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Determinants of Corporate Cash Holding: Evidence from Indonesia

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Abstract

This thesis investigates the determinants of cash holdings for 417 publicly listed firms of which stock was traded on the Indonesian Stock Exchange over the period 2010 to 2016. The determinants of the cash holdings used in this research are derived from the trade-off, pecking order, and agency theory. We show that there is a significant correlation between firm characteristics and cash holdings in Indonesia. We find that Indonesian firms tend to hold more cash when they have higher leverage and whether they pay dividend to their shareholders. We also find that Indonesian firms tend to hold less cash when they have bigger firm size and higher investment opportunity. This is the first study that examines the relationship between firm characteristics and cash holdings in Indonesian firms.

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1. Introduction

There is an old expression in the world of business “Cash is king”. This expression is sometimes used in business analyses or investment portfolios. Damodaran (2001) defines cash that is owned by the company as operating cash which consists of cash in hand and investment without interest or with interest below the market rate. To settle their daily routine transactions or future opportunities, sometimes firms hold cash. Gill and Shah (2012) defined cash holding as cash that is on hand or readily available for investment in physical assets and to distribute to investors.

Cash is very instrumental to all firms in the world because every transaction needs cash. Although there is no optimal target of cash level, cash is essential to firms because it provides them with flexibility. That is, firms are able to settle their needs even when crisis condition hits. Cash can be used as a buffer between their retained earnings and investment needs.

To grow profits and sales, firms need to build up cash reserves by ensuring that the timing of cash movements creates an overall positive cash flow situation (Gill and Shah, 2012). Moreover, holding cash allows firms to get the optimal timing to exercise investment and avoid the under-pricing issue (Cossin and Hricko, 2004). However, the decision of a firm to hold excessive amounts of cash may have negative consequences if its use proves ineffective. Therefore financial practitioners need to learn the determinants of the cash holding.

In South East Asia (ASEAN) countries, cash is still considered a major account in a company’s asset. This situation also exists in Indonesia; as per 31 December 2016, Astra International, the largest firm in Indonesia based on revenue alone, held cash around 11.73% of their assets. Table 1 presents the sum of cash holdings of all firms listed in the Indonesian Stock Exchange. In 2010, the firms in Indonesia were holding cash amounting to Rp 221 billion, while in 2016, the cash holding of Indonesian firms amounted to as much as Rp 415 billion, which shows an increase of 87,78% since 2010.

In 2010 all Indonesian firms held cash around 13.2% of their assets, and then it increased to 13.84% in 2011. However, we see a major decrease in 2013 in the cash holding level of Indonesian firms. The Economic slowdown in China lead to reduced prices of major export items such as coal and palm oil, which contributed to decreased economic growth in Indonesia (Gunn, 2013). This situation is reflected on

the fall of gross domestic product (GDP) in 2013 which only rose 5.78%, its slowest growth since 2009, after a 6.23% increase in 2012.

Table 1. Cash Holding Level in All Indonesian Firm

Year	Cash Amount	Total Assets	Cash level (%)
2010	221,897,169,967	1,681,278,963,647	13.20%
2011	271,946,135,731	1,964,850,022,852	13.84%
2012	287,342,552,351	2,307,097,224,201	12.45%
2013	331,403,430,847	2,808,172,032,685	11.80%
2014	349,158,629,760	3,088,256,353,520	11.31%
2015	372,923,286,201	3,353,150,524,590	11.12%
2016	415,817,961,777	3,498,741,340,223	11.88%

However, as of 31 December of 2016, all firms in Indonesia held cash as much as 11.88% of their total assets, which shows that cash is still a major figure in the firm's balance sheets. We then continued our observation to the top 10 firms based on their revenues in Table 2. Based on our observations we found that the cash holding level of these firms varies from 3.07% to maximum 17.47%. We also report that there were an increase and decrease in the percentage of cash holding for each firm. It varies from a decrease of 10% to an increase of 7.9%. However, from 2010 to 2016 the cash balance increase was ranging from 17.6% to 562.4%.

Table 2. Cash holding of top 10 Indonesian Firms from 2010 to 2016

No.	Name	Cash/TA* (2016)	Cash/TA* (2010)	Cash Increase ** (%)	Difference*** (%)
1	Astra International	11.73%	6.33%	327.5%	5.4%
2	Telekomunikasi Indonesia	17.47%	9.52%	229.1%	7.9%
3	Indofood Sukses Makmur	17.34%	23.30%	27.5%	-6.0%
4	Sumber Alfaria Trijaya	4.83%	10.20%	115.4%	-5.4%
5	HM Sampoerna	15.84%	15.67%	108.5%	0.2%
6	Garuda Indonesia	15.95%	8.76%	562.4%	7.2%
7	Adaro Energy	16.58%	13.47%	166.7%	3.1%
8	Unilever Indonesia	2.23%	3.65%	17.6%	-1.4%
9	Charoen Pokphand Indo	10.46%	20.42%	91.8%	-10.0%
10	Indah Kiat Pulp & Paper	3.07%	1.36%	292.4%	1.7%

Note:

* Cash/TA defines the cash holding divided by the total assets of the reflected firms.

** Cash increase consist of increase on Cash and Cash Equivalents from 2010 to 2016

*** Difference between Cash/TA (2010) and Cash/TA (2016)

From our observation of the cash holding balances from 2010 to 2016 depicted above, we gain information that firms in Indonesia still consider the use of cash as significant. However, the empirical

study about the determinants of the firm's cash holding for listed firms in Indonesia have never been performed before.

Several prior works of literature have examined the subject of corporate cash holdings in firms other than Indonesia. The most famous is the research from Opler *et al* (1999). They performed the test based on the trade-off theory on US firms. They found that the characteristics of a firm are important in the determination of a firm's cash holding. In detail, they find that firms that with smaller size, greater business risk and strong growth opportunities have a higher level of cash compared to other firms.

Though we know that a firm's characteristic plays a significant role in determining cash holding, the question is which firm characteristics can significantly affect the level of corporate cash holding in Indonesia? To answer this question we take a look at three theoretical models that are able to explain the determinant of the cash holding: trade-off theory, pecking order theory and the agency theory. We have also developed in section 2 one for each theory.

First is the trade-off theory, which postulates that the optimal cash holding level of the firms is identified by weighing the marginal costs and the marginal benefits of cash holding (Afza and Adnan, 2007). The advantages of holding cash decrease in the firm's likelihood of financial distress and allowing the firm to minimize the cost from raising external funds (Ferreira and Vilela, 2004). Economies of scale in cash management lead larger firms to hold less cash (Miller and Orr, 1966).

Next is the pecking order theory (Myers, 1984), which states that to minimize asymmetric information costs and other financing costs, firms should initially finance their investments with their internal funding. If internal funding is unavailable, the firm will use debt as their source of funding. Lastly, when debt and internal funding are unavailable to the firm, they will issue equity. Pecking order theory suggests that firms will not have optimal target cash level, but they will use cash as a buffer between their retained earnings and their investment needs.

The last theory that we use is the agency theory by Jensen and Meckling (1976). This theory defines agency relationship as a connection where the principal will hire someone else (agent) to run the activities of the firm. To do this, the firms need a good corporate governance mechanism to bridge the relationship between the principal and the agent. Because of that, the board of directors must play an important role to assist the decision that is taken by the firms, in this case, the cash holding. Details on these three theories will be discussed in the overview in section 2.

In Indonesia research that examines the determinants of corporate cash holding has never been done before. The closest research that we found in regard to Indonesia is the research from Kusnadi (2011) which examines the relationship between corporate governance and cash holding in Singapore firms. The researchers formulated their research to be based on the agency theories and found that firms that have CEO duality and smaller proportion of outside directors will hold larger cash balance.

Because it has globally never been done before, it is unknown whether firm characteristics in Indonesian firms significantly affect their level of corporate cash holdings. Therefore we propose the main research question:

Research Question: Do firm characteristics affect the level of cash holding in Indonesian firms?

To answer the main question, we have also formulated several sub-questions to support the development of this research. The sub-questions are listed below:

1. What theories are able to explain the determinant of cash holding?
2. What has been found in the prior literature regarding the connection between firm characteristics and corporate cash holdings?
3. What are the hypotheses that can be formulated in the relation between firm characteristics and cash holdings?
4. What is the research methodology that is used to examine the relationship between firm characteristics and cash holdings?
5. Based on the result, what firm characteristics significantly affect the level of corporate cash holding in Indonesia?

This research is the first research that focuses on Indonesian firms while no previous research has been performed in this country regarding the determinants of the corporate cash holdings in the listed firms. This research performed in the period of 2010 to 2016 to gain results that applicable to the recent conditions in Indonesia. We will collect the data from the Erasmus DataStream Research Data Centre.

This research will contribute to the finance and governance literature in Indonesia. Through this research we will know whether differences in firm characteristics affect the firm's decision in regard to cash holdings. This research will also benefit not only the researcher of accounting but also accounting

practitioners such as finance managers, accounting managers, investors and CFO in Indonesian firms. The result will give more insight to the management of the companies regarding how to take decisions regarding cash holding.

In this research, first, we found that there is a negative correlation between firm size and cash holding in Indonesian firms. In Indonesian firms a negative relationship between investment opportunity and cash holdings can be found. Moreover, both leverage and dividend paying firms are found to be positively related to the size of a firm's cash holdings. We will elaborate the details of our findings in details in section 6.

This thesis is relevant for my study in Accounting and Finance track in Erasmus School of Economics. Because in the courses and Seminars which we took during the year such as Advance Corporate Finance & Corporate Governance, Seminar Corporate Finance & Governance, we discuss a broad level of theories regarding governance, practices about firms and board characteristics of companies and how it may impact the firm's decisions.

The structure of this research starts in section 2, which provides the overview regarding the theories that built the determinants of corporate cash holdings. Section 3 will provide the prior literature review regarding the corporate cash holding that has been performed by prior researchers. Section 4 will provide the hypothesis development and the predicted relationship between the firm characteristics and the corporate cash holdings. Section 5 will discuss the statistical methodology and the details about the data that are used, details proxy of each variable for the firm characteristics and board characteristics. Section 6 will discuss the result from the regression that is performed. Section 7 finally will discuss the conclusion, limitation and suggestion for this research.

2. Theoretical Overview

In this section, we will discuss the three theoretical models that can explain the relation between the firm characteristics and the corporate cash holding decisions. Those theories are trade-off theory, pecking order theory, and agency theory. First, we will discuss the cash holding theory, followed by the trade-off theory, pecking order theory and the agency theory.

2.1.1. Cash holding

There's an old expression in the world of business "Cash is king". This expression is sometimes used in businesses analyses or investment portfolios. Damodaran (2001) defines cash that is owned by the company as operating cash which consists of cash in hand and investment without interest or with interest below the market rate. Cash in the bank also classifies as cash and cash equivalent components as long as it gives rates below the risk-free rate.

Cash usually comes in physical form, paper or coins that can be used for exchanging goods, debt or services. In a company, cash is generally stored in the form of saved bank deposits. Gill and Shah (2012) defined cash holding as readily available for investment use and cash that is ready to be distributed to investors. Usually, on the balance sheet, cash and cash equivalent consist of cash on hand, bank account, marketable securities, deposits and other.

Cash can be used by firms to repurchase stock of the companies, factory acquisition or buying new operating tools. We can also say that cash holding is one of the components of internal funding of a firm. Sanchez and Yurdagul (2013) argued that firms hold cash because it provides them with the flexibility that firms need for their transactions. Maintaining the level of cash holding of the company is a major factor because whenever firms intend to raise funds from external sources, there will be costs incurred in the process.

A firm is considered to be short of liquid assets when it has to cut back investments, cut back dividends, or raise funds by selling securities or assets (Opler *et al*, 2009). Even when the revenue of the firms drops or is delayed, firms will still have enough money on hand to meet their obligations when they have a large cash balance. Excess in cash provides firms with the autonomy resources, necessary to explore new solutions and opportunities, thereby facilitating risk-taking (Cyert and March, 1963).

However, large cash balance can also be deemed as bad performance because large cash balance usually associated with the company's inability to allocate its cash. There is also a negative side when a firm hoards cash. Unused cash allocation will allow the firm to invest their cash in dubious projects, such as unrelated diversification (Jensen, 1986). In fact, fewer resources for the company, rather than more resources may induce the firm to be efficient and innovative in mobilizing resource allocation (Baker and Nelson 2005, George 2005). Consequently, firms may become complacent and overly optimistic which will lead to bad performance of a company.

So, in a way, there is no optimal solution to the question of whether a firm should maintain a high or low level of cash holding. However, we can examine the determinants of the corporate cash holdings to know whether a firm that has different firm characteristics behaves differently in regard to the policy of cash holding. We will investigate the determinants of cash holdings that may have a correlation with the level of corporate cash holding using the development of the theory. Theories that we want to investigate are the trade-off theory, pecking order theory and the agency theory.

2.1.2. Trade-off Theory

Trade-off theory first arising to determines the best decision that is taken by the firm it comes to their choice of capital structures. Trade-off theory originated from proposition by Modigliani and Miller (1963). They argued that when a firm's corporate income tax is able to create a benefit for debt and it will be served as shield earnings from taxes. On this theory, a firm will choose how much debt finance and how much equity funding they want to use by balancing the costs and benefits.

Since the firm's objective function is linear, there is no cost from the offsetting cost of debt, which suggests that firms choose all debt financing (Modigliani and Miller, 1963). However, the same with debt, cash holding is essential to the firm and has several costs and benefits. Miller and Orr (1966) on their firm's money demand model argued that there are economies of scale in cash management which will lead to large firms holding less cash than small firms.

The principal benefit of holding cash is that it provides firms with a safety buffer that will allow them to avoid making costs by raising external funds or preventing them from being forced to liquidate their existing assets (Levasseur, 1979). Fees that incurred for obtaining funds through borrowing are not related to the size of the loan, which indicates that the fee for borrowing is a fixed amount (Peterson and Rajan, 2003). Because of that, the fees that come from the borrowing itself is more expensive for small firms compared to large firms.

As a result, small firms are forced to turn their funding using insider financing, accept the higher costs of funding or take shorter-term financing alternatives (Berger and Udell, 1998). In other research, Bates (1971) found that small firms, compared to large ones, tended to be more self-financing, have lower liquidity, rarely issue stock, have less leverage and rely more on bank financing.

In contrary, large firms sometimes considered the cost that arises from issuing debt or equities as immaterial. It is suggested that large firms have less information asymmetry than small firms (Brennan

and Hughes, 1991). Therefore, small firms face borrowing constraints and higher costs of external financing than large firms (Kim *et al*, 2011).

Large firms will have less trouble with the process of issuing debt or securities compared to small firms. Smith (1977) found that small firms pay much more than large firms to issue new equity, and more to issue debt. This suggests that large firms will prefer to perform financing activities by issuing debt or security. They are considered to have more active shareholders that participate in the monitoring of the company.

The shareholder of large firms will demand cash to be used optimally rather than sitting on their balance sheet idly. Dittmar *et al* (2003) found that countries with weak shareholder protection hold more cash than countries with a high level of shareholder protection. Large cash holding can increase the agency conflict between the managers and shareholders because managers will be able to waste the funds on bad investment which will damage the shareholder value (Jensen and Meckling, 1976). Therefore, shareholders are not expecting firms to hold an unreasonable amount of cash since it is considered inefficient.

Because costly external financing increases the prospect of firms taking a pass on valuable investment opportunities, firms will tend to hold a sufficient level of liquid assets to be able to take advantage of the most profitable investment opportunities that will arise in the near future at the lowest cost (Ozkan and Ozkan, 2004). Therefore firms with greater investment opportunities possibly hold a larger amount of cash to prevent raising costly external capital. Particularly firms which value is determined largely by the growth opportunities have high exposure to financial distress and adverse shock (Kim *et al*, 2011). In other words, investment opportunity could arise at any time. If firms hold enough level of cash, they can execute the investment without worry about external financing.

Leverage increases the probability of bankruptcy for a firm because there are rigid amortization plans that have to be paid (Ferreira and Vilela, 2004). However, the use of debt increases the discipline of managers (Jensen, 1986). However, when a firm increases leverage, managers will not tend to consume more than the optimal level because of the increased risk threat of bankruptcy (Grossman and Hart, 1982). To mitigate the risks of financial distress and going bankrupt, firms accumulate a higher level of cash (Ferreira and Vilela, 2004). On trade-off theory, the predicted relationship between cash holdings and leverage is considered unclear.

Another way to raise cash for firms according to trade-off theory is cutting back dividend payment. Firms that distribute dividends to their shareholders are more able to raise funds at a lower cost when needed by cutting dividend payment (Opler *et al*, 1999). Therefore, this theory expects that firms that pay dividend hold a lower level of cash. In contrary, a firm that does not pay dividends has no other option but to raise funds from external sources.

2.1.3. Pecking Order Theory

According to Donaldson's (1961), pecking order theory is a theory of how firms have to decide its financing decisions. Later the Pecking order theory was discussed again by Myers (1984) and Myers and Majluff (1984). This theory stated that firm finance their investments first with their internal funds that usually come from their retained earnings, then they will use debt, and lastly they will use equity. This theory argued that there is no optimal level of debt, as there is no optimal level of cash. The cash balance that is owned by the company is the outcome of investment and financing decisions that are taken by the firm.

Issuing debt had a positive effect presented in the previous section such as discipline managers. Stulz (1990) found that the impact of leverage on the increase of the firm growth is that it increases firm value by preventing managers from taking poor projects. However, there are also negative effects that arise from the issuance of the debt. If a firm has a high level of debt, the likelihood of going bankrupt is also increasing (Kaplan and Stein, 1993). This is because firm must also be able to repay its debt interest and principal periodically.

In a pecking order world, debt typically grows when the investment level of the firm exceeds the retained earnings and fall when investment is less than retained earnings (Ferreira and Vilela, 2004). Firms that have a high level of leverage are more likely to go bankrupt (Kaplan and Stein, 1993). They also find that if a firm has a high level of debt, the likelihood of going bankrupt is also increasing. A firm can also maintain financial flexibility through having unused debt slot (low leverage) and having large cash reserves, which suggests a negative relationship between leverage and cash holding (Graham and Harvey, 2001).

Pecking order theory also predicts that firms with better investment opportunities have higher financial distress costs because the positive NPV of these investments will disappear when the firms faces

bankruptcy (Ferreira and Vilela, 2004). Therefore, firms with higher investment opportunities will keep a higher level of cash holdings to avoid financial distress.

When there are information asymmetries between managers and shareholders, raising funds from outside is considered to be more expensive. When firms are faced by large investment opportunities demand for cash will increase as well. Ferreira and Vilela (2004) argued that when firms face a cash shortage, they will have to force to forgo better project due to insufficient cash level. They also argued that firms with high investment opportunity will create demand for a large stock of cash, which forces a positive relationship between cash holding and investment opportunity.

Also because of diversification, larger firms will have more stability in their cash and lower the probability of financial distress (Rajan and Zingales, 1995). For large firms, the cost to issue equity or debt sometimes deemed as immaterial. Opler *et al* (1999) argued that large firms are presumably more successful and should have more cash compared to a small firm.

In pecking order theory, a firm preferably finances their activities by using their internal funding. Saddour (2006) argued that larger firms have a higher level of operating cash flow compared to small firms. Therefore, large firms will tend to hold their retained earnings as cash on their asset and have larger cash balances than small firms.

Dittmar and Smith (2003) argued that there are no optimal levels of cash, just like there is no optimal level of debt. In this theory, debt is typically used by the firm when the investment level is exceeding their retained earnings (Ferreira and Vilela, 2004). They also argued that debt level will fall when investment level is less than its retained earnings. Therefore, every increase in the leverage of the firm will lead to decrease in corporate cash holding.

Another characteristic is dividend payment of the firm. Pecking order theory suggests that cash holding is positively associated with dividend payment because firms attempt to build conservative balance sheets before returning the cash to their investors (Nguyen, 2005). Firms that pay dividends have the incentives to avoid a decrease in their cash holding because they are reluctant to cut dividends (Brav *et al*, 2005).

The fear of being caught short of cash and unable to pay the promised dividends automatically leads dividend-paying firms to hold more cash (Ozkan and Ozkan, 2004). The pecking order theory predicts

that cash holdings are positively related to dividend payout and internal cash flows as firms attempt to build conservative balance sheets before returning cash to investors (Nguyen, 2005).

2.1.4. Agency Theory

Every business has two sides of relationship, the principal, and the agent. Usually, the principal is the one who has the capital. However, sometimes the principal is too busy to be directly involved in the daily business, and therefore a third party is hired to execute business operation. Agent and principal sometimes have a different view regarding how the company should be operated. The agency relationship defined as one in which one (or more) principal engages the agents to perform some service on their behalf which involves the delegation of some decision-making authority to the agent (Jensen and Meckling, 1976).

Problems arise when agents act to fulfil self-interest rather than the best interest of the principals. These conflicts between principal and agent relate to the firm's level of cash holdings. One of the reasons for managers to hold the excess of cash is because managers are risk-averse (Fama and French, 1998). This excess of cash will make managers able to make a bad investment which capital market would not be willing to finance. Agency theory predicts that self-interested managers are more likely to have higher level of cash holding in the present to gain self advantage rather than hold them for future investment (Jensen and Meckling, 1976)

Hence, a good corporate governance mechanism is needed by the firms to bridge the relationship between the principal and agent. The Board of directors plays a central role in the corporate governance of firms (Fama and Jensen, 1983). Boards can play a major role in the corporate because they have several broad responsibilities. Their core responsibilities involve monitoring, disciplining, and removing ineffective management teams (Guest, 2009). The board of directors also involved in the firm's activities because it has to monitor the actions taken so that managers do not deviate from their strategic plans.

The board of directors and the CEO are responsible for the formulation of the cash management, corporate governance, and all other policies in the organization (Gill and Shah, 2012). Every company also has a different board characteristic which makes it differ from the other. According to Linck *et al* (2008), board characteristics are divided into 3: size of the board, board composition, and the leadership of the board.

Many argue that large boards will lead to the decline in the firm's performance (Guest, 2009). It is argued that big board size causes communication and coordination problems and hence the effectiveness of the

board declines (Lipton and Lorsch, 1992). Since large boards cause inefficiency in the firms, managers are not able to take the decisions that are best for the firms since they are not well monitored.

Because they are not well monitored, managers will not act in the best interest of shareholders. As board size increases beyond a certain point, the inefficiencies outweigh the initial advantages, leads to lower level of performance (Jensen, 1993). Hence, the manager will hoard a larger amount of cash so to use as a buffer to fund future needs.

Another board characteristic that we examine is the independence level of the board. In a corporate governance world, it is argued that board with greater outside director representation will make better decisions (Borokhovic *et al*, 1996). It is best for the public firm to have mixed composition of the board from outside and from inside. The insider boards will offer their knowledge as a suggestion to the management of the firm. An inside director is more likely to have information that an outsider does not have (Myers and Majluff, 1984). An insider board is expected to be more active in the day to day activities. While outside directors are believed to be better monitors of management as they maintain strong value in their reputation in the directorship market (Fama and Jensen, 1983).

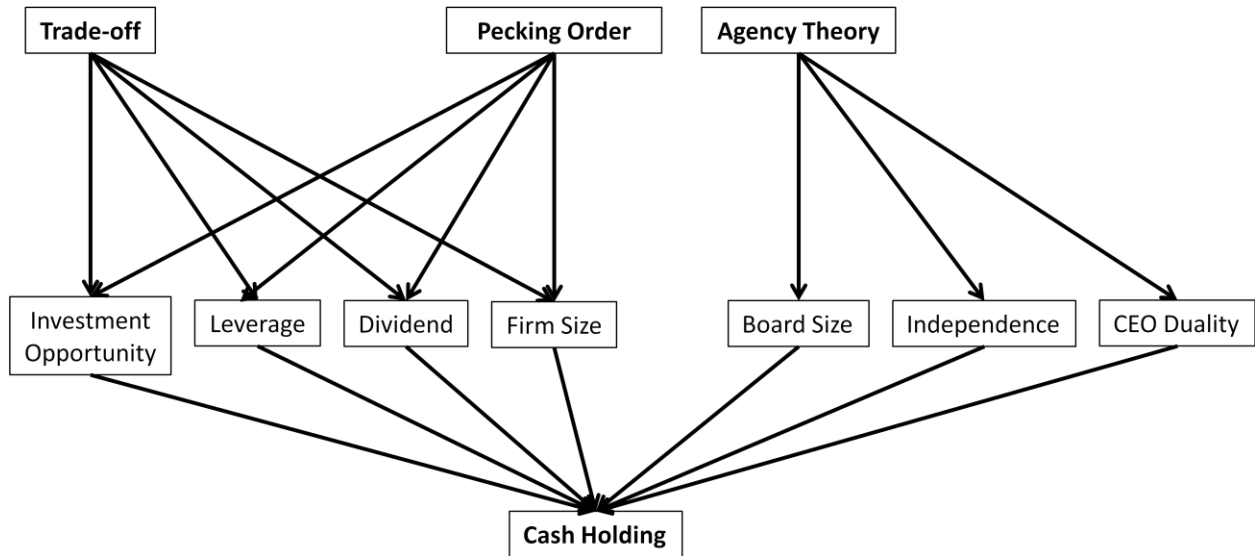
Because independent directors are appointed from outside, they are less conflicted to the management and thus will be able to make a decision that is to maximize shareholder value. Independent directors will not let firms hoard cash more than to an appropriate level. Ozkan and Ozkan (2004) argue that independence of outside directors can reduce information asymmetry between firms and investors, thus they will also increase the firm's ability to raise funds externally. Therefore, firms that have more independent directors will be expected to have a lower level of cash holding.

The last board characteristic that we examine is the board leadership. The CEO's task is varying from hiring, evaluating, firing and compensating the management, while the chairman's primary task is to act as a link between the shareholder and the management. When the same person holds the titles of CEO and chairman of the board, it's called CEO duality (Baliga *et al*, 1996). In a firm that has CEO duality, the firm's process of decision-making will be faster.

When CEO duality exists, the decision-making of the firm could lead to a decrease in firm value, which contradicts the shareholder goal (Jensen, 1993). Dahya and Travlos (2000) found that with dual-responsibility, CEOs serve the interest of the management team and one way to protect the team's position is to hold an excessive level of cash. Due to this, firm with CEO duality expected to have a

higher level of cash. The framework based trade-off theory, pecking order theory and agency theory is presented in Figures 2 below.

Figure 1: Framework based on Trade-off, Pecking Order and Agency Theory



3. Literature Review

This section provides a literature review to answer one of the sub-questions:

“What has been found in prior literature regarding the connection between firm characteristics and corporate cash holdings?”

Prior literatures concerning the correlation between firm characteristics and board characteristics to the level of firm cash holding have produced different outcomes. Section 3.1 provides a summary of all the relevant literature discussed.

3.1. Review of Prior Literatures

Saddour (2006) explains the determinants of corporate cash holdings by using panel data regression. The researcher checked 297 French firms in the period 1998 to 2002 based on the trade-off theory and the pecking order theory. He found that French growing companies have a higher level of cash compared to companies that are mature. He also found that French firms increase the cash level when they have higher internal cash flow and riskier activities. French firms will reduce the level of cash holdings when they are highly leveraged.

Saddour (2006) also separates the observation into two groups: growing companies and mature companies. He also found that for growing companies, there is negative association between size, level of liquid assets and short-term debts to the level of the firm's cash holdings. In other hands, for French mature companies; there is a positive correlation between size, level of investment and dividend to the shareholders.

Gill and Shah (2012) performed research on 166 listed Canadian firms in the period 2008 to 2010. They also reported those agency problems are important determinants of corporate cash holdings, and that their result of study generally supports the trade-off theory on cash holdings. They found that by having a higher level of cash, management is having less pressure to perform well and will allow a manager to invest in the projects that are best for their interest. They also found that internal cash flow, leverage, board size and CEO duality affects the level of corporate cash holdings. They also use the control variables using Industry dummy to differentiate the industry effect on the cash holdings in manufacturing and service industry.

Opler *et al* (1999) collected the data from 1971 to 1994 on 1,048 publically traded US firms. Using time-series and cross-section test, they found empirical evidence in support of the trade-off theory. They found that firms with strong growth opportunities and greater cash flow volatility will hold a higher cash balance. They also found that firms that large firms and firms with greater leverage will have lower cash holdings. They also add other variables as control, which is the R&D spending, capital expenditures to control for the level of investment expenditures.

Another research by Nguyen (2005) for 1,528 listed Japanese non-financial firms in the period 1992-2002. His research is in line with the pecking order theory and broadly consistent with the trade-off theory. He concludes that big sized firms in Japan will have lower cash holdings compared to small firms. He also found that firms with better investment opportunities, pay dividend to their shareholders and have better ability to generate internal cash flow hold more cash. He also found a negative relationship between firm size, leverage and sales growth to cash holdings.

Dittmar and Smith (2003) collected samples for more than 11,000 firms in 45 countries and found that firms in countries with weaker shareholder protections hold twice as much as cash compared to firms in countries with better shareholder protection. He also found that when the shareholder protection is weak, the factors that drive the need for cash holding such as investment opportunities will become less important to the firm. This study also found that when access to fund is easier, a firm will hold a larger level of cash balances.

Another research by Kusnadi (2011) performed on 500 Singaporean firms listed on Singapore Stock Exchange (SGX) and Kuala Lumpur Stock Exchange (KLSE) between 2000 and 2005. He found that internal governance mechanisms such as board characteristics and ownership concentration are important predictors of corporate cash holdings. He found that firms that with weak governance structure and more proportion of independent board tend to hold larger cash holdings. They also found that there is a negative relationship between insider ownership and cash holdings. They also add firm size, leverage, asset tangibility, capital expenditure, investment opportunity, and dividend to control for firm-specific effects.

Bates *et al* (2009) performed research on cash holding for US firms in the period 1980 to 2006. This research found that firms with poor access to external capital, have greater internal cash flows, and have better investment opportunity will hold more cash. They also found that firm size, net working capital, leverage and dividend-paying firms have a negative association with the firm's level of cash holding.

They also found capital expenditure and firms with greater R&D to have a positive relationship with the firm's cash holding.

Bates *et al* (2009) also argued that firms that have better investment opportunities hold more cash because adverse shocks and financial distress are most costly to these firms. He also found that because of lower asset tangibility, R&D investment opportunities are costlier to finance for the firms than capital using external capital expenditures. They also add several control variables, which is loss dummy, T-bill, years after IPO and credit spread.

Drobtz and Gruninger (2007) examined Swiss non-financial firm's cash holding in the period of 1995 to 2004. They found that corporate governance variables don't have a significant impact to the cash holding. They also concluded that their research is in line with the pecking order theory. Using simple regression analysis, they found that firm size, asset tangibility, leverage and managerial ownership are both negatively related to corporate cash holdings. They also found that internal cash flows, dividend payment, and CEO duality were positively related to the cash holding. In addition, they found a non-significant relationship between board size and corporate cash holding.

Ferreira and Vilela (2004) examined cash holding on 400 EMU countries from 1987 to 2000. The results of this research are proven to be consistent with the trade-off theory which postulates that firms identify their optimal level of cash holdings by weighting the marginal cost and benefits of holding cash. They also found that the result is contradicting with the pecking order theory where they found a negative association between firm size and cash holdings. They also found that cash holding of a firm is positively affected by the investment opportunity and internal cash flow. They also found a negative association between asset's liquidity, leverage, bank debt and size in relation to the cash holding.

Ozkan and Ozkan (2004) performed research on 1,029 UK based firms in the period 1995 to 1999. They emphasized in their research that ownership structure of firms play a major role in determining the firm's cash holding. They also found that the ability of a firm to generate internal cash flow and the liquidity of a firm have a negative relationship with the firm's level of cash holding. In addition, they found that bank debt and investment opportunity has a positive relationship to the firm's level of cash holding in UK.

Guney *et al* (2006), performing research on 4,096 firms spread across France, Germany, Japan, UK and US in the period 1996 to 2000. They performed panel regression analysis between firm characteristics and cash holdings on each country. They found that the firm characteristic plays a significant role in

determining their cash holdings in those countries. He found that internal cash flow, leverage, capital expenditure, and firm size have a negative relationship to the firm's cash holdings. The result from this research also determined that liquidity of the firm and investment opportunity has a positive relationship to the firm's cash holding.

Afza and Adnan (2007) performing research on 205 Pakistani publicly listed firms at KSE between the period of 1998 to 2005, found that larger Pakistani firms hold more cash to follow the pecking order pattern of financing the investment and avoid illiquidity. They found a positive relationship between internal cash flow of the firm to the cash holding. On the other hand they found a negative correlation between investment opportunity, Net Working Capital, and Leverage. They also conclude that the negative relationship founded to the cash holdings between several variables confirmed agency problem exist in Pakistani firms.

Other research from Faulkender (2002) was performed on 2,800 for-profit non-financial and non-farm business that listed as C-Corp companies in the USA. The main finding of their research is that information asymmetry and costs of financial distress play a vital role in the determination level of the firm's cash holding. They also found a positive association between firm's ages, leverage and interest payment to the level of the firm's cash holdings. He also found firm size and firms with less concentrated ownership hold lower level of cash holding.

Kim *et al* (2011) performed research on 125 publicly traded US restaurant firms from 1997 to 2008. They argued that the trade-off theory is able to explain the determinants of cash holdings. They found in restaurant US firms, firm size, liquid asset substitutes, capital expenditures and dividend to be negatively associated with cash holdings. They also found that restaurants with greater investment opportunity are also more financially constrained and need to hoard more cash to finance new projects.

3.2. Literature Matrix

Below presented the summary of prior literatures:

Author - Title	Samples	Variables and (Interaction to cash holdings)	Results
Gill and Shah (2012) "Determinants of Corporate Cash Holdings"	166 Canada Listed Firms on Toronto Stock Exchange. 2008-2010	Independent Variable: <ul style="list-style-type: none"> • Investment opportunity (-) • Cash flow (+) • Net Working Capital (-) • Leverage (+) • Firm Size (-) • Board Size (+) • CEO Duality (+) Dependent Variable: <ul style="list-style-type: none"> • Cash holding Control Variable: <ul style="list-style-type: none"> • Industry dummy 	<ul style="list-style-type: none"> • Agency problems are important determinants of cash holdings • The results generally support trade-off theory
Opler <i>et al</i> (1999)	87,117 publicly traded US firms 1971-1994	Independent Variables: <ul style="list-style-type: none"> • Investment opportunity (+) • Cash flow volatility (+) • Access to capital markets (-) • Firm Size (+) • Dividend (+) Dependent Variables: <ul style="list-style-type: none"> • Cash holding Control Variables: <ul style="list-style-type: none"> • R&D spending • Capital expenditures • Industry sigma 	<ul style="list-style-type: none"> • Result is in support of trade-off theory • Precautionary motive for holding cash is excessively strong

Author - Title	Samples	Variables and (Interaction to cash holdings)	Results
<p>Nguyen (2005)</p> <p>"How sensitive are Japanese firms to earning risk? Evidence from cash holdings"</p>	<p>1.528 Japan non-financial firms listed on Tokyo Stock Exchange</p> <p>1992-2002</p>	<p>Independent Variables:</p> <ul style="list-style-type: none"> • Investment opportunity (+) • Profitability (+) • Firm size (-) • Dividend (+) • Leverage (-) • Sales growth (-) <p>Dependent Variables:</p> <ul style="list-style-type: none"> • Cash holdings <p>Control Variables:</p> <ul style="list-style-type: none"> • Firm that have financial institution as their major shareholder (+) 	<ul style="list-style-type: none"> • This result is inline with the pecking order and broadly consistent with the trade-off model • Cash holding are associated with firm level risk but negatively related to industry risk
<p>Kusnadi (2011)</p> <p>"Do corporate governance mechanisms matter for cash holdings and firm value?"</p>	<p>500 firms that listed on Singapore Stock Exchange (SGX) and Kuala Lumpur Stock Exchange (KLSE)</p> <p>2000-2005</p>	<p>Independent Variable:</p> <ul style="list-style-type: none"> • Independence (-) • Board size (+) • Non-management block holder ownership (-) <p>Dependent Variable:</p> <ul style="list-style-type: none"> • Cash Holding <p>Control Variable:</p> <ul style="list-style-type: none"> • Firm Size (+) • Leverage (-) • Asset tangibility (-) • Capital expenditure • Investment opportunity • Dividend (-) 	<ul style="list-style-type: none"> • Internal governance mechanisms are important predictors of corporate cash holdings. • Firms with poor corporate governance have more discretion on cash policies.

Author - Title	Samples	Variables and (Interaction to cash holdings)	Results
<p>Bates, Kahle, Stulz (2009)</p> <p>"Why do US firms hold so much more cash than they used to?"</p>	<p>US firms from 1980 to 2006.</p>	<p>Independent Variables:</p> <ul style="list-style-type: none"> • Investment opportunity (+) • Firm size (-) • Cash flow (+) • Net working capital (-) • Capital expenditure (+) • Leverage (-) • Dividend (-) • R&D expense (+) <p>Dependent variable:</p> <ul style="list-style-type: none"> • Cash holding <p>Control variable:</p> <ul style="list-style-type: none"> • Loss dummy • T-bill • IPO1/2/3/4 • Credit spread 	<ul style="list-style-type: none"> • Their result is inconsistent with the agency motive where they found that some firm hold more cash due to agency problems. • Increase in cash ratios can be explained by the change in firm characteristics.
<p>Ferreira and Vilela (2004)</p> <p>"Why do firms hold cash?"</p>	<p>400 EMU (Economic and Monetary Union) Countries</p> <p>1978-2000</p>	<p>Independent variable:</p> <ul style="list-style-type: none"> • Investment opportunity (+) • Internal cash flow (+) • Bank debt (-) • Liquid asset (+) • Leverage (-) • Size (-) <p>Dependent variables;</p> <ul style="list-style-type: none"> • Cash holding <p>Control variables:</p> <ul style="list-style-type: none"> • Year effect • Industry effect • Investor protection 	<ul style="list-style-type: none"> • Their research proven to be consistent with the trade-off theory, but contradict with the pecking order theory. • Firms in countries with better investment protections hold more cash.
<p>Drobtz and Gruninger (2007)</p> <p>"Corporate cash holdings: Evidence from Switzerland."</p>	<p>Swiss non-financial firms</p> <p>1995 to 2004</p>	<p>Independent variable:</p> <ul style="list-style-type: none"> • Asset tangibility (-) • Firm size (-) • Dividend payment (+) • Operating cash flows (+) • CEO duality (+) • Managerial ownership (-) 	<ul style="list-style-type: none"> • This research is in support to the pecking order theory

Author - Title	Samples	Variables and (Interaction to cash holdings)	Results
<p>Saddour (2006)</p> <p>"The determinants and the value of cash holdings: Evidence from French Firms"</p>	<p>297 French companies</p> <p>1998 to 2002</p>	<p>Growth Companies old higher level of cash than mature companies</p> <p>a. Growth Companies:</p> <ul style="list-style-type: none"> • Size (-) • Liquid asset (-) • Leverage (-) <p>b. Mature Companies:</p> <ul style="list-style-type: none"> • Size (+) • Investment level (+) • Dividend (+) • Trade credit (-) • R&D expense (-) 	<ul style="list-style-type: none"> • Growing companies hold higher level of cash • Both trade-off and pecking order theories play an important role in explaining the determinants of the cash holdings.
<p>Ozkan and Ozkan (2004)</p> <p>"Corporate cash holdings: An empirical investigation of UK companies"</p>	<p>1029 UK Firms</p> <p>1995 to 1999</p>	<p>Independent Variables:</p> <ul style="list-style-type: none"> • Internal cash flow (-) • Liquidity ratio (-) • Bank debt (+) • Investment opportunity (+) <p>Dependent Variables:</p> <ul style="list-style-type: none"> • Cash 	<ul style="list-style-type: none"> • Ownership structure of firms plays an important role in determining cash holding. • Unobserved firm heterogeneity is significant in affecting cash holding decisions.
<p>Guney and Ozkan (2006)</p> <p>"International evidence on the non-linear impact of leverage on corporate cash holdings"</p>	<p>4096 companies of France, Germany, Japan, UK and US</p> <p>1996-2000</p>	<p>Independent Variables: (pooled regression)</p> <ul style="list-style-type: none"> • Cash flow (-) • Leverage (-) • Liquidity (+) • CapEx (-) • Investment opportunity (+) • Firm size (-) <p>Control variables:</p> <ul style="list-style-type: none"> • Dividend (-) <p>Dependent Variables</p> <ul style="list-style-type: none"> • Cash holding 	<ul style="list-style-type: none"> • Firm characteristics play a significant role in determining cash holdings of firms. • Leverage acts as a substitute for cash holdings but at the same time increases the probability of financial distress.

Author - Title	Samples	Variables and (Interaction to cash holdings)	Results
Afza and Adnan (2007) "Determinants of Corporate Cash Holdings: A Case Study of Pakistan	205 public Pakistani firms listed at KSE 1998-2005	Independent Variables: <ul style="list-style-type: none"> • Investment Opportunity (-) • Firm Size (+) • Internal cash flow (+) • NWC (-) • Leverage (-) Dependent Variables: <ul style="list-style-type: none"> • Cash holding 	<ul style="list-style-type: none"> • Firm size and cash flow associated with the cash level of the firm. Indicates that larger firm hold more cash to follow the pecking order pattern of financing the investment and avoid illiquidity • Agency problem exists in Pakistani firms since investment opportunity, liquidity asset substitutes, leverage and dividend found to be negatively associated with cash holding

4. Hypothesis Development

This section will discuss the development of the hypotheses. This thesis formulates the hypothesis based on the overview and the literature review that **it** has discussed in the previous sections. This thesis has also shown literature review on prior literature and found that several firm characteristics affect the level of corporate cash holdings. Based on section 2 and 3 above, we found that several firm characteristics might affect the level of corporate cash holdings. From trade-off theory and pecking order theory, we found that size, investment opportunity, leverage, and dividend payments have a significant association with cash holding. Concurrently from the agency theory, board characteristics such as board size, board independence, and CEO duality have a significant association with the corporate cash holdings.

According to the trade-off theory there is a negative association between firm size and cash holding. However, this theory is contradicting with the pecking order theory which argues cash holding increase with firm size because larger firms tend to hold their retained earnings as cash on their asset. Bates *et al* (2009) stated that larger firms are more likely to be able to liquidate part of non-core assets to obtain cash, which reduces the likelihood of experiencing financial distress.

Smaller firms also face higher costs of external financing than large ones because they are more likely to face constraints from borrowings (Whited, 1992). There are economies of scale in cash management of the firm (Nguyen, 2005). The economies of scale associated with the cash level that is required to confront the normal transactions of the firm, so that larger firms can lower their level of cash holdings (Mulligan, 1997).

Ferreira and Vilella (2004) found a negative association between firm size and cash holding because raising funds is more expensive for small firms. Due to reasons above, in this thesis, we propose the following hypothesis:

H1a: There is a negative association between firm size and cash holding.

The firm with valuable investment opportunities is more likely to demand a lot of funds in the future to finance these kinds of investments (D'Mello, Krishnaswami and Larkin, 2008). One of the issues of a firm with high investment opportunities is that they must be able to guarantee their financing. However, when the firms are seeking to finance from outside, sometimes the funds are either too expensive or inexistent when needed.

The cost of incurring in a cash shortage is higher for firms with a larger investment opportunity set due to the expected losses which would be resulting from giving up valuable investment opportunities (Ferreira and Vilella, 2004). Therefore, firms with future valuable possible investment opportunity will hoard more cash (Bigelli and Sanchez Vidal, 2012). Cash holding helps the firm to keep firm's potential investment opportunities alive (Boyle and Guthrie, 2003).

Consequently, in line with the trade-off theory and the pecking order theory discussed in section 2, we expect the following hypothesis:

H2a: There is a positive association between investment opportunity and cash holding.

Firms can also fulfil their financing needs by using debt. In the trade-off theory, the predicted relationship is unclear because there are several cost and benefit in using leverage instead of cash. Leverage increases the probability of a firm going bankrupt and cost of financial distress. To mitigate these risks, firm then accumulate higher level of cash holding (Ferreira and Vilella, 2004). Furthermore, firms may try to

increase cash holding level as a buffer to avoid the financial distress conditions and decrease the likelihood of cash insufficiency on hand to make required interest payment (Faulkender, 2002).

Leverage is also viewed as cash substitute because leverage decreases the moral hazard and increases the discipline of the firm (Ozkan and Ozkan, 2004). In this case, the relationship between leverage and cash is negative. On the other hand, pecking order theory predicts negative association between leverage and cash holding. The negative association between leverage and cash holding is because cash is used by the company to reduce leverage (Bates *et al*, 2009). Leveraged firms have to pay higher transaction costs to raise external finance and are more likely to suffer from a cash shortfall (Nguyen, 2005).

With the facts above, we predict that there is a negative association with the following hypothesis:

H3a: There is a negative association between leverage and cash holding.

Trade-off theory predicts that firms that distribute dividends to their shareholders are more able to raise fund at lower cost when needed by cutting dividend payment (Opler *et al*, 1999). Firms that are able to pay dividends can raise funds at low cost by reducing its dividend payments. In contrast to a firm this has to raise funds from external sources (Ferreira and Vilela, 2004). This theory predicts that there is a negative association between dividend and cash holdings. However, the pecking order theory predicts that cash holding is positively related to the firm's dividend payment (Nguyen, 2005). Pecking order theory predicts that firms build conservative balance sheets before returning cash to investors.

It is also possible that firms that pay dividend hold more cash to avoid the situation in which they are short of cash (Ozkan and Ozkan, 2004). Drobetz and Gruninger (2007) also found a positive relationship between their research between dividend paying and cash holding. Therefore, positive association between these two variables are expected as described in the hypothesis below:

H4a: There is a positive association between Dividend and cash holding.

According to agency theory, board characteristics determine the level of corporate cash holdings. Board must be efficient in the process of decision-making and monitoring of the board's performance. The value of the firm is increasing as the board becomes smaller (Yermack, 1996). Larger board size will lead to inefficiency in the decision-making which includes corporate strategic decisions (Jensen, 1993). Due to

this inefficiency, management of the firms will tend to hoard cash balances because they cannot foresee their future needs well and need the cash to be used as a buffer.

Kusnadi (2011) in his research found that as firms increase their board size, they tend to hold more cash because the board becomes less effective as a monitoring mechanism. Because management are not well monitored, managers will not act in the best interest of shareholders. As board size increase beyond a certain point, the inefficiencies outweigh the initial advantages leading to lower level of performance (Jensen, 1993).

This condition, in turn, will prevent the shareholders from forcing a manager to distribute excess cash, and as a result, the cash balance increases. Therefore, we expected a positive association between these two variables as described below:

H5a: There is a positive association between board size and the cash holding.

Furthermore, we want to discuss another board characteristic, which is board independence. Prior literature has suggested that independent directors are appointed to act in the best interest of the shareholders. Outside directors are believed to be better monitor management as they maintain strong value in their reputation in the directorship market (Fama and Jensen, 1983). Independent directors can reduce information asymmetry between firms and investors, thus also increase the firm's ability to raise funds from external sources (Ozkan and Ozkan, 2004).

Desai *et al* (2003) argued that outside board monitoring can provide better shareholder protection and improve performance. Therefore, firms will be operating more effectively with more proportion of outside director and hold less cash. We expect the following hypothesis:

H6a: There is a negative association between independence level and cash holding

Next, we want to examine the relationship between CEO duality and cash holding. Whenever CEO and chairman combine their roles, they will make an effort to build an empire by entering more segments (Benston, 1985). Because CEO's are investing more in building empire rather than maximizing shareholder wealth, they are prepared to invest their cash in projects that will give return below the cost of capital to increase the size and scope of their operations (Aoki, 1984; Jensen and Meckling, 1976). With duality, CEO will serve the interest of the management team and protect the team by holding an excessive

level of cash (Dahya and Travlos, 2000). We expect that firms with CEO dualities have higher level of cash holding. We expect the following hypothesis:

H7a: There is a positive association between CEO duality and cash holding

5. Data and Methodology

This chapter will be discussing the sample selection, data construction, as well as variable definition and measurement. Furthermore, we will discuss the methodology that is used in this study. Section 5.1 discusses the data sample selection regarding the collection process for firm characteristics and board characteristic data. Section 5.2 will discuss the regression equation, including the detailed explanation about the dependent, independent and control variables. Section 5.3 will point out the statistical method that we use in this research. Lastly, in section 5.4 will discuss the Libby boxes.

5.1. Sample selection

In the process of gathering the sample, we found that we are able to gather firm characteristic financial data. However, we concluded that there are problems in collecting the board characteristics data. The explanation concerning the data collection form firm characteristics is explained in section 5.1.1 and for board characteristics is explained in section 5.1.2.

5.1.1. Firm characteristics data

This study will be performed in the period 1 January 2010 to 31 December 2016. We started the data from 2010 to avoid the effect of the 2008 crisis. The data consist of Indonesian firms listed on the Indonesian Stock Exchange. We picked the listed firms to ensure that all the firms are regulated and have corporate governance mechanisms. The independent, dependent and control variables obtained from the DataStream of Erasmus University database. All the financial data is picked from World Scope Indonesia on the section Equity. We use International Securities Identification Number (ISIN) code for our identifier code.

At first, the sample consists of 609 Indonesian firms with 4,263 firm observations. However, we found that on the list of the firms there are financial services and utility firms on our list with the SIC (Standard Industrial Classification) code 6000 to 6999 and 4900 to 4999. These industries are highly regulated, and governance is considered less efficient in these firms (Vafeas and Theodorou, 1998). Therefore, we

eliminate the financial service and utility firms from our list to evade biased result. After that, we eliminated 192 firms including financial institutions and utility companies due to missing financial information from independent, dependent and control variables.

Furthermore, with the inclusion of control variables, there are five more firms to eliminate due to missing financial information. After all of that elimination, our observation resulted in 2,743 firms observations with 417 firms as our samples. To ensure the reliability of the data, we have performed checking to the data centre that is available in the Economic Research Data Centre of University of Indonesia (PDEB). We have also performed a validation to the financial statement of several companies to ensure that the data are reliable. Based on our checking, we found that the financial characteristics data that we obtained from Datastream is the same data as presented Indonesia.

5.1.2. Board characteristics data

This thesis is also supposed to examine the relationship between board characteristics and cash holding level of Indonesian firms. However, the data concerning board characteristics is not available. This thesis has checked the availability of the data in University of Indonesia Research Data Centre, Compustat People Intelligence of Wharton Research Data Centre, Datastream, and Worldscope. However, we encountered problems because no board characteristic data are available.

Furthermore, this thesis is unable to gather the data related to the independence level of the board and CEO Duality. Our best effort is to gather the data of Board Size, but they only exist for 42 firm's observations in the period 2010 to 2016. Because Indonesia is still a developing country, not all data concerning governance are available. Because the observation is too limited, we decided to drop all of our board characteristic observations.

5.2. Research equation and variables

5.2.1. Regression equation

To be able to answer the main research question, we perform simple linear OLS regression analysis and one more regression analysis as our robustness check. The statistical method is explained in section 5.3 in this section. Here is the equation for our OLS-Regression:

$$Cash_{it} = \alpha + \beta_1 MTB_{it} + \beta_2 FSize_{it} + \beta_3 Dividend_{it} + \beta_4 Leverage_{it} + \beta_5 CONTROLS + FirmFE + YearFE + \epsilon_{it}$$

Where:

i	=	Firm
t	=	Year observation
$Cash_{it}$	=	Cash holding level of firm i in year t.
MTB_{it}	=	Investment opportunity of firm i in year t.
$FSize_{it}$	=	Size of firm i in year t.
$Dividend_{it}$	=	Dividend dummy if firm i paying dividend in year t.
$Leverage_{it}$	=	Leverage level of firm i in year t.
$CONTROLS$	=	Control variables: ICF and NWC of firm i in year t.
$YearFE$	=	Year Fixed Effects.
$FirmFE$	=	Firm Fixed Effects.

5.2.2. Variable Description

5.2.2.1. Dependent Variable

In this thesis, the dependent variable is the cash holding level of each firm. These variables define how much cash level each firm holds. We compute the cash holding level by calculating the ratio of cash and cash equivalent to the level of net assets, where we compute the net assets by using the book value of assets less cash and cash equivalents of the company. This method of calculating cash holding has consistently been used by Opler *et al* (1999), Saddour (2006), Gill and Shah (2012), Ferreira and Vilela (2004). The formula for the cash holding is as follows:

$$Cash\ Holding = \frac{Cash\ and\ Cash\ Equivalent}{Net\ Assets}$$

5.2.2.2. Independent Variable

Independent variables used in this research are the firm characteristics. It consists of investment opportunity, leverage, dividend and firm size. The details variables for each firm are as follows:

Investment Opportunity:

In the previous chapter we have explained that there are significant associations between investment opportunities of the firms to the level of cash holdings. This thesis uses the market to book ratio as our proxy for investment opportunity as previously had been used by Opler *et al* (1999), Ferreira and Vilela (2004) and Bates *et al* (2009). For the calculation of the Market-to-Book ratio, we use the formula as follows:

$$MTB = \frac{(Book\ Value\ of\ Asset - Book\ Value\ of\ Equity + Market\ Value\ of\ Equity)}{Book\ Value\ of\ Assets}$$

Firm Size:

Our second variable is the size of the firms in which we have argued that there is a significant association between the sizes of the firms to the level of corporate cash holding. We calculate this proxy using the natural logarithm of the total assets of each firm. These proxies have previously been used by several researchers such as Opler *et al* (1999), Gill and Shah (2012), Saddour (2006) and Bates *et al* (2009). The formula is as follows:

$$FSize = \ln(Total\ Assets)$$

Dividend:

As predicted in the previous section, we argued that firm that pays dividend will have a higher level of cash holding. We will use dummy variables on this variable as previously been used by Gill and Shah (2012), Ferreira and Vilela (2004) and Opler *et al* (1999). We gave the value one if the firm is paying a dividend for the respective year and we give value 0 if the firm did not pay its dividend.

$$Dividend = 1\ if\ paid; 0\ otherwise$$

Leverage:

Our last firm characteristics independent variables is the leverage level of the firm. As stated before, we argued that the leverage level of the firm affecting the cash holding level of firms. We will use the variable from Opler *et al* (1999), Bates *et al* (2009), Ferreira and Vilela (2004) and Drobetz & Gruninger (2007). The formula for leverage is:

$$Leverage = \frac{Total\ Debt}{Total\ Asset - Cash\ and\ Cash\ Equivalent}$$

5.2.2.3. *Control Variables*

Internal Cash Flow:

This proxy is used by Bates *et al* (2009) in which they find that firms with ability to generate higher Internal Cash Flow (ICF hereafter) will accumulate more cash. This proxy is also used by Guney *et al* (2006), they found that firms with higher internal cash flow will have a large source of liquidity to fulfil their operational needs, funding their investment and settle their outstanding liabilities. Kim *et al* (1998) argued that cash flow provides a ready source of liquidity for investment and maturing liabilities. This proxy is considered important to capture Indonesian firm's ability to generate cash internally based on their operations.

The formula that is used for this control variable is as follows:

$$ICF = \frac{Net\ Income + Depreciation}{Total\ Assets}$$

Liquid Asset Substitution:

Ferreira and Vilela (2004) argued that liquid assets other than cash can be liquidated in the event of a cash shortage and be used as substitutes for cash holding. They found that firms with more liquid asset substitutes have less cash. For the proxy of the liquid assets substitution, they use Net Working Capital which calculated as follows:

$$Net\ Working\ Capital = \frac{(Current\ Asset - Cash\ and\ Cash\ Equivalent)}{(Total\ Asset - Cash\ and\ Cash\ Equivalent)}$$

Year Effects and Firm Fixed Effects:

Lastly, because our research is a panel data, we will use year fixed effects and firm fixed effects on our regression. Year fixed effects is used by us to pick up any variation in the outcome which happens over time and is not attributable to other explanatory variables. Also, we use firm fixed effect to reduce the bias that comes from the error that might emerge from this research. We use these effects by including the command to our Stata regression when we perform the OLS regression.

Here are the summary of each variables and the description for each of the variables:

Table 3. Variable Description

Variable	Measurement
Cash	Proportion of cash and cash equivalent to the net assets of the firm.
MTB	Book value of assets minus book value of equity plus market value of equity, divided by book value of assets.
Fsize	Natural logarithm of the total assets of the company.
Dividend	1 if dividend is paid on the respective year; 0 otherwise
Leverage	Total debt of the firm divided by the total asset minus the cash and cash equivalent
ICF	Net income plus depreciation divided by total assets

NWC

Current asset minus cash and cash equivalent divided
by total assets minus cash and cash equivalent

5.3 Statistical methods

To test the relations between the independent variables and the dependent variables, we will use simple linear regression. The method that we will use is panel data regression (OLS regression) using Stata. OLS regression is one of the techniques that is used to analyze the data and forms the basis of many other techniques (Rutherford, 2001). OLS regression is particularly powerful as it is relatively easy to check also the model assumption such as linearity, constant variance and the effect of outliers using simple graphical methods (Hutcheson and Sofroniu, 1999).

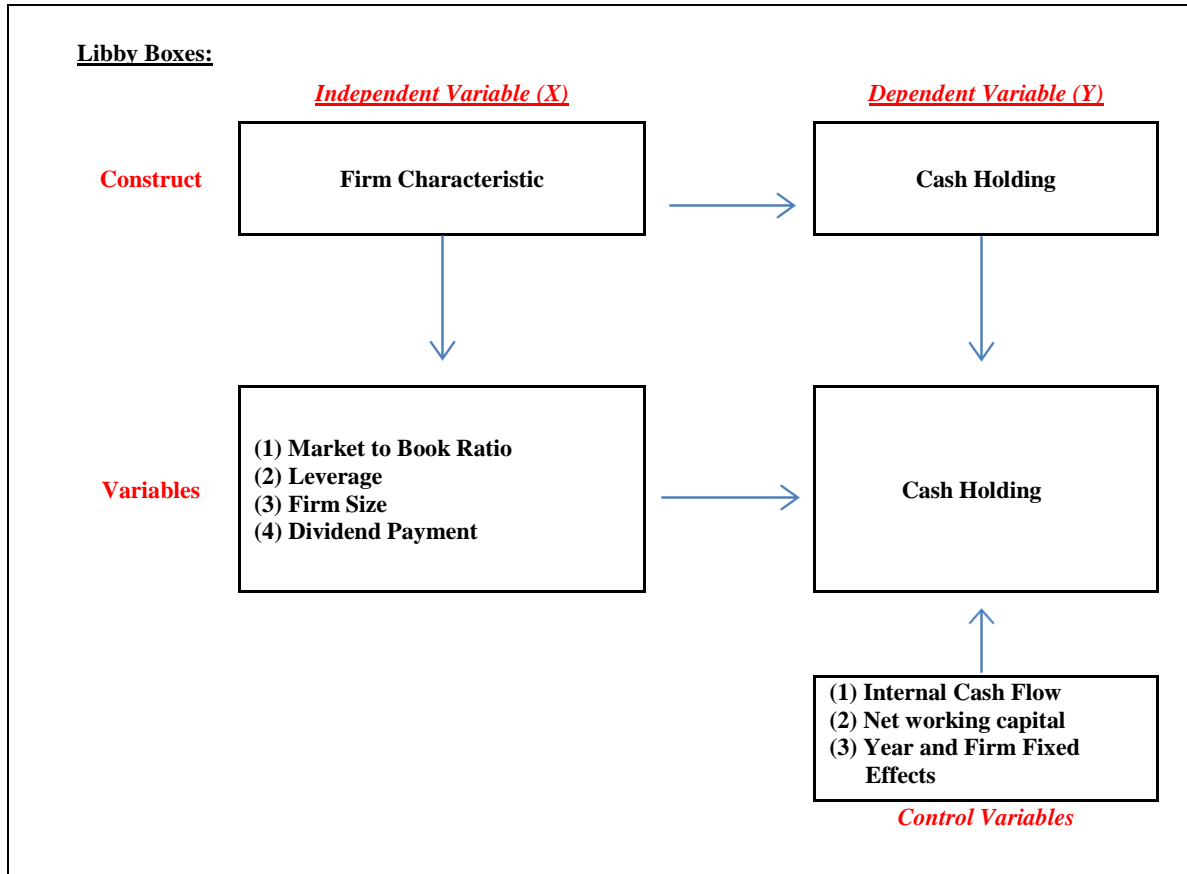
It is best to use OLS regression since this type of regression has been used by several prior researchers when examining the cash holding (see for example, Opler *et al* (1999), Saddour (2006), Gill and Shah (2012), Ferreira and Vilela (2004)). In this research as well, we will perform the descriptive statistic explanation on all the variables presented on the test in the next section. However, before performing the regression, we found that there are several variables with a deviation from the normal distribution, namely Cash, MTB, Leverage, ICF and NWC.

Therefore we will perform winsorize test on all of the non-normal distributions to make the deviation of each variable normal. After we have ensured that all data are normally distributed, we will also ensure that there are no variables that are highly correlated. We will perform a multicollinearity test and test the VIF value of each variable to eliminate the correlation issues. We will also ensure that there are no heteroskedasticity problems on our regression by using robust standard error on our regression. Lastly, we will include fixed year effects.

5.4 The Libby Boxes

The Libby box of this research including the independent variables, dependent variables and the control variables are as follows:

Figure 2: Libby Boxes



6. Result and analyses

This section will present the result of our regression analytic test. All of the tests are performed using Stata application. In section 6.1 we will perform the normality test and the multicollinearity test on each variable to ensure that all the data are normal and have no multicollinearity problem. In section 6.2 we will discuss the descriptive statistics of independent, dependent and control variables. Next, in section 6.3 we will discuss with the regression analysis which already includes the elimination of heteroskedasticity problem and the fixed year effect. Lastly, in section 6.4 we add a robustness test using the dependent variables from Bates *et al* (2009) to ensure that our result is firm and robust.

6.1. Normality and correlation analysis

6.1.1. Normality analyses

We will determine the normality of the distribution of the dependent variables, independent variables, and control variables before we discuss the descriptive statistics. We will use histogram graphs to decide whether a variable has a normal distribution. With the histogram, we will know whether the distribution of each variable is normal or skewed.

The histogram plots of several variables show that there are variables with a deviation from the normal distribution. That variable in which the distribution is not normal is Cash, MTB, Leverage, Firm Size, ICF, and NWC. The outliers in these data are considered to be large. An outlier is a variable that is outside of the overall pattern of all other data points. When we know that there is an outlier in the y-direction, it will have a large residual. A residual itself is the difference between the predicted value of the dependent variables and the actual value of the dependent variables.

According to Moore (2001), when an outlier is lying on the x-direction, it will not necessarily have large residuals. When we have outliers in our data, it can shift the data from a normal distribution and make the statistical analysis less accurate. To overcome this problem, we will perform winsorize to reduce the possible impact of the outliers. Winsorize is a data transformation process by limiting the extreme values in the statistical data to reduce the effect of possibly spurious outliers. We will winsorize outliers in such way that they were set at 1th and 99th percentiles.

Appendix 1 provides the histogram of the variables Cash, MTB, Leverage, Firm Size, ICF and NWC before and after the Winsor process. After we winsorize, we found that these variables are less skewed. To gain a better result, we will also perform other normality tests, The Shapiro Francia W test. From our observation in Table 4, we found that the W value of the variables lies between zero and one. Small value of W indicates a non-normal distribution. We can also conclude from Shapiro Francia W test that the variables used in this research are normal because there is no W value that lies close to 0.

Table 4. Shapiro Francia W Test

Variable	Observation	W	Prob > z
Cash	2,831	0.54386	0.00001
Firm Size	2,845	0.99637	0.00001

Leverage	2,831	0.74584	0.00001
MTB	2,801	0.69732	0.00001
Dividend	3,304	1	0.00001
ICF	2,841	0.91464	0.00001
NWC	2,787	0.97329	0.00001

To summarize the normality test, we found that all of our variables have been normal after it has been winsorized. But, after winsorize, we found that variables Leverage, MTB and NWC are not perfectly distributed. However, Ghasemi and Zahediasl (2012) concluded that it should not be a problem if the research has more than 30 observations. This research comprises 2,743 observations.

6.1.2. Correlation analyses

To test the multicollinearity problem on the data, we perform a correlation matrix test. Multicollinearity is a situation where one predictor or more variables in a regression is highly correlated. When there is multicollinearity in regression, the result of a regression could be considered non valid. This research will use two ways to measure multicollinearity. The first is the Pearson correlation matrix and the second is the VIF test.

Pearson correlation coefficient is a measurement of the linear correlation between two variables X and Y. According to Moore (2011), if the correlation between the variables is close to -1 or close to +1, it is possible that there is a strong relationship between the independent variables that may lead to the distortion of the regression result.

Table 5. Pearson Correlation Matrix

	Firm Size	Leverage	MTB	Dividend	ICF	NWC
Firm Size	1					
Leverage	0.0431	1				
MTB	-0.0813	0.7828	1			
ICF	0.1266	-0.2431	-0.266	1		
NWC	-0.2039	-0.161	0.0072	0.0735	1	
Dividend	0.3594	-0.1825	0.1789	0.3531	0.1354	1

Furthermore, Table 5 presents the Pearson correlation matrix for independent variables and control variables that are used in this thesis. Based on our observation through the Pearson correlation matrix, we found that most of the independent variables and the control variables show no high correlation between each other. Although there is a significant sign between variable MTB and variable leverage, the value of the correlation still lies between -1 and 1. Because of that, we can conclude that there is no multicollinearity problem in these variables.

After that, to gain more certainty that there are no multicollinearity problems in our variables, we perform VIF test. The VIF test is presented in Table 6 showing no multicollinearity problem between the variables. The highest correlation exist on the variable Leverage as much as 2.82 and variable MTB as much as 2.77. The average VIF value on all variables is 1.76. Therefore we can conclude that no multicollinearity problems exist within the variables used in this research.

Table 6. VIF Analysis

Variable	VIF	1/VIF
Leverage	2.82	0.354607
MTB	2.77	0.360375
Dividend	1.37	0.727672
Fsize	1.27	0.785339
ICF	1.2	0.830353
NWC	1.14	0.878005
Mean VIF	1.76	

6.2. Descriptive statistic

Table 7 presents the descriptive statistics of the dependent variable, independent variables and the control variables that are used in the statistical regression. On the regression presented in Table 8, we found that there are 2,787 observations with 424 firms. But after we include the control variables that are also used in the regression our observations decrease to as much as 2,743 observations with 417 firms included in the samples. The observation in our research is more than the observation that is performed on prior literature, namely Gill and Shah (2012), Saddour (2006), Nguyen (2005) and Kusnadi (2011). More samples in our research will give greater precision to the result of the test.

Table 7. Descriptive statistics of independent and control variables

The table comprises of summary statistics, namely number of observations, mean, median, standard deviation, minimum value and maximum value for the following measures: (1) Cash: Cash and Cash Equivalent divided by Net Assets (2) FSize: Natural logarithm of Total Assets (3) Leverage: Total Debt of the firm divided by the Total

Asset minus Cash and Cash Equivalent (4) Dividend: dummy variable equals to 1 if dividend is paid on the respective year (5) MTB: Book Value of Assets minus Book Value of Equity plus Market Value of Equity, divided by Book Value of Assets (6) ICF: Net Income plus Depreciation divided by Total Assets (7) NWC: Current Assets minus Cash and Cash Equivalent divided by Total Assets minus Cash and Cash Equivalent (8) Total Assets in this table denominated in million Rupiah

Variables	Cash	FSize	Leverage	Dividend	MTB	ICF	NWC	Total Assets
Mean	0.169	21.278	0.310	0.390	0.565	0.073	0.395	6,090
Median	0.079	21.310	0.266	0	0.525	0.066	0.371	1,550
St Dev	0.277	1.726	0.325	0.488	0.409	0.106	0.261	15,700
Minimum	0.001	16.601	0	0	0.011	-0.324	-0.149	0
Maximum	2.210	26.078	2.179	1.000	2.826	0.415	0.967	257,900
Observations	2,831	2,845	2,831	3,304	2,801	2,841	2,787	3,073

Cash is defined by dividing cash and cash equivalent to the net assets of the firm as previously used in prior literature. The value of the proportion of cash varies between 0.1% to 221%. Though it may seem like a high deviation on the variable, we found that the mean value of the cash proportion is 16.9%, with the median value 7.9% and the standard deviation is 27.7%. From here we can say that the value of Indonesian cash proportion is less than in Canadian firms which is shown in Gill and Shah (2012) averaging as much as 38.7%. However, the overall mean statistic ratio for Indonesian firms are similar to US firms, which we can find from Opler *et al* (1999) which shows there is 17% mean on publicly traded US firm.

These values of cash were consistent with the findings of Dittmar *et al* (2003). In their research, they found that the median cash proportion of Kenyan firms (0.3%) and Egyptian firms (29.6%). Dittmar *et al* (2003) argued that cash holding is attributable to the corporate governance structures across each country. They argued that countries with better governance structure will have a higher level of cash holding. Because we are unable to gather governance related data regarding board structure we can assume that the governance structure of Indonesian firms is still weaker than those in developing countries, therefore they have a lower level of cash holding as well.

The natural logarithm of total assets is used as a proxy for our firm size. When we look into the actual value of the total assets we found that the total asset of the Indonesian public firm varies between IDR 0 to IDR 257.9 billion. The company with the biggest total assets is the company with the biggest revenue as of December 31, 2016 as well, which was PT Astra International. The distribution of the firm size is more normally distributed when we use the natural logarithm of the total assets. The firm size ranged from 16.60 to 26.07, with the average of 21.27. Therefore, for this research, we will follow what has been

performed on Opler *et al* (1999), Gill and Shah (2012), Saddour (2006) and Bates *et al* (2009), and use natural logarithm on total assets as our proxy for our firm size.

Next variable is leverage which we calculated using the proportion of total debt to the total assets minus cash and cash equivalent. Based on our descriptive statistics, we found that the average leverage is around 31%. It indicates that in Indonesia, the firm is preferably using financing other than debt, which contradicts the trade-off theory. Dividend was varying between the value of 0 and 1 and averaging on the value 0.391 because we used dummy dividend variables to proxy for dividend payment. It indicates that more firms are not paying dividends to their shareholders compared to those who pay.

Our control variable is internal cash flow and net working capital. Our ICF variables were following the research from Bates *et al* (2009). The ICF ratio varies between the minimum -32.4% to maximum 41.5%. This indicates that although they are already listed in the public stock markets, there are several firms in Indonesia that are still facing difficulties in generating internal cash flows. Last control variable is our net working capital. This control variable is used in the research of Ferreira and Vilela (2004). From this variable we found that the average of net working capital is around 39.5%. This indicates that most of the Indonesian firms have enough short-term assets to cover their short-term debts.

6.3. Regression result

In this section we will describe the regression analysis that we have performed and we will also compare our findings to the findings from prior literature. In the previous section, we have ensured that there is no multicollinearity problem on each variable by testing the correlation and the VIF. We have also ensured that all of the data used in this test are normal by performing winsorize for each variable.

We perform the test to our hypothesis empirically using the panel data regressions and the general results actually support our hypothesis. We have also added the robust command to our Stata regression to ensure that there is no white heteroskedasticity problem in our regression. We have also used the year fixed effect to ensure that there is no time effect on our regression that might influence the result of regression. Our first regression is presented in Model 1 in Table 8. However, the result did not differ from the result in Model 2 where we added all the control variables that relate to this research. Therefore, we will use model 2 on Table 8 as our main finding for this research.

Table 8. OLS Regression

The table presents the regression result between the firm characteristics and cash holding in Indonesian firms. The dependent variable is Cash (Cash and Cash Equivalent divided by Net Assets). The independent variables are: (1) FSize: Natural logarithm of Total Assets (2) Leverage: Total Debt of the firm divided by the Total Asset minus Cash and Cash Equivalent (3) Dividend: dummy variable equals to 1 if dividend is paid on the respective year (4) MTB: Book Value of Assets minus Book Value of Equity plus Market Value of Equity, divided by Book Value of Assets. The control variables are: (1) ICF: Net Income plus Depreciation divided by Total Assets (2) NWC: Current Assets minus Cash and Cash Equivalent divided by Total Assets minus Cash and Cash Equivalent.

Variables	Model 1 Cash	Model 2 Cash
Fsize	-0.0596** (0.0267)	-0.0584** (0.0276)
Leverage	0.131* (0.0743)	0.139* (0.0726)
Market to Book	-0.210*** (0.0793)	-0.206*** (0.0783)
Dividend	0.0216** (0.00919)	0.0177* (0.00916)
ICF		0.0984 (0.112)
NWC		0.101* (0.0583)
Constant	1.488*** -0.568	1.409** -0.596
Year Fixed Effect	Yes	Yes
Firm Fixed Effect	Yes	Yes
Observations	2,787	2,743
R-squared	0.064	0.072
Adjusted R-squared	0.061	0.068
Number of firms	424	417

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Based on the regression on Table 8, we conclude that there is a negative association between firm size and the cash holding. This result supports our first hypothesis (H1). We found that increase of one percent in the firm size will lead to decrease in cash holding as much as 0.0584%. The negative relation between size and the cash holding provides support to the argument from the trade-off theory but contradicts with the pecking order theory.

The negative correlation between firm size and cash holding indicates that raising funds is more expensive for small firms compared to large firms (Ferreira and Vilela, 2004). Additionally, there are economies of scale in cash management of the firms, which makes firms only hoard cash level into the required normal transaction level (Mulligan, 1997). Large and more diversified firms are less prone to bankruptcy related costs and less likely to hoard cash reserves (Al-Najjar and Belghitar, 2011). This finding also supports the hypothesis regarding firm size and the result from previous findings from Ferreira and Vilela (2004) and Nguyen (2005).

Next, based on our results, we found that there is a positive association between the leverage of the firms and the level of corporate cash holdings in Indonesia. This finding is contradicting with our third hypothesis (H3) and the previous expectations from the pecking order theory. We found that on average every 1 unit increase in the leverage of the firm will lead to a increased level of cash holdings of Indonesian firms as much as 0.139. This result shows that leverage is not used by firms in Indonesia as a substitute for cash.

The positive relationship between leverage and the firm's level of cash holding has previously been reported in literature by Faulkender (2002) and Gill and Shah (2012). According to Faulkender (2002), firms with greater leverage have higher expected cost of financial distress. A firm with greater leverage is also considered to have a higher probability of bankruptcy. Based on these reasons, Faulkender (2002) argued that firms with a higher level of leverage tend to hold more cash as their preventive purposes.

Firms with high leverage are also more subject to monitoring by the investor, implying that there is limited managerial discretion and thus a lower level of cash holdings (Drobotz and Gruninger, 2007). Moreover, firms with high level of debt are less able to stockpile cash due to higher monitoring role of financial institutions (Ferreira and Vilela, 2004).

Moving on to the regression result of Investment opportunity level on cash holding, the regression result that is presented in model 2 shows that investment opportunity has significant negative impact on the level of a firm's cash holding. In Indonesian firms, we found that every 1 unit increase in the Investment opportunity of the firm will result in the decrease in the cash holding level (of Indonesian firm) as much as 0.206.

This result, however, contradicts with our second hypothesis and contradicts with several prior works of literature which found a positive relationship between investment opportunities and cash holdings (Gill

and Shah, 2012; Opler *et al*, 1999; Nguyen, 2005; Bates *et al*, 2009; Ferreira and Vilela, 2004). Despite all the findings mentioned from prior literature, we also found that there are prior literatures that have similar results to findings of this thesis. Afza and Adnan (2007) find similar negative relationship results in their research on Pakistani firms. They argued that the negative relationship between investment opportunity and cash holding was a result of managers having low investment opportunity resulting in firm hold more cash to guarantee the availability of cash for investment projects that possibly may earn a negative NPV to them.

Afza and Adnan (2007) also add that this suggests that an agency problem occurs in the Pakistani firms where the managers keep the investment information of to the company to themselves and try to avoid raising funds from external sources. Weak law enforcement and weak protection for minority shareholders in Asian countries also are among the reasons that the agency problems exist (Hidayat and Utama, 2017). The managers who control the firm's assets are able to shift the assets for personal use or invest in unprofitable projects, in the end expropriating shareholder's wealth (Lemmon & Lins, 2003).

Next is our last independent variable, we found a positive correlation between dividend and cash holding in Indonesian firms. We found that when a firm pays dividend to its shareholders, the cash holding would decrease as much as 0.0177. This finding is in line with our fourth hypothesis which shows that firms in Indonesia who pay dividends hoard more cash than non-dividend paying firms so they can avoid situation in which they are short of cash (Ozkan and Ozkan, 2004).

This result also in line with the pecking order theory where the positive relationship between dividend paying firm and cash holding were caused by the firms attempt to build conservative balance sheets before returning cash to investors (Nguyen, 2005). This finding is also in line with the findings from prior literature such as Saddour (2006), Drobotz and Gruninger (2004) and Kim *et al* (2011).

Moving on to our control variable, we found that there are insignificant relationships between a firm's ability to generate internal cash flow and the level of the firm cash holding. This result is not in line with the result from Bates *et al* (2009). This shows that in Indonesian firms there is no association between firm's ability to generate internal cash flow and the level of firm cash holding.

Last control variable is the net working capital (NWC). We used NWC to measure the firm's ability to have liquid asset substitution to the corporate cash holding. We found a positive relationship between the firms's NWC and the firm's cash holding level. This is contradicting with the result from Ferreira and

Vilela (2004), in which they suggest that in their research liquid assets act as cash substitutes. This result shows that in Indonesian firms although the liquid assets substitution is available, firms would not use those assets as a way to substitute for cash in terms of cash shortage.

The R-squared is 0.072 and the adjusted R-squared is 0.068. Both R-squared and the adjusted R-squared in model 2 are slightly higher compared to R-squared and adjusted R-squared in model 1 in Table 8 by 0.064 and 0.061. This result implies that the relationship between our firm characteristics and cash holding is stronger when we include a firm's ability to generate internal cash flow and the availability of liquid asset substitution. The low score on the R-squared of this thesis indicates that there are possibly omitted variables in the model. It implies that cash holding in Indonesian firms possibly determined by other factors.

Based on our research, we found that there are two results that contradict with our hypothesis. Those variables are investment opportunity and leverage. We have summarized our findings in Table 9 to compare the prediction sign that we have built from our hypothesis to the actual results that we have found in Indonesian firms.

Table 9. Prediction versus Result

No	Variables	Predicted Sign	Result
1.	Firm Size	-	-
2.	<i>Leverage</i>	-	+
3.	Dividend	+	+
4.	<i>MTB</i>	+	-

6.4. Additional robustness test

To gain more reliable result, we also add robustness test in Table 10. We change the dependent variables in this test using the main dependent variables that are used in the research of Bates *et al* (2009) and Guney *et al* (2006). On our main regression, we use the dependent variables of cash using the log of cash to the net assets. In our robustness test we added the dependent variables using cash to total assets. The main result for this robustness test is presented in Model 2 on Table 10.

Based on our regression in Table 10 we found that there are only slight differences in terms of economical value but the statistical positive or negative significant relationship between each variable is still the same. The relationship between firm size and cash holding from this test is still the same with the

previous result on Table 8. However, a one percent increase in the firm size will only decrease cash holding as much as 0.0224%. This result still confirmed that the relationship between these two variables supports the trade-off theory, but contradicts with pecking order theory.

Table 10. Robustness Test Regression

The table present the robustness test regression between the firm characteristics and cash holding in Indonesian firms. The dependent variable is Cash (Cash and Cash Equivalent divided by Net Assets). The independent variables are: (1) FSize: Natural logarithm of Total Assets (2) Leverage: Total Debt of the firm divided by the Total Asset minus Cash and Cash Equivalent (3) Dividend: dummy variable equals to 1 if dividend is paid on the respective year (4) MTB: Book Value of Assets minus Book Value of Equity plus Market Value of Equity, divided by Book Value of Assets. The control variables are: (1) ICF: Net Income plus Depreciation divided by Total Assets (2) NWC: Current Assets minus Cash and Cash Equivalent divided by Total Assets minus Cash and Cash Equivalent.

Variables	Model 1 Cash	Model 2 Cash
FSize	-0.0228*** (0.00821)	-0.0224*** (0.00835)
Leverage	0.0550* (0.0289)	0.0585** (0.0285)
Market to Book	-0.0941*** (0.0306)	-0.0902*** (0.0303)
Dividend	0.0126*** (0.00479)	0.0103** (0.00473)
ICF		0.0690* (0.0351)
NWC		0.0439** (0.0192)
Constant	0.630*** -0.174	0.594*** -0.178
Year Fixed Effect	Yes	Yes
Firm Fixed Effect	Yes	Yes
Observations	2,787	2,743
R-squared	0 .074	0.086
Adjusted R-squared	0.071	0.082
Number of firms	424	417

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Next variable is the relationship between leverage and the firm's cash holding. We found that when we changed the dependent variables, the economic significance is weakened for variable leverage and that every 1 unit increase in the leverage of the firm will lead to increased level of cash holding only as much as 0.0585. The same result also occurred when we examined the relationship between leverage and cash

holding, where the relationship between investment opportunity and cash holding shows a weaker economically significant relation when we changed the dependent variables. We found that every 1 unit increase in the investment opportunity of the firm will lead to decrease in the cash holding only as much as 0.0902.

In addition, the relationship between our independent variables dividend to the cash holding on this robustness check shows a slight decrease in the economical significance. We found that firm that pays dividend increases its cash holding as much as 0.0103.

Next are our control variables which are net working capital and internal cash flow. From the net working capital, which we used as the proxy for liquid assets substitution we found that there is a slight decrease in the economical significance between the two variables but the statistical significance is still the same. The only different result on our robustness occurs in the relationship between internal cash flow and the firm's cash holding. The robustness check shows that the firm's ability to generate internal cash flow has a positive significant association with the firm's cash holding.

7. Conclusion

In this paper, we investigate the determinants of cash holdings of Indonesian Firms in the period 1 January 2010 to 31 December 2016. By using the trade-off theory and pecking order theory, we can find the determinants of cash holding. Originally, in this research, we wanted to also extend our test not only on firm characteristics but also on the board characteristics. Due to unavailability of the board characteristics data, we were only able to check the relationships between the firm characteristics and cash holdings in Indonesian firms.

The goal of this thesis is to examine whether firm characteristics have a significant influence on the firm's cash holding which leads to the main research question of this thesis:

Research Question: Do firm characteristic affects the level of cash holding in Indonesian firms?

We are able to answer all the research questions and found that firm characteristics significantly affect the firm cash holding. We found similar results from our test for two hypotheses while we reject the other two. Our findings show that firm size and the investment opportunity of the firm in Indonesia have a negative significant impact on cash holdings, while we found leverage and dividend have a positive relationship to the corporate cash holding.

Our results show both trade-off theory and pecking order theory to play an important role in explaining the determinants of cash holdings of firms in Indonesia. However, not our entire hypotheses are proven to be true. We found that in Indonesian firms there is a significant negative relationship between investment opportunity and the firm's cash holding level. These results suggest that agency problems occur in the Indonesian firms, as is the same with the research from Pakistani firms by Afza and Adnan (2007). Weak law protection in Asian countries is also one of the reasons that the agency problem exists in Indonesia (Hidayat and Utama, 2017).

Another result that is not in line with our hypothesis is the positive relationship between the variable leverage and cash holding. This situation occurs because a firm with greater leverage has higher expected cost of financial distress and higher probability of going bankrupt (Faulkender, 2002). Therefore, an Indonesian firm that has a higher leverage prefers to hold more cash to prevent being exposed to these risks.

7.1. Limitations

This section will discuss the limitations that exist in this study. First, we want to test the relationship between board characteristics and the cash holding of the firms in Indonesia. However, due to the unavailability of the data, we did not perform the test.

Second, the result of this thesis could be subject to omitted variable bias. The chosen variables in this research are based on the theoretical overview and prior literature review. There are some possibilities of other variables which are not included in the regression that possibly had a significant influence on the relationship between firm characteristics and the cash holding. We have used year and firm fixed effect to mitigate the possibly omitted variables. However, the year fixed effects and firm fixed effects could not reduce all the omitted variables adequately.

The third limitation is that the research is performed only on Indonesian firms. The same result could not be expected to occur should we perform the research on firms in other nation, implying that there is possibly low external validity. It is proven by the difference on several of our result when compared to prior literature. The fourth limitation is that this thesis excludes the financial industry and the utility industry because those firms are a highly regulated industry. In addition, we also did not examine the results specifically for each industry in this research.

7.2. Suggestions for further research

The results and limitations that exist in this research suggest several matters that could be elaborated in future research. First, we hope that the data concerning board characteristics in listed Indonesian firms will be more available. Further research can improve this thesis by not only examining the relationship between firm characteristic and cash holding, but also the relationship between board characteristics.

Second, for further research it would be better to add more variables that might have a significant impact on the firm's cash holding to gain a better result. There might be other factors that impact the level of cash holdings. For example, Yanchao *et al* (2014) found that cash holding could also be determined by the macroeconomic environment in the country. Further research can try to also include macroeconomic factors such as inflation level to their research.

Thirdly, we would recommend further research to examine the difference in the industry level of the firms. It is also interesting for further research to check the relationship between firm characteristics and cash holding specifically for utilities and financial services firms.

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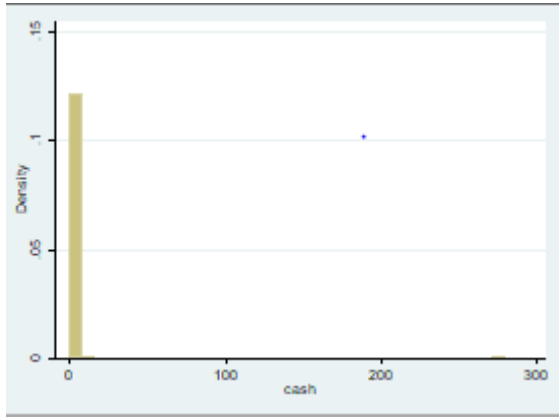
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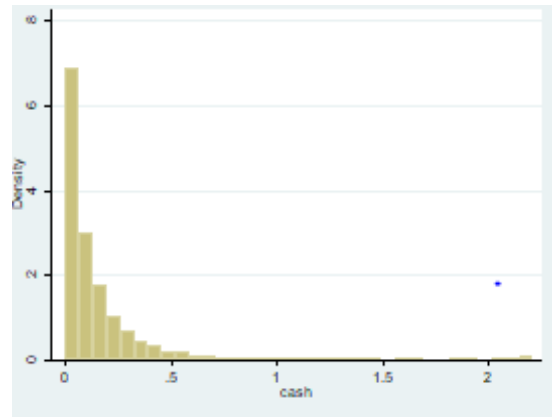
Appendix 1 – Winsorize

Cash:

Before Winsorize:

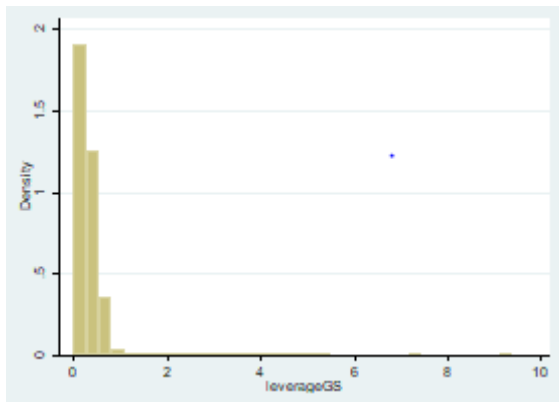


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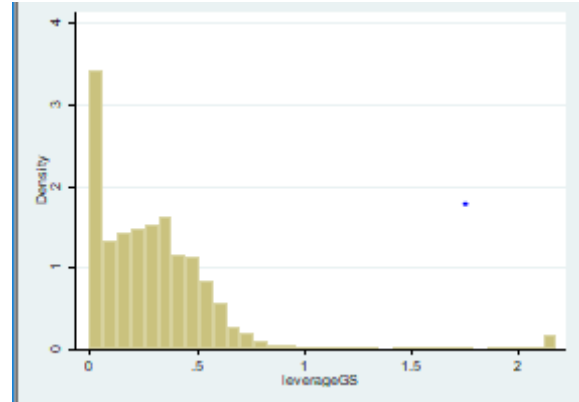


Leverage:

Before Winsorize:

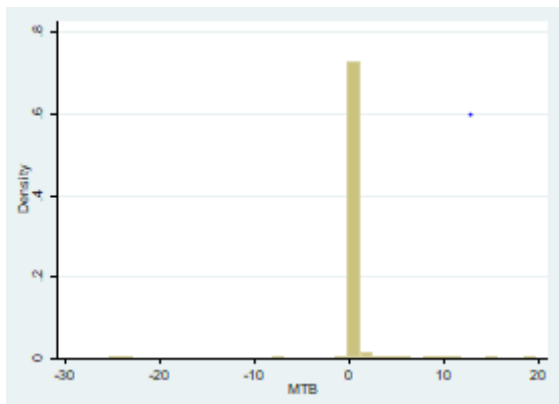


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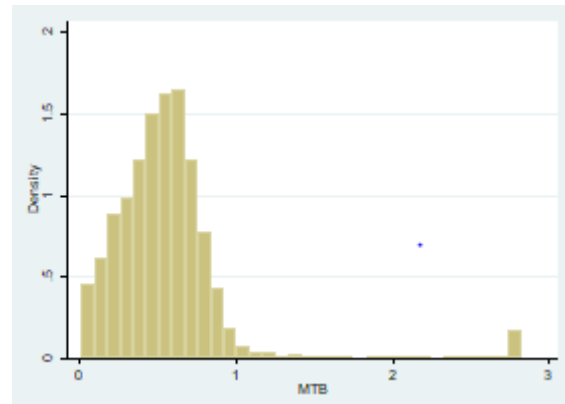


Market to Book:

Before Winsorize:



After Winsorize:

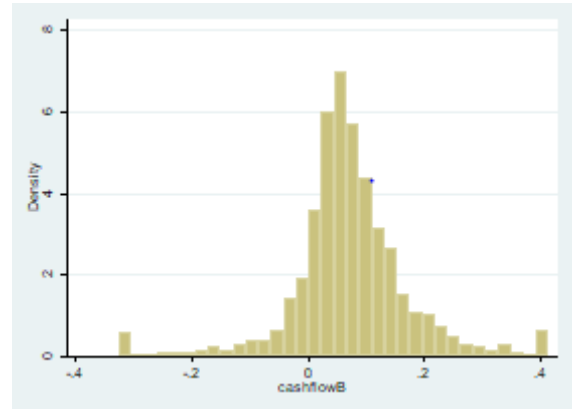


Internal Cash Flow:

Before Winsorize:

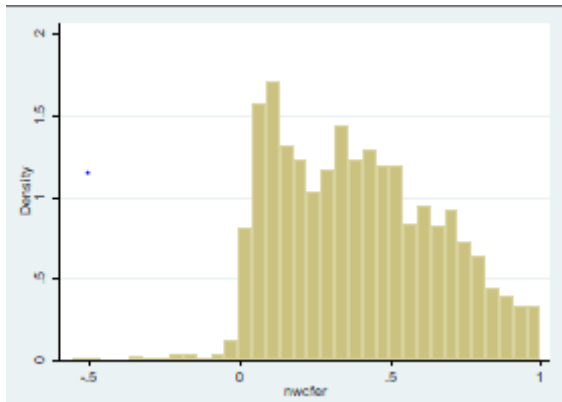


After Winsorize:



NWC:

Before Winsorize:



After Winsorize:

