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Reinvestigating the relationship between ownership structure and inventory management: A corporate governance perspective

Khaled Elsayed *, Hayam Wahba

Business Administration Department, Faculty of Commerce, Ain Shams University, Main Campus (Western Division), Abbassia 11566, Cairo, Egypt

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ABSTRACT

It is hypothesized in this study that the relationship between institutional ownership and inventory management is more likely to be moderated by other internal corporate governance mechanisms (i.e., managerial ownership, board leadership structure and board size). This is more likely to happen as one weak governance mechanism in one area will be offset by a strong one in another area. Furthermore, the effectiveness of one corporate governance mechanism (i.e., institutional ownership) is more likely to be contingent on some contextual variables. Econometric analysis, using a sample of Egyptian listed firms, provides strong evidence for the applicability of this theme and demonstrates that institutional ownership affects inventory management positively (negatively) when managerial ownership is high (low), CEO duality (non-duality) is in place, or board size is large (small). This conclusion is robust to the use of different control variables and econometric models.

1. Introduction

Inventory represents one of the most important and difficult assets to be managed at firm level as well as at macro economy level. Conventionally, academics and practitioners argued that inventories have a triple role in modern organizations: as contributors to value creation, as means of flexibility and means of control (Chikan, 2009). The underlying interrelationship between corporate strategy and inventory (Hitt and Ireland, 1985; Li, 1992; Tamas, 2000) has induced much of existing research to examine its main usual suspects. Examples of these usual suspects include volume and structure of inventories (Chikan, 1996), incentives for efficient inventory management (Baldenius and Reichelstein, 2005), parameters that impact on inventory policy (Borgonovo, 2008), efficacy of inventory (Barker and Santos, 2010), and determinants of inventory turnover (Gaur et al., 2005; Kolias et al., 2011).

In this context, theoretical and empirical studies are conducted to investigate the relationship between inventory and different managerial and financial issues. Example of these issues include capital structure (Luciano and Peccati, 1999), demand uncertainty (Bo, 2001), risk measure selection (Borgonovo and Peccati, 2009), risk aversion (Chen et al., 2007), liquidity and financial constraints (Carpenter et al., 1998; Corbett et al., 1999; Buzacott and Zhang, 2004), managerial perception (Chikan, 2009), financial performance (Cannon, 2008), transaction costs (Girlich, 2003), organizational design (Vries, 2005), stock market (Lai, 2006; Tribo, 2009), ownership structure (Niehaus, 1989; Dimelis and Lyriotaki, 2007; Tribo, 2007; Ameer, 2010), and corporate social responsibility (Barcos et al., 2012).

Previous studies that examined the relationship between institutional ownership and inventory management and policy, to the best of our knowledge, are limited to the studies of Tribo (2007) and Ameer (2010). Both of these studies have argued for a positive relationship between institutional ownership and inventory management. This positive correlation is justified through two different channels: liquidity channel and control channel. Existing of institutional ownership, according to liquidity channel, increases the ability of the firm to access more cash from creditors. This, in turn, should induce a lower inventory level as its need to accumulate cashable assets like inventories to hedge liquidity shocks is reduced (Tribo, 2007). On the other hand, according to control channel, strong voting power and superior knowledge of institutional shareholders enable them to manipulate decisions of management effectively. Hence, excess inventory as a sign of mismanagement is unlikely to be presented in this situation (Tribo, 2007; Ameer, 2010).

In fact, this conclusion ignores that the effectiveness of one corporate governance mechanism (i.e., institutional ownership) is more likely to be contingent on some contextual variables and that the effect of one mechanism can depend upon others. Put simply, this conclusion disregarded not only the documented relationship between institutional ownership and managerial

* Corresponding author. Tel.: +20 2 4610 3469; fax: +20 2 4610 3560.
E-mail addresses: k_elsayed@mailer.eun.eg (K. Elsayed), hayam@asunet.shams.edu.eg (H. Wahba).

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shareholding (Bathala et al., 1994; Chen and Steiner, 1999; Crutchley et al., 1999; Joher et al., 2006; Khurshed et al., 2011), but also the interrelationship between institutional ownership and board characteristics (i.e., size and leadership structure) (Huse, 2005; Li et al., 2006; Elsayed, 2007 and 2010; Khurshed et al., 2011). Furthermore, this argument overlooks that the effectiveness of institutional investors is more likely to vary across-nations. This is because national institutions may allocate power within firms in a different way (Aguilera, 2005). For instance, although the USA and the UK have a common law system, each county has decided to address corporate governance initiatives differently (Aguilera, 2005; Huse, 2005).

In fact, to hypothesize that institutional investors are always "*active*" or "*passive*" in their actions towards monitoring and controlling responsibility, and hence, inventory management and to model this case as a linear relationship are considered as idealistic themes. Rather, it is more reasonable to expect that the relationship between institutional investors and inventory management is a nonlinear one that might be moderated by various motivations. This is more likely to happen as institutional investors are generally profit maximizers who will not be engaged in an activity whose costs exceed its benefits (Bainbridge, 2008), will not take their decisions far from considering expected financial returns (Sparkes, 1998; Matterson, 2000), and behave differently across-countries (Seifert et al., 2005).

Moreover, because it is unfeasible to expect which firm will face which problem, institutional investors will be required, as a result of asymmetric information, to monitor all of their portfolio firms. However, increasing cost of monitoring, intervening and reforming do not provoke institutional investors "to be involved in day-to-day corporate matters. Instead, they are likely to step in only where there are serious long-term problems…[and] is likely to focus on crisis management" (Bainbridge, 2008: 13–14). This possibility is more likely to be high with relatively small size investment of long-term institutional investors, information asymmetry, and non-existence of collation among shareholders. The implication of this assertion is that institutional investors are more likely to play an active (passive) role in monitoring management behavior and decisions in contexts that facilitate (hinder) managerial entrenchment. "Managerial entrenchment occurs when managers gain so much power that they are able to use the firm to further their own interests rather than the interests of shareholders" (Weisbach, 1988: 435). Managerial entrenchment varies not only with national cultural and governance systems (Short and Keasey, 1999), but also with managerial ownership, board leadership structure, and board size (Finkelstein and D'Aveni, 1994; Zhou, 2001; Elsayed, 2011).

Thus, this study is designed to add to existing literature by exploring the moderating effect of managerial ownership, board leadership structure, and board size through testing the relationship between institutional ownership and inventory management using a sample of Egyptian listed firms. Doing so not only helps to better understand the comparative corporate governance and inventory debate, but it also can enhance corporate governance and inventory management practices in Egypt as an emerging market. Presenting data from other less developed contexts is more likely to develop the existing theory of corporate governance, as countries' cultural differences will cause directors to have different ethical perceptions and orientations (Aguilera, 2005).

The remainder of this paper is structured as follows. The second section is devoted to discuss different arguments regarding the role of institutional ownership as a corporate governance mechanism. The third section presents some evidence regarding corporate governance and ownership structure in the Egyptian context. The fourth section is designated to develop some testable hypotheses in this study. Sample and variable measurements are found in the fifth section. Empirical findings are presented in the sixth section. The final section is dedicated to portray conclusions, discussion of the main findings, and some directions for future work.

2. Institutional ownership as a corporate governance mechanism

Separation of ownership and management in modern corporations has led to different arguments regarding the relationship between the principal and the agent. Jensen and Meckling (1976) articulated this scenario as an agency relationship and argued that the agent (i.e., executive managers) will be a self-interest optimizer. Therefore, internal and external monitoring mechanisms are required to be executed to diminish disagreement in interests between shareholders and the management (Fama and Jensen, 1983). Scholars have proposed various corporate governance mechanisms to attain such convergence. Some of these mechanisms are the board of directors, managerial shareholdings, institutional ownership, and operation of the market for corporate control.

Indeed, the past few decades have witnessed a noticeable change in corporate ownership structure with an increase in the stakes of institutional investors such as banks, mutual funds, insurance companies and pension funds (Sundaramurthy et al., 2005). "The fact that institutional investors have cross-border portfolios and are becoming increasingly influential must have an impact on the development and adoption of corporate governance in companies across the globe. This in turn will lead to increased transparency and accountability—something that is beneficial to all investors" (Mallin, 2002: 68).

In this context, institutional shareholders are recognized as long-term investors whose investment volume and horizon encourage them to incur a monitoring cost to control the decisions of the management. In other words, complexity of exit without losses and strong voting power enable institutional investors to manipulate decisions of management effectively. Thus, the superior knowledge of institutional investors arises from their ability to hire professionals to monitor and control a firm's performance (Fama and Jensen, 1983; Sundaramurthy et al., 2005; Mahoney and Roberts, 2007).

However, other commentators detracted from the importance of institutional investors as a corporate governance mechanism on the basis that they are passive, allied with management, and short-term oriented (Hansen and Hill, 1991; Bushee, 1998). Furthermore, evaluating and compensating managers of these institutions on the basis of short-term performance cycles discourages institutional investors from incurring monitoring cost to participate in governing firms in their portfolios (Koh, 2003). In this context, institutional investors are less likely to support long-term projects as they mainly prefer near-term earnings (Bushee, 2001).

To accommodate between these two opposing themes, some scholars, such as Zahra et al. (2000), and Huse (2004) argued that there are different types of institutional ownership: pressure-resistant institutions, pressure-indeterminate institutions, and pressure-sensitive institutions. While pressure-resistant institutions have a long-term investment perspective, pressure-indeterminate investors are short-term oriented in their investments. Pressure-resistant investors, such as mutual funds and public pension funds, are more likely to challenge and vote against management discretionary decisions.

Prior studies have focused on institutional ownership as a corporate governance mechanism and tried to establish a link with various organizational and strategic issues such as corporate

R&D investment (Graves, 1988), debt policy (Bathala et al., 1994), corporate productivity (Chowdhury and Geringer, 2001), dividend policy (Short et al., 2002), corporate innovation strategies (Hoskisson et al., 2002), earnings management strategies (Koh, 2003), firm performance (Sundaramurthy et al., 2005), CEO compensation (Khan et al., 2005), operating performance (Cornett et al., 2007), corporate social responsibility (Wahba, 2010), firm complexity (Wahba and Elsayed, 2010), and board leadership structure and size (Elsayed, 2011).

3. Corporate governance and ownership structure in the Egyptian context

Whilst the USA and the UK share an Anglo-American common law system, the Egyptian corporate law system is fundamentally influenced by French civil law. However, concepts of the Anglo-American common law system are well established in the capital market and central depository laws. Specifically, while the Company Law (No. 159/1981) governs joint stock companies, the Capital Market Law (No. 95/1992) legalizes the capital market and sets up the structure and custody of the Cairo and Alexandria Stock Exchanges (CASE) and market intermediates. Furthermore, the Central Depository and Registry Law (No. 93/2000) regulates the central registration for shareholders' records, clearance, settlement, and depositing (for more details, review Fawzy, 2003). In this context, although the Egyptian legal system does not prohibit CEO duality, it specifies that the board of directors for any company should be constituted according to capital distribution, and be nominated to represent shareholders.

In contrast to the USA/UK, where the level of individual share ownership has decreased and the proportion of institutional investors has increased (Mallin, 2002), many Egyptian companies are held by relatively few shareholders due to tax laws that encourage listing (ROSC, 2004). Moreover, the Egyptian market is dominated by retail investors who account for 50 to 60 percent of the total equity in the market, for which foreign investment and domestic institutional investors are relatively small (Abdel Shahid, 2003; ROSC, 2004).

With regard to corporate governance initiatives, "Egypt started to give due importance to the subject of corporate governance in 2001, with an initiative taken by the Ministry of Economy and Foreign Trade (now the Ministry of Foreign Trade)" (Fawzy, 2003: 10). The Egyptian approach to corporate governance reform can be best described as a "mixture" structure of the USA mandatory reform and UK voluntary reform. On the mandatory side, legislation that regulates the Egyptian capital market has recently been reformed, partially to increase disclosure and corporate governance requirements for quoted firms. For instance, due to implementing new and strict listing rules in July 2002, the number of listed companies in CASE decreased from 1148 companies in 2002 to 595 companies in 2006 (ROSC, 2004; Cairo and Alexandria Stock Exchange, 2007).

On the voluntary side, some initiatives have been launched to boost corporate governance practices in Egypt. Examples of these initiatives include the execution of a joint project between the World Bank and the Ministry of Foreign Trade in 2001 to benchmark corporate governance practices in Egypt against corporate governance principles of the Organization of Economic Co-operation and Development (OECD). Afterward, the Egyptian Institute of Directors (EIOD) was established in 2004 to render proper awareness among Egyptian corporations and emphasize the roles and functions of directors in achieving corporate activities and attaining corporate goals. Consequently, in 2005, the EIOD launched a code, guidelines, and standards of corporate governance to be followed by the Egyptian corporations.

The Egyptian market concentration is moderate with market capitalization of the top 10 listed companies accounting for just under one-half of the total market capitalization and turnover value of just over 40% (MENA-OECD, 2010). Many Egyptian companies are held by relatively few shareholders and the ownership of most companies remains concentrated (ROSC, 2009). For instance, the mean proportion of the shares held by blockholders in Egypt is 58 percent (Bolbol et al., 2004).

"In its response to the questionnaire, the CMA [Capital Market Authority] has estimated that families own 30%, individuals 15%, institutional investors 25%, and foreign investors 25%" (MENA-OECD, 2010: 8). The dominant institutional investors in Egypt are domestic banks and mutual funds. Public and private pension funds invest only a fraction of their assets in equities. Of the 50 most active companies on the stock exchange, 25 are privatized companies where the state retains its stake through a holding company structure (Shamseldin, 2006). "Approximately two-thirds of EGX share trading is done by retail and one-third by institutional investors" (ROSC, 2009: 6). Pre-empting the results of our empirical analysis below, ownership structure of the top 10 listed (25 most active) companies on EGX, which are included in our final sample, are as follows: managerial ownership 21.92% (15.69%), institutional ownership 34.12% (39.02%), foreign ownership 13.77% (12.95%), and state-holding ownership 23.59% (21.45%).

"Given this high ownership concentration, other control mechanisms such as class shares and pyramidal structure are not particularly common. Nonetheless, multiple class shares, usually capped at two votes per share, are largely permitted and do exit. Holding company structures, where the apex company is often listed, are common" (MENA-OECD, 2010: 9). Pre-empting the results of our analysis below, ownership structure varies across industrial sectors (see the results of ANOVA test analysis and Kruskal–Wallis test in Table 2).

With regard to board characteristics, "Egyptian companies have single tier boards comprised of an odd number of members, with a minimum of three. Two "experts" may be appointed to the board; they are full members of the board, and they vote. Directors must be shareholders or represent companies who are shareholders. In this context, although the Egyptian legal system does not prohibit CEO duality, it specifies that the board of directors for any company should be constituted according to capital distribution, and be nominated to represent shareholders (ROSC, 2004: 12). For instance, "there are no rules governing the composition between executive and non-executive directors and the concept of independent directors is not well established among listed companies. In most listed companies, there is no separation between the roles of the chairman and managing director roles. The same person may hold both posts" (Abdel Shahid, 2001: 55). The majority of firms tend to adopt the CEO duality structure as a consequence of entrepreneur's domination: "[i]t is not easy to convince an owner of a company who invested money to step aside and allow others to manage his money" (MENA (Middle East and North Africa Corporate Governance Workshop), 2003: 37).

Pre-empting the results of our analysis below, classification of firms according to their board leadership structure (see Table 1) showed that the same person holds the posts of CEO and chairman (i.e., CEO duality) in about 78% of the sample. Comparable figures are reported in the USA context. For instance, it is 76% in Booth et al. (2002) and 62% in Boone et al. (2007). On the other hand, the CEO duality ratio is not consistent with findings in the UK, where about 22% of firms do not split the roles of CEO and chairman (as reported in Lasfer, 2006). In fact, different arguments have been presented either to support or to challenge CEO duality. Drawing on agency theory, the opponents (e.g. Dayton,

1984) suggest that CEO duality diminishes the monitoring role of the board of directors over the executive manager, and this in turn may have a negative effect on corporate performance. In other words, as Alchian and Demsetz (1972: 782)) state, "who monitors the monitor?". On the other hand, advocates of CEO duality (e.g. Donaldson and Davis, 1991) assert that corporate performance can be enhanced, when executive manager has the full authority over his corporation by serving also as the chairman, as less conflict is likely to happen. In Egypt, Elsayed (2007) reported that the impact of CEO duality on corporate performance not only varies across industrial sectors, but also has a positive and significant coefficient only when corporate performance is low.

Furthermore, "it is not common for institutional investors to have explicit voting policies and some investors do not vote" (ROSC, 2004: 14). Existing evidence in the Egyptian context indicates that institutional investors seek to offset their passive role by supporting, as members of the board of directors, various governance mechanisms that help in monitoring and controlling the actions and decisions of management (Webb et al., 2003). These mechanisms, include, for instance, high dividends payout (Abdelsalam et al., 2008), investment in corporate social responsibility (Wahba, 2010), and board leadership structure that splits the roles of the CEO and chairman (Elsayed, 2010).

4. Institutional ownership and inventory management: hypotheses development

The association between institutional ownership and inventory management has explained in prior studies (Tribo, 2007; Ameer, 2010) through two different channels: liquidity channel and control channel. According to liquidity channel, existing of institutional ownership is more likely to increase trust as well as the bargaining power of the firm in facing lenders, which in turn facilitate the process of getting the needed cash. As a result, the firm's tendency to accumulate cashable assets, and hence inventory, is reduced. On the other hand, according to control channel, institutional stockholders are more likely to play an active and effective role in monitoring management behavior and decisions. Therefore, excess inventory as a sign of mismanagement is inversely related to the existence of institutional ownership. Consequently, the underlying theme of both liquidity channel and control channel is that institutional ownership and inventory management are positively related.

In fact, to hypothesize that institutional investors are always "*active*" or "*passive*" in their actions towards monitoring and controlling responsibility, and hence, inventory management and to model this case as a linear relationship are considered as idealistic themes. Rather, it is more reasonable to expect that the relationship between institutional investors and inventory management is a nonlinear one that might be moderated by various motivations. This is more likely to happen as institutional investors are generally profit maximizers who will not be engaged in an activity whose costs exceed its benefits (Bainbridge, 2008), and will not take their decisions far from considering expected financial returns (Sparkes, 1998; Matterson, 2000). Furthermore, their influence may vary across-countries (Seifert et al., 2005).

Moreover, because it is unfeasible to expect which firm will face which problem, institutional investors will be required, as a result of asymmetric information, to monitor all of their portfolio firms. However, increasing cost of monitoring, intervening and reforming do not provoke institutional investors "to be involved in day-to-day corporate matters. Instead, they are likely to step in only where there are serious long-term problems…[and] is likely to focus on crisis management" (Bainbridge, 2008: 13–14). This possibility is more likely to be high with relatively small size investment of long-term institutional investors, information asymmetry, and non-existence of collation among shareholders. The implication of this assertion is that institutional investors are more likely to play an active (passive) role in monitoring management behavior and decisions in contexts that facilitate (hinder) managerial entrenchment. "Managerial entrenchment occurs when managers gain so much power that they are able to use the firm to further their own interests rather than the interests of shareholders" (Weisbach, 1988: 435). Managerial entrenchment varies not only with national cultural and governance systems (Short and Keasey, 1999), but also with managerial ownership, board leadership structure, and board size (Finkelstein and D'Aveni, 1994; Zhou, 2001; Elsayed, 2011).

Institutional ownership and managerial ownership can be considered as substitutive corporate governance mechanisms. The general argument is that an increase in managerial ownership is more likely to correlate negatively with managerial entrenchment. This is because mangers, by owning shares in the companies they run, will have the incentive to invest in projects that have an expected positive net value (Jensen and Meckling, 1976). Consequently, by taking an active role in monitoring management decisions in this case, institutional investors will incur more and unneeded costs, as managerial ownership is more likely to reduce agency cost. However, it may be argued that by increasing his stake in the firm, the manager may overwhelm other shareholders and pursue his own goals (Lasfer, 2006). If this is the case, then institutional investors are likely to be involved in monitoring and controlling activities.

In fact, the net effect of the relationship between institutional investors and managerial ownership on inventory management is not as simple as it appears. Rather, this effect is more likely to vary not only with country and industry settings, but also with the cost, effectiveness, and availability of other corporate governance mechanisms. For instance, in contexts such as Egypt, where there is little investor protection and family-owned firms are common, increasing of managerial ownership is expected to result in the entrenchment management and subject them to the interest of the other shareholders. The managers increase their ownership stakes in order to boost their voting power, implement decisions that optimize their own interests, and weaken the monitoring power of the other corporate governance mechanisms (Fama and Jensen, 1983). If this is the case, then institutional shareholders are likely to exercise their monitoring and controlling role effectively to protect their wealth. The implication of this assertion is that the presence of institutional investors is expected to affect inventory management positively. This assertion will be tested empirically through the following hypothesis:

H1. Managerial ownership is expected to moderate the relationship between institutional ownership and inventory management, with the relationship being positive (negative) in firms with high (low) managerial ownership.

Board leadership structure refers to whether the executive manager serves also as the chairman of the board of directors (CEO duality) or the firm assigns the two positions to two different people (CEO non-duality). Board leadership structure may confound the relationship between institutional ownership and inventory management because it may encourage (or discourage) some inner or outer actors to join (or withdraw from) the game (Elsayed, 2010).

For instance, board leadership structure that does not split the roles of the CEO and the chairman (i.e., CEO duality structure) may impede outside directors from practicing their authority in

monitoring management (Lorsch and MacIver, 1989). Furthermore, board leadership structure may detract from the effectiveness of the board of directors by reflecting the relative power of the CEO in setting the board's agenda, controlling information flow, and weakening independency of outside members (Boyd, 1995). In this context, institutional investors are enforced to practice an active role to protect their investment. They are likely to do this as agency cost of CEO duality is expected to outweigh the cost that they incur to monitor and control the decisions of management. If this argument is valid, it is expected to detect a positive relationship between institutional ownership and inventory management when CEO duality is present.

However, the passive role of institutional investors is expected to show up under the CEO-non duality structure. This is because benefits of CEO-non duality (such as decreasing agency cost, separating decision-management from decision-control, increasing decision efficiency as a result of more discussion, and reducing managerial entrenchment) discourage them to incur unnecessary monitoring and controlling cost. Thus, if this argument is true, then one could expect a negative relationship between institutional ownership and inventory management when CEO non-duality is existed. This assertion is consistent with the above discussed evidence in the Egyptian context that demonstrates that institutional investors prefer a board leadership structure that splits the roles of the CEO and chairman to offset their missing role in monitoring and controlling the actions and decisions of management (ROSC, 2004). For instance, domestic banks try to avoid challenge or conflict with the CEO, as most of them play a dual role in the same firm (shareholder and creditor) (Elsayed, 2010). In sum, the above arguments will be tested empirically through the following hypothesis:

H2:. Board Leadership structure is expected to moderate the relationship between institutional ownership and inventory management, with the relationship being positive (negative) in firms with CEO duality (CEO non-duality) structure.

Institutional ownership and board size can also be considered as substitutive corporate governance mechanisms that play an important role in lessening conflict of interest between managers, who control corporate resources, and owners, whose equity stakes often do not justify monitoring cost. When a board becomes large, the ability of the board of directors to satisfy its main functions will be limited. Specifically, as a large group (board size) has less group cohesiveness, it is more likely to experience communication and coordination difficulties, which may increase free-rider problems, information sharing cost, and the possibility of the CEO controlling the board. Furthermore, new ideas and complete opinions are less likely to be expressed in large groups, and the monitoring process becomes more diffuse (Dalton et al., 1999).

Accordingly, large board size stimulates institutional investors to be active participants in monitoring and controlling management behavior and decisions seeking to reduce managerial entrenchment. The premise of this argument is that the relationship between institutional ownership and inventory management is expected to be positive when board size is large. Alternatively, as small board size allows for more effective monitoring and limits CEO domination, institutional investors are less likely to exercise their active role in monitoring and controlling management decisions. Thus, one could expect a negative relationship between institutional ownership and inventory management when board size is small. We expect that this argument to be existed and valid in the Egyptian context where, as explained above, not only there are no rules governing the composition between executive and non-executive directors, but also the concept of independent directors is not well established among listed firms. This, in turn, may collaborate with large board size, that is documented in prior work (see, for example, Elsayed, 2011), to weaken the ability of the board's oversight management and hence weaken inventory management. This assertion will be tested empirically through the following hypothesis:

H3:. Board size is expected to moderate the relationship between institutional ownership and inventory management, with the relationship being positive (negative) in firms with large (small) board size.

5. Sample and data

Since much of the existing evidence regarding corporate governance mechanisms in Egypt (see for example, Abdel Shahid, 2001; Fawzy, 2003; MENA (Middle East and North Africa Corporate Governance Workshop), 2003; ROSC, 2004; MENA-OECD, 2006; Elsayed, 2007, 2010) covers the period from 2000 to 2004, the sample time frame is also decided to be within this limit to be able to compare the findings of this study with existing evidence in the Egyptian context. This period is also of interest as not only the Egyptian government gave corporate governance initiatives and programs an extraordinary effort to execute its economic reform program (Abdel Shahid, 2001; Fawzy, 2003), but also the Egyptian stock market authority introduced new listing rules in 2002. During this period, the total number of listed firms in the Egyptian stock market dropped from 1076 firms with a total market capitalization of LE 121 billion in 2000 to 795 firms with a total market capitalization of LE 234 billion in 2004 (Cairo and Alexandria Stock Exchange, 2007).

As tax laws encourage listing, "few active companies constitute the bulk of trading over the Egyptian Exchange" (Abdel Shahid, 2001: 10). Thus, to determine the sample size for this study and following previous work in the Egyptian context (Abdel Shahid, 2001; Elsayed, 2007 and 2011) the author examined the lists of the most active firms published by the Egyptian stock market authority from 2000 to 2004. Those firms that belong to financial industries such as banks, insurance companies and mutual funds were dropped as they expose to exceptional legislations and their operations often are relatively different. This screening process as well as availability of data on board characteristics and ownership structure resulted in a dataset with 92 firms that cover nineteen industrial sectors. The average of the total market capitalization during 2000–2004 for all companies that are listed in the EGX as well as for those firms constituting the sample was computed to test for whether the sample of the current study represents all listed firms in the EGX. The results showed that the sample accounted for 46 percent of the total market capitalization of the entire market during 2000–2004 (while the average for all listed firms was LE 537.4 billion, it was LE 246.91 billion for the sample). This finding is consistent with previous work (see, for example, Abdel Shahid, 2001), who applied a sample of ninety active firms in the Egyptian stock market and reported that the sample accounted for 44 percent of the total market capitalization in 2000. This gives assurance that the sample does represent all the Egyptian listed firms.

5.1. Dependent variable

Efficiency of inventory management, as the main dependent variable in this study, is expressed by various proxies in previous work (see, for example, Lee and Hsieh, 1985; Hariga, 1997; Gaur et al., 2005; Dimelis and Lyriotaki, 2007; Tribo, 2007, 2009; Koumanakos, 2008; Ameer, 2010; Barcos et al., 2012). Following some prior related work (see, for example, Tribo, 2007, 2009; Barcos et al., 2012), efficiency of inventory management is

proxied by inventory to sales ratio (IVS). Inventory to sales ratio is computed by dividing of average inventory to sales. It shows whether the firm is able to keep inventory level low with regard to its current sales figures. Since increasing this ratio from one period to another can be a sign for poor management of inventory, the reciprocal of this ratio is used to indicate that the larger the value, the better the inventory management. In regression analysis below, the natural logarithm of the reciprocal value is used, as the Shapiro–Wilk W test for normality is significant ($Z=12.28$, $p<0.001$). Using the natural logarithm leads to 12 negative observations (3.4% of 350 observations) that belong to 4 firms (4.34% of 92 firms). In fact, dropping these observations does not alter the key results reported in this paper. For instance, while the mean (standard deviation) of natural logarithm of the reciprocal value is 1.51(1.25), it is 1.58(1.20) after dropping the negative observations.

5.2. Independent variable

The main independent variable of interest in this study is institutional ownership. Following prior studies (see, for example, Tribo, 2007; Wahba, 2008; Wahba and Elsayed, 2010; Ameer, 2010), institutional ownership (INS) is measured by the fraction of common shares owned by institutional investors.

5.3. Moderating variables

As explained above, managerial ownership, board leadership structure and board size are the three moderating variables that may confound the relationship between institutional ownership and inventory management. Managerial ownership (MAN) is measured by the proportion of shares owned by top management divided by total number of shares. Following prior work (see, for example, Morck et al., 1988; Short and Keasey, 1999), high managerial ownership (as a proxy for managerial entrenchment) is expressed by managerial ownership concentration at 5% or above.

A binary variable was used as a proxy for board leadership structure (BLS) (Chiang and Lin, 2007; Elsayed, 2007, 2010; Jiang et al., 2011). This binary variable takes the value of one if the CEO also served as board chairman and zero otherwise. Board size (BOA) was expressed by the total number of directors on the board (Musteen et al., 2010; Wahba and Elsayed, 2010; Elsayed, 2011; Machold et al., 2011). In fact, some authors (see, for example, Lipton and Lorsch, 1992; Jensen, 1993) have argued that boards of directors that include more than seven members are more likely to be inefficient and that a negative impact of board size on corporate financial performance is more likely to be detected. Thus, in regression analysis below, a dummy variable is generated to express board size. This dummy variable takes the value of one if board size is more than seven and zero otherwise. Experimenting with the total number of directors on the board does not alter the key results reported in this study.

5.4. Control variables

A number of associated control variables that may affect the relationship between institutional ownership and inventory management are also included in the models of analysis to avoid model misspecification problem. Particularly, these variables are firm growth, firm size, profitability, leverage, capital intensity, firm age, private ownership, state holding ownership, foreign ownership and industry effect. Firm growth (GRO) is controlled for on the basis that inventory turnover increases with growth (Gaur et al., 2005), and is proxied in prior studied by Tobin's q ratio (see, for example, Smith and Watts, 1992; Gaver and Gaver, 1993; Lang et al., 1996). Tobin's q ratio refers to the ratio of market to book value of the firm and is calculated as it is explained in detail in Chung and Pruitt (1994). Firm size (SIZ) is included to capture the effect of economies of scale and fluctuation in inventory between large and small firms (Carpenter et al., 1998; Dimelis and Lyriotaki, 2007; Ameer, 2010), and represented by the firm total assets (Mendes-da-Silva and Black, 2005). The natural logarithm is employed to transform firm size, as the Shapiro–Wilk W test for normality is significant ($Z=12.18$, $p<0.001$).

Profitability (PRO) is included not only to control for the effect of holding gains but also to capture the effect of short-term finance supply (Carpenter et al., 1998; Dimelis and Lyriotaki, 2007). Profitability is proxied by return on assets and calculated by dividing firm profits before taxes by its total assets. Firm leverage (LEV) is controlled for on the basis that firms with great institutional monitoring need less debt leverage to control agency cost (Bathala et al., 1994), high leverage might diminish firm's ability to finance inventory investment (Carpenter et al., 1998), and the documented relationship between inventory management and firm's capital structure (Luciano and Peccati, 1999). Firm leverage is measured by the ratio of total debt to total assets (Kashyap et al., 1993).

Capital intensity (CAP) is utilized to reflect the importance of production-investment opportunity as well as inventory controllability (Lee and Hsieh, 1985; Cannon, 2008; Kolias et al., 2011). Capital intensity is measured by the ratio of net fixed assets to total assets (Dimelis and Lyriotaki, 2007). Firm age (AGE) is controlled for to reflect organizational complexity (Faleye, 2007), as organizational characteristics, variables, and priorities vary with the firm life cycle stage (Quinn and Cameron, 1983). It is represented by the time period from the incorporation date and the year of analysis (Faleye, 2007).

The effect of other types of ownership is also controlled for. Specifically, private shareholding (PRV), state holding ownership (HOL) and foreign shareholding (INT) are captured based on the proportion of each stake in the total equity, respectively. Industry effect (SEC) is expressed by inclusion of dummy variables using the two-digit standard industrial classification code to capture the expected differences between industries in managing their inventories (Ameer, 2010). Table 1 introduces descriptive statistics for all of the above-explained variables.

Table 1
Descriptive statistics.

	Observations	Mean	Median	Sd
IVS	350			
Percentage		39.58	27.81	58.69
Reciprocal		20.68	3.55	104.4
Log of reciprocal		1.51	1.27	1.25
INS (%)	368	35.6	32	31.8
MAN (%)	368	11.4	0	23.8
BLS	368	0.78	1	0.41
BOA	364			
Number		8	7	3
Dummy		0.47	0	0.49
GRO	361	0.75	0.67	0.77
SIZ	361	13.1	12.9	1.31
PRO	361	4.73	4.87	12.49
LEV (%)	361	63	58	41
CAP (%)	361	43	41	27
AGE	367	35.6	37	22.7
PRV (%)	368	20.41	11.7	21.30
HOL (%)	368	20.8	0	30.4
INT (%)	368	7.2	0	19.6

IVS: Inventory to sales; INS: Institutional ownership; MAN: Managerial ownership; BLS: CEO duality; BOA: Board size; GRO: Firm growth; SIZ: Firm size (log of total assets); PRO: Profitability; LEV: Firm leverage; CAP: Capital intensity; AGE: Firm age; PRV: Private ownership; HOL: State ownership; INT: Foreign ownership.

6. Empirical analysis and findings

To assess whether there is a difference between industrial sectors based on explanatory and control variables, parametric and nonparametric analyses were performed using the one-way analysis of variance test (ANOVA) and Kruskal–Wallis test, respectively. The findings (reported in Table 2) indicate that there is a systematic variation across the nineteen industrial sectors in conjunction with all of the above-discussed variables.

Furthermore, correlation analysis, as it is documented in Table 3, shows that there is a positive and significant relationship between institutional ownership and reciprocal of inventory to sales ratio as the correlation coefficient is 0.13 ($p<0.05$). However, when the partial correlation is computed between institutional ownership and reciprocal inventory to sales ratio, controlling for the other three suggested internal corporate governance mechanisms, correlation coefficient is found to be 0.10 ($p<0.10$). This finding gives an initial supportive evidence for the plausibility of the main argument in this study.

Table 2
ANOVA and Kruskal–Wallis of variables across the nineteen industrial sectors.

	ANOVA (F)	Kruskal–Wallis (χ^2)
IVS (%)	8.17*	171.56*
INS (%)	6.35*	87.64*
MAN (%)	3.66*	61.17*
BLS	8.11*	55.24*
BOA	10.26*	107.10*
GRO	4.31*	138.33*
SIZ	19.09*	143.82*
PRO	1.59	65.28*
LEV (%)	7.02*	83.76*
CAP (%)	19.9*	176.98*
AGE	8.40*	112.92*
PRV (%)	3.71*	80.82*
HOL (%)	7.54*	82.75*
INT (%)	4.88*	50.48*

(i) IVS: Inventory to sales; INS: Institutional ownership; MAN: Managerial ownership; BLS: CEO duality; BOA: Board size; GRO: Firm growth; SIZ: Firm size (log of total assets); PRO: Profitability; LEV: Firm leverage; CAP: Capital intensity; AGE: Firm age; PRV: Private ownership; HOL: State ownership; INT: Foreign ownership.

* $p<0.001$.

The main hypotheses in this study are tested using the following model of analysis:

$$\begin{aligned}IVS = {} & \alpha+\psi_1 INS_{it}+\psi_2 MAN_{it}+\psi_3 INS_{it}{}^{*}MAN_{it}\\ & +\psi_4 BLS_{it}+\psi_5 INS_{it}{}^{*}BLS_{it}+\psi_6 BOA_{it}\\ & +\psi_7 INS_{it}{}^{*}BOA_{it}+\psi_8 GRO_{it}+\psi_9 SIZ_{it}+\psi_{10} PRO_{it}\\ & +\psi_{11} LEV_{it}+\psi_{12} CAP_{it}+\psi_{13} AGE_{it}+\psi_{14} PRV_{it}\\ & +\psi_{15} HOL_{it}+\psi_{16} INT_{it}+\psi_{17} SEC_{it}+\mu_i+\nu_{it}\end{aligned}$$

where (α) is a constant, ($\psi_1 : \psi_{17}$) are the parameters for the explanatory variables. The subscript (i) refers to the firm number and the subscript (t) denotes the time period. (μ_i) is the unobservable individual heterogeneity, and (ν_{it}) is the remainder disturbance or the usual disturbance in the regression model that varies with individual units and time

According to Hermalin and Weisbach (2003), expected endogeneity represents a crucial matter that should be considered to validate the results of corporate governance research. This is because estimating corporate governance mechanisms individually, in the presence of endogeneity effect, leads to biased and inconsistent estimates as a result of the expected correlation between the error term and endogenous variable. The implication of this is that the estimates will not approach their true values in the population with increasing the sample size (Maddala, 2001). Following the suggestion of Davidson and Mackinnon (1993), the Durbin–Wu–Hausman test, as an augmented regression test, was performed to check for possible endogeneity. The test was conducted by including the residuals of each endogenous right-hand side variable (i.e., INS, MAN, BLS, and BOA), as a function of all exogenous variables, in a regression of the unrestricted model. In fact, the Durbin–Wu–Hausman, shows no sign for possible endogeneity as the F test for the predicted residual values of corporate governance mechanisms are not significant under any case.

The above stated hypotheses are examined through panel data regression. Using of panel data structure allows researchers to control for unobservable firm-specific effects and, as a consequence, has the potential to provide a much more powerful evidence base (Baltagi, 1995). Thus, the Breusch and Pagan (1980) Lagrange Multiplier (B-P LM) test (*Chi2*-test) and the *F*-test (Baltagi, 1995) were performed to decide between the

Table 3
Correlation coefficients.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. IVS (%)	1													
2. INS (%)	0.13*	1												
3. MAN (%)	0.01	−0.31***	1											
4. BLS	0.10+	−0.15*	0.16**	1										
5. BOA	0.11+	0.21***	0.03	−0.07	1									
6. GRO	0.07	0.02	−0.01	−0.10*	0.18***	1								
7. SIZ	0.17**	−0.03	0.12*	−0.14**	0.33***	0.22***	1							
8. PRO	0.04	0.04	0.02	−0.02	0.09	0.16**	−0.02	1						
9. LEV (%)	−0.02	−0.12*	0.07	0.11	−0.07	0.47***	−0.01	−0.08	1					
10. CAP (%)	0.36***	0.16***	−0.08	−0.12*	0.35***	0.36***	0.52***	0.04	−0.11	1				
11. AGE	−0.32***	0.03	−0.18**	0.30***	−0.25***	−0.02	−0.23***	0.11	0.02	−0.35***	1			
12. PRV (%)	−0.13*	−0.24***	−0.23***	0.16**	−0.06	−0.06	−0.26***	−0.15**	0.13*	−0.05	0.08	1		
13. HOL (%)	−0.07	−0.41***	−0.34***	0.17**	−0.13*	0.07	0.15**	−0.06	−0.06	0.18***	0.18***	−0.21***	1	
14. INT (%)	0.02	−0.27***	0.04	−0.06	−0.07	−0.07	−0.02	0.10	−0.01	0.04	−0.20**	−0.21***	−0.21***	1

(i) IVS: Reciprocal of inventory to sales ratio; INS: Institutional ownership; MAN: Managerial ownership; BLS: CEO duality; BOA: Board size; GRO: Firm growth; SIZ: Firm size (log of total assets); PRO: Profitability; LEV: Firm leverage; CAP: Capital intensity; AGE: Firm age; PRV: Private ownership; HOL: State ownership; INT: Foreign ownership.

+ $p<0.10$.
* $p<0.05$.
** $p<0.01$.
*** $p<0.001$.

alternatives of panel data (i.e., random and fixed effects, respectively) and pooled regression. The results showed that both tests are significant (*Chi2*-test=86.08, $p<0.001$; *F*-test=6.83, $p<0.001$). The implication of this finding is that the null hypothesis of both tests can be rejected and, hence, it is appropriate to use the panel data model. The Hausman's (1978) specification test was performed to decide between employing the random effects model or the fixed effects model (Baltagi, 1995). Since the Hausman test statistic is insignificant (*Chi2*=11.83, $p=0.068$), the null hypothesis of the Hausman test cannot be rejected. In other words, there is no correlation between the regressors and the firm effects. Although the Hausman test points in favor of the random effects model, a comparison of the fixed effects and random effects demonstrates that the results are quite robust across panel data techniques used.

According to Table 4, the results of the GLS random effect model show that while institutional ownership has a negative and significant coefficients (-0.709, $p<0.05$), its interaction term

Table 4
Impact of institutional ownership on inventory management using static panel data analysis.

Dependent variable: Log IVS	Fixed effects model	Random effects model	MLE, random effects model	
			Unrestricted model	Nested model
INS	−0.630*	−0.709*	−0.695**	−0.011
	(0.359)	(0.314)	(0.250)	(0.132)
MAN	−0.028*	−0.025*	−0.025**	−0.004
	(0.015)	(0.012)	(0.009)	(0.006)
INS × MAN	0.009*	0.007*	0.007*	
	(0.004)	(0.003)	(0.002)	
BLS	−2.21*	−2.39*	−2.30*	0.189
	(1.25)	(1.12)	(0.898)	(0.290)
INS × BLS	0.493+	0.614*	0.602**	
	(0.319)	(0.281)	(0.233)	
BOA	−2.91*	−2.35**	−2.31**	0.091
	(1.24)	(1.12)	(0.886)	(0.241)
INS × BOA	0.716*	0.631*	0.609**	
	(0.316)	(0.293)	(0.231)	
GRO	−0.017	−0.036	−0.063	−0.107
	(0.127)	(0.129)	(0.126)	(0.127)
SIZ	−0.241*	−0.289*	−0.211*	−0.202
	(0.115)	(0.113)	(0.101)	(0.108)
PRO	0.008*	0.007*	0.007*	0.007*
	(0.004)	(0.003)	(0.003)	(0.003)
LEV	0.078	0.067	0.089	0.089
	(0.166)	(0.169)	(0.164)	(0.165)
CAP	2.08***	1.88***	1.71***	1.80***
	(0.391)	(0.404)	(0.376)	(0.385)
AGE	−0.021**	−0.014*	−0.013*	−0.011
	(0.007)	(0.007)	(0.006)	(0.006)
PRV	0.047	0.056	0.054	0.051
	(0.033)	(0.036)	(0.029)	(0.030)
HOL	0.007	0.009	0.007	0.004
	(0.008)	(0.008)	(0.006)	(0.007)
INT	0.0009	0.006	0.006	0.007
	(0.013)	(0.011)	(0.008)	(0.008)
SEC (Joint *F*-test)		47.80***	76.48***	68.72***
Model goodness-of-fit test (*F*)	8.97***			
Model goodness-of-fit test (Wald χ^2)		134.58***		
Model goodness-of-fit test (LR χ^2)			116.71***	104.80***
R^2	0.46	0.62		
B-P LM test (χ^2)		86.08***		
F-test		6.83***		
Hausman test		11.83*		
Joint-test (χ^2)		8.55*	12.70**	
Wooldridge's AR(1) (*F*)	2.134			
LR test-Nested model (χ^2)				11.92**
AIC			514.03	519.95

(i) Figures in brackets are standard errors.
(ii) B-P LM test is the Breusch and Pagan's (1980) Lagrange Multiplier statistic that provides a test of the pooled OLS model against the random effects model based on the OLS residuals.
(iii) *F*-test provides a test of the pooled OLS model against the fixed effects model based on the OLS residuals.
(iv) Hausman test is the Hausman's (1978) specification test that is used to decide between employing the fixed effects model or the random effects model.
(v) Joint-test is the Wald (χ^2) test for joint equality of the interaction terms' coefficients.
(vi) LR test for nested model is the likelihood ratio test of the restricted model against the unrestricted model
(vii) AIC is the Akaike standard information criterion for model selection, as a lower figure means a better specified model
(viii) IVS: Reciprocal of inventory to sales ratio; INS: Institutional ownership; MAN: Managerial ownership; BLS: CEO duality; BOA: Board size; GRO: Firm growth; SIZ: Firm size (log of total assets); PRO: Profitability; LEV: Firm leverage; CAP: Capital intensity; AGE: Firm age; PRV: Private ownership; HOL: State ownership; INT: Foreign ownership.

+ $p<0.10$.
* $p<0.05$.
** $p<0.01$.
*** $p<0.001$.

with each of the three corporate governance mechanisms has exerted a positive and significant coefficient on inventory management. Further, the magnitude of the interaction coefficients with both board leadership structure and board size (0.614 and 0.631, respectively) are much larger than with managerial ownership (0.007). A Wald test that these coefficients are equality yields a Chi-square value of 8.55 with p value of 0.036. Thus, it can be concluded that the effect of institutional ownership on inventory management varies with the other applied corporate governance mechanisms in the firm.

To check the rigor of this conclusion, the unrestricted model was re-estimated using the maximum likelihood (MLE) random effects model (results are also reported in Table 4). The MLE approach involves making stronger distributional assumptions for the unobservable component (i.e., individual heterogeneity or individual effect) (Baltagi, 1995). The results of the MLE model support the findings of the GLS model and demonstrate that the effect of institutional ownership on inventory management differs with the other applied corporate governance mechanisms. A Wald test that the coefficients of interaction terms are equality yields a Chi-square value of 12.70 with p value of 0.005.

Another nested model, which does not include interaction terms between institutional ownership and the three suggested corporate governance mechanisms, with the MLE model is also considered (results are included in Table 4). Then, a likelihood ratio (LR) test of the MLE nested model against the MLE unrestricted model was performed. The LR Chi-square statistic for the nested model is 11.92 ($p<0.01$). The implication of this is that the interaction terms cannot safely dropped from model of analysis. That is, interaction terms between institutional ownership and the three corporate governance mechanisms do appear to add something unique in explaining differences in inventory management.

Further supporting evidence was obtained by calculating the Akaike Information Criterion (AIC) for MLE unrestricted and nested models (reported in Table 4). The AICs for both models are 514.03 and 519.95, respectively. Since a lower number of AIC means a better specified model (Greene, 2003), this finding supports the MLE unrestricted model as superior to the nested model (please note that, from a statistical point of view, the LR test as well as the AIC cannot be performed with the GLS random effects model, review Greene (2003) for more details regarding this point).

Although the Wooldridge's (2002) serial correlation test does not show evidence of serial correlation ($F=2.134$, $p=0.149$), the generalized method of moments (GMM) estimators are employed as a robustness check. One simple way of allowing for dynamic effects in panel data models is by the inclusion of a lagged dependent variable and this is a common approach in studies of industrial organization (see, for example, Geroski and Machin, 1997; Machin and Van Reenen, 1993). Consistent estimators can be found using the GMM approach described, for example, by Arellano and Bond (1991), which involves transforming the equation into first differences and then using lagged values of the endogenous variables as instruments. This procedure is used to obtain estimates for the dynamic model and results are reported in Table 5.

According to results reported in Table 5, the Sargan Test of over-identifying restrictions is not significant ($Chi2=2.71$, $p=0.2584$), which provides support for the choice of instrument variable. Moreover, neither first order nor second order serial correlation is significant. In fact, the results of GMM model give strong supportive evidence for the applicability of the current study's hypotheses. Specifically, while institutional ownership has a negative and significant effect on inventory management, its interaction term with each of the three corporate governance mechanisms has exerted a positive and significant coefficient.

7. Conclusion and discussion

Much of the existing research has been directed at examining the effects and consequences of inventory on various organizational issues, with little to say about the link between ownership structure and inventory management. The main conclusion in previous limited work is that institutional ownership and inventory management are positively correlated. The underlying premise of this conclusion is that one universal structure fits all.

However, the main argument of this paper is that the relationship between institutional ownership and inventory management varies with other applied internal corporate governance mechanisms (i.e., managerial ownership, board leadership structure and board size). Empirical analysis of a sample of Egyptian listed firms presents strong evidence for the applicability of this theme.

On the whole, the findings reveal that institutional ownership affects inventory management positively when managerial ownership is high, CEO duality is in place, or board size is large. Alternatively, institutional ownership exerts a negative and significant coefficient on inventory management when managerial

Table 5
Impact of institutional ownership on inventory management using dynamic panel data analysis (Arellano and Bond estimation).

Dependent variable: Log IVS	GMM model
Dependent lag1	0.278
	(0.875)
INS	−0.545*
	(0.289)
MAN	−0.035*
	(0.016)
INS × MAN	0.007*
	(0.003)
BLS	−2.793*
	(1.498)
INS × BLS	0.646*
	(0.326)
BOA	−4.469*
	(2.027)
INS × BOA	1.259*
	(0.586)
GRO	−0.401
	(0.332)
SIZ	0.011
	(0.087)
PRO	0.016*
	(0.007)
LEV	0.133
	(0.441)
CAP	0.800
	(0.527)
AGE	−0.017*
	(0.009)
PRV	0.050
	(0.053)
HOL	0.002
	(0.005)
INT	0.004
	(0.007)
AR(1)	−1.07
AR(2)	−0.05
Sargan	2.71

(i) Figures in brackets are standard errors.
(ii) IVS: Reciprocal of inventory to sales ratio; INS: Institutional ownership; MAN: Managerial ownership; BLS: CEO duality; BOA: Board size; GRO: Firm growth; SIZ: Firm size (log of total assets); PRO: Profitability; LEV: Firm leverage; CAP: Capital intensity; AGE: Firm age; PRV: Private ownership; HOL: State ownership; INT: Foreign ownership.

* $p<0.05$.

ownership is low, CEO non-duality is adopted, or board size is small.

The findings of this paper have some implications. First, although Egyptian government has changed legislations and introduced many new mechanisms that have improved the economic climate in Egypt, it seems that more effort is required to reveal the awareness among Egyptian firms regarding the best practices and codes in corporate governance. For instance, as an urgent must, more initiatives and programs must be developed in order to attract more foreign institutional investments as a way of improving the quality of corporate governance in Egypt. Having more foreign investment, especially for developing countries, means more advanced technology and a greater likelihood of more developed practices. This is an important issue as the findings of this paper showed that foreign ownership currently does not affect inventory efficiency significantly. Second, to find that the impact of institutional investors on inventory efficiency varies with corporate governance mechanism in the Egyptian context implies that before developing and launching new and additional corporate governance reforms, policy makers in Egypt should understand that "context" and "actors" will best explain differences in corporate governance systems.

The results of this study imply that institutional ownership and inventory management may correlate either positively or negatively under certain conditions. In other words, existing theories and evidence might need to be treated as complementary viewpoints, each of which comprises a part of the whole picture. To assume that a theoretical perspective is always valid is more likely to result in misleading conclusions about the whole structure. This is more likely to be a plausible argument as some authors concluded that inventory intensity (Chikan, 1996) as well as the effect of institutional shareholders (Aguilera, 2005; Seifert et al., 2005) varies with country characteristics.

The negative impact of managerial ownership on inventory management that is reported in this study aligns with the results of Niehaus (1989). In addition, The negative coefficient that board leadership structure (CEO duality) has exerted on inventory management is consistent with the argument of some scholars (e.g. Levy, 1981; Dayton, 1984) who suggest that CEO duality diminishes the monitoring role of the board of directors over the executive manager, and this in turn may have a negative effect on corporate performance. Moreover, the negative impact of board size on inventory management gives supportive evidence for the advocates of small board size (e.g., Lipton and Lorsch, 1992; Jensen, 1993) who argued that when a board becomes large, the ability of the board of directors to satisfy its main functions will be limited.

In fact, documented negative correlation between firm leverage and institutional ownership (-0.12, $p<0.05$), in this study, provides supportive evidence for the conclusion of Graves and Waddock (1994) who argued that institutional investors are risk-averse and therefore, they often, in making their investment, prefer firms with low debt ratios. Thus, future research is invited to examine how the relationship between institutional ownership and inventory policy vary with firm leverage. Furthermore, future studies need to investigate the moderating effect of firm financial performance on the relationship between institutional ownership and inventory policy. This is expected to add to our knowledge as some previous studies found that strong financial performance leads to increase in institutional ownership (see, for example, Graves and Waddock, 1994; Cox et al., 2004).

Besides, the significant effect of industry type that is documented in this study indicates that the moderating impact of industry type on investors' perception toward inventory management represents another promising area for future research. This is because some investors may not prefer to invest, for example, in tobacco industry as a result of their ethical orientation, while this industry for many other investors is an "uncontrolled financial risk" (Hummels and Timmer, 2004).

Scholars, in future studies, are also invited to investigate how the relationship between institutional ownership and inventory management is moderated not only by investment horizon and size, but also by institutional investors' activism and coordination. This is important as previous work (see, for example, Zahra et al., 2000; Huse, 2004) argued that institutional investors are not often one consistent group.

Since this is the first study, to the best of our knowledge, that provides empirical findings regarding the link between inventory management and some internal corporate governance, namely, managerial ownership, board leadership structure and board size, future studies are invited to replicate and retest these findings in other contexts or countries. Moreover, another potential area that future research is encouraged to explore is the determinants of inventory management in developing countries and how they possibly differ from those variables that affect inventory efficiency in developed countries.

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