), improve the credit ratings (Ashbaugh et al., 2006), and provide a better analyst consensus (Wright, 1996). Refer to the box, Summary of Directors' Control Role Characteristics for a brief summary of the characteristics discussed on this subsection.

Summary of Directors' Control Role Characteristics

Assumptions: Board independence is positive related with corporate governance, and governance mechanisms is positive related with firm performance.

Conditions: High degree of board independence is a necessary condition to effective control.

Logic: High Board Independence → Effective Control → Increase Corporate Governance → Increase Firm Performance.

Committees' control role

Auditing committee: improve information quality through effective monitoring.

Compensation committee: provide the correct incentives to align executives' and shareholders' interests by designing the adequate remuneration packages.

Nomination committee: protect shareholders' rights through strong corporate governance

Due to the gap in the existing literature, I have identified the following Hypothesis:

Hypothesis 1_0: *Board composition mediates the relationship between the board's independence and firm's performance in such way that the agency problems effects are negative.*

Hypothesis 2_0: C*ommittees' independence mediates the relationship between the board independence and the firm's performance in such way that outside directors effects are positive.*

1.3.3.2 Service role

Although the logic of agency theory seems to be correct, one could argue that these control mechanisms might have an excessive cost relative to the benefits derived from them (Pincus et al., 1990). Contrasting with directors' control, service role is premised on the assumption that instead of monitoring executives, directors should assist them in performing their roles and duties. These directors' services will result in better evaluation of managerial-decisions, improving the process of strategy formulation through directors' specific skills and knowledge. In short, if the quality of directors' self-reports increases, then corporate decision–making process improves (Johnson et al., 1996). On the basis of the evidence currently available, it seems fair to suggest that one of the committee's pivotal purposes is to assist the board of directors cope with

management issues. Gendron and Bédard (2006) have argued that efficient audit committee is implied when there is more transparency, better levels of integrity, and more financial accuracy in an organization. Anderson and Bizjak (2003) have shown that compensation committee may be the principal source for attracting effective managers, and to reduce the turnover of top executives. Along similar lines of monitoring, the self-report formulation also might be expensive since the major proportion of board's time is devoted to this function.

It is noticeable that firms faced a serious trade-off between control (effectiveness) and service (efficiency). If it is the case that committees are designed to maintain a high level of control, following the agency theory assumptions, then we will expect that interests of board and shareholders would be aligned. On these grounds, we can argue that committees must be highly independent. It might be said that high independence follows when the directors have less knowledgeable about the organization. Bearing in mind the previous points of service role, decision-making will tend to be rooted on accounting and finance standards as well as committee' value judgments instead of on the firm's real and potential performance (Kirk and Siegel, 1996). For instance, Spira (1999) has argued that auditors need to be aware of specific standard operation procedures that are adopted by firms (e.g. financial control system) in order to avoid any misunderstandings on financial reports. Thus, an effective and efficient audit committee requires information exchange among external and internal auditors (Kinney, 2000). Refer to the box, Summary of Committees' Service Role Characteristics for a brief summary of the characteristics discussed in this subsection.

Summary of Committees' Service Role Characteristics

Assumptions: Board independence is negative related with specific firm knowledge and skill, and this kind of knowledge and skill are positive related with firm performance.

Conditions: Low degree of board independence is a necessary condition to provide efficient service.

Due to the gap in the existing literature, I have identified the following Hypothesis:

Hypothesis 1_1: *Board composition mediates the relationship between the board´s independence and firm´s financial performance in such way that services effects are positive.*

Hypothesis 2_1: *Committees' independence mediates the relationship between the board´s independence and the firm's financial performance in such way that outside directors effects are negative.*

1.3.3.3 Resource dependence role

Resource dependence role on the contrary of the first two domains is a double edge sword and might work under either at a high or a low level of board independence. According to this view, the board of directors is conceptualized as managerial instruments that are used to increase access of critical resources such as funding for new projects (e.g. better relation with financial institutions). Rajagopalan & Zhang (2008) have pointed out that recent corporate governance rules from China and India requires listed companies to own specific committees to disclose their operational activities. Koh

et al. (2007) have provided some empirical evidence that demonstrates the better corporate governance mechanisms increase value of firms and consequently impact positively on performance. Along similar lines of agency theory and directors' control role, this body of research have pointed independent audit committee as one possible source of these improvements as a consequence of managers' and shareholders' better alignment. As a substantiation to this point, it may be argued that more accurate information combined with high levels of disclosure better aligns the conflicting interests among executives and several sources of critical resources through the committees such as financial institutions (audit committee), effective executives (compensation committee), and investors (nomination committee).

As a rebuttal to this point, it might be argued that dependent (outsider) directors add less value to organization relative to non-independent (insiders), given that the former possesses less knowledge about firm. This lacking of knowledge reveals that the insiders are more capable, and for this reason, the executives prefer insiders on the board (Geletkanycz and Hambrick, 1997). It can also be argued that if an non-independent (insiders) is more skillful and has more knowledge, then he or she will tend to evaluate better physical and human resources that are fundamental for company needs. Refer to the boxes, Summary of Committees' Resource Dependence Role under High Independence and Summary of Committees' Resource Dependence Role under Low Independence for a brief summary of the characteristics discussed in this subsection.

Summary of Committees' Resource Dependence Role under High Independence

Assumptions: Board independence is positive correlated with corporate governance, and governance mechanisms is positive correlated with critical resources. These resources are positive correlated with performance.

Conditions: High degree of board independence is a necessary condition to access critical resources such as credit.

Logic: High Independence → Increase Corporate Governance → Increase access to Critical

Due to the gap in the existing literature, I have identified the following Hypothesis:

Hypothesis 3_0: *Board composition mediates the relationship between the board´s independence and firm´s financial performance in such way that board composition fails to provide critical resources.*

Hypothesis 4_0: *Committees´ independence mediates the relationship between the board´s independence and firm´s financial performance in such way committees succeed in providing critical resources.*

Summary of Committees' Resource Dependence Role under Low Independence

Assumptions: Independence is negative correlated with specific skills and knowledge. Specific skills and knowledge are positive correlated with Critical Resources. These Resources are positive correlated with performance.

Conditions: Low degree of independence is a necessary condition to access critical resources such as human resource plans to reduce turnover.

Logic: Low Independence → Increase Specific Skills and Knowledge → Increase access to Critical Resources → Increase Firm Performance.

Committees' resource dependence role under low independence

Auditing committee: improve information quality providing better reports through specific skills and knowledge.

Compensation committee: provide the correct incentives to attract and retain effective through specific skills and knowledge.

Nomination committee: protect shareholders rights through an efficient decision-making process based on specific skills and knowledge.

Due to the gap in the existing literature, I have identified the following Hypothesis:

Hypothesis 3_1: *Board composition mediates the relationship between the board´s independence and firm´s performance in such way that board composition succeeds in providing critical resources.*

Hypothesis 4_1: *Committees´ independence mediates the relationship between the board´s independence and firm´s financial performance in such way that committees fail to provide critical resources.*

1.4 METHODOLOGY

StataCorp understands that structural equation modeling (SEM) is more than a simple estimation method for a particular model, different, for instance, from ordinary least squares. They believe that SEM involves a particular way of thinking, writing and estimating (StataCorp, 2013).

The generalized Structural Equation Modelling (gSEM), in its turn, combines the broader generalized linear model (GLM) estimation framework, as proposed by McCullaugh and Nelder (1989), with the well-known modelling capabilities of SEM. This combination enables the creation and estimation of models that include latent variables and general response variables that are not continuously measures, such as binary variables (StataCorp, 2013).

Structural equation models should be used when the target variables are not perfectly observable nor perfectly measurable with a proxy. In this situation, there would either be sets of observable variables that explain part of variability of the theoretical construct (e.g., Board Composition) or metrics that measure the theoretical construct with some level of error (e.g., Board Independence) using different instruments. With this set of observed variables, it is possible to create latent variables, or factors, that represent the constructs, traits, or “true” variables underlying the measured items and inducing dependence among them. It is also possible to assess the measurement model, which may be of interest in its own right, although what often defines the substantive model of interest is the relationship among the latent variables or the relationship between latent variables and observed variables (the structural part of the model) (StataCorp, 2013).

McCullaugh and Nelder (1989) present the generalized linear model (GLM) estimators. They are maximum likelihood estimators that are based on a density in the linear exponential family (LEF). There are different estimators for different circumstances: for continuous data, there are the normal and inverse Gaussian estimators; for count data, the Poisson and negative binomial; for binary data, including logit and probit, there is the Bernoulli; and for duration data, the Gamma estimator (StataCorp, 2013).

Considering that GLM estimators are essentially generalizations of nonlinear least squares, they are optimal for a nonlinear regression model with homoscedastic additive errors. They can also be used for other types of data that present intrinsic

heteroscedasticity. There is a rationale for modeling this heteroscedasticity (StataCorp, 2013).

Without loss of generality, the GLM estimator $\hat{\theta}$ adopted in this study maximizes the log-likelihood as below:

$$Q(\theta) = \sum_{i=1}^{N} \left[a\left(m(x_{i,t}, \beta)\right) + b(y_{i,t}) + c\left(m(x_{i,t}, \beta)\right) \right]$$

where $m(x_{i,t}, \beta) = \mathrm{E}(y_{i,t}|x_{i,t})$ is the conditional mean of $y_{i,t}$, $a(.)$ and $c(.)$ correspond to different members of the LEF, and $b(.)$ is a normalizing constant.

If the conditional mean function is correctly specified, that $\mathrm{E}(y_{i,t}|x_{i,t}) = m(x_{i,t}, \beta)$, then GLM estimators are consistent. However, a robust estimate of the VCE needs to be used if the variance function is not correctly specified, as we have done in this study (StataCorp, 2013).

Thus, in order to use the GLM estimator we must choose the $\mathrm{family}()$ to select the LEF that will be adopted. We also must choose the $\mathrm{link}()$ express the transformation that will be made on the non-independent variable, since the $\mathrm{link}()$ is the inverse of the conditional mean function (StataCorp, 2013).

When considering gSEM in comparison with SEM, it can be seen that the former is an extension of the latter. “While in SEM responses are continuous and models are linear regression, in gSEM, responses are continuous or binary”, among others and models are linear regression, logit, among others (StataCorp, 2013, p. 10).

1.4.1 Single-factor measurement model (generalized response)

The single-factor measurement model, in which we consider several observed variables as influencing a single latent factor, allow for a generalized response, rather than assuming that the response is continuous, driven by Gaussian errors. The latent factor, being related to only binary measurements, will have different properties than a model based on continuous measurements. Thus, the errors are presumed to follow a Bernoulli distribution, and the GLM link function is the probit, for example (StataCorp, 2013).

If one or more of these measurements was continuous, we could use a different family and link for that part of the model. Say that one measurement was not only a pass/fail mark, but the score on a test. Then that equation would be fit with the gSEM default of Gaussian errors and the Identity link (StataCorp, 2013). By using generalized response variables, we can specify by GLM. For instance, these specifications include logistic regression among others (StataCorp, 2013).

1.4.2 Full structural equation model (generalized response)

In this model, coefficients from latent variables are parameterized as causal and researchers use SEM to test causal model based on theory. Thus, we can apply these technique to reach “something other than empirical results to rule out competing but equivalent models such as the covariance model. Distinguishing causality from correlation is always problematic.” It is important to highlight that multilevel data in gSEM “must be recorded in the long form except in one case” (StataCorp, 2013, p. 342).

1.4.3 One- and two-level mediation models (multilevel)

We are interested in the effect of board independence on firm financial performance, but we suspect a portion of the effect might be mediated through committees independence and board structure. In Baron and Kenny (1986) mediation analysis, “the model would be fit by a series of linear regression models.” This framework is sufficient only if the errors are not correlated. By using gSEM we can “fit a single model and estimate the indirect and total effects, and we can embed the simple mediation model in a larger model and even use latent variables to measure any piece of the mediation model” (StataCorp, 2013, p. 418).

1.4.4 The measurement-error model interpretation

We can reinterpret the measurement model as a measurement-error model. In this interpretation, X is the unobserved true value. $x1, x2, x3, x4, x5$ and $x6$ are each measurements of X, but with error. Meanwhile, the non-independent variables are really something else entirely. We are interested in $´s$, the effect of true X on $x´s$ (StataCorp, 2013).

For instance, if we were to go back to the data and type $\mathrm{regress}\ x1_{it}\ \log x2_{it}$, we would obtain an estimate of β_1, but we would expect that estimate to be biased toward 0 because of the errors-in-variable problem. The same applies for $x1_{it}$ on the others $x´s$. In gSEM output above, we have an estimate of $\beta´s$ with the bias washed away (StataCorp, 2013).

The parameters μ and Σ are estimated, just as are $\propto_1$, $\beta_1, \ldots, \propto_6$, β_6. However, some elements of Σ are constrained to be 0; "which elements are constrained is determined by how we specify the model". In drew the model in such a way that I assumed and imposed that "error variables were uncorrelated with each other" (StataCorp, 2013, p. 10). The absence of correlation among error terms means that the variables are constrained to be uncorrelated. For instance, that is not to say that $x1_{it}$ and $x2_{it}$ are uncorrelated; obviously, they are correlated because both are functions of the same X_{it}. Their corresponding error variables, however, are uncorrelated (StataCorp, 2013).

1.4.5 Generalized structural equation model estimation procedures

The generalized linear models (measurement models) are:

$$g\{\mathrm{E}(y_{jit}|X_{it}) = \boldsymbol{x}_{it}\beta$$

I estimate three single-factor measurement model, in which I consider several observed variables as influencing a single latent factor. I also allow for a generalized response, rather than assuming that the response is continuous, driven by Gaussian errors.

TABLE 1.1: **Observed variables that measure Board´s Independence (X_{it})**

Variables	***Variables Name***	***Expected Sign***	
		Agency Theory	*Stewardship Theory*
$x1_{it}$	$(Inside\ directors)_{it}$	$-$	$+$
$x2_{it}$	$(Outside\ directors)_{it}$	$+$	$-$
$x3_{it}$	$(Inside\ directors\ \%)_{it}$	$-$	$+$
$x4_{it}$	$(Outside\ directors\ \%)_{it}$	$+$	$-$

$x5_{it}$	$(Outside\_related\ directors)_{it}$	$-$	$+$
$x6_{it}$	$(Sum\ outside\ and\ outside\_related\ directors)_{it}$	$+$	$-$

Source: The author.

In Table 1.1 I present the factor loadings that make up the latent factor Board´s Independence. I present also the expected signs of each factor loadings in consonance with the theories used in this article.

TABLE 1.2: **Observed variables that measure Board Composition ($X2_{it}$)**

Variables	***Variables Name***	***Expected Sign***	
		Agency Theory	*Stewardship Theory*
$x7_{it}$	$(\#\ full\ board\ meetings)_{it}$	$-$	$+$
$x8_{it}$	$(Total\ directors)_{it}$	$-$	$+$
$x9_{it}$	$(Directors\ zero\ shares)_{it}$	$+$	$-$
$x10_{it}$	$(Directors\ age)_{it}$	$+$	$-$
$x11_{it}$	$(Directors\ tenure)_{it}$	$+$	$-$
$x12_{it}$	$(\#\ womans)_{it}$	?	?
$x13_{it}$	$(Ceo\ duality)_{it}$	$-$	$+$

Source: The author.

In Table 1.2 I present the factor loadings that make up the latent factor Board Composition. I present also the expected signs of each factor loadings in line with the theories used in this article.

In Table 1.3 I present the factor loadings that make up the latent factor Committees Independence. I present also the expected signs of each factor loadings in consonance with the theories used in this article.

TABLE 1.3: **Observed variables that measure Committees Independence ($X3_{it}$)**

Variables	***Variables Name***	***Expected Sign***	
		Agency Theory	*Stewardship Theory*
$x14_{it}$	$(Audit\ Committee)_{it}$	$+$	$-$

$x15_{it}$	$(Financial\ Expertise)_{it}$	$+$	$+$
$x16_{it}$	$(Compensation\ Committee)_{it}$	$+$	$-$
$x17_{it}$	$(Nomination\ and\ governance\ Committee)_{it}$	$+$	$-$

Source: The author.

In Table 1.4 I present the control variables with the expected signs of each variable in consonance with the theories used in this article.

TABLE 1.4: **Dependent variable** $(ROA)_{it}$ **and Control variables**

Variables	***Variables Name***	***Expected Sign***	
		Agency Theory	*Stewardship Theory*
$x18_{it}$	$(Total\ Audit\ Fees)_{it}$		
$x19_{it}$	$(Governance\ Policy)_{it}$		
$x20_{it}$	$(Firm\ Size)_{it}$		
$x21_{it}$	$(Leverage/Debt\ Proportion)_{it}$		

Source: The author.

The equations below represent the full system of simultaneous equations that was estimated to test the hypotheses of this study. It is worth mentioning that the variable ROA and the control variables are general response variables, while the variables Independence and Board Composition are both latent variables.

$$
\begin{cases}
x1_{it} = \propto_1 + \beta_1 . X_{it} + e . x1_{it} & (1)\\
\log x2_{it} = \log(\propto_2 + \beta_2 . X_{it} + e . x2_{it}) & (2)\\
\log x3_{it} = \log(\propto_3 + \beta_3 . X_{it} + e . x3_{it}) & (3)\\
\log x4_{it} = \log(\propto_4 + \beta_4 . X_{it} + e . x4_{it}) & (4)\\
\log x5_{it} = \log(\propto_5 + \beta_5 . X_{it} + e . x5_{it}) & (5)\\
\log x6_{it} = \log(\propto_6 + \beta_6 . X_{it} + e . x6_{it}) & (6)\\
x7_{it} = \propto_7 + \beta_7 . X2_{it} + e . x7_{it} & (7)\\
x8_{it} = \propto_8 + \beta_8 . X2_{it} + e . x_{8it} & (8)\\
\log x9_{it} = \log(\propto_9 + \beta_9 . X2_{it} + e . x9_{it}) & (9)\\
\log x10_{it} = \log(\propto_{10} + \beta_{10} . X2_{it} + e . x10_{it}) & (10)\\
\log x11_{it} = \log(\propto_{11} + \beta_{11} . X2_{it} + e . x11_{it}) & (11)\\
\log x12_{it} = \log(\propto_{12} + \beta_{12} . X2_{it} + e . x12_{it}) & (12)\\
\Pr(x13_{it} = 1 | X2_{it}) = \dfrac{1}{1 + e^{(\propto_{13} + \beta_{13} . X2_{it})}} & (13)\\
\Pr(x14_{it} = 1 | X3_{it}) = \dfrac{1}{1 + e^{(\propto_{14} + \beta_{14} . X3_{it})}} & (14)\\
\Pr(x15_{it} = 1 | x14_{it}) = \dfrac{1}{1 + e^{(\propto_{15} + \beta_{15} . x14_{it})}} & (15)\\
\Pr(x16_{it} = 1 | X3_{it}) = \dfrac{1}{1 + e^{(\propto_{16} + \beta_{16} . X3_{it})}} & (16)\\
\Pr(x17_{it} = 1 | X3_{it}) = \dfrac{1}{1 + e^{(\propto_{17} + \beta_{17} . X3_{it})}} & (17)\\
\log y_{it} = \log(\propto_{18} + \beta_{18} . x18_{it} + e . y_{it}) & (18)\\
\log y_{it} = \log(\propto_{19} + \beta_{19} . x19_{it} + e . y_{it}) & (19)\\
\log y_{it} = \log(\propto_{20} + \beta_{20} . x20_{it} + e . y_{it}) & (20)\\
\log y_{it} = \log(\propto_{21} + \beta_{21} . x21_{it} + e . y_{it}) & (21)\\
\log y_{it} = \log(\propto_{22} + \beta_{22} . X_{it} + e . y_{it}) & (22)\\
\log y_{it} = \log(\propto_{23} + \beta_{23} . X2_{it} + e . y_{it}) & (23)\\
\log y_{it} = \log(\propto_{24} + \beta_{24} . X3_{it} + e . y_{it}) & (24)\\
X2_{it} = \propto_{25} + \beta_{25} . X_{it} + e . X2_{it} & (25)\\
X3_{it} = \propto_{26} + \beta_{26} . X_{it} + e . X3_{it} & (26)
\end{cases}
$$

where, $i = 1, \dots, 568$; $t = 1, \dots, 11$; $(X3, x14, x15, x16, x17)_{it} \sim i.i.d.$;

$(X, x1, x2, x3, x4, x5, x6, e.x1, e.x2, e.x3, e.x4, e.x5, e.x6)_{it} \sim i.i.d.$;

$(X2, x7, x8, x9, x10, x11, x12, x13, e.x7, e.x8, e.x9, e.x10, e.x11, e.x12)_{it} \sim i.i.d.$;

$(y, x18, x19, x20, x21, X, X2, X3, e.y, e.X2, e.X3)_{it} \sim i.i.d.$ with mean vector μ and covariance matrix Σ.

1.4.6 Empirical strategy

Briefly, it can be said that the central empirical strategy of this study was to construct latent variables composed of observable variables of two competing theories, that is, the agency theory and the stewardship theory. The RBV theory, on the other hand, has a broader perspective and may have been in line with either the agency theory or stewardship theory.

The tests of the hypotheses discussed above are presented in two subsections of the next section: **1)** the mediating effect of board composition on the relationship between independence and a firm´s financial performance; **2)** the mediating effect of the committees' independence on the relationship between independence and the firm's financial performance.

In both subsections, we have pairs of hypotheses in which Hn_0 always refers to agency theory or the RBV aligned with this theory, and Hn_1 always refers to stewardship theory or the RBV aligned with this perspective.

1.5 RESULTS AND DISCUSSION

After performing the estimations described in the prior section, this section presents data analysis and the results. The analyses consider ROA as the metric of the firm's financial performance. The complete estimation output can be seen in Table 1.15. In the mediation analyses, all results were presented in terms of the three latent variables: Board Independence, Board Composition, and Committees Independence.

TABLE 1.5: **Board Independence Confirmatory Factor Analysis (CFA)**

	Coefficients $(\boldsymbol{\beta})$	***Agency***	***Stewardship***

	(*p-Value*)	***Theory* (β)**		***Theory* (β)**	
		Expect.	*Found*	*Expect.*	*Found*
(Independence) → (Inside Director)	-0.77 (0.000)	−	−	+	−
(Constant) → (Inside Director)	0.905 (0.000)				
(Independence) → (Outside Director)	1 (constrained)	+	+	−	+
(Constant) → (Outside Director)	0.367 (0.000)				
(Independence) → (Inside Director%)	-2.12 (0.000)	−	−	+	−
(Constant) → (Inside Director%)	-1.97 (0.000)				
(Independence) → (Outside Director%)	1.439 (0.000)	+	+	−	+
(Constant) → (Outside Director%)	-0.92 (0.000)				
(Independence) → (Outside-Related Director)	-0.52 (0.000)	−	−	+	−
(Constant) → (Outside-Related Director)	0.096 (0.000)				
(Independence) → (Sum Outside Director)	0.325 (0.000)	+	+	−	+
(Constant) → (Sum Outside Director)	0.725 (0.000)				

Source: The author.

In Table 1.5 (Board Independence Confirmatory Factor Analysis – CFA), the CFA results of the latent variable Board Independence are presented. If we observe the p-

values in Table 1.5, data seem to suggest that all observed metrics are jointly measuring board independence.

TABLE 1.6: **Board Composition Confirmatory Factor Analysis (CFA)**

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
(Board Composition) → (#Meetings)	-0.096 (0.000)	–	+	–
(Board Composition) → (Total Directors)	-0.163 (0.000)	–	–	+
(Board Composition) → (Direct Zero Share)	0.362 (0.000)	+	+	–
(Board Composition) → (Director Age)	0.002 (0.000)	+	+	+
(Board Composition) → (Director Tenure)	0.137 (0.000)	+	+	+
(Board Composition) → (Women)	-0.521 (0.000)	?	?	–
(Board Composition) → (CEO Duality)	-0.248 (0.000)	–	+	–

Source: The author.

In Table 1.6 (Board Composition Confirmatory Factor Analysis – CFA), the CFA results of the latent variable Board Composition are shown. If we observe the p-values in Table 1.6, data seem to suggest that all observed metrics are jointly measuring Board Composition. For the metric Director Age we have a p-value with up to five percent significance, which should be highlighted. However, the specification of the latent variable Board Composition without the Director Age variable results in a worse estimation when compared to the results presented above.

In the Table 1.7 (Committees' Independence Confirmatory Factor Analysis – CFA), the CFA results for the latent variable Committees Independence are shown. If we observe the p-values in Table 1.7, data seem to suggest that all observed metrics are jointly measuring committees independence.

TABLE 1.7 **Committees Independence Confirmatory Factor Analysis (CFA)**

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$		***Stewardship Theory*** $(\boldsymbol{\beta})$	
		Expect.	*Found*	*Expect.*	*Found*
(Committees) → (Audit Committee)	1 (constrained)	+	+	−	+
(Constant) → (Audit Committee)	3.547 (0.000)				
(Committees) → (Compensat. Committee)	1.197 (0.000)	+	+	−	+
(Constant) → (Compensat. Committee)	3.931 (0.000)				
(Committees) → (Nom. & Gov. Committee)	1.63 (0.000)	+	+	−	+
(Constant) → (Nom. & Gov. Committee)	4.662 (0.000)				

Source: The author.

1.5.1 Board of directors composition mediates independence effect on firm´s financial performance

I argue that whether board composition affects or not the impact of independence on firm performance is clouded by the fact that the empirical evidence is often based on the perspective of only one of two opposing theories, the agency theory or stewardship theory.

On the one hand, agency theory states that independence is associated with firms suffering from agency problems that can come from choosing directors for what they can add to the board in terms of knowledge and diversity of ideas rather than the ability of directors to exercise their monitoring role. Therefore, shareholders demand high levels of independence to guarantee effective monitoring, which should increase the firm's financial performance. On the other hand, stewardship theorists point out that agency problems are not a concern and, because of that, directors should assist executives in their roles and duties. Therefore, stewardship theory advocates that directors should be chosen by what they will add to the management of the firm rather than its monitoring capacity. Thus, low levels of independence in service-oriented boards imply an increase in the accuracy of board roles and duties. Based on this definition, we can argue that a specific domain will require a different kind of resource.

On these grounds, the bidimensionality of board composition was tested through a mediation model, in which both board independence and board composition were measured as latent variables consisting of observable metrics of both competing theories and a measurement error term.

The equations below represent the system of simultaneous equations that was estimated to test the hypotheses of this section. It is worth mentioning that the variable ROA and the control variables are general response variables, while the variables Board Independence and Board Composition are both latent variables.

$$\begin{cases} ROA_{it} = \beta_0 + \beta_1(Board\ Independece)_{it} + \beta X_{it} + e_{it} & (C) \\ (Board\ Composition)_{it} = \beta_0 + \beta_1 Independece_{it} + \beta X_{it} + e_{it} & (a'_{BC}) \\ ROA_{it} = \beta_0 + \beta_1(Board\ Composition)_{it} + \beta X_i + e_{it} & (b'_{BC}) \\ ROA_i = \beta_0 + \beta_1(Board\ Independece)_{it} + \beta_2(Board\ Composition)_{it} + \beta X_{it} + e_{it} & (c'_{BC}) \end{cases}$$

The figure below represents the estimated model in traditional mediation notation. Each arrow represents a path coefficient of generalized structural equation modeling. In order to provide an intuition on the estimation, each path coefficient can be understood as one of the linear regressions specified in the system shown above or as a path coefficient of a path analysis.

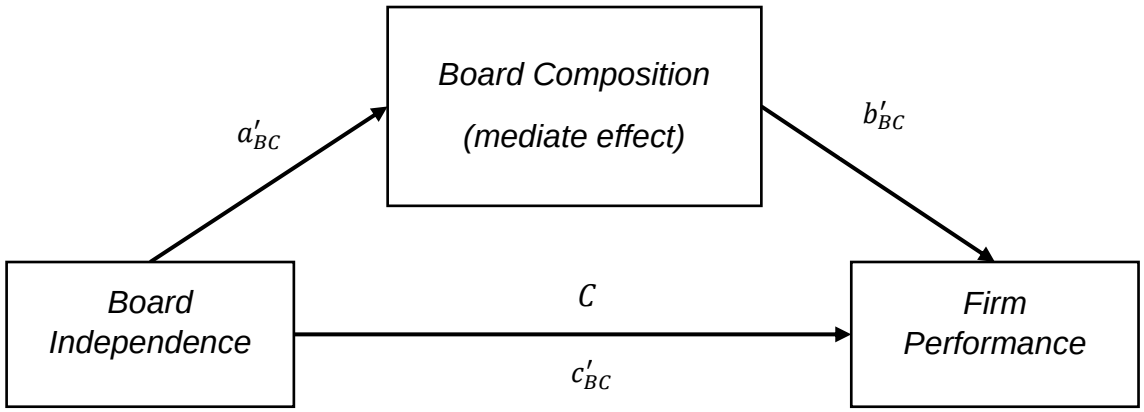


Figure 1.4 The board composition mediating effect on the relationship between board independence and firm financial performance.
Source: The author.

According to agency theory, it has been hypothesized in $\mathrm{H1}_0$ that the direct positive effect of board independence on the firm's financial performance is mitigated (mediated) by the agency costs derived from choosing a board composition that prioritizes the directors' ability to provide services rather than the director's ability to perform an effective monitoring of executives' actions. On the contrary, in line with the stewardship theory, it has been hypothesized in $\mathrm{H1}_1$ that the direct negative effect of board independence on the firm's financial performance is mitigated (mediated) by choosing a board composition that prioritizes the directors' ability to provide services rather than the director´s ability to perform an effective monitoring of executives' actions. The hypotheses follow below.

$H1_0$: *Agency problems mediate the relationship between board independence and the firm's financial performance in such a way that board composition effects are negative.*

$H1_1$: *Services mediate the relationship between board independence and the firm's financial performance in such a way that board composition effects are positive.*

In short, these competing theories have opposing ideas about the indirect effects of independent (outside) directors on firm performance through board composition. For that reason, if agency logic is correct, there should be a positive total effect of Board Independence on ROA combined with a negative mediation effect of Board Composition and $H1_0$ would not be rejected. Conversely, if stewardship ideas are correct, the opposite effect is expected, that is, a negative total effect of Board Independence on ROA combined with a positive mediation effect of Board Composition. Thus, $H1_0$ would be rejected and, consequently, $H1_1$ would not be rejected.

The association between Board Independence and ROA are completely mediated since the direct effect of Independence on ROA lost statistical significance as show in Table 1.8.

TABLE 1.8: **Direct effect** (Board Independence → ROA)

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
Direct effect (C)	1.887 (.)	+	−	.

Source: The author.

Based on Table 1.9 we can see the indirect effect of Board Independence on ROA mediated by Board Composition with a path coefficient $\beta = -0.141$, significant at 10 per cent level.

TABLE 1.9: **Indirect effect** (Board Independence → Board Composition → ROA)

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
Indirect effect $\{(\boldsymbol{a'_{BC}}) \times (\boldsymbol{b'_{BC}})\}$	−0.141 (0,080)	−	+	−

Source: The author.

The results in Table 1.9 show the total effect of Board Independence on ROA mediated by Board Composition, which has a statistically significant path coefficient equal to $\beta = 1.747$.

TABLE 1.10: **Total effect** (Board Indep. → ROA)**+**(Board Indep. → Board Composition → ROA)

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
Total Effect $(\boldsymbol{c'_{BC}})$	1.747 0.000	+	−	+

Source: The author.

Analyzing these results combined, we can see in Table 1.11 that there is slight support for the hypothesized mediation in $\mathrm{H1}_0$ (and, consequently, rejection of $\mathrm{H1}_1$), wherein the total positive effect of Board Independence on the firm's financial performance appears to be smoothed by the agency costs derived from the Board Composition. Thus, one can argue that boards that increase the number of women directors and the number of meetings, with high number of total directors and with CEO Duality, tend to increase agency costs and, therefore decrease monitoring capacity of boards.

TABLE 1.11: **Mediation effect**

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***

Direct effect (C)	1.887 (.)	+	−	.
Indirect effect $\{(\boldsymbol{a'_{BC}}) \times (\boldsymbol{b'_{BC}})\}$	−0.141 (0,080)	−	+	−
Total Effect $(\boldsymbol{c'_{BC}})$	1.747 0.000	+	−	+

Source: The author.

Another perspective based on RBV states that the level of board independence should be defined according to a firm's resources. In short, distinct resource needs will require distinct levels of independence. The hypotheses follow below.

$\mathrm{H3_0}$**:** *Critical resources mediate the relationship between board independence and the firm's financial performance in such a way that board composition mitigates the positive effect of independence on performance.*

$\mathrm{H3_1}$**:** *Critical resources mediate the relationship between board independence and the firm's financial performance in such a way that board composition mitigates the negative effect of independence on performance.*

Based on the results above, it is noticeable that if the board is composed of directors dedicated to providing internal services, then these directors are not apt to access critical external resources as competitive credit lines, which usually require an effective corporate governance mechanism. On these grounds, $\mathrm{H3_0}$ cannot be rejected and, consequently, $\mathrm{H3_1}$ is rejected.

1.5.2 Independence of committees mediates the relationship between independence and the firm's financial performance

Given the principal-agent problem within the firm, directors are the "common apex" mechanism for monitoring and controlling executives' actions. Classic agency problems require a business-like mechanism designed to build an efficient contract technology capable of mitigating any deadweight losses due to the principal-agent problems. For instance, the board of directors has the duty of defining compensation, hiring executives and even firing executives.

Although the logic of the agency theory is widely accepted in the areas of economics, accounting, and finance, strategy literature diverges from this thinking, usually rooted in stewardship theory. It is noticeable that much of the current debate in strategy literature revolves around the idea that non-independent (insider) directors have more accurate information than independents (outsiders). Non-independent (insider) directors' skills and knowledge may increase the boards' ability to effectively assist executives in the management process. Anderson et al. (2004, p. 317) have argued that although boards are responsible for monitor of the financial accounting processes, this task is usually delegated to a committee of the board, the audit committee. This committee "plays an important role because it is concerned with establishing and monitoring the accounting processes to provide relevant and credible information to the firm's stakeholders."

The equations below represent the system of simultaneous equations that was estimated to test the hypotheses of this section. It is worth mentioning that the variable

ROA and the control variables are general response variables, while the variables Board Independence and Committees Independence are both latent variables.

$$\begin{cases} ROA_{it} = \beta_0 + \beta_1(Baard\ Independece)_{it} + \beta X_{it} + e_{it} & (C) \\ (Committees\ Independence)_{it} = \beta_0 + \beta_1(Baard\ Independece)_{it} + \beta X_{it} + e_{it} & (a'_{CI}) \\ ROA_{it} = \beta_0 + \beta_1(Committees\ Independence)_{it} + \beta X_i + e_{it} & (b'_{CI}) \\ ROA_i = \beta_0 + \beta_1(Baard\ Independece)_{it} + \beta_2(Committees\ Independence)_{it} + \beta X_{it} + e_{it} & (c'_{CI}) \end{cases}$$

The Figure 1.7 represents the estimated model in traditional mediation notation. Each arrow represents a path coefficient of generalized structural equation modeling. In order to provide an intuition on the estimation, each path coefficient can be understood as one of the linear regressions specified in the system shown above or as a path coefficient of a path analysis.

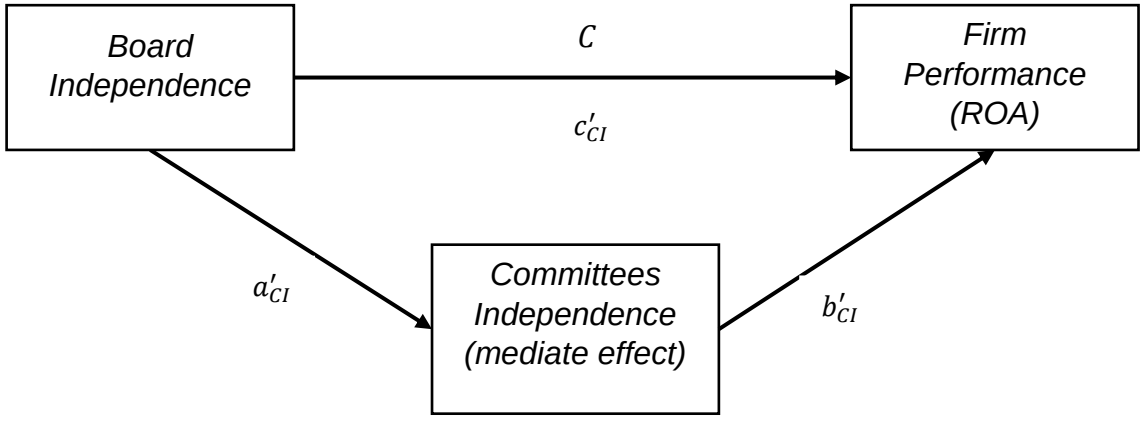


Figure 1.5 The committees' independence mediating effect on the relationship between board independence and firm financial performance.
Source: The author.

According to agency theory, it has been hypothesized in $\mathrm{H2}_0$ that the direct positive effect of board independence on the firm's financial performance is increased (mediated) by committees independence, i.e., committees of audit, compensation and nominating are fulfilling their specific roles and fiduciary duties that act in favor of shareholders' interests, which, in turn, improve the monitoring of corporate functions and

increase objectivity and reliability of all of the board's crucial roles. On the contrary, in line with the stewardship theory, it has been hypothesized in $H2_1$ that the direct negative effect of board independence on the firm' s financial performance is increased (mediated) by the presence of independent committees that tend to emphasizes directors' ability of monitoring rather than director´s ability to provide services. The hypotheses follow below.

$H2_0$ *Agency problems mediate the relationship between board independence and the firm's financial performance, through committees, in such a way that outside directors' effects are positive.*

$H2_1$: *Services mediate the relationship between the degree of independence of directors and the firm's financial performance, through committees, in such a way that if critical processes and decisions of boards occur on committees, then, outside directors effects are negative.*

The association between Independence and ROA is completely mediated since the direct effect of Independence on ROA lost statistical significance as show in Table 1.12.

Table 1.12: **Total effect** (Board Independence → ROA)

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
Direct effect (C)	1.887 (.)	+	−	.

Source: The author.

Based on results presented in Table 1.13, it can be seen the indirect effect of Independence on ROA, mediated by committees independence, with a path coefficient $\beta = 0.069$, significant at 5 per cent level.

TABLE 1.13: **Indirect effect** (Board Independence → Committees' independence → ROA)

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
Indirect effect $\{(\boldsymbol{a'_{CI}}) \times (\boldsymbol{b'_{CI}})\}$	0.069 (0,005)	+	−	+

Source: The author.

The results of Table 1.14 show the total effect of Board Independence on ROA, mediated by Committees' Independence, which has a statistically significant path coefficient equal to $\beta = 1.957$.

TABLE 1.14: **Total effect** (Board Indep.→ROA)**+**(Board Indep. → Committees' Indep. → ROA)

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
Total Effect $(\boldsymbol{c'_{CI}})$	1.957 0.000	+	−	+

Source: The author.

Analyzing these results combined, we can see in Table 1.15 that there is support for the hypothesized mediation in $\mathrm{H2}_0$ (and, consequently, rejection of $\mathrm{H2}_1$), wherein the total positive effect of independent (outside) directors on the firm's financial performance appears to be increased by the committees' independence. Thus, one can argue that boards that increase the independence of the committees tend to increase the effectiveness of the monitoring capacity of boards.

TABLE 1.15: **Mediation effect**

	Coefficients $(\boldsymbol{\beta})$ **(*p-Value*)**	***Agency Theory*** $(\boldsymbol{\beta})$	***Stewardship Theory*** $(\boldsymbol{\beta})$	***Found***
Direct effect (C)	1.887 (.)	+	−	.
Indirect effect $\{(\boldsymbol{a}'_{CI}) \times (\boldsymbol{b}'_{CI})\}$	0.069 (0,005)	+	−	+
Total Effect $(\boldsymbol{c}'_{CI})$	1.957 0.000	+	−	+

Source: The author.

Another perspective based on RBV view posits that the level of board independence should be defined according to a firm's resources. In short, distinct resource needs will require distinct levels of independence. The hypotheses follow below.

$H4_0$**:** *Critical resources mediate the relationship between the independence of the board of directors and the firm's financial performance, through committees, in such a way that outside directors' effects are positive.*

$H4_1$**:** *Critical resources mediate the relationship between the independence of the board of directors and the firm's financial performance, through committees, in such a way that outside directors' effects are negative.*

Based on the results above, it is noticeable that independent committees appear to improve the quality of disclosure, which, in turn, is crucial in attracting investments.

High levels of disclosure can decrease the cost of governance mechanisms, which may mitigate both moral hazard and informational asymmetry. Boards of directors are responsible for monitoring lending agreements by auditing the financial statements in order to protect investors' rights. Thus, the option for independent committees should be one of the functions of the board of directors. On these grounds, $H4_0$ cannot be rejected and, consequently, $H4_1$ is rejected.

1.6 DISCUSSION

In this paper, I argued that the claim that the relationship between the board of directors and long-term firm performance in fact does matter. The consensus view of standard-setters and a significant body of research is that efficient monitoring requires both an appropriate set of incentives and a set of skills to perform monitoring (Beasley, 1996). Along similar lines, "independent (outside) directors are effective monitors because of reputation concerns and their desire to obtain additional director positions". Anderson et al., (2004, p. 322), posit that scholars "suggests that professional directors and directors with equity stakes are associated with greater monitoring."

However, literature is not stacked and there have been dissenters to the view that independent (outside) directors and monitoring are sufficient dimensions to conceptualize boards. Based on the aforementioned discussion, it is clear that committees and board composition placed a cornerstone role on the boards. Current research appears to validate the view that this issue should be addressed by a multitheoretical approach. On these grounds, this paper's basic argument is that to develop such a kind of approach is to fundamentally identify a convergent point among

the theories adopted in a way to reconcile the divergent findings. The theoretical discussion conducted during this essay shows that board composition is a common issue on each theoretical prism that addressed the relationship between boards and performance. A second point is that boards' relevance is rooted in directors' roles and duties. And finally, committees are the arena in which the decision process occurs.

On the basis of the evidence found on the full mediation model, it seems fair to suggest that further research in this area may consider both the board composition and the board committees to conceptualize the board of directors in a broader view. The main theoretical premise behind the model proposed on this study is that the three categories defined in Johnson's "role typology" may be correct, under specific assumptions. The theoretical approach adopted propounds the view that ex-ante we should not assume any restriction or assumption about the relation among firms, managers, directors, and shareholders. I am not alone in this view. Zahra & Pearce (1989) have argued that to access the idiosyncrasies inherent on relation between committees, boards, and long-term performance requires us to examine the distinct committees and their structures and furthermore their relations with the board. Rather than, relationship among board composition, committees, and firm financial performance may occur either directly through impact of the functions of both board composition and committees on performance or indirectly by the mediate effect of both board composition´s activities and committees' activities on boards' roles and duties. On logical grounds, John and Senbet (1998) have argued that despite the traditional argument that size and composition drives the boards performance, committees are the root of decision-making process. My only claim is that the concept of board

independence is mediated by both the board composition and the independence of committees' members. In short, both the board composition as well the committee members' independence mediates the relationship between the board of directors and firm financial performance.

Additional, literature seems to show that by both the committees as well the board composition, boards can provide better alignment (or agency problems), positive externalities (or lack on service), or access to resources (or scarcity of critical resources). I also emphasize that a specific committee effect on board performance may not be independent of other committees, i.e., each committee explain the relation between committees' independence and board performance. The literature shows no consensus on which should be an optimal composition for board of directors. Usually, past researches have addressed both distinct problems and/or benefits that boards may lead. However, I have argued that by assessing the relationship between the board of directors and firm financial performance through latent variables may be a way to identify which factors implies in an effective or non-effective effect from the boards on performance. For instance, a collection of committees may have a diversity of configuration. For example, audit committee may guarantee that executives and shareholders interest are aligned. On the other hand, compensation committees may lack knowledge about the company not providing a top management team capable to assist executives and directors in their roles and duties. Taking a middle-ground position, this study claims that only throughout a broader comprehension of composition of boards and their committees is possible to access the relationship between the board of directors and firm financial performance.

Thus, I propose and estimate the model on Figure 1.6. to access the relationship between the board of directors and firm financial performance based on the previous discussion. I conclude that choosing a board composition that prioritizes the directors' ability to provide services rather than the director’s ability to perform an effective monitoring of executives' actions decreases firm´s performance. Conversely, increasing committees’ ability to perform an effective monitoring of executives' actions rather than prioritizes the committees' ability to provide services increases firm´s performance.

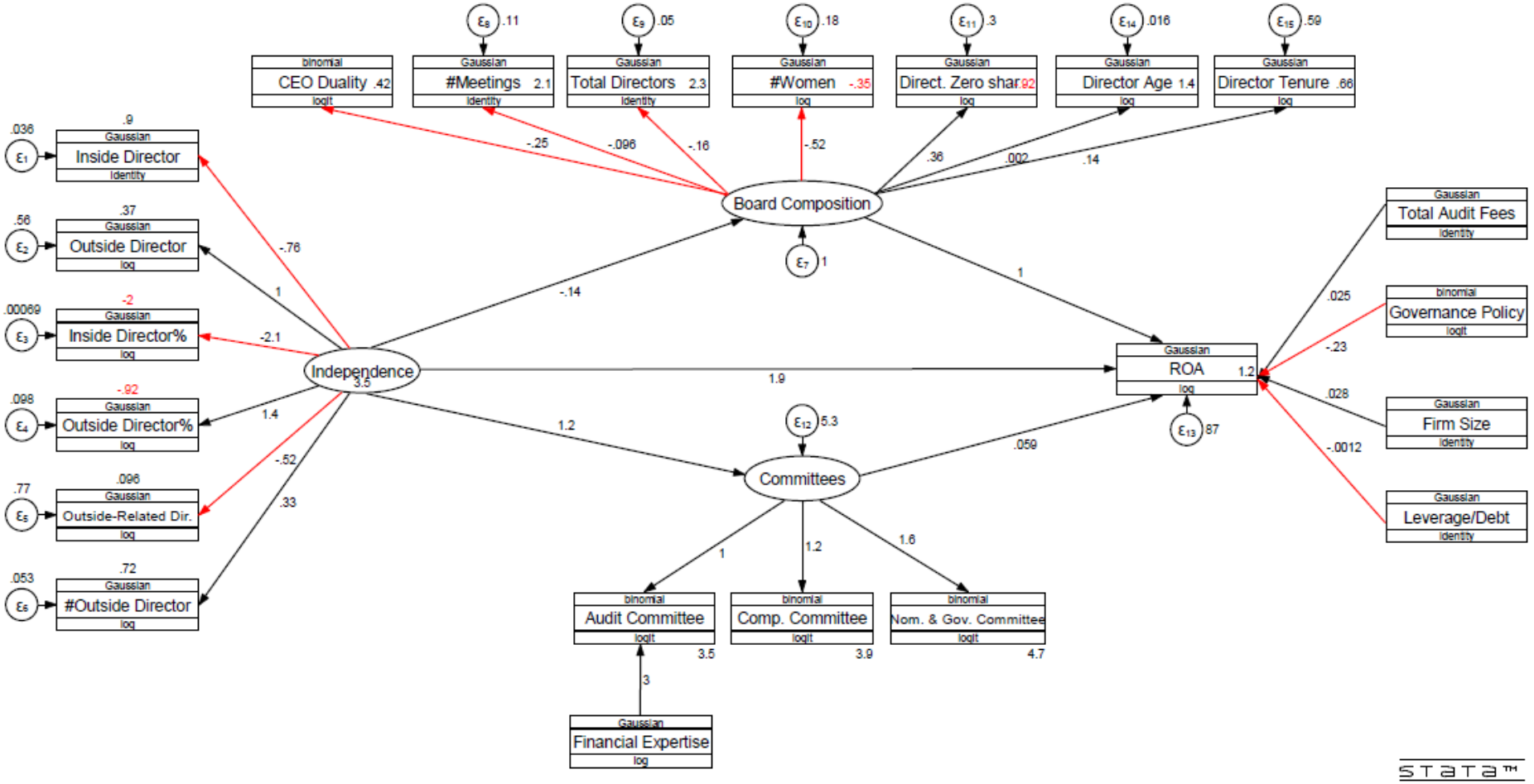


Figure 1.6: **gSEM Model Results**
Source: The author.

TABLE 1.16: **gSEM Estimation Results**

	Coef. **P > |z|**	**Std. Err.**	**z**	**(95% conf. interval)**	
(Constant) → (ROA)	1.164 (0.000)	0.212	5.5	0.750	1.579
(Board Independence) → (ROA)	1.887 .	.	.	.	.
(Board Independence) → **(Board Composition)**	-0.141 (0.080)	0.080	-1.75	-0.298	0.017
(Board Independence) → **(Committees Independence)**	1.184 0.000	0.315	3.76	0.567	1.801
(Board Composition) → (ROA)	1 (constrained)				
(Committees Independence) → (ROA)	0.059 (0.000)	0.011	5.39	0.037	0.080
(Board Independence) → (Inside Director)	-0.765 (0.000)	0.026	-28.89	-0.817	-0.713
(Constant) → (Inside Director)	0.905 (0.000)	0.003	327.77	0.899	0.910
(Board Independence) → (Outside Director)	1 (constrained)				
(Constant) → (Outside Director)	0.367 (0.000)	0.008	44.73	0.351	0.383
(Board Independence) → (Inside Director%)	-2.118 (0.000)	0.058	-36.74	-2.230	-2.005
(Constant) → (Inside Director%)	-1.968 (0.000)	0.003	-593.71	-1.977	-1.962
(Board Independence) → (Outside Director%)	1.439 (0.000)	0.027	53.16	1.386	1.493
(Constant) → (Outside Director%)	-0.917 (0.000)	0.012	-74.9	-0.941	-0.893
(Board Independence) → (Outside-related Director)	-0.519 (0.000)	0.028	-18.48	-0.574	-0.464

(Constant) → (Outside-related Director)	0.096 (0.000)	0.010	9.47	0.076	0.116
(Board Independence) → (Sum Outside Director)	0.325 (0.000)	0.010	32.24	0.305	0.345
(Constant) → (Sum Outside Director)	0.725 (0.000)	0.002	446.36	0.722	0.728
(Board Composition) → (Women)	-0.521 (0.000)	0.033	-15.79	-0.586	-0.456
(Constant) → (Women)	-0.351 (0.000)	0.009	-38.84	-0.369	-0.333
(Board Composition) → (#Meetings)	-0.096 (0.000)	0.009	-10.53	-0.114	-0.078
(Constant) → (#Meetings)	2.127 (0.000)	0.004	499.52	2.119	2.136
(Board Composition) → (Total Director)	-0.163 (0.000)	0.011	-15.31	-0.184	-0.142
(Constant) → (Total Director)	2.262 (0.000)	0.003	761.22	2.256	2.268
(Board Composition) → (CEO Duality)	-0.248 (0.000)	0.052	-4.74	-0.350	-0.146
(Constant) → (CEO Duality)	0.417 (0.000)	0.026	15.94	0.366	0.468
(Board Composition) → (Director Zero Share)	0.362 (0.000)	0.038	9.5	0.287	0.436
(Constant) → (Director Zero share)	-0.922 (0.000)	0.018	-52.09	-0.957	-0.888
(Board Composition) → (Director Age)	0.002 (0.018)	0.001	2.37	0.0003	0.004
(Constant) → (Director Age)	1.391 (0.000)	0.0004	3334.76	1.390	1.391
(Board Composition) → (Director Tenure)	0.136 (0.000)	0.013	10.65	0.111	0.161
(Constant) → (Director Tenure)	0.656	0.005	127.31	0.646	0.666

	(0.000)				
(Committees Independence) → (Audit Committee)	1 (constrained)				
(Constant) → (Audit Committee)	3.547 (0.000)	0.169	21.04	3.217	3.877
(Committees Independence) → (Compensat. Committee)	1.197 (0.000)	0.079	15.18	1.043	1.352
(Constant) → (Compensat. Committee)	3.931 (0.000)	0.183	21.49	3.572	4.289
(Committees Independence) → (Nom. & Gov. Committee)	1.630 (0.000)	0.128	12.7	1.378	1.882
(Constant) → (Nom. & Gov. Committee)	4.662 (0.000)	0.255	18.27	4.162	5.162
(Financial Expertise) → (Audit Committee)	3.048 (0.000)	0.805	3.79	1.471	4.625
(Total Audit Fees) → (ROA)	0.025 (0.128)	0.016	1.52	-0.007	0.057
(Governance Policy) → (ROA)	-0.225 0.001	0.069	-3.27	-0.360	-0.090
(Firm Size) → (ROA)	0.028 (0.059)	0.015	1.89	-0.001	0.057
(Leverage/Debt Proportion) → (ROA)	-0.001 (0.003)	0.0004	-2.92	-0.002	-0.0004
var(e.**(Board Composition)**)	1.001	0.123		0.786	1.275
var(e.**(Committee Independence)**)	5.255	0.483		4.390	6.292
var(**(Board Independence)**)	3.453	1.991		1.116	10.689
var(e.(Outside Director))	0.555	0.010		0.536	0.576
var(e.(Inside Director%))	0.001	0.0001		0.001	0.0008
var(e.(Outside Director%))	0.098	0.001		0.095	0.100
var(e.(Outside-related Director))	0.766	0.008		0.750	0.782
var(e.(Sum Outside Director))	0.053	0.001		0.050	0.055
var(e.(ROA))	87.367	10.398		69.190	110.32

var(e.(Women))	0.178	0.003		0.172	0.183
var(e.(Director Zero shar.))	0.300	0.006		0.288	0.313
var(e.(Director Age))	0.016	0.0003		0.015	0.016

Source: The author.

Chapter 2

2 THE IMPACT OF SUPPLY CHAIN MANAGEMENT ON FIRM FINANCIAL PERFORMANCE: AN ACCOUNTING AND FINANCE ANALYSES

2.1 INTRODUCTION

Scholars and practitioners share the common view that supply chain management (SCM) is integral to the performance of any firm. The Vice President of Boston Consulting Group, Harold Sirkin, states that the basis of competition has been changed given the new dynamic of the economy. Thus, the competition is now of supply chain versus supply chain and no longer firm versus firm (Henkoff, 1994). For instance, one commonly adopted definition postulates that SCM has the purpose of increasing the long-term performance within the firm and also the entire supply chain (Mentzer et al., 2001). Along similar lines, Presutti and Mawhinney (2007, p. 38) posit that more than 70 percent of a typical "manufacturing firm's expenditures are on supply chain-related activities, the potential impact of effectively linking supply chain and financial performance becomes absolutely huge". In the same vein, the Council of Supply Chain Management Professionals (CSCMP) has argued that "supply chain executives need a more relevant set of metrics in order to better measure performance improvement." Surprisingly, there is insufficient objective empirical findings on this topic to establish a consensus view of how SCM correlates to firm financial performance.

I argue that the impact of SC-activities on firm profitability may be better measured by adopting metrics based on balance sheet and financial statement, since

these metrics allow us to identify the SC-strategy; are public and have low cost; are comparable over time; among companies; among countries; and the balance sheet and financial statement give us the financial performance.

There seems to be no compelling reason to argue against the existence of relation between SCM and firm performance, which is “stressed in both practitioner journals and academic journals” (Hendricks and Singhal 2008, p. 777). However, much of the current research addresses this relationship by measuring supply chain activities through non-financial metrics (Kaplan and Norton, 1992; Chan et al., 2006; Gunasekaran et al., 2001). The main argument behind these studies is that non-financial metrics capture the dynamic operations management activities and day-to-day activities in a more accurate manner (Gardner, 2004). A small set of scholars has adopted financial metrics in a more traditional manner. The basic premises of these researchers are that financial metrics are more objective, which allows managers to measure more directly the impact of SCM on performance (Christopher, 1992; 2000; Mason-Jones and Towill, 1997; Hendricks and Singhal, 2003). Thus, we can argue that the “lack of a balance” between these two approaches might be one possible reason why the supply chain literature provides little systematic evidence connecting SCM to financial performance (Gardner, 2004; Gunasekaran and Kobu, 2007). That said, this study aims to answer the following researches questions: **Does SCM strategies impact on firm financial performance? Does firm financial performance impacts on SCM strategies?**

This study was based on two companies, Walmart and P&G, that are considered supply chains in the specialized literature. These companies have a partnership that is

considered one of the most successful cases of information sharing in the supply chain. P&G is pointed as lean company (Mason-Jones & Towill, 2000; Grean & Shaw, 2002; Christopher, Peck & Towill, 2006). Walmart is pointed as agile company (Fiotito, Giunipero & Yan, 1998; Horwitz, 2009; Lee, 2004; Grean & Shaw, 2002). A Lean company focuses on waste elimination and cost minimization which in turn are positively correlated with firm profitability. Conversely, an agile company focuses on flexibility and agility that are also positively correlated with firm profitability.

On these grounds, it is argued in this study that the relationship between SCM and firm financial performance may be better understood by measuring performance in a more objective manner; i.e., by adopting financial metrics. Unlike the common approach, in which performance is measured by questionnaires and even anecdotal evidences, analyzing supply chain's activities adopting financial metrics can provide insights into how SCM strategies affect firm performance (Wagner et al., 2012; Hendricks and Singhal, 2005; 2014).

On these grounds, one can argue that SCM strategies can make companies run more efficiently, which brings wealth to the shareholders. Because of this, executives might use SCM practices to generate competitive advantages. This study argues that the available evidence is not enough to portray the complex relationship between SCM and firm financial performance. It is worth mentioning that whether SCM practices are good or bad is clouded by those scholars who have considered supply chain activities neglecting chain's financial flows. I argue that addressing the relationship between SCM and firm financial performance through objective financial metrics can also provide insights into which paths can mitigate possible supply-chain threats or which can

maximize supply-chain potentialities. Additionally, the discussion will center on which circumstances for firm financial performance matter to SCM strategy. Under the perspective of financial statement analysis and accounting analysis, this study explores the argument.

Although it is intuitive that the link between SCM and firm financial performance may be addressed through financial statement analysis and accounting analysis, few identified studies have adopted these approaches (Hendricks and Singhal, 2003; 2005; 2008; 2009; 2012; 2014; Wagner et al., 2012). Specifically, this study adopted a set of well-established metrics of supply chain activities derived from Supply-Chain Operations Reference-Model (SCOR) and Economic Value Added (EVA) to access the SCM strategic choice (Klingenberg et al., 2013). Additionally, this study used secondary data to measure both the supply chain activities and the firm's financial performance and, in doing so, all the metrics came from the same data source: the balance sheet and the financial statement. Because of this, it is expected that the Data Generating Process (DGP) of both SCM metrics and financial performance metrics would be the same. Considering that, problems of comparability and generalizability of results could be mitigated, which constitutes an empirical and theoretical contribution to the field.

This study also adopted two distinct econometric techniques (Granger Causality Tests and VAR) to access the long-term relationship between SCM and firm financial performance in an attempt to answer the claim that the field needs more rigorous methods to test the SCM theory (Grimm, 2008). Nevertheless, with the supply chain metrics and firm financial performance measure operationalized in this study, the often-asked questions of whether SCM strategies are causing Firm Performance or Firm

Performance is causing SCM strategies are answered, in Granger-cause sensitization. Under the assumptions of stationarity of the time series adopted, the adequate number of lagged terms, and the absence of correlation between the error terms, the study distinguished unidirectional causality either from SCM to performance or performance to SCM. The study also distinguished bilateral causality and independence between both constructs. In the next sections, the theoretical perspectives and methodology are outlined. The data were collected annually from the S&P Capital IQ database from Walmart and P&G, covering the period from 1979 to 2014 totaling 35 observations for each supply chain. The results suggest that if a supply chain chose a lean strategy such as P&G, then lean metrics will granger-cause ROA. Conversely, if a supply chain chose an agile strategy such as Walmart, then agile metrics will granger-cause ROA.

2.2 LITERATURE REVIEW

On this study, I understand SCM as the process of strategically coordinating business activities within a specific firm and throughout the supply chain. By doing this, it is expected that long-term performance will increase both at the firm level and at the supply chain level (Mentzer et al*.,* 2001). Through a logical perspective, this study argues that the supply chain strategy should be aligned with the firm strategy to maximize the long-term performance of either the individual companies or the supply chain as a whole.

I put forward the claim that the impact of SCM activities on firm financial performance may be more objectively measured by adopting metrics based on accounting information and financial information. The underlying argument in favor of

this idea is that SCM, accounting and finance are business subjects with many commonalities. Specifically, these fields aim to produce quality information in order to support an efficient decision-making process. Additionally, SCM is a process of managing flows that may be flow of goods, flow of services, information flows, financial flows, among others. Thus, if all the stakeholders are provided with adequate information, then we can expect that the long-term performance of firms will tend to improve.

In order to support the abovementioned idea by the accounting point of view, the Statement of Financial Accounting Concepts No.1 states that “financial reporting should provide information about the economic resources of an enterprise, the claims to those resources, and the effects of transactions, events, and circumstances that change its resources and claims to those resources.” Thus, financial reporting should provide more relevant information endowed with more quality to make the decision-making process more accurate (Dechow et al., 2010).

Complementary to this topic, by the SCM point of view Mentzer et al., (2001) state that SCM is the process of strategically coordinating the traditional business functions within a specific firm and across the supply chain. This process should be done by adopting specific analytical tools that may improve the performance of the supply chain (Mentzer et al. 2008). Examined more narrowly, one of the functions of supply chain management is to manage the chain's financial flow.

There is a claim from academics and practitioners for more research that establishes a formal bridge linking SCM to firm financial performance (Wagner et al., 2012; Hendricks and Singhal, 2005; 2014). Aside from the theoretical debate of whether

or not the financial-based approach explains supply chain impact on firm financial performance, we can argue that there is a need for further developing systematic analyses in an attempt to provide solid empirical proof of the impact of SCM on firm financial performance. If we show that supply chain practices increase firm performance, through an efficient management of the chain's financial flows, and if we are underestimating the effect of neglecting the other flows of SCM, then we are providing evidence confirming that SCM is pivotal to firm financial performance.

Drawing on the strategy literature, a necessary condition to achieve a supernormal (abnormal) return on investment from the supply chain activities (Anderson and Jap, 2005) is to turn these activities into a competitive advantage either from Porter's (1980; 2008) Five Forces Model's point of view or through a Resource Based View perspective, in which a resource must be valuable (Conner, 1991), rare (Dierickx & Cool, 1989), inimitable (Rumelt, 1984; Conner & Prahalad, 1996) and non-substitutable (Dierickx & Cool, 1989) (V.R.I.N) as stated by Barney's (1986; 1990). Aside from the theoretical debate of whether this approach explains competitive advantage, it can be argued that the information seems to fulfill the assumptions to be considered a V.R.I.N (valuable, rare, inimitable and non-substitutable) resource, i.e., information quality is at least a firm's critical-resource.

For the sake of discussion, please refer to Figure 2.1 that provides a framework combining Porter's Five Force Model and RBV's model in a SCM strategy context.

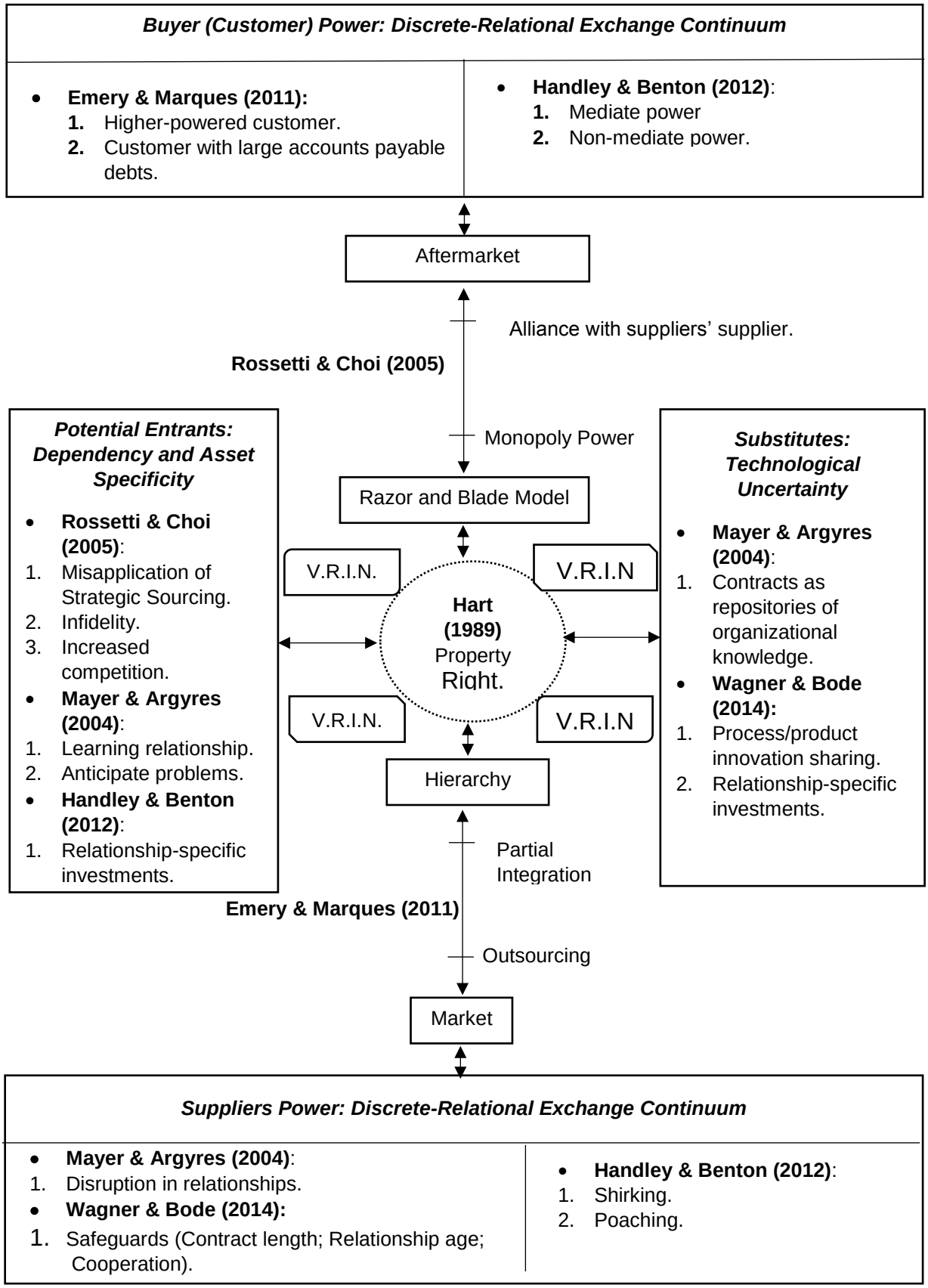


Figure 2.1: Framework combining SCM Strategy, Porter's Five Force Model, and RBV's model. Source: The author.

The underlying argument of the aforementioned framework is that firms must define precisely their own basic priorities in terms of cost, flexibility, delivery, quality and innovation (Boyer and Lewis, 2002; Ward et al., 1998; Hayes and Pisano, 1996; Krause et al., 2001; Kroes and Ghosh, 2010). As a rebuttal to this point, it also might be argued that managers face several tradeoffs in decision-making involving issues related to optimal choice between cost and flexibility, delivery and flexibility, and delivery and quality (Boyer and Lewis, 2002). If a company designs its processes considering its goods characteristics and structure, then this alignment generates value (Wagner et al., 2012). One can argue that under this condition, supply chains will be able to provide more accurate information about companies by using accounting data and finance data; consequently, supply chains will be able to effectively assist firms in designing better activities and solutions for decision-making process; i.e., they will provide strategic information for the board of the directors and C-level executives. Specifically, Daugherty et al. (1998) argued that resources allocation to improve customer satisfaction should be measured based on accounting standards and also should be significant.

2.2.1 Supply chain Finance

There are several arguments that can be advanced to support the view that supply chain should be more closely linked with the financial decisions in a traditional manner (Gardner, 2004). The operations management literature clearly establishes that supply chain activities exert significant impact on firms' operations activities. Nonetheless, little academic effort has been seen to empirically link financial performance and supply chain, specially by using secondary data. This study is not the

only one to consider that it is possible to access supply chain performance through financial performance evaluation. For instance, “[t]he lack of links between supply chain operations and financial performance seems to be related to the Board's perception of the supply chain function and to the alignment between supply chain and finance functions” (Camerinelli and Candtu (2006, p.41). Additionally, it is well known among academics and practitioners that both shareholders’ investment decision and firms’ strategic decision-making are deeply rooted on financial criteria (Useem, 1984; Richardson, 1987; DeFond & Jiambalvo, 1994; Dichev & Skinner, 2002; Klein, 1998; 2002a; 2002b; Davis, Yoo & Baker, 2003; Anderson, Mansi, Reeb, 2004; Gendron, Bédard, 2006).

Likewise, Fawcett and Waller (2011) have fostered a debate on the relevance of specific elements of firm arguing that top managers are moved for both financial and nonfinancial aspects of firms. Specifically, the authors have argued that the new configuration of the competition is what makes it possible for supply chain professionals to ingress into the C-suite group. However, this new position is a result of the fact that supply chain professionals are unheard by C-level professionals (Stank et al., 2012), since supply chain metrics fail in translating the results of this activity in terms of the technical jargons used in accounting and finance (Fawcett and Waller, 2011). If supply chain professionals intend to move themselves from the operations field to the core of strategic decision-making, then it is necessary to connect the current supply chain taxonomy with accounting and finance jargons. In short, drawing from the idea of Alderson and Martins (1965, p.117), “we have a great need” in supply chain management “to make our language more precise”, to be sure that all stakeholders

know “what we are talking about” (Fawcett and Waller, 2011; Stank et al., 2012; Gardner, 2004).

2.2.2 SCM connection with accounting: SCOR and EVA Models

In this study, it is argued that the relationship between supply chain activities and accounting and finance information in fact exists. The common view of standard setters and researchers is that both accounting and finance are the language of business (Fawcett and Waller, 2011). For instance, Fawcett and Waller (2011, p.166) “emphasize how important it is that all supply chain professionals understand the fundamental elements of financial analysis.” Additionally, in face of the economic recession (the subprime in 2009) and the recent US corporate scandals, the U.S. Securities and Exchange Commission (SEC) has been carefully observing the supply chain activities, which is directly represented by the Statements of Financial Accounting Standards (SFAS) No. 131, which demanded firms to disclose supply chain activities on their own balance sheet. Nonetheless, this concern by the SEC is not a new issue and it could be traced at least as far back as the SFAS No. 14 from December 1976 and SFAS No. 30 from August 1979, which were the first to require the disclosure of major customers. SFAS No. 131, which replaced those previous ones, states that:

> Since the adoption of SFAS No. 14, GAAP has required disclosure of revenues from major customers. SFAS No. 131 now requires issuers to disclose the amount of revenues from each external customer that amounts to 10 percent or more of its revenue as well as the identity of the segment(s) reporting the revenues. The accounting standards, however, have never required issuers to identify major customers. On the other hand, Regulation S-K Item 101 historically requires naming a major customer if sales to that customer equal 10 percent or more of the issuer’s consolidated revenues and if the loss of the customer would have a material adverse effect on the issuer and its subsidiaries. Since we continue to believe that the identity of major customers is material information to investors, we propose to retain this Regulation S-K requirement. (SFAS No. 131)

Drawing on the statements of the accounting setter, it is possible to note the relevance of firms sharing information, given that “identity of major customers is material information to investors”. As a substantiation to this view, accounting “makes up a large part of the general information systems which provide decision-making information expressed in quantitative terms” (Godfrey and Prince, 1971, p.75). Specifically, this study puts forward the claim that it is almost impossible for a firm to formulate its supply chain strategy without objective accounting information, data and metrics (Datar, Rajan, and Horngren, 2013). Finally, accounting is both the part of the activity that has information as a boundary and “a part of the general information system of an operating entity” (Godfrey and Prince, 1971).

As a rebuttal to this view, it might be argued that the accounting information system abides by its specific logic relative to other fields, which can result in biased information. Nevertheless, based on the generally accepted accounting principles, we can expect that the accounting information system will fairly reflect a specific firm in its relations with its own environment. Will (1971, p.694) states that “[t]he modern accountant provides information to meet frequently ill-defined user needs and designs his information system accordingly”.

Additionally, Dechow et al. (2010) define Reported Earnings as:

$$Reported\ Earnings \equiv f(X) \quad (1)$$

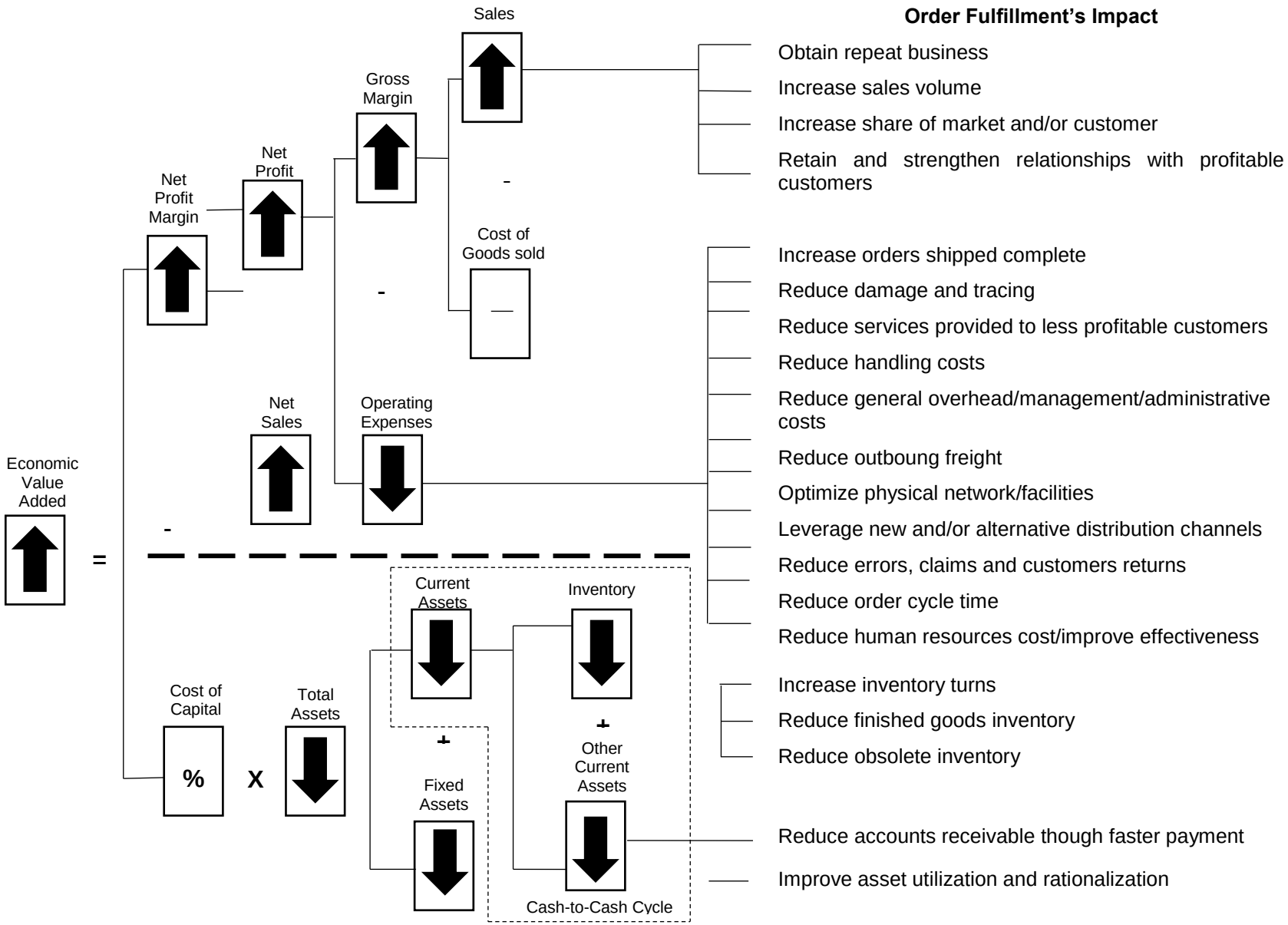
where the unobservable variable X is the firm’s financial performance during a period, according to the SFACNo.1. The function f is the accounting information system that turns the variable X into an observable variable (earnings).

This definition of Reported Earnings implies that decisions based on earnings are a function of performance per se and not just a simple measurement of the financial performance during a period (Dechow et al. 2010). Although one can argue that, theoretically, the accounting information system is able to predict future earnings and, consequently, provide the sufficient level of information for an optimal decision-making process (in terms of investment), accessing this information is not a very simple task (Barth et al., 1999). However, one could also argue that the accounting (and financial) information system requires a specific structure that imposes restrictions to information sharing, turning it incompatible with supply chain activities. It can also be argued that accounting disclosure process is subject to manipulation that shapes the information according to the interests of executives, a well-known practice called earnings management (Christopher and Ryals, 1999). However, some scholars, such as Thomas and Zhang (2002), have shown empirically that inventory changes hold a strong relation with future returns and abnormal returns (the accounting counterpart for the concept of supernormal returns presented in the supply chain management literature). In short, inventory changes are one of the drivers of market mispricing.

Leaving aside the discussion, if the accounting information system suffers from bias and lacks in providing the level of specific operational activities, which is beyond the scope of this study, this study argues that if such an argument is true, then almost all other business activities suffer from a common bias, since the accounting information system is the most used language to make investment and strategic decisions. Conversely, it is important to note that both techniques (VAR and Granger causality) adopted in this study do not impose constraints to the constructs, since no assumption

derived from either accounting or supply chain models is required. The results come from the temporal patterns of the time series of the variables. By leveraging the knowledge from the varied approaches that modeling supply chain activities, this study attempts to align those approaches with the concept of firm financial performance. Regardless of the differences between the two approaches (financial and non-financial metrics) in this study, it is not assumed that any of these approaches are wrong in the way that each has addressed the relationships between a set of well-known operational activities and the performance of the company. On the contrary, given certain conditions, one can assume that all of these scholars' perspectives are correct in their assumptions. Please refer to Figure 2.2 (Order Fulfillment's Impact on Economic Value Added) to see what is almost the current state of the art about the connection between supply chain management literature and the accounting and finance literature.

Considering the Figure 2.2, the core idea of this study is to use the decomposition of the EVA to identify metrics that serve as proxies of supply chain activities aligned with the SCOR model as we can see Figure 2.3 (EVA Tree) and the Figure 2.4 above for an illustration of the connection between supply chain literature and accounting and finance literature. For instance, the figure illustrates that the Lean strategy can be measured by the work in progress/sales ratio. Thus, the conceptual framework of this study is connecting both languages, accounting and supply chain, to access more accurately firm performance elements by avoiding the current bow-tie between both fields and consequently adopting the reverse bow-tie; that will be presented later.


Sales
Gross Margin
Net Profit
Net Profit Margin
Cost of Goods sold
Net Sales
Operating Expenses
Economic Value Added
=
-
Current Assets
Inventory
Cost of Capital
Total Assets
%
X
+
Fixed Assets
+
Other Current Assets
Cash-to-Cash Cycle
Order Fulfillment's Impact
Obtain repeat business
Increase sales volume
Increase share of market and/or customer
Retain and strengthen relationships with profitable customers
Increase orders shipped complete
Reduce damage and tracing
Reduce services provided to less profitable customers
Reduce handling costs
Reduce general overhead/management/administrative costs
Reduce outboung freight
Optimize physical network/facilities
Leverage new and/or alternative distribution channels
Reduce errors, claims and customers returns
Reduce order cycle time
Reduce human resources cost/improve effectiveness
Increase inventory turns
Reduce finished goods inventory
Reduce obsolete inventory
Reduce accounts receivable though faster payment
Improve asset utilization and rationalization

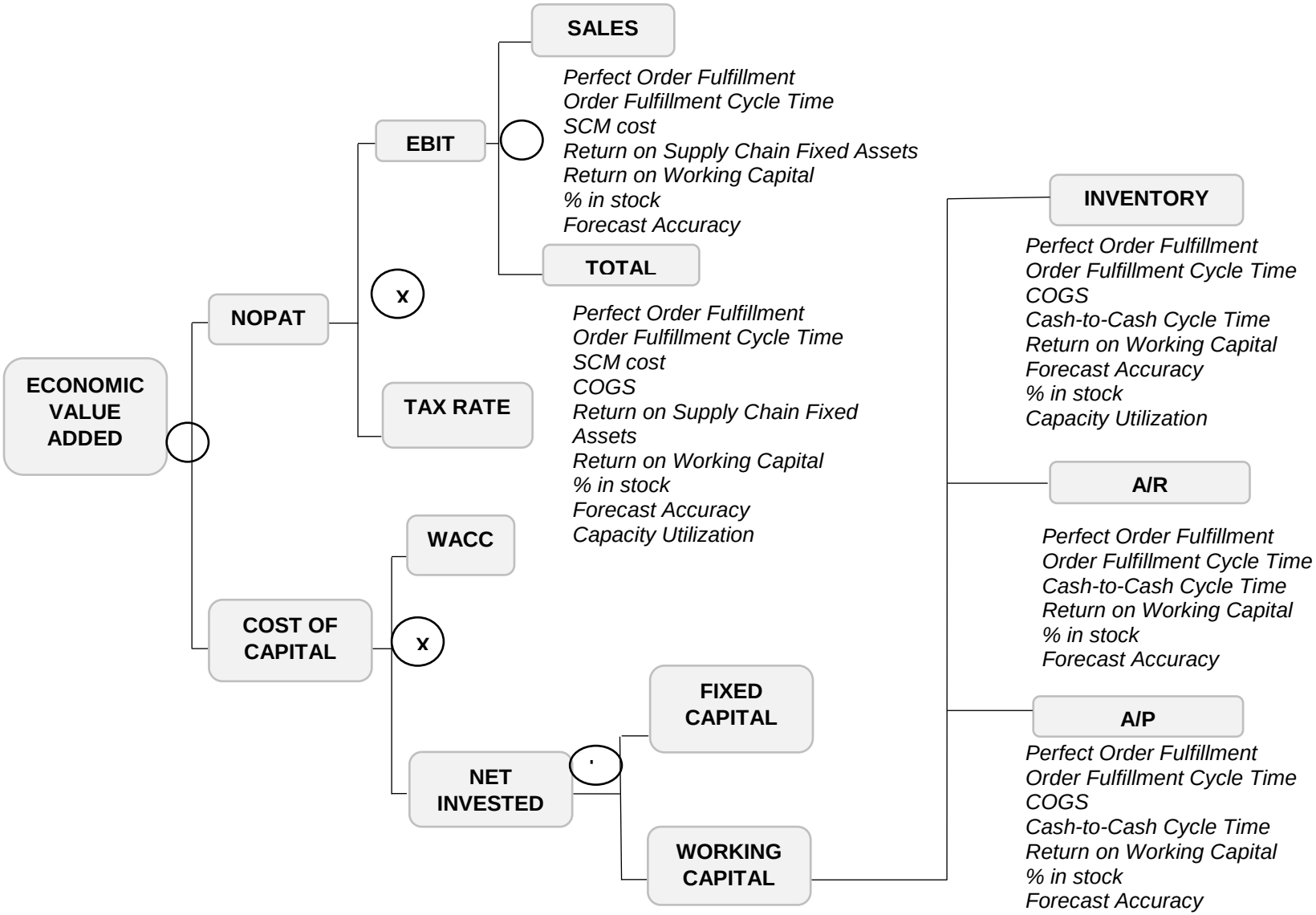


Figure 2.3: “The EVA Tree”
Source: Camerinelli (2008)

This work states that it may be fundamental to develop a "black box model" of supply chain management by considering the accounting information system as input to measure the supply chain strategy in the firm's performance. However, the refinement level and the accuracy of the technique of this modeling effort must have to provide insights into supply chain decision making. In this case, it is essential for the supply chain professional to be capable of dealing with the accounting information system components. In short, this professional must be able to model accounting information specific contents. The chain member needs access to the accounting information system to test given activities to evaluate efficiency and effectiveness in the context of the firm's financial performance. It is argued here that supply chain strategies may be measured by a homomorphic model of the customers' information system. A necessary condition to apply this homomorphic modeling is that the activities of supply chain management uniquely reflect the activities of the supply chain strategy. In short, it must be possible to find suitable metrics and mappings into both the supply chain activities and the accounting information systems. As a substantiation to this view, Will (1971, p.698) argues that "[T]he more comprehensive and powerful the applied language, the easier will be the formulation, execution and evaluation of the investigative procedures."

Figure 2.2: Order Fulfillment's Impact on Economic Value Added
Source: Losbichler; Mahmoodi and Rothboeck (2008)

METRIC	PROCESSES	INCOME STATEMENT				BALANCE SHEET				
		Sales	Sales Returns and Allowances	COGS	SG&A	Inventories	Receivables	Cash	PP&E	Payables
METRICS LEVEL 1 &2										
Perfect Order Fulfilment +	D1.10, D1.11, D2, D2.2, D2.9, D2.10, D3, D3.8, D3.9	+	-	0	-	-	-	+	0	+
% of Orders Delivered in Full +	M1.1, M2.1, M3.1, D1.3, D1.12, D1.13, D2.3, D2.12, D2.13, D3.3, D3.12, D3.13, ED	+	-	0	-	-	-	+	0	+
Delivery Performance to Commit Data +	D.1.3, D1.12, D1.13, D2.3, D2.12, D2.13, D3.3, D3.12, D3.13	+	-	0	-	-	-	+	0	+
Documentation Accuracy +	D1.11, D1.15, D2.11, D2.15, D3.11, D3.15, ED.2	+	-	0	-	-	-	+	0	+
Perfect Condition +		+	-	0	-	-	-	+	0	+
Order Fulfillment Cycle Time -	P1, P2, P3, P4, S1, S2, S3, M1, M2, M3, D1, D2, D3, D4, SR1, DR1, SR2, DR2, SR3, DR3.	+	0	0/+	-	-	-	+	+	+
Source Cycle Time -	S1, S2, S3	+	0	0	-	-	-	+	0	+
Make Cycle Time -	M, M3, M2	+	0	0	-	-	-	+	+	+
Deliver Cycle Time -	D3, D2.15, D1, D2, D4	+	-	0	-	-	-	+	0	+
OTHER METRICS										
% In -Stock +	D4.4	+	-	0	0	0	+	-	0	+
Forecast Accuracy +	EP.4, EP.5, EP6, EP.7, P1, P1.1, P2.1, P3.1, P4, P4.1, P4.2	+	-	0	-	-	-	-	0	+
Capacity Utilization +	M1.1, M1.3, M1.4, M2.1, M2.3, M2.4, M3.2, M3.4, M3.5	0	0	-	0	-	-	0	-	0

Figure 2.4: Metrics mapping chart (excerpt)
Source: Camerinelli and Cantu (2006)

2.2.3 Supply chain management strategy

Comprehending and effectively executing SCM activities requires that the firms establish an adequate strategic alignment. Some scholars have argued that the supply chain is an integral part of corporate strategy (Ellram 1991; Ralston et al., 2014). On these grounds, Fisher (1997) states that in order to build an effective supply chain strategy the firm must have an optimal fit between the product offered and its consumers. Thus, if the cornerstone of establishing the adequate strategy is linked with the nature of the demand, then we can argue that “the root cause of the problems plaguing many supply chains is a mismatch between the type of product and the type of supply chain” (Fisher, 1997, p. 106). If a firm seeks to improve its competitiveness, then this firm needs to find the supply chain strategy that best fits the demand (Christopher, Peck and Towill, 2006). As a substantiation to this point, Mentzer and Esper (2010, p.221) say that “SCM strategy consists of aligning all companies involved in a supply chain with respect to product, market, and supply characteristics [and] involves two interrelated activities”. In short, if a firm implements the correct strategy, then the firm maintains the proper level of “customer service effectiveness” and the proper level of “cost efficiency”. The two generic supply chain strategies will be discussed, attempting to address firm financial performance in each of them.

2.2.3.1 Lean strategy

The basic premises of Lean strategy rest on the assumption that firms must pursue two goals: waste elimination and cost minimization (Cabral, Grilo and Cruz-

Machado, 2012; Womack et al., 1990). Essentially, a Lean strategy implies that supply chains reduce any kind of non-value added (NVA) activities or solutions as much as possible (Hallgren and Olhager, 2009; Wee ad Wu, 2009) and consequently improve firm performance through the focus on value added (VA) activities (Cabral, Grilo and Cruz-Machado, 2012; Womack et al., 1990), i.e., a Lean supply chain focuses on increasing efficiency. With that in mind, the consensus view seems to be that a Lean-oriented supply chain emphasizes the reduction of total cost as a kind of prerequisite of waste elimination. The key aspect of this argument is that if a firm decreases resource waste, then the firm products will be more standardized and, consequently, the firm will adopt a mass production line (Ben Naylor et al., 1999).

Therefore, a Lean-oriented supply chain assumes efficiency as a market winner, which, in turn, is crucial in acquiring competitive advantage and therefore increasing firm financial performance (Agarwal et al., 2007). Usually, adopting a Lean strategy is the basis for the implementation of approaches such as ‘just in time’ (JIT), ‘zero delays’, ‘zero downtimes’, ‘zero defects’, and ‘zero inventory’ (Christopher, Peck and Towill, 2006; Fan et al., 2007; Wee and Wu 2009; Cabral, Grilo and Cruz-Machado, 2012). Thus, it is clear that both the Lean strategy and the efficient activities or solutions overlap in the SCM domain, given that it is expected that a successful Lean strategy will be followed by a set of efficient practices.

On these grounds, this study argues that high levels of Lean practices can decrease total cost, which may mitigate both inventory/cost and response to demand capability shocks. Although the logic of Lean strategy seems to be correct, one could argue that this waste decrease might have an excessive cost in terms of quick response

in relation to the benefits derived from it (Fisher, 1997; Christopher, Peck and Towill, 2006). Refer to the box Summary of Lean Strategy Characteristics for a brief summary of the characteristics discussed above.

Summary of Lean Strategy Characteristics

Assumptions: Waste elimination and cost minimization are positively related with improving the value added (VA) in activities and solutions, and value added (VA) mechanisms are positively related with firm performance.

Conditions: A high degree of demand predictability is a necessary condition for efficiency.

Logic: High Demand Predictability → Efficiency → Increased Value Added (VA) → Increased Firm Performance.

Supply Chain's Lean role

Identifying VA mechanisms: improve information quality to identify VA activities and solutions.

2.2.3.2 Agile strategy

Contrasting with Lean strategy, Agile strategy is based on the assumption that, instead of minimizing cost and eliminating waste, firms should assist the supply chain in performing a quick response to changes in demand (Christopher, 2000; Fan et al., 2007; Zhang, 2011; Cabral, Grilo and Cruz-Machado, 2012). This quick response will result in higher capacity to provide personalized products to the customers, which will result in better evaluation of managerial-decisions, thus improving the process of strategy formulation through product customization and, consequently, a complex production line (Christopher, 2000; Fan et al., 2007; Zhang, 2011; Cabral, Grilo and Cruz-Machado, 2012). In short, if the quality of response increases, the corporate decision-making

process improves, resulting in a more efficient process, such as delivery of goods (Gligor & Holcomb, 2012; Wilson & Doz, 2011).

Therefore, an Agile-oriented supply chain assumes efficiency (in terms of cost reduction) as a market qualifier attribute, which contrasts with the Lean-oriented strategy (Agarwal et al., 2007). Usually, adopting an Agile strategy demands systemic configuration based on either an effective relationship structure and a high level of information sharing (Christopher, Peck and Towill, 2006; Baramichai et al. 2007; Wee and Wu, 2009; Cabral, Grilo and Cruz-Machado, 2012). It is clear, then, that both the Agile strategy and the effective activities or solutions overlap in the SCM domain, given that it is expected that a successful Agile strategy will be followed by a set of effective practices. It is noticeable that firms faced a serious trade-off between quick response (effectiveness) and cost minimization (efficiencies). An Agile strategy demands that the firm integrates its business information with partners in order to have the customization levels required to react quickly (Bottani, 2009).

On these grounds, this study argues that high levels of Agile practices can increase the response capability, which may improve both flexibility and agility in face of demand shocks. Although the logic of Agile strategy seems to be correct, one could argue that agility might have a high degree of dependency in terms of information sharing in relation to the benefits derived from it (Fisher, 1997; Christopher, Peck and Towill, 2006). If it is the case that supply chains are designed to maintain a high level of information sharing, then we can argue that firms must be highly dependent. It might be said that high dependency follows when the chain members have more knowledge about the supply chain as a whole.

Refer to the box *Summary of Agile Strategy Characteristics* for a brief summary of the characteristics discussed above.

Summary of Agile Strategy Characteristics

Assumptions: Flexibility and agility are positively related with improving the response capability in face of demand shocks, and response capability mechanisms are positively related with firm performance.

Conditions: A high degree of information sharing is a necessary condition for effectiveness.

Logic: High Information Sharing → Effectiveness → Increased Response Capability → Increased Firm Performance.

Supply Chain's Agile role

Achieving High Degree of Information Sharing: improve information sharing to increase response capability.

Reaching Response Capability mechanisms: improve information quality to customize goods, which increases flexibility.

2.2.4 Conceptual and theoretical framework

Fisher (1997) argued that a supply chain should emphasize a kind of strategy that fits the type of product the supply chain sells. If the product sold is functional, then the supply chain should be efficient by adopting a Lean strategic orientation. Conversely, if the product sold is innovative, then the supply chain should be responsive by adopting an Agile strategic orientation. As mentioned before, a Lean focused supply chain, in terms of efficiency, is one that places considerable focus on cost reduction and inventory minimization. Conversely, an Agile focused supply chain, in terms of effectiveness, emphasizes flexibility at the cost of high inventory safety levels in order to meet the demand. Kisperska-Moron and Hann (2011) have noted that the distinction between the Agile strategy and the Lean strategy is not well established by the literature, causing significant confusion among scholars and practitioners. Without a

clear understanding of the impact of both efficiency and effectiveness on performance, managers have little guidance as to what outcomes to expect from both strategies (Naylor et al., 1999).

Along similar lines, Inman et al. (2011) have identified that supply chain is also in front of a trade-off when executives chose the chains' strategic orientation between Lean or Agile (Inman et al., 2011; Narasimhan et al., 2006). In a similar manner, Qi et al. (2009; 2011) have shown that the decision for assuming an efficient position (cost-efficient oriented) or a responsiveness position (quick response oriented) also generates a trade-off (Fisher, 1997; Parmigiani et al., 2011; Randall et al., 2003).

On logical grounds, Christopher and Ryals (1999) state that "the four basic drivers of enhanced shareholder value are: revenue growth, operating cost reduction, fixed capital efficiency and working capital efficiency. All four of these drivers are directly and indirectly affected by logistics management and supply chain strategy". Christopher and Ryals (1999) have also argued that the accounting valuation theory provides a generally accepted measurement system of the shareholder's wealth. In short, the "net present value of the free cash flow occurring from its operations over its lifetime" determines the current value of a firm to its shareholders. In order to explore the relationship between SCM and financial performance one can argue that it is necessary to identify which supply chain strategies are affecting the firm's free cash flow. On these grounds, one can argue that accounting and financial information are adequate to evaluate the connection between supply chain strategy and firm financial performance. Other scholars (Srivastava et al., 1998; Hendricks and Singhal, 2003; 2014; Wagner et al., 2012) agree with this idea. The current literature, as demonstrated, neglects to

consider that accounting-based metrics play a crucial function to predict the impact of SCM strategy on firm financial performance. Therefore, this study argues that the scholars should access just the relevance of the SCM strategy throughout the balance sheet and the financial statements. In order to demonstrate the developing idea, refer to Figure 4.

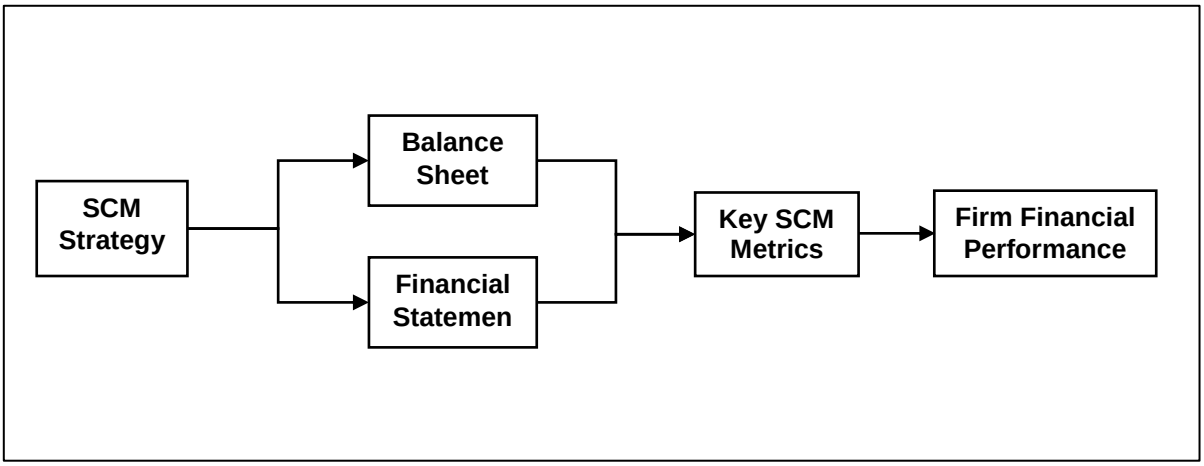


Figure 2.5: Conceptual Framework
Source: The author.

2.3 HYPOTHESES DEVELOPMENT

Fisher (1997) has argued that a successful supply chain must have a strategy that matches with its type of products. This condition will define if a supply chain adopts a Lean strategy (efficient-focused) or an Agile strategy (effective-focused) or even a Leagile strategy. The main theoretical premise behind Fisher's logic is that a Lean supply chain is the one that places considerable focus on cost reduction and inventory minimization. Conversely, an Agile supply chain emphasizes flexibility at the cost of higher inventory safety-stock levels to offer customized products. In short, we can argue

that a supply chain strategy should be a function of the type of products that the supply chain offers to their customers.

It is noticeable that firms face a serious trade-off between agility (effectiveness) and leanness (efficiency). If these distinct strategies have opposite purposes as seen in the literature, we can expect that their key operations metrics will also be opposite, i.e., the accounting and financial ratios will present opposite directions. If the firm pursues both agility and leanness, we can expect that both key operations metrics will follow together. Thus, a successful Lean supply chain requires efficient operations practices. Conversely, a successful Agile supply chain requires effective operations practices. Thus, a successful Leagile supply chain requires both efficient and effective operation practices. Based on the abovementioned discussion, this study presents the following hypotheses:

Hypothesis 1a, and 1b: if an efficient practice (effective practice) causes the firm's performance, then the firm adopts a lean strategy (agile strategy).

Hypothesis 2a and 2b: if an efficient practice (effective practice) explains the firm's performance variance, then the firm adopts a lean strategy (agile strategy).

2.4 OPERATIONALIZATION OF VARIABLES AND SAMPLE

The data were collected from the S&P Capital IQ database about several supply chains covering the period of 1979 to 2014. Table 1 summarizes the operationalization of the variables and a more comprehensive description follows after Figure 5.

2.4.1 Variables

The variables adopted are based on prior studies (Hendricks and Singhal, 2003; 2005; 2008; 2009; 2012; 2014; Wagner et al., 2012; Klingenberg et al., 2013; Roth et al., 2013). The data were collected annually from the S&P Capital IQ database from Walmart and P&G, covering the period from 1979 to 2014 totaling 35 observations for each supply chain.

2.4.1.1 Firm financial performance:

This set of metrics is the most commonly adopted variable to measure a firm's financial performance in the SCM literature (Hendricks and Singhal, 2003; 2005; 2008; 2009; 2012; 2014; Wagner et al., 2012; Klingenberg et al., 2013; Roth et al., 2013).

Return on Assets (ROA): This metric indicates how profitable a firm is in relation to its total assets. ROA gives some guidance on how efficient the firm is at using its assets to generate earnings. ROA is calculated by dividing a firm's earnings in a period by its total assets in the same period, it is shown as a percentage. Some scholars referred to ROA as Return on Investment (ROI). In this study ROA is calculated as follows:

$$\mathrm{ROA} = \frac{(\text{Net Income})}{(\text{Total Assets})} \qquad (2)$$

2.4.1.2 Lean Strategy

This set of measures is the most commonly adopted metric to measure firm Leanness and Efficiency in the SCM literature (Hendricks and Singhal, 2003; 2005; 2008; 2009; 2012; 2014; Wagner et al., 2012; Roth et al., 2013).

TABLE *2*.1: **Operationalization of Lean variables**

Lean Variables	***Operationalization***	***Expected Effect***
Gross Margin%	$\frac{(\text{Revenue})-(\textbf{Cost of Goods Sold})}{(\text{Net Revenue})}$	High due the low level of ***cost of goods sold.***
SG&A Margin%	$\frac{(\textbf{SG\&A})}{(\text{Net Revenue})}$	Low due the low level of ***selling, general and administrative expenses.***
EBIT Margin%	$\frac{(\textbf{EBIT})}{(\text{Net Revenue})}$	High due the high level of ***EBIT***.
Fixed Asset Turnover	$\frac{(\text{Net Sales})}{(\textbf{Net Property, Plan, and Equipment})}$	High due the low level of ***net property, plant and equipment.***
Accounts Receivable Turnover	$\frac{(\textbf{Net Credit Sales})}{(\text{Average Accounts Receivable})}$	High due the high level of ***net credit sales***.
Inventory turnover	$\frac{(\text{Sales})}{(\textbf{Inventory})}$	High due the low level of ***inventory***.

Source: The author.

Gross Margin: The Gross Margin represents the amount of the total sales revenue that firms retain (in percentage) deducting the cost of goods sold. Mottner and Smith (2009, p.538) posits that Gross Margin "measures a firm's ability to extract profit from each sale. It is affected by both a firm's ability to command higher prices and its ability to reduce cost of goods sold through efficient production". Thus, a low value

indicates that the firm is retaining less of sales to pay other obligations. If a supply chain adopts a Lean strategy, then we expect low gross margin that will impact positively on ROA. This positive effect on ROA derived from the reduction of non-value adding activities rather than a lower inventory level (Lewis, 2000; Kinney and Wempe, 2002; Klingenberg et al., 2013). In short, from a supply chain point of view, the leaner firm increases its ROA by the "lower material costs and improved operations productivity resulting through more accurate forecasts. A lower price represents a potential value driver for the COGS component (CAMERINELLI, 2009). In this study, Gross Margin is expressed as a percentage and is calculated as follows:

$$(\text{Gross Margin}\%) = \frac{\text{(Revenue)-(Cost of Goods Sold)}}{\text{(Revenue)}} \quad (7)$$

SG&A (Selling, General & Administrative Expense) Margin: The SG&A Margin is the sum of all selling expenses (direct and indirect) and all general and administrative expenses of the firm divided by the net sales. Thus, a high value indicates that the firm is retaining more of net sales to pay SG&A. I expect that a Lean strategy will increase net sales and reduce SG&A costs, which will improve the SG&A margin by "increased sales generated by price reductions, increased product availability, improved product mix, fewer stockouts, and better customer service" (CAMERINELLI, 2009). In this study, SG&A Margin is expressed as a percentage and is calculated as follows:

$$(\text{SG\&A Margin}\%) = \frac{(\text{SG\&A})}{(\text{Net Sales})} \quad (8)$$

EBIT Margin: EBIT Margin is the earnings before interest, and tax divided by the revenues. This ratio is used to evaluate the firm's growth rate. The EBIT Margin is most

commonly adopted internally. This ratio is used for equating profitability and efficiency. If a firm increases its net revenue and productivity combined with an efficient cost control then we expect high EBIT margin that will impacts positively on ROA, i.e., a decrease in the operating expenses of the firm relatively to revenue. This positive effect on ROA derived from the reduction of non-value adding activities rather than a lower inventory level (Lewis, 2000; Kinney and Wempe, 2002; Klingenberg et al., 2013). In short, from a supply chain point of view, the leaner firm increases its ROA by the increase on efficient practices such as perfect order fulfilment, order fulfilment cycle time, and forecast accuracy (CAMERINELLI, 2009). In this study EBIT Margin is expressed as a percentage and is calculated as follows:

$$(\text{EBIT Margin}\%) = \frac{(\text{EBIT})}{(\text{Net Revenue})}$$

(11)

Fixed Asset Turnover: The Fixed Asset Turnover indicates the firm's capability of generating revenues from its fixed asset. Mottner and Smith (2009, p.538) argue that Fixed Asset Turnover "captures a firm's efficiency in using fixed assets in manufacturing, which may reduce cost per unit produced." Thus, if a firm has a higher ratio, then we can consider that the firm has been effective in using its own fixed assets to generate net sales, that is, the firm will reduce its non-value added activities. In this study Fixed Asset Turnover is calculated as follows:

$$(\text{Fixed Asset Turnover}) = \frac{(\text{Net Sales})}{(\text{Net Property, Plan, and Equipment})}$$

(14)

Accounts Receivable Turnover: The Accounts Receivable Turnover indicates how effectively the firm uses its assets. If a firm has a high value, then we can consider that it is possible that the firm collects its accounts receivable in an efficient manner. Camerinelli (2009) posits that this metric is positively correlated with supply-chain activities, “such as providing more reliable transit times and shorter lead times, delivering products in the right quantity and with the right specs” and by generating improvements on invoicing process due to “correct information on delivery documents”. In this study the Accounts Receivable Turnover is calculated as follows:

$$(\text{Accounts Receivable Turnover}) = \frac{(\text{Net Credit Sales})}{(\text{Average Accounts Receivable})}$$

(15)

Inventory Turnover: The Inventory Turnover shows the number of times that inventory is sold and replaced in a period. This ratio must be analyzed carefully, since it can indicate either a firm with ineffective purchasing or a firm with strong sales. Klingenberg et al., (2013) posits that Inventory Turnover “evaluates operating efficiency in the use of inventory in the production process.” According to them, a Lean strategy reduces the inventory, which should increase upon this ratio (Billesbach and Hayen (1994), Balakrishnan et al. (1996), Boyd et al. (2002), Huson and Nanda (1995) and Kinney and Wempe(2002). The idea is identifying if a firm push its inventory holding costs to its suppliers, to optimize its efficiency. In this study Inventory Turnover is calculated as follows:

$$(\text{Inventory Turnover}) = \frac{(\text{Sales})}{(\text{Inventory})}$$

(16)

2.4.1.4 Agile strategy

This set of measures is the most commonly adopted metric to measure a firm's Agility and Effectiveness in the SCM literature (Hendricks and Singhal, 2003; 2005; 2008; 2009; 2012; 2014; Wagner et al., 2012; Roth et al., 2013).

TABLE *2.2*: **Operationalization of Lean variables**

Lean Variables	***Operationalization***	***Expected Effect***
Gross Margin%	$\frac{(\text{Revenue})-(\textbf{Cost of Goods Sold})}{(\text{Net Revenue})}$	High due the low level of ***cost of goods sold.***
SG&A Margin%	$\frac{(\textbf{SG\&A})}{(\text{Net Revenue})}$	Low due the low level of ***selling, general and administrative expenses.***
EBIT Margin%	$\frac{(\textbf{EBIT})}{(\text{Net Revenue})}$	High due the high level of ***EBIT***.
Fixed Asset Turnover	$\frac{(\text{Net Sales})}{(\textbf{Net Property, Plan, and Equipment})}$	High due the low level of ***net property, plant and equipment.***
Accounts Receivable Turnover	$\frac{(\textbf{Net Credit Sales})}{(\text{Average Accounts Receivable})}$	High due the high level of ***net credit sales***.
Inventory turnover	$\frac{(\text{Sales})}{(\textbf{Inventory})}$	High due the low level of ***inventory***.

Source: The author.

Current Ratio: The Current Ratio measures the firm's capability of paying obligations in the short term, which indicates its liquidity and agility in terms of cash,

inventory, and receivables. Thus, if a firm invests in property, plant and equipment, then the firm will increase debts which reduces the current ratio. In this study Current Ratio is calculated as follows:

$$(\text{Current Ratio}) = \frac{(\text{Current Assets})}{(\text{Current Liabilities})}$$

(18)

Quick Ratio: The Quick Ratio also measures the firm's capability of meeting obligations in the short term with its liquid assets, which also indicates its liquidity and agility. This metric excludes firm inventories from firm current assets. In this study Quick Ratio is calculated as follows:

$$(\text{Quick Ratio}) = \frac{\{(\text{cash and Equivalents}) + (\text{Marketable Securities}) + (\text{Accounts Receivable})\}}{(\text{Current Liabilities})} \qquad (19)$$

Average Days Sales Outstanding (DSO): The DSO measures the average of days in which a firm collects its revenues after a sale. Thus, a high DSO means that it takes a firm many days to collect its accounts receivable, which means that the sales have been made on credit. In this study DSO is calculated as follows:

$$\text{DSO} = \left(\frac{(\text{Accounts Receivable})}{(\text{Total Credit Sales})}\right) \text{ x } (\text{Number of Days})$$

(22)

Average Days Inventory Outstanding (DIO): The DIO shows the time that a firm has been taking to turn its inventory into sales. Thus, a high DIO shows low agility. In this study DIO is calculated as follows:

$$\text{DIO} = \left(\frac{\text{Inventory}}{\text{Cost of Sales}}\right) \text{x } (365)$$

(24)

Average Days Payable Outstanding (DPO): The DPO shows how many days it takes a firm to pay its suppliers which indicates agility. In this study DPO is calculated as follows:

$$\mathrm{DPO} = \frac{(\text{Ending Accounts Payable})}{(\text{Cost of Sales})/(\text{Number of Days})}$$

(25)

Average Cash Conversion Cycle (CCC): The CCC indicates the time that a firm has been taking to convert resources into cash flow. For instance, this metric measures the amount of time that the firm needs to sell its inventory, to collect its receivables, and to pay its liabilities. Thus, if a firm has a high cycle, more time capital will be employed in the business process. In this study CCC is calculated as follows:

$$\mathrm{CCC} = \mathrm{DIO} + \mathrm{DS0} - \mathrm{DPO}$$

(26)

2.5 METHODOLOGY

This study also adopted two distinct econometric techniques (Granger Causality Tests and VAR) to access the long-term relationship between SCM and firm financial performance in an attempt to answer the claim that the field needs more rigorous methods to test the SCM theory (Grimm, 2008).

2.5.1 Vector Autoregressive Model (VAR)

According to Sims (1980) the VAR is a generalization of an autoregressive model. In essence, it is a Simultaneous Equation Model, which considers the existence of more

than one dependent variable, i.e., all variables are treated as being endogenous simultaneously (Sims et al., 1990). In this kind of econometric model, the lagged values of all the other endogenous variables are used to explain each variable of the model. Thus, based on this Simultaneous Equation Model, we should not make any initial distinction between exogenous and endogenous variables in the set of variables adopted on the estimation (Hamilton, 1994).

The simple bivariate case in the VAR presents the following structural equation:

$$\begin{bmatrix} 1 & a_{12} \\ a_{21} & 1 \end{bmatrix} \begin{bmatrix} PERF_t \\ SCM_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \begin{bmatrix} PERF_{t-1} \\ SCM_{t-1} \end{bmatrix} + \begin{bmatrix} \sigma_{PERF} & 0 \\ 0 & \sigma_{SCM} \end{bmatrix} \begin{bmatrix} \varepsilon_{PERF,t} \\ \varepsilon_{SCM,t} \end{bmatrix}$$

(29)

$$AX_t = B_0 + B_1 X_{t-1} + B\varepsilon_{it}$$

where ε_{it} is an iid disturbance term with $E(\varepsilon_{it}) = 0, i = 1.2; E\left(\varepsilon_{SCM,t}\varepsilon_{PERF,t}\right) = 0.$

The reduced form is given by:

$$X_t = \Phi_o X_{t-1} + e_t$$

(30)

$$\Phi_o = A^{-1}B_0 \quad (31)$$

$$\Phi_1 = A^{-1}B_1 \quad (32)$$

$$\mathrm{Ae}_t = B\varepsilon_t \quad (33)$$

Thus, the forecast provided by a VAR extrapolates both current and future expected value of each of the endogenous variables. This result derives from the use of observed lagged values of the whole set of variables, under the assumption of the absence of additional shocks (Hamilton, 1994).

2.5.1.1 Impulse Response Function (IRF)

In a VAR model, the IRF is able to trace both the expected current responses and the expected future responses of each variable. Thus, if we submit one of the aforementioned equations to an abrupt variation, we can estimate the response of the variables relative to the variable that received the shock. This study traced out the dynamic response of each component of the $PERF_t$ to a disturbance to each of the components of the error term. Since there are n components of the $PERF_t$, there are n^2 responses in total (Sims et al., 1990; Hamilton, 1994). Thus, this study derived four Impulse Response Functions as follows:

$$\frac{\partial SCM_{t+k}}{\partial \varepsilon_{SCM,t}} \; ; \; \frac{\partial SCM_{t+k}}{\partial \varepsilon_{PERF,t}} \; ; \; \frac{\partial PERF_{t+k}}{\partial \varepsilon_{SCM,t}} \; ; \; \frac{\partial PERF_{t+k}}{\partial \varepsilon_{PERF,t}} \tag{36}$$

2.5.1.2 Variance decomposition (VD)

The VD gives the percentage of the variance derived from the disturbance term that we make to forecast a variable at a specific time horizon and conditioned to a specific disturbance. Thus, the VD is essentially a type of "partial" R^2 for the forecast error. In short, this study interprets the VD as a fraction of the variance of the firm's performance that comes from the SCM strategic practices versus the fraction of variance that derives from real factors (Sims, 1980; Sims et al., 1990; Hamilton, 1994).

On logic grounds, the variance of each element of $PERF_t$ was decomposed into components derived from each of the elements from the error term. In short, it was shown the magnitude of the variance of each element of $PERF_t$ that comes from the first noise term, the second noise term, and subsequently. After that, I have partitioned the

conditional variance of SCM_{t+k} in fractions of both supply chain management disturbance $\varepsilon_{SCM,t}$ and firm performance disturbance $\varepsilon_{PERF,t}$.

2.5.2 Granger Causality Tests

To perform a Granger-Causality test, we need to have the values of SCM_{t-k} correlated to the values of $PERF_{t+k}$ and it is also necessary to keep constant the values of $PERF_{t-k}$ and any other possible explanatory variables. Thus, if we have an information set composed of past variables from both time series, SCM and firm Performance, then a SCM variable is said to fail to Granger-cause the Performance variable if and only if:

$$E[PERF_t|PERF_{t-1}, SCM_{t-1}, PERF_{t-2}, SCM_{t-2}, \dots] = E[PERF_t|PERF_{t-1}, PERF_{t-2}, \dots] \quad (37)$$

Thus, under the condition established in (37) the SCM_t does not Granger-cause $PERF_t$ if and only if in equation (37) the $\varphi_{21} = 0$. In short, in the bivariate case we are performing a t-test to test the null hypothesis that at least one variable does not Granger-cause another variable (Granger, 1969; 2004; Hamilton, 1994).

2.6 DATA ANALYSIS, RESULTS, AND DISCUSSION

After performing the tests described in the previous sections, this section presents the data analysis and the results. The analyses consider the ROA as the metric of the firm's performance.

2.6.1 Lean strategy tests

In this section, first I tested the hypothesis 1a through the Granger Causality Test of ROA with each of the follow variables: Gross Margin %, SG&A Margin %, EBIT Margin%, Fixed Asset Turnover, Accounts Receivable Turnover, and Inventory Turnover. Please refer to Table 2.9 to see the results. This set of variables is referring to Walmart Stores and it measures the impact of Lean/Efficiency practices on firm performance, which is measured by ROA.

As we can see in Table 2.9, based on the p-value, we cannot reject the hypothesis that an efficient activity does not Granger-cause ROA for any of the variables adopted. However, we can reject the hypothesis that ROA does not Granger-cause the Gross Margin %, SG&A Margin %, Fixed Asset Turnover, and Inventory Turnover. Therefore, it appears that Granger causality runs one-way from ROA to these four metrics of efficiency. Thus, the findings do not suggest the existence of a bilateral causality between Lean strategy and performance. However, based on these results, this study argues that despite the fact that none of these Efficient practices impacted firm performance, if Walmart has a good financial performance, then Walmart is more efficient in Granger-cause sense. Since ROA is negatively correlated with SG&A Margin %, a higher ROA may be imply in an increasing in net sales derived from price reductions, increased product availability and in decreasing in SG&A costs derived from a better product mix, lower stockouts, and better customer service. Since ROA is positively correlated with Fixed Asset Turnover, a higher ROA may be imply in an increasing on firm’s capability of generating revenues from its fixed asset derived from cost per unit produced reductions and increased capacity of the fixed assets in generate

net sales. Since ROA is negatively correlated with Inventory Turnover, a higher ROA may be imply in an increasing in net sales or a decreasing in inventory. Thus, the firm may be pushing its inventory holding costs to its suppliers, to optimize its efficiency.

TABLE 2.9: WALMART GRANGER CAUSALITY TEST – ROA & LEAN/EFFICIENCY PRACTICES

Null Hypothesis:	Obs	F-Statistic	Prob.
Gross Margin % does not Granger Cause ROA	33	1.71223	0.1988
ROA does not Granger Cause Gross Margin%**		5.07416	0.0132
SG&A Margin % does not Granger Cause ROA	33	2.10877	0.1403
ROA does not Granger Cause SG&A Margin%***		7.04464	0.0033
EBIT Margin% does not Granger Cause ROA	33	1.05664	0.3611
ROA does not Granger Cause EBIT Margin%		0.67771	0.5159
Fixed Asset Turnover does not Granger Cause ROA	33	0.03160	0.9689
ROA does not Granger Cause Fixed Asset Turnover***		6.79355	0.0039
Accounts Receivable Turnover does not Granger Cause ROA	33	0.80437	0.4574
ROA does not Granger Cause Accounts Receivable Turnover		2.17361	0.1326
Inventory Turnover does not Granger Cause ROA	33	0.65863	0.5254
ROA does not Granger Cause Inventory Turnover*		3.25412	0.0536

Source: The author.

The other set of variables refers to Procter & Gamble and measures the impact of Lean/Efficiency practices on the firm's performance, which is measured by ROA. Please refer to Table 2.10 to see the results.

TABLE 7: P&G GRANGER CAUSALITY TEST – ROA & LEAN/EFFICIENCY PRACTICES

Null Hypothesis:	Obs	F-Statistic	Prob.
Gross Margin % does not Granger Cause ROA***	23	6.31481	0.0084
ROA does not Granger Cause Gross Margin %		5.07416	4.72742
SG&A Margin % does not Granger Cause ROA**	23	3.99837	0.0366
ROA does not Granger Cause SG&A Margin %		7.04464	2.84590
EBIT Margin% does not Granger Cause ROA*	23	3.36673	0.0573

ROA does not Granger Cause EBIT Margin%		0.67771	1.19336
Fixed Asset Turnover does not Granger Cause ROA***	23	9.69642	0.0014
ROA does not Granger Cause Fixed Asset Turnover		6.79355	0.49018
Accounts Receivable Turnover does not Granger Cause ROA*	23	2.83958	0.0848
ROA does not Granger Cause Accounts Receivable Turnover		2.17361	2.77669
Inventory Turnover does not Granger Cause ROA	23	1.01626	0.3818
ROA does not Granger Cause Inventory Turnover		3.25412	5.53809

Source: The author.

As we can see in Table 2.10, based on the p-value, we can reject the hypothesis that an efficient activity does not Granger-cause ROA in most of the variables adopted, which show evidence that P&G adopts a Lean strategy. The results indicate that Granger causality runs one way from these metrics of efficiency to ROA. Thus, P&G efficiency may be derived from firm's ability to “to command higher prices and its ability to reduce cost of goods sold through efficient production”. The leaner firm increases its ROA by the “lower material costs and improved operations productivity resulting through more accurate forecasts.” The Lean strategy also increases net sales and reduce SG&A costs, which will improve the SG&A margin by “price reductions, increased product availability, improved product mix, fewer stockouts, and better customer service”. P&G is may be also increases its net revenue and productivity combined with an efficient cost control which decreases the operating expenses relatively to revenue. This positive effect on ROA derived from the reduction of non-value adding activities rather than a lower inventory level. The evidences suggest that P&G may be also using its “fixed assets in manufacturing, which may reduce cost per unit produced” and “providing more reliable transit times and shorter lead times, delivering products in the right quantity and with the right specs” and by generating improvements on invoicing process due to “correct information on delivery documents”. It is important to note that we cannot reject that Inventory Turnover does not granger cause ROA, which may be derived from the

partnership with Wall-Mart. P&G is a major supplier of Wall-Mart and We found evidences that may be pushing its inventory holding costs to its suppliers to optimize its efficiency.

Second, this study tested the hypothesis 2a by performing a VAR. It was assumed that the ROA and the same set of variables adopted in the first test are endogenous variables. Then, the variance of variables was decomposed considering the ROA as explained variable. Please refer to Table 2.11 to see the Walmart results. The findings suggest that after the second year an innovation to Gross Margin % can cause just 0.041% of fluctuation in ROA, which has a significant increase in the fourth year, accounting for almost 12.5%. Analyzing the same periods of SG&A Margin % it is noted that a shock to it can cause 6.38% of fluctuation in ROA, which has a significant increase in the fifth year, accounting for almost 11.3%. The SG&A Margin % can cause 1.55% of fluctuation in ROA, which has a significant increase in the third year, accounting for almost 9.27%. The EBIT Margin% can cause 8.82% of fluctuation in ROA on the second year. Fixed Asset Turnover can cause 4.87% on the second year. Accounts Receivable Turnover can cause 12.61% on the second year. Finally, the Inventory Turnover can cause 3.22% of fluctuation in ROA also on the second year.

TABELA 2.11 – WALMART VARIANCE DECOMPOSITION OF ROA

Period	S.E.	ROA	Gross Margin %	SG&A Margin %	EBIT Margin%	Fixed Asset Turnover	Accounts Receivable Turnover	Inventory Turnover
1	0.005150	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.007139	68.87927	0.040928	1.550204	8.824547	4.871997	12.60919	3.223861

3	0.007972	56.41650	2.524301	9.265165	7.097555	8.702068	13.39894	2.595468
4	0.008991	44.83693	11.26221	12.42289	5.843657	7.383921	14.14175	4.108647
5	0.010228	35.28589	20.34042	9.958512	8.021962	6.496150	13.72621	6.170857
6	0.011411	28.80023	25.41956	8.295142	11.04323	7.101520	11.63828	7.702033
7	0.012340	24.63296	28.07371	7.684299	13.13344	7.604319	9.966113	8.905160
8	0.013023	22.37024	29.37728	6.988384	13.77367	8.109233	9.042125	10.33907
9	0.013619	20.93743	29.89055	6.485980	13.70032	8.560295	8.505086	11.92034
10	0.014152	19.95625	29.92934	6.391113	13.62682	8.780772	8.100400	13.21530

Source: The author.

Please refer to Table 2.12 to see the P&G results. The findings suggest that after the second year an innovation to Gross Margin% can cause 7.98% of fluctuation in ROA which has a significant increase in the third year, accounting for almost 17%. Analyzing the same periods of SG&A Margin% it can be seen that a shock to it can cause 0.79% of fluctuation in ROA. The EBIT Margin% can cause 0.69% of fluctuation in ROA. The Fixed Asset Turnover can cause 3.6% of fluctuation in ROA. The Accounts Receivable Turnover can cause 3.62%. Finally, Inventory Turnover can cause 0.8% of fluctuation in ROA.

TABLE 2.12 – P&G VARIANCE DECOMPOSITION OF ROA

Period	S.E.	ROA	Gross Margin %	SG&A Margin %	EBIT Margin%	Fixed Asset Turnover	Accounts Receivable Turnover	Inventory Turnover
1	0.006999	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.008024	82.51898	7.978504	0.787911	0.687871	3.600987	3.628861	0.796884
3	0.008862	69.07555	16.63688	1.141405	0.845429	6.425761	4.596756	1.278217
4	0.009394	61.52722	22.85250	1.035214	0.819251	7.733243	4.560511	1.472055
5	0.009757	57.10299	26.83869	1.033780	0.768576	8.412634	4.313629	1.529700
6	0.010014	54.48565	29.16465	1.239379	0.729660	8.761497	4.096525	1.522642
7	0.010199	52.91127	30.43167	1.563260	0.705970	8.931156	3.962477	1.494197
8	0.010332	51.95910	31.07264	1.907042	0.693613	9.003890	3.899241	1.464476
9	0.010425	51.38296	31.36863	2.211958	0.688199	9.027207	3.880553	1.440489
10	0.010489	51.03581	31.48665	2.455248	0.686520	9.027807	3.884654	1.423310

Source: The author.

Finally, the Impulse Response Function was analyzed considering the ROA as explained variable. Please refer to Figure 2.6, which shows the Walmart Impulse Response Function from ROA to the variables described above. The paths of a disturbance of one standard deviation on the six variables in the ROA can be seen. Thus, the response of ROA to Gross Margin% is slightly positive from the second period onwards. If we look at the response of ROA to the SG&A Margin%, it is possible to observe a positive response on the second period, which turns negative in the sixth period. With respect to EBIT Margin%, the graph shows a negative response. If we look at the response of ROA to the EBITA Margin%, it is possible to see a slightly positive response until the fourth period. With respect to EBIT Margin%, the graph shows a positive response from the second period onwards. If we look at the response of ROA to the Fixed Asset Turnover, it is possible to observe a positive response on the second period, which turns negative in the fifth period. With respect to Accounts Receivable Turnover, the graph shows a positive response on the second period, which turns negative in the eighth period. Finally, looking at the Inventory Turnover, the response is slightly positive from the second period onwards.

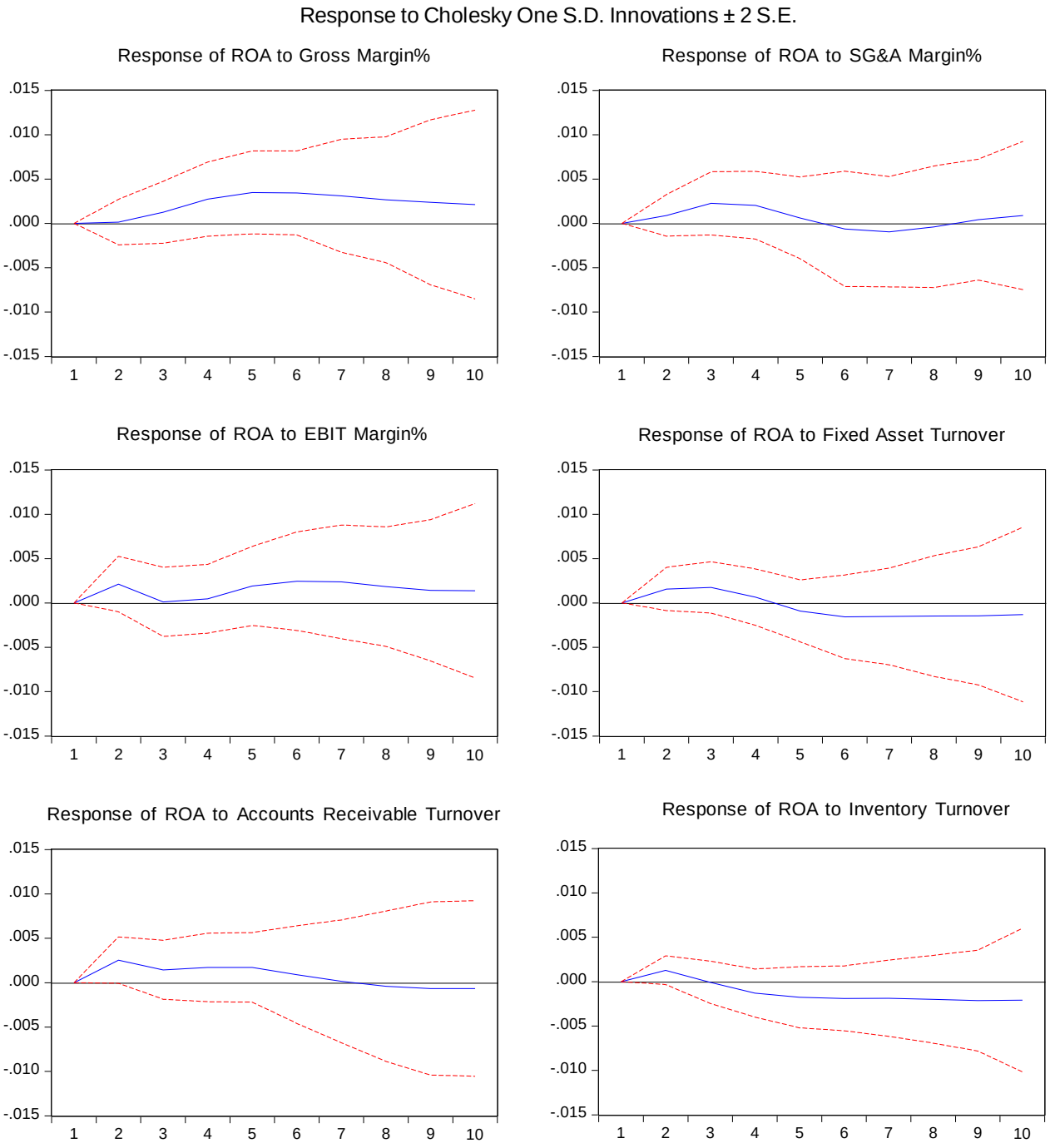


Figure 2.6: Walmart Impulse Response Function of ROA to Lean/Efficient metrics

Please refer to Figure 2.7 that shows the P&G Impulse Response Function from ROA to the variables described above.

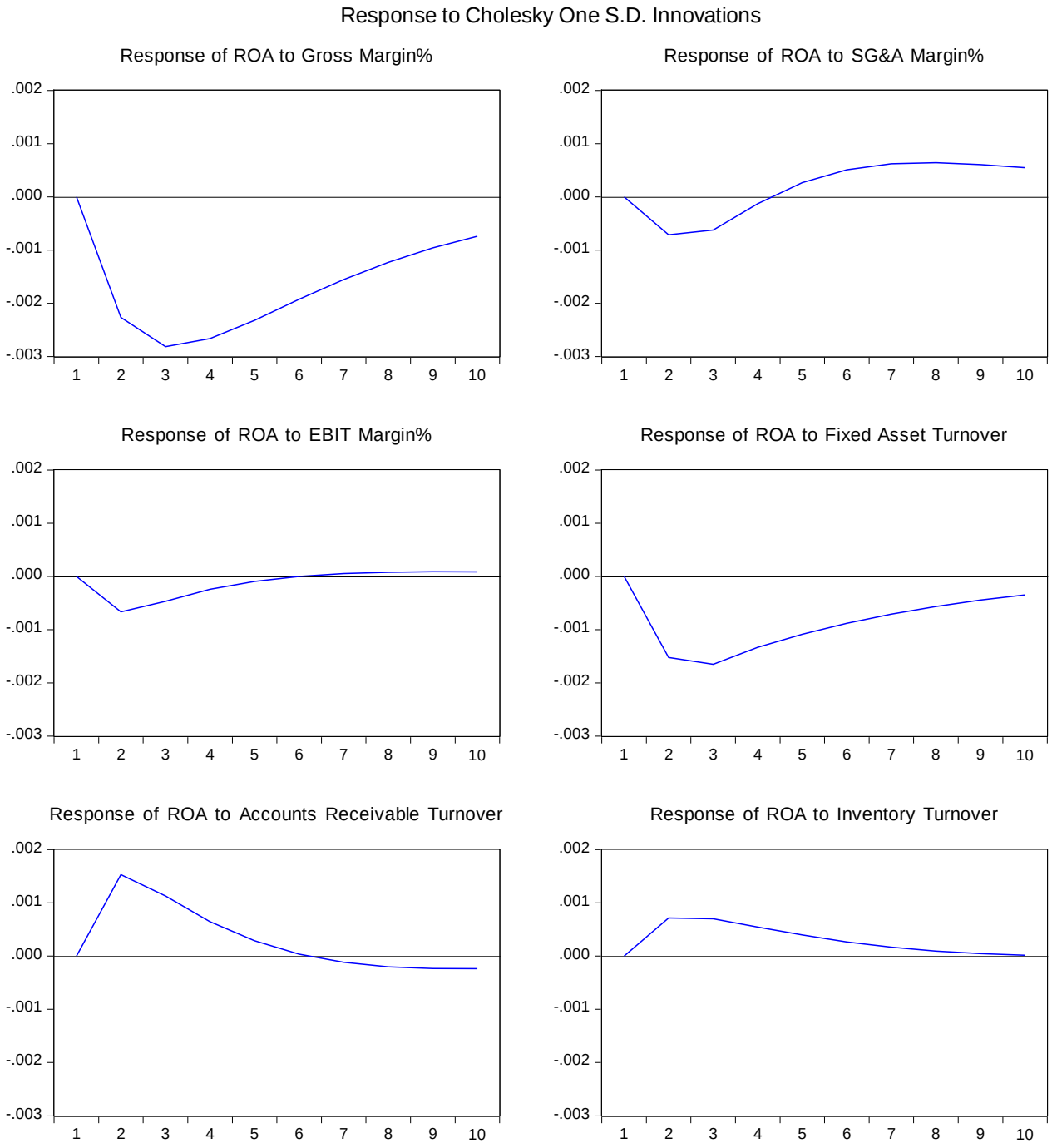


Figure 2.7: P&G Impulse Response Function of ROA to Lean/Efficient metrics

The paths of a disturbance of one standard deviation on the six variables in the ROA can be seen. Thus, the response of ROA to Gross Margin% is negative. If we look at the response of ROA to the SG&A Margin%, it is negative and becomes positive on

the fourth period. With respect to EBIT Margin%, the graph shows a negative that becomes slightly positive on the seventh period. If we look at the response of ROA to the Fixed Asset Turnover, it is possible to observe a negative response. With respect to Accounts Receivable Turnover, the graph shows a positive response, which turns negative in the seventh period. Finally, looking at the Inventory Turnover, the response is slightly positive from the second period onwards.

2.6.2 Agile strategy tests

This section presents firstly a test of hypothesis 1b through the Granger Causality Test of ROA with each of the follow variables: Current Ratio, Quick Ratio, Avg. Days Sales Out., Avg. Days Inventory Out., Avg. Days Payable Out., and Avg. Cash Conversion Cycle. Please refer to Table 2.13 to see the Walmart results. This set of variables is referring to Walmart Stores and it measures the impact of Agile/Effective practices on a firm's performance, which is measured by ROA.

TABLE 2.13: WALMART GRANGER CAUSALITY TEST - ROA & AGILE/EFFECTIVE PRACTICES

Null Hypothesis:	Obs	F-Statistic	Prob.
Current Ratio does not Granger Cause ROA	33	2.12085	0.1388
ROA does not Granger Cause Current Ratio*		1.47090	0.0767
Quick Ratio does not Granger Cause ROA***	33	12.3275	0.0001
ROA does not Granger Cause Quick Ratio		0.18073	0.8356
Avg. Days Sales Out. does not Granger Cause ROA*	33	3.15642	0.0581
ROA does not Granger Cause A Avg. Days Sales Out.**		3.54368	0.0425
Avg. Days Inventory Out. does not Granger Cause ROA	33	0.37986	0.6874
ROA does not Granger Cause Avg. Days Inventory Out.*		2.73772	0.0820
Avg. Days Payable Out. does not Granger Cause ROA	33	1.47218	0.2466
ROA does not Granger Cause Avg. Days Payable Out.*		3.26251	0.0533
Avg. Cash Conversion Cycle does not Granger Cause ROA	33	1.30212	0.2879
ROA does not Granger Cause Avg. Cash Conversion Cycle**		3.68089	0.0381

Source: The author.

As we can see in Table 2.13, based on the p-value, we can reject the hypothesis that Quick Ratio and Avg. Days Sales Out. does not Granger-cause ROA. In these tests, it seems that Granger causality runs one-way from Quick Ratio to ROA. However, we can observe a bilateral causality between Avg. Days Sales Out. and ROA. Since we found evidences that Walmart is pushing its inventory holding costs to its suppliers to optimize its efficiency, it was expected that Quick Ratio granger-causes ROA, instead of Current Ratio. The Walmart agility may be derived from its capability of meeting obligations in the short term with its liquid assets, excluding Walmart inventories, and from its liquidity due the positive correlation of ROQ with Avg. Days Sales Out.

TABLE 2.14: P&G GRANGER CAUSALITY TEST – ROA & AGILE/EFFECTIVE PRACTICES

Null Hypothesis:	Obs	F-Statistic	Prob.
Current Ratio does not Granger Cause ROA**	23	5.10227	0.0176
ROA does not Granger Cause Current Ratio*		2.97100	0.0767
Quick Ratio does not Granger Cause ROA	23	2.03365	0.1598
ROA does not Granger Cause Quick Ratio*		2.70551	0.0939
Avg. Days Sales Out. does not Granger Cause ROA	23	2.56722	0.1045
ROA does not Granger Cause Avg. Days Payable Out. *		3.01595	0.0742
Avg. Days Inventory Out. does not Granger Cause ROA	23	0.66364	0.5271
ROA does not Granger Cause Avg. Days Inventory Out.**		5.56555	0.0131
Avg. Days Payable Out. does not Granger Cause ROA	23	0.92452	0.4148
ROA does not Granger Cause Avg. Days Payable Out.**		4.81420	0.0211
Avg. Cash Conversion Cycle does not Granger Cause ROA	23	0.30859	0.7383
ROA does not Granger Cause Avg. Cash Conversion Cycle**		3.44557	0.0541

Source: The author.

As we can see in Table 2.14, based on the p-value, we can reject the hypothesis that Current Ratio does not Granger-cause ROA and vice versa. This result shows a bilateral causality between the Lean strategy and financial performance, which shows

evidences that P&G also adopts at least an Agile strategy. Since we found evidences that P&G may be carrying out part of the inventories hold costs of Walmart, this counterintuitive result may be from the fact that the Current Ratio indicates the firm liquidity and agility in terms of cash, inventory, and receivables. We can also that, if P&G has a good financial performance, then P&G is more effective on Current Ratio, Quick Ratio, Average Days Sales Out., Avg. Days Payable Out., and Avg. Cash Conversion Cycle in Granger-cause sense.

TABELA 2.15 – WALMART VARIANCE DECOMPOSITION OF ROA

Period	S.E.	ROA	Current Ratio	Quick Ratio	Avg. Days Sales Out.	Avg. Days Payable Out.	Avg. Days Inventory Out.	Avg. Cash Conversion Cycle
1	0.008237	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.009532	93.32663	2.301387	3.410413	0.925918	0.019221	0.016429	2.45E-07
3	0.010346	85.41091	5.177611	5.514108	3.559394	0.031063	0.306911	1.78E-06
4	0.010886	79.66042	7.411152	6.298678	5.866723	0.091920	0.671103	3.67E-06
5	0.011273	75.59857	9.138132	6.456503	7.589646	0.177761	1.039379	5.49E-06
6	0.011564	72.65374	10.47720	6.368606	8.843563	0.271300	1.385587	7.13E-06
7	0.011793	70.42337	11.53664	6.208214	9.767959	0.364082	1.699728	8.57E-06
8	0.011979	68.66636	12.39193	6.042956	10.46730	0.451750	1.979692	9.83E-06
9	0.012135	67.23900	13.09517	5.894892	11.01180	0.532245	2.226886	1.09E-05
10	0.012268	66.05315	13.68234	5.768319	11.44719	0.604883	2.444112	1.19E-05

Source: The author.

Secondly, hypothesis 2b was tested by performing a VAR. It was assumed that the ROA and the same set of variables adopted in the first test are endogenous variables. Then, the variance of variables was decomposed considering the ROA as explained variable. Please refer to Table 2.15 to see the Walmart results. The findings suggest that after the second year an innovation to Current Ratio can cause 2.3% of fluctuation in ROA. Analyzing the same periods of Quick Ratio, that Granger-causes ROA, it is seen that a shock to it can cause 3.41% of fluctuation in ROA. The Avg. Days

Sales Out. can cause 0.93% of fluctuation in ROA, Avg. Days Payable Out. can cause 0.02% of fluctuation in ROA, Avg. Days Inventory Out. can cause 0.02% of fluctuation in ROA, and Avg. Cash Conversion Cycle can cause less than 0.01% of fluctuation in ROA.

TABLE 2.16 – P&G VARIANCE DECOMPOSITION OF ROA

Period	S.E.	ROA	Current Ratio	Quick Ratio	Avg. Days Sales Out.	Avg. Days Payable Out.	Avg. Days Inventory Out.	Avg. Cash Conversion Cycle
1	0.010344	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.011857	93.75647	5.174722	0.098055	0.056615	1.13E-06	0.914135	1.71E-07
3	0.012787	89.56661	8.840475	0.093137	0.117797	0.000954	1.381028	3.03E-07
4	0.013350	87.06605	10.96768	0.085938	0.281583	0.001520	1.597233	3.71E-07
5	0.013700	85.37336	12.33034	0.087170	0.494441	0.002348	1.712340	4.15E-07
6	0.013917	84.22699	13.19807	0.092624	0.701021	0.002686	1.778605	4.45E-07
7	0.014051	83.45415	13.75017	0.098979	0.875662	0.002734	1.818301	4.67E-07
8	0.014133	82.94028	14.09922	0.104570	1.010632	0.002706	1.842596	4.81E-07
9	0.014185	82.60367	14.31831	0.108902	1.108826	0.002696	1.857594	4.91E-07
10	0.014216	82.38626	14.45491	0.112020	1.177216	0.002719	1.866875	4.98E-07

Source: The author.

Please refer to Table 2.16 to see the P&G results. The findings suggest that after the second year an innovation to Current Ratio can cause 5.17% of fluctuation in ROA which has a significant increase in the third year, accounting for almost 8.84%. Analyzing the same periods of Quick Ratio, that Granger-causes ROA, it is seen that a shock to it can cause 0.1% of fluctuation in ROA. The Avg. Days Sales Out. can cause 0.06% of fluctuation in ROA, Avg. Days Payable Out. can cause less than 0.01% of fluctuation in ROA, Avg. Days Inventory Out. can cause 0.91% of fluctuation in ROA, and Avg. Cash Conversion Cycle can cause less than 0.01% of fluctuation in ROA.

Finally, the Impulse Response Function was analyzed considering the ROA as explained variable. Please refer to Figure 2.8 that shows Walmart Impulse Response Function from ROA to the variables described above.

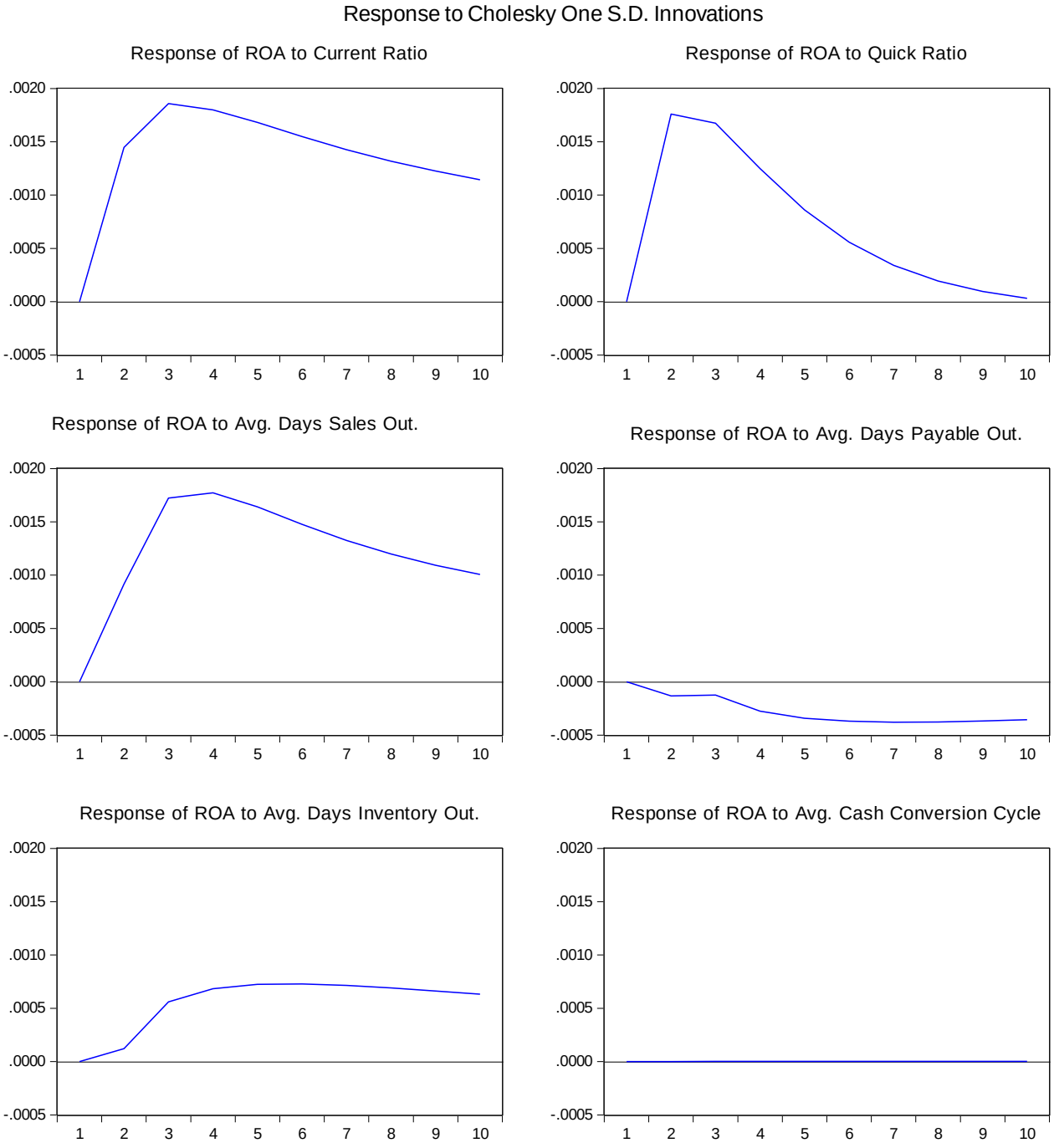


Figure 2.8: Walmart Impulse Response Function of ROA to Agile/Effective metrics

The paths of a disturbance of one standard deviation on the six variables in the ROA can be seen. Thus, the responses of ROA to Current Ratio, Quick Ratio, Avg. Days Sales Out., Avg. Days Inventory Out., are positive. With respect to Current Avg. Days Payable Out. and Avg. Cash Conversion Cycle, ROA response is positive for the former and zero for the latter.

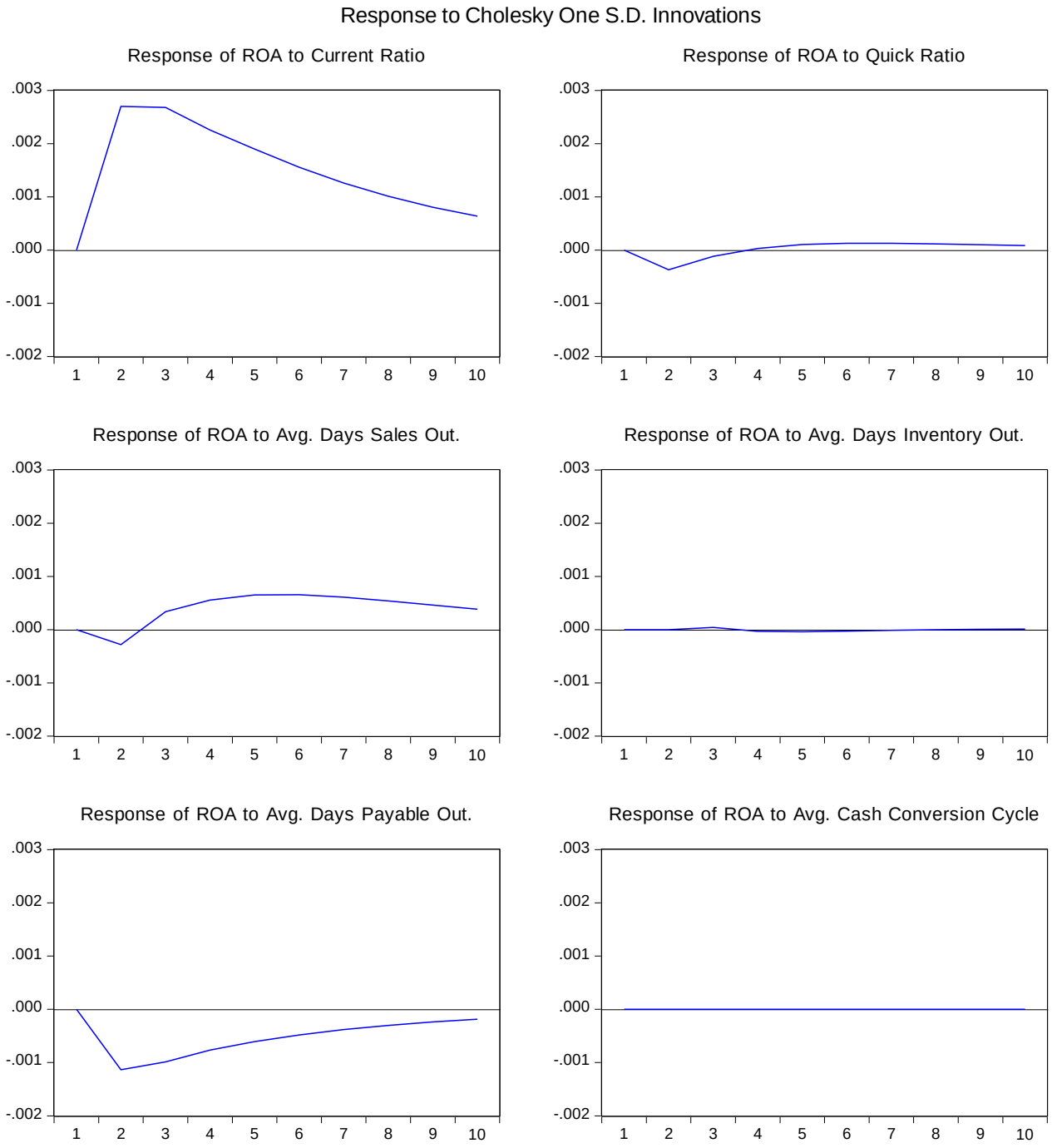


Figure 2.9: P&G Impulse Response Function of ROA to Agile/Effective metrics

Please refer to Figure 2.9 that shows P&G Impulse Response Function from ROA to the variables described above. The paths of a disturbance of one standard deviation on the six variables in the ROA can be seen.

2.7 Conclusion

There are several arguments that can be advanced to support the view that supply chain should be more closely linked with the financial decisions in a traditional manner (Gardner, 2004). The operations management literature clearly establishes that supply chain activities exert significant impact on firms' operations activities. Nonetheless, little academic effort has been seen to empirically link financial performance and supply chain, specially by using secondary data. Regardless of the fact that most studies in supply chain management argue that non-financial metrics capture the dynamic supply chain management activities and day-to-day activities in a more accurate manner I adopted financial metrics in a more traditional manner to measure supply chain strategy. The main idea behind this argument is that formulation process of strategy it is not reflected by day-to-day activities since that the decision that a supply chain will be either lean or agile involves, for instance, the conclusion of key contracts with partners that ensured the operation of the company almost without inventories, for the lean case, and involves a large capital expenditure to acquire property, plant and equipment.

Given that this type of decision of which strategy the chain will adopt occurs in the board of directors, this study adopted accounting and finance metrics to identify the strategy adopt by Walmart and P&G, two partners of the same supply chain. The evidences show that Walmart adopts an Agile strategy. Since we found evidences that Walmart is pushing its inventory holding costs to its suppliers to optimize its efficiency, it was expected that Quick Ratio granger-causes ROA, instead of Current Ratio. The Walmart agility may be derived from its capability of meeting obligations in the short term

with its liquid assets, excluding Walmart inventories, and from its liquidity due the positive correlation of ROQ with Avg. Days Sales Out. The evidences also shown that Walmart´s good financial performance is increasing its net sales due its price reductions, increased product availability and in decreasing in SG&A costs derived from a better product mix, lower stockouts, and better customer service. Walmart financial performance is also increasing its capability of generating revenues from its fixed asset derived from cost per unit produced reductions and increased capacity of the fixed assets in generate net sales. Finally, evidences suggest that Walmart is pushing its inventory holding costs to its suppliers, to optimize its efficiency.

We can also observe evidences that P&G adopts a Lean strategy. P&G efficiency may be derived from firm's ability to “to command higher prices and its ability to reduce cost of goods sold through efficient production”. The leaner firm increases its ROA by the “lower material costs and improved operations productivity resulting through more accurate forecasts.” The Lean strategy also increases net sales and reduce SG&A costs, which will improve the SG&A margin by “price reductions, increased product availability, improved product mix, fewer stockouts, and better customer service”. P&G is may be also increases its net revenue and productivity combined with an efficient cost control which decreases the operating expenses relatively to revenue. This positive effect on ROA derived from the reduction of non-value adding activities rather than a lower inventory level. The evidences suggest that P&G may be also using its “fixed assets in manufacturing, which may reduce cost per unit produced” and “providing more reliable transit times and shorter lead times, delivering products in the right quantity and with the right specs” and by generating improvements on invoicing process due to

“correct information on delivery documents”. It is important to note that we cannot reject that Inventory Turnover does not granger cause ROA, which may be derived from the partnership with Wall-Mart. P&G is a major supplier of Wall-Mart and We found evidences that may be pushing its inventory holding costs to its suppliers to optimize its efficiency. Since we found evidences that P&G may be carrying out part of the inventories hold costs of Walmart, this counterintuitive result may be from the fact that the Current Ratio indicates the firm liquidity and agility in terms of cash, inventory, and receivables. We can also that, if P&G has a good financial performance, then P&G is more effective on Current Ratio, Quick Ratio, Average Days Sales Out., Avg. Days Payable Out., and Avg. Cash Conversion Cycle in Granger-cause sense

APPENDIX A

PROCESSES	
D1	Deliver Stocked Product
D1.10	Pack Product
D1.11	Load Vehicle & Generate Shipping Docs
D1.12	Ship Product
D1.13	Receive and verify Product by Customer
D1.15	Invoice
D1.3	Reserve Inventory and Determine Delivery Date
D2	Receive, Enter, and Validate Order
D2.10	Pack Product
D2.11	Load Vehicle & Generate Shipping Docs
D2.12	Ship Product
D2.13	Receive and verify Product by Customer
D2.15	Invoice
D2.2	Receive, Configure, Enter and Validate Order
D2.3	Reserve Inventory and Determine Delivery Date
D2.9	Pick Product
D3	Deliver Engineer-to-Order Product
D3.11	Load Product & Generate Shipping Docs
D3.12	Ship Product
D3.13	Receive and verify Product by Customer
D3.15	Invoice
D3.3	Enter Order, Commit Resource & Launch Program
D3.8	Receive Product from Source or Make
D3.9	Pick Product
D4	Deliver Retail Product
D4.4	Stock Shelf
DR1	Deliver Return Defective Product
DR2	Deliver Return MRO Product
DR3	Deliver Return Excess Product
M1	Make-to-Stock
M1.1	Schedule Production Activities
M1.3	Produce and Test
M1.4	Package
M2	Make-to-Order
M2.1	Schedule Production Activities
M2.3	Produce and Test
M2.4	Package
M3	Engineer-to-Order
M3.1	Finalize Production Engineering
M3.2	Schedule Production Activities
M3.4	Produce and Test
M3.5	Package
P1	Plan Supply Chain
P1.1	Identify, Prioritize and Aggregate Supply Chain Requirements
P2	Plan Source
P2.1	Identify, Prioritize and Aggregate Product Requirements
P3	Plan Make
P3.1	Identify, Prioritize and Aggregate Production Requirements

P4	Plan Deliver
P4.1	Identify, Prioritize and Aggregate Delivery
P4.2	Identify, Assess and Aggregate Delivery Resource
S1	Source Stocked Product
S2	Source Make-to Order Product
S3	Source Engineer-to-Order Product
SR1	Source Return Defective Product
SR2	Source Return MRO Product
SR3	Source Return Excess Product

Source: The author.

Chapter 3

3 DOES EARNINGS MANAGEMENT OCCUR IN THE LONG TERM?

3.1 INTRODUCTION

A significant number of firms present performance results that diverge from the market average. Many analysts justify the superior performance by stating they use Earnings Management techniques. However, even knowing that these companies employ such techniques, most investors continue allocating their resources to these firms (Dechow; Ge; Schrand, 2010). In this sense, Becker et al. (1998) argue that the occurrence of Earnings Management may be a result of incentives given by managers to disclose manipulated accounting results, intending to improve their individual well-being and, also, the value of the companies they manage.

Earnings Management are the changes in the presentation of accounting data that are intentionally and discretionary made by managers without the characterization of any legal violation (Burgstahler and Dichev, 1997). Thus, decisions are made based on the limits set by accounting practices and standards, which ultimately allow managers to add some level information asymmetry to company results aiming to increase their value (Schipper, 1989; Leuz, Nanda, Wysocki, 2003; Burgstahler, Hail, Leuz, 2006).

For that reason, it is important to highlight that Earnings Management is not necessarily a fraudulent process; it is a legal procedure that managers may use to present the accounting and financial information of their companies (Dechow, Ge, Schrand, 2010; Burgstahler, Hail, Leuz, 2006) prominent example in the world market is

the case of General Electric (GE) when it was under the management of CEO Jack Welch. Ritholtz (2012) points out that "GE's revenues increased by 385% under Welch's management, but the company's market capital increased by 4000%". Another aspect that deserves to be highlighted is that GE's growth remained regular for a long period of time, with profit goals being achieved for 100 consecutive quarters (Riholtz, 2012). Even with such impressive numbers Dechow, Ge and Schrand (2010) point out that there is a consensus in the literature that the practice of earnings management is harmful to companies' earnings quality and should not be adopted.

There is wide accounting literature that seeks to understand Earnings Management through incentives that managers have in order to use of such techniques. The literature in earnings management typically defines that there are two distinct ways a manager can adopt earnings management practices: by income smoothing and by operational activities. Specifically, in this article I address the case of income smoothing practices, since that an accurate verification of earnings management by operational activities demands information that is not required by companies to disclose (Eckel, 1981).

Along similar lines, one can argue that accounting practices and standards are not the only determinants of the properties present in the accounting and financial information of companies, showing that it is necessary to observe managers' motivations to disclose information the way they do (Ball, Robin and Wu, 2000; Ball, Kothari and Robin, 2003). In this case, I argue that if we observe the properties of the time series of accounting and financial information, then we can identify if a company is adopting income smoothing techniques.

In the same vein, the institutional environment in which the company is inserted may affect the managers' incentives to employ Earnings Management techniques. Thus, countries that are characterized by having weak institutional structure provide earning opportunities for managers who opt for less rigid structures of corporate governance (Houlthausen, 2003). Therefore, the environment mitigates incentives to the dissemination of more accurate accounting reports, increasing the incidence of Earnings Management, which would be the case of Brazil (Durnev and Kim, 2005).

Following this line, Dichev and Tang (2008) argue that the earnings volatility significantly affects profits; also, the new economic context, with many R&D costs, has deteriorated the quality of earnings. Due to these factors, the authors argue that in order to access the properties of profit, it is essential to understand the long-term effects of the earnings volatility and of changes in the economy (DICHEV and TANG, 2008). That said, this study aims to answer the following research question: **Is Earnings Management sustainable in the long term?**

Earnings management studies provide mixed findings (Healy, 1985). The purpose of this paper is providing some evidences if Earnings Management practices occurs or not in the long-run. Earnings Management is assumed to erode earnings quality, (Dechow et al., 2010) that is a decrease in the capacity of the reported earnings to accurately represent current operating performance and to accurately forecasting future operating performance. On the logical grounds, the idea of this paper is if earnings management practices occur eventually, then the accounting data series will not lose informational content. Conversely, if these practices occur systematically, then the accounting data series will lose informational content.

One that is often as a given often in the empirical studies on the subject regards managers' incentives to use earnings management. In case the practice is only occasional, the effects of earnings management would be just random divergences in the accounting information and the many negative consequences of the distortions of the properties of accounting numbers cited by Ball, Robin and Wu (2000) would not be of concern to investors and other shareholders. However, if the incentives for managers to "manipulate" the results cause a persistent behavior, then the arguments of Leuz, Nada and Wysocki (2003) who observed a negative correlation between management and investor protection are supported and, consequently, this management practice becomes extremely important.

Another aspect this study seeks to address is the fact that the literature that deals with earnings management, should address the issue through a cointegration approach. The literature on earnings management has been using time series techniques that evaluate the correlation between earnings management and earnings quality over time. In this study, it is assumed that if the process of earnings management occurs, then the revenue and earnings management metrics series should not cointegration, despite with the correlation between the series shows.

I adopted a cointegration approach to address the research question. Cointegration is a property of two or more variables moving together through time, and despite they are following its own individual trends, they will not drift too far apart, since they are linked together in some sense. I verified if Earnings Management practices are moving together with Revenue. If Earnings Management exist, then the expectation is that the series will not be cointegrated with Revenue. I performed both the Engle-

Granger (1987) Cointegration $\tau - test$ and Engle-Granger (1987) Cointegration z$-test$. I also performed the five specifications of Johansen (1991) Cointegration eigenvalue$-test$ and the $trace - test$.

The overall results pointed out that for the sample and period studied, the Brazilian companies are not adopting earning management practices by income smoothing in a systemically manner. The cointegration tests that consider the possibility of deterministic trends in the series shown that the standard-deviation of non-operating income follow the same pattern of the gross revenue and the standard-deviation of operating cash flow; that absolute value of total accruals follow the same pattern of the absolute value of operating cash flow and gross revenue; and the standard-deviation of the net income follow the same pattern of the gross revenue.

3.2 THEORETICAL BACKGROUND

3.2.1 Earnings Management

There is still no consensus in the accounting literature about the existence and implications of Earnings Management. Since the seminal work of Schipper (1989) in which it is emphasized that the practice of Earnings Management has a strong correlation with the literature on Earnings Quality, the accounting literature has put significant effort in identifying the existence and measure the effects of the practice of earnings management (Dechow, Ge, Schrand, 2010; Burgstahler, Hail, Leuz, 2006).

Even in face of contradictory evidence, the common idea, based on agency theory (Jensen; Mackling, 1976), argues that managers choose to disclose accounting

information in order to get some private benefit during this process (Schipper, 1989; Healy and Wahlen, 1999; Leuz, Nanda, Wysocki, 2003). The earnings management process may originate from several techniques used by managers, but two distinctive features can be identified: management by accruals or by operational activities of the companies. The evidence about the occurrence of earnings management is inconsistent and there is no consensus in the literature about the effective adoption of this management practice (Dichev and Tang, 2008). Most studies seek to see the effects of earnings management by accruals manipulation. There are few studies that focus on the operational activities, with highlights to Dechow and Sloan (1991) and Bartov (1993).

Even with the high concentration of management evaluations based on accruals, their calculation is complex and may be accomplished in many different ways. This discussion is beyond the scope of this work, but Leuz et. al., (2003) and Dechow and Dichev (2002) conducted an extensive review of the various methods and techniques to measure earnings management, which produces strong theoretical evidence that if the practice actually occurs, it is detectable and measurable, even if such procedures are subject to limitations due to the lack of data or due to methodological issues.

Hepworth (1953, p.33) was one of the first researchers to investigate earnings management practices. The author argues that the core motivation for a firm adopt income smoothing practices “is the existence of tax levies, based upon income.” Hepworth (1953) also highlight that the reduction on the volatility of the income makes the shareholders feel more confident toward the manager. In logics grounds, Gordon (1966) posits that we can test the income smoothing hypothesis by looking the correlation between the “gains and losses on the sale securities” and the operating

income. According to him, if we compare the variation on the series of sale securities with and without these gains and losses, and the former presents a smaller variation, then we have income smoothing.

Following Gordon (1964), Watts and Zimmerman (1978, p.113) posit that “one function of financial reporting is to constrain management to act in the shareholders' interest.” However, they argue that the market can distinguish real events from earnings management practices (Fama, 1970). Thus, one can argue that on average the market can differentiate these events and the managers know that. Consequently, if these practices generate inefficiency, then managers will be at least constraint to eliminate these practices by the shareholders.

3.2.2 Evidence of the existence of earnings management

Attempting to bring empirical evidence to the topic, Leuz et. al., (2003) conducted a cross-country study in which they proposed four metrics for the measurement of earnings management. The argument of the authors is that managers seek to cause some degree of information asymmetry in order to ensure the maintenance of their private control benefits in relation to the other shareholders. The results showed a negative correlation between management and protection of investors, indicating that the relationship between accounting information quality and corporate governance would be endogenous (Leuz; Nada; Wysocki, 2003).

On logical grounds, some scholars (Lang, Raedy, Wilson, 2006; Lel, Miller, 2008; Leuz, 2006) investigated the existence of a possible variation in the degree of accounting management arising from changes in cross listing standards. The argument

found in these studies is that changes in the cross listing process would result in information gain, which would mitigate earnings management, measured by the methodology proposed by Leuz, Nada and Wysocki (2003). The results show that non-USA companies are “characterized by more evidence of smoothing, a greater tendency to manage earnings towards a target, a lower association with share price and less timely recognition of losses” (Lang, Raedy, Wilson, 2006, p. 255). Companies from a weak institutional environment present accounting data “of lower quality even though cross-listed firms are required to follow nominally similar accounting standards as U.S. firms” (Lel and Miller, 2008, p.1901).

In this sense, Leuz (2006) assessed the effects of adjustments to American accounting standards and of cross listing in earnings management in 34 countries. Following Leuz, Nada and Wysocki (2003), the authors argue that the institutional instability of the country results in lower investor protection and accounting indicators with low information content. Due to these factors, it is expected that cross listing companies present more effective instruments of corporate governance, given that the requirements of the American accounting system demand a higher quality of accounting indicators. By means of three different earnings management metrics, the results indicated that “both cross-listed and U.S. firms continue to exhibit significantly less earnings management than non-cross listed firms” (Leuz, 2006, p. 297).

On logical grounds, there is no compelling reason to argue that further research in this area may differentiate the institutional environment by countries. Specifically, due the inconclusive results of empirical research in Brazil (Azevedo, 2012; Da Silva, Bezerra, 2010; Lopes, Tukamoto, 2007; Lopes, Tukamoto, Galdi, 2014; Martinez, 2013;

Durnev, Kim, 2005), this article attempt to provide empirical evidence about the existence of Earnings Management in this country. In this sense, Dechow, Ge and Schrand (2010) and Martinez (2013) conducted an extensive and exhaustive survey on the subject, which took the earnings managements debate to a discussion on earnings management.

3.2.3 Earnings quality

Dechow, Ge and Schrand (2010) argue that, aiming to find out the features and predictive power of earnings quality, research in accounting and finance uses a variety of metrics and proxies that make it impossible to accurately define the concept of earnings quality. This stems from the fact that there is no uniformity in the studies that employ the various indicators based on frameworks and different theories, such as persistence (Ball; Brown, 1968; Dechow, 1994; Penman; Sougiannis, 1998) accruals (Dechow; Sloan; Sweeney, 1995; Dechow; Dichev, 2002), mitigation (Leuz, Nada; Wysocki, 2003) timeliness (BASU, 1997), reduction of losses (Burgstahler; Dichev, 1997; Dechow; Richardson; Tuna, 2003), investors' responsiveness (Ball; Brown, 1968; Holthausen; Verrecchia, 1988), and external indicators (Dechow; Sloan; Sweeney, 1996; Beneish, 1999).

In this context, Leuz (2006) conclude that earnings quality is a function of the environment and context in which the company and the investor are inserted and the company's bases, which makes it difficult to establish a general definition. In this sense, Dechow and Schrand (2004) argue that, given the distortions created in the process of

disclosing the accounting information, the practice Earnings Management has a negative correlation with earnings quality.

On logical grounds, Lel and Miller (2008) support this argument by stating that the earnings management reduces the usefulness of accounting indicators, thus mitigating corporate governance strategies that use such information. Therefore, considering the existence of management, foreign investors need to seek alternative means to verify the actual performance of the companies, which results in additional monitoring costs. The authors also point out that there is a set of studies that have sought to investigate the incentives managers have to practice earnings management and not the practice itself (Lel, Miller, 2008).

3.2.4 Cointegration

Cointegration can be understood as the long-term balance between variables, even in face of non-stationary series, that is, series that have some type of stochastic component. Thus, cointegrated series will have a common trend over time, and by verifying the difference between them, the resulting series will be stationary, that is, the series converge to an equal pattern in the long term.

Because of that, if earnings management series are cointegrated with revenue series, there are two possible explanations. The first explanation is that in the long term managers do not adopt the practice of earnings management, as the revenue series does not suffer manipulation. In case it is argued that the earnings management practice occurs in the long run, then managers would be managing not only the accounting numbers, but also the revenue, which characterizes fraud. Thus, matching would

decrease over time if this cointegration process does not occur, given that matching can be interpreted as the cointegration of the revenue series with financial indicators.

3.3 METHODOLOGY

3.3.1 Sample

In order to initially build the sample, the list of all companies that traded shares listed on the BM&FBOVESPA during the period from 1998 to 2013 and with active registration was obtained based on information from the software Economática. Then, companies from the economic sector "finance and insurance" were excluded due to the specific rules they are subject to. Companies that did not have enough information to calculate the total accruals for the analyzed period were removed from the sample.

The data were collected quarterly from the Economatica database from the listed companies in the Brazilian Securities, Commodities, and Futures Exchange BM&FBOVESPA, covering the period of 1998 to 2013. Then we have $t = 60$.

TABLE 3.1 – SELECTION CRITERIA OF THE DATA

Selection Criteria	***Companies***
Companies classified as active on BM&FBOVESPA within these periods	**400**
Companies from the financial or insurance sector	**37**
Companies that did not present the necessary data for the operationalization of the metrics adopted within these periods	**340**
SAMPLE	**23**

Source: The author.

3.3.2 Earnings management metrics

Among the various forms that are proposed to measure the presence and level of Earnings Management, this study will be based on the methodology developed by Leuz,

Nada and Wysocki (2003) and Pincus e Rajgopal (2002). I will base the analyses on two metrics developed by Leuz, Nada and Wysocki (2003) and one metric proposed by Pincus e Rajgopal (2002). These metrics use statistical techniques that enable the identification of the mitigation of company results by means of discretionary actions of "manipulation" of accounting numbers by managers. The empirical strategy is instead of computing the ratios proposed by the authors and then measuring their effects at each moment of time, I verify if the denominator cointegrates with the numerator or with the gross revenue series, which in turn indicates that there are no practices earnings management of long-run results.

The first measure of earnings management EM_1 reveals information about the levels at which managers reduce the variability of reported earnings. Thus, a small value indicates that the standard-deviation of net operating income is smaller than the standard-deviation of operating cash flow, which in turn suggests that the manager practiced income smoothing. The calculation of EM_1 is given by:

$$EM_1 = \sigma(NOI_t)/\sigma(OCF_t) \quad (1)$$

where EM_1 is our first Earnings Management metric; NOI_t is the net operating income; OCF_t is the operating cash flow; σ is the firm-level standard deviation.

The OCF_t was compute as follow:

$$OCF_t = OPp_t - TAC_t \quad (2)$$

where OCF_t is the operating cash flow; OP is the operating profit; TAC_t is the total accruals.

The total accruals were computed as follow:

$$TAC_t = (\Delta CA - \Delta CASH) - (\Delta STDEBT - \Delta CL - \Delta TAXES) - \mathrm{DEPTN} \quad (3)$$

where ΔCA is the change in current liabilities; $\Delta CASH$ is the change in cash and cash equivalents; $\Delta STDEBT$ is the change in debt; ΔCL is the change in current liabilities; $\Delta TAXES$ is the change in taxes; DEPTN is the depreciation and amortization expense.

The second metric of earnings management EM_2 reveals information about the magnitude at which managers adopted earnings managements practices in the reported earnings. Thus, a high value indicates that the absolute value of total accruals is bigger than the absolute value of operating cash flow, which in turn suggests that the manager practiced income smoothing. The calculation of EM_2 is given by:

$$EM_2 = |TAC_t|/|OCF_t| \quad (5)$$

where EM_2 is our third Earnings Management metric; $|TAC_t|$ is the absolute value of total accruals; $|OCF_t|$ is the absolute value of operating cash flow.

The third measure of earnings management EM_3 reveals information about the levels at which managers reduce the variability of reported earnings. Thus, a high value indicates that the standard-deviation of non-discretionary is bigger than the standard-deviation of net income, which in turn suggests that the manager practiced income smoothing. The calculation of EM_3 is given by:

The calculation of the forth measure of earnings management EM_3 is given by:

$$EM_3 = \sigma_{NDI_{(t)}}/\sigma_{NI_{(t)}} \quad (6)$$

where EM_3 is Smoothing Ratio; $\sigma_{NDI_{(t)}}$ is the standard deviation of the non-discretionary income; $\sigma_{NI_{(t)}}$ is the standard deviation of the net income.

The non-discretionary income was computed as follow:

$$NDI_i = OCF_i + NDA_i \quad (7)$$

where NDI is, the nondiscretionary income; OCF_i is the operating cash flow; NDA_i are the nondiscretionary accruals.

3.3.3 Cointegration tests

The five cointegration specifications of the Johansen Cointegration Test (1991) and the Engle and Granger Cointegration Test (1987) were carried out. The statistics of both tests were computed in two different ways, trace and maximum value statistics for the first five and tau and standardized z statistics for the latter.

In this context, 552 cointegration tests were performed with statistics computed in two different ways, resulting in 1104 results. The tests are briefly explained below.

The trace statistic is given by:

$$Q_r = -T \sum_{i=r+1}^{k} \text{In}\,(1 - \lambda_i) \quad (8)$$

where Q_r is the likelihood ratio statistic; λ_i is the $i - th$ largest estimated eigenvalue; T is the number of observations.

The hypotheses of Johansen Cointegration Test are:

$\boldsymbol{H_0}$ **–** Exist at least r Cointegration vectors.

$\boldsymbol{H_1}$ **–** Does not exist at least r Cointegration vectors.

The maximum eigenvalue statistic is given by:

$$Q_{max}(r, r+1) = -T\,\text{In}\,(1 - \lambda_{r+1}) \quad (9)$$

where Q_{max} is the maximum eigenvalue statistic; λ_{r+1} is the estimated eigenvalue; T is the number of observations.

λ é a estimativa do autovalor;

T é o número de observações na série.

The hypotheses of Johansen Cointegration Test are:

$\boldsymbol{H_0}$ **–** Exist exactly r Cointegration vectors.

$\boldsymbol{H_1}$ **–** Does not exist exactly r Cointegration vectors.

The specifications of Johansen Cointegration Test estimated in this study were:

Test 1 – no deterministic trends and no intercepts:

$$H_2(r): \mathbf{\Pi} y_{t-1} + \mathcal{B} x_t = \alpha \beta' y_{t-1} \quad (10)$$

Test 2 – no deterministic trends with intercepts:

$$H_1^*(r): \mathbf{\Pi} y_{t-1} + \mathcal{B} x_t = \alpha(\beta' y_{t-1} + \rho_0) \quad (11)$$

Test 3 – linear trends but have only intercepts:

$$H_1(r): \mathbf{\Pi} y_{t-1} + \mathcal{B} x_t = \alpha(\beta' y_{t-1} + \rho_0) + \alpha \perp \gamma_0 \quad (12)$$

Test 4 – linear trends:

$$H^*(r): \mathbf{\Pi} y_{t-1} + \mathcal{B} x_t = \alpha(\beta' y_{t-1} + \rho_0 + \rho_1^t) + \alpha \perp \gamma_0 \quad (13)$$

Test 5 – quadratic trends with linear trends:

$$H(r): \mathbf{\Pi} y_{t-1} + \mathcal{B} x_t = \alpha(\beta' y_{t-1} + \rho_0 + \rho_1^t) + \alpha \perp (\gamma_0 + \gamma_1^t) \quad (14)$$

The specifications of Engle-Granger Cointegration Test estimated in this study were:

$$y_t = X_t'\beta + D_{1t}'\gamma_1 u_{1t} \quad (15)$$

$$X_t = T_{21}'D_{1t} + T_{22}'D_{2t} + \epsilon_{2t} \quad (16)$$

$$\Delta\epsilon_{2t} = u_{2t} \quad (17)$$

where u_{1t} and ϵ_{2t} are white noise error process; $D_t = (D_{1t}', D_{2t}')'$ is a vector of deterministic trends and stochastic regressors.

3.4 RESULTS AND DISCUSSION

The results of the Engle-Granger cointegration tests for EM_1 are presented in Table 3.2. It can be seen that by the Engle-Granger Test for the gross revenue and the standard-deviation of operating cash flow, considering the tau statistic, only 24% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 36% of results rejected the null hypothesis.

It can be noted that by the Engle-Granger Test for the gross revenue and the standard-deviation of non-operating income, considering the tau statistic, only 32% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 36% of results rejected the null hypothesis.

TABLE 3.2 – ENGLE-GRANGER COINTEGRATION TEST EM_1 RESULTS

Sample adjusted: 1998 – 2013				
Company	**Statistical**	**Gross Revenue & σ_{OCF}**	**Gross Revenue & σ_{NOI}**	**σ_{OCF} & σ_{NOI}**
ABEV3	Tau statistics	-2.142953 (0.4601)	-1.331211 (0.8222)	-2.169643 (0.4471)
	Z statistics	-13.06840 (0.1767)	-4.852022 (0.7344)	**-50.73498 (0.0000)**
ALPA4	Tau statistics	-1.889432 (0.5884)	-1.744982 (0.6586)	-2.295081 (0.3848)
	Z statistics	**-16.32868 (0.0855)**	-4.976162 (0.7239)	**-75.71666 (0.0000)**
BRFS3	Tau statistics	-2.183137 (0.4397)	-2.786547 (0.1859)	-1.669328 (0.6932)
	Z statistics	-11.47487 (0.2477)	**-38.34694 (0.0001)**	-4.464333 (0.7673)
CEEB3	Tau statistics	-1.856780 (0.6046)	-1.585761 (0.7294)	**-4.094882 (0.0099)**
	Z statistics	-8.089701 (0.4624)	-5.015773 (0.7205)	**-68.20815 (0.0000)**
CELP3	Tau statistics	-2.626851 (0.2414)	-1.436352 (0.7873)	-1.436269 (0.7873)
	Z statistics	**-24.78792 (0.0095)**	**-17.00302 (0.0701)**	-10.60691 (0.2917)
CEP5	Tau statistics	-1.498816 (0.7642)	-1.578984 (0.7322)	-1.896010 (0.5849)
	Z statistics	-5.144826 (0.7094)	-5.630898 (0.6673)	-8.927621 (0.4029)
CESP6	Tau statistics	-2.271660 (0.3961)	-2.200835 (0.4309)	-1.140942 (0.8732)
	Z statistics	-14.22230 (0.1385)	**-19.93983 (0.0351)**	-2.948368 (0.8798)
Company	**Statistical**	**Gross**	**Gross**	**σ_{OCF}**

Sample adjusted: 1998 – 2013				
Company	**Statistical**	**Gross Revenue & σ_{OCF}**	**Gross Revenue & σ_{NOI}**	**σ_{OCF} & σ_{NOI}**
FIBR3	Tau statistics	-1.818337 (0.6235)	-2.144476 (0.4591)	-1.302057 (0.8310)
	Z statistics	-5.031432 (0.7191)	-12.43406 (0.2036)	-4.162455 (0.7919)
ITEC3	Tau statistics	-1.548655 (0.7446)	-1.103451 (0.8816)	-1.857315 (0.6046)
	Z statistics	-9.386012 (0.3692)	-14.28344 (0.1366)	-5.416271 (0.6842)
LAME4	Tau statistics	-2.690397 (0.2182)	-2.533226 (0.2783)	-2.318022 (0.3734)
	Z statistics	**-77.75104 (0.0000)**	**-17.84564 (0.0594)**	-9.702593 (0.3503)
MGEL4	Tau statistics	-1.691071 (0.6835)	-1.648512 (0.7025)	-2.399207 (0.3355)
	Z statistics	-11.19675 (0.2604)	-4.708053 (0.7466)	-10.21776 (0.3189)
MYPK3	Tau statistics	**-3.502570 (0.0441)**	-1.557849 (0.7409)	-1.785985 (0.6390)
	Z statistics	**-325.6929 (0.0000)**	**-15.58722 (0.1017)**	-8.803110 (0.4112)
RSID3	Tau statistics	**-3.501193 (0.0457)**	-1.614204 (0.7175)	-2.193399 (0.4347)
	Z statistics	7.180623 (1.0000)	-45.11586 (0.0000)	**-327.2531 (0.0000)**
SBSP3	Tau statistics	-2.119249 (0.4722)	**-3.115793 (0.1020)**	-1.717379 (0.6715)
	Z statistics	**-16.28359 (0.0847)**	37.76132 (0.9999)	**-21.07933 (0.0258)**
Company	**Statistical**	**Gross**	**Gross**	**σ_{OCF}**

		Revenue & σ_{OCF}	**Revenue & σ_{NOI}**	**& σ_{NOI}**
CGAS5	Tau statistics	-1.867957 (0.5991)	-2.051524 (0.5063)	-2.336188 (0.3665)
	Z statistics	**-16.52028 (0.0817)**	-10.98390 (0.2730)	12.55137 (1.0000)
CMGR3	Tau statistics	**-6.538607 (0.0000)**	-1.689377 (0.6842)	-2.213001 (0.4247)
	Z statistics	11.35749 (1.0000)	-3.009959 (0.8758)	**-55.85650 (0.0000)**
CSRN5	Tau statistics	-1.374071 (0.8085)	-1.213495 (0.8556)	-2.182271 (0.4397)
	Z statistics	-4.131421 (0.7939)	-2.129711 (0.9257)	-12.98935 (0.1835)
ELEK4	Tau statistics	-1.717222 (0.6715)	-1.912616 (0.5768)	-1.570830 (0.7356)
	Z statistics	-5.920649 (0.6422)	-9.962258 (0.3321)	-5.947654 (0.6407)
ELPL4	Tau statistics	-1.862167 (0.6019)	-1.687727 (0.6850)	-2.615607 (0.2448)
	Z statistics	-4.260514 (0.7835)	-3.846796 (0.8162)	-14.71706 (0.1263)
EMBR3	Tau statistics	-2.702618 (0.2139)	**-3.964413 (0.0143)**	-2.487745 (0.2967)
	Z statistics	**-15.57682 (0.1019)**	**-155.4500 (0.0000)**	-13.73081 (0.1562)
SCLO4	Tau statistics	**-3.534379 (0.0410)**	**-3.421510 (0.0530)**	-1.234548 (0.8500)
	Z statistics	**-129.4077 (0.0000)**	**-78.13939 (0.0000)**	-3.790357 (0.8209)
SGAS4	Tau statistics	-1.777303 (0.6433)	**-3.231046 (0.0800)**	-1.403798 (0.7986)
	Z statistics	-13.88011 (0.1487)	**-50.03783 (0.0000)**	-5.259525 (0.6995)
TUPY3	Tau statistics	-2.179893 (0.4413)	0.176703 (0.9924)	-1.980987 (0.5426)
	Z statistics	-13.27032 (0.1705)	1.633109 (0.9985)	2.479041 (0.9996)
WAR11	Tau statistics	-1.996414 (0.5346)	-2.153695 (0.4550)	-3.075452 (0.1084)
	Z statistics	**-17.43711 (0.0641)**	**-44.92993 (0.0000)**	**-16.46856 (0.0847)**
WEGE3	Tau statistics	-2.038394 (0.5129)	-0.386822 (0.9710)	0.018599 (0.9886)
	Z statistics	-10.59416 (0.2945)	-0.654580 (0.9767)	0.029145 (0.9884)

Source: The author.

Note: Nº. Observation (applied to all companies): 49. p-value based on MacKinnon (1996). Lag = 12. Number of stochastic trends = 2. Null hypothesis: The series are not cointegrated.

Finally, it also can be seen that by the Engle-Granger Test for the gross revenue and the standard-deviation of operating cash flow, considering the tau statistic, only 0.04% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 28% of results rejected the null hypothesis.

In 36% (tau statistic) and 36% (z statistic) of the Engle-Granger cointegration tests results indicate that at least one pair of series cointegrates, suggesting that managers do adopt management practices in the long term. These results are summarized in Table 3.3.

It is important to note that to issues in the Engle-Granger tests. First, if we have a deterministic trend it will dominate non-stationary, which in turn will dominate stationarity. Second, the Engle-Granger Test is estimated through a traditional autoregressive vector (VAR) that is later manipulated to correct the equilibrium error. Based on these issues, I performed the Johansen tests that allow us to consider the presence of deterministic trends and to estimate the cointegration vectors together with the Vector Error Correction Model (VECM).

TABLE 3.3 – ENGLE-GRANGER COINTEGRATION TEST EM_1 RESULTS SUMMARIZED

	We reject H_0	
Series	$\tau - test$	$z - test$
Gross Rev. & σ_{OCF}	24%	36%
Gross Rev. & σ_{NOI}	32%	36%
σ_{OCF} & σ_{NOI}	0.04%	28%
All series simultaneously	36%	60%

Source: The author.

TABLE 3.4 – JOHANSEN COINTEGRATION TEST EM_1 RESULTS

Sample adjusted: 1998 - 2013.

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
ABEV3	Gross Rev. & σ_{OCF}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NOI}	1	1	1	1	2	1	1	1	1	2
	σ_{OCF} & σ_{NOI}	2	0	0	0	0	0	0	0	0	0
ALPA4	Gross Rev. & σ_{OCF}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NOI}	1	1	1	1	1	1	1	1	1	1
	σ_{OCF} & σ_{NOI}	0	0	0	0	0	0	0	0	0	0
BRFS3	Gross Rev. & σ_{OCF}	0	0	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NOI}	0	1	1	1	2	0	1	1	1	2
	σ_{OCF} & σ_{NOI}	0	0	0	0	1	0	0	0	0	1
CEEB3	Gross Rev. & σ_{OCF}	0	1	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NOI}	0	1	1	1	2	0	1	1	1	2
	σ_{OCF} & σ_{NOI}	2	1	1	0	1	2	1	1	0	1
CELP3	Gross Rev. & σ_{OCF}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NOI}	1	1	1	1	1	1	1	1	1	1
	σ_{OCF} & σ_{NOI}	1	1	1	1	2	1	1	1	1	2
CEPE5	Gross Rev. & σ_{OCF}	1	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NOI}	1	0	2	2	2	1	0	2	2	2
	σ_{OCF} & σ_{NOI}	1	1	1	1	2	1	1	1	1	2
CESP6	Gross Rev. & σ_{OCF}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NOI}	0	1	2	1	1	0	1	2	1	1
	σ_{OCF} & σ_{NOI}	0	0	0	0	0	0	0	0	0	0
CGAS5	Gross Rev. & σ_{OCF}	0	0	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NOI}	1	2	1	1	1	1	2	1	1	1
	σ_{OCF} & σ_{NOI}	1	2	2	1	1	1	2	2	1	1
CMGR3	Gross Rev. & σ_{OCF}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NOI}	0	0	1	1	2	0	1	1	1	2
	σ_{OCF} & σ_{NOI}	0	1	2	1	1	0	1	2	0	1

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
CSRN5	Gross Rev. & σ_{OCF}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NOI}	0	1	1	1	2	0	1	1	1	2
	σ_{OCF} & σ_{NOI}	1	1	1	1	1	1	1	1	1	1
ELEK4	Gross Rev. & σ_{OCF}	0	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NOI}	0	0	0	1	1	0	0	0	1	1
	σ_{OCF} & σ_{NOI}	0	0	0	1	1	0	0	0	1	1
ELPL4	Gross Rev. & σ_{OCF}	1	1	2	1	2	1	1	2	1	2
	Gross Rev. & σ_{NOI}	1	2	2	2	2	1	2	2	2	2
	σ_{OCF} & σ_{NOI}	0	1	1	1	1	0	1	1	1	1
EMBR3	Gross Rev. & σ_{OCF}	1	1	1	1	2	1	1	1	1	2
	Gross Rev. & σ_{NOI}	1	2	1	1	2	0	2	1	1	2
	σ_{OCF} & σ_{NOI}	0	0	0	0	2	0	0	0	0	0
FIBR3	Gross Rev. & σ_{OCF}	0	0	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NOI}	1	1	1	1	1	0	1	1	1	1
	σ_{OCF} & σ_{NOI}	0	0	0	0	0	0	0	0	0	0
ITEC3	Gross Rev. & σ_{OCF}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NOI}	1	1	2	2	2	1	1	2	2	2
	σ_{OCF} & σ_{NOI}	0	1	1	1	1	0	1	1	1	1
LAME4	Gross Rev. & σ_{OCF}	0	1	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NOI}	0	1	2	2	2	0	1	2	2	2
	σ_{OCF} & σ_{NOI}	1	1	0	0	2	1	1	0	0	2
MGEL4	Gross Rev. & σ_{OCF}	1	1	1	1	2	1	1	1	1	2
	Gross Rev. & σ_{NOI}	1	1	2	2	2	1	1	2	2	2
	σ_{OCF} & σ_{NOI}	0	0	0	1	2	0	0	0	1	2
MYPK3	Gross Rev. & σ_{OCF}	0	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NOI}	0	0	0	0	1	0	0	0	0	0
	σ_{OCF} & σ_{NOI}	0	0	0	0	0	0	0	0	0	0
RSID3	Gross Rev. & σ_{OCF}	0	1	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NOI}	0	0	1	1	2	0	1	1	1	2
	σ_{OCF} & σ_{NOI}	0	0	0	1	2	0	0	0	1	2

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
SBSP3	Gross Rev. & σ_{OCF}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NOI}	0	1	1	1	2	0	1	1	1	2
	σ_{OCF} & σ_{NOI}	0	0	0	0	0	0	0	0	0	0
SCLO4	Gross Rev. & σ_{OCF}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NOI}	1	1	1	1	1	1	1	1	1	1
	σ_{OCF} & σ_{NOI}	0	0	0	0	0	0	0	0	0	0
SGAS4	Gross Rev. & σ_{OCF}	1	1	2	1	2	1	1	2	1	2
	Gross Rev. & σ_{NOI}	0	1	1	0	1	0	1	1	1	1
	σ_{OCF} & σ_{NOI}	1	0	1	1	1	1	1	1	1	1
TUPY3	Gross Rev. & σ_{OCF}	0	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NOI}	1	1	1	2	2	1	1	1	2	2
	σ_{OCF} & σ_{NOI}	0	1	1	1	1	0	1	1	1	1
VVAR11	Gross Rev. & σ_{OCF}	0	0	0	1	2	0	0	0	1	2
	Gross Rev. & σ_{NOI}	0	0	0	1	1	0	0	0	1	1
	σ_{OCF} & σ_{NOI}	1	2	2	1	2	1	2	2	1	2
WEGE3	Gross Rev. & σ_{OCF}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NOI}	1	0	0	1	1	1	0	1	1	1
	σ_{OCF} & σ_{NOI}	0	0	0	0	0	0	1	0	0	0

Source: The author.

Note: The values for Johansen Tests show the maximum number of cointegration present. Test 1 – no deterministic trends and no intercepts; Test 2 – no deterministic trends with intercepts; Test 3 – linear trends but have only intercepts; Test 4 – linear trends; Test 5 – quadratic trends with linear trends. The critical values are based on MacKinnon, Haug, Michelis (1999).

The results of the Johansen cointegration tests for EM_1 are presented in Table 3.4. It can be seen that by the Johansen tests for the gross revenue and the standard-deviation of operating cash flow, considering the trace statistic, 100% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 100% of results do not rejected the null hypothesis.

It can be noted that by the Johansen cointegration tests for the gross revenue and the standard-deviation of non-operating income, considering the trace statistic, 100% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 100% of results do not rejected the null hypothesis.

Finally, it also can be seen that by the Johansen cointegration tests for the standard-deviation of operating cash flow and the standard-deviation of non-operating income, considering the trace statistic, 76% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 76% of results do not rejected the null hypothesis.

TABLE 3.5 – JOHANSEN COINTEGRATION TEST EM_1 RESULTS SUMMARIZED

	We cannot reject H_0	
Series	$Trace - statistics$	$Eigenvalues - statistics$
Gross Rev. & σ_{OCF}	100%	100%
Gross Rev. & σ_{NOI}	100%	100%
σ_{OCF} & σ_{NOI}	76%	76%
All series simultaneously	100%	100%

Source: The author.

In 100% (trace statistic) and 100% (eigenvalues statistic) of the Johansen cointegration tests results indicate that at least one pair of series cointegrates,

suggesting that managers do not adopt management practices in the long term. These results are summarized in Table 3.5.

The results of the Engle-Granger cointegration tests for EM_2 are presented in Table 3.6. It can be seen that by the Engle-Granger Test for the gross revenue and the absolute value of total accruals, considering the tau statistic, only 72% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 80% of results rejected the null hypothesis.

It can be noted that by the Engle-Granger Test for the gross revenue and the absolute value of operating cash flow, considering the tau statistic, only 72% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 76% of results rejected the null hypothesis.

Finally, it also can be seen that by the Engle-Granger Test for the absolute value of total accruals and the absolute value of operating cash flow, considering the tau statistic, only 84% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 92% of results rejected the null hypothesis.

In 92% (tau statistic) and 92% (z statistic) of the Engle-Granger cointegration tests results indicate that at least one pair of series cointegrates, suggesting that managers do adopt management practices in the long term. These results are summarized in Table 3.7.

TABLE 3.6 – ENGLE-GRANGER COINTEGRATION TEST EM_2 RESULTS

Sample adjusted: 1998 - 2013				
Company	**Statistical**	**Gross Revenue & $\|TAC\|$**	**Gross Revenue & $\|OCF\|$**	**$\|TAC\|$ & $\|OCF\|$**
ABEV3	Tau statistics	**-6.562212 (0.0000)**	-1.784538 (0.6398)	**-5.038041 (0.0006)**
	Z statistics	**-54.19945 (0.0000)**	-6.787742 (0.5682)	**-40.46601 (0.0001)**
ALPA4	Tau statistics	**-8.620087 (0.0000)**	**-6.248093 (0.0000)**	**-8.275616 (0.0000)**
	Z statistics	**-161.2543 (0.0000)**	**-48.14202 (0.0000)**	**-65.00216 (0.0000)**
BRFS3	Tau statistics	**-5.713395 (0.0001)**	**-3.147431 (0.0946)**	-3.095944 (0.1049)
	Z statistics	**-43.21326 (0.0000)**	**-52.13537 (0.0000)**	**-49.34981 (0.0000)**
CEEB3	Tau statistics	**-9.624472 (0.0000)**	-2.799018 (0.1815)	**-8.625100 (0.0000)**
	Z statistics	**-74.76453 (0.0000)**	-13.56539 (0.1612)	**-70.41696 (0.0000)**
CELP3	Tau statistics	**-3.396016 (0.0561)**	**-6.638049 (0.0000)**	**-6.118258 (0.0000)**
	Z statistics	27.80189 (1.0000)	**-52.11182 (0.0000)**	**-47.03839 (0.0000)**
CEP5	Tau statistics	**-10.91344 (0.0000)**	**-3.313097 (0.0662)**	**-9.041543 (0.0000)**
	Z statistics	**-80.90364 (0.0000)**	**-23.08028 (0.0161)**	**-70.21856 (0.0000)**
CESP6	Tau statistics	**-6.807920 (0.0000)**	**-4.097965 (0.0096)**	**-7.500560 (0.0000)**
	Z statistics	**-51.17028 (0.0000)**	**-24.68694 (0.0105)**	**-59.50846 (0.0000)**
Company	**Statistical**	**Gross**	**Gross**	**$\|TAC\|$**

Sample adjusted: 1998 - 2013				
Company	**Statistical**	**Gross Revenue & $\|TAC\|$**	**Gross Revenue & $\|OCF\|$**	**$\|TAC\|$ & $\|OCF\|$**
FIBR3	Tau statistics	-2.081379 (0.4909)	-1.586995 (0.7289)	-2.629313 (0.2403)
	Z statistics	-8.069653 (0.4650)	-5.248561 (0.7007)	**-31.51846 (0.0013)**
ITEC3	Tau statistics	**-5.072650 (0.0005)**	**-5.746503 (0.0001)**	**-6.590797 (0.0000)**
	Z statistics	**-36.75605 (0.0003)**	**-49.15678 (0.0000)**	**-126.1580 (0.0000)**
LAME4	Tau statistics	**-7.369663 (0.0000)**	**-4.606493 (0.0023)**	**-7.137328 (0.0000)**
	Z statistics	**-57.98352 (0.0000)**	**-23.66574 (0.0134)**	**-57.01915 (0.0000)**
MGEL4	Tau statistics	**-6.264453 (0.0000)**	**-6.970407 (0.0000)**	-2.179052 (0.4415)
	Z statistics	**-48.85045 (0.0000)**	**-54.77394 (0.0000)**	**-15.54320 (0.1038)**
MYPK3	Tau statistics	-1.831735 (0.6170)	-1.769077 (0.6471)	-1.887714 (0.5891)
	Z statistics	**-25.11693 (0.0085)**	-6.953675 (0.5546)	-7.495400 (0.5102)
RSID3	Tau statistics	-0.968308 (0.9078)	**-8.541055 (0.0000)**	**-7.521371 (0.0000)**
	Z statistics	-2.933353 (0.8806)	**-66.84602 (0.0000)**	**-58.75644 (0.0000)**
SBSP3	Tau statistics	**-7.277990 (0.0000)**	**-3.125849 (0.0988)**	**-6.405076 (0.0000)**
	Z statistics	**-57.01150 (0.0000)**	**-65.21403 (0.0000)**	**-49.77329 (0.0000)**
Company	**Statistical**	**Gross**	**Gross**	**$\|TAC\|$**

		Revenue & $\|TAC\|$	Revenue & $\|OCF\|$	& $\|OCF\|$
CGAS5	Tau statistics	-2.812270 (0.1776)	**-3.446867 (0.0501)**	**-5.739874 (0.0001)**
	Z statistics	**-78.16541 (0.0000)**	**-529.0703 (0.0000)**	**-46.53319 (0.0000)**
CMGR3	Tau statistics	-2.035640 (0.5142)	-2.308672 (0.3782)	**-3.221928 (0.0815)**
	Z statistics	-3.629036 (0.8328)	**-31.34946 (0.0014)**	101.1360 (0.9999)
CSRN5	Tau statistics	**-7.982014 (0.0000)**	-2.106122 (0.4783)	**-7.918397 (0.0000)**
	Z statistics	**-62.83009 (0.0000)**	-10.44058 (0.3046)	**-62.83393 (0.0000)**
ELEK4	Tau statistics	**-6.697677 (0.0000)**	**-7.202086 (0.0000)**	**-5.692425 (0.0001)**
	Z statistics	**-55.44522 (0.0000)**	**-56.84359 (0.0000)**	**-46.14357 (0.0000)**
ELPL4	Tau statistics	**-7.802275 (0.0000)**	**-3.650036 (0.0304)**	**-7.473798 (0.0000)**
	Z statistics	**-62.12743 (0.0000)**	**-22.01400 (0.0216)**	**-59.94727 (0.0000)**
EMBR3	Tau statistics	**-6.585843 (0.0000)**	**-3.471191 (0.0466)**	**-6.536443 (0.0000)**
	Z statistics	**-52.69497 (0.0000)**	**-24.86715 (0.0099)**	**-50.56753 (0.0000)**
SCLO4	Tau statistics	**-6.546801 (0.0000)**	**-4.814247 (0.0012)**	**-7.418316 (0.0000)**
	Z statistics	**-50.74894 (0.0000)**	**-33.89650 (0.0007)**	**-58.39315 (0.0000)**
SGAS4	Tau statistics	**-6.396141 (0.0000)**	**-6.258775 (0.0000)**	**-7.309113 (0.0000)**
	Z statistics	**-49.43865 (0.0000)**	**-48.23391 (0.0000)**	**-57.84922 (0.0000)**
TUPY3	Tau statistics	-1.522026 (0.7552)	**-3.214598 (0.0827)**	**-6.573441 (0.0000)**
	Z statistics	-6.296553 (0.6100)	**-51.45301 (0.0000)**	**-88.30596 (0.0000)**
WAR11	Tau statistics	**-7.045593 (0.0000)**	**-6.302987 (0.0000)**	**-6.713841 (0.0000)**
	Z statistics	**-54.12293 (0.0000)**	**-48.81386 (0.0000)**	**-51.91673 (0.0000)**
WEGE3	Tau statistics	-2.597673 (0.2519)	-2.078916 (0.4921)	**-3.277853 (0.0720)**
	Z statistics	**-16.53841 (0.0829)**	-10.70590 (0.2895)	**-39.98693 (0.0001)**

Source: The author.

Note: Nº. Observation (applied to all companies): 49. p-value based on MacKinnon (1996). Lag = 12. Number of stochastic trends = 2. Null hypothesis: The series are not cointegrated.

TABLE 3.7 – ENGLE-GRANGER COINTEGRATION TEST EM_2 RESULTS SUMMARIZED

	We reject H_0	
Series	$\tau - test$	$z - test$
Gross Rev. & $\|TAC\|$	72%	80%
Gross Rev. & $\|OCF\|$	72%	76%
$\|TAC\|$ & $\|OCF\|$	84%	92%
All series simultaneously	**92%**	**92%**

Source: The author.

It is important to note that to issues in the Engle-Granger tests. First, if we have a deterministic trend it will dominate non-stationary, which in turn will dominate stationarity. Second, the Engle-Granger Test is estimated through a traditional autoregressive vector (VAR) that is later manipulated to correct the equilibrium error. Based on these issues, I performed the Johansen tests that allow us to consider the presence of deterministic trends and to estimate the cointegration vectors together with the Vector Error Correction Model (VECM).

The results of the Johansen cointegration tests for EM_2 are presented in Table 3.8. It can be seen that by the Johansen Test for the gross revenue and the absolute value of total accruals, considering the trace statistic, 100% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 100% of results do not rejected the null hypothesis.

The Johansen tests results for the gross revenue and the absolute value of the operating cash flow, considering the trace statistic, 100% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 100% of results do not rejected the null hypothesis.

TABLE 3.8 – JOHANSEN COINTEGRATION TEST EM_2 RESULTS

Sample adjusted: 1998 - 2013.

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
ABEV3	Gross Rev. & $\|TAC\|$	1	1	1	2	2	1	1	1	2	2
	Gross Rev. & $\|OCF\|$	0	0	1	1	2	0	0	1	1	2
	$\|TAC\|$ & $\|OCF\|$	0	0	0	1	2	0	0	0	1	2
ALPA4	Gross Rev. & $\|TAC\|$	1	1	1	2	2	1	1	1	2	2
	Gross Rev. & $\|OCF\|$	1	0	1	1	2	1	0	0	1	2
	$\|TAC\|$ & $\|OCF\|$	1	1	2	1	2	1	1	2	1	2
BRFS3	Gross Rev. & $\|TAC\|$	1	0	0	0	2	1	0	0	0	0
	Gross Rev. & $\|OCF\|$	0	1	1	2	2	0	1	1	2	2
	$\|TAC\|$ & $\|OCF\|$	0	0	1	1	2	0	1	1	0	2
CEEB3	Gross Rev. & $\|TAC\|$	1	1	2	2	2	1	1	2	2	2
	Gross Rev. & $\|OCF\|$	1	1	2	2	2	1	1	2	2	2
	$\|TAC\|$ & $\|OCF\|$	0	0	2	1	2	0	0	0	1	2
CELP3	Gross Rev. & $\|TAC\|$	0	0	0	1	2	0	0	0	1	2
	Gross Rev. & $\|OCF\|$	0	0	0	1	2	0	0	0	1	2
	$\|TAC\|$ & $\|OCF\|$	0	0	0	0	2	0	0	0	0	0
CEPE5	Gross Rev. & $\|TAC\|$	1	1	2	2	2	1	1	2	2	2
	Gross Rev. & $\|OCF\|$	0	0	2	1	2	0	0	0	1	2
	$\|TAC\|$ & $\|OCF\|$	1	0	2	0	2	1	0	0	0	0
CESP6	Gross Rev. & $\|TAC\|$	1	1	2	2	2	1	1	2	2	2
	Gross Rev. & $\|OCF\|$	1	1	1	1	2	1	1	1	1	2
	$\|TAC\|$ & $\|OCF\|$	1	1	1	1	2	1	1	1	1	2
CGAS5	Gross Rev. & $\|TAC\|$	1	1	1	2	2	1	1	1	2	2
	Gross Rev. & $\|OCF\|$	0	0	0	1	2	0	0	0	1	2
	$\|TAC\|$ & $\|OCF\|$	1	1	2	2	2	1	1	2	2	2
CMGR3	Gross Rev. & $\|TAC\|$	0	0	0	1	2	0	0	1	1	2
	Gross Rev. & $\|OCF\|$	0	0	0	1	2	0	0	0	1	2
	$\|TAC\|$ & $\|OCF\|$	0	0	0	0	0	0	0	0	0	0

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
CSRN5	Gross Rev. & $\|TAC\|$	1	1	2	2	2	1	1	2	2	2
	Gross Rev. & $\|OCF\|$	1	1	2	2	2	1	1	2	2	2
	$\|TAC\|$ & $\|OCF\|$	1	1	2	2	2	1	1	2	2	2
ELEK4	Gross Rev. & $\|TAC\|$	1	0	2	2	2	1	0	0	2	2
	Gross Rev. & $\|OCF\|$	0	1	2	1	2	0	1	2	1	2
	$\|TAC\|$ & $\|OCF\|$	1	2	2	2	2	1	2	2	2	2
ELPL4	Gross Rev. & $\|TAC\|$	1	2	2	2	2	1	2	2	2	2
	Gross Rev. & $\|OCF\|$	0	1	2	1	2	0	1	2	1	2
	$\|TAC\|$ & $\|OCF\|$	0	1	2	1	2	0	1	2	1	2
EMBR3	Gross Rev. & $\|TAC\|$	0	1	2	1	2	0	1	2	1	2
	Gross Rev. & $\|OCF\|$	0	1	2	1	2	0	1	2	1	2
	$\|TAC\|$ & $\|OCF\|$	0	0	2	0	2	0	0	2	0	0
FIBR3	Gross Rev. & $\|TAC\|$	1	1	1	1	2	1	1	1	1	2
	Gross Rev. & $\|OCF\|$	1	1	1	2	2	1	1	1	2	2
	$\|TAC\|$ & $\|OCF\|$	0	1	1	2	2	0	1	1	2	2
ITEC3	Gross Rev. & $\|TAC\|$	1	2	2	2	2	1	2	2	2	2
	Gross Rev. & $\|OCF\|$	1	2	2	1	2	1	2	2	1	2
	$\|TAC\|$ & $\|OCF\|$	1	2	2	2	2	1	2	2	2	2
LAME4	Gross Rev. & $\|TAC\|$	1	0	1	2	2	1	1	1	2	2
	Gross Rev. & $\|OCF\|$	1	1	1	2	2	1	1	1	2	2
	$\|TAC\|$ & $\|OCF\|$	1	1	2	2	2	1	1	2	2	2
MGEL4	Gross Rev. & $\|TAC\|$	0	0	2	1	2	0	0	0	1	2
	Gross Rev. & $\|OCF\|$	0	1	2	1	2	0	0	2	1	2
	$\|TAC\|$ & $\|OCF\|$	1	1	2	2	2	1	1	2	2	2
MYPK3	Gross Rev. & $\|TAC\|$	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & $\|OCF\|$	0	0	1	1	1	0	1	1	1	1
	$\|TAC\|$ & $\|OCF\|$	0	0	1	1	1	0	1	1	1	1
RSID3	Gross Rev. & $\|TAC\|$	1	1	1	1	2	1	1	1	1	2
	Gross Rev. & $\|OCF\|$	0	1	1	1	2	0	1	1	1	2
	$\|TAC\|$ & $\|OCF\|$	0	1	2	2	2	0	1	2	2	2

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
SBSP3	Gross Rev. & $\|TAC\|$	0	0	2	1	2	1	0	0	1	2
	Gross Rev. & $\|OCF\|$	1	1	2	2	2	1	1	1	2	2
	$\|TAC\|$ & $\|OCF\|$	0	0	2	1	2	0	0	0	1	2
SCLO4	Gross Rev. & $\|TAC\|$	0	0	2	0	2	0	0	0	0	0
	Gross Rev. & $\|OCF\|$	1	1	2	1	2	1	0	2	1	2
	$\|TAC\|$ & $\|OCF\|$	1	1	2	1	2	1	1	2	1	2
SGAS4	Gross Rev. & $\|TAC\|$	0	2	2	1	2	0	0	0	1	2
	Gross Rev. & $\|OCF\|$	1	2	2	2	2	1	0	0	2	2
	$\|TAC\|$ & $\|OCF\|$	1	2	2	2	2	1	0	2	2	2
TUPY3	Gross Rev. & $\|TAC\|$	0	0	0	1	2	0	0	0	1	2
	Gross Rev. & $\|OCF\|$	0	0	0	1	2	0	0	0	1	2
	$\|TAC\|$ & $\|OCF\|$	0	1	1	1	2	0	1	1	0	2
VVAR11	Gross Rev. & $\|TAC\|$	1	1	1	1	2	1	1	1	1	2
	Gross Rev. & $\|OCF\|$	1	1	1	1	2	1	1	1	1	2
	$\|TAC\|$ & $\|OCF\|$	1	1	2	1	2	1	1	2	1	2
WEGE3	Gross Rev. & $\|TAC\|$	0	0	0	1	2	0	0	0	1	2
	Gross Rev. & $\|OCF\|$	1	1	1	2	2	1	1	1	2	2
	$\|TAC\|$ & $\|OCF\|$	0	1	2	1	2	0	1	2	1	2

Source: The author.

Note: The values for Johansen Tests show the maximum number of cointegration present. Test 1 – no deterministic trends and no intercepts; Test 2 – no deterministic trends with intercepts; Test 3 – linear trends but have only intercepts; Test 4 – linear trends; Test 5 – quadratic trends with linear trends. The critical values are based on MacKinnon, Haug, Michelis (1999).

Finally, it also can be seen that by the Johansen cointegration tests for the absolute value of total accruals and the standard-deviation of non-operating income, considering the trace statistic, 76% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 76% of results do not rejected the null hypothesis. In 100% (trace statistic) and 100% (eigenvalues statistic) of the Johansen cointegration tests results indicate that at least one pair of series cointegrates, suggesting that managers do not adopt management practices in the long term. These results are summarized in Table 3.9.

TABLE 3.9 – JOHANSEN COINTEGRATION TEST EM_2 RESULTS SUMMARIZED

	We cannot reject H_0	
Series	$Trace - statistics$	$Eigenvalues - statistics$
Gross Rev. & $\|TAC\|$	100%	100%
Gross Rev. & $\|OCF\|$	100%	100%
$\|TAC\|$ & $\|OCF\|$	96%	96%
All series simultaneously	100%	100%

Source: The author.

The results of the Engle-Granger cointegration tests for EM_3 are presented in Table 3.9. It can be seen that by the Engle-Granger Test for the gross revenue and the standard-deviation of non-discretionarily income, considering the tau statistic, only 16% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 32% of results rejected the null hypothesis.

It can be noted that by the Engle-Granger Test for the gross revenue and the standard-deviation of net income, considering the tau statistic, only 16% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 24% of results rejected the null hypothesis.

TABLE 3.9 – ENGLE-GRANGER COINTEGRATION TEST EM_3 RESULTS

Sample adjusted: 1998 - 2013				
Company	**Statistical**	**Gross Revenue & σ_{NDI}**	**Gross Revenue & σ_{NI}**	**σ_{NDI} & σ_{NI}**
ABEV3	Tau statistics	-2.142953 (0.4601)	-1.480144 (0.7713)	-2.058743 (0.5030)
	Z statistics	-13.06840 (0.1767)	-4.661468 (0.7505)	250.4757 (0.9999)
ALPA4	Tau statistics	-1.889432 (0.5884)	-1.018248 (0.8988)	-1.587527 (0.7287)
	Z statistics	**-16.32868 (0.0855)**	-6.784164 (0.5668)	-9.944846 (0.3311)
BRFS3	Tau statistics	-2.183137 (0.4397)	-0.278171 (0.9772)	-1.564695 (0.7382)
	Z statistics	-11.47487 (0.2477)	-0.733503 (0.9749)	23.76760 (1.0000)
CEEB3	Tau statistics	-1.856780 (0.6046)	-1.524652 (0.7542)	**-4.239591 (0.0072)**
	Z statistics	-8.089701 (0.4624)	-4.870871 (0.7328)	5.121051 (1.0000)
CELP3	Tau statistics	-2.626851 (0.2414)	-0.699451 (0.9448)	**-4.071803 (0.0105)**
	Z statistics	**-24.78792 (0.0095)**	-1.142200 (0.9641)	**-61.13199 (0.0000)**
CEP5	Tau statistics	-1.498816 (0.7642)	-1.408291 (0.7970)	-1.545756 (0.7459)
	Z statistics	-5.144826 (0.7094)	-3.053190 (0.8730)	-11.78303 (0.2282)
CESP6	Tau statistics	-2.271660 (0.3961)	-1.675916 (0.6902)	-2.088448 (0.4871)
	Z statistics	-14.22230 (0.1385)	-4.399149 (0.7728)	-9.102342 (0.3907)

Sample adjusted: 1998 - 2013				
Company	**Statistical**	**Gross Revenue & σ_{NDI}**	**Gross Revenue & σ_{NI}**	**σ_{NDI} & σ_{NI}**
FIBR3	Tau statistics	-1.558486 (0.7407)	-1.718970 (0.6707)	**-3.444285 (0.0519)**
	Z statistics	-7.627021 (0.4987)	-5.935180 (0.6409)	6.234551 (1.0000)
ITEC3	Tau statistics	-1.548655 (0.7446)	**-3.170103 (0.0906)**	**-3.564427 (0.0389)**
	Z statistics	-9.386012 (0.3692)	10.91655 (1.0000)	21.87307 (1.0000)
LAME4	Tau statistics	-2.690397 (0.2182)	-2.319787 (0.3734)	**-3.275944 (0.0727)**
	Z statistics	**-77.75104 (0.0000)**	284.0553 (0.9999)	106.2873 (0.9999)
MGEL4	Tau statistics	-1.691071 (0.6835)	-1.524096 (0.7544)	-1.973488 (0.5457)
	Z statistics	-11.19675 (0.2604)	-5.857788 (0.6470)	-9.538557 (0.3614)
MYPK3	Tau statistics	**-3.502570 (0.0441)**	-2.019960 (0.5224)	-2.100202 (0.4816)
	Z statistics	**-325.6929 (0.0000)**	**-22.27596 (0.0187)**	**-21.79165 (0.0213)**
RSID3	Tau statistics	**-3.501193 (0.0457)**	**-4.051626 (0.0121)**	**-4.299774 (0.0062)**
	Z statistics	7.180623 (1.0000)	3.702291 (0.9999)	5.208430 (1.0000)
SBSP3	Tau statistics	-2.119249 (0.4722)	-2.284660 (0.3895)	-2.183841 (0.4391)
	Z statistics	**-16.28359 (0.0847)**	-12.51632 (0.2014)	-12.60819 (0.1975)

Company	Statistical	Gross Revenue & σ_{NDI}	Gross Revenue & σ_{NI}	σ_{NDI} & σ_{NI}
CGAS5	Tau statistics	-1.867957 (0.5991)	-1.483279 (0.7701)	-2.035337 (0.5151)
	Z statistics	**-16.52028 (0.0817)**	63.06798 (0.9999)	30.57689 (1.0000)
CMGR3	Tau statistics	**-6.538607 (0.0000)**	-2.366537 (0.3512)	-0.188661 (0.9815)
	Z statistics	11.35749 (1.0000)	**-24.29982 (0.0109)**	-0.236987 (0.9847)
CSRN5	Tau statistics	-1.374071 (0.8085)	**-3.375025 (0.0604)**	-1.732563 (0.6645)
	Z statistics	-4.131421 (0.7939)	7.970049 (1.0000)	**-70.27604 (0.0000)**
ELEK4	Tau statistics	-1.717222 (0.6715)	-1.946734 (0.5596)	-1.834231 (0.6156)
	Z statistics	-5.920649 (0.6422)	-10.97662 (0.2727)	-6.624629 (0.5827)
ELPL4	Tau statistics	-1.862167 (0.6019)	-1.849729 (0.6081)	**-3.969797 (0.0137)**
	Z statistics	-4.260514 (0.7835)	-4.095755 (0.7967)	**-32.44392 (0.0010)**
EMBR3	Tau statistics	-2.702618 (0.2139)	-2.150366 (0.4561)	-1.929993 (0.5678)
	Z statistics	**-15.57682 (0.1019)**	-8.505531 (0.4311)	-7.817612 (0.4850)
SCLO4	Tau statistics	**-3.534379 (0.0410)**	-2.454626 (0.3118)	**-3.625703 (0.0326)**
	Z statistics	**-129.4077 (0.0000)**	**-34.08129 (0.0005)**	**-58.70142 (0.0000)**
SGAS4	Tau statistics	-1.777303 (0.6433)	-2.119569 (0.4718)	-1.978355 (0.5435)
	Z statistics	-13.88011 (0.1487)	**-18.89478 (0.0454)**	-13.20824 (0.1728)
TUPY3	Tau statistics	-2.179893 (0.4413)	-2.197251 (0.4327)	-1.761174 (0.6508)
	Z statistics	-13.27032 (0.1705)	-10.18676 (0.3184)	-5.986252 (0.6377)
WAR11	Tau statistics	-1.996414 (0.5346)	**-3.101850 (0.1039)**	-2.670700 (0.2245)
	Z statistics	**-17.43711 (0.0641)**	**-77.22635 (0.0000)**	**-16.05730 (0.0927)**
WEGE3	Tau statistics	-2.038394 (0.5129)	-1.185640 (0.8626)	**-3.695739 (0.0284)**
	Z statistics	-10.59416 (0.2945)	-3.114397 (0.8689)	24.13357 (1.0000)

Source: The author.

Note: Nº. Observation (applied to all companies): 49. p-value based on MacKinnon (1996). Lag = 12. Number of stochastic trends = 2. Null hypothesis: The series are not cointegrated.

Finally, it also can be seen that by the Engle-Granger Test for the standard-deviation of non-discretionarily income and the standard-deviation of net income, considering the tau statistic, only 36% of the results rejected the null hypothesis that the series are not cointegrated. Evaluating the standardized z statistic for the same series, 52% of results rejected the null hypothesis.

In 48% (tau statistic) and 52% (z statistic) of the Engle-Granger cointegration tests results indicate that at least one pair of series cointegrates, suggesting that managers do adopt management practices in the long term. These results are summarized in Table 3.10.

TABLE 3.10 – ENGLE-GRANGER COINTEGRATION TEST EM_3 RESULTS SUMMARIZED

	We reject H_0	
Series	$\tau - test$	$z - test$
Gross Rev. & σ_{NDI}	16%	36%
Gross Rev. & σ_{NI}	16%	24%
σ_{NDI} & σ_{NI}	36%	24%
All series simultaneously	48%	52%

Source: The author.

It is important to note that to issues in the Engle-Granger tests. First, if we have a deterministic trend it will dominate non-stationary, which in turn will dominate stationarity. Second, the Engle-Granger Test is estimated through a traditional autoregressive vector (VAR) that is later manipulated to correct the equilibrium error. Based on these issues, I performed the Johansen tests that allow us to consider the presence of deterministic trends and to estimate the cointegration vectors together with the Vector Error Correction Model (VECM).

TABLE 3.11 – JOHANSEN COINTEGRATION TEST EM_3 RESULTS

Sample adjusted: 1998 - 2013.											
		TRACE STATISTICS					**MAXIMUM EIGENVALUE STATISTICS**				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
ABEV3	Gross Rev. & σ_{NDI}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NI}	0	0	2	1	2	0	0	0	1	2
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
ALPA4	Gross Rev. & σ_{NDI}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NI}	1	0	0	1	1	1	0	0	1	1
	σ_{NDI} & σ_{NI}	0	1	1	0	0	0	1	0	0	0
BRFS3	Gross Rev. & σ_{NDI}	0	0	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NI}	1	1	1	2	2	1	1	1	2	2
	σ_{NDI} & σ_{NI}	0	0	1	0	0	0	0	1	0	0
CEEB3	Gross Rev. & σ_{NDI}	0	1	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NI}	0	0	2	1	1	0	0	0	1	1
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
CELP3	Gross Rev. & σ_{NDI}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NI}	1	1	2	2	2	1	1	2	2	2
	σ_{NDI} & σ_{NI}	0	1	1	1	1	0	1	1	1	1
CEPE5	Gross Rev. & σ_{NDI}	1	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NI}	0	0	0	1	1	0	0	0	1	1
	σ_{NDI} & σ_{NI}	0	0	0	1	1	0	1	0	1	1
CESP6	Gross Rev. & σ_{NDI}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NI}	0	1	1	1	1	0	1	1	1	1
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
CGAS5	Gross Rev. & σ_{NDI}	0	0	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NI}	0	0	0	1	2	0	0	0	1	2
	σ_{NDI} & σ_{NI}	0	0	0	1	2	0	0	0	1	2
CMGR3	Gross Rev. & σ_{NDI}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NI}	1	1	1	1	1	1	1	1	1	1
	σ_{NDI} & σ_{NI}	2	2	2	2	2	2	2	2	2	2

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
CSRN5	Gross Rev. & σ_{NDI}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NI}	0	1	1	1	1	0	1	1	1	1
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
ELEK4	Gross Rev. & σ_{NDI}	0	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NI}	0	0	1	1	2	0	0	1	0	0
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
ELPL4	Gross Rev. & σ_{NDI}	1	1	2	1	2	1	1	2	1	2
	Gross Rev. & σ_{NI}	1	0	1	1	1	1	1	1	1	1
	σ_{NDI} & σ_{NI}	1	1	1	1	1	1	1	1	1	1
EMBR3	Gross Rev. & σ_{NDI}	1	1	1	1	2	1	1	1	1	2
	Gross Rev. & σ_{NI}	1	1	1	1		1	1	1	1	1
	σ_{NDI} & σ_{NI}	1	0	1	0	0	1	0	0	0	0
FIBR3	Gross Rev. & σ_{NDI}	0	0	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NI}	1	0	1	1	1	1	1	1	1	1
	σ_{NDI} & σ_{NI}	1	1	1	0	0	1	1	1	0	0
ITEC3	Gross Rev. & σ_{NDI}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NI}	2	1	1	1	1	2	1	1	1	1
	σ_{NDI} & σ_{NI}	1	1	1	1	2	1	1	1	1	0
LAME4	Gross Rev. & σ_{NDI}	0	1	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NI}	2	1	2	1	2	0	1	2	1	2
	σ_{NDI} & σ_{NI}	1	1	1	1	0	1	1	1	1	0
MGEL4	Gross Rev. & σ_{NDI}	1	1	1	1	2	1	1	1	1	2
	Gross Rev. & σ_{NI}	1	1	1	1	1	1	1	1	1	1
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	1
MYPK3	Gross Rev. & σ_{NDI}	0	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NI}	0	0	0	1	1	0	0	0	1	1
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
RSID3	Gross Rev. & σ_{NDI}	0	1	1	1	2	0	1	1	1	2
	Gross Rev. & σ_{NI}	0	0	0	0	2	0	0	0	0	0
	σ_{NDI} & σ_{NI}	1	1	1	1	1	0	1	1	1	1

		TRACE STATISTICS					MAXIMUM EIGENVALUE STATISTICS				
Company	**Series**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 1**	**Test 2**	**Test 3**	**Test 4**	**Test 5**
SBSP3	Gross Rev. & σ_{NDI}	0	1	1	1	1	0	1	1	1	1
	Gross Rev. & σ_{NI}	0	0	0	1	2	0	0	0	1	2
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
SCLO4	Gross Rev. & σ_{NDI}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NI}	1	1	1	1	1	1	1	1	1	1
	σ_{NDI} & σ_{NI}	0	0	0	1	1	0	0	0	1	1
SGAS4	Gross Rev. & σ_{NDI}	1	1	2	1	2	1	1	2	1	2
	Gross Rev. & σ_{NI}	0	0	1	1	2	0	1	1	1	2
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
TUPY3	Gross Rev. & σ_{NDI}	0	0	0	1	1	0	0	0	1	1
	Gross Rev. & σ_{NI}	0	1	1	1	1	0	1	1	1	1
	σ_{NDI} & σ_{NI}	0	0	0	0	0	0	0	0	0	0
VVAR11	Gross Rev. & σ_{NDI}	0	0	0	1	2	0	0	0	1	2
	Gross Rev. & σ_{NI}	1	1	2	0	0	1	0	2	0	0
	σ_{NDI} & σ_{NI}	1	1	2	1	2	1	1	2	1	2
WEGE3	Gross Rev. & σ_{NDI}	1	1	1	1	1	1	1	1	1	1
	Gross Rev. & σ_{NI}	2	2	2	2	1	2	2	2	2	1
	σ_{NDI} & σ_{NI}	1	1	2	1	0	1	1	2	0	0

Source: The author.

Note: The values for Johansen Tests show the maximum number of cointegration present. Test 1 – no deterministic trends and no intercepts; Test 2 – no deterministic trends with intercepts; Test 3 – linear trends but have only intercepts; Test 4 – linear trends; Test 5 – quadratic trends with linear trends. The critical values are based on MacKinnon, Haug, Michelis (1999).

The results of the Johansen cointegration tests for EM_3 are presented in Table 3.11. It can be seen that by the Johansen Test for the gross revenue and standard-deviation of non-discretionarily income, considering the trace statistic, 100% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 100% of results do not rejected the null hypothesis.

The Johansen tests results for the gross revenue and the standard-deviation of net income, considering the trace statistic, 100% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 100% of results do not rejected the null hypothesis.

Finally, it also can be seen that by the Johansen cointegration tests for standard-deviation of non-discretionarily income and the standard-deviation of net income, considering the trace statistic, 64% of the results we cannot rejected the null hypothesis that the series are cointegrated. Evaluating the eigenvalues statistic for the same series, 64% of results do not rejected the null hypothesis.

TABLE 3.12 – JOHANSEN COINTEGRATION TEST EM_3 RESULTS SUMMARIZED

	We cannot reject H_0	
Series	$Trace - statistics$	$Eigenvalues - statistics$
Gross Rev. & σ_{NDI}	100%	100%
Gross Rev. & σ_{NI}	100%	100%
σ_{NDI} & σ_{NI}	64%	64%
All series simultaneously	100%	100%

Source: The author.

In 100% (trace statistic) and 100% (eigenvalues statistic) of the Johansen cointegration tests results indicate that at least one pair of series cointegrates,

suggesting that managers do not adopt management practices in the long term. These results are summarized in Table 3.12.

3.5 CONCLUSION

The aim of this study was to determine whether earnings management practices are sustainable in the long term. Assuming that the Gross Revenue series does not suffer manipulations, given that this practice characterizes fraud, when analyzing the cointegration of the metrics proposed by Leuz, Nada and Wysocki (2003), in most conducted tests these series are cointegrated.

Unlike studies that evaluate the management practice by managers only calculating metrics, in this study some evidence was presented regarding whether such practices are sustainable in the long run. It was observed that management does not remain in a long-term horizon, which converges with the microfounded literature that says that earnings management in the long term is not an optimal choice for the manager.

Another contribution of this study concerns the literature on matching, which suggests that this process has eroded over time due to the new focus of Regulators in establishing accounting standards that prioritize balance sheet information. The time series approach adopted by studies in this area evaluates the correlation of Revenues and Expenses series in time, usually dividing the time series into a high matching period and a poor matching period. The results of these studies suggest that the matching of Revenues and Expenses has been declining in recent decades due to an increase in some specific balance sheet accounts, such as expenses on R&D and Special and

Extraordinary Items. If this process is actually taking place, that would characterize earnings management because managers would be "manipulating" these accounts to present information that privileges themselves. However, when assessing the movement of the Revenue series in the long-term with Earnings Management metrics, there is a joint movement, which suggests two possibilities: either the companies are adopting fraudulent practices in a systematic way, which seems unlikely, or management does not occur in the long term and, therefore, matching is not eroding.

Thus, based on the results found, it is suggested an investigation as to the reason why investors are not accessing all the information content of about the profits, that, the reason why the process of matching is not presenting the same predictive power of decades ago. Given the limitations of this work, we intend to extend the research to other markets, such as the American, which have a larger database and an institutional environment different from the Brazilian one. Another expectation is carry out cross-country studies and assess cross listing companies.

Another aspect to be explored is the estimation of earnings management by other methods, as well as the development of a theoretical model to support the hypothesis that earnings management is not sustainable in the long term founded on game theory. Finally, it is also intended to evaluate the long-term behavior between Revenues and Expenses, carrying out the decompositions of the Expenses series as stated in the literature on matching, but using a cointegration approach instead of the correlation analysis.

Earnings Management are the changes in the presentation of accounting data that are intentionally and discretionary made by managers without the characterization

of any legal violation (Burgstahler and Dichev, 1997). Thus, decisions are made based on the limits set by accounting practices and standards, which ultimately allow managers to add some level information asymmetry to company results aiming to increase their value.

A significant number of firms present performance results that diverge from the market average. Many of these firms justify the superior performance by stating they use Earnings Management techniques. There is wide accounting literature that seeks to understand Earnings Management through incentives that managers have in order to use of such techniques. One issue that is often omitted in the empirical studies on the subject regards managers' incentives to use earnings management.

By addressing the topic with a Cointegration analysis, the evidences of this paper show that, for the period studied, there is no evidence to support the existence of a systematic practice of earnings management in Brazil. Thus, I argue that these practices are only occasional, and its effects should be just random divergences in the accounting information. Given that, many negative consequences of the distortions of the properties of accounting numbers cited by Ball, Robin and Wu (2000) would not be of concern to investors and other shareholders.

CONCLUSION

Despite, Dalton, Daily, Certo and Roengpitya (2003) were unable to find empirical support for the relationship between the board of directors and firm financial performance I found empirical evidence that the positive total effect of board independence on firm financial performance is negatively mediated by a board

composition aligned with the stewardship theory, there is, with directors chosen by their capacity to provide services instead of their capacity to provide effective monitoring. Thus, one can argue that the “agency costs” derived from such board composition mitigate the positive effect of the board independence on firm financial performance. I also found that this relationship is positively mediated by the independence of boards’ subcommittees which converges with agency theory argument that directors chosen by their ability to provide monitoring increase the positive effect of the board independence.

Regardless of the fact that most studies in supply chain management argue that non-financial metrics capture the dynamic supply chain management activities and day-to-day activities in a more accurate manner I adopted financial metrics in a more traditional manner to measure supply chain strategy. The main idea behind this argument is that formulation process of strategy it is not reflected by day-to-day activities since that the decision that a supply chain will be either lean or agile involves, for instance, the conclusion of key contracts with partners that ensured the operation of the company almost without inventories, for the lean case, and involves a large capital expenditure to acquire property, plant and equipment. This type of decision of which strategy the chain will adopt occurs in the board of directors rather than in day-to-day activities. That said, the evidences show that despite Walmart and P&G are members of the same supply chain, they adopt different supply chain strategies. The results show that Walmart adopts an Agile strategy and P&G adopts a Lean strategy. We also found that these companies complete the strategy of each other since that Walmart is pushing its inventory holding costs to its suppliers to optimize its efficiency, and P&G may be

carrying out part of the inventories hold costs of Walmart, which indicates that P&G liquidity and agility derived from cash, inventory, and receivables.

Finally, despite a significant number of firms justify the superior performance by stating they use Earnings Management techniques, by addressing the topic with a Cointegration analysis, the results show that there is no evidence to support the existence of a systematic practice of earnings management in Brazil. Thus, I argue that these practices are only occasional, and its effects should be just random divergences in the accounting information. Given that, many negative consequences of the distortions of the properties of accounting numbers cited by Ball, Robin and Wu (2000) would not be of concern to investors and other shareholders.

Take all these results together, I put forward the claim that investors and specifically the board of directors should focus their efforts to improve the monitoring capacity of their firms' board of directors to reach superior financial performance. More specifically, the boards of directors should consider more carefully the independence of the boards and its committees rather than their capacity to provide services. Boards should also demand from supply chain executives that the results of their activities must be expressed in accounting and finance terms. Finally, if the monitoring of the business activities is efficient, then boards should expect that earnings management practices would be only occasional, and its effects should be just random divergences in the accounting information. Thus, boards can dedicate less efforts to deal with the distortions of the properties of accounting numbers cited by Ball, Robin and Wu (2000).

4 REFERENCES

4.1 REFERENCES CHAPTER 1

Anderson, R. C. & Bizjak, J. (2003). An Empirical Examination of the Role of the CEO and the Compensation Committee in Structuring Executive Pay. *Journal of Banking & Finance*, 27 (7) 1323-1348.

Anderson, R. C., Mansi, S. A., & Reeb, D. M. (2004). Board characteristics, accounting report integrity, and the cost of debt. *Journal of accounting and economics*, *37* (3), 315-342.

Ahmed, A. S., & Duellman, S. (2007). Accounting conservatism and board of director characteristics: An empirical analysis. *Journal of Accounting and Economics*, *43* (2), 411-437.

Ashbaugh-Skaife, H., Collins, D. W., & LaFond, R. (2006). The effects of corporate governance on firms' credit ratings. *Journal of Accounting and Economics*, *42* (1), 203-243.

Barney, J. B. (1990). The debate between traditional management theory and organizational economics: substantive differences or intergroup conflict?. *Academy of Management Review*, *15* (3), 382-393.

Barney, J. B. (1986). Strategic factor markets: Expectations, luck, and business strategy. *Management Science*, *32* (10), 1231-1241.

Beasley, M. S. (1996). An empirical analysis of the relation between the board of director composition and financial statement fraud. *Accounting Review*, 443-465.

Bebchuk, L. A., Grinstein, Y., & Peyer, U. (2010). Lucky CEOs and lucky directors. *The Journal of Finance*, *65* (6), 2363-2401.

Beekes, W., Pope, P., & Young, S. (2004). The link between earnings timeliness, earnings conservatism and board composition: evidence from the UK. *Corporate Governance: An International Review*, *12* (1), 47-59.

Berger, P. G., Ofek, E., & Yermack, D. L. (1997). Managerial entrenchment and capital structure decisions. *The Journal of Finance*, *52* (4), 1411-1438.

Bowen, R. M., Rajgopal, S., & Venkatachalam, M. (2008). Accounting Discretion, Corporate Governance, and Firm Performance*. *Contemporary Accounting Research*, *25* (2), 351-405.

Bushman, R., Chen, Q., Engel, E., & Smith, A. (2004). Financial accounting information, organizational complexity and corporate governance systems. *Journal of Accounting and Economics*, *37* (2), 167-201.

Byrd, J. W., & Hickman, K. A. (1992). Do outside directors monitor managers?: Evidence from tender offer bids. *Journal of financial Economics*, *32* (2), 195-221.

Carcello, J. V., & Neal, T. L. (2000). Audit committee composition and auditor reporting. *The Accounting Review*, *75* (4), 453-467.

Chhaochharia, V. & Grinstein, Y. (2007). The Changing Structure of US Corporate Boards: 1997-2003. *Corporate Governance: An International Review*, 15 (6), 1215-1223.

Clarke, D. C. (2007). Three Concepts of the Independent Director. *Delaware Journal of Corporate Law*, 32 (1) 73-111.

Conner, K. R. (1991). A historical comparison of resource-based theory and five schools of thought within industrial organization economics: do we have a new theory of the firm?. Journal of management, 17 (1), 121-154.

Conner, K. R., & Prahalad, C. K. (1996). A resource-based theory of the firm: Knowledge versus opportunism. *Organization Science*, *7* (5), 477-501.

D'Aveni, R. A. (1990). Top managerial prestige and organizational bankruptcy. *Organization Science*, *1* (2), 121-142.

Daley, L. A., & Vigeland, R. L. (1983). The effects of debt covenants and political costs on the choice of accounting methods: The case of accounting for R&D costs. *Journal of Accounting and Economics*, *5*, 195-211.

Dalton, D. R., Daily, C. M, Ellstrand, A. E. & Johnson, J. L. (1998). Meta-Analytic Reviews of Board Composition, Leadership Structure and Financial Performance. *Strategic Management Journal*, 19 (3), 269-90.

Dalton, D. R., Daily, C. M., Certo, S. T., & Roengpitya, R. (2003). Meta-analyses of financial performance and equity: fusion or confusion?. *Academy of Management Journal*, 46 (1), 13-26.

Davis, G. F., Yoo, M., & Baker, W. E. (2003). The small world of the American corporate elite, 1982-2001. *Strategic organization*, *1* (3), 301-326.

Davis, G. F. (1991). Agents without principles? The spread of the poison pill through the intercorporate network. *Administrative science quarterly*, 583-613.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1996). Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the sec*. *Contemporary accounting research*, *13* (1), 1-36.

DeFond, M. L., & Jiambalvo, J. (1994). Debt covenant violation and manipulation of accruals. *Journal of accounting and economics*, *17* (1), 145-176.

Dichev, I. D., & Skinner, D. J. (2002). Large–sample evidence on the debt covenant hypothesis. *Journal of Accounting Research*, *40* (4), 1091-1123.

Dierickx, I., & Cool, K. (1989). Asset stock accumulation and sustainability of competitive advantage. *Management Science*, *35* (12), 1504-1511.

Donaldson, L. (1985). *In Defense of organization theory: A reply to the critics* (Vol. 9). CUP Archive.

Donaldson, L. (1990). The ethereal hand: Organizational economics and management theory. *Academy of management Review*, *15* (3), 369-381.

Donaldson, L., & Davis, J. H. (1994). Boards and Company Performance-Research Challenges the Conventional Wisdom. *Corporate governance: An international review*, *2* (3), 151-160.

Donaldson, L., & Davis, J. H. (1991). Stewardship theory or agency theory: CEO governance and shareholder returns. *Australian Journal of management*, *16* (1), 49-64.

Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of management Review*, *20* (1), 65-91.

Etzioni, A. (1975). *Comparative Analysis of Complex Organizations, Rev*. Simon and Schuster.

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *Journal of law and economics*, 301-325.

Farber, D. B. (2005). Restoring trust after fraud: Does corporate governance matter?. *The Accounting Review*, *80* (2), 539-561.

Geletkanycz, M. A., & Boyd, B. K. (2011). CEO outside directorships and firm performance: A reconciliation of agency and embeddedness views. *Academy of Management Journal*, *54* (2), 335-352.

Geletkanycz, M.A. & Hambrick, D. C. (1997). The External Ties of Top Executives: Implications for Strategic Choice and Performance. *Administrative Science Quarterly*, 42 (4), 654-681.

Gendron, Y. & Bédard, J. (2006). On the Constitution of Audit Committee Effectiveness. *Accounting, Organizations & Society*, 31 (3), 211-239.

Granovetter, M. (1985). Economic action and social structure: the problem of embeddedness. *American journal of sociology*, 481-510.

Grinstein, Y., & Tolkowsky, E. (2004, November). The role of the board of directors in the capital budgeting process-evidence from s&p 500 firms. In *EFA 2005 Moscow Meetings*.

Harrison, J. R. (1987). The Strategic Use of Corporate Board Committees. *California Management Review*, 30 (1).

Haunschild, P. R. (1993). Interorganizational imitation: The impact of interlocks on corporate acquisition activity. *Administrative science quarterly*, 564-592.

Hermalin, B. E., & Weisbach, M. S. (2001). *Boards of directors as an endogenously determined institution: A survey of the economic literature* (No. w8161). National Bureau of Economic Research.

Hillman, A. J. & Dalziel, (2003). Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *Academy of Management Review*, 28, 383-396.

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.

Johnson, J. L., Daily, C. M., & Ellstrand, A. E. (1996). Boards of directors: A review and research agenda. *Journal of Management*, *22* (3), 409-438.

John, K., & Senbet, L. W. (1998). Corporate governance and board effectiveness. *Journal of Banking & Finance*, 22 (4), 371-403.

Johnson, J. L., Daily, C. M. & Ellstrand, A. E. (1996). Board of Directors: A Review and Research Agenda. *Journal of Management*, 22, 409-438.

Khanna, P., Jones, C. D. & Boivie, S. (2014). Director Human Capital, Information Processing Demands, and Board Effectiveness. *Journal of Management*, 40, 557-585.

Klein, A. (1998). Firm Performance and Board Committee Structure 1. *The Journal of Law and Economics*, *41* (1), 275-304.

Klein, A. (2002a). Audit committee, board of director characteristics, and earnings management. *Journal of accounting and economics*, *33* (3), 375-400.

Klein, A. (2002b). Economic determinants of audit committee independence. *The Accounting Review*, *77* (2), 435-452.

Kiel, G. C., & Nicholson, G. J. (2003). Board composition and corporate performance: how the Australian experience informs contrasting theories of corporate governance. *Corporate Governance: An International Review*, *11* (3), 189-205.

Kinney Jr, W. R. (2000). Research opportunities in internal control quality and quality assurance. *Auditing: A Journal of Practice & Theory*, 19 (s-1), 83-90.

Kirk, D. J. & Siegel, A. (1996). How Directors and Auditors Can Improve Corporate Governance. *Journal of Accountancy*, 181 (1), 53-57.

Koh, P.-S., Laplante, S. K. & Tong, Y. H. (2007). Accountability and Value Enhancement Roles of Corporate Governance. *Accounting & Finance*, 47 (2), 305-333.

McClelland, D. C. (1967). *Achieving society*. Simon and Schuster.

McGregor, D. (1960). The human side of enterprise. *New York*, *21*, 166.

Mizruchi, M. S. (1996). What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates. *Annual review of sociology*, 271-298.

Monks, R. A. G. & Minow, N. (2011). *Corporate Governance*. Wiley.

Palmer, D. A., Jennings, P. D., & Zhou, X. (1993). Late adoption of the multidivisional form by large US corporations: Institutional, political, and economic accounts. *Administrative science quarterly*, 100-131.

Peasnell, K. V., Pope, P. F., & Young, S. (2000). Accrual management to meet earnings targets: UK evidence pre-and post-Cadbury. *The British Accounting Review*, *32* (4), 415-445.

Pincus, K., Rusbarsky, M., & Wong, J. (1990). Voluntary formation of corporate audit committees among NASDAQ firms. *Journal of Accounting and Public Policy*, *8* (4), 239-265.

Podolny, J. M. (1993). A status-based model of market competition. *American journal of sociology*, 829-872.

Podolny, J. M. (1994). Market uncertainty and the social character of economic exchange. *Administrative science quarterly*, 458-483.

Rajagopalan, N. & Zhang, Y. (2008). Corporate Governance Reforms in China and India: Challenges and Opportunities. *Business Horizons*, 51 (1), 55-64.

Richardson, R. J. (1987). Directorship interlocks and corporate profitability. *Administrative Science Quarterly*, 367-386.

Rosenstein, S., & Wyatt, J. G. (1994). Shareholder wealth effects when an officer of one corporation joins the board of directors of another. *Managerial and Decision Economics*, *15* (4), 317-327.

Rumelt, R. P. (1984). Towards a strategic theory of the firm. *Competitive strategic management*, *26*, 556-570.

Silverman, D. (1970). *The theory of organisations: a sociological framework*. London: Heinemann.

Smith Jr, C. W., & Watts, R. L. (1992). The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of financial Economics*, *32* (3), 263-292.

Spira, L. (1999). Ceremonies of Governance: Perspectives on the Role of the Audit Committee. *Journal of Management and Governance*, 3 (3), 231-260.

Useem, M. (1984). *The inner circle: Large corporations and the rise of business political activity in the US and UK*. Oxford University Press.

Vafeas, N. (1999). The Nature of Board Nominating Committees and Their Role in Corporate Governance. *Journal of Business Finance & Accounting*, 26 (1/2), 199-225.

Wade, J., O'Reilly III, C. A., & Chandratat, I. (1990). Golden parachutes: CEOs and the exercise of social influence. *Administrative Science Quarterly*, 587-603.

Watts, R. L. (2003). Conservatism in accounting part I: Explanations and implications. *Accounting horizons*, *17* (3), 207-221.

Watts, R. L. (2006). What has the invisible hand achieved?. *Accounting and Business Research*, *36* (sup1), 51-61.

Watts, R. L., & Zimmerman, J. L. (1986). Positive accounting theory.

Westphal, J. D., Seidel, M. D. L., & Stewart, K. J. (2001). Second-order imitation: Uncovering latent effects of board network ties. *Administrative Science Quarterly*, *46* (4), 717-747.

Williamson, O. E. (1985). *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting.* Free Press, New York.

Wright, D. W. (1996). *Evidence on the relation between corporate governance characteristics and the quality of financial reporting* (No. 9601). University of Michigan.

Xie, B., Davidson III, W. N., & DaDalt, P. J. (2003). Earnings management and corporate governance: the role of the board and the audit committee. *Journal of corporate finance*, *9* (3), 295-316.

Zahra, S. A., & Pearce, J. A. (1989). Boards of directors and corporate financial performance: A review and integrative model. *Journal of management*, 15 (2), 291-334.

4.2 REFERENCES CHAPTER 2

Agarwal, A., Shankar, R., & Tiwari, M. K. (2007). Modeling agility of supply chain. Industrial Marketing Management, 36(4), 443-457.

Anderson, R. C., Mansi, S. A., & Reeb, D. M. (2004). Board characteristics, accounting report integrity, and the cost of debt. Journal of accounting and economics, 37 (3), 315-342.

Anderson, E., & Jap, S. (2012). The dark side of close relationships. Sloan Management.

Alderson, W., & Martin, M. W. (1965). Toward a formal theory of transactions and transvections. Journal of Marketing Research, 117-127.

Baramichai, M., Zimmers Jr, E. W., & Marangos, C. (2007). Agile supply chain transformation matrix: a QFD-based tool for improving enterprise agility. International Journal of Value Chain Management, 1(3), 281-303.

Barney, J. B. (1986). Strategic factor markets: Expectations, luck, and business strategy. Management Science, 32 (10), 1231-1241.

Barney, J. B. (1986). Types of competition and the theory of strategy: Toward an integrative framework. Academy of management review, 11(4), 791-800.

Barney, J. B. (1990). The debate between traditional management theory and organizational economics: substantive differences or intergroup conflict?. Academy of Management Review, 15 (3), 382-393.

Barth, M. E., Beaver, W. H., Hand, J. R., & Landsman, W. R. (1999). Accruals, cash flows, and equity values. Review of Accounting Studies, 4(3-4), 205-229.

Ben Naylor, J., Naim, M. M., & Berry, D. (1999). Leagility: integrating the lean and agile manufacturing paradigms in the total supply chain. International Journal of production economics, 62(1), 107-118.

Boyer, K. K., & Lewis, M. W. (2002). Competitive priorities: Investigating the need for trade-offs in operations strategy. *Production and operations management*, 11(1), 9-20.

Bottani, E. (2009). A fuzzy QFD approach to achieve agility. International Journal of Production Economics, 119(2), 380-391.

Cabral, I., Grilo, A., & Cruz-Machado, V. (2012). A decision-making model for lean, agile, resilient and green supply chain management. International Journal of Production Research, 50(17), 4830-4845.

Camerinelli, E., & Candtu, A. (2006). Measuring the value of the supply chain: a framework. Supply Chain Practice, 8(2), 40-59.

Camerinelli, E. (2009). Supply chain finance. *Journal of Payments Strategy & Systems*, 3(2), 114-128.

Chan, F. T., Chan, H. K., & Qi, H. J. (2006). A review of performance measurement systems for supply chain management. *International Journal of Business Performance Management*, *8*(2), 110-131.

Christopher, M. (1992). *Logistics and supply chain management: strategies for reducing costs and improving services* (Vol. 1). Financial Times.

Christopher, M. (2000). The agile supply chain: competing in volatile markets. Industrial marketing management, 29(1), 37-44.

Christopher, M., & Ryals, L. (1999). Supply chain strategy: its impact on shareholder value. *The International Journal of Logistics Management, 10*(1), 1-10.

Christopher, M., Peck, H., & Towill, D. (2006). A taxonomy for selecting global supply chain strategies. The International Journal of Logistics Management, 17(2), 277-287.

Christopher, M., & Ryals, L. (1999). Supply chain strategy: Its impact on shareholder value. The International Journal of Logistics Management, 10(1), 1-10.

Conner, K. R. (1991). A historical comparison of resource-based theory and five schools of thought within industrial organization economics: do we have a new theory of the firm? Journal of management, 17(1), 121-154.

Conner, K. R., & Prahalad, C. K. (1996). A resource-based theory of the firm: Knowledge versus opportunism. Organization science, 7(5), 477-501.

Daugherty, P. J., Stank, T. P., & Ellinger, A. E. (1998). Leveraging logistics/distribution capabilities: the effect of logistics service on market share. Journal of Business Logistics, 19(2), 35.

Datar, S. M., M. Rajan, and C.T., Horngren. 2013. Managerial Accounting: Decision Making and Motivating Performance. Englewood Cliffs, NJ: Prentice Hall.

Davis, G. F., Yoo, M., & Baker, W. E. (2003). The small world of the American corporate elite, 1982-2001. Strategic organization, 1 (3), 301-326.

Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. Journal of Accounting and Economics, 50(2), 344-401.

DeFond, M. L., & Jiambalvo, J. (1994). Debt covenant violation and manipulation of accruals. Journal of accounting and economics, 17 (1), 145-176.

Dichev, I. D., & Skinner, D. J. (2002). Large–sample evidence on the debt covenant hypothesis. Journal of Accounting Research, 40 (4), 1091-1123.

Dierickx, I., & Cool, K. (1989). Asset stock accumulation and sustainability of competitive advantage. Management Science, 35 (12), 1504-1511.

Ellram, L. M. (1991). Suplly Chain Management: The Industrial organization perspective. *Internaconal Journal of Physical Distribution & Logistics Management, 21 (1), 13-22.*

Emery, G.W., Marques, M.A., 2011. The effect of transaction costs, payment terms and power on the level of raw materials inventories. Journal of Operations Management 29 (3), 236-249.

Fan, Q., Xu, X. J., & Gong, Z. Y. (2007). Research on Lean, Agile and Leagile Supply Chain. 2007 International Conference on Wireless Communications, Networking and Mobile Computing, Vols 1-15, 4902-4905.

Fawcett, S. E., Waller, M. A., & Bowersox, D. J. (2011). Cinderella in the C-Suite: Conducting Influential Research to Advance the Logistics and Supply Chain Disciplines. Journal of Business Logistics, 32(2), 115-121.

Fisher, M. L. (1997). What is the right supply chain for your product?. *Harvard business review*, *75*, 105-117.

Gardner, D. L. (2004). Supply Chain Vector: Methods for Linking the Execution of Global Business Models with Financial Performance. J. Ross Publishing.

Gendron, Y. & Bédard, J. (2006). On the Constitution of Audit Committee Effectiveness. Accounting, Organizations & Society, 31 (3), 211-239.

Gligor, D. M., & Holcomb, M. C. (2012). Understanding the role of logistics capabilities in achieving supply chain agility: a systematic literature review. Supply Chain Management: An International Journal, 17(4), 438-453.

Godfrey, J. T., & Prince, T. R. (1971). The accounting model from an information systems perspective. The Accounting Review, 46(1), 75-89.

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 424-438.

Granger, C. W. (2004). Time series analysis, cointegration, and applications. *American Economic Review*, 421-425.

Grimm, C. M. (2008). THE APPLICATION OF INDUSTRIAL ORGANIZATION ECONOMICS TO SUPPLY CHAIN MANAGEMENT RESEARCH*. *Journal of Supply Chain Management*, *44*(3), 16-21.

Gunasekaran, A., & Kobu, B. (2007). Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995–2004) for research and applications. *International Journal of Production Research*, *45*(12), 2819-2840.

Gunasekaran, A., Patel, C., Tirtiroglu, E. (2001). Performance measures and metrics in a supply chain environment. *International Journal of Operations & Production Management*, 21(1/2), 71–87.

Hallgren, M., & Olhager, J. (2009). Lean and agile manufacturing: external and internal drivers and performance outcomes. International Journal of Operations & Production Management, 29(10), 976-999.

Hamilton, J. D. (1994). *Time series analysis* (Vol. 2). Princeton: Princeton university press.

Handley, S.M., Benton Jr, W., 2012. The influence of exchange hazards and power on opportunism in outsourcing relationships. Journal of Operations Management 30 (1), 55-68.

Hart, O., 1989. An Economist's Perspective on the Theory of the Firm. Columbia Law Review 89 1775.

Hayes, R. H., & Pisano, G. P. (1996). Manufacturing strategy: at the intersection of two paradigm shifts. *Production and operations management*, 5(1), 25-41.

Hayes, R.H., Wheelwright, S.C. (1979). Link manufacturing process and product life cycles. *Harvard business review*, 57(1), 133-265.

Hendricks, K. B., & Singhal, V. R. (2003). The effect of supply chain glitches on shareholder wealth. *Journal of Operations Management*, *21*(5), 501-522.

Hendricks, K. B., & Singhal, V. R. (2005). An empirical analysis of the effect of supply chain disruptions on long-run stock price performance and equity risk of the firm. *Production and Operations management*, *14*(1), 35-52.

Hendricks, K. B., & Singhal, V. R. (2008). The effect of supply chain disruptions on shareholder value. *Total Quality Management*, *19*(7-8), 777-791.

Hendricks, K. B., & Singhal, V. R. (2009). Demand-supply mismatches and stock market reaction: Evidence from excess inventory announcements. *Manufacturing & Service Operations Management*, *11*(3), 509-524.

Hendricks, K. B., & Singhal, V. R. (2012). The Effect of Supply Chain Disruptions on Corporate Performance. *The Handbook of Integrated Risk Management in Global Supply Chains*, 51-78.

Hendricks, K. B., & Singhal, V. R. (2014). The Effect of Demand–Supply Mismatches on Firm Risk. *Production and Operations Management*, *23*(12), 2137-2151.

Henkoff R. (1994). Delivering the goods. Fortune, 28, November, 64 -78.

Inman, R. A., Sale, R. S., Green Jr, K. W., & Whitten, D. (2011). Agile manufacturing: relation to JIT, operational performance and firm performance. *Journal of Operations Management*, 29(4), 343-355.

Kaplan, R.S. & Norton, P.D. (1992). The balanced scoreboard-measures that drives performance. *Harvard Business Review*, 71-9.

Kisperska-Moron, D., & De Haan, J. (2011). Improving supply chain performance to satisfy final customers: “Leagile” experiences of a polish distributor. International Journal of Production Economics, 133(1), 127-134.

Klein, A. (1998). Firm Performance and Board Committee Structure 1. The Journal of Law and Economics, 41 (1), 275-304.

Klein, A. (2002a). Audit committee, board of director characteristics, and earnings management. Journal of accounting and economics, 33 (3), 375-400.

Klein, A. (2002b). Economic determinants of audit committee independence. The Accounting Review, 77 (2), 435-452.

Klingenberg, B., Timberlake, R., Geurts, T. G., & Brown, R. J. (2013). The relationship of operational innovation and financial performance—A critical perspective. *International Journal of Production Economics*, *142*(2), 317-323.

Krause, D. R., Pagell, M., & Curkovic, S. (2001). Toward a measure of competitive priorities for purchasing. *Journal of Operations Management*, 19(4), 497-512.

Kroes, J. R., & Ghosh, S. (2010). Outsourcing congruence with competitive priorities: Impact on supply chain and firm performance. *Journal of Operations Management*, 28(2), 124-143.

Lo, S. M., & Power, D. (2010). An empirical investigation of the relationship between product nature and supply chain strategy. Supply Chain Management: An International Journal, 15(2), 139-153.

Mayer, K.J., Argyres, N.S., 2004. Learning to contract: Evidence from the personal computer industry. Organization Science 15 (4), 394-410.

Mason-Jones, R., & Towill, D. R. (1997). Enlightening supplies. *Manufacturing Engineer*, *76*(4), 156-160.

Mason-Jones, R., Naylor, B., & Towill, D. R. (2000). Lean, agile or leagile? Matching your supply chain to the marketplace. International Journal of Production Research, 38(17), 4061-4070.

Mentzer, J. T. and Esper, T. L. 2010. Supply Chain Management Strategy. Wiley International Encyclopedia of Marketing. 1.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. *Journal of Business logistics*, *22*(2), 1-25.

Mentzer, J. T., Stank, T. P., & Esper, T. L. (2008). Supply chain management and its relationship to logistics, marketing, production, and operations management. Journal of Business Logistics, 29(1), 31-46.

Naim, M. M., & Gosling, J. (2011). On leanness, agility and leagile supply chains. International Journal of Production Economics, 131(1), 342-354.

Naylor, J. B., Naim, M. M., & Berry, D. (1999). Leagility: integrating the lean and agile manufacturing paradigms in the total supply chain. International Journal of production economics, 62(1), 107-118.

Narasimhan, R., Swink, M., & Kim, S. W. (2006). Disentangling leanness and agility: an empirical investigation. *Journal of operations management*, 24(5), 440-457.

Parmigiani, A., Klassen, R. D., & Russo, M. V. (2011). Efficiency meets accountability: Performance implications of supply chain configuration, control, and capabilities. *Journal of Operations Management*, 29(3), 212-223.

Payne, T., & Peters, M. J. (2004). What is the right supply chain for your products?. The International Journal of Logistics Management, 15(2), 77-92.

Pohlen, T. L., & Goldsby, T. J. (2003). VMI and SMI programs: How economic value added can help sell the change. International *Journal of Physical Distribution & Logistics Management*, 33(7), 565-581.

Porter, M. E. (1980). Competitive strategies. New York.

Porter, M. E. (2008). The five competitive forces that shape strategy. Harvard business review, 86(1), 25-40.

Presutti Jr, W. D., & Mawhinney, J. R. (2007). Supply Chain – Finance Link. *Supply Chain Management Review*, 33.

Purvis, L., Gosling, J., & Naim, M. M. (2014). The development of a lean, agile and leagile supply network taxonomy based on differing types of flexibility. International Journal of Production Economics, 151, 100-111.

Qi, Y., Boyer, K. K., & Zhao, X. (2009). Supply chain strategy, product characteristics, and performance impact: Evidence from chinese manufacturers. Decision Sciences, 40(4), 667-695.

Qi, Y., Zhao, X., & Sheu, C. (2011). The Impact of Competitive Strategy and Supply Chain Strategy on Business Performance: The Role of Environmental Uncertainty. Decision Sciences, 42(2), 371-389.

Randall, T. R., Morgan, R. M., & Morton, A. R. (2003). Efficient versus responsive supply chain choice: an empirical examination of influential factors. *Journal of Product Innovation Management*, 20(6), 430-443.

Ralston, P., Blackhurst, J., Cantor, D.E., Crum, M.R., (2014). A Structure-Conduct-Performance Perspective of How Strategic Supply Chain Integration Affects Firm Performance. Journal Of Supply Chain Management Forthcoming.

Richardson, R. J. (1987). Directorship interlocks and corporate profitability. Administrative Science Quarterly, 367-386.

Rossetti, C., & Choi, T. Y. (2005). On the dark side of strategic sourcing: experiences from the aerospace industry. The Academy of Management Executive, 19(1), 46-60.

Roth, A., Gray, J., Shockley, J., & Weng, H. H. R. (2013). The Use of Secondary Source Data for Measuring Performance in Operations Management Research. *Available at SSRN 2271202*.

Rumelt, R. P. (1984). Towards a strategic theory of the firm. Competitive strategic management, 26, 556-570.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica: Journal of the Econometric Society*, 1-48.

Sims, C. A., Stock, J. H., & Watson, M. W. (1990). Inference in linear time series models with some unit roots. *Econometrica: Journal of the Econometric Society*, 113-144.

Srivastava, R. K., Shervani, T. A., & Fahey, L. (1998). Market-based assets and shareholder value: a framework for analysis. *The Journal of Marketing*, 2-18.

Stank, T. P., Esper, T. L., Crook, T. R., & Autry, C. W. (2012). Creating relevant value through demand and supply integration. Journal of Business Logistics, 33(2), 167-172.

Stavrulaki, E., & Davis, M. (2010). Aligning products with supply chain processes and strategy. The International Journal of Logistics Management, 21(1), 127-151.

Stratton, R., & Warburton, R. D. (2003). The strategic integration of agile and lean supply. International Journal of Production Economics, 85(2), 183-198.

Thomas, J. K., & Zhang, H. (2002). Inventory changes and future returns. Review of Accounting Studies, 7(2-3), 163-187.

Useem, M. (1984). The inner circle: Large corporations and the rise of business political activity in the US and UK. Oxford University Press.

Zhang, D. Z. (2011). Towards theory building in agile manufacturing strategies—Case studies of an agility taxonomy. International Journal of Production Economics, 131(1), 303-312.

Wagner, S. M., Grosse-Ruyken, P. T., & Erhun, F. (2012). The link between supply chain fit and financial performance of the firm. *Journal of Operations Management*, 30(4), 340-353.

Wagner, S.M., Bode, C., 2014. Supplier relationship-specific investments and the role of safeguards for supplier innovation sharing. Journal of Operations Management 32 (3), 65-78.

Ward, P. T., McCreery, J. K., Ritzman, L. P., & Sharma, D. (1998). Competitive priorities in operations management. *Decision Sciences*, 29(4), 1035-1046.

Ward, P. T., Bickford, D. J., & Leong, G. K. (1996). Configurations of manufacturing strategy, business strategy, environment and structure. Journal of management, 22(4), 597-626.

Will, H. J. (1974). Auditing in systems perspective. The Accounting Review, 49(4), 690-706.

Wilson, K., Doz, Y. L (2011). Agile Innovation: A Footprint Balancing Distance and Immersion. California Management Review, 53(2).

Womack, J. P., Jones, D. T., & Roos, D. (1990). Machine that changed the world. Simon and Schuster.

Wee, H. M., & Wu, S. (2009). Lean supply chain and its effect on product cost and quality: a case study on Ford Motor Company. Supply chain management: An international Journal, 14(5), 335-341.

4.3 REFERENCES CHAPTER 3

Azevedo, F. B., & da Costa, F. M. (2012). Efeito da troca da firma de auditoria no gerenciamento de resultados das companhias abertas brasileiras. *Revista de Administração Mackenzie,* 13(5).

Ball, R., & Brown, P. (1968). An empirical evaluation of accounting income numbers. *Journal of accounting research*, 159-178.

Ball, R., Robin, A., & Wu, J. S. (2003). Incentives versus standards: properties of accounting income in four East Asian countries. *Journal of accounting and economics*, 36(1), 235-270.

Ball, R., Kothari, S. P., & Robin, A. (2000). The effect of international institutional factors on properties of accounting earnings. *Journal of accounting and economics*, 29(1), 1-51.

Bartov, E. (1993). The timing of asset sales and earnings manipulation. *Accounting Review*, 840-855.

Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings 1. *Journal of accounting and economics*, 24(1), 3-37.

Becker, C. L., DeFond, M. L., Jiambalvo, J., & Subramanyam, K. R. (1998). The effect of audit quality on earnings management. *Contemporary accounting research,* 15(1), 1-24.

Beneish, M. D. (1999). Incentives and penalties related to earnings overstatements that violate GAAP. The Accounting Review, 74(4), 425-457.

Burgstahler, D., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of accounting and economics*, 24(1), 99-126.

Burgstahler, D. C., Hail, L., & Leuz, C. (2006). The importance of reporting incentives: Earnings management in European private and public firms. *The accounting review*, 81(5), 983-1016.

da Silva, J. O., & Bezerra, F. A. (2010). Análise do Gerenciamento de Resultados e o Rodízio de Firmas de Auditoria nas Empresas de Capital Aberto/Analysis of Earnings Management and Turnover of Auditors Firms in Companies Traded/Análisis de la Gestión por Resultados y la Alternancia de las Firmas de Auditoría en las Empresas de Capital Abierto. *Revista Brasileira de Gestão de Negócios*, 12(36), 304.

Dechow, P. M. (1994). Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals. *Journal of accounting and economics*, 18(1), 3-42.

Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. *The accounting review*, 77(s-1), 35-59.

Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of accounting and economics*, 50(2), 344-401.

Dechow, P. M., Richardson, S. A., & Tuna, I. (2003). Why are earnings kinky? An examination of the earnings management explanation. *Review of accounting studies*, 8(2-3), 355-384.

Dechow, P., Schrand, C. (2004). Earnings quality. **The Research Foundation of CFA Institute**, 2004.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *Accounting review*, 193-225.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1996). Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC. Contemporary accounting research, 13(1), 1-36.

Dichev, I. D., & Tang, V. W. (2008). Matching and the changing properties of accounting earnings over the last 40 years. *The Accounting Review*, 83(6), 1425-1460.

Durnev, A., & Kim, E. (2005). To steal or not to steal: Firm attributes, legal environment, and valuation. *The Journal of Finance*, 60(3), 1461-1493.

Donelson, D. C., Jennings, R., & McInnis, J. (2011). Changes over time in the revenue-expense relation: Accounting or economics?. *The Accounting Review*, 86(3), 945-974.

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.

Houthaulsen, R. Testing the Relative Power of Accounting Standards versus Incentives and Other Institutional Features to Influence the Outcome of Financial Reporting in an International Setting. Journal of Accounting and Economics 36, p. 271-283., and Valuation. **Journal of Finance,** v. 60, p. 1461-1493, 2003.

Holthausen, R. W., & Verrecchia, R. E. (1988). The effect of sequential information releases on the variance of price changes in an intertemporal multi-asset market. Journal of Accounting Research, 82-106.

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.

Lang, M., Raedy, J. S., & Wilson, W. (2006). Earnings management and cross listing: Are reconciled earnings comparable to US earnings? *Journal of accounting and economics*, 42(1), 255-283.

Leuz, C., Nanda, D., & Wysocki, P. D. (2003). Earnings management and investor protection: an international comparison. Journal of financial economics, 69(3), 505-527.

Lopes, A. B., & Tukamoto, Y. S. (2007). Contribuição ao estudo do" gerenciamento" de resultados: uma comparação entre as companhias abertas brasileiras emissoras de ADRs e não-emissoras de ADRs. Revista de Administração, 42(1), 86-96.

Lopes, A. B., Tukamoto, Y., & Galdi, F. C. (2007) Earnings management and cross listing in Brasil. In: CONGRESSO ANPCONT, 1, 2007, Rio Grande do Sul. Anais... Disponível em: <http://www.furb.br/especiais/interna.php?secao=590>. Acesso em: 22 ago. 2014.

Martinez, A. L. (2013). Gerenciamento de resultados no Brasil: um survey da literatura. BBR-Brazilian Business Review, 10(4), 1-31.

Penman, S. H., & Sougiannis, T. (1998). A comparison of dividend, cash flow, and earnings approaches to equity valuation. Contemporary accounting research, 15(3), 343-383.

Ritholtz, Barry. (2012). 12:15pm; GE's Jack Welch Knows About Cooking the Books, disponivel em: <http://www.ritholtz.com/blog/2012/10/ges-jack-welch-on-bls-book-cooking/>. Acesso em: 22 ago. 2014.

Schipper, K. (1989). Earnings management. **Accounting Horizons**, v. 3, p. 91-102, 1989.