The Financial and Corporate Governance Determinants of Corporate Cash Holdings: Evidence from Egypt

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Abstract

Corporations hold significant cash balances (Ferreira and Vilela, 2004). There are benefits to holding cash such as decreasing the risk of financial distress and decreasing the reliance on expensive external financing or the fire sale of assets (Opler, Pinkowitz, Stulz and Williamson, 1999). The main cost of holding cash is the opportunity cost of lost returns that could have been generated if the company invested the cash in positive net present value projects (Ferreira and Vilela, 2004). In a cross-country analysis on cash holdings of 45 countries by Dittmar, Mahrt-Smith and Servaes (2003), Egypt has been found to have the highest cash ratio by a large margin. There are three established theories that attempt to explain corporate cash holdings, namely the trade-off, pecking order and agency cost of free cash flow. Al-Najjar (2013) highlights the importance of further academic enquiry into cash holdings in developing economies, particularly from a firm-level corporate governance perspective. The recent political and economic instability, the inherent market risks and the low shareholder protection in Egypt offer an ideal context for investigating the cash holding theories previously examined in developed economies. Therefore, this thesis contributes to the existing literature by analysing the determinants of corporate cash holdings of firms listed on the Egyptian stock market. Ordinary least squares, two-stage least squares and generalized method of moments regression estimators are used on a sample of 157 Egyptian listed firms from 2008-2015. The findings confirm strong evidence of the trade-off theory, agency theory and partial evidence of the pecking order theory. The findings will help managers, boards of directors, investors and policy makers understand the reasons behind cash hoarding in Egypt. This research will help improve cash management in Egypt and hence will increase shareholder wealth, attract more investors to the market and thus contribute to the improvement of the Egyptian economy.

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Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the Faculty Ethics Committee on the 13th of March 2015.

I declare that the Word Count of this Thesis is 70,899 words.

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Chapter 1: Introduction

Introduction

Corporations usually hold significant portions of their assets in cash (Ferreira and Vilela, 2004). Managers hold cash mainly for three reasons. The first reason relates to the transaction motive, which is the motive to hold cash in order to save transaction costs that occur due to external financing or sale of fixed assets (Opler, Pinkowitz, Stulz and Williamson, 1999). The second reason is embedded in the precautionary motive, which is about accumulating cash in order to decrease the risk of financial distress and hedge against unfavourable future changes in cash flows (Opler *et al.*, 1999). The third reason is the agency motive, which occurs as a result of managers piling up cash to have higher discretionary power by increasing resources under their control (Jensen, 1986). This thesis aims to study the reasons why managers hold cash through analysing the determinants of corporate cash holdings of firms listed on the Egyptian stock market.

1.1 Motivation

It is important to study cash holdings for several reasons. Firstly, cash represents a major portion of corporate wealth (Dittmar and Mahrt-Smith, 2007). Secondly, holding cash has many benefits such as being able to provide liquidity for day to day operations and having sufficient funds for upcoming investment opportunities. Furthermore, cash holdings decrease the risk of financial distress and decrease the cost of capital arising from decreased dependence on external financing and fire sale of assets (Ferreira and Vilela, 2004). Nevertheless, cash holdings come with a cost. The cost of holding cash is the opportunity cost of lost returns that could have been achieved if the company invested the cash in positive net present value projects (Al-Najjar, 2013). Finally, cash is easily accessible by managers, especially when there is low monitoring and high managerial

discretion (Dittmar and Mahrt-Smith, 2007). Agency problems cause managers with high managerial discretion to hold cash for their own private benefits at the expense of shareholders' benefits (Jensen, 1986). Managers prefer to keep cash to increase resources under their control and to make the business safer in order to stay in control for the longest possible time. As such, cash can provide an easy opportunity for managerial expropriation (Shleifer and Vishny, 1997).

1.2 Evolution of Corporate Cash Holdings

Corporate cash holdings have received increased academic attention in recent years. This is mainly because many corporations hold large amounts of cash (Ferreira and Vilela, 2004). Furthermore, there has been great variation in cash holdings over time (Dittmar and Mahrt-Smith, 2007). Studies found that cash balances have been significantly growing throughout the years. Bates, Kahle and Stulz (2009) found that in 2006, companies in the United States held double the amount of cash compared to 1980 figures. Iskandar-Datta and Jia (2012) extend this analysis to other major industrial countries, namely United States (U.S.), United Kingdom (U.K.), Canada, Australia, Germany, France and Japan from 1991 to 2008. The only country that had a decrease in cash holdings is Japan. This was attributed to the country's strong banking sector. All other countries experienced an increase in corporate cash holdings over time predominantly due to precautionary motives. Iskandar-Datta and Jia (2012) reveal that the increase in risk throughout time has caused companies to decrease leverage and increase corporate cash holdings. This means that companies do not finance higher cash balances through increased debt. Moreover, after the financial crisis of 2008, firms have made liquidity management their top priority (Song and Lee, 2012). This could be due to precautionary motives that are reinforced by the difficulties associated with lack of access to capital markets.

1.3 Original Contribution

The aim of this research is to analyse the determinants of corporate cash holdings of firms listed on the Egyptian stock market. This study is the first to investigate the determinants of corporate cash holdings in Egypt. In developing countries, there are higher market imperfections and higher bankruptcy related costs compared to developed countries (Al-Najjar, 2013). Previous research has found that firms operating in countries with weak shareholder protection hoard more cash than those operating in countries with strong shareholder protection due to higher managerial discretion exercised by top management (Dittmar, Mahrt-Smith and Servaes, 2003; Pinkowitz, Stulz and Williamson, 2006; Al-Najjar, 2013). Because of significant market imperfections, economic instability and weak shareholder protection, Egypt offers an ideal context for investigating the reasons that affect the managerial decisions regarding corporate cash holdings. This research investigates a large set of variables in order to gain a comprehensive understanding of the determinants of corporate cash holdings from both financial and corporate governance perspectives. This includes the investigation of variables that are underrepresented in the literature on corporate cash holdings such as government ownership, board gender diversity and audit quality. Crucially, this study is the first to investigate the effect of political stability on corporate cash holdings.

1.3.1 Theoretical Contribution

This thesis aims to fill the gap in research through combining firm characteristics with firm-level governance variables by measuring their effect on the level of cash holdings of companies listed on the Egyptian stock market. Dittmar *et al.* (2003) conducted a cross country analysis on corporate cash holdings. They analysed around 11,000 companies from 45 different countries and found that the overall median cash ratio is 6.6%. One key observation from the study is that Egypt had the highest median cash ratio of 29.57%. This

investigation shows that companies in Egypt keep significantly higher amounts of cash and highlights the importance of a thorough investigation into the reasons why this is the case.

The focus of previous research on corporate cash holdings has been mainly on Europe and the U.S. such as Bates *et al.* (2009), Harford, Mansi and Maxwell (2008), Ozkan and Ozkan (2004), Ferreira and Vilela (2004) and Drobetz and Gruninger (2007). Recently, studies have started to focus more on emerging markets such as Brazil, Russia, India, China (Al-Najjar, 2013), Nigeria (Ogundipe, Salawu and Ogundipe, 2012), China (Chen, Li, Xiao and Zou, 2014; Kusnadi, Yang and Zhou, 2015), East Asia (Song and Lee, 2012) and Iran (Rezaei and Saadati, 2015). Al-Najjar (2013) highlights the importance of investigating developing countries due to greater market imperfections and higher bankruptcy related costs as compared to developed markets. Nevertheless, there has been no research on the determinants of corporate cash holdings in Egypt to date. The recent political and economic instability and the inherent market risks in Egypt increase the importance of investigating cash holdings because managers may have an incentive to hoard cash, specifically due to transaction and precautionary motives mentioned earlier.

Most of the previously cited studies have focused on the financial determinants of corporate cash holdings ignoring the important effect of corporate governance determinants. This leaves a gap in the literature particularly given that the impact of the agency theory on corporate cash holdings is expected to be higher in developing economies due to weaker corporate governance structures, less monitoring and higher managerial discretion. The relationship between corporate governance and cash holdings is not significant in a strong corporate governance country like the U.S., because investors do not discount the value of firms with poor corporate governance, even if they are holding relatively high amounts of cash (Kalcheva and Lins, 2007). This indicates that cash holdings do not affect firm value in the presence of strong corporate governance (Kalcheva

and Lins, 2007). Nevertheless, cash holdings are critical for poorly governed firms (Dittmar and Mahrt-Smith, 2007). Major studies such as Dittmar *et al.* (2003), Pinkowitz *et al.* (2006) and Al-Najjar (2013) agree that firms in countries with low shareholder protection tend to hold significantly more cash than firms in countries with strong shareholder protection. This has been explained by the higher discretionary powers exercised by top management and inability of investors to rely on appropriate market mechanisms to force significant dividend pay-outs. Dittmar *et al.* (2003) find that the agency motive is the primary determinant of corporate cash holdings and highlight the importance of this matter in countries with poor investor protection. Investor protection is very weak in Egypt as a recent World Bank ranking in 2016 has ranked Egypt 122 out of 189 economies on the investor protection index. This ranking has improved to 81 in 2018, but still investor protection is considered weak in Egypt. Thus, the Egyptian context offers an ideal environment for the 'stress test' of the well-established theories mostly tested in developed economies.

Many studies which use corporate governance variables have mainly focused on country-level governance rather than firm-level governance. A few studies measuring corporate cash holdings in an international context have included Egypt in their analysis among many other countries. However, studies that focus on country level governance do not capture the major effect of firm-level governance on corporate cash holdings failing to show the importance of agency problems (Chen *et al.*, 2014). For example, Dittmar *et al.* (2003) analyse international corporate governance and cash holdings of around 11,000 companies from 45 countries; Ramirez and Tadesse (2009) investigate cash holdings, uncertainty avoidance and the multinationality of firms using a large panel of firms from 49 countries; Chang and Noorbakhsh (2006) investigate cash holdings using data from 22,000 firms from 48 countries; and Al-Najjar and Clark (2017) analyse corporate governance and cash holdings in the MENA region, all include Egypt. Nevertheless, cross

country studies focus on broad corporate governance concepts such as investor protection without considering important firm-level agency problems. Therefore, in order to investigate the vital impact of the agency theory on cash holdings, it is important to study the effect of firm-level corporate governance characteristics on corporate cash holdings in Egypt.

Al-Najjar (2013) highlights the importance of further academic inquiry into cash holdings in developing economies focusing on firm-level corporate governance variables such as board parameters, audit features and Chief Executive Officer (CEO) characteristics. Similarly, a recent study by Rezaei and Saadati (2015) focuses on corporate cash holdings in Iran and recommends the use of other variables in future research such as ownership structure and board of directors parameters. In addressing these calls, this study contributes to the existing literature through combining firm characteristics with corporate governance variables and measuring their effect on corporate cash holdings in Egypt. The research is designed to combine a comprehensive set of determinants and addresses important corporate governance aspects that have been underrepresented in the literature.

In further analysis, the study extends to the existing literature in two ways. Firstly, this study investigates if companies listed on the Egyptian stock market have target cash ratios. In this respect, the study analyses the speed of adjustment. In order to get further intuition about the speed of adjustment and adjustment costs, the speed of adjustment in Egypt is compared to the speed of adjustment found by other studies carried out in different contexts. Secondly, the study contributes to the existing literature by analysing the effect of political stability on corporate cash holdings in Egypt. When there is low political stability, managers may take decisions in favour of hoarding cash for precautionary motives disregarding the opportunity cost of forgone returns. Egypt has faced a significant deterioration in political stability since the revolution in 2011 (Euromonitor International,

2014). To the best of the researcher's knowledge, this study is the first to investigate the effect of political stability on corporate cash holdings. In addition to this, a subsample analysis is performed in order to analyse the differences in the determinants of corporate cash holdings in Egypt before and after the revolution.

1.3.2 Practical Implications

Corporate cash holdings have been receiving increased attention in recent years from academics and practitioners internationally. The New York Times has recently reported that companies in the U.S. hold $1.9 trillion in cash collectively (Davidson, 2016). One example is Google having $80 billion cash in bank accounts and short term investments (Davidson, 2016). These significant amounts of cash are idle funds that could be invested to generate future profits. Therefore, academics and practitioners such as boards of directors, managers, investors and policy makers need to know why companies hoard such significant cash balances. Research has shown that companies in Egypt keep a significant portion of their assets in cash. This research will help explain the reasons behind cash hoarding in Egyptian listed companies.

The agency cost of free cash flow theory states that managers favour to accumulate cash for their own wealth maximization even if it is not in the best interest of the shareholders (Jensen, 1986). In countries where there are weak corporate governance structures, there is less monitoring, higher managerial discretion and thus managers are able to keep high levels of cash. Entrenched managers may be able to increase resources under their control for their own private benefits and at the expense of shareholders. Analysing the effect of corporate governance on cash holdings in this thesis will help highlight the important corporate governance variables that may affect the cash holding decisions. This will help policy makers in improving and enforcing the code of corporate governance that will lead to appropriate corporate governance structures. This will in turn increase monitoring and

decrease managerial discretion. Managers will be forced to invest excess cash in positive net present value projects or distribute cash to shareholders as dividends. When investors are able to rely on effective corporate governance mechanisms, shareholder rights will be stronger and corporate wealth should increase. If investors understand this, they will be more willing to invest in the market, causing an overall positive effect on the Egyptian economy. Raised awareness of corporate governance in Egypt will attract more investors to the market due to increased compliance and higher transparency (Elsaman and Alshorbagy, 2011). Additionally, it is important to understand the effect of political stability on cash holdings because political stability directly affects investor and consumer confidence particularly in emerging market economies (Euromonitor International, 2014). More specifically, Egypt has been found to have the highest deterioration in political stability out of 25 major emerging markets since the revolution in 2011 (Euromonitor International, 2014). Understanding how political stability affects managerial decisions regarding cash can help investors and consumers gain back confidence in Egyptian listed firms and the economy as a whole. This research is the first to investigate cash holdings in Egypt attempting to improve cash management in order to increase shareholder wealth, attract more investors to the market and thus improve the Egyptian economy.

In order to gain an understanding of the Egyptian economy, the next section focuses on contextualizing and highlighting the importance of corporate cash holdings in Egypt from different aspects. The section starts by an overview of the Egyptian economy and stock market discussing its development throughout the period under analysis. Then a review of corporate governance in Egypt is presented including a brief discussion on the Egyptian code of corporate governance.

1.4 The Egyptian Context

Egypt is one of the oldest civilizations in the world and one of the most influential countries in the Arab world (Oxford Business Group, 2013). It has recently faced years of political and economic uncertainty (Oxford Business Group, 2013). Egypt has been trying to re-establish economic stability after the revolution that started on the 25th of January 2011. It is claimed that Egypt is now one of the seven most vulnerable economies in the Middle East and North Africa (MENA) region (Farid, 2014). One of the causes behind the revolution was the unequal distribution of wealth brought about by the immense concentration of financial resources in the hands of the Egyptian elite (Elsaman and Alshorbagy, 2011). The ensuing economic and political instability caused by the revolution considerably decreases investor confidence in the Egyptian market.

The above highlights the importance of such a significant economy and how it has been affected by economic and political instability in the recent years. Such instability could affect managerial decisions of firms operating in Egypt. More specifically, political and economic instability can cause managers to accumulate cash in order to protect against future risks and cash shortages. Furthermore, managers could be reluctant to undertake major investments under such risky circumstances and choose to retain high cash levels for precautionary motives. Dittmar *et al.* (2003) find that firms in Egypt keep relatively high cash balances. The alternative emphasis of previous academic studies along with recent developments, thus suggest that Egypt offers a valuable perspective on corporate cash holding decisions.

1.4.1 The Egyptian Stock Market

During the global financial crisis of 2008, Egypt was not as strongly affected as other economies. The Egyptian stock exchange (EGX) reported that 90% of listed companies

actually achieved profits in the third quarter of 2008 (The Egyptian Exchange Annual Report, 2008). In 2009, there was an improvement in the Egyptian economy exceeding expectations for the year. This improvement was reflected in the stock market through high trading records, regulatory development, improvement of information dissemination, technological developments and more (The Egyptian Exchange Annual Report, 2009). In 2010, the Egyptian Economy continued to grow. According to World Bank indicators, the GDP of Egypt increased from 4.7% in 2009 to 5.1% in 2010, which is a healthy percentage considering the period in the aftermath of the global financial crisis (Global economic Prospects, 2011). The Egyptian stock exchange also reported that the improvement of tourism would create more jobs in Egypt and induce development (The Egyptian Exchange Annual Report, 2010).

In 2011, Egypt witnessed a significant decline in economic growth due to the Egyptian revolution which started on the 25th of January 2011. Political tension and economic instability caused the Egyptian economy to deteriorate widely due to many aspects such as a huge drop in foreign direct investments and state budget deficit. The Egyptian stock market reported a market loss of 21% in January 2011 followed by 30% loss after the revolution (The Egyptian Exchange Annual Report, 2011). In 2012, the political events continued to affect the Egyptian economy. Economic growth rates were still very low, negatively affecting the state budget deficit. There was also a significant decline in Egypt's international reserves and reduction in the value of the Egyptian pound. Nevertheless, in 2012 the Egyptian stock market reported that trading volumes and market capitalization increased moderately compared to 2011 (The Egyptian Exchange Annual Report, 2012).

During 2013 and 2014, the Egyptian stock market continued to improve despite the challenges. The year 2014 is considered the best year for the Egyptian stock exchange since the revolution and 2015 is considered second best. The Egyptian Stock Exchange

helped Egyptian companies to expand and create more jobs through providing financing opportunities (The Egyptian Exchange Annual Report, 2015). The following table summarizes the Egyptian stock market development in the recent years.

Table 1.1: The Egyptian Stock Exchange

Listed Companies (Main Market)	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Number of Listed Companies	212	213	213	212	214	221
Number of Traded Companies	211	204	204	206	206	217
Number of Traded Companies as a % of Number of Listed Companies	99	96	96	97	96	97
Average Company Size (LE million)	2,302	1,378	1,763	2,013	2,337	1,945
Market Capitalization End of Year (LE billion)	488	294	376	427	500	430
Market Capitalization as a % of GDP	40	19	24	21	25	22

Source: The Egyptian Exchange Annual Report 2015

As seen in table 1.1, the number of firms listed on the Egyptian stock market range from 212 to 221 in the most recent year and the number of traded firms is between 204 and 217. Even though there are some multinational firms listed on the Egyptian stock market, most firms are domestic. For a large economy like Egypt, the fact that the number of listed firms is only 221 in 2015 is a relatively small number. This indicates that the number of private companies in Egypt is relatively high. Nevertheless, research in Egypt is limited to listed firms because of the unavailability of data on private firms. Gao *et al.* (2013) state that most research on corporate cash holdings have focused on public firms due to the unavailability of data on private firms in most contexts. The firms listed on the Egyptian stock market comprise of 17 different sectors. The sectors are classified according to the

Egyptian exchange official website (http://www.egx.com.eg/English/ListedStocks.aspx). The 17 sectors are:

- Basic resources
- Chemicals
- Construction and materials
- Food and beverage
- Healthcare and pharmaceuticals
- Industrial goods and services and automobiles
- Media
- Oil and gas
- Personal and household products
- Real estate
- Retail
- Technology
- Telecommunications
- Travel and leisure
- Utilities
- Banking
- Financial services excluding banks

The companies listed on the Egyptian stock market are mainly large companies as seen from table 1.1 with average company sizes ranging from 1,378 to 2,337 million Egyptian pounds (Almost 77 to 130 million U.S. dollars). Even though there is the Nilex exchange which is the market for small and medium enterprises, the trading on Nilex in 2015 is only 0.6 billion Egyptian pounds compared to 248 billion Egyptian pounds on the main market (The Egyptian Exchange Annual Report, 2015). Therefore, generally the focus is on the main Egyptian stock market. The main indices of the Egyptian stock market are the EGX 30, EGX 70, EGX 100 alongside to EGX 20 and EGX 50.

After presenting a general overview of the Egyptian economy and stock market in the recent years, the following sections discuss specific issues which relate to the Egyptian stock market that may have an impact of corporate cash holdings.

1.4.1.1 Listing Requirements

The listing requirements for the Egyptian stock exchange are set by the Egyptian Financial Regulatory Authority and were last updated in November 2016. The specific part of listing requirements directly related to this research is article 18. Article 18 states that companies must disclose ownership structure and board of directors in details in a disclosure report including the names of the directors, their job titles and whether they are executives or non-executives (Egyptian Financial Regulatory Authority, 2011). This information is only disclosed compulsory and regularly by Egyptian companies after 2011. This is critical information to this research because studying the effect of corporate governance on corporate cash holdings relies heavily on the fact that such data is consistently and reliably available in Egypt in the time period covered by this study.

1.4.1.2 Dividends and Capital Gains

The Egyptian stock exchange reported that the dividend yield by the end of 2015 was only 7.7%. Even though 7.7% may be high in some developed economies, it is relatively low in Egypt when compared to other safe investments such as deposit interest rates which reached almost 7% in 2015 (World Bank indicators). Also, the dividend yield of 7.7% is a relatively low return figure compared to the high inflation rates in Egypt. This is an indication that investors in Egypt mainly target capital gains rather than dividends. It is also important to note that after the devaluation of the Egyptian pound in 2016 certificates of deposits reached an interest rate of 20%. However, 2016 is not included in the period of this study so it will not be affecting the analysis of the results.

Sakr, Abdel Gawad and Soliman (2016) conduct a research regarding dividend policies on a sample of the 50 most active Egyptian companies from 2006 to 2011. They find that the average pay-out ratio of Egyptian firms is only 22%. They also find that most firms in the

sample do not pay dividends at all. This confirms the fact that investors in Egypt target returns from capital gains more than dividend income. Dividends are directly related to corporate cash holdings through the trade-off theory as discussed later in chapter 2, section 2.2. According to the trade-off theory, firms that pay dividend hold lower levels of cash due to their ability to cut off dividends and raise cash when needed. According to the trade-off theory, since most companies in Egypt do not pay dividends, they would be expected to hold higher cash balances because they do not have the advantage of cutting off dividends and raising cash by doing so.

1.4.1.3 Taxation on Stock Market Returns

Taxation on capital gains was introduced to Egypt in 2014 but has been delayed several times and still has not come into effect (Global Tax Alert by Ernst and Young, 2015). The tax rule states that holders of listed shares will be subject to a 10% tax on capital gains resulting from the sale of listed Egyptian stocks. However, the capital gains resulting from the sale of non-listed stocks is subject to the regular tax rate of 22.5% for corporate and individual stockholders (Doing Business in Egypt Report- a tax and legal guide by Pricewaterhouse Coopers, 2016). The taxation on capital gains of listed stocks is yet to be enforced in Egypt. Thus, the Egyptian tax system clearly encourages wealth generation through capital gains. As mentioned earlier, most Egyptian investors seek to make profits from capital gains rather than dividend income.

Dividend distributions in the Egyptian stock market are subject to a tax rate of 10% (Global Tax Alert, Ernst and Young, 2015). Although participations representing more than 25% of voting stocks are subject to only a 5% tax rate if the holding period is longer than two years (Doing Business in Egypt Report- a tax and legal guide by Pricewaterhouse Coopers, 2016). Since the tax system encourages capital gains and most investors seek

capital gains rather than dividends, dividend payments in the Egyptian stock market are relatively weak and many companies choose not to pay dividends at all.

1.4.1.4 Ownership Structure of Firms Listed on the Egyptian Stock Market

There has been a considerable level of research focusing on ownership structure in Egyptian listed companies in recent years. Omran *et al.* (2008) use a sample of 81 firms in Egypt and compare them to a sample from Jordan, Oman and Tunisia. They find that Egypt is the country with the highest government ownership with an average of 34%. They also find that the average ownership by local individuals is 18%, local private institutions 35%, local others 1% and finally foreign ownership of 12%. They also measure ownership concentration by the top three block holders and find that Egypt has the highest ownership concentration at 58%. Abdelsalam *et al.* (2008) conduct a research on board composition, ownership structure and dividend policy. When analysing ownership structure in Egypt, Abdelsalam *et al.* (2008) agree to a high governmental ownership ratio of 29.97%. They also find that the managerial ownership ratio is 6.51%, individuals' block ownership ratio is 2.27% and institutional ownership (non-governmental) is 19.43%.

Soliman, Bahaa El Din and Sakr (2012) use 42 of the most active companies listed on the Egyptian stock market from 2007-2009 to analyse ownership structure and corporate social responsibility. They find that the average managerial ownership is 24.81%, institutional ownership 52.43% and foreign ownership 24.31%. Wahba (2014) also uses a sample of the 50 most active Egyptian firms to find that the mean managerial ownership is 8.522%, institutional ownership is 24.497%, private ownership is 48.076% and state ownership is 10.937%.

Most studies that analysed the ownership structure of Egyptian listed companies have only used the most active firms listed on the stock market which may lead to survivorship bias.

Survivorship bias may occur due to the fact that these studies only choose firms that meet a certain criteria and neglect others that do not. Nevertheless, as seen from the high percentages of ownership concentration, most studies have showed that institutional ownership is relatively high in Egypt. Khlif, Samaha and Azzam (2015) ensure the fact that most listed companies are still concentrated and many of them in family hands. They state that free float is very low in the Egyptian stock market. Khlif *et al.* (2015) highlight that ownership concentration rise corporate governance challenges, especially in terms of minority shareholder protection. This leads to the next section presenting an overview on corporate governance in Egypt.

1.4.2 Corporate Governance in Egypt

Corporate governance structures and regulations in Egypt have been under continuous improvement to ensure good disclosure practices and enhance investor protection. Such improvements include amendments to existing stock market listing requirements to improve corporate governance structures of listed companies as well as implementation of a new online disclosure system (The Egyptian Exchange Annual Report, 2015). Nevertheless, corporate governance and investor protection still remain weak in Egypt compared to other countries. The World Bank claims that in emerging economies, corporate governance can be very important for a variety of reasons. These reasons include decreasing market vulnerability to financial crises, reducing transaction costs and the cost of capital, and increasing capital market development. However, poor corporate governance structures decrease investor confidence and decrease foreign direct investments (Report on the Observance of Standards and Codes, 2009). Elsaman and Alshorbagy (2011) highlight the importance of corporate governance awareness in Egypt. They suggest that an increased investor awareness of corporate governance will increase

compliance and lead to higher transparency. This will then entice more investors to the market.

In countries with poor minority shareholder protection, controlling shareholders can easily take advantage to their own private benefit (Pinkowitz *et al.*, 2006). The Doing Business Report (2016) states that Egypt has a score of 4.5 out of 10 in the index measuring investor protection. As mentioned earlier, Egypt is ranked number 122 out of 189 economies on the strength of minority investor protection index in 2016 and number 81 in 2018. This ranking shows that Egypt remains a country of relatively poor investor protection. Ferreira and Vilela (2004) state that in countries with poor shareholder protection managers will have incentives to increase cash balances to have greater control over corporate resources. Dittmar *et al.* (2003) and Al-Najjar (2013) find that firms operating in countries with poor shareholder protection hold more cash than those operating in countries with strong shareholder protection. This highlights the importance of investigating the case of Egypt with respect to corporate cash holdings specifically from the agency perspective. The Following section presents a brief discussion on the code of corporate governance in Egypt.

1.4.2.1 The Code of Corporate Governance in Egypt

The code of corporate governance in Egypt is issued by the Ministry of Finance. The latest code was adopted in February 2011 (European Corporate Governance Institute, 2011). The code does not have a legal status, but like in many countries is rather a code of conduct written for the organizations in order to protect stakeholders in general and shareholders in particular. The code is specifically intended for companies listed on the Egyptian stock exchange and companies that finance most of their operations through the banking and financial sectors. However, the code is transferable to any other type of business set up. The code states that if any corporation is not able to comply with one of the standards it

should disclose the reason. All companies listed on the Egyptian stock exchange are required to disclose their compliance with the code of corporate governance in their annual report and their official websites.

Companies must disclose detailed financial statements, independent auditor's report and any other relevant financial information to its stakeholders. Companies are also required to disclose non-financial information such as Board of Directors (BOD) formation, ownership structures, corporate governance compliance, safety standards and corporate social responsibility strategies. Corporate governance in Egypt has been developing in recent years. An example of such development is the involuntary disclose of board data after 2011. Nevertheless, corporate governance still requires improvement in Egypt, especially its practical enforcement.

Having presented some background on the Egyptian context, the next section covers a brief summary of the research methodology used in this study. The sections after then present the research questions and research objectives. The research questions are formulated to contribute to the understanding of cash holding decisions through hypotheses testing (later discussed in chapter 2, section 2.8 and chapter 3, section 3.8). Finally, the specific research objectives are set in order to help test the research hypotheses.

1.5 Methodology

This study is conducted from a philosophical stance of objectivism. A quantitative research approach is adopted. The data collected comprises of all firms listed on the Egyptian stock market. The final sample includes a panel data set of 157 companies from 2008-2015. The data consists of financial data and corporate governance data extracted from Bloomberg. Observations with missing values were completed and cross referenced from Thomson Reuters EIKON. Additional corporate governance data was obtained from Egypt for

Information Dissemination and macro-economic variables were downloaded from the World Bank database. Multivariate regression analysis is used to analyse the effect of financial and corporate governance variables on corporate cash holdings. In order to analyse the determinants of corporate cash holdings, Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS) regression estimators are used. Ordinary least squares regression is tested and corrected for model specification, multicollinearity, heteroscedasticity and autocorrelation. Two-stage least squares regression is used in order to address endogeneity. Finally, in order to measure the speed of adjustment of firms towards their target cash ratios, Generalized Method of Moments (GMM) regression is used.

1.6 Research Questions

The overall aim of this thesis is to analyse the determinants of corporate cash holdings of firms listed on the Egyptian stock market. The aim is achieved by testing the research hypotheses which determine if the established theories adequately explain managerial decisions regarding cash. This thesis fills the gap in research through combining firm characteristics with firm-level governance variables and measuring their effect on the level of cash holdings of companies listed on the Egyptian stock market. In order to contribute to the understanding of corporate cash holdings in Egypt, the following research questions are formulated:

1- What are the financial determinants of corporate cash holdings of firms listed on the Egyptian stock market?
2- What are the corporate governance determinants of corporate cash holdings of firms listed on the Egyptian stock market?

1.7 Research Objectives

In order to address the research questions the following objectives are formulated:

1- Highlighting the importance of corporate cash holdings and providing a background on the Egyptian context
2- Reviewing the literature on corporate cash holdings from a financial perspective
3- Reviewing the literature on corporate cash holdings from a corporate governance perspective
4- Selecting an appropriate data collection technique and the best possible multivariate regression estimator
5- Analysing empirical findings in comparison with previous literature and providing recommendations for companies, managers, investors and policy makers
6- Providing conclusions, highlighting the contribution of findings, presenting research limitations and recommending areas of future research

1.8 Thesis Structure

Based on the research objectives, the thesis structure consists of the following six chapters:

Chapter1: Introduction

This chapter provides a background on corporate cash holding and why it is an important area of research. It overviews the basic managerial decisions regarding cash. The chapter explains how the original contribution addresses the gap in the literature. More specifically, it highlights the theoretical contribution of the research and the important practical implications. The chapter highlights the importance of investigating into the determinants of corporate cash holdings in the Egyptian context. Thereby, the chapter provides an overview of the Egyptian economy focusing on the Egyptian stock market and

corporate governance in Egypt. Finally, it states the overall aim and individual objectives to be met and presents the research questions.

Chapter 2: Literature Review Part 1: The Financial Determinants of Corporate Cash Holdings

This chapter aims to focus on reviewing previous studies and showing how firm characteristics can be very important in cash determination. It explains the theoretical framework as a base for empirical analysis. More specifically, it describes the factors determining cash holding decisions under each established theory. Based on these theories, the hypotheses for firm characteristics are formulated. Furthermore, a review of studies linking cash holdings to political and economic factors is presented.

Chapter 3: Literature Review Part 2: Corporate Governance and Corporate Cash Holdings

This chapter starts by an introduction on the agency theory and its manifestations. Then it describes how the agency theory and managerial discretion can affect cash holding decisions. It reviews previous research on country level and firm level corporate governance and how they can have a significant impact on cash decisions. Based on the agency theory, the hypotheses for corporate governance characteristics are formulated.

Chapter 4: Research Methodology

This chapter starts by presenting the philosophical stance of the research. It describes the research strategies and methodological approaches used in support of major studies in the field. The research model is generated with detailed description of all variables and their calculations. The chapter also provides detailed review of different regression estimators, highlighting the most appropriate detailed procedure carried out for analysis. Finally, it clarifies the data type, collection procedures and limitations of the data.

Chapter 5: Findings and Discussion

This chapter covers the research findings along with its detailed analysis. It shows interpretations of the results of the empirical analysis including comparison of the findings with previous research.

Chapter 6: Conclusion

This chapter concludes the thesis, summarizing the research methods and results. It also presents how the research objectives are achieved and how the research gap is filled. The theoretical and practical contributions are highlighted in terms of the research findings. Finally, it provides recommendations for future research in corporate finance.

Chapter 2: Literature Review Part 1: The Financial Determinants of Corporate Cash Holdings

Introduction

Cash and cash equivalents usually constitute an important component of a firm's assets (Kusnadi, 2011). Dittmar and Mahrt-Smith (2007) examine cash because firms hold large amounts of it. Cash represents a major portion of corporate wealth and is easily accessible by managers. It is also important to analyse corporate cash holdings because of associated costs such as the opportunity cost of not investing in positive Net Present Value (NPV) projects (Al-Najjar, 2013). Song and Lee (2012) state that after the financial crisis of 2007 - 2009, firms have made liquidity management their top priority. Here, one of the solutions is for firms to hoard cash due to the increased cost and difficulty of raising funds in financial markets.

Dittmar *et al.* (2003) analysed corporate cash holdings of around 11,000 companies from 45 countries, the overall median of the cash to net assets ratio is 6.6%. As far as this work is concerned, one key observation is that Egypt has the highest median of 29.57%. This highlights the importance of investigating why companies in Egypt are keeping a high portion of their assets in cash.

Since cash may constitute a significant part of any firm's assets, it is important to analyse the factors that affect the managerial decision on spending or retaining it. Managers have four main motives to holding cash, namely the transaction motive, precautionary motive, agency motive and tax motive. Based on these four motives, there are three main theories that determine corporate cash holdings. These theories are the trade-off, pecking order and agency cost of free cash flow theories. Each of these theories includes firm specific characteristics that add to the understanding of why managers keep cash in companies. The

following section presents the four motives to holding cash in order to later explain the theories and understand the financial determinants of corporate cash holdings under each theory. The motives and theories are summarized later in diagram 2.1.

2.1 Cash Holding Motives

All in all, there are four motives for holding cash: the transaction motive, precautionary motive, agency motive and tax motive. The transaction motive is the motive to hold cash in order to minimize transaction costs associated with financing from external sources (Opler *et al.,* 1999). The precautionary motive is the motive to hold cash as means of protection from future risks (Opler *et al.,* 1999). The agency motive is the motive for managers to hold cash in order to increase resources under their control and their discretionary power (Jensen, 1986). Finally, the tax motive is the motive for multinational firms to hold more cash as they are otherwise required to pay higher taxes due to repatriation of foreign earnings (Foley, Hartzell, Titman and Twite, 2007). This section continues with a more detailed discussion of these motives.

1- The Transaction Motive

The transaction motive states that firms that hold more cash face lower transaction costs as they do not need to raise funds from external sources or sell existing fixed assets (Opler *et al.,* 1999). Firms that accumulate cash do not need to finance their projects by having to rely on expensive capital markets. If companies have sufficient cash reserves to finance their investments, then they can save on transaction costs that come with buying and selling financial and real assets.

2- The Precautionary Motive

The precautionary motive states that companies will hold more cash to hedge the firm against risks associated with unfavourable future changes in respective cash flows (Opler

et al., 1999). They find that firms with riskier cash flows hold more cash due to precautionary motives. Firms that have significant cash reserves can protect themselves from cash flow volatility which could be brought about by business or market risks. Thus, firms with a big enough cash ratio have a lower risk of financial distress and a lower probability of bankruptcy.

3- The Agency Motive

The agency motive deals with the conflicts between managers and outside investors arising from the decision to spend internally generated cash (Jensen, 1986; Ferreira and Vilela, 2004; Harford *et al.,* 2008). Dittmar *et al.* (2003) find that managers decide on how much cash to keep in a company mainly based on their personal wellbeing, rather than shareholders' best interest. Managers would prefer to build up cash reserves to increase the discretionary power under their control (Jensen, 1986). Moreover, higher cash reserves can also be linked to the sense of greater job security for mangers. However, outside investors usually prefer surplus cash reserves to be distributed as dividends or invested in positive net present value projects that increase shareholder wealth. Miller and Modigliani (1961) explain that the rational behaviour assumption is that investors always prefer increased wealth either in the form of dividends or higher market values of their shares.

4- The Tax motive

The tax motive assumes that multinational firms hold higher levels of cash due to higher tax expenses resulting from the repatriation of foreign earnings (Foley *et al.,* 2007). They suggest that firms facing higher repatriation taxes hold higher cash reserves abroad. Most empirical research has ignored the influence of the tax motive on corporate cash holdings. Flipse (2012) finds that European firms primarily hold cash due to precautionary, transaction and agency motives but finds no evidence of the tax motives. This justifies the

assertion that there may be no relationship between cash holdings and the tax motive. The tax motive is beyond the scope of this study because it is a rule based decision whereas the focus of this study relates to decisions with managerial discretion. This study is also not considering the tax motive because it predominantly applies to multinational firms which are not the focus here. From this point onwards, the tax motive will be excluded from the discussion.

Based on the motives to holding cash there are three main theories that attempt to explain the determinants of corporate cash holdings. The three considered motives are related to the three main theories that underpin corporate cash holding decisions (see diagram 2.1, section 2.8). These theories are the trade-off, pecking order and agency cost of free cash flow theories.

The trade-off theory examines the cash holding decision through identifying an optimal level of cash by weighing up the benefits and costs of holding cash (Drobetz and Grüninger 2007). In terms of the benefits, holding cash can decrease the risks of financial distress (precautionary motive) and decrease the firm's reliance on expensive external sources or the unfavourable fire sale of assets (transaction motive) (Opler *et al.,* 1999). The cost of holding cash is mainly the opportunity cost of forfeited returns that could have been generated if the company had invested the cash in a positive net present value project (Ferreira and Vilela, 2004). In the presence of market imperfections there is an optimal level of cash that maximizes firm value (Garcia-Teruel and Martinez-Solano, 2008). The recent political instability and the inherent market risks in Egypt may boost the above outlined motives and persuade mangers in favour of making the decision to accumulate cash.

The pecking order theory originally developed by Myers (1984) deals with the hierarchy of financing preferences. The theory suggests that firms prefer to finance projects through

internally generated funds in the first instance, turning to debt instruments as second choice and leaving equity as the least preferred source of finance. Issuing debt is risky and costly in a country like Egypt where the yield on treasury bonds is significantly higher than in most developed economies.

"In perfect markets all traders have equal and costless access to information about the ruling price and about all other relevant characteristics of shares" (Miller and Modigliani, 1961, p.412).

In imperfect markets, information asymmetry arises and it becomes more expensive for firms to acquire external financing. This is due to the problems related to adverse selection (Garcia-Teruel and Martinez-Solano, 2008). Akerlof (1970) present an example of adverse selection on insurance companies. As the most popular type of medical insurance in the U.S. is group insurance, good health is already a requirement for employment. Thus, the people who get medical insurance are the ones who need it least. The same concept can be applicable to finance. One of the most important aspects of explaining economic institutions uncertainties can be the difficulty of determining good quality from bad quality businesses and so trust is a very important issue (Akerlof, 1970). This problem of adverse selection may cause difficulties for firms to access required external financing resources. The transaction and precautionary motives of holding cash may force managers to rely on internal funds if they are having difficulties accessing expensive capital markets. All of the above reasons suggest stronger motives for greater corporate cash holdings.

The Agency cost of free cash flow theory first proposed by Jensen (1986) deals with conflicts that may occur between managers and shareholders relating to cash decisions. The theory predicts that managers will not pay-out cash to shareholders in the form of dividends in order to protect the resources under their control. This arises from the agency motive to holding cash. Managers hoard cash in order to increase their power and security by removing the all-important monitoring function of capital markets. Jensen (1986)

suggests that internal financing reduces monitoring of capital markets that otherwise occurs when companies obtain external capital. Jensen (1986) states that as managers accumulate more free cash flow, they become more likely to make decisions promoting their own private benefits. An example here would be a decision to grow a company beyond its optimal size in order to increase resources under their control and increase their compensation. Studies like Dittmar *et al.* (2003) and Al-Najjar (2013) agree that firms in countries with low shareholder protection tend to hold more cash because of the higher discretionary powers exercised by top management and inability of investors to rely on appropriate market mechanisms to force significant dividend pay-outs.

The following sections explain the trade-off, pecking order and agency cost of free cash flow theories in detail. It also discusses key financial determinants of corporate cash holdings according to each theory and explains how each determinant adds to the understanding of the cash related decisions. Previous studies do not find consistent evidence on the relationship between cash holdings and its determinants (Belghitar and Khan, 2013). Based on the understanding of the explained theories, an expected relationship between each determinant and cash holdings can be anticipated providing background to more formal hypotheses development for this study.

2.2 The Trade-off Theory

The trade-off theory focuses on optimal cash levels, and does so by analysing marginal costs and benefits of holding cash. Ferreira and Vilela (2004) state that the benefits of holding cash amount to the lower likelihood of financial distress and reduced cost of capital brought about by reduced reliance on external financing and fire sale of assets. The main cost of holding cash is the opportunity cost of investing in low risk, low-return liquid assets.

According to the trade-off theory, when firms accumulate cash they do so in line with an incentive to protect against risks of financial distress. The trade-off theory can explain cash holdings specifically in emerging markets because of the greater market imperfections and higher bankruptcy related costs as compared to developed markets (Al-Najjar, 2013).

The most commonly selected firm characteristics related to the trade-off theory according to major studies such as Opler *et al.* (1999), Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Bates *et al.* (2009), Al-Najjar (2013) and Guizani (2017) are Dividend Payments, Investment Opportunity, Liquid Asset Substitutes, Leverage, Firm Size, Cash Flow, Cash Flow Volatility, Debt Maturity and Capital Expenditure. Each of these determinants is further discussed with references to previous research that examines corporate cash holdings in different contexts.

2.2.1 Dividend Payments

Firms that pay dividends are expected to hold less cash as they can raise funds cheaply through simply forfeiting or cancelling dividend pay-outs (Ferreira and Vilela, 2004). Therefore, according to the trade-off theory, the relationship between dividend payments and cash holdings is expected to be negative.

Bates *et al.* (2009) study the evolution of cash holdings of U.S. firms from 1980 to 2006 and find that the average cash ratio more than doubles over this period. They report that the greatest increase in cash holdings of U.S. firms is mostly in non-dividend-paying firms, recently listed firms and firms operating in high volatility industries. This indicates that the increase in cash holdings over time can be explained by precautionary motives. The trade-off theory is supported by the analysis of Bates *et al.* (2009), which shows a negative relationship between dividends and cash holdings. Non-dividend-paying firms have a relatively higher need to hoard cash than dividend-paying firms. This is due to their

inferior ability to raise funds from cutting off dividends as compared to dividend paying firms. Jensen (1986) also finds that firms that do not pay dividends keep more cash.

Harford *et al.* (2008) and Gao, Harford and Li (2013) also support the trade-off theory by suggesting that firms that pay dividends in the U.S have relatively low cash holdings. Al-Najjar and Clark (2017) find a negative relationship between dividend payment and cash holdings in the MENA region indicating that firms that pay dividends can raise cash when needed. Belghitar and Khan (2013) also find a negative relationship between dividends and cash holdings in U.K. Small and Medium Enterprises (SMEs). In a cross country analysis, Guney, Ozkan and Ozkan (2007) find a negative relationship between cash holdings and dividends. Analysing each country separately they find a negative relationship in the U.S., a positive relationship in Germany, and no significant relationship in France, Japan and the U.K. Also, Guizani (2017) finds no significant relationship between dividends and cash holdings in Saudi Arabia. In another cross-country analysis, Iskandar-Datta and Jia (2012) find a negative relationship between dividends and cash holdings in the U.S., U.K., Canada and Australia, but find a positive relationship in France, Japan and Germany.

In the Russian context, Al-Najjar (2013) finds a negative relationship between the dividend pay-out ratio and cash holdings again supporting the assumptions of the trade-off theory. However, in the Brazilian context the findings of Al-Najjar (2013) contradict the trade-off theory showing a positive relationship between the two variables. This may be because dividend paying firms want to keep their reputation as regular dividend payers while in the meantime continue to accumulate some cash to possibly improve their financial positions. Shah (2011) and Masood and Shah (2014) also find a positive relationship between dividend payments and cash holdings in Pakistan. This means that firms save cash to continue their dividend paying patterns. Drobetz and Grüninger (2007), Bigelli and Sánchez-Vidal (2012) and Wu, Rui and Wu (2012) all contradict the trade-off theory by

finding a positive relationship between dividends and cash holdings. The results of Drobetz and Grüninger (2007) reveal evidence of a significant positive relationship between dividend payments and cash holdings when dividends are measured by means of a dummy variable, but no such significant relationship is found when dividends are measured using dividend yield.

Even though Ozkan and Ozkan (2004) find no empirical evidence of the effect of dividend payments on cash holdings, they explain that a positive relationship between dividend payments and cash holdings imply that dividend paying firms are unwilling to cancel dividend pay-outs and thus need to accumulate cash to avoid future liquidity issues. Song and Lee (2012) also find that cash dividend payments are positively associated with cash holdings in East Asia. Chen *et al.* (2014) show that Chinese firms that paid dividends in the previous year hold more cash the following year in order to sustain dividend pay-outs.

This argument can be linked to the signalling theory. The signalling theory discusses the concept of how information asymmetry between managers and investors can signal the firm's financial position. Managers tend to know more about the firm's future performance and so when firms pay dividends this can show a signal of the firm's financial position to investors (Al-Najjar and Belghitar, 2011). According to the signalling theory, firms that pay dividends send a signal of strong future prospects. Dividend paying firms may need to keep a cash buffer in order to keep paying regular dividends and thus maintain good corporate image. Firms that send out such positive signals to the capital markets may also be able to reduce their cost of capital because investors will consider investing in these companies as relatively safe and as a result may settle for lower returns. Nevertheless, Miller and Modigliani (1961) argue differently to the traditional view explained here by explaining that dividend policies are irrelevant to market valuation. Even though paying dividends could mean sending a positive signal, firms would have to forgo positive net

present value projects in order to pay these dividends which may send a negative one. Therefore, dividend pay-outs send no signal to the market and are irrelevant in the determination of market prices (Miller and Modigliani, 1961).

Al-Najjar and Belghitar (2011) argue that the relationship between cash holdings and dividends could be a simultaneous one. This means that the decision to pay dividends is based on the availability of cash in the company. However, the decision itself to hold cash is dependent on the firm's dividend policy. Interestingly, their findings from a simultaneous equation model show that cash holdings and dividend policy do not have an impact on one another when controlling for endogeneity. Findings also show that cash holdings and dividend policy have the same determinants.

The academic debate regarding the effect of dividend pay-outs on cash holdings is clearly an on-going one. The trade-off theory argues a negative association between dividend payments and cash holdings. Some researchers have supported the trade-off theory by finding evidence of the negative relationship. Here, the narrative which goes with the findings highlights that dividend-paying firms keep low levels of cash because they are free to cancel dividends and raise cash anytime they need. However, other researchers contradict the trade-off theory and actually find a positive relationship between dividends and cash holdings. These researchers explain their findings through showing that dividend paying firms are unwilling to cancel dividends because otherwise their reputation would suffer sending a negative signal to the market. These companies hoard cash to be able to keep paying dividends, alongside trying to improve their financial position. The next section looks at the second determinant of corporate cash holdings, which is investment opportunity.

2.2.2 Investment Opportunity

Firms with good investment opportunities will keep higher levels of cash in order to decrease the opportunity cost of forgone returns (Ozkan and Ozkan, 2004). This implies that firms will accumulate cash to meet all their profitable investment requirements. Firms with higher investment opportunities will also register higher cash levels to protect themselves from possible financial distress that may occur from a stretched liquidity position, once all investments have been made (Ferreira and Vilela, 2004). Thus, according to the trade-off theory the relationship between investment opportunity and cash holdings is expected to be positive. The market-to-book ratio is usually used as a proxy for investment opportunity (Opler *et al.*, 1999).

In the U.S context, Harford *et al.* (2008) find that firms with higher market-to-book ratios have higher cash ratios because they have more growth options. The trade-off theory assumes that firms with more investment opportunities will keep higher levels of cash earmarked for investment, plus a certain surplus which protects from possible future bankruptcy. Dittmar *et al.* (2003) find a positive association between cash holdings and the market-to-book ratio. The academics analysed the data on 11,000 companies from 45 countries. Kusnadi (2005) find that firms with more attractive opportunities in Singapore hold more cash. Guney *et al.* (2007) and Iskandar-Datta and Jia (2012) also find a positive relationship between investment opportunities and cash holdings. Ogundipe *et al.* (2012) find that firms have higher cash ratios when they have upcoming business and growth opportunities. Chen *et al.* (2014) present evidence in the Chinese context that firms with high growth opportunities have high cash levels.

It may be argued that if firms have investment opportunities, they would have already spent the excess cash financing them (Opler *et al.*, 1999). However, it must be noted that the argument here is regarding upcoming growth opportunities and not past ones. Firms

with upcoming opportunities have an incentive to hold cash in order to invest in them because if they face cash shortages they would have to bear a high opportunity cost of the forgone investment (Drobetz and Grüninger, 2007). The next determinant of corporate cash holdings according to the trade-off theory is liquid asset substitutes.

2.2.3 Liquid Asset Substitutes

Firms with more liquid asset substitutes are expected to hold less cash as they can easily sell those liquid assets to make up for possible cash shortages (Ferreira and Vilela, 2004). Most empirical research on cash holdings uses the net working capital to assets ratio as a proxy for liquid asset substitutes. A firm with higher net working capital will have less need to keep cash out of precautionary motives as liquid current assets can be easily converted into cash in case of financial distress. Therefore, according to the trade-off theory the relationship between liquid asset substitutes and cash holdings is expected to be negative.

Ozkan and Ozkan (2004) find that liquid assets have a negative impact on cash holdings of companies in the United Kingdom. Garcia-Teruel and Martinez-Solano (2008) provide evidence of a significant negative relationship between liquid assets and cash holdings supporting the proposition that liquid assets are a substitute to cash. D'Mello, Krishnaswami and Larkin (2008) find a negative relationship between working capital and cash holdings in the U.S. because firms with liquid assets do not need to keep cash. Song and Lee (2012) confirm that net working capital has a negative association with cash holdings in the East Asian context.

Dittmar *et al.* (2003), Ogundipe *et al.* (2012), Bigelli and Sánchez-Vidal (2012), Iskandar-Datta and Jia (2012), Orens and Reheul (2013), Chen *et al.* (2014), Masood and Shah (2014), Locorotondo, Dewaelheyns and Van Hulle (2014) and Guizani (2017) all support

the trade-off theory through reporting a negative relationship between net working capital and cash holdings further justifying that liquid assets are indeed considered as a substitute to cash. Al-Najjar (2013) supports previous studies by finding a negative relationship between liquid assets and cash holdings of Indian firms. The author's conclusions are consistent with aforementioned studies. However, according to Al-Najjar (2013) no significant relationship is found between liquid asset substitutes and cash holdings in Brazil and Russia. Guney *et al.* (2007) contradict all the previously mentioned studies by finding evidence of a positive relationship between liquidity and cash holdings.

Drobetz and Grüninger (2007) use the length of cash conversion cycle (CCC) as a determinant of cash holdings of Swiss firms. As with similar research, they support the trade-off theory by reporting evidence of a negative relationship between cash conversion cycles and cash holdings. This is because a higher CCC represents more inventory and accounts receivables which are generally regarded as liquid assets. A relatively long cycle implies that firms are keeping a reasonable level of inventory in order to avoid risks of stock outs or interruptions in daily operations. Nevertheless, this approach may be more applicable to some industries than others. For example, Chowdhury and Amin (2007) explain that in the case of stock outs in the pharmaceutical industry, the results will be doctors not prescribing this specific medicine at all. Wang, Ji, Chen, Song (2014) also find a negative relationship between the operating cycle and cash holdings up to a certain point, after which the relationship becomes positive because companies increase cash holdings out of precautionary motives resulting from the high operational risk of a long cycle.

Liquid asset substitutes measured using net working capital or the cash conversion cycle group liquid current assets altogether. For a more detailed analysis, current assets may be examined separately. The effect of inventory and accounts receivables may be considered to determine corporate cash holdings. Bates *et al.* (2009) find that the cash ratio increases

with a decrease in inventory levels. This could support the trade-off view that liquid assets and cash holdings are considered substitutes. Even though Ogundipe *et al.* (2012) find a negative relationship between net working capital and cash holdings, they find that accounts receivables and inventory are positively associated with cash holdings. Ogundipe *et al.* (2012) explain that the positive relationship between accounts receivables and cash holdings is due to firms keeping higher cash reserves in order to cover possible losses that may occur as a result of bad debts or late payments. The positive relationship between inventory and cash holdings can happen when there is risk of erosion of inventory value due to obsolescence. Wu *et al.* (2012) find a negative relationship between liquid asset substitutes measured using net working capital and cash holdings. They also examine Account Receivables (A/R) and Account Payables (A/P) separately. Wu *et al.* (2012) find a significant negative relationship between A/R and cash holdings indicating that they are substitutes. This substitute is higher in places where firms have easy access to external finance. More specifically they find that $1 of A/R substitutes only $0.15 of cash. As for accounts payable, they find a significant positive relationship between payables and cash holdings. They show that for every $1 of A/P firms leave $0.71 of cash. They also argue that firms hold less cash for payables if they are in regions with easier financial access.

In a similar strand of research, Drobetz and Grüninger (2007) measure the effect of tangible assets on cash holdings. They use the ratio of fixed assets to total assets in order to measure tangibility. The authors report a negative relationship between cash holdings and tangibility and explain it by suggesting that firms with more tangible assets can sell these assets quickly if they are facing cash shortages. Nevertheless, the conclusion remains strongly debatable. The argument of a negative relationship between liquid current assets and cash holdings is valid because firms can easily sell liquid assets in case of cash shortages. However, the argument may not be as strong in the case of tangible fixed assets

which are harder to sell quickly. It is thus more important to analyse the effect of liquid asset substitutes on cash holdings.

Even though there may be a slight academic disagreement regarding the relationship between liquid assets and cash holdings, the vast majority of studies reveal a negative relationship between the two variables giving an overwhelming support for the trade-off theory (Opler *et al.*, 1999; Dittmar *et al.*, 2003; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004; Garcia-Teruel and Martinez-Solano, 2008; Bates *et al.*, 2009; Ogundipe *et al.*, 2012; Song and Lee, 2012; Wu *et al.*, 2012; Al-Najjar, 2013; Chen *et al.*, 2014). Researchers generally agree that liquid assets are considered to be acceptable substitutes to cash and that companies with high levels of net working capital do not need to keep high levels of cash. The next determinant of cash holdings with regard to the trade-off theory relates to the firm's degree of financial leverage.

2.2.4 Leverage

According to the trade-off theory, identifying the relationship between cash and leverage may be analysed through two different viewpoints. The first point of view suggests a positive relationship between leverage and cash holdings proposing that firms that have higher leverage are expected to hold more cash to reduce the probability of financial distress (Ferreira and Vilela, 2004). Firms that have higher leverage should keep higher levels of cash on hand as precaution in case the firm was unable to settle its obligations on time.

The second point of view suggests a negative relationship between leverage and cash holdings. High leverage means that firms have the ability to issue debt. Firms that have higher leverage are expected to keep lower levels of cash as leverage is seen as a feasible

substitute to cash (Ferreira and Vilela, 2004). Therefore, the relationship between leverage and cash holdings remains indefinite.

Ogundipe *et al.* (2012) find a positive relationship between leverage and cash holdings which is consistent with the first view of the trade-off theory. The authors claim that firms with higher leverage keep higher cash reserves as protection from financial distress. They also support a positive relationship between financial distress (measured using Altman's Z-score model) and cash holdings. They explain that in the same sense, firms with higher leverage and hence higher financial distress keep higher cash reserves as a means of protection from bankruptcy. Locorotondo *et al.* (2014) also provide evidence of a positive relationship between leverage and cash holdings. Garcia-Teruel and Martinez-Solano (2008) find that Small and Medium Enterprises (SMEs) with high leverage keep high levels of cash. SMEs prefer to keep cash rather than settling debts because of the relatively limited access to capital markets as compared to larger firms.

Ferreira and Vilela (2004) show support for the second take on the trade-off theory by reporting that cash holdings are negatively affected by leverage. This supports the second view that debt is a substitute to cash because leverage can act as a proxy for firms' ability to issue debt instruments. Ozkan and Ozkan (2004), Al-Najjar and Belghitar (2011) and Belghitar and Khan (2013) also support this view with their studies which show a negative relationship between leverage and cash holdings in the U.K. Al-Najjar and Clark (2017) report a negative relationship between leverage and cash holdings in the MENA region. Wu *et al.* (2012) and Chen *et al.* (2014) also find a negative relationship between cash holdings and leverage in the Chinese context. Harford *et al.* (2008) and D'Mello *et al.* (2008) find evidence that firms with low cash holdings tend to have high leverage in the U.S. In a cross-country analysis, Iskandar-Datta and Jia (2012) support a negative

relationship between leverage and cash holdings. Guizani (2017) also document a negative relationship between leverage and cash holdings in Saudi Arabia.

Guney *et al.* (2007) combine both views finding evidence that the relationship between leverage and cash holdings is non-linear. They explain that leverage can act as a proxy for the firm's ability to issue debt at low levels. However, when leverage increases, firms accumulate cash for precautionary motives to avoid financial distress (Guney *et al.*, 2007). Guney *et al.* (2007) argue that this non-linear relationship between leverage and cash holdings depends on country-specific corporate governance aspects. They find that the negative relationship between leverage and cash holdings (which is the substitution effect) decreases with creditor protection and ownership concentration but increases with shareholder protection.

Since there are two different views to the relationship between leverage and cash holdings according to the trade-off theory, it remains to be seen specifically which view is more applicable to the Egyptian context. The next determinant of corporate cash holdings according to the trade-off theory is firm size.

2.2.5 Firm Size

The trade-off theory predicts that larger firms are expected to keep lower cash levels because they are fairly diversified and generally have lower probability of financial distress (Ferreira and Vilela, 2004). Thus, the precautionary motive suggests that larger firms have less need to keep cash than their smaller peers. The trade-off theory supports the proposition that large firms do not need to accumulate cash out of transaction motives either. Larger firms do not need to accumulate cash because they have greater access to capital and debt markets and can better absorb associated fees compared to smaller firms

(Ferreira and Vilela, 2004). Therefore, according to the trade-off theory the relationship between firm size and cash holdings is expected to be negative.

Dittmar *et al.* (2003) find that larger firms hold less cash. Ozkan and Ozkan (2004) propose that larger firms are subject to lower information asymmetry, face fewer borrowing constraints and overall enjoy lower costs of external financing. This shows that larger firms do not need to keep high levels of cash to finance their projects internally. Larger firms are also able to raise funds relatively cheaper than small firms due to apparent economies of scale (Opler *et al.*, 1999).

Gao *et al.* (2013) and Locorotondo *et al.* (2014) also find a negative relationship between firm size and cash holdings in the U.S. and Belgium, respectively. Drobetz and Grüninger (2007) agree that firm size is negatively related to cash holdings. Similarly, Ogundipe *et al.* (2012) support the trade-off theory by finding a strongly significant negative relationship between firm size and cash holdings. They suggest that small firms should hold relatively higher cash levels. Bigelli and Sánchez-Vidal (2012) also find a significant negative relationship between cash holdings and firm size in Italian private firms. Wu *et al.* (2012) confirm that firm size impacts cash holdings negatively in China.

D'Mello *et al.* (2008) support this view by finding a negative relationship between cash holdings and firm size for firms experiencing spin-offs in the U.S. A spin-off is when a company divests one of its segments into a new company and divides the firm's assets and liabilities between the new and old companies (D'Mello *et al.*, 2008). They explain that around a spin-off, smaller firms need to accumulate cash because they do not have easy access to external capital markets. However, Garcia-Teruel and Martinez-Solano (2008), Guney *et al.* (2007) and Orens and Reheul (2013) find a statistically insignificant relationship between firm size and cash holdings. This could be because these studies focus solely on small and medium enterprises in Spain and Belgium, respectively. Masood and

Shah (2014) also find an insignificant relationship between cash holdings and firm size in Pakistan. Similarly, Al-Najjar (2013) finds no significant relationship between firm size and cash holdings in Russia or Brazil. The next determinant of corporate cash holdings according to the trade-off theory is cash flow.

2.2.6 Cash Flow

Firms with higher cash flows are expected to hold lower cash levels because cash flows are regarded as a substitute to cash (Ferreira and Vilela, 2004). Iskandar-Datta and Jia (2012) support a negative relationship between cash flows and cash holdings in the U.K. and Germany. Therefore, the relationship between cash flows and cash holdings is expected to be negative.

Most empirical research on cash holdings show contradicting evidence of the trade-off theory by presenting a positive relationship between cash flows and cash holdings (Drobetz and Grüninger, 2007; Harford *et al.*, 2008; Garcia-Teruel and Martinez-Solano, 2008; Song and Lee, 2012; Chen *et al.*, 2014; Masood and Shah, 2014; Gao *et al.*, 2013; Orens and Reheul, 2013; Kusnadi *et al.*, 2015). The positive relationship between cash flows and cash holdings can be interpreted as evidence of the explanatory power of the pecking order theory that will be discussed in detail in section (2.3.4). Ogundipe *et al.,* (2012) find that cash flows have no significant impact on cash holdings. Also, Iskandar-Datta and Jia (2012) show no significant relationship between cash flows and cash holdings in the U.S., Canada, Australia, France and Japan. The following determinant of cash holdings relating to the trade-off theory is cash flow volatility.

2.2.7 Cash Flow Volatility

Firms with higher cash flow uncertainty (Volatility) are expected to hold higher cash levels as they have a higher probability of facing cash shortages (Opler *et al.*, 1999). Firms can

decrease their cash flow uncertainty and avoid liquidity problems through holding cash (Saddour, 2006). In case of high cash flow volatility, firms can experience financial distress (Ferreira and Vilela, 2004). Therefore, the trade-off theory suggests that in the instance of greater volatility it would be more beneficial for firms to hold higher levels of cash in order to protect themselves from bankruptcy. The trade-off theory predicts the relationship between cash flow volatility and cash holdings to be positive.

In the U.S. context, Harford *et al.* (2008), Bates *et al.* (2009), Guney *et al.* (2007) and Gao *et al.* (2013) find a positive relationship between cash flow volatility and cash holdings. These results are in line with the trade-off theory. This could be explained by the precautionary motive indicating that firms keep higher cash levels in order to avoid cash shortages and financial distress. Chen *et al.* (2014) suggest that firms with more volatile cash flows opt for holding more cash. Bigelli and Sánchez-Vidal (2012) and Locorotondo *et al.* (2014) find a positive relationship between cash holdings and volatility in Italy and Belgium, respectively. Also, Belghitar and Khan (2013), Iskandar-Datta and Jia (2012) and Guizani (2017) find that cash flow volatility impacts cash holdings positively. Han and Qiu (2007) argue that in the U.S., cash flow volatility affects cash holdings positively only in firms that have borrowing constraints due to difficult access to external financing. This is because when firms have uncertain cash flows, the difficult access to finance causes them to keep cash for precautionary motives. However, they find no relationship between cash holdings and cash flow volatility of firms that already have easy access to capital markets. Shah (2011) finds no relationship between volatility and cash holdings in Pakistan. They justify that this may be due to slow court procedures in Pakistan, leading to managers not fearing the risk of financial distress. The next determinant of cash holdings according to the trade-off theory is debt maturity.

2.2.8 Debt Maturity

Firms with more short term debt are expected to hold more cash as they frequently renegotiate their credit terms (Saddour, 2006; Ferreira and Vilela, 2004). Therefore, firms with lower debt maturity hold more cash because they face higher risks of financial distress due to uncertainty associated with such refinancing. Therefore, the relationship between debt maturity and cash holdings is expected to be negative. Garcia-Teruel and Martinez-Solano (2008) support Ferreira and Vilela (2004) by finding a significant negative relationship between debt maturity structure and cash holdings. Firms with shorter debt maturity keep higher cash levels in order to decrease their dependence on external financing and reduce refinancing risk. Shah (2011) also finds a negative relationship between debt maturity and cash holdings. Nevertheless, Wu *et al.* (2012) contradict these findings through a positive relationship between debt maturity and cash holdings. This is because firms with longer debt maturity hold more cash to avoid unexpected liquidity risks. The following determinant of corporate cash holdings regarding the trade-off theory is capital expenditure.

2.2.9 Capital Expenditure

Capital expenditure to assets measures a firm's investment opportunity specifically in fixed assets. If firms are facing good investment opportunities they will accumulate cash. Therefore, according to the trade-off theory, the relationship between capital expenditure and cash holdings is expected to be positive. Kusnadi (2005) finds evidence of the trade-off theory in Singapore by reporting that firms with more capital expenditure hold higher levels of cash.

To sum up, the trade-off theory analyses the financial determinants of corporate cash holdings through identifying the benefits and costs of holding cash. One of the main

benefits of holding cash is reduced risks of financial distress (Opler *et al.,* 1999). According to the trade-off theory, firms with higher leverage, higher cash flow volatility and shorter debt maturity are subject to higher financial distress and thus maintain higher cash levels. Another benefit of holding cash is that firms with sufficient cash levels do not have to rely on expensive external sources or equally (if not more) expensive fire sale of existing fixed assets (Opler *et al.,* 1999). According to the trade-off theory, cash levels increase with an increase in investment opportunity and capital expenditure because firms that have profitable investment opportunities ahead tend to hoard cash prior to such investments.

However, it is by far not optimal to keep unnecessary levels of cash in a firm due to associated holding costs. The main cost of holding cash is the opportunity cost of not investing in profitable positive net present value projects (Ferreira and Vilela, 2004). According to the trade-off theory, cash levels decrease with dividend payments because it is unnecessary for dividend-paying firms to keep high levels of cash as they can retain funds through the cancellation of dividends. Also as per the trade-off theory, cash decreases with liquid assets, leverage and cash flows because they are all regarded as substitutes to cash. Similarly, larger firms keep relatively low levels of cash because they have a lower probability of financial distress and better access of capital markets and therefore do not need to keep high levels of cash.

As the trade-off theory views the determinants of corporate cash holdings through weighing the benefits and costs of holding cash, the pecking order theory views the financial determinants of corporate cash holdings from a different perspective. The latter theory suggests that firms opt to accumulate cash to avoid financing from external sources. In the following section, the financial determinants of corporate cash holdings are discussed in accordance with the pecking order theory.

2.3 Pecking Order Theory

"In the pecking order theory, firms prefer internal to external funds and debt to equity if external funds are needed" (Myers, 1984, p. 2).

This implies that firms would opt to finance projects using retained earnings. If retained earnings are insufficient then they would use debt instruments and leave equity as the last resort.

When there are market imperfections, internal and external finance are not perfectly interchangeable because the cost of external finance is derived from the extent to which companies face capital market imperfections (Arslan, Florackis and Ozkan, 2006). Due to information asymmetry, the cost of external finance is thus always higher than internal finance and so firms prefer to finance from internal resources before obtaining more expensive external resources (Chen, 2008). Unlike the trade-off theory, firms do not have an optimal cash level, but try to hoard cash for future investments and overall decrease dependence on external financing.

The firm characteristics related to the pecking order theory according to major studies such as Opler *et al.* (1999), Ferreira and Vilela (2004), Saddour (2006), Shah (2011), Al-Najjar (2013) and Guizani (2017) are Investment Opportunity, Leverage, Firm Size, Cash Flow and Capital Expenditure. The financial determinants which are applicable to the trade-off theory are also applicable to the pecking order theory, albeit with different justifications. In the next section, each determinant is discussed in detail from the pecking order point of view. An expected relationship between each determinant and cash holdings is presented using review of prior research on the subject matter. The first determinant of corporate cash holdings under the pecking order theory is investment opportunity.

2.3.1 Investment Opportunity

Firms with higher investment opportunity are expected to have higher cash holdings to invest in these opportunities (Ferreira and Vilela, 2004). The alternative here would mean expensive external financing. In order for companies to save financing costs and decrease reliance on issuing debt or equity, firms that have potential investment opportunities would simply save cash for that purpose. Therefore, the relationship between investment opportunity and cash holdings is expected to be positive. The trade-off theory also proposes a positive relationship between investment opportunity and cash holdings but suggests competing justifications. As discussed before, according to the trade-off theory firms retain cash to take advantage of profitable investment opportunities as well as protect themselves from possible financial distress. According to the pecking order theory however, firms retain cash in order to avoid having to rely on expensive external financing.

Myers and Majluf (1984) propose that external financing is costly in the presence of asymmetric information between managers and investors as securities may be mispriced. Akerlof (1970) explain that information asymmetry occurs when sellers have more information than buyers of a specific product. In this case, it is difficult for buyers to distinguish good quality products from bad. Since all products should sell at the same price, eventually bad quality products drive good quality products out of the market. If information asymmetry occurs in capital markets, securities become mispriced and external financing becomes very costly. In this case, firms will prefer internal over external finance according to the pecking order theory and thus it becomes better for firms to hoard cash. To avoid high adverse selection costs, firms with higher information asymmetries hold higher cash levels. Song and Lee (2012) find a positive relationship between investment opportunity (measured by the market-to-book ratio) and cash holdings in East

Asia. Kusnadi *et al.* (2015) also find that firms with more investment opportunities hold higher levels of cash.

Drobetz and Grüninger (2007) do not find statistically significant results between the market to book ratio and cash holdings of firms in Switzerland. They interpret the results by explaining that Switzerland is a more bank-oriented economy than the U.K. and U.S., and banks usually have stronger monitoring power than capital markets. In this case, there would be less information asymmetry and the cash decision would not be affected. Egypt also has a bank-based financial system (Demirguc-Kunt and Levine, 1999).The authors define a bank based financial system as one in which banks play a major role in mobilizing savings, allocating capital, overseeing the investment decisions of corporate managers and in providing risk management vehicles. However, D'Mello *et al.* (2008) also did not find a significant relationship between investment opportunity and cash holdings in the U.S. However, their analysis is only for firms that divest their segments into new companies. They justify that in this case, managers only take advantage of immediate investment opportunities instead of upcoming ones. Shah (2011) also finds no significant relationship between the market to book ratio and cash holdings. However, the author explains this as a problem with the market value of equity data in Pakistan. Therefore, the study uses the annual percentage increase in assets as a proxy for growth, instead of the market to book ratio. Finally, Guizani (2017) also finds no relationship between investment opportunity and cash holdings in Saudi Arabia. The second determinant of cash holdings according to the pecking order theory is leverage.

2.3.2 Leverage

According to the pecking order theory there is a negative association between leverage and cash holdings. This can be shown by means of two scenarios. The first scenario is when investment needs exceed retained earnings. This scenario inevitably causes a cash deficit

which once all the cash reserves for investments have been used up, the company starts financing through issuing debt (Opler *et al.*, 1999). Therefore, a reduction in cash leads to higher leverage.

Similarly, the second scenario also proves a negative relationship between leverage and cash holdings. This is when investment spending is less than retained earnings. This situation creates cash surplus. In case of cash surplus, firms accumulate cash and use it to repay principle debt as they come due (Opler *et al.*, 1999). Debt repayment can be done either through periodic instalments or bulk principal repayment subject to availability of surplus cash from extraordinary items. In both cases firms try to settle debt obligations first and then accumulate cash. Therefore, the relationship between leverage and cash holdings is expected to be negative.

Drobetz and Grüninger (2007) support the pecking order theory reporting a negative relationship between leverage and cash holdings. The negative relationship between leverage and cash that is suggested by the pecking order theory is similar to the second point of view of the trade-off theory that leverage and cash are substitutes. Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Harford *et al.* (2008), Gao *et al.* (2013) and Orens and Reheul (2013) all find a negative relationship between cash holdings and leverage. Song and Lee (2012) also find that leverage is negatively related to cash holdings when analysing a sample of East Asian companies. Chen *et al.* (2014), Wu *et al.* (2012) and Kusnadi *et al.* (2015) find a negative relationship between leverage and cash holdings in China.

In further analysis, studies such as Almeida, Campello and Weisbach (2004) and Acharya, Almeida and Campello (2007) find that the relationship between debt and cash holdings depends on whether firms have easy access to capital markets or not. Financial development allows easier access to external financing at lower costs (Khurana, Martin

and Pereira, 2006). However, when external finance is costly, firm's investments are limited to its internal funds (Khurana *et al.,* 2006). Financially constrained firms are those that do not have easy access to capital markets (Almeida *et al.,* 2004). If firms are financially constrained then they will need to hoard cash to protect against future liquidity needs and to have cash available for future investment opportunities (Almeida *et al.,* 2004). However, unconstrained firms that have unrestricted access to capital markets do not need to hoard cash for these reasons. Almeida *et al.* (2004) measure financial constraints by different approaches such as dividing the sample by pay-out policy, asset size, and bond and commercial paper ratings. More specifically, Almeida *et al.* (2004) suggest that financial constraints affect cash flow sensitivity of cash. They define cash flow sensitivity as the firm's intention to save cash from cash inflows. Arslan *et al.* (2006) support these findings by suggesting that constrained firms show higher cash flow sensitivity than unconstrained firms.

In similar sense, Acharya *et al.* (2007) explain that traditionally cash has been viewed as negative debt because cash on a company's balance sheet can be easily used to cover the company's obligations. They study firms that have upcoming profitable investment opportunities but have difficult access to external capital markets (financially constrained firms). In this case, firms have two different alternatives. The first alternative is to save internal funds or issue debt to be able to undertake the profitable investment opportunities. The second alternative is to use the excess cash to pay off existing debt. Acharya *et al.* (2007) prove that financially constrained firms with high hedging needs prefer to retain excess cash flows into cash holdings. However, those with low hedging needs prefer to pay back existing debt. In a cross country analysis, Khurana *et al.* (2006) also find that firms operating in countries that are financially underdeveloped, managers have a greater intention to save cash out of cash flows because firms are financially constrained. Pal and Ferrando (2010) argue that in Europe, constrained and unconstrained firms prefer to save

cash out of cash flows. This means that even if firms have easy access to external finance, they still prefer to hold cash for internal financing. They also find that firms facing difficult access to external finance invest at a low rate and grow more slowly. These firms specifically hold high cash reserves in bad economic conditions due to precautionary motives. Nevertheless, D'Espallier, Huybrechts and Schoubben (2014) contradict the findings of Almeida *et al.* (2004) and find that accumulating cash out of cash flows is not a result of financial constraints. However, they argue that accumulating cash is a result of income uncertainty, which is in line with precautionary motives. Moving on to the third determinant of corporate cash holdings, firm size is discussed in the next section.

2.3.3 Firm Size

Opler *et al.* (1999) state that larger firms are expected to have more cash because they are expected to be more successful and as such do not need to resort to expensive external financing. Therefore, the relationship between firm size and cash holdings is expected to be positive.

The pecking order theory totally contradicts the trade-off theory with regard to firm size. The trade-off theory states that larger firms are expected to keep lower cash levels because they have higher diversification and lower probability of financial distress (Ferreira and Vilela, 2004). Conversely, the pecking order theory states that larger firms are able to accumulate more cash because they are considered more successful and therefore are better able to decrease their reliance on external sources of finance.

Song and Lee (2012) provide evidence of a positive relationship between firm size and cash holdings in East Asia. Shah (2011) shows a positive relationship between firm size and cash because larger firms are able to accumulate more cash. Al-Najjar and Clark (2017) also find that in the MENA region larger firms hold more cash to be able to finance

their projects. Al-Najjar (2013) finds evidence of the pecking order theory in China which is indicated by a positive relationship between size and cash holdings. Al-Najjar (2013) explains that large Chinese firms actually need to hold more cash due to higher diversification. However, in India they find a negative relationship between size and cash holdings explaining that smaller sized firms keep higher levels of cash because of their inability to obtain external funds easily. The fourth determinant of corporate cash holdings according to the pecking order theory is cash flow.

2.3.4 Cash Flow

Firms with more cash flows are expected to have more cash (Ferreira and Vilela, 2004). This indicates that firms with higher cash flows do not need to rely on external financing because they can rely on retained earnings for internal finance. Therefore, the relationship between cash flows and cash holdings is expected to be positive.

Major studies such as Opler *et al.* (1999), Dittmar *et al.* (2003) and Ferreira and Vilela (2004) measure the cash flow ratio as after tax profit plus depreciation divided by total assets. According to the pecking order theory firms with more profitability build up cash reserves (Opler *et al.*, 1999). Drobetz and Grüninger (2007) support this view by finding a significant positive relationship between operating cash flows and cash holdings. The trade-off theory argument that cash flows and cash holdings are substitutes is not supported by the pecking order theory. In fact, the pecking order theory has the exact opposite view once again. Firms with higher cash flows keep higher cash levels to avoid external financing.

The positive relationship between cash flows and cash holdings supports the idea that firms with more cash flows prefer to finance their projects internally (Garcia-Teruel and Martinez-Solano, 2008). They suggest that this relationship is more pertinent for SMEs

because of the greater information asymmetry. Belghitar and Khan (2013) argue that problems such as market imperfections, information asymmetry and financial distress are found to be more severe in SMEs. Harford *et al.* (2008) find that firms with high cash holdings are the ones with high cash flows. Song and Lee (2012) confirm this view by discovering a positive association between cash flows measured by EBIT and cash holdings of East Asian firms. Recent studies such as Wu *et al.* (2012), Gao *et al.* (2013), Chen *et al.* (2014), Masood and Shah (2014) and Kusnadi *et al.* (2015) also find that firms with higher levels of cash flows hold higher levels of cash. The findings support the pecking order theory showing that firms keep cash in order to minimize financing from external sources. The fifth determinant of corporate cash holdings according to the pecking order theory is capital expenditure.

2.3.5 Capital Expenditure

Capital expenditure measures the firm's investments in fixed assets. According to the pecking order theory, firms finance investments form internal sources. Firms that have good investment opportunities in fixed assets have low cash holdings because the cash reserves would have been already used in the purchase of such assets. Harford *et al.* (2008) support this view by finding that firms with low cash holdings spend relatively more on capital expenditures and acquisitions. Therefore, the relationship between capital expenditure and cash holdings is expected to be negative. Bates *et al.* (2009) argue that one of the main reasons behind the increase in cash holdings over time is the decrease in capital expenditure. This supports the pecking order theory because when there is a good investment opportunity in capital expenditure firms use internal cash to finance it. Wu *et al.* (2012) and Chen *et al.* (2014) find that firms in China with high capital expenditures hold relatively low levels of cash. Guney *et al.* (2007) and Iskandar-Datta and Jia (2012) find evidence of a negative relationship between capital expenditure and cash holdings in

their cross-country study. Masood and Shah (2014) and Gao *et al.* (2013) also report a negative relationship between capital expenditure and cash holdings in Pakistan and the U.S., respectively. Locorotondo *et al.* (2014) also find a negative relationship between capital expenditure and cash holdings in Belgium. In the Saudi Arabian context, Guizani (2017) confirms a negative relationship between capital expenditure and cash holdings. The author explains that firms in Saudi Arabia that have large investments do not have surplus cash to keep in the company. However, D'Mello *et al.* (2008) find no significant relationship between cash holdings and capital expenditure in the U.S. They justify that at spin-offs, managers focus on immediate growth opportunities and do not spend cash on capital expenditures.

To sum up, under the pecking order theory, firms prefer to finance projects internally and try to minimize financing from external expensive sources. Firms with more investment opportunities keep more cash to avoid financing such opportunities from capital markets. Similarly, larger firms and firms with more cash flows accumulate cash while they can in order to avoid reliance on external financing. Cash holdings decrease with leverage and capital expenditure because firms prefer to use up all internal resources before turning to external ones.

While the trade-off theory combines firm characteristics through weighing benefits and costs of holding cash and the pecking order theory combines firm characteristics because of the preference for internal financing, the agency cost of free cash flow theory presents the determinants of corporate cash holdings from an entirely different perspective. The agency cost of free cash flow theory is based on the agency motive to holding cash which relates to factors affecting managerial discretion. The determinants of corporate cash holdings with regard to agency considerations are discussed in the next section.

2.4 Agency Cost of Free Cash Flow Theory

Free cash flow is the excess cash generated by a firm which is left over after financing all positive net present value projects when discounted at the relevant cost of capital (Jensen, 1986). Agency cost of free cash flow refers to the agency conflict which arises between managers and investors concerning cash holdings. According to Jensen (1986), managers want to accumulate cash to increase the amount of assets under their control and thus gain power over the firm's investment decisions.

Ferreira and Vilela (2004) suggest that when managers accumulate cash they become exposed to less pressure to perform well and get the discretion to invest in projects that best suit their own interests and at the expense of shareholders. In developing the free cash flow hypothesis, Jensen (1986) assumes that in stronger corporate governance regimes shareholders are more powerful and force managers to pay-out that cash in the form of dividends. This essentially means that companies with stronger corporate governance hold less cash. According to major studies such as Ferreira and Vilela (2004), the firm characteristics related to the agency cost of free cash flow theory are Investment Opportunity, Leverage and Firm Size. All of these firm characteristics have been previously discussed under the trade-off and pecking order theories but will now be discussed from the agency perspective. The first financial determinant of corporate cash holdings according to the agency cost of free cash flow theory is investment opportunity.

2.4.1 Investment Opportunity

According to Dittmar and Mahrt-Smith (2007), if decisions are left entirely to managers, they will waste corporate resources. Firms with more investment opportunities are expected to have lower cash holdings because managers fail to identify positive net present value projects and are likely to simply waste the cash. Jensen (1986) suggests that firms

with poor growth opportunities keep higher levels of cash. Therefore, under the agency theory the relationship between investment opportunity and cash holdings is expected to be negative.

Dittmar *et al.* (2003) claim that in countries with low shareholder protection the relationship between investment opportunity and cash holdings weakens and thus the transaction cost motive is no longer considered the primary determinant of the cash decision. In these countries, managers pay less attention to investment opportunities while the cash holdings are viewed as a product of agency conflicts. Ferreira and Vilela (2004) state that managers may invest in growth projects even if they have a negative net present value and will likely erode shareholders wealth. Rezaei and Saadati (2015) confirm this view by finding that companies that have free cash flow in Iran invest in negative net present value projects due to agency conflicts between shareholders and managers. Iskandar-Datta and Jia (2012) find that managers in Germany that have poor growth opportunities hold excess cash which is evidence of an agency motive. However, they do not find evidence of this in the U.S., U.K, Canada, Australia or France. The second determinant of cash holdings according to the agency theory is leverage.

2.4.2 Leverage

Firms with higher leverage hold less cash because they are subject to greater monitoring (Ferreira and Vilela, 2004). Firms that issue debt securities are monitored by capital markets. In such cases managers have lower managerial discretion and are forced to invest excess cash or otherwise distribute it as dividends to shareholders. Therefore, the relationship between leverage and cash holdings is expected to be negative.

Pinkowitz and Williamson (2001) find that firms that have access to non-bank finance in Japan hold significantly lower levels of cash than firms that depend heavily on the banking

system. This shows that banks encourage firms to accumulate cash in order to benefit the bank itself. The negative relationship between leverage and cash holdings that is developed by the agency theory is similar to the negative expectations developed by the pecking order theory and the second view of the trade-off theory. As mentioned before, Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Drobetz and Grüninger (2007), Harford *et al.* (2008), Song and Lee (2012), Chen *et al.* (2014) and Kusnadi *et al.* (2015) all find a negative relationship between leverage and cash holdings. According to the agency cost of free cash flow theory, managers with high leverage are better monitored by capital markets and thus are forced to keep lower levels of cash.

Underinvestment problems may be created when there are agency conflicts between shareholders and creditors. In this case, it is more costly and difficult to acquire funds and so firms can keep liquid assets to decrease dependence on external financing (Garcia-Teruel and Martinez-Solano, 2008). This means that in the presence of agency problems, managers keep high levels of cash to avoid external financing implying a negative relationship between leverage and cash holdings. The third determinant of cash holdings according to the agency theory is firm size.

2.4.3 Firm Size

Larger firms are expected to hold more cash because managers of larger firms have higher discretionary power (Ferreira and Vilela, 2004). This is because of dispersed ownership, inability to speak with one voice, free riding problems and lower probability of takeover. Therefore, according to the agency theory the relationship between firm size and cash holdings is expected to be positive.

The positive relationship between firm size and cash holdings suggested by the agency theory is in line with the expectations of the pecking order theory but contradicts the

expectation of the trade-off theory. Al-Najjar and Belghitar (2011), Song and Lee (2012) and Al-Najjar (2013) find a positive relationship between firm size and cash holdings.

To sum up, the agency cost of free cash flow theory offers three determinants of corporate cash holdings from agency standpoints. Firms with more investment opportunities are expected to forgo them because they will fail to identify the positive net present value projects. Firms with more leverage are expected to hold less cash because they are better monitored from capital markets and so managers are forced to decrease cash levels. Similarly, managers of large firms keep high levels of cash because shareholders are unable to control cash decisions. This argument leads to the conclusion that stronger corporate governance mechanisms will decrease managerial opportunism and force managers to take decisions in favour of shareholders' best interests. This strongly suggests that corporate governance has a significant impact on the managerial decisions regarding cash.

This chapter relates to financial determinants of corporate cash holdings with the theoretical framework behind the discussion made up of the trade-off, pecking order and agency theories. The next chapter focuses solely on the effect of the agency theory on corporate cash holdings because the cash decision does not depend only on financial determinants, but on corporate governance as well. The corporate governance variables that add to the understanding of corporate cash holdings from the agency perspective specifically are discussed in the next chapter. Before considering the effect of corporate governance on corporate cash holdings, it is important to overview other variables that may have an impact on cash holdings in certain contexts which are not considered in this study. The following section briefly reviews miscellaneous variables that have been discussed in previous research but are beyond the scope of this research.

2.5 Miscellaneous Variables

As mentioned before, the opportunity cost of holding cash is the firms' need to sacrifice more profitable investments. However, usually firms hold cash for transaction and precautionary motives. Recent literature discovered that cash decisions may be affected by other factors such as agency conflicts, information asymmetry and financial distress (Garcia-Teruel and Martinez-Solano, 2008). Here, the focus is on Small and Medium-sized Enterprises (SMEs) because it is argued that agency conflicts, information asymmetry and financial distress are all more severe in the context of such companies.

This section overviews other miscellaneous variables examined in previous studies. These variables may have a significant impact on cash holdings in certain contexts but are considered to be beyond the scope of this study. This could be because their effect is already captured by other variables or they are not applicable to the Egyptian context. The first miscellaneous firm specific variable that has been addressed in prior research is financial distress.

2.5.1 Financial Distress

Re-considering the trade-off theory, it can be noted that financial distress is an important element of the theory. Most determinants of corporate cash holdings relating to the trade-off viewpoint are somewhat linked to financial distress. Firms with higher investment opportunities hold higher cash levels as protection from risks associated with financial distress. Similarly, firms with higher leverage, higher cash flow volatility and shorter debt maturity are expected to keep higher cash levels as they may be more exposed to the risk of financial distress. On the other hand, larger sized firms and firms with more liquid asset substitutes keep lower cash levels because they have lower probability of financial distress.

Ogundipe *et al.* (2012) find a positive relationship between financial distress and cash holdings. They measure financial distress using Altman's Z-score model. According to the trade-off theory, firms with a higher probability of financial distress keep higher cash levels in order to avoid bankruptcy. Drobetz and Grüninger (2007) follow Kim *et al.* (1998) using the inverse of an adjusted version of Altman's (1968) Z-score (1/ZSCORE) in order to analyse the effect of the probability of financial distress on corporate cash holdings. Drobetz and Grüninger (2007) argue that there could be a positive relationship between the probability of financial distress and cash holdings as firms try to avoid financial distress by accumulating cash. However, there could also be a negative relationship between the probability of financial distress and cash holdings as firms in distress are unable to hold excess cash. Their results support a significant negative relationship between the inverse of the Z-score and cash holdings. They explain that financial pressure may decrease the agency cost of free cash flow according to Jensen (1986) and so managers are pressured to keep lower levels of cash.

The Z-score is not used in this study to measure financial distress because financial distress is already considered through the means of other variables such as leverage, cash flow volatility and debt maturity. Higher leverage and higher cash volatility are in themselves proxy indications of higher financial distress. Adding the Z-score could be a duplication of the existing variables in the research model causing multicollinearity among them. Also Garcia-Teruel and Martinez-Solano (2008) and Shah (2011) find no significant relationship between financial distress (ZSCORE) and cash holdings. The second miscellaneous variable that has been analysed in some previous research is bank debt.

2.5.2 Bank Debt

Ozkan and Ozkan (2004) find that bank debt impacts cash holdings negatively. Firms that have a relationship with banks have better access to bank finance and thus keep lower

levels of cash (Ogundipe *et al.,* 2012). The academics support this claim by reporting a negative relationship between the bank debt/total debt ratio and the cash ratio. Garcia-Teruel and Martinez-Solano (2008) also find a significant negative relationship between bank debt and cash holdings. This indicates that companies that maintain a good relationship with banks do not need to keep high levels of cash because they have reliable access to bank financing. Bank debt is not considered in this study because it is difficult to distinguish between bank debt and other types of debt by examining balance sheet data pertaining to Egyptian listed companies. It is also expected that the majority of balance sheet debt of Egyptian companies would be already bank debt. This is due to the fact mentioned before that Egypt has a bank-based financial system (Demirguc-Kunt and Levine, 1999). Therefore, adding a bank debt variable would be duplication to the incorporated leverage variable. Another variable widely addressed in previous studies is research and development expenditure. However, data collection is a major limitation regarding this variable.

2.5.3 Research and Development

According to the trade-off theory, firms will keep high levels of cash to invest in research and development (Opler *et al.,* 1999). Therefore, the relationship between Research and Development (R&D) expenditure and cash holdings is expected to be positive. Dittmar *et al.* (2003) support the trade-off theory by finding that firms that hold more cash have higher research and development expenditures. Bates *et al.* (2009) find that cash holdings increase with R&D expenditures. This is explained by the fact that firms will accumulate cash if they have the intention to invest in useful research and development. Research and development is not considered in this study because it represents a firm's growth opportunity which is already captured through the investment opportunity variable measured using the market-to-book ratio. Also there is no availability of information

regarding research and development expenditures of companies in Egypt. The next section briefly reviews how cash holdings can be affected by firm structure.

2.5.4 Firm Structure

Previous research also examined how different organizational structures may have different cash holding policies. The factors addressed in this section are not related to any specific theory, but could be generally linked to firm structure. Dittmar and Duchin (2011) analyse the effect of corporate life cycle on cash holdings. Dittmar and Duchin (2011) find that cash holdings of companies decrease as they progress through their life cycles. This is because older (mature) firms have lower need to keep cash for precautionary motives.

Fernandes and Gonenc (2015) measure the effect of 'multinationality' on corporate cash holdings. Even though it has been widely accepted that multinational firms hoard more cash, Fernandes and Gonenc (2015) find no evidence of this suggestion. In fact they observe the opposite by confirming that multinationality of firms and cash holdings are negatively associated. The academics find that in emerging markets firms with foreign sales have higher cash levels. More specifically, Fernandes and Gonenc (2015) find that more diversified multinationals hold higher cash levels compared to focused multinationals. This is because multinationals selling different products in different countries have a greater need for cash.

Duchin (2010) contradict this view finding that diversified firms hold significantly less cash than specialized firms in the U.S. This is because diversified firms have lower risk due to the fact that risky debt is spread out across different operations (Duchin, 2010). Duchin (2010) specifies that in the U.S. the cash holdings of specialized firms are double the cash holdings of diversified firms. The author explains that diversified firms do not need to keep high cash levels for precautionary motives. Diversified firms are less exposed

to risk due to coinsurance. They do not need to accumulate cash because when in need, cash can be transferred from one segment to the other. For this reason, diversified firms will hold less cash for precautionary motives because their investment opportunities and the outcomes of their divisions are not perfectly correlated. Duchin (2010) also explains that when there is a smaller financing gap (which is higher correlation between investment opportunity and cash flows), firms keep lower levels of cash. They also find that cash holdings are specifically sensitive to diversification when firms are financially constrained.

Cai, Zeng, Lee and Ozkan (2016) analyse cash holdings from a slightly different perspective based on whether firms are part of business groups or not. They define business groups as an organizational form in which legally independent firms affiliate together formally or informally. The research focuses on China because this type of organizational form is specifically popular in transition economies (Cai *et al.*, 2016).

Cai *et al.* (2016) find that business group affiliated firms hold significantly lower levels of cash than non-affiliated firms in China. Locorotondo *et al.* (2014) confirm that business group affiliated firms hold lower cash levels than non-affiliated firms in Belgium. Cai *et al.* (2016) explain that this is due to the fact that business groups create internal capital markets which decrease the importance of external capital markets. There is no need for firms that are members of a business group affiliation to hoard cash for precautionary motives because even at difficult times, higher performing affiliates may transfer funds to the lower performing ones. This is similar to the findings of Duchin (2010). In addition to this, members of a group affiliation can gain external capital easier than stand-alone firms because of the increased debt capacity and enhanced reputation. Cai *et al.* (2016) argue that the aforementioned benefits of group-affiliations are more evident is privately controlled firms than state-controlled firms in China. Cai *et al.* (2016) do not find evidence to support the opposite view that business groups could complicate ownership structures leading to

information asymmetry and increasing agency problems. In further analysis, Locorotondo *et al.* (2014) find that affiliates of financially distressed groups hold less cash than non-distressed groups. This is because financially distressed firms are pressured to meet firm obligations.

Klasa, Maxwell and Ortiz-Molina (2009) investigate cash holdings of manufacturing firms. Klasa *et al.* (2009) examine a unique perspective of cash holdings related to the unionizations of firm's labour. They provide evidence that unionization affects cash holdings negatively. Klasa *et al.* (2009) explain that keeping low levels of cash, gives firms a strong case of not fulfilling the union's demands due to liquidity shortage threats. They also find that high levels of cash increase the risk of a strike. The next section reviews studies that examine how cash holdings could affect firm value.

2.5.5 The Effect of Cash Holdings on Firm Value

As mentioned before, holding cash has many advantages. Maintaining sufficient cash allows firms to maintain their daily operations, reduce financing from expensive external sources and decrease the risk of financial distress. The main disadvantage of holding cash is the opportunity cost of not investing it in profitable projects. Most literature on cash holdings has been examining the determinants of corporate cash holdings in order to get a full understanding of the factors that affect managerial decisions regarding cash levels. Some researchers have examined the issue from a different angle. A number of studies attempt to link cash holdings with firm value. This is beyond the scope of this study because this study aims to investigate the determinants affecting managerial decisions regarding cash holdings in Egypt and not the effect of cash holdings on firm value. Even though it is beyond the scope of this study, it is still important to review studies that try to examine the effect of cash holdings on firm value.

Harford *et al.* (2008) find that in the U.S. firms accumulating cash have lower firm value. Martinez-Sola, Garcia-Teruel and Martinez-Solano (2013) measure the effect of cash holdings on firm value using the market-to-book ratio. They find that accumulating cash holdings increases firm value up to a certain point. Beyond that point, accumulating cash decreases firm value. This proves evidence of the trade-off theory, that firms do have an optimal cash level and that firm value decreases if firms deviate from this level. This optimal level depends on firm specific characteristics such as growth potential, size and leverage. Saddour (2006) finds that cash holdings impact firm market value positively. The relationship is stronger for growth firms than for mature firms (Saddour, 2006).

While the previous sections present firm specific variables that may impact corporate cash holding, the next section presents studies that focus on economic and political factors that may have a significant impact on corporate cash holdings decisions. A few studies have analysed several macro-economic variables affecting cash holdings. However, this study is the first to investigate the effect of political stability on cash holdings.

2.6 Political Stability and Cash Holdings

Researchers have viewed corporate cash holdings from different angles. Country specific factors have a significant impact on the determinants of corporate cash holdings (Guney *et al.*, 2007). Recent research on the determinants of corporate cash holdings have been focusing on political and economic factors that may affect cash holding decisions.

Kusnadi *et al.* (2015) claim that prior studies show that there is discrimination in regulations against the private sector in China. They also claim that there should be more knowledge regarding managerial actions to protect firm's assets from political extraction, especially cash as it is the most liquid asset and possibly the most subject to political extraction. Kusnadi *et al.* (2015) argue that non-state-controlled firms which are exposed to

higher political extraction may hold less cash reserves to secure their firms against risks of political extraction. These firms may also invest more in fixed assets as they are harder to expropriate (Kusnadi *et al.,* 2015). However, the academics find a positive relationship between institutional development and cash holdings. When they compare firms in Chinese provinces having more developed institution with firms in provinces having less developed institutions, they find that the former hold more cash. This is because more developed institutions decrease the risk of political extraction and are therefore able to keep higher levels of cash. Political connections help non-state controlled firms decrease political extraction and so allow firms to keep the required level of cash reserves for future investments (Kusnadi *et al.*, 2015). Similarly, Feng and Johansson (2014) provide evidence of a positive relationship between political participation and cash holdings in China, especially in areas with weak institutions. The reason for this is that firms controlled by entrepreneurs involved in stronger political participation hold more cash because they face lower risks of political extraction.

Rezaei and Saadati (2015) state that political support affects cash holdings of companies because the government facilitates the process of obtaining resources. They discover that companies that have political support in Iran hold less cash because they will quickly access financial resources when needed. These companies are also considered reliable and so are able to purchase from suppliers on credit. Rezaei and Saadati (2015) also find that this impact of political relations on cash holdings increases with agency costs. This means that companies with strong political relations have less agency costs and so hold less cash. Hill, Fuller, Kelly and Washam (2014) agree that firms with political connections have lower cash holdings. They measure political connections using lobbying expenditures which are the expenses paid to political insiders to influence legislative decisions that are beneficial to the lobbying firm. When such lobbying activities increase, they create stronger connections. Political affiliations can influence access to capital and reduce risks

of cash shortages for firms. As a result, the need for firms to keep cash for precautionary motives is reduced. Ullah and Kamal (2017) agree that politically connected firms have lower cash holdings. However, they find that connected firms with board independence accumulate cash. They suggest that this is because independent directors are not able to effectively monitor management due to the complicated nature of these firms. Boubakri, Ghoul and Saffar (2012) argue that there are two different views to the relationship between political connections and cash holdings. The first view is similar to the one previously discussed (Hill *et al.*, 2014; Rezaei and Saadati, 2015; Ullah and Kamal, 2017). However, the second view states that politically connected firms actually hold more cash because they face more severe agency problems than non-connected firms. Boubakri *et al.* (2012) find evidence of the second view through a positive relationship between political connections and cash holdings in a cross-country analysis. They define a firm as politically connected if at least one of its shareholders or top executives is a member of parliament, minister, head of state or closely connected to top officials. Boubakri *et al.* (2012) explain that politically connected firms may have more severe agency problems because they may focus on obeying political objectives rather than focusing on maximizing shareholder wealth. In this case, monitoring mechanisms by the board are weakened and managers are left to take decisions for their own personal benefits such as cash hoarding. Ullah and Kamal (2017) suggest that policy makers should develop strong mechanisms to monitor political connections.

Ullah and kamal (2017) also compare the differences in the determinants of cash holdings in a democratic regime and a dictator regime in Pakistan. They find that board size and board independence have a significant positive effect on cash holdings in a democratic regime but are insignificant in a dictator regime. They provide evidence that female directors increase cash levels in dictator regimes only. This is due to precautionary motives which could be heightened during dictator regimes.

Other studies suggest that the government quality is a significant determinant of corporate cash holdings. Chen *et al.* (2014) find that a good government decreases firm's financial constraints and agency problems and thus enables firms to hold lower levels of cash. They report a negative relationship between local government quality and cash holdings in China. Gao *et al.* (2013) compare differences in cash policies between public and private firms in the U.S. They find that public firms hold almost double the amount of cash compared to private firms. Gao *et al.* (2013) explain that this is not due to precautionary motives because public firms are expected to have easier access to external finance. Nevertheless, the increase in cash holdings by public firms is mainly due to higher agency conflicts compared to private firms.

Other studies such as Chen and Mahajan (2008) use macro-economic factors as control variables to investigate if these factors affect corporate cash decisions. According to Chen and Mahajan (2008) there is a positive relationship between GDP growth rate and cash holdings. Companies keep higher cash reserves during times of good economic conditions because they suspect profitable investment opportunities ahead which will require substantial cash reserves. Dittmar (2008) states that cash holdings are specifically important during times of bad financial situations because cash decreases the risks of financial distress and allows firms to invest in valuable projects if available. In case of economic upturn companies may decide to invest the unnecessary cash hoarded (Dittmar, 2008). Chen and Mahajan (2008) find a negative relationship between inflation and cash holdings. When there are high inflation rates, the value of cash decreases through weaker purchasing power making investments in real assets more attractive (Chen and Mahajan, 2008). However, Wang *et al.* (2014) argue that the relationship between cash holdings and inflation is U shaped rather than linear. They explain that when there is high inflation, firms spend cash to take speculative opportunities. However, when inflation increases beyond a certain limit, listed firms hoard cash because financial constraints occur due to

the government setting limits to funds in capital markets. Chen and Mahajan (2008) also find that when short term interest rates are high, firms keep higher cash reserves in banks because they are less willing to undertake risky investments. Garcia-Teruel and Martinez-Solano (2008) find a negative relationship between interest rates and cash holdings but no relationship between GDP and cash holdings which may be due to the study being carried out in one economic cycle.

This study extends on the existing literature regarding the effect of political and economic factors on cash holdings through addressing a new perspective. This perspective is the effect of political stability on corporate cash holdings in Egypt. Political stability is specifically important in Egypt because it has faced the highest deterioration in political stability out of 25 major emerging market economies since 2011 (Euromonitor International, 2014). In emerging market economies, political stability has a direct impact on investor and consumer confidence (Euromonitor International, 2014). Therefore, it is important to analyse if low political stability causes managers to hoard cash due to precautionary motives. At times of low political stability, managers may not be willing to undertake risky investments and instead choose to accumulate high levels of cash. When managers accumulate cash, they will hedge against future cash shortages and decrease risks of financial distress. Nevertheless, companies will face significant opportunity costs of forgone return, which could be at times when the economy needs investing activities the most. Additionally, the determinants of corporate cash holdings in Egypt are compared before and after the revolution in order to analyse if managerial behaviour towards cash decisions has significantly changed. The next section addresses the issue of firms having target cash levels and analysing if they are able to adjust to these target levels.

2.7 Cash Holdings Speed of Adjustment

A very important issue to address is investigating whether firms set target cash levels that they try to reach or not. Many studies such as Opler *et al.* (1999), Ozkan and Ozkan (2004), Drobetz and Grüninger (2007), Al-Najjar and Belghitar (2011), Dittmar and Duchin (2011), Shah (2011), Ogundipe *et al.* (2012), Gao *et al.* (2013), Guizani (2017), Martínez-Sola *et al.* (2018) and Orlova and Rao (2018) prove that firms have target cash levels and try to adjust their current cash holdings towards these targets. Investigating whether firms have target cash ratios is done through investigating if cash holdings revert back to the mean (Opler *et al*, 1999). If firms adjust quickly towards their target cash ratios, it indicates that they do not bear significant costs to reach their target cash levels. The speed of adjustment is measured by the adjustment coefficient on a scale ranging from zero to one. If the speed of adjustment is close to one, then it means firms adjust quickly to their target cash ratios with low cost, because the target cash is close to the actual cash. However, if the speed of adjustment is close to zero, this indicates that adjustment costs are high and firms are unable to adjust quickly to their targets.

Ozkan and Ozkan (2004) find that the adjustment coefficient is slightly higher than 0.6 indicating a dynamic nature of the model and showing that firms in the U.K. adjust to their target cash ratios relatively quickly. The results indicate that it is costly for firms to deviate from their target cash holdings. Al-Najjar and Belghitar (2011) confirm that there is a significant cost for firms that deviate from their target cash holdings in the U.K. by finding the adjustment coefficient is more than 0.5 for a sample of U.K. firms.

Drobetz and Grüninger (2007) find that the speed of adjustment for Swiss firms is significantly lower than other countries as the adjustment coefficient is between 0.35-0.5. Since Swiss firms adjust slowly toward their targets, Drobetz and Grüninger (2007) explain that firms must hold high cash levels to avoid cash shortages that may incur high

adjustment costs. Dittmar and Duchin (2011) find the adjustment coefficient to be only 0.38 indicating that firms in the U.S. do not adjust quickly towards their target cash ratios. Shah (2011) finds that the speed of adjustment in Pakistani firms is almost 0.5 explaining that there is some delay for firms to adjust to their target cash ratios. Orlova and Rao (2018) provide evidence of an adjustment coefficient of 0.54 in the U.S. Guizani (2017) estimate a high adjustment coefficient of 0.85 in Saudi Arabia. The author explains that in Saudi Arabia, firms keep 15% gap between the actual and target cash ratios within one year. Ogundipe *et al.* (2012) also find that cash holdings of the current year are significantly and positively related to the cash holdings of the previous year in Nigeria. Ogundipe *et al.* (2012) show an adjustment coefficient around 0.89 and comment that firms cannot instantly adjust towards their target cash levels due to transaction and other adjustment costs. However, this figure is relatively higher than previous research indicating that firms in Nigeria are able to adjust relatively quickly to their target cash ratios compared to previously mentioned studies in the U.K., U.S., Switzerland and Pakistan. Gao *et al.* (2013) find that public firms adjust slower to their target cash ratios than private firms. This could be because public firms have higher target cash levels. More specifically, they find that well governed public firms adjust slower than poorly governed firms.

In further analysis, Martinez-Sola, Garcia-Teruel and Martinez-Solano (2018) find that Spanish SMEs try to adjust to their target cash ratios. They find that the speed of adjustment is higher for firms that have more growth opportunities and for financially constrained firms. They also find that smaller firms and firms with lower cash flows adjust relatively quicker to their target cash holdings than large firms and those with higher cash flows. Finally, they find that firms with higher probability of financial distress adjust relatively quickly to their target cash levels trying to avoid distress costs. Since the financial crisis of 2008 decreased credit supply, Martínez-Sola *et al.* (2018) report that the

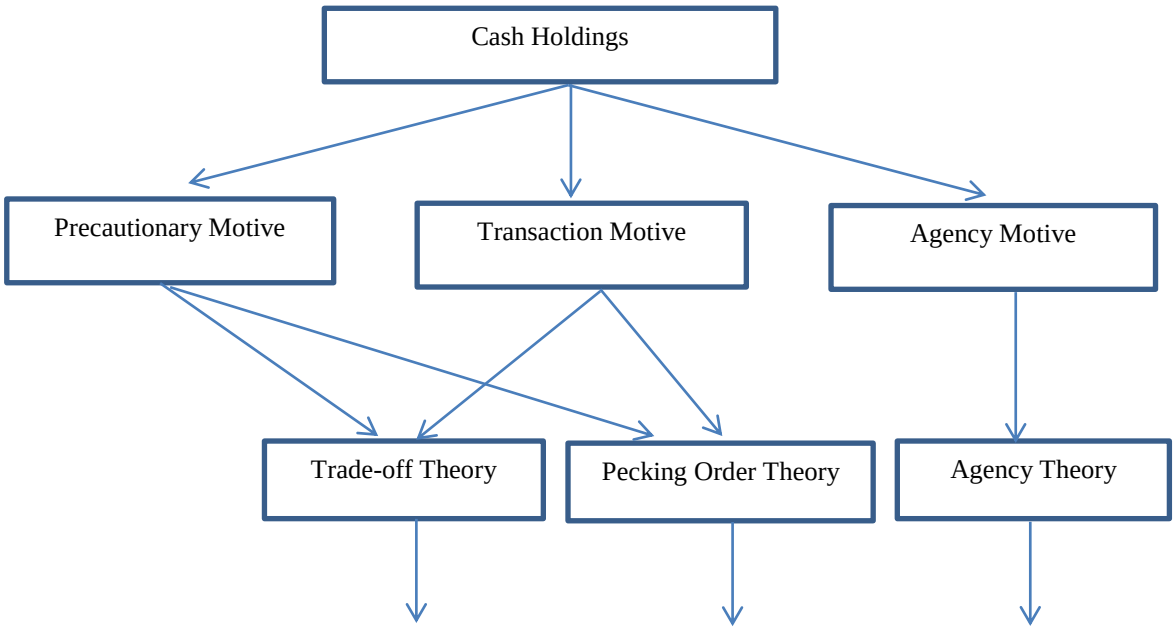
speed of adjustment is quicker after the financial crisis. Orlova and Rao (2018) find that the speed of adjustment is quicker for firms that have excess cash than those with cash deficit. They also find that smaller firms adjust quicker to their target cash ratios than larger firms. Dittmar and Duchin (2011) argue that more established firms (older firms) adjust their target cash ratios much slower than younger firms. They explain that this could be due to the fact that older firms are not keen on rebalancing their cash balances to reach their targets. As such, older firms may face higher adjustment costs leading them to adjust slowly to their target cash ratios.

In addition to investigating the determinants of corporate cash holdings in Egypt, this study extends on the existing literature by analysing the speed of adjustment in Egypt. It is important to investigate if companies listed on the Egyptian stock market have target cash ratios that they try to reach or not. If firms have target cash ratios, an important issue remains to investigate the speed of adjustment to these target cash ratios in Egypt and compare it to the speed of adjustment found in major studies in other context. The final part of this chapter presents the hypotheses development related to firm specific characteristics.

2.8 Hypotheses Development for Firm Specific Characteristics

According to the trade-off, pecking order and agency cost of free cash flow theories, all of the previously mentioned firm characteristics affect corporate cash holdings. The following diagram summarizes all three theories. The relationship between each firm characteristic and cash holdings is presented in order to facilitate the understanding of the hypotheses development.

Diagram 2. 1 : The Financial Determinants of Corporate Cash Holdings



Determinant	Expected Relationship	Expected Relationship	Expected Relationship
Dividend Payments	Negative	-	-
Investment Opportunity	Positive	Positive	Negative
Liquid Assets Substitutes	Negative	-	-
Leverage	Positive/ Negative	Negative	Negative
Firm Size	Negative	Positive	Positive
Cash Flow	Negative	Positive	-
Volatility	Positive	-	-
Debt Maturity	Negative	-	-
Capital Expenditure	Positive	Negative	-

Source: Author

According to the trade-off theory there should be a negative relationship between dividend payments and cash holdings because companies that pay dividends can simply cancel them and raise cash when needed (Jensen, 1986; Guney *et al.*, 2007; Harford *et al.*, 2008; Bates *et al.*, 2009; Iskandar-Datta and Jia, 2012; Al-Najjar, 2013; Belghitar and Khan, 2013; Gao *et al.*, 2013; Al-Najjar and Clark, 2017).

H1: There is a significant negative relationship between dividend payments and cash holdings

According to the trade-off and pecking order theories firms accumulate cash when there are good investment opportunities. This is done in order to seize these opportunities without having to face financial distress or having to use expensive external financing (Dittmar *et al.*, 2003; Ozkan and Ozkan, 2004; Ferreira and Vilela, 2004; Guney *et al.*, 2007; Harford *et al.*, 2008; Iskandar-Datta and Jia, 2012; Ogundipe *et al.*, 2012; Song and Lee, 2012; Chen *et al.*, 2014; Kusnadi *et al.*, 2015). However, according to the agency cost of free cash flow theory, managers may not even identify such opportunities and might end up wasting cash (Jensen, 1986; Rezaei and Saadati, 2015). Therefore, the relationship between investment opportunities and cash holdings is indefinite.

H2: There is a significant relationship between investment opportunities and cash holdings

According to the trade-off theory, firms with high liquid assets keep low levels of cash because the former are regarded as substitutes to the latter. Cash holdings are negatively affected by the amount of liquid asset substitutes held by a firm (Opler *et al.*, 1999; Dittmar *et al*., 2003; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004; D'Mello *et al.*, 2008; Garcia-Teruel and Martinez-Solano, 2008; Bates *et al.*, 2009; Bigelli and Sánchez-Vidal, 2012; Iskandar-Datta and Jia, 2012; Ogundipe *et al.*, 2012; Song and Lee, 2012; Wu *et al.*, 2012; Al-Najjar, 2013; Orens and Reheul, 2013; Chen *et al.*, 2014; Locorotondo *et al.*, 2014; Masood and Shah, 2014; Guizani, 2017). Therefore, the hypothesis related to this factor could be formulated as follows:

H3: There is a significant negative relationship between liquid asset substitutes and cash holdings

The trade-off theory views the relationship between leverage and cash holdings from two different standpoints. One view assumes a positive relationship between leverage and cash because cash acts as protection from possible bankruptcy (Garcia-Teruel and Martinez-Solano, 2008; Al-Najjar and Belghitar, 2011; Ogundipe *et al.*, 2012; Locorotondo *et al.*, 2014), whereas the other view assumes a negative relationship between leverage and cash because they can be regarded as substitutes (Al-Najjar, 2013).

Moreover, the pecking order theory and the agency theory support the latter view of the trade-off theory indicating that leverage and cash holdings are negatively related. The pecking order theory assumes that firms do not prefer to finance projects by issuing debt and instead they choose to rely on internal funds. When there is a cash deficit, firms use up all of the retained cash before they turn to borrowing. Similarly, in case of cash surplus firms use the extra money to pay back principal on debts before accumulating cash. For this reason leverage and cash holdings always go in different directions. Opler *et al.* (1999) find that cash holdings decrease with leverage. The agency theory also supports a negative relationship between leverage and cash holdings because managers are forced to keep lower levels of cash due to higher monitoring brought about by capital markets. Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Drobetz and Grüninger (2007), D'Mello *et al.* (2008), Harford *et al.* (2008), Iskandar-Datta and Jia (2012), Song and Lee (2012), Wu *et al.* (2012), Belghitar and Khan (2013), Gao *et al.* (2013), Orens and Reheul (2013), Chen *et al.* (2014), Masood and Shah (2014), Kusnadi *et al.* (2015), Guizani (2017) and Al-Najjar and Clark (2017) all find a negative relationship between leverage and cash holdings. Thus, the relationship between leverage and cash holdings is indefinite.

H4: There is a significant relationship between leverage and cash holdings

According to the trade-off theory, larger firms do not need to accumulate cash because they have greater access to external financing. Opler *et al.* (1999), Dittmar *et al.* (2003),

Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Drobetz and Grüninger (2007), D'Mello *et al.* (2008), Bigelli and Sánchez-Vidal (2012), Ogundipe *et al.* (2012), Wu *et al.* (2012), Gao *et al.* (2013) and Locorotondo *et al.* (2014) find a negative relationship between firm size and cash holdings because larger firms can raise external fund relatively cheaper than smaller firms.

Nevertheless, the pecking order and agency theories assume a positive relationship between firm size and cash holdings (Al-Najjar and Belghitar, 2011; Shah, 2011; Song and Lee, 2012; Al-Najjar, 2013; Al-Najjar and Clark, 2017). The pecking order theory assumes that larger companies do not have a preference towards external financing and in general are better positioned to accumulate more cash. The agency theory supports the pecking order theory suggesting a positive relationship between size and cash holding because of the higher discretionary power of managers which is brought about by highly dispersed ownership. Omran, Bolbol and Fatheldin (2008) find that in Arab countries (Egypt, Jordan, Oman and Tunisia) larger firms have lower ownership concentration.

The trade-off theory indicates a negative relationship between size and cash holdings whereas the pecking order and agency theories suggest a positive relationship. Therefore, the relationship between firm size and cash holdings remains to be indefinite.

H5: There is a significant relationship between firm size and cash holdings

According to the trade-off theory, firms with higher cash flows are expected to have lower cash holdings because they are both seen as substitutes (Ferreira and Vilela, 2004). This view is supported by minimal studies such as Iskandar-Datta and Jia (2012). However, the pecking order theory contradicts the trade-off theory in this context explaining that higher cash flow leads to higher cash levels. This is because under pecking order considerations, any excess cash flows would be retained resulting in higher cash levels in order to

minimize the need to depend on external financing (Ferreira and Vilela, 2004; Drobetz and Grüninger, 2007; Garcia-Teruel and Martinez-Solano, 2008; Harford *et al.,* 2008; Song and Lee, 2012; Wu *et al.,* 2012; Gao *et al.,* 2013; Orens and Reheul, 2013**;** Chen *et al.,* 2014; Masood and Shah, 2014; Kusnadi *et al.*, 2015). Preferring to finance from internal rather than external sources, causes firms with higher cash flows to keep higher amounts of cash holdings (Okzan and Ozkan, 2004). The relationship between cash flow and cash can be seen as indefinite.

H6: There is a significant relationship between cash flows and cash holdings

The trade-off theory predicts higher levels of cash when there is higher cash flow volatility. This is based on the desire of firms to protect themselves from such volatility. Firm Volatility affects cash holdings positively (Opler *et al.,* 1999; Saddour, 2006; Guney *et al.,* 2007; Harford *et al.,* 2008; Bates *et al.,* 2009; Bigelli and Sánchez-Vidal, 2012; Gao *et al.,* 2013; Iskandar-Datta and Jia, 2012, Belghitar and Khan, 2013, Chen *et al.*, 2014, Locorotondo *et al.*, 2014; Guizani, 2017).

H7: There is a significant positive relationship between Cash flow volatility and cash holdings

According to the trade-off theory, firms with short term borrowing (lower debt maturity) feel the need to keep higher cash levels as a form of protection from the risks associated with renegotiation of credit terms (Ferreira and Vilela, 2004; Saddour, 2006; Garcia-Teruel and Martinez-Solano, 2008; Shah, 2011). Therefore, the shorter the debt maturity within the firm's capital structure, the higher the cash levels.

H8: There is a significant negative relationship between debt maturity and cash holdings

The trade-off theory assumes that firms accumulate cash when there is a good investment opportunity in fixed assets whereas the pecking order theory suggests that if this

opportunity exists the company would have already spent the cash reserves on it. Kusnadi (2005) finds a positive relationship between capital expenditure and cash holdings whereas Guney *et al.* (2007), Harford *et al.* (2008), Bates *et al.* (2009), Iskandar-Datta and Jia (2012), Wu *et al.* (2012), Gao *et al.* (2013), Chen *et al.* (2014), Locorotondo *et al.* (2014), Masood and Shah (2014) and Guizani (2017) find a negative relationship between capital expenditure and cash holdings. Therefore, the relationship between capital expenditure and cash holdings can be considered indefinite.

H9: There is a significant relationship between capital expenditure and cash holdings

The final hypothesis for this chapter is related to political stability. At times of low political stability, managers may take decisions in favour of hoarding cash for precautionary motives disregarding the opportunity cost of forgone returns. At these difficult times, managers may not be willing to undertake risky investment. Instead, managers could choose to accumulate high levels of cash to hedge against future cash shortages and decrease risks of financial distress. Therefore, the hypothesis for the relationship between political stability and cash holdings can be formulated as follows:

H10: There is a significant negative relationship between political stability and cash holdings

Conclusion

To sum up, this chapter gives an overview of previous research which focuses on the financial determinants of corporate cash holdings. This chapter addresses the second research objective by reviewing the literature on corporate cash holdings from a financial perspective. There are three main theories that attempt to explain corporate cash decisions. Overwhelmingly, this is done by analysing the relationship between firm specific characteristics and cash holdings. The hypotheses formulated help answer the first research

question regarding the investigation of the financial determinants of corporate cash holdings of firms listed on the Egyptian stock market. Importantly, the debate about which theory better explains corporate cash policies remains an on-going one.

The trade-off theory attempts to explain cash holdings through weighing the benefits and costs of holding cash (Opler *et al.*, 1999; Ferreira and Vilela., 2004; Drobetz and Grüninger, 2007). The pecking order theory attempts to explain cash holdings through the hypothesis originally formulated by Myers (1984) that companies accumulate cash to finance their projects internally and try to avoid expensive external financing. Finally, the agency cost of free cash flow theory is based on Jensen's (1986) hypothesis that managers want to increase cash levels in order to increase their own power and managerial discretion.

Since previous research has found contradicting evidence on the determinants of corporate cash holdings, there still remains to be a gap in the literature regarding the theories that best explain cash holding decisions. Al-Najjar (2013) states that it is specifically important to focus on developing markets because they have greater market imperfections and higher bankruptcy related costs as compared to developed markets. This study is the first to investigate the determinants of corporate cash holdings in Egypt. Recent research has been attempting to analyse the effect of political and economic factors on corporate cash holdings. This study extends on the existing literature by investigating if political stability has a significant impact on corporate cash holdings in Egypt. At times of low political stability, managers may choose to accumulate cash due to precautionary motives.

As mentioned earlier, the agency cost of free cash flow theory is based on agency conflicts between managers and shareholders. Since managers with higher discretion feel free to accumulate cash for their own private benefits, then a new issue comes to light. Corporate governance can be a very important determinant of corporate cash holdings. Stronger

corporate governance regimes should force managers to take decisions in favour of shareholders' best interest. Higher monitoring effectiveness should force managers to invest excess cash in positive net present value projects or distribute it as dividends to shareholders. The next chapter focuses on how corporate governance affects corporate cash holdings.

Chapter 3: Literature Review Part 2: Corporate Governance and Corporate Cash Holdings

Introduction

Corporate governance is vital for deterring managers from destroying firm value (Dittmar and Mahrt-Smith, 2007). The academics find that better governance significantly increases the value of a dollar of cash. To recall from the previous chapter, the agency cost of free cash flow theory suggests that managers hoard cash because they want to increase resources under their control to increase their personal power and managerial discretion (Jensen, 1986). Therefore, it is important to highlight that good corporate governance practices should in theory decrease managerial discretion and force managers to take decisions that are value adding to shareholders.

Dittmar *et al.* (2003) and Kusnadi (2011) confirm that in the presence of poor corporate governance practices firms prefer to hold higher cash levels. Al-Najjar (2013) highlights the importance of further academic enquiry into corporate cash holdings in developing countries. Al-Najjar (2013) specifically suggests that research in developing countries should focus more on firm-level corporate governance factors that impact cash holdings, namely board of directors, audit features and CEO characteristics. Rezaei and Saadati (2015) also suggest the investigation of ownership structure and board of director parameters. In addressing these calls, this study aims to investigate the determinants of corporate cash holdings in Egypt which is a developing country from two perspectives. The first perspective is the firm characteristics that act as financial determinants of corporate cash holdings as discussed in the previous chapter. The second perspective is through adding corporate governance variables to analyse how corporate governance practices can be a key factor in managerial decisions regarding cash. This study contributes

to the literature by analysing how board characteristics and ownership structure impact the cash holding decisions of firms listed in Egypt further contributing to agency based conclusions. This chapter provides a general overview of the agency theory followed by a focused discussion of the effects of corporate governance on corporate cash holdings from the agency perspective.

3.1 The Agency Theory

Jensen and Meckling (1976) define an agency relationship as a contract under which a principal person(s) delegates authority of decision making to an agent to act on their behalf. They explain that it is impossible for the agent to always make optimal decisions on behalf of the principal at zero cost. Since the relationship between stockholders and managers can be seen as an agency relationship in all organizations, it is inevitable that separation of ownership and control may lead to more acute agency problems (Jensen and Meckling, 1976). Agency problems are a major concern when managers have significant control over company resources, known as managerial discretion.

3.1.1 Managerial Discretion

Managerial discretion occurs when managers have significant control rights over the allocation of corporate resources that were originally financed through investors (Shleifer and Vishny, 1997). In many cases managers expropriate these resources. Shleifer and Vishny (1997) explain that managerial expropriation can take many forms. The simplest form of expropriation is managers taking out cash. More complicated forms include managers establishing private companies (other than the main company they already manage) and then selling inventory or assets from the main company to their private company below market prices. Another very important way in which managers can

expropriate shareholders is by staying in their jobs for significant periods of time even when they are no longer suitable or efficient.

Research on cash holdings have found that managerial discretion affects cash holding decisions. In fact, as cash is the most liquid asset, it is the most subject to managerial expropriation leading to severe agency problems. Pinkowitz *et al.* (2006) expect that controlling shareholders invest excessively in liquid assets because they can be easily turned into private benefits. Therefore, it is important to investigate the agency theory with regard to the level of liquidity of underlying assets. This investigation is specifically important in countries with low shareholder protection because people in control of corporations can easily gain their private benefits due to poor corporate governance structures.

Jensen (1986) explains that managers will prefer to hold high cash levels because of their own personal self-wealth maximizing motives. According to Pinkowitz *et al.* (2006) those who control firms only pay-out to shareholders the part of cash that they cannot use for their own private benefits. They try to make the business safer in order to stay in control for the longest time possible, hence increase the resources under their control and increase their personal wealth. At times of uncertainty, cash serves as a buffer for controlling shareholders and allows them to stay in control. However at other times, they will just try to extract private benefit. Liquid assets give controllers the opportunity to extract private benefits so much easier than fixed assets (Pinkowitz *et al.*, 2006). The following section discusses ways in which managerial discretion could be handled so that managers act in the favour of the shareholders' interests rather than pursuing their personal objectives.

3.1.2 Solutions to Agency Problems

In order to decrease agency problems, the interests of managers and shareholders must be aligned. One way for this to be achieved is through creating incentive plans to align the interests of managers with the interests of shareholders (Hill and Jones, 1992). Incentive costs are the costs incurred by the principal as a means of trying to align the interests of the agents with their own interests. In most organizations, incentives are used through rewarding managers financially for acting on behalf of shareholders (Jensen and Meckling, 1976). Shleifer and Vishny (1997) state that a good way to deal with agency problems is giving managers long term incentive plans to align their interests with the interests of shareholders. Incentives can be in many forms including top executives taking shares, tying executive compensation to shareholder returns or deferring part of executive compensation to the future in order to enhance long term corporate value maximization (Donaldson and Davis, 1991). Shleifer and Vishny (1997) state that managerial ownership encourages managers to seek profit maximization. If managers have ownership in the firm there is no longer complete separation of ownership and control which is the original cause of agency problems. Hill and Jones (1992) state that stock option plans help managers and employees focus on shareholder wealth maximization since this will gain benefits for them as stock owners. Nevertheless, incentive plans do not completely eliminate agency problems. Shleifer and Vishny (1997) argue that in certain cases managers may manipulate accounting earnings to increase their pay.

The second way to decrease agency problems is through effective monitoring. However, shareholders will have to incur monitoring costs to limit managerial opportunism (Hill and Jones, 1992). Jensen and Meckling (1976) state that one of the major components of agency costs are monitoring costs.

Managers have the ability to control important information inside the firm (Hill and Jones, 1992). Managers of firms may filter information in a way that does not allow individual shareholders to monitor if management is working toward the shareholders' best interest or not. Therefore, governance structures include board of directors to act as monitoring mechanisms (Hill and Jones, 1992).

Donaldson and Davis (1991) state that the board of directors has a major role in decreasing managerial opportunism through monitoring managers on behalf of shareholders. According to the agency theory, this monitoring power will be more efficient if the chairman of the board is independent from the Chief Executive Officer (CEO). However, if both roles are carried out by the same person (i.e. there is CEO-Chairman duality), decisions will be in favour of management and at the expense of shareholders causing managerial opportunism and agency loss.

Donaldson and Davis (1991) argue that the stewardship theory, unlike the agency theory suggests that managers actually want to perform well in favour of the corporation and be good stewards of corporate assets. Under the stewardship theory, it is only a matter of whether the organizational structure facilitates this good performance or not. Therefore, they find evidence of the stewardship theory suggesting that when the CEO of the corporation is also the chairman of the board, they have higher authorities and hence can perform better and achieve higher returns.

Previous research on corporate governance and corporate cash holdings build on the free cash flow hypothesis originally developed by Jensen (1986) which states that managers accumulate cash for their own private benefits. Jensen (1986) state that managers prefer to accumulate cash reserves to increase resources under their control. Previous research such as Dittmar *et al.* (2003), Kalcheva and Lins (2007) and Kusnadi (2011) show that agency theory impacts cash holding decisions. In the cash holding literature, effective monitoring

has proved to have a significant effect on the way that managers handle cash. When there is effective monitoring, managers will be forced to invest cash in positive net present value projects or distribute cash as dividends to shareholders. Managers will not be able to accumulate cash if there is effective monitoring by large shareholders (Ferreira and Vilela, 2004).

The agency theory explains managerial behaviour more than any other corporate governance theory in countries with poor shareholder protection (Chang and Noorbakhsh, 2006). The following section provides a review of the literature on corporate governance and cash holdings. Ownership structure, board characteristics and audit features all have an impact on corporate cash holding decisions that are explained in the following sections.

3.2 Corporate Governance and Cash Holdings

Higher levels of cash allow managers to have higher managerial discretion (Chen, 2008). Jensen's (1986) agency cost of free cash flow hypothesis suggests that managers hoard cash to increase resources under their control and thus gain power over the firm's investment decisions. Dittmar *et al.* (2003) and Ferreira and Vilela (2004) propose that managers keep cash because of their own private benefits rather than shareholders' best interest. Ammann, Oesch and Schmid (2011) find evidence showing that managers of firms with poor firm-level governance accumulate more cash in order to protect themselves. Kusnadi (2005) explains that managers sometimes want to build cash reserves because executive remuneration schemes could be related to firm size (both directly through bonuses and indirectly through budget size). This motivates managers to build assets regardless of their future profitability prospects. Jensen (1986) argues that managers prefer not to pay-out cash to shareholders because it decreases the resources under managerial control making them less powerful. Similarly, in the presence of stronger corporate governance, managers are forced to keep lower levels of cash because they are

consequently better monitored. This fact of accountability forces them to make positive NPV investments which they otherwise would have not identified. Dittmar and Mahrt-Smith (2007) explain that shareholders' defence against managerial inefficient use of corporate resources is strong corporate governance.

This argument leads to the conclusion that corporate cash holding decisions are not limited to firm characteristics but also include corporate governance and investor protection aspects as determining factors. When investor protection is low, management will have an incentive to hold high cash balances to gain discretionary power over the company's investment decisions (Ferreira and Vilela, 2004).

Dittmar *et al.* (2003) state that there has been weak evidence of agency related considerations regarding corporate cash holdings in previous literature, possibly because the vast majority of studies have focused on the U.S., where there is strong shareholder protection. In their cross country analysis, they find evidence that the agency motive is the primary determinant of cash holdings. Dittmar *et al.* (2003) specifically find that firms operating in countries with low shareholder protection hold double the amount of cash as those operating in countries with high shareholder protection. Since counties with low shareholder protection are predominantly those operating in developing economies, corporate governance is a very important determinant of cash holdings in such economies. This is specifically important in Egypt as the World Bank ranking of the index measuring shareholder protection has ranked Egypt number 122 in 2016 and number 81 in 2018. This particularly low shareholder protection rating shows that potentially Egyptian companies have relatively high cash balances.

Dittmar *et al.* (2003) support this by finding that Egypt has the highest median cash balance out of 45 countries. They state that the agency motive is the primary determinant of corporate cash holdings and highlight the importance of this matter in countries with

poor shareholder protection. Since Egypt has the highest median cash balance in their cross country analysis, there is a compelling call for the analysis of the determinants of corporate cash holdings specifically in Egypt and particularly from the agency perspective.

Even studies like Dittmar *et al.* (2003) and Al-Najjar (2013) that attempt to explain agency problems have been focusing mainly on the effect of country-level governance on corporate cash holdings. Chen *et al.* (2014) claim that cross-country studies have three limitations. Firstly, they focus on shareholder rights showing evidence of law rather than enforcement of shareholder protection. The law on paper and the enforcement of the law can be very different in many countries. Chen *et al.* (2014) suggest that it is harder for insiders to take advantage of corporate resources in the presence of a good government that protects investors through properly enforcing laws. Secondly, Chen *et al.* (2014) present theoretical evidence that recent literature has found contradicting evidence regarding the effect of shareholders' rights on cash holdings. Finally, Chen *et al.* (2014) argue that cross-country studies fail to capture the effect of firm-level agency problems on corporate cash holdings.

Dittmar and Mahrt-Smith (2007) claim that cash holdings are a material issue in poorly-governed firms, whereas there may be minimal costs to holding high cash levels in well-governed firms. They find that governance has a significant effect on how managers spend cash. Their results suggest that corporate governance exerts greater influence over investing decisions compared to financing decisions.

To conclude, corporate governance has a significant impact on cash holding decisions, especially in a country like Egypt. This is mainly because many studies reveal that firms in countries with low shareholder protection hold higher cash balances (Dittmar *et al.*, 2003; Pinkowitz *et al.*, 2006; Al-Najjar, 2013). Also, Dittmar *et al.* (2003) find that Egypt has the highest cash holding level out of 45 countries. This study fills the gap in the literature by

investigating the effect of firm-level corporate governance determinants on corporate cash holdings of firms listed on the Egyptian stock market. Corporate governance has many different aspects. The following sections discuss the relationship between corporate governance and corporate cash holdings addressing each aspect of corporate governance separately. Ownership structure, board characteristics and shareholder protection are discussed in details with respect to previous studies conducted to analyse the relationship between corporate governance and cash holdings.

3.3 Ownership Structure

Corporate governance decreases agency problems of free cash flows by decreasing cash holding levels (Chen, 2008). One very important corporate governance issue is ownership structure. Ownership structure includes many sub-categories such as managerial ownership, ownership concentration, institutional ownership, government ownership and family ownership. For example, when there is higher ownership concentration, managers have lower discretionary powers and are thus forced to keep lower levels of cash. In certain ownership structures, the goals of managers and shareholders may be aligned and so managers have the incentive to maximize shareholder wealth. The following section presents how each ownership structure type can affect managerial discretion regarding corporate cash holding decisions.

3.3.1 Managerial Ownership

Separation of ownership and control causes conflicts of interest between managers and shareholders (Chen, 2008). According to Jensen (1986), managerial ownership decreases agency problems of free cash flows. The traditional interest alignment hypothesis proposes that when managers hold more shares in the firm, conflicts of interest between shareholders and managers are reduced (Chen and Chuang, 2009). When the interests of

shareholders and managers are aligned, there is goal congruence and managers keep lower levels of cash. Managers will be encouraged to invest the excess cash in positive net present value projects in order to generate future returns benefiting them as shareholders. In other words, when there is high managerial ownership, the agency problem is less severe, which in turn lowers managerial discretion and levels of cash. Therefore, the relationship between managerial ownership and cash holdings is expected to be negative.

Drobetz and Grüninger (2007) find that managerial ownership is negatively associated with cash holdings. This is because the incentives of managers who own a high percentage of shares in the company are aligned with the incentives of stockholders and thus they are encouraged to keep lower levels of cash. Jensen (1986) claims that managers with higher managerial discretion hold higher cash levels for their own purposes. If they have excess cash they may invest in projects that could not be financed through capital markets. Jensen and Meckling (1976) suggest a negative relationship between managerial ownership and cash holdings because managerial ownership decreases the incentives for actions that may destroy shareholders' wealth. Masood and Shah (2014) also find a negative relationship between managerial ownership and cash holdings in Pakistan.

Nevertheless, the entrenchment hypothesis totally contradicts the expectations of the interest alignment hypothesis. The entrenchment hypothesis proposes that higher managerial ownership encourages managers to take decisions in favour of their private interests and at the expense of shareholders (Chen and Chuang, 2009). There would be a positive relationship between managerial ownership and cash holdings under the entrenchment hypothesis, because entrenched managers will keep higher levels of cash for their own private benefits. Belghitar and Khan (2013) agree to the entrenchment hypothesis by finding a negative relationship between non-executive ownership and cash holdings in U.K. small and medium enterprises. They explain that non-executive

ownership is the most powerful internal governance monitoring mechanism. In further analysis, Belghitar and Khan (2013) divide the sample into high growth and low growth firms based on investment opportunity set. They find that ownership structure is only significant for high growth SMEs. Belghitar and Khan (2013) conclude that internal governance tools such as ownership structures are particularly important to decrease agency problems arising from conflicts over cash held for investment purposes in high growth SMEs. However, external governance tools such as capital market monitoring due to leverage are more important for low growth SMEs.

Ozkan and Ozkan (2004) argue that the relationship between managerial ownership and cash holdings of firms in the U.K. is non-linear. As managerial ownership increases, managers go from alignment to entrenchment and to alignment again. Kusnadi (2011) confirm that the relationship between insider ownership and cash holdings is non-linear. Ozkan and Ozkan (2004) state that at high levels of managerial ownership, there could be less efficient monitoring and so managers of U.K. firms could be seen as entrenched. Managers may keep high levels of cash out of precautionary motives because managerial ownership causes them to become more risk averse (Ozkan and Ozkan, 2004). Harford *et al.* (2008) confirm that insider ownership is positively related to cash holdings.

Chen (2008) find that CEO ownership impact cash holdings negatively in old economy firms but have no significant impact in listed new economy firms (firms from the computer, software, internet, telecommunications or networking industries). Chen and Chuang (2009) opted to investigate high-tech firms because of their highly competitive market. They explain that these firms typically prefer to hold sufficient cash reserves in order to invest in new projects and in doing so keep their competitive advantage. In this case, shareholders are in a dilemma to either face agency problems caused by accumulating cash or bear the loss of profitable investment opportunities forgone.

Chen and Chuang (2009) argue that in high tech firms it is actually better for firms to accumulate cash in order to seize the profitable investment opportunities in a highly competitive market. Shareholders will accept large cash holdings only if strong governance mechanisms are present and so they do not have to worry about managerial expropriation. Chen and Chuang (2009) find that in high tech firms there is a positive relationship between CEO ownership and cash holdings. This is consistent with the interest-alignment hypothesis because in high-tech firms it is better to hold more cash. When firms accumulate cash for profitable investment opportunities, they will invest in positive net present value projects with high required rate or return. In this case, shareholders benefit from higher returns rather than requesting dividend pay-outs.

Kalcheva and Lins (2007) find no relationship between management ownership and cash holdings. They measure management ownership as the percentage of control rights held by the management and their families. Nevertheless, they find that when managers control more votes than other block holders, entrenched managers keep significantly larger cash reserves to further increase resources under their control.

Kuan, Li and Liu (2012) specifically focus on the separation of control and cash flow rights in Taiwan. They explain that control rights are the ability of controlling shareholders to influence the way the firm is managed, whereas cash flow rights is the controlling shareholders' share of profits and losses from decision making activities. Kuan *et al.* (2012) find that when cash holdings of a firm are low, and there is separation of control and cash flow rights, cash holdings decrease as a result. The above argument is based on the alignment of interests of managers and shareholders and thus grants managers freedom to undertake profitable investment opportunities. However, in firms that already have high cash holding levels, agency conflicts are more severe and controlling shareholders have

more power. In this case, entrenched managers choose to hold cash in order to pursue their own interests (Kuan *et al.*, 2012).

3.3.2 Ownership Concentration

"The most direct way to align cash flow and control rights of outside investors is to concentrate share holdings" (Shleifer and Vishny, 1997, p.754).

Dittmar and Mahrt-Smith (2007) claim that large shareholders have enough capital to influence managerial decisions. When there is ownership concentration, there is higher monitoring, and large shareholders have enough voting rights to put pressure on management in certain situation (Shleifer and Vishny, 1997). Kusnadi (2005) finds that non-management block-holder ownership has a significant negative effect on cash holdings. This is due to the fact that these block-holders perform effective external monitoring and by doing so impact managerial decisions regarding cash. Large shareholders are able to force managers to pay-out cash or invest excess cash in projects that increase shareholder wealth. Thus, the relationship between ownership concentration and cash holdings is expected to be negative. Large shareholders decrease possible agency problems and improve governance by protecting their own investments through monitoring management (Dittmar and Mahrt-Smith, 2007). Kusnadi *et al.* (2015) confirm that firms with lower ownership concentration hold higher cash reserves. Guney *et al.* (2007) also find a negative relationship between ownership concentration and cash holdings.

Similar to this argument, an important aspect of ownership concentration is institutional ownership. Institutional ownership is a way to measure agency problems that occur due to ownership concentration (Kuan *et al.*, 2011). This is because large shareholders play an important role in decreasing agency problems through their monitoring roles. Large shareholders are an important tool to decrease agency problems and force managers to take decisions in favour of the shareholders' best interests. When a large portion of the firm's

ownership is represented by institutions, the shareholders' monitoring power increases and managerial opportunism decreases. Kuan *et al.* (2011) and Kuan *et al.* (2012) confirm this view by finding a negative relationship between institutional ownership and cash holdings in Taiwan.

Even though it would be expected that cash holdings would decrease with institutional ownership, Harford *et al.* (2008) contradict this view and find a positive relationship between institutional ownership and cash holdings. This may be because institutional shareholders typically seek formal compliance with corporate governance rules. Nevertheless, formal compliance does not necessarily mean good corporate governance practices, thus the results may not be always constant. Masood and Shah (2014) also find a positive relationship between institutional ownership and cash holdings, but they explain that this is due to shareholder rights being not protected by the law in Pakistan. This means that even in the presence of institutional ownership, the large insider shareholders who are managing the firms cannot be forced to pay-out dividends to the minority outside shareholders. Thus, the conflict of interest in Pakistan remains between inside and outside shareholders. Belghitar and Khan (2013) find a positive relationship between cash holdings and institutional ownership in U.K. SMEs, explaining that institutional shareholders do not perform effective monitoring in the U.K. Al-Najjar and Clark (2017) show evidence of a positive relationship between institutional ownership and cash holdings in the MENA region. They explain that institutional shareholders do not provide effective monitoring and they try to maximize their private benefits.

Previous research has mainly focused on measuring ownership concentration through institutional ownership. This is because large shareholders decrease agency problems though performing as a monitoring function (Dittmar and Mahrt-Smith, 2007). A more specific aspect of ownership concentration that is expected to perform a more powerful

monitoring function than any other agency is the government. There still remains to be a gap in the literature in analysing how government ownership can enhance monitoring managers and thus impact cash holding decisions. Despite the trials towards privatization in the recent years in Egypt, research has shown that government ownership remains relatively high in Egyptian listed firms. Omran *et al.* (2008), Abdelsalam El-Masry and Elsegini (2008) and Wahba (2014) find that the average government ownership in Egyptian listed firms is 34%, 29.97% and 10.937%, respectively. In this respect, this study contributes to the existing literature by investigating how government ownership impacts cash holding decisions in Egypt.

3.3.3 Government Ownership

Government ownership can perform a strong monitoring function, thus it would be expected that firms with high government ownership have low cash holding levels. Megginson, Ullah and Wei (2014) find a negative relationship between cash holdings and state ownership in China but explain it from a slightly different perspective. From Megginson *et al.* (2014)'s perspective, inefficiencies in state-owned firms come from the economics theory 'soft budget constraint' effect. This means that state-owned firms can depend heavily on other state-owned organizations for help. They explain that state-owned firms will have easy access to financial resources from state-owned banks even if these companies are financially distressed. This way there is no need for state-owned firms to keep high levels of cash. Shleifer and Vishny (1997) explain that state owned firms usually do not serve the public interest better than private firms. In fact, state owned firms are inefficient and their losses have a negative impact on their country's treasuries (Shleifer and Vishny, 1997). Also, Wu *et al.* (2012) find that state-controlled firms have low cash holdings in China due to their easy access to finance.

3.3.4 Family Ownership

Another aspect of ownership structure is family ownership. Kuan *et al.* (2011) investigate the relationship between cash holdings and corporate governance within family-controlled firms in Taiwan. They define family controlled firms as those where families own a large percentage of shares that exceed the critical control level. In this case, the family controllers become the majority shareholders and have enough power to influence the firm's financial decisions. Kuan *et al.* (2011) explain that in this case, agency problems start to rise between the majority shareholders and the minority shareholders. They highlight the importance of family ownership through explaining that in family-controlled firms agency problems are more complicated than in other firms due to separation of ownership and control. Families could force the firm to implement financial policies that are in the favour of their best interest but not favourable to minority shareholders.

Ozkan and Ozkan (2004) find that Family ownership controllers impact cash holdings positively. They explain that this is because controlling shareholders want to increase resources under their control. Kuan *et al.* (2011) suggest that in Taiwanese family-controlled firms there are more severe agency problems than in non-family-controlled firms. This is due to the fact that in family-controlled firms majority shareholders are able to expropriate wealth from minority shareholders. This increased agency problems in family controlled firms causes them to have higher external financing costs and thus require to hold higher cash levels.

Kusnadi (2011) also agree with Ozkan and Ozkan (2004) and Kuan *et al.* (2011) on a positive relationship between cash holdings and family control. Kusnadi (2011) also finds that Pyramidal ownership structure (measured using a dummy variable) has a positive impact on cash holdings. The author defines a pyramid structure as a firm with ownership "*inter-connected through a chain*" (Kusnadi, 2011, p.557). Interconnected through a chain

means that ownership structure is just like a pyramid (firm A owns firm B and firm B owns firm C) and the controlling shareholders at the top of it are a family. Firms with pyramidal ownership are usually family controlled firms having less effective boards and higher managerial discretion. Due to higher managerial discretion caused by weaker monitoring, these firms keep higher cash levels and refuse to pay excess cash to remaining shareholders. Kusnadi (2005) finds that family-controlled firms have lower cash holdings levels. These findings are contrary to the results of Ozkan and Ozkan (2004), Kusnadi (2011) and Kuan *et al.* (2011).

3.4 Board Characteristics

"The board of directors is the key internal governance mechanism, and its main functions are to monitor management decisions on behalf of shareholders and to verify the accuracy of information released to shareholders" (Chen, 2008, p. 433).

The board's main responsibility is to monitor and evaluate top management (Harford *et al.*, 2008). This section addresses the relationship between board characteristics and corporate cash holdings. According to previous empirical research board size, board independence and CEO duality all impact corporate cash decisions.

3.4.1 Board Size

When the board size is larger, the decision-making process slows down causing boards to be less effective (Jensen, 1993). Kusnadi (2005) find that board size has a significant positive impact on cash holdings. This could be because larger boards provide less effective monitoring and hence corporate governance structures work less effectively in those companies. Due to their weak monitoring power, these boards will not be able to force managers to distribute residual cash to shareholders. Ullah and Kamal (2017) also find a significant positive relationship between board size and cash holdings in Pakistan.

Harford *et al.* (2008) clarify that the literature on board size effectiveness has found different views. The first view suggests that smaller boards are more effective because they provide better decision making, whereas the second view suggests that larger boards are more effective because they perform a stronger monitoring function. Loukil and Yousfi (2016) clarify that the first view that smaller boards are more effective is consistent with the agency theory. This is because smaller boards are expected to provide higher monitoring and control over management than larger boards due to more efficient communication and coordination (Jizi, Salama, Dixon and Stratling, 2014). However, the second view that larger boards are more effective is consistent with the resource dependency theory because larger boards have access to more skills and resources (Loukil and Yousfi, 2016).

Masood and Shah (2014) find that larger boards have more monitoring powers and control over management in Pakistani firms, leading to a negative relationship between board size and cash holdings. Kuan *et al.* (2012) also find that companies with lower cash holdings have larger boards in Taiwan. Al-Najjar and Clark (2017) also report a negative relationship between board size and cash holdings in the MENA region. On the contrary, Chen and Chuang (2009) claim that relatively smaller boards are more effective because they have lower costs of coordination and less severe free riding problems. However, Chen and Chuang (2009) suggest that even if this is the case in firms analysed in previous studies, the case may be different in high tech-firms. They explain that the average board size in high tech firms shows that larger boards are actually more effective because they provide more monitoring and advising in such a competitive business. Chen and Chuang (2009) find evidence of a positive relationship between board size and cash holdings explaining that in high tech firms, larger boards are more effective and allow managers to keep higher cash levels for future investments. This is specific to high tech firms due to the dynamic market requiring immediate cash to invest in profitable opportunities. Because

high-tech businesses are more complex than traditional businesses, there appears to be higher information asymmetry between managers and investors causing higher costs of external financing (Chen and Chuang, 2009). In order for large shareholders to be part of the cash holdings decision making process, they seek board membership. Nevertheless, Kusnadi (2011) finds no significant relationship between board size and cash holdings in Singapore and Malaysia. Also, Harford *et al.* (2008) and Boubaker and Derouiche (2015) find no significant relationship between board size and cash holdings in the U.S. and France, respectively. Kalcheva and Lins (2007) argue that empirical research in the U.S. have mostly found no evidence that poor firm-level corporate governance increases cash holdings and/or in turn decreases firm value. They state that this is probably due to strong corporate governance already existing in the U.S. which leads to investors not discounting the value of firms with poor corporate governance, even if they are holding relatively high amount of cash.

3.4.2 Board Independence

More independent boards exert higher monitoring powers and thus cause lower managerial opportunism and improved firm performance (Harford *et al.,* 2008). Due to this higher monitoring effectiveness, independent directors enhance long-term firm value maximization (Jizi *et al.,* 2014). Firms with high board independence have lower information asymmetry and therefore it is easier for their respective companies to access capital markets (Chen, 2008). Such firms do not need to accumulate cash. Since independent directors are not closely involved in setting firm strategies and policies, they are able to assess managers more objectively than executive directors (Jizi *et al.,* 2014). If independent directors create higher monitoring, they will be able to force managers to invest excess cash in positive net present value projects. Accordingly, the relationship between board independence and cash holdings is expected to be negative.

Kusnadi (2005) finds that when there are more insiders on the board, firms tend to hold more cash. More insiders on the board of directors means that the board overall becomes less independent and as a result have weaker monitoring powers. Therefore, in the presence of a more independent board, the board's monitoring power increases and managers are forced to pay-out or invest excess cash. Boubaker and Derouiche (2015) support this view by finding that when there are more independent directors on the board, cash levels decrease because more independent boards are more effective.

Kusnadi (2011) agree to this argument by discovering that firms having less independent directors on the board have higher cash levels. As such, firms with less independent boards have lower monitoring effectiveness, leading to more severe agency problems. In the presence of such weak governance structures, managers have the opportunity to increase cash balances under their control. Kuan *et al.* (2011) contradict this argument by reporting a significant positive relationship between cash holdings and board independence in family-controlled firms. Similarly, Kuan *et al.* (2012) and Ullah and Kamal (2017) provide evidence of a positive relationship between board independence and cash holdings. Nevertheless, Ullah and Kamal (2017) find a negative relationship between non-executive directors on the board and corporate cash holdings. Ullah and Kamal (2017) argue that non-executive directors perform a strong monitoring function and force managers to decrease cash holdings. However, it is difficult for independent directors to monitor managers effectively.

Ozkan and Ozkan (2004) find that board characteristics do not impact cash holdings significantly. Harford *et al.* (2008) and Al-Najjar and Clark (2017) find no significant relationship between board independence and cash holdings. Similarly, Belghitar and Khan (2013) find no significant relationship between non-executive directors on the board and cash holdings in U.K. small and medium enterprises. Chen (2008) finds no empirical

evidence regarding the effect of board independence on corporate cash holdings in old economy firms but finds that board independence affects cash holdings positively in new economy (high technology) firms. Board independence is one way of protecting shareholders' interests. In new economy firms in the U.S., it is acceptable to keep high levels of cash as long as the board of directors is protecting shareholders' interests. Similarly, in high tech firms, when there are more effective boards, shareholders will actually allow managers to accumulate cash (Chen and Chuang, 2009). When boards are more independent, corporate governance mechanisms are stronger. In such a dynamic market, shareholders will allow managers to keep cash in order to seize risky yet profitable investment opportunities.

3.4.3 CEO Duality

CEO duality appears when the Chief Executive Officer (CEO) and Chairman of the Board (COB) are the same person. Companies with a dual CEO have higher cash ratios than companies with CEO and COB separation (Drobetz and Grüninger, 2007). Kusnadi (2011) confirm that firms with CEO-Chairman duality have larger cash reserves. Boubaker and Derouiche (2015) also find that firms with CEO duality keep higher cash holdings. They explain that firms with CEO duality favour hoarding cash which could in turn enable insider expropriation. This shows that boards happen to be more effective and have stronger monitoring powers when the CEO and chairman are two different people. This leads to the conclusion that companies with CEO-chairman duality have less effective boards and so managers have the discretion to accumulate cash. Kuan *et al.* (2011) also find a positive relationship between chair duality and cash holdings.

Chen and Chuang (2009) explain that the governance mechanisms in high tech firms may be different than in traditional firms. For example, one way to ensure stronger governance mechanisms is having the founder of the firm as its CEO. This way the CEO will act in the

firm's best interest because they believe that the firm's existence is a product of their effort. Chen and Chuang (2009) find a positive relationship between CEO founder and cash holdings. When the CEO of a high-tech company is also its original founder, the interests of the CEO and shareholders are aligned and the CEO is encouraged to keep cash for future investments.

3.4.3.1 CEO Characteristics

Some studies have focused more on how CEO characteristics such as age, gender and compensation can affect cash holding decisions. Tong (2010) explains that while shareholders are risk neutral, managers are risk averse because they invest their human capital in a single firm and sometimes part of their wealth due to stock-based compensations. Therefore, Tong (2010) focuses on the relationship between risk-related agency theory and cash holdings through measuring risk-related CEO incentives. Tong (2010) finds that firms with higher CEO risk incentives hold less cash. This is evidence of the agency theory that managers keep more cash to decrease risk even if it is at the expense of shareholder wealth. Liu and Mauer (2011) contradict the findings of Tong (2010) by finding a positive relationship between CEO risk-taking incentives and cash holdings. They explain that this could be because firms with higher risk-taking incentives have a higher probability of facing financing constraints. This could increase the costs of external financing and hence managers prefer to hold cash in order to ensure financing needs in the future are met. The second reason is that higher risk-taking incentives increase the conflict between shareholders and bondholders. The higher risk leads to bondholders requiring extra liquidity. Liu and Mauer (2011) prove that debt-holders actually have a significant impact on shaping liquidity policies of firms with high CEO risk-taking incentives.

Regarding CEO characteristics, Orens and Reheul (2013) analyse the effect of CEO demographics on corporate cash holdings of Belgian SMEs. They find that older CEOs

keep more cash than younger CEOs for precautionary motives due to their natural risk aversion attitude. They also find that CEOs that have experiences in different industries hold less cash because they are concerned about the opportunity cost of holding cash and have a positive attitude towards innovation.

Zeng and Wang (2015) analyse the effect of CEO gender diversity on cash holdings. They highlight that previous research show that women are more risk averse and more caring about corporate spending patterns. They state that previous research also shows that women extract less private benefits and make more ethical decisions and so companies managed by women perform better that companies managed by men. Zeng and Wang (2015) focus on Chinese listed firms to find that firms with female CEOs have higher cash holdings because women are more concerned with precautionary motives to holding cash and less concerned with the opportunity cost of cash. They also find that in firms with female CEOs there are less agency problems because females are risk averse and so mitigate over-investment problems of free cash flow. Liang, Hsieh, Lin and Chi (2018) also confirm a positive relationship between female CEOs and cash holdings in Taiwan. They explain that this is because women are more risk averse and so hold more cash for precautionary motives, regardless of the opportunity cost of cash. Since some studies find that CEO demographics such as CEO gender diversity affect cash holdings, other studies focus on analysing board gender diversity on corporate cash holdings.

3.4.4 Board Gender Diversity

Ullah and Kamal (2017) explain that there are two different views to the effect of board gender diversity on corporate cash holdings. The first view is from an agency perspective and suggests that female directors benefit the board by increasing its monitoring effectiveness and decreasing agency problems. Adams and Ferreira (2009) prove that women perform better monitoring functions than men. They show that women attend more

board meetings and are likely to be assigned more monitoring roles. Under this view, the high monitoring effectiveness of female directors will decrease cash holdings. However, the second view is from a precautionary perspective suggesting that females are risk averse and so firms with females on the board will hold more cash (Ullah and Kamal, 2017)

Ullah and Kamal (2017) support the first view by finding a negative relationship between board gender diversity and corporate cash holdings in Pakistan. Ullah and Kamal (2017) measure board gender diversity using a dummy variable of 1 if the board of directors includes a female director and zero otherwise. They explain that including a female director on the board, benefits the firm by enhancing the monitoring effectiveness of the board and hence decreasing agency costs.

On the other hand, Loukil and Yousfi (2016) support the second view to board gender diversity by finding that the participation of women on the board actually increases cash holdings in Tunisia. They explain that this is due to the risk avoidance behaviour carried out by women. This implies that women prefer high cash holdings due to precautionary motives.

3.5 Shareholder Protection

One of the major components of corporate governance that impacts corporate cash holdings is shareholder protection. When there is weaker shareholder protection, managers have higher managerial discretion and are free to accumulate cash for their own private benefits. In a cross country study, Dittmar *et al.* (2003) use La Porta's anti-directors' rights index to measure investor protection. They find that firms in countries with poor shareholder protection hold more cash than firms in countries with strong shareholder protection. However, most studies carried out to investigate the effect of shareholder protection on corporate cash holdings, measure shareholder protection on a country level.

Pinkowitz *et al.* (2006) explain that there are 2 components of shareholder protection. These components are a legal rights component and an enforcement component. The former determines the legal rights granted to shareholders and the latter determines if the country's institutions actually enforce these rights. Pinkowitz *et al.* (2006) state that controlling shareholders intend to influence firms in order to increase their welfare. Agency problems arise when the interests of controlling shareholders and outside investors are not aligned. In countries where investor protection is weak, controlling shareholders are able to extract more private benefits causing firm value to fall (Pinkowitz *et al.*, 2006).

Kalcheva and Lins (2007) find that in firms with poor corporate governance, where shareholders are less protected, managers hold more cash. Chen, Chen, Schipper, Xu and Xue (2012) agree to this view when studying the split share structure reform in China. The split share structure reform allowed shareholders to convert non-tradable shares to tradable ones. This improved governance structure has led firms to decreases cash holdings. Al-Najjar (2013) compares the determinants of cash holdings in developing and developed markets. Here developing countries such as Brazil, Russia, India and China are investigated and compared with a sample of firms in the U.K. and the U.S. which represent developed markets. In emerging markets, Al-Najjar (2013) find that firms operating in countries with low shareholder protection hold more cash than firms operating in countries with high shareholder protection. This is due to the fact that when there is low shareholder protection, managers have high discretionary powers and shareholders are not able to force dividend pay-outs. This negative relationship between shareholder protection and cash holdings can also be explained by the fact that when shareholder protection is relatively higher, there is higher certainty and thus a lower need to keep a cash buffer.

Dittmar *et al.* (2003) find that firms in countries where shareholders are not well protected accumulate double the amount of cash than firms in countries that enjoy good shareholder

protection. Harford *et al.* (2008) find contradicting results to those of Dittmar *et al.* (2003). Harford *et al.* (2008) provide evidence that firms with weaker shareholder protection have smaller cash holdings. One reason for the contradicting findings could be the different measures used to represent shareholder protection. Dittmar *et al.* (2003) use La Porta's anti-directors' rights index to measure shareholder protection (La Porta *et al.*, 1997), whereas Harford *et al.* (2008) use the G-index (Gompers *et al.*, 2003). Guney *et al.* (2007) agree that companies operating in countries with strong shareholder protection hold more cash. However, their sample included developed countries which are expected to have strong shareholder protection anyway, namely France, Germany, Japan, the U.K. and the U.S. Cash holdings have minimal costs in strongly governed firms (Dittmar and Mahrt-Smith, 2007). In strong corporate governance countries, investors do not discount the value of firms, even if they are holding significant cash balances (Kalcheva and Lins, 2007). Therefore, the effect of the agency theory on cash holdings is more critical for firms operating in countries with weak shareholder protection. This study contributes to the existing literature by focusing on the relationship between corporate governance and corporate cash holdings specifically in Egypt, which is predominantly a country of weak shareholder protection.

Another reason to explain why firms in countries with poor shareholder protection hold more cash could be the overall access to financial markets. Countries with low shareholder protection are usually those with inferior financial development (Pinkowitz *et al.*, 2006). If firms keep low levels of cash then they would regularly require access to the operationally inefficient capital markets and so bear high financing costs. As for cash value, Pinkowitz *et al.* (2006) find that investors in countries with poor shareholder protection, value cash holdings less and value dividends more compared to investors in counties with strong shareholder protection. More specifically, they find that cash is worth more in countries with higher financial development and that this could be mainly due to capital market

infrastructure and not necessarily related to investor protection. The value of cash is discussed later in section 3.7. The following section addresses how corporate governance may be related to corporate cash holdings in Egypt through presenting studies that have included Egypt in their research.

3.6 Corporate Cash Holdings in Egypt

There has been very limited research on corporate cash holdings in developing countries and more specifically in the Egyptian context. Al-Najjar (2013) suggests that it is important to analyse corporate cash holdings in developing countries, especially from a corporate governance perspective. In countries with poor shareholder protection, the agency theory explains managerial behaviour more than any other corporate governance theory (Chang and Noorbakhsh, 2006).

Even though there has been no research on cash holdings in Egypt, a few cross country studies have included Egypt as one of the countries among many others. Dittmar *et al.* (2003) analyse international corporate governance and cash holdings of 45 countries. In this cross country analysis, Egypt had the highest median cash ratio of all 45 countries. The overall median of the cash ratio was only 6.6% whereas Egypt had a median cash ratio of 29.57%. Dittmar *et al.* (2003) explain that firms hold higher cash ratios when shareholder protection is weak.

Chang and Noorbakhsh (2006) investigate cash holdings using data from 22,000 firms from 48 countries including Egypt. They divide their sample into 2 groups, high corporate governance and low corporate governance countries. They include Egypt in the low corporate governance category. Also in this study, Egypt was one of the countries with an exceptionally high cash ratio. Among the low corporate governance countries, Egypt had the third highest cash ratio of 16.76% after Jordan and China with 17.36% and 16.83%,

respectively. Their findings are similar to Dittmar *et al.* (2003) showing that firms in countries with low shareholder protection hold higher levels of cash. Chang and Noorbakhsh (2006) measure shareholder protection based on the governance index of La Porta *et al.* (1998). The findings are consistent with the agency theory implying that when shareholder protection is weaker, managerial discretion is higher and so managers keep high cash holdings. They also find that larger firms have lower cash holdings relative to total assets which is consistent with the trade-off theory.

Chang and Noorbakhsh (2006) extend the analysis of Dittmar *et al.* (2003) by applying the same model but introducing a new variable to analyse the effect of globalization on cash holdings. They do so by studying the effect of Foreign Direct Investment (FDI) on corporate cash holdings. Foreign direct investment has been increasing due to globalization. They find that when the ratio of FDI to GDP increases, firms hold lower amounts of cash implying that FDI inflows and cash holdings are substitutes. They also highlight that countries with higher shareholder protection, usually have lower political risks and attract more foreign direct investment. Since Egypt is a country with low shareholder protection and high political risk, then FDI inflows and cash holdings will not be considered as substitutes. This justifies the assumption that in countries with a high uncertainty levels, companies hold higher cash levels to hedge against future risks. Once again, this supports the fact that companies in Egypt hold significant amounts of cash similar to the findings discovered by Dittmar *et al.* (2003).

Ramirez and Tadesse (2009) also include Egypt in their cross country analysis on cash holdings, uncertainty avoidance and the multinationality of firms. They use a large panel of firms representing 49 countries from 1990 to 2004. Egypt had the second highest cash ratio of 19% immediately after Hong Kong of 20%. Ramirez and Tadesse (2009) explain that uncertainty avoidance is a dimension of national culture that relates to the level of stress in

a society that deals with an uncertain future. Uncertainty avoidance is the degree of which society tries to decrease this risk of an uncertain future. They find that culture has an impact on corporate financial decisions. More specifically, they find that firms in countries with high uncertainty avoidance hold higher levels of cash. Ramirez and Tadesse (2009) also find that the degree of multinationality of firms is positively related to cash holdings. They also control for firm specific variables and country level variables. For the firm specific variables, their findings are mostly in line with previous literature, which is a negative association between cash holdings and leverage, size, cash flow and capital expenditure and a positive association between cash holdings and R&D. These findings are mostly in line with the trade-off theory. As for the country level control variables, the study reveals a positive relationship between GDP and inflation with cash holdings.

A recent study by Al-Najjar and Clark (2017) investigates the relationship between corporate governance and cash holdings in the MENA region. The sample included in their analysis comprises of 430 non-financial firms from Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Tunisia and United Arab Emirates. They include 78 firms from Egypt. However, when searching for internal corporate governance data specifically regarding institutional ownership and board independence, they are able to get data for only 13 firms in Egypt. Contrary to expectations, they find partial evidence that countries in the MENA region that have better corporate governance practices hold more cash.

Even though a few studies included Egypt in their cross country analysis, no study analyses corporate cash holdings in the Egyptian context in details. This research is different to prior research in that it focuses on the determinants of corporate cash holdings in Egypt only. This allows a detailed investigation of firm characteristics of Egyptian companies in order to show the effect of the trade-off, pecking order and agency cost of free cash flow theories. With regard to corporate governance, a major drawback of cross

country studies is that they focus on country level governance and do not capture the major effect of firm-level governance on corporate cash holdings failing to show the importance of agency problems (Chen *et al.*, 2014). Cross country studies such as Dittmar *et al.* (2003), Chang and Noorbakhsh (2006) and Ramirez and Tadesse (2009) focus on broad concepts of corporate governance on the country level such as investor protection. However, this thesis investigates corporate governance attributes on a firm level capturing the important effect of the agency theory on corporate cash holdings. Focusing solely on Egyptian companies will show important corporate governance aspects that have an effect on the firm level such as managerial discretion and monitoring.

3.7 Corporate Governance and the Value of Cash Holdings

In a different line of literature, the value of cash holdings has been addressed by many researchers. Dittmar (2008) explain the concept as an enquiry by investors on how much a dollar of cash on the company's balance sheet is worth to its investors. If accumulating cash results in the company being able to undertake profitable investments, then the value of a 1 dollar of cash is worth more than 1 dollar. However, if accumulating cash results in idle investment, then the value of 1 dollar is worth less than 1 dollar (Dittmar, 2008). In order to estimate the impact of excess cash holdings on firm value, studies measure the impact of the residuals from the normal cash holding regression on firm value. They use only the observations with positive residuals, because these are the firms that keep excess cash over the cash needed for operation and investment. The relationship between cash holdings and firm value has been reviewed in the previous chapter (section 2.5.5.). In this section, the relationship between cash holdings and firm value is reviewed from a corporate governance perspective. As mentioned before, analysing firm value is beyond the scope of this study as this study aims to analyse the determinants of corporate cash holdings. Nevertheless, it is important to review major studies such as Kalcheva and Lins

(2007), Dittmar and Mahrt-Smith (2007) and Megginson *et al.* (2014) that analyse the effect of corporate governance on the value of cash.

Harford *et al.* (2008) find that firms that accumulate cash have lower firm value. This is evident by the negative relationship between the firm's cash residual and its market to book ratio. They also find that poor corporate governance affects firm value negatively and this relationship is stronger in the presence of excess cash. Kusnadi (2011) find that shareholders discount firms that have large cash balances. They support previous research that strong corporate governance increases the marginal value of excess cash holdings.

3.7.1 Shareholder Protection and the Value of Cash

Pinkowitz *et al.* (2006) find that in countries with poor shareholder protection a dollar of liquid assets is worth much less than countries with strong shareholder protection. Kalcheva and Lins (2007) extend the analysis of Pinkowitz *et al.* (2006) by combining firm-level governance with country level governance. Kalcheva and Lins (2007) find that in cases of firms in which managers are expected to be entrenched, external shareholders discount the cash held by these firms. They also find that in such cases of expected managerial entrenchment, paying out dividends to shareholders increases firm value. They conclude that poor shareholder protection along with managerial entrenchment and the intention to retain cash, negatively affect firm value. Dittmar (2008) recommend that excess cash can be managed using stock repurchase because it is more flexible than the commitment of dividend payments. Pinkowitz *et al.* (2006) explain that one possible reason that minority shareholders value cash less in countries with weak shareholder protection is because shareholders believe that accounting statements misrepresent cash.

Dittmar and Mahrt-Smith (2007) examine how corporate governance impacts the value and eventual use of cash holdings. They employ two different specifications to carry out this

investigation. First, they evaluate how a change in cash affects a change in the firm's market value measuring market value using stock returns (25 size and book-to-market portfolios) adopted from Fama and French (1993). Second, they measure the impact of governance on the value of excess cash measuring market value using the market to book ratio adopted from Fama and French (1998). Excess cash is the cash left in excess of that needed for operations and investments. Dittmar and Mahrt-Smith (2007) explain that this excess cash is at highest risk of being wasted because it is highly at managerial discretion. Fresard and Salva (2010) measure excess cash as the residual from the cash holding regression equation. Dittmar and Mahrt-Smith (2007) also find that firms with high levels of excess cash and poor corporate governance have relatively lower operating profits.

Dittmar and Mahrt-Smith (2007) conclude that holding significant cash reserves has little costs in well governed firms but significantly affects the value of poorly governed firms. More specifically, they find that in the presence of stronger corporate governance, less entrenched managers and stronger monitoring effectiveness (through institutional block holdings), the value of a dollar of cash increases significantly. To carry out this investigation they use an interaction term between governance variables and the change in cash. These findings imply that poorly governed firms waste excess cash and hence destroy firm value.

In a cross-country analysis, Iskandar-Datta and Jia (2012) find that the value of cash in Japan increased through time from $0.42 to $0.58 and then to $1.08, reflecting more optimal cash holdings in Japan throughout the years. They find that the value of a dollar change in cash in the U.S. is $1.68, Canada $1.66 and the U.K. $1.24. However, in Germany building up cash causes only $0.49 change in firm value which reflects agency problems in Germany.

3.7.2 State Ownership and the Value of Cash

Megginson *et al.* (2014) and Sun and Wang (2016) analyse the effect of state ownership on the value of cash holdings. Megginson *et al.* (2014) find that state ownership decreases the marginal value of cash. This is because the soft budget constraint effect found in these firms increases agency costs. Under the soft budget constraint effect managers do not worry about investing efficiently or increasing returns because they can easily rely on other government organizations for finance. They explain that in this case, managers have a better chance to expropriate liquid assets for their own private benefits. They also explain that corruption could lead managers in state-owned firms to just invest in projects due to political reasons instead of investing in projects that maximize the firm's net present value. Sun and Wang (2016) contradict the findings of Megginson *et al.* (2014). Sun and Wang (2016) find that in China, the marginal value of a dollar of cash in state owned firms is higher than private firms. This indicates that investors believe that state-ownership performs as a strong monitoring function.

3.7.3 Financial Constraints and the Value of Cash

Studies such as Faulkender and Wang (2006) and Denis and Sibilkov (2010) focus on the effect of financial constraints on the value of cash. Faulkender and Wang (2006) explain that if shareholders believe that the difficulty to access external financing causes managers to forgo profitable investment opportunities, then the value of a dollar of cash should be more than one. However, if shareholders believe that excess cash cause cash flow problems, then the value of a dollar of cash should be less than one. They find that the marginal value of a dollar of cash is $0.94. Faulkender and Wang (2006) show that the marginal value of cash is higher for firms with low cash holdings, less leverage and firms facing difficulties to access capital markets. Denis and Sibilkov (2010) find that in financially constrained firms, high cash holdings results in high investment levels which in

turn increase firm value. Denis and Sibilkov (2010) explain that high cash holdings in financially constrained firms, allows these firms to undertake projects that otherwise would be forgone.

Drobetz, Grüninger and Hirschvogl (2010) explain that there are two different views to the market value of corporate cash holdings. The first view is through the pecking order theory, stating that the marginal value of a dollar of cash increases when there is higher information asymmetry because external financing becomes very costly and firms keep cash to try to avoid this costly external financing. The second view is through the agency theory, stating that the marginal value of a dollar of cash decreases when there is higher information asymmetry due to moral hazard problems. The authors analyse 8500 firms from 45 countries from 1995-2005 to find that the value of one dollar of cash is almost one. However, they provide evidence that the marginal value of a dollar of cash decreases when firms face higher information asymmetry, which is in support of the agency theory.

3.7.4 Cross-Listing and the Value of Cash

When U.S. firms choose to cross-list, firms face changes such as more disclosure requirements and higher informal monitoring from large investors or analysts (Fresard and Salva, 2010). The authors find evidence that the value of cash for investors of cross-listed firms is more than the value of cash for non-cross-listed firms. They find that $1 of excess cash is $0.58 for non-U.S. firms and $1.61 for firms cross-listed in the U.S. Even though excess cash premium is larger for firms in countries with low shareholder protection, investors view the value of cash similarly for any country once it enters the U.S. market through cross listing. This shows that firm's corporate governance improves through U.S. cross-listing (Fresard and Salva, 2010). Investors also view cross-listing as a firm's commitment to decrease the risk of cash holdings being extracted into private benefits.

Fresard and Salva (2010) also find that investor valuation of excess cash increases when there is higher informal monitoring measured by the number of financial analysts following the firm, especially in over the counter listings. Insider's extracting private benefits is decreased through higher legal protection, transparency and higher monitoring by financial analysis and large investors (Fresard and Salva, 2010).

3.7.5 CEO risk incentives and the Value of Cash

Tong (2010) finds that in firms with higher CEO risk incentives, the value of cash is higher. More specifically, in firms with higher CEO risk incentives an additional dollar of cash is worth 1.10 dollars. However, in firms with low CEO risk incentives an additional dollar of cash is worth only 0.93 dollars (Tong, 2010). The author finds that the value of cash is higher in firms with higher CEO risk incentives even after controlling for financial constraints and growth options.

3.7.6 Diversification and the Value of Cash

Tong (2011) finds that firm diversification decreases the marginal value of a dollar of cash through agency problems. The author finds evidence that the value of a dollar of cash is $0.92 in diversified firms and $1.08 in single segment firms. Since cash is the most liquid asset, managers can easily derive private benefits from cash holdings. In diversified firms, managers can easily transfer cash from well-performing divisions to poor-performing divisions (Tong, 2011). Therefore, in diversified firms, investors view the value of a dollar of cash less than one because they expect inefficient use of cash from managers.

3.8 Hypotheses Development

Jensen's (1986) agency cost of free cash flow theory suggests that managers accumulate cash reserves to increase resources under their control, provide job security or benefit from compensation schemes related to firm size. Dittmar *et al.* (2003) and Ferreira and Vilela

(2004) confirm that managers keep cash because of their own private benefits disregarding immediate value to shareholders. Managers choose to keep cash for their own private benefits and effective corporate governance structures force them to decrease cash levels (Harford *et al.*, 2008; Kusnadi, 2011). Therefore, building on previous studies, hypotheses are formulated in the sense that when corporate governance effectiveness increases, cash holdings decrease.

Jensen and Meckling (1976) suggest that when there is separation of ownership and control managers have more power to pursue their own interest and may decrease value for shareholders. They propose a negative relationship between managerial ownership and cash holdings because managerial ownership aligns the interest of shareholders and managers, allowing managers to keep lower cash levels. According to Jensen (1993, cited in Harford *et al.*, 2008) if firms increase managerial equity ownership they will decrease managerial opportunism problems and managers will hold less cash. Drobetz and Grüninger (2007) and Masood and Shah (2014) also find a negative relationship between managerial ownership and cash holdings. If the company has a higher percentage of its managers as owners in the company, there will be goal congruence and thus lower managerial opportunism and lower levels of cash. The hypothesis related to managerial ownership can be formulated as follows:

H11: There is a significant negative relationship between managerial ownership and cash holdings

Dittmar and Mahrt-Smith (2007) state that corporate governance is improved by large shareholders because they perform a monitoring function to protect their own investments and decrease agency problems. Guney *et al.* (2007) and Kusnadi *et al.* (2015) find a negative relationship between ownership concentration and cash holdings. Kuan *et al.*

(2011) and Kuan *et al.* (2012) specifically find a negative relationship between institutional ownership and cash holdings.

If there is a higher level of institutional ownership in the company, there will be higher monitoring effectiveness, lower managerial opportunism and managers will be forced to keep lower levels of cash. The hypothesis related to institutional ownership can be formulated as follows:

H12: There is a significant negative relationship between institutional ownership and cash holdings

Similar to the previous argument on institutional ownership, if there is higher government ownership, there will be higher monitoring effectiveness, lower managerial opportunism and managers will be forced to keep lower levels of cash. Wu *et al.* (2012) and Megginson *et al*. (2014) find a negative relationship between state-ownership and cash holdings in China. However, there still remains to be a gap in the literature regarding the effect of government ownership on corporate cash holdings. The hypothesis related to government ownership can be formulated as follows:

H13: There is a significant negative relationship between government ownership and cash holdings

According to Harford *et al.* (2008) different views on the effect of board size on firm value can be found in the literature. They explain that some studies find that smaller boards are more efficient as they provide better decision making. Studies like Kusnadi (2005), Chen and Chuang (2009) and Ullah and Kamal (2017) find that smaller boards provide better monitoring due to lower costs of coordination and less acute free riding problems. Thus, these studies find evidence of a positive relationship between board size and cash holdings. In this case, when there is a larger board, there is lower monitoring, higher managerial

opportunism and higher cash levels suggesting a positive relationship between board size and cash holdings.

However, Harford *et al.* (2008) explain that other studies find that larger boards will provide better monitoring. In this case, when there is a larger board, there is higher monitoring, lower managerial opportunism and lower cash levels suggesting a negative relationship between board size and cash holdings. Kuan *et al.* (2012), Masood and Shah (2014) and Al-Najjar and Clark (2017) all support this view by finding a negative relationship between board size and cash holdings. Therefore, the theory does not suggest a clear cut direction of the relationship. The hypothesis for board size can be formulated as follows:

H14: There is a significant relationship between board size and cash holdings

Board independence is also an important issue. It can be expected that when the board is more independent, it's monitoring ability increases, the fact which in turn reduces managerial opportunism (Harford *et al.*, 2008). Since board independence provides a strong monitoring power, managers of firms with more independent boards will be forced to decrease cash holdings. Kusnadi (2011) reveal evidence that when the board is more independent, there is higher monitoring, lower managerial opportunism and lower cash levels. Boubaker and Derouiche (2015) also support a negative relationship between board independence and cash holdings. The hypothesis related to board independence can be formulated as follows:

H15: There is a significant negative relationship between board independence and cash holdings

Boards of directors are less effective when the roles of chief executive officer and chairman of the board are performed by the same person (Kusnadi, 2011). In the presence

of CEO-duality, there is less monitoring effectiveness, higher managerial opportunism and higher cash holdings (Drobetz and Grüninger, 2007; Kuan *et al.*, 2011; Kusnadi, 2011; Boubaker and Derouiche, 2015). Therefore, the hypothesis related to CEO duality can be formulated as follows:

H16: There is a significant positive relationship between CEO duality and cash holdings

There are different views on the effect of board gender diversity on cash holdings. The first view states that women directors benefit the board by increasing monitoring effectiveness and hence decreasing cash holdings (Ullah and Kamal, 2017). This view suggests a negative relationship between female directors on the board and cash holdings. This view is supported by the findings of Ullah and Kamal (2017).

The second view states that women are more risk averse than men and so are more concerned with precautionary motives to holding cash and hence are expected to take decisions in favour of hoarding cash (Zeng and Wang, 2015). This view suggests a positive relationship between the percentage of women on the board and cash holdings. Also women are better at long term planning so may force managers to take decisions in favour of accumulating cash. Loukil and Yousfi (2016) support the second view by finding a positive relationship between female directors and cash holdings. Therefore, there is no clear cut identification on the relationship between the percentage of women on the board and cash holdings. The hypothesis for percentage of women on the board can be formulated as follows:

H17: There is a significant relationship between the percentage of women on the board and cash holdings

There has been minimal research on the relationship between audit quality and cash holdings. When the firm's audit quality increases, monitoring effectiveness increases and

cash holdings are expected to decrease. Therefore, the final hypothesis can be formulates as follows:

H18: There is a significant negative relationship between audit quality and cash holdings

Conclusion

To sum up, this chapter addresses the third research objective by presenting an overview of previous studies analysing the effect of corporate governance on corporate cash holdings. The main theory that explains the relationship between corporate governance and cash holdings is the agency theory. Agency problems occur when managers act as agents on behalf of shareholders and do not take all optimal decisions from the shareholders' point of view. When corporate governance structures are weak, agency problems increase because managers have more power over cash holding decisions. Jensen (1986) explains that under the agency cost of free cash flow hypothesis, managers increase cash levels to increase resources under their control and thus gain power over the firm's investment decisions. Nevertheless, previous literature has found mixed evidence on the effect of agency problems on cash holdings (Gao *et al.*, 2013). In order to analyse the effect of the agency theory on cash holdings, the hypotheses formulated help answer the second research question regarding the investigation of the corporate governance determinants of corporate cash holdings of firms listed on the Egyptian stock market. The two main aspects of corporate governance that affect cash holding decisions focused on in this research are ownership structure and board characteristics. This chapter presents a review of previous research on cash holdings from a corporate governance perspective around the world. Some key studies have included Egypt in their cross country analysis (Dittmar *et al.*, 2003; Chang and Noorbakhsh, 2006; Ramirez and Tadesse, 2009; Al-Najjar and Clark, 2017). Nevertheless, there still remains to be a gap in the literature regarding the determinants of corporate cash holdings from a firm-level governance perspective, particularly in

developing countries. Recent studies have been calling for further academic inquiry into the effect of board characteristics, audit features and ownership structure on corporate cash holdings in developing economies (Al-Najjar, 2013; Rezaei and Saadati, 2015). Many academics agree that the effect of the agency theory on corporate cash holdings is more important in countries with poor corporate governance and weak shareholder protection (Dittmar *et al.*, 2003; Pinkowitz *et al.*, 2006; Dittmar and Mahrt-Smith, 2007; Kalcheva and Lins, 2007; Al-Najjar, 2013). Most of the cross country studies that include Egypt find that Egyptian companies have relatively large cash balances (Dittmat *et al.*, 2003; Chang and Noorbakhsh, 2006; Ramirez and Tadesse, 2009). Due to poor corporate governance structures, weak shareholder protection and exceptionally large cash holdings, Egypt offers an ideal case of investigating the effect of the agency theory on corporate cash holdings. This study contributes to the existing literature by analysing the effect of the agency theory on corporate cash holdings in Egypt.

Chapter 4: Research Methodology

Introduction

This research aims to analyse the determinants of corporate cash holdings of firms listed on the Egyptian stock market. In doing so, the study tests hypotheses that are formulated based on the trade-off, pecking order and agency cost of free cash flow theories. According to the theories, the factors affecting the all-important cash holding decision can be either linked to firm specific financial determinants and/or corporate governance determinants.

The first part of chapter 4 presents the philosophical underpinning of this research including discussion of ontology, epistemology and methodology. Then the chapter continues with an explanation of the research method used to analyse the determinants of corporate cash holdings. This is followed by a detailed discussion of all the variables used in the study in the context of the selected research models. Additionally, each variable is discussed in terms of the corresponding literature and the most appropriate measurement technique. The chapter proceeds with a discussion of the regression model assumptions and the necessary diagnostic testing. The regression estimators used to analyse the determinants of corporate cash holdings are further supported by the review of major studies in the cash holding literature. Finally, the sampling and data collection methods are presented in details. Accordingly, the chapter concludes by setting a procedure in order to ensure the most robust research design.

4.1 Philosophical Underpinning

The philosophical underpinning of a research is linked to the assumptions of how the researcher views the world. In order to design a comprehensive piece of research it is important to clearly identify what these assumptions are. The philosophical underpinning

then determines the methodology and methods to be used to answer the research question (Crotty, 1998).

Ontology is a strand in philosophy that helps researchers define what is meant by objective reality and how they can search for it. Ontological assumptions are related to the essence of the phenomena under analysis, addressing questions about whether reality actually exists in the world or is just a product of human mind (Burrell and Morgan, 1979). Epistemology on the other hand, is the relationship between the reality and the researcher. Once the two have been clearly defined, research methodology can be formulated in terms of quite specific techniques designed for effective study of the phenomenon in question (Sobh and Perry, 2006). The following section explains the different views to ontology, epistemology and methodology and specifically explains the philosophical underpinning of this research.

4.1.1 Ontology (Objectivism)

"Ontology is the study of being" (Crotty, 1998, p. 10). Ontology refers to issues concerning the nature of existence and reality. There are two opposing views on ontology, namely objectivism and subjectivism. Objectivism is also known as realism which is a concept of assuring that there is an objective reality outside the human mind regardless of individual perception. Burrell and Morgan (1979) state that realists perceive the social world as a real world that is tangible just like the natural world and not something that the individual creates. Saunders, Lewis and Thornhill (2009) define objectivism as the researcher's belief that social entities exist outside and independently of the social actors. They give an example of objectivism with reference to the discipline of business management. They explain that in organizations, people have clear job descriptions, rigid procedures and formal structures. This leads to the reporting process being very similar across all organizations.

The opposite view in ontology is subjectivism, which is based on the perception and actions of the social actors. Unlike realists, they do not acknowledge a real structure to the world and believe that external to individual perception, the social world merely consists of names, concepts and labels (Burrell and Morgan, 1979). This implication here is that people may interpret the same situation differently based on their own views of the world. Saunders *et al.* (2009) explain that in customer service, customers perceive reality differently and so there must be a dynamic interaction between the organization and its customers.

The aim of this research is to analyse the determinants of corporate cash holdings. Objectivism ontology also referred to as realism, views that reality exists outside the human mind, regardless of individual perception. The determinants of corporate cash holdings are divided into two categories, namely firm specific financial determinants and corporate governance determinants. Firm specific financial determinants are financial ratios based on figures extracted from financial statements issued by corporations. These are actual figures based on objective facts that have actually occurred during the period under analysis. The corporate governance determinants are attributes that are based on actual figures of ownership structure and board of director's compositions. In both cases there is an existing reality of actual financial figures and corporate governance attributes representing facts and transactions regardless of human perception. This study confirms an objectivism ontological view as it analyses how the financial and corporate governance determinants can generate knowledge regarding the level of retained cash in corporations. After determining ontology, the next section describes the different views on epistemology and justifies the one followed in this research.

4.1.2 Epistemology (Positivism)

Epistemology is a manner of understanding and explaining how we know what we know (Crotty, 1998). Epistemology is the establishment of the knowledge in a field (Saunders *et al.*, 2009). The main two epistemological views are positivism and interpretivism. Under the positivistic view, researchers use resources and deal with observable social reality to develop hypotheses from the existing theory (Saunders *et al.*, 2009). Positivists believe in existence of actual facts that occur due to cause and effect regardless of human ideas (Tuli, 2010). For positivists, research is carried out to find scientific explanation (Tubey, Rotich and Bengat, 2015). Positivistic epistemology is consistent with realism in which the researcher discovers knowledge about an objective reality (Scotland, 2012).

On the other hand, interpretivism suggests that humans are very different and interpret situations differently in the sense that reality is socially constructed and that individuals make their own sense of social realities (Tubey *et al.*, 2015). Under interpretivism, researchers have to communicate with the social world and understand their unique perspectives (Saunders *et al.*, 2009). Unlike positivists, they do not test hypotheses developed from existing theory. However, they believe that business situations occur as a result of humans interacting with these situations at a specific point in time.

This research endeavours to discover knowledge about an objective reality, namely the factors affecting the level of cash held by companies in the research sample. Since this research is based on the objectivist philosophical underpinning, it is naturally connected to the positivist epistemology. This research develops hypotheses based on the existing and established theories taken from the cash holding literature. These theories are the trade-off, pecking order and agency cost of free cash flow theories. Actual facts are analysed in order to test the developed hypotheses (see chapter 2, section 2.8; and chapter 3, section 3.8) and provide evidence of the explanatory power of the theories in a specific context. Under

positivism, statistical analysis of an accessible reality is used in order to generalize the sample based findings to the entire population (Sobh and Perry, 2006). Tubey *et al.* (2015) state that ontology and epistemology influence the determination of research methodology. They explain that ontology determines the methodology about the nature of reality and what should be studied. However, epistemology determines the methodology about the nature of knowledge or where it is to be found. Once the research methodology is clear, the research methods are determined which are the specific techniques used to answer the research questions and hypotheses under analysis. The following section discusses research methodology which later feeds into the specific research methods used to analyse the determinants of corporate cash holdings of firms listed on the Egyptian stock market.

4.1.3 Methodology (Quantitative)

Research methodology is the strategy used to determine the application of particular methods (Crotty, 1998). It deals with the reasons and strategies of gathering data and analysing it (Scotland, 2012). The main two research methodology paths are quantitative and qualitative, each prescribing a group of appropriate research methods.

Tuli (2010) explains that positivist researchers, who believe in facts outside the human mind, use quantitative data to explain relationships between variables or causes of events and outcomes. They claim that many researchers use statistical techniques that are based on direct observation for their analysis and produce inferential results. Quantitative research is referred to as a deductive approach because it tests existing theories. Tubey *et al.* (2015) state that quantitative researchers in social science believe that social observations should be treated as entities, similar to those in physical science. They confirm that quantitative researchers express assumptions that are consistent with positivist paradigm.

However, interpretive researchers usually use qualitative research methodologies (Tuli, 2010). Qualitative research methodologies involve personal contact with the participants under analysis trying to deeply understand the research problem under consideration. Qualitative research is an inductive approach, which means it develops theories rather than testing existing ones. This approach deals more with discovery but has lower concern for generalizability compared to the quantitative approach (Tubey *et al.*, 2015). Qualitative researchers (Interpretivists) deal with reality as a matter that is subjective by individuals (Tubey *et al.*, 2015). The following table illustrates a comparison between quantitative and qualitative research methodologies.

Table 4. 1 : Comparison between Quantitative and Qualitative Research Methodologies

	Quantitative Methodology	**Qualitative Methodology**
Nature	Objective	Subjective
Theory	Tests Theory (Deductive)	Develops Theory (Inductive)
Purpose	Establishing relationships and causation	Describing meaning and discovery
Testing	Hypotheses	Research Questions
Literature Review	Conducted early in study	Conducted as study progresses or afterwards
Reality	One (Narrow Focus)	Multiple (Broad Focus)
Facts	Unbiased	Biased
Data Collection	Use Subjects and instruments	Use Participants, communications and observation
Sample Size	Concern	Not a concern
Setting	Highly Controlled	Flexible
Context	Free	Dependent
Strives for	Generalizability	Uniqueness

Source: Tubey *et al.* (2015)

This research analyses the determinants of corporate cash holdings of listed companies in Egypt. Tubey *et al.* (2015, p.226) states that:

"The positivist research paradigm underpins quantitative methodology owing to its deductive nature".

Based on an objectivist ontological approach and positivistic epistemology, this study uses quantitative research methodology. Under the positivist paradigm, an objective research methodology is required because the target is to measure variables and test hypotheses that occur due to causal explanations (Tubey *et al.*, 2015). The theoretical underpinning of this research is based on determinants suggested by the trade-off, pecking order and agency

theories. A quantitative approach is used because this study aims on testing existing theories instead of developing new ones. As mentioned in the literature review, each theory deals with a set of determinants with expectations on their effects on cash holdings.

Positivists use data collection techniques that involve collecting number data to present hard evidence in a quantitative form (Tubey *et al.*, 2015). The determinants of cash holdings consist of financial determinants based on financial ratios extracted from financial statements and corporate governance variables extracted from disclosure reports. This data is historical secondary data mostly based on scalar measurable values. The quantitative data used in this study is based on direct observation of actual facts resulting in knowledge about the level of retained cash in Egyptian corporations. The results of this study will explain how the selected theories explain the all-important cash holding decisions of a sample of Egyptian listed firms and seek for generalization among all firms listed on the Egyptian stock market. Tubey *et al.* (2015) state that positivist researchers explain how variables interact, shape events and cause outcomes in quantitative terms. They highlight that the most common contributions for quantitative research are multivariate analysis and techniques for statistical prediction. The specific research method used in this research is multivariate regression analysis which is discussed in details in the following sections.

4.1.4 Research Methods

The research methods are the specific techniques used to answer a research question or hypothesis under consideration. These techniques include data collection procedures and analysis (Crotty, 1998). In order to adequately measure the determinants of corporate cash holdings in relation to firms listed on the Egyptian stock market, panel data will be collected. Here, the observations include time series and cross sectional units. Panel data give more informative data, more variability, less collinearity among variables and more efficiency (Baltagi, 2005). Based on the theoretical underpinning of this research addressed

in the previous sections, a quantitative research approach is used to test evidence of the trade-off, pecking order and agency theories that impact corporate cash holdings. In a quantitative research approach data analysis is carried out using statistical techniques and mathematical operations (Tubey *et al.*, 2015). As is the case in the vast majority of studies on the subject matter, multivariate regression analysis is used to analyse the determinants of corporate cash holdings. The next section presents the research model and explains the variable calculations in details. However, before commencing the discussion on regression analysis and the presentation of the research model, the theoretical underpinning is summarized in table 4.2 in order to differentiate between research approaches. The table highlights the quantitative approach used in this study which is underpinned by objectivist/realist ontology and positivistic epistemology.

Table 4. 2 : Research Approach used in this study

Philosophical Underpinning	**Quantitative Approach** (Used in this study)	**Qualitative Approach**
Ontology	**Objectivism/ Realism**	Subjectivism
Epistemology	**Positivism**	Interpretivism
Research Methodology	**Quantitative**	Qualitative
Research Methods	Statistical techniques **Multivariate Regression**	Non-numerical techniques

4.2 Multivariate Regression

According to previous research on corporate cash holdings, multivariate regression is an appropriate method to analyse the determinants of corporate cash holdings, be it on firm or country level (see appendix 2). In order to analyse and test the hypotheses previously formulated, two regression models are constructed. This section discusses model

specification and presents the research models. It also provides detailed identification of each variable used in the models.

4.2.1 Cash Holdings

In order to analyse the determinants of corporate cash holdings, the dependent variable for the model is the firm's *cash holdings* measured using the natural logarithm of the cash ratio. The cash ratio is computed as cash and equivalents over the book value of assets less cash and equivalents. Dittmar *et al.* (2003) explain that the reason for removing cash from assets in the denominator is because a firm's profitability is mainly related to assets in place and cash should be measured relative to this base. However, Bates *et al.* (2009) state that using assets less cash and equivalents in the denominator causes the problem of extreme outlier for firms with most of their assets in cash. They suggest that using the natural logarithm of the ratio decreases this problem. Logarithmic functions bring numbers closer together along the number line decreasing the problem of extreme outliers. Drobetz and Grüninger (2007) also use the natural logarithm of the cash ratio because using the natural logarithm of a ratio is one way to reduce the problem of non-normal panel data. This ratio is used by many key studies on the determinants of cash holdings such as Opler *et al.* (1999), Dittmar *et al.* (2003), Kusnadi (2011), Gao *et al.* (2013) and Locorotondo *et al.* (2014). Even though Ferreira and Vilela (2004), Ozkan and Ozkan (2004) and Saddour (2006) use the cash ratio without the natural logarithm, the natural logarithm is preferred because it normalizes the data and reduces the problem of extreme outliers.

4.2.2 Firm Specific Variables

Based on the trade-off, pecking order and agency cost of free cash flow theories, the independent variables in the model correspond to firm specific characteristics that have an impact on corporate cash holdings.

Dividend Payment is measured through a dummy variable that is set to one if the firm pays dividends and zero if it does not. If the value of one is given to a company in a certain year it means that the company paid out dividends to its investors in that year, if it is given a value of zero then the company did not pay dividends in that year (Opler *et al.*, 1999; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004; Guney *et al.*, 2007; Kusnadi, 2011; Iskandar-Datta and Jia, 2012; Wu *et al.*, 2012; Masood and Shah, 2014). Al-Najjar (2013) uses the dividend pay-out ratio to measure dividend payments. Drobetz and Grüninger (2007) measure dividend using both dividend dummy and dividend yield but find no significant relationship between dividends and cash holdings when dividends are measured using dividend yield.

Investment Opportunity is a measure used to capture the firm's investment opportunities. The market-to-book ratio is used as a proxy for a firm's investment opportunities (Smith and Watts, 1992). The market-to-book ratio is estimated through dividing the market value of assets over the book value of assets. The market value of assets in the numerator is computed as the book value of assets minus the book value of equity plus the market value of equity (Ferreira and Vilela, 2004). The book value of assets in the denominator represents assets in place (Smith and Watts, 1992). A relatively high market-to-book ratio shows a relatively high market value of assets in relation to the book value of assets for a firm, indicating that it has more investment opportunities ahead. Even though Kusnadi (2011) measure investment opportunity using sales growth, similar results are reported when trying to measure investment opportunity using the market to book ratio. Opler *et al.* (1999), Dittmar *et al.* (2003), Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Saddour (2006), Guney *et al.* (2007), Harford *et al.* (2008), Iskandar-Datta and Jia (2012) and Wu *et al.* (2012) all use the market-to-book ratio to measure firm's investment opportunities.

Liquid Asset Substitutes measures the company's liquidity through the net working capital to assets ratio (Opler *et al.*, 1999; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004; Harford *et al.*, 2008; Wu *et al.*, 2012; Gao *et al.*, 2013; Locorotondo *et al.*, 2014). The net working capital to assets ratio is calculated as current assets minus total cash and equivalent minus current liabilities over the total book value of assets minus cash and equivalents. Other measures of liquidity such as the current ratio or acid test ratio are not used because they are static ratios at a given point in time. However, the net working capital measures the firm's on-going liquidity.

Leverage is computed using the debt to assets ratio which represents the percentage of the company's assets that are financed through debt rather than equity. It is calculated as total debt over total assets less cash and equivalents according to Opler *et al.* (1999), Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Saddour (2006) and Harford *et al.* (2008). If the ratio is relatively high, it indicates that the company is depending more on borrowing rather than using internal resources.

Firm Size measures the size of the company through the natural logarithm of total assets (Opler *et al.*, 1999; Dittmar *et al.*, 2003; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004; Kusnadi, 2011; Saddour, 2006; Harford *et al.*, 2008; Iskandar-Datta and Jia, 2012; Wu *et al.*, 2012; Locorotondo *et al.*, 2014; Masood and Shah, 2014).

Cash Flow is estimated using the cash flow to assets ratio (Opler *et al.*, 1999; Dittmar *et al.*, 2003; Ferreira and Vilela, 2004; Masood and Shah, 2014). Cash flow is measured using firm's cash flow from its income statement by calculating the after tax profit, but depreciation is added back because it is a non-cash expense.

Cash Flow Volatility measures the uncertainty of cash flows by calculating the standard deviation of the cash flow ratio mentioned above for the period of the study (Opler *et al.*,

1999; Ferreira and Vilela, 2004; Saddour, 2006; Guney *et al.*, 2007; Harford *et al.*, 2008; Chen *et al.*, 2014; Locorotondo *et al.*, 2014).

Debt Maturity measures the maturity of borrowed funds. It is measured by calculating the total debt after deducting the short term debt. If the ratio is relatively high, this indicates higher dependence on long term debt (Ferreira and Vilela, 2004; Wu *et al.*, 2012).

Capital Expenditure measures a firm's investment in fixed assets. It is calculated as the change in fixed assets plus depreciation over total assets (Opler *et al.*, 1999; Dittmar *et al.*, 2003; Guney *et al.*, 2007; Harford *et al.*, 2008; Iskandar-Datta and Jia, 2012; Wu *et al.*, 2012; Gao *et al.*, 2013).

4.2.3 Corporate Governance Variables

Based on the agency cost of free cash flow theory, the independent variables in the second model correspond to corporate governance variables that have an impact on corporate cash holdings. These variables are divided into three main categories, namely ownership structure, board characteristics and audit quality.

The first variable under ownership structure is *Insider Ownership*, also known as managerial ownership which represents the percentage of managers that are also owners in the company. Harford *et al.* (2008) measure insider ownership as the ratio of top-five insider holdings of common stocks. However, Masood and Shah (2014) use the percentage of director's ownership to the total number of shares outstanding. Due to data availability in Egypt, the ratio used in this study is the percentage of outstanding shares held by insiders, similar to the measurement used by Masood and Shah (2014).

The second variable under ownership structure is *Institutional Ownership* which is measured as the ratio of shares that institutions own in the firm divided by the total number of shares outstanding (Harford *et al.*, 2008; Kuan *et al.*, 2011; Kuan *et al.*, 2012).

The third variable under ownership structure is *Government Ownership* which is computed by the ratio of shares held by the government of Egypt divided by the total number of shares outstanding. In a similar sense, Megginson *et al.* (2014) measure state ownership as the percentage of shares owned by the state and managed by the state management authority in China. Even though Wu *et al.* (2012) measure state ownership using a dummy variable equal to one if the firm is controlled by the government and zero otherwise, the percentage of government ownership is a more comprehensive measure.

Moving on to board characteristics, the first variable used is *Board size*. Following the technique used by Harford *et al.* (2008), Board Size is measured by the number of directors on the board over the natural logarithm of total assets. Other studies such as Chen and Chuang (2009) and Kusnadi (2011) measure board size as the natural logarithm of the total number of directors in the board without taking assets into consideration. Kuan *et al.* (2011) and Ullah and Kamal (2017) measure board size using just the total number of directors on the board. However, Harford *et al.* (2008) divide the number of directors on the board by the natural logarithm of total assets to avoid any correlation between board size and firm size. For this reason the method used by Harford *et al.* (2008) is preferred.

Harford *et al.* (2008), Chen and Chuang (2009), Kuan *et al.* (2011), Kusnadi (2011), Kuan *et al.* (2012) and Boubaker and Derouiche (2015) all measure *Board Independence* using the ratio of non-executive independent directors to total directors. Chen and Chuang (2009) define outside directors as non-executives having no personal relationship with current or past executives. Since independent directors are not reported in Egypt, this study will be computing this ratio as non-executive directors to total directors. The ratio of non-executive directors is used in previous cash holding literature by Belghitar and Khan (2013) and Ullah and Kamal (2017). In this study, the percentage of non-executive directors is used as a proxy for board independence.

The third variable regarding board characteristics is *CEO-Chairman Duality*. This ratio is used to determine if the chairman of the board is also the company's Chief Executive Officer (CEO). CEO duality is measured using a dummy variable set to one if the chairman of the board is also the CEO and zero otherwise (Kusnadi, 2011; Kuan *et al.*, 2011; Kuan *et al.*, 2011).

The fourth variable regarding board characteristics is the *percentage of women on the board* to measure the extent of board gender diversity. This ratio is calculated as the number of women on the board divided by the total number of directors on the board. Even though Ullah and Kamal (2017) use a dummy variable set to one if the company has a female director and zero otherwise, the percentage of women on the board is a more detailed and comprehensive measure. The percentage of women on the board is also used by Loukil and Yousfi (2016).

The final corporate governance variable is *audit quality* which is a dummy variable set to 1 if the company's audit firm is one of the big four audit firms in a given year and zero otherwise (Kusnadi, 2005).

4.2.4 Control Variables

Control Variables for year and industry are applied. Yearly dummies are used to control for macroeconomic events (Ferreira and Vilela, 2004). Yearly dummies have been used by most major studies such as Opler *et al.* (1999), Ferreira and Vilela (2004), Drobetz and Grüninger (2007), Bates *et al.* (2009), Kusnadi (2011), Chen *et al.* (2014), Kusnadi (2015) and Al-Najjar and Clark (2017). Industry dummies are used to control for differences in cash holdings across industries which may not be accounted for by the other variables in the model (Ferreira and Vilela, 2004). Industry dummies have been applied by Opler *et al.* (1999), Dittmar *et al.* (2003), Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Chang and Noorbakhsh (2006), Guney *et al.* (2007), Bates *et al.* (2009), Kusnadi (2011), Chen *et al.* (2014), Kusnadi (2015) and Al-Najjar and Clark (2017). The industry dummies are based on the Egyptian Stock Market Industry classification (http://www.egx.com.eg/English/ListedStocks.aspx).

As shown in the regression models in the next section, this research relies on firm specific characteristics and corporate governance structures as independent variables and corporate cash holdings as the dependent variable. The first research model includes firm characteristic variables and the second model includes the same variables with the addition of corporate governance ones.

4.2.5 Research Models

The following equations show the two research models. Research model 1 incorporates firm specific variables. Research model 2 includes both firm specific variables and corporate governance variables together. Both models include control variables for year and industry.

Model 1

$$CASH_{i,t} = \beta_{0\ i,t} + \beta_1 DIV_{i,t} + \beta_2 INVEST_{i,t} + \beta_3 LIQ_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 CF_{i,t} + \beta_7 VOL_{i,t} + \beta_8 DEBTMAT_{i,t} + \beta_9 CAPEX_{i,t} + \Sigma d_t YEAR_t + \Sigma e_k INDUSTRY_k + \mu_{i,t} \quad (4\text{-}1)$$

Model 2

$$CASH_{i,t} = \beta_{0\ i,t} + \beta_1 DIV_{i,t} + \beta_2 INVEST_{i,t} + \beta_3 LIQ_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 CF_{i,t} + \beta_7 VOL_{i,t} + \beta_8 DEBTMAT_{i,t} + \beta_9 CAPEX_{i,t} + \beta_{10} INSIDER_{i,t} + \beta_{11} INST_{i,t} + \beta_{12} GOV + \beta_{13} BOARDSIZE_{i,t} + \beta_{14} BOARDINDEP_{i,t} + \beta_{15} DUAL_{i,t} + \beta_{16} WOMEN + \beta_{17} AUDIT + \Sigma d_t YEAR_t + \Sigma e_k INDUSTRY_k + \mu_{i,t} \quad (4\text{-}2)$$

Where:
$CASH_{i,t}$ is the *cash holdings* for firm i at period t
$DIV_{i,t}$ is the *dividend payments*
$INVEST_{i,t}$ is the *investment opportunity*
$LIQ_{i,t}$ is the *liquid asset substitutes*
$LEV_{i,t}$ is the *leverage*
$SIZE_{i,t}$ is the *firm size*
$CF_{i,t}$ is the *cash flow ratio*
$VOL_{i,t}$ is the *cash flow volatility*
$DEBTMAT_{i,t}$ is the *debt maturity*
$CAPEX_{i,t}$ is the *capital expenditure ratio*
$INSIDER_{i,t}$ is the *insider ownership*
$INST_{i,t}$ is the *institutional ownership*
$GOV_{i,t}$ is the *government ownership*
$BOARDSIZE_{i,t}$ is the *board size*
$BOARDINDEP_{i,t}$ is the *board independence*
$DUAL_{i,t}$ is the *CEO-Chairman duality*
$WOMEN_{it}$ is the *women on the board*
$AUDIT_{it}$ is the *audit quality*
$\Sigma d_t YEAR_t$ are the *yearly dummies*
$\Sigma e_k INDUSTRY_k$ are the *industry dummies*
$\mu_{i,t}$ is the *error term*

4.2.6 Variable Description and Calculations

The variables tabulated below are used to analyse the determinants of corporate cash holdings. The dependent variable is the natural logarithm of the cash ratio which is used as a proxy for cash holdings. The independent variables correspond to firm specific characteristics and corporate governance variables. Table 4.3 shows the firm specific variables and their established measurement techniques. A summary of the literature review findings regarding the discussed financial determinants is presented in appendix 1a.

Table 4. 3 : Firm Specific Variables

Firm Specific Variables			
Dependent Variable			
Variable	**Measurement**	**Variable Type**	**References**
Cash Holdings	Natural Logarithm of Cash Ratio= cash and cash equivalents/ book value of assets less cash and equivalents	Continuous Variable (Ratio)	Opler *et al.* (1999) Dittmar *et al.* (2003) Drobetz and Grüninger (2007) Kusnadi (2011) Gao *et al.* (2013) Locorotondo *et al*. (2014)
Independent Variables			
Variable	**Measurement**	**Variable Type**	**References**
Dividend Payments	Dummy variable that is set to one if the firm paid dividends in the year under consideration and zero if it did not in that year	Dummy Variable	Opler *et al.* (1999) Ferreira and Vilela (2004) Ozkan and Ozkan (2004) Guney *et al.* (2007) Kusnadi (2011) Iskandar-Datta and Jia (2012) Wu *et al.* (2012) Masood and Shah (2014)
Investment Opportunity	Market-to-book ratio = book value of assets – the book value of equity + the market value of equity/ the book value of assets	Continuous Variable (Ratio)	Opler *et al.* (1999) Dittmar *et al.* (2003) Ferreira and Vilela (2004) Ozkan and Ozkan (2004) Saddour (2006) Guney *et al.* (2007) Harford *et al.* (2008) Iskandar-Datta and Jia (2012) Wu *et al.* (2012) Guizani (2017)
Liquid Asset Substitutes	Net working capital to assets ratio = Current assets – total cash and equivalents – current liabilities/ the total book value of assets – cash and equivalents	Continuous Variable (Ratio)	Opler *et al.* (1999) Ferreira and Vilela (2004) Ozkan and Ozkan (2004) Harford *et al.* (2008) Wu *et al.* (2012) Gao *et al.* (2013) Locorotondo *et al*. (2014)
Leverage	Total debt/ total assets – cash and equivalents	Continuous Variable (Ratio)	Opler *et al.* (1999) Ferreira and Vilela (2004) Ozkan and Ozkan (2004) Saddour (2006) Harford *et al.* (2008)
Firm Size	Natural logarithm of total assets	Continuous Variable (Ratio)	Opler *et al.* (1999) Dittmar *et al.* (2003) Ferreira and Vilela (2004) Ozkan and Ozkan (2004) Saddour (2006) Harford *et al.* (2008) Kusnadi (2011) Iskandar-Datta and Jia (2012) Wu *et al.* (2012) Locorotondo *et al*. (2014) Masood and Shah (2014) Al-Najjar and Clark (2017) Guizani (2017)

Table 4.3: Firm Specific Variables (Continued)

Variable	Measurement	Variable Type	References
Cash Flow Ratio	Cash flow to assets = Net income + depreciation/ total assets	Continuous Variable (Ratio)	Opler *et al.* (1999) Dittmar *et al.* (2003) Ferreira and Vilela (2004) Masood and Shah (2014)
Cash Flow Volatility	Cash flow uncertainty = Standard deviation of the cash flow ratio	Continuous Variable (Ratio)	Opler *et al.* (1999) Ferreira and Vilela (2004) Saddour (2006) Guney *et al.* (2007) Harford *et al.* (2008) Chen *et al.* (2014) Locorotondo *et al.* (2014) Guizani (2017)
Debt Maturity	Total debt – debt repayable in less than one year/ total debt	Continuous Variable (Ratio)	Ferreira and Vilela (2004) Wu et al. (2012)
Capital Expenditure	Capital expenditure to assets = Change in fixed assets + depreciation/ total assets	Continuous Variable (Ratio)	Opler *et al.* (1999) Dittmar *et al.* (2003) Guney *et al.* (2007) Harford *et al.* (2008) Iskandar-Datta and Jia (2012) Wu *et al.* (2012) Gao *et al.* (2013)

The second set of variables is used to measure the effect of corporate governance structures on cash holdings. They are divided into variables measuring ownership structure, variables measuring board characteristics and a variable measuring audit quality. Table 4.4 shows the corporate governance variables and their established measurement techniques. A summary of the literature review findings regarding the discussed corporate governance determinants is presented in appendix 1b.

Table 4. 4: Corporate Governance Variables

Ownership Structure			
Variable	**Measurement**	**Variable Type**	**References**
Insider Ownership	Percentage of outstanding shares held by insiders	Continuous Variable (Ratio)	Masood and Shah (2014)
Institutional Ownership	Percentage of outstanding shares held by institutions	Continuous Variable (Ratio)	Harford *et al.* (2008) Kuan *et al.* (2011) Kuan *et al.* (2012)
Government Ownership	Percentage of outstanding shares held by the government of Egypt	Continuous Variable (Ratio)	Megginson *et al.* (2014)
Board Characteristics			
Variable	**Measurement**	**Variable Type**	**References**
Board Size	Number of directors on the board/ natural logarithm of total assets	Continuous Variable (Ratio)	Harford *et al.* (2008)
Board Independence	Non-executive directors on the board/ total directors on the board	Continuous Variable (Ratio)	Belghitar and Khan (2013) Ullah and Kamal (2017)
CEO-Chairman Duality	Dummy variable that is set to one if the chairman of the board is also the CEO for the year under consideration and zero other wise	Dummy Variable	Kusnadi (2011) Kuan *et al.* (2011) Kuan *et al.* (2012) Boubaker and Derouiche (2015)
Percentage of Women on the Board	Women directors on the board/ total directors on the board	Continuous Variable (Ratio)	Loukil and Yousfi (2016)
Audit			
Variable	**Measurement**	**Variable Type**	**Reference**
Audit Quality	Dummy variable that is set to one if the company auditor is one of the BIG FOUR audit firms for the year under consideration and zero otherwise.	Dummy Variable	Kusnadi (2005)

4.3 Regression Assumptions and Diagnostic Testing

Regression is a widely used method when it comes to testing theory. To be able to formulate a regression model, important decisions such as model specification and model estimation must be made. Model specification deals with decisions relating to independent variables and importantly, how they should be represented in the model. On the other hand, model estimation deals with different ways in which the model can be estimated. Ordinary Least Squares (OLS) regression despite its almost ubiquitous use is only one of many estimators that could be obtained. Nevertheless, OLS is the most commonly used estimator in the cash holding literature (see appendix 2). OLS is commonly used because if the

assumptions of the Gauss-Markov Theorem are satisfies, OLS ensures that the result is in fact the Best Linear Unbiased Estimator (BLUE). In this section, the Gauss-Markov Theorem assumptions are evaluated. The Gauss-Markov assumptions are considered below:

4.3.1 Assumption 1: Sum of Error Terms must Equal to Zero

OLS draws a line of best fit to a set of data points to minimize the sum of least squares. The first assumption for OLS linear regression is that the average value of the error terms must equal to zero. However, if the regression model has a constant term included, then this assumption will never be violated (Brooks, 2008). This assumption is only a problem in regression lines with no intercept parameter and hence those lines are forced to run through the origin. This could lead to severe biases in the slope coefficient estimates (Brooks, 2008). In the analysis of corporate cash holdings there will always be an intercept because even when all independent variables are equal to zero, the dependent variable cash $_{i,t}$ will still have a value because companies will at least hold a minimum amount of cash for daily operations.

4.3.2 Assumption 2: Variance of Error Terms are Homoscedastic

The second assumption requires that the variance of the error terms in a regression model should be homoscedastic. This means that the variance of the distribution of the errors should be constant. If the variance of errors increases systematically with the increase in any given independent variable, then the problem of heteroscedasticity must be addressed.

The problem of heteroscedasticity appears when the error terms are not constant and not random around the line of best fit. The regression line may be fitted correctly, yet the error terms may increase or decrease as the independent variable increases in value. In such a case, parts of the regression line that have lower variance in the error terms will be closer

to the true regression line. These low variance points are considerably more informative than other points which have errors that are distant from the line. These informative low variance points should be given a larger weight than the high variance points. The problem with OLS is that it gives equal weights to all data points.

If the problem of heteroscedasticity exists in Ordinary Least Squares (OLS) regression then its estimators are not the Best Linear Unbiased Estimators (BLUE) (Brooks, 2008). Heteroscedasticity can be measured using the White's test. If the test shows significant results, then there is a problem of heteroscedasticity. The advantages of the White's test are that it is a non-parametric test that does not require knowledge of the exact form of heteroscedasticity and it does not require normality of the errors. For these reasons, the White's test is recommended in most cases as it is more robust that other tests for heteroscedasticity. The White's test is based on the null hypothesis that the variance is constant. If the results show a large t-statistic then the null hypothesis is accepted indicating that the errors are homoscedastic. If the test shows significant results, then there is a problem of heteroscedasticity. Reasons behind the problem of heteroscedasticity are discussed in the following section.

4.3.2.1 Reasons for Heteroscedasticity

Since this study is mostly dealing with firm specific financial ratios, the variables in question are predominantly scalar values. This is one of the possible reasons behind the problem of heteroscedasticity. For example, a large size company may have a large variance in cash holdings just because it has the option of holding cash or spending it. However, a small sized company can only afford to hold limited amounts of cash, thus the variance in its cash holdings will be limited. In a large data set that comprises of different sized companies, it is reasonable to assume that firm size will be positively correlated with the variance in cash holdings. This assumption, if true, increases the risk of

heteroscedasticity. One very important control procedure that is already observed to avoid such variances in errors between companies relates to model specification where cash holdings and firm size variables are both measured in terms of natural logarithm functions. The natural logarithm brings numbers closer together along the number line to avoid significant differences in scale variables. When the numbers are brought closer together they will be better fitted along the regression line. Using logarithmic forms decreases heteroscedasticity because the numbers will show smaller variances in the residuals.

Another very common reason for the presence of heteroscedasticity in a regression model is incorrect model specification. There are two main reasons behind this. The first relates to the problem of omitted variables in the model. There are many factors that account for changes in corporate cash holdings and so it may be possible for some variables to be omitted. The second reason behind model misspecification arises from incorrect variable transformations. The two variables that are presented in natural logarithm forms in this model are the cash holdings and firm size. They are calculated as logarithmic functions and this is consistent with major studies such as Opler *et al.* (1999) and Dittmar *et al.* (2003). For this reason, variable transformation should not be a problem in this particular model. The Ramsey (1969) RESET test is commonly used to test for functional form misspecification (Brooks, 2008).

Similar to reasons that cause heteroscedasticity by an increase in the variance of error terms, there are also valid and equally important reasons that may cause heteroscedasticity by a decrease in the variance of error terms through time. One reason for the latter is that the learning curve of some companies may improve over time and so the variance in error terms decreases. Another reason that may cause the variance of the error terms to decrease is the improvement in data collection techniques by time due to factors like technology advancement. These reasons are not considered as applicable to this particular study since

it is dealing with financial data of listed companies. These companies are expected to be mostly mature companies with reliable audited and published annual reports.

Another reason for heteroscedasticity is the presence of outliers in the data set due to possible major events. If outliers occur frequently as to cause the change in the entire distribution of the data, then heteroscedasticity may appear. However, random outliers that occur merely due to chance are not a problem. Outliers are a common issue in corporate finance research. Therefore, the data for this sample will be checked against outliers. A common method used by major studies such as Dittmar *et al.* (2003), Bates *et al.* (2009) and Kusnadi *et al.* (2015) to deal with outliers is winsorizing. Winsorizing creates a new variable almost exactly similar to the original one, but giving outliers a lower weight by bringing the extreme observations closer to the defined percentile.

If heteroscedasticity is present due to magnitude and frequency of the outliers it is not preferable to use ordinary least squares regression. OLS minimizes the sum of least squares and importantly squares the estimated errors giving them a greater weight. Outliers are data points with significant error terms, thus when the errors are squared they exert a disproportionately strong influence on the OLS estimator. Under such circumstances, it is more appropriate to use another estimator.

4.3.2.2 Dealing with Heteroscedasticity

As mentioned before, the problem of heteroscedasticity appears when the variance of the error terms change with the increase in the independent variables. In this case, there will be certain data points that have variances that are considerably closer to the regression line than others. The points with variances close to the true regression line are more accurate and informative than their high variance counterparts. The problem with OLS is that it gives all data points equal weights.

As the White's test is used to test for presence of heteroscedasticity, it is also used as a correction tool. In order to fix the problem of heteroscedasticity in OLS, the independent variable X should be divided by its variance. If the variance is low, then X will thus be given a higher weight. However, if the variance is high, then X will be given a lower weight. Therefore, in order to address heteroscedasticity problems White's robust standard errors are commonly used.

4.3.3 Assumption 3: Error Terms are Uncorrelated

The third assumption requires random error terms to be uncorrelated with one another. If this assumption does not hold then there is a problem of autocorrelation, existence of which indicates that ordinary least squares estimator is not the most appropriate.

Autocorrelation can be tested using the Durbin Watson test. The test assumes that the errors of time t-1 and t are independent of each other (Brooks, 2008). Test results vary between zero and four. If the Durbin Watson Statistic (d-statistic) is two then there is no autocorrelation problem. However, if the test gives a result of zero then there is perfect positive autocorrelation and if it gives a result of four then there is perfect negative autocorrelation.

One of the criticisms of the Durbin Watson (DW) test is that it only diagnoses first-order serial correlation. If the error t is correlated to error t-1 it will be easily determined by the DW test. However, if error t is related to error t-2 or t-3 for example, then the test is not fit for the purpose. In this case, it is necessary to use the Breusch-Godfrey LM test. If the probability calculated by the test is very low, this indicates that the null hypothesis (that there is no serial correlation) must be rejected. In this case, the significant test results confirm that there is a problem of autocorrelation.

4.3.3.1 Reasons for Autocorrelation

Autocorrelation is of significantly greater concern in time series data. The presence of autocorrelation in a sample is an indication that the error terms of previous years and the error term of current year are correlated. Since the sample comprises of listed companies, which by definition comply with the listing requirements, they are reasonably expected to be at the mature stage of their life cycle. Such companies usually experience smooth changes in their financial variables over time rather than random significant ones.

As an example, the capital structure choice of a listed company is not a random decision. The leverage ratio of a listed company would not be expected to change significantly year on year. For instance, the leverage ratio of 2013 is expected to be positively influenced by the changes in the leverage ratio of 2012. This implies that the error term in 2012 and the error term in 2013 are related. This indicates a problem of autocorrelation. Autocorrelation is a very common problem in corporate finance. As far as this research is concerned, the dependent variable is the cash ratio. Cash is a permanent account from a company's balance sheet which brings high expectations of autocorrelation.

4.3.3.2 Dealing with Autocorrelation

A common approach to deal with autocorrelation is through using Newey-West standard errors. If there is serial correlation and it is unspecified, then the model will be estimated assuming uncorrelated errors and as a result standard error will be incorrect. Newey-West takes into account that the errors are serially correlated. The Newey-West approach produces heteroscedasticity and autocorrelation consistent standard errors (Brooks, 2008). Similarly, another approach to deal with autocorrelation is using Driscoll-Kraay standard errors. The Driscoll-Kraay approach produces standard errors that are robust to general

types of spatial and temporal dependence (Baltagi, 2005). This means that Driscoll-Kraay deals with both time series and cross sectional correlation.

Another common way to solve the autocorrelation problem is through adding a Lagged Dependent Variable (LDV) as an independent variable. In case of the model in this study, for each year where the dependent variable is $CASH_{i,t}$, a new independent variable would be generated and added to the model as $CASH_{i,t-1}$ representing the cash ratio of the previous year.

"Lagged Dependent Variables (LDVs) are frequently used as a robust strategy to eliminate autocorrelation in the residuals and to model dynamic data generating processes" (Wilkins 2014, p.1).

Keele and Kelly (2006) cited in Wilkins (2014) state that excluding lagged dependent variables may cause omitted variable bias. However, Achen's (2000) cited in Wilkins (2014) argues that when there is autocorrelation, adding LDVs to a regression model may create biased coefficient estimates.

4.3.4 Assumption 4: The Independent Variables are Non-stochastic

This assumption requires that the independent variables of the model must not be randomly chosen. The determinants of corporate cash holdings have been analysed before in other contexts so this assumption is not violated in this study. The independent variables of the model are very carefully selected based on existing theories. If the lagged cash holdings variable is introduced to the model then it will be considered as a random variable and thus the assumption will be violated. However, the lagged cash ratio has been introduced in previous studies such as Ozkan and Ozkan (2004) in order to measure the speed of adjustment towards the target cash ratio. Nevertheless, when the lagged cash ratio is introduced to the model it is inappropriate to use OLS. This issue will be discussed in more details in section 4.6.1. Even if the independent variables are stochastic, OLS is still

regarded as consistent and unbiased provided assumption 1 (the sum of error terms are equal to zero) holds true (Brooks, 2008).

4.3.5 Assumption 5: The Disturbances are Normally Distributed

In order to test the hypotheses a normality assumption is required. A normal distribution involves data that are normally distributed and symmetric about its mean. Skewness measures how much the data is not symmetric around the mean and kurtosis measures the fatness of the tail of the distributions (Brooks, 2008). Normality can be measured using the Shapiro-Wilk test which gives significant results if the data is not normal. Brooks (2008, p.3) state that:

"Financial data are almost always not normally distributed in spite of the fact that most techniques in econometrics assume that they are".

The importance of normality decreases as the sample size increases. This means that in a large sample analysis, the normality condition is somewhat relaxed.

4.3.6 Assumption 6: There is no Perfect Multicollinearity between Independent Variables

When multivariate ordinary least squares regression is used, an additional assumption is made that the independent variables are not correlated with one another. This Gauss-Markov assumption states that there should not be perfect multicollinearity between the independent variables. The assumption is not really violated as long as there is no perfect correlation between any two variables. However, when there is imperfect multicollinearity, OLS may still work albeit with possible problems within the regression model. If the problem of multicollinearity between independent variables exists, then the regression model may show a high R^2 value with individual variables failing to register significance (Brooks, 2008).

Solutions to multicollinearity can be ignoring it if the model is accurate, dropping one of the highly correlated variables, transforming one of the highly correlated variables or alternatively increasing the sample size. Multicollinearity can be measured by a correlation matrix or the Variance Inflation Factor (VIF) test. Studenmund (2014) explains that there is no formal table to determine the critical point for VIF results and that a rule of thumb states that greater than 5 β_i is considered severe multicollinearity. When the number of independent variables increases, this value can increase (Studenmund, 2014). Since the number of independent variables is large in this research, the threshold used is only up to 10 as an acceptable level of multicollinearity for the VIF test. Generally, the level of multicollinearity is expected to decrease as the sample size increases. Therefore, with larger sample data multicollinearity is of a significantly lower concern.

4.3.7 Assumption 7: Independent Variables and Error Terms are Uncorrelated

This assumption is particularly important in time series data. Independent variables and the error term must be uncorrelated for OLS to be BLUE. When independent variables and the error term are uncorrelated, independent variables are known to be strictly exogenous. In a regression equation, every change in the independent variable X causes a change in the dependent variable Y. If the independent variable X is correlated with the error term U, then every change in X will cause a change in U. In such case, the change in the dependent variable Y will be due to changes in both X and U. This is clearly misleading. In other words, when the independent variables are related to their error terms, known as the endogeneity problem, the results are biased making it very difficult to estimate the true value of the dependent variable. The Two-Stage Least Squares (2SLS) estimator is an extension to OLS in order to address the problem of endogeneity using an instrumental variable approach (Wooldridge, 2009). In this case, endogeneity is solved by adding

instruments to the independent endogenous variables. These instruments must be uncorrelated with the error term. According to Ozkan and Ozkan (2004) it is important to address endogeneity in cash holding regressions because random shocks affecting cash holdings are likely to affect its determinants as well. Two-stage least squares is discussed later in details in section 4.5. It is also important to note that since the error term is already related to the dependent variable, adding a lagged dependent variable to the model as an independent variable, increases the risk of the endogeneity problem. Therefore, if a lagged dependent variable is introduced to a regression model, it becomes inappropriate to use OLS.

4.3.8 Other Assumptions

There are additional assumptions to ensure that ordinary least squares regression is the best linear unbiased estimator. However, since the study is following a literature review and the determinants of corporate cash holdings have been analysed before in other contexts, these assumptions should not be problematic in the context of this study. These assumptions include that the regression model must be specified correctly and the model should be linear in parameters. Correct model specification include issues such as incorporating meaningful independent variables into the model, checking variable measurements and ensuring no omitted variable biases. The Ramsey (1969) RESET test is a test to ensure that there is no functional form misspecification (Brooks, 2008). It is also critical to ensure that the number of observations N is greater than the number of variables K.

To sum up, ordinary least squares regression is the most commonly used estimator in the literature on corporate cash holdings. As mentioned in the previous sections, if the Gauss-Markov assumptions hold, then OLS is the best linear unbiased estimator. There are many possible solutions to OLS such as robust standard errors and Newey-West standard errors in order to obtain heteroscedasticity and autocorrelation consistent standard errors.

However, it is important to analyse different regression estimators in order to construct the best possible and robust procedure to be used in this study.

4.4 Panel Data

Panel data is a set of data that contains information across time and space (Brooks, 2008). Panel data assumes that firms are heterogeneous. Time-series and cross-section data studies that do not control for heterogeneity run the risk of obtaining biased results. Also panel data give researchers a chance of relaxing and testing assumptions that are hidden in cross-sectional analysis (Garcia-Teruel and Martinez-Solano, 2008).

The advantages of panel data can be summarized into the following:

1- Panel data generates more accurate predictions, addresses more issues and tackles more complex problems than time-series and cross-sectional data (Brooks, 2008). Panel data also captures greater complexity of human behaviour (Hsiao, 2007). Panel data controls for individual heterogeneity that occur due to factors such as differences in individuals, firms or countries (Baltagi, 2005).

2- In order to examine how variables change over time solely with time series data, a large number of observations is required to test hypotheses. However, panel data combines time series and cross sectional data and so increases the degrees of freedom and hence increases the accuracy of tests (Brooks, 2008). Panel data improves the efficiency of econometric estimates due to having more degrees of freedom and sample variability than cross sectional data (Hsiao, 2007).

3- Panel data can decrease the problem of multicollinearity when compared to modelling time-series data individually (Brooks, 2008).

4- Through good model estimation, panel data controls the impact of omitted variables and omitted variable bias can be reduced (Brooks, 2008; Hsiao, 2007).

5- Panel data reveals dynamic relationships (Hsiao, 2007). Baltagi (2005) specify that dynamic data are better to study the dynamics of adjustment.

As mentioned before, if the assumptions of Gauss-Markov hold, then ordinary least squares regression is the best linear unbiased estimator. The challenge for panel data is to control for the unobservable heterogeneity that could be either random variables or fixed parameters (Hsiao, 2007). In order to consider these effects, there are two main approaches to panel data estimators which are fixed effect and random effect models (Brooks, 2008). A fixed group effect model examines group differences in intercepts, assuming the same slopes and constant variance across entities or subjects. However, a random effect estimates variance components for groups (or times) and error. In a random effect model the difference among groups (or time periods) lies in their variance of the error term, not in their intercepts (Park, 2009).

There are two types to fixed effect models, firm specific effects and time effects. Ogundipe *et al.* (2012) highlight the importance of firm specific effects in cash holding analysis. They explain that firm specific effects occur when differences are evident across firms but not necessarily throughout time. In this case, it is assumed that firms in a sample are different from each other, but each firm is constant across time. However, time effects are differences that occur throughout time but are similar for all firms in a given year. Time-effects usually occur due to macro-economic factors that affect all firms regardless of their business nature.

Fixed effect and random effect models have been previously used in the cash holding literature. Dittmar *et al.* (2003) apply a random effect model to control for interdependencies of observations within an industry and a country alongside using OLS estimations. Drobetz and Grüninger (2007) use Hausman (1978) test statistic to determine whether to use fixed effect or random effect estimators. They highlight that fixed effect

emphasizes differences within firms (within dimension) whereas random effect focuses on differences between firms (between dimension). They include year dummies to control for variables that are constant across firms but change over time. They claim that the model with both time-fixed and firm-fixed effects removes omitted-variables bias.

Bates *et al.* (2009) use four different model specifications to investigate why U.S. firms hold significantly more cash than they did in the past. The first model estimates the dependent variable as the cash to net assets ratio whereas the second model uses the natural logarithm of the cash to net assets ratio. They find that the first model better explains the variations in cash holdings as it shows a significantly higher R^2 than the second model. They also estimate a third model using the changes in the variables rather than the levels. In this model, they include the lagged cash ratio to allow for partial adjustments to the equilibrium level. They finally estimate a forth model using fixed effects. Bates *et al.* (2009) conclude that the effect of firm characteristics on cash holdings over time vary across these different models. Bates *et al.* (2009) explain that the increase in cash ratio can be explained considerably by changes in firm characteristics over the sample period and less considerably by changes in the relationship between firm characteristics and cash holdings.

Despite its common use in panel data analysis, fixed effect regression models have been widely criticized. Fixed effect adds a dummy variable for every firm, thus adds a considerable amount of variables to the model. This significantly decreases the degrees of freedom (n-k). Bell and Jones (2015) state that when using fixed effect models, it is impossible to measure the effects of time-invariant variables because all degrees of freedom have been consumed. Therefore, one of the main criticisms of fixed effect models is that they have significantly lower explanatory power due to lower degrees of freedom. More importantly, fixed effect is an unbiased estimator under the assumption of strict

exogeneity (Wooldridge, 2012). This means that when fixed effect is used, the independent variables and error term must be uncorrelated in order to generate unbiased estimates. However, in the analysis of corporate cash holdings it is inappropriate to assume strict exogeneity (Ozkan and Ozkan, 2004). This is because random shocks affecting cash holdings are likely to affect its financial determinants as well.

Baltagi (2005) claims that fixed effect regression is only appropriate when the focus is on a set of N firms in which the inferences are solely the behaviour of these firms and not conditional on the particular N firms, countries or states that are observed. When N is very large, the regression may not be feasible because it includes N-1 dummies (Baltagi, 2005). Too many parameters in fixed effect models cause significant loss of degrees of freedom. Also, too many dummy variables may increase the problem of multicollinearity between the independent variables.

Baltagi (2005) argues that the high number of parameters and loss of degrees of freedom in fixed effect models can be avoided if error terms are assumed to be random which implies using random effect models. Random effect models assume that differences between firms lie in the error term (Brooks, 2008). When using random effect models, there is no need to control for heterogeneity using dummy variables, instead this happens through the error terms. This shows that one of the major advantages of using random effect over fixed effect is that random effect does not waste degrees of freedom and so should produce relatively more efficient estimations (Brooks, 2008).

Another advantage of using random effects is that it allows estimation of the effects of time-invariant variables. As mentioned earlier, fixed effects are not able to measure time-invariant variables due to the loss in degrees of freedom. Bell and Jones (2015) state that even when time-invariant variables are not of interest to the researcher, random effect

models are preferred because when using random effect models, the rigid assumptions of fixed effect models are relaxed.

Random effect models are modelled to correct for heterogeneity bias (Bell and Jones, 2015). Nevertheless, the random effect estimator still has its drawbacks. In random effect models there is an exogeneity assumption (Bell and Jones, 2015). Random effect can only be used if this assumption is valid (Brooks, 2008). Brooks (2008) define a strictly exogenous variable as one that is independent of all errors in the model. In random effect models, errors must be independently and identically distributed (IID) and the parameters must be independent of the error terms in all observations. However, in many random effect models these assumptions do not hold (Bell and Jones, 2015). Bell and Jones (2015) explain that there has been little attention drawn to the reasons behind the causes of endogeneity. However, Ozkan and Ozkan (2004) claim that in cash holding models, it is inappropriate to assume that independent variables are strictly exogenous. This is mainly because unobservable shocks affecting cash holdings are likely to affect it's determinants as well. Even though Shah (2011) uses fixed and random effects to analyse cash holdings in Pakistan, the author states that fixed effects are costly due to the lost degrees of freedom. Also, random effects may be inconsistent due to the correlation between individual effects and the independent variables (Shah, 2011).

As far as this research is concerned, year and industry dummies are included to the research models in order to control for unobservable heterogeneity (see section 4.2.5). Yearly dummies are applied in order to control for differences that occur throughout time but are similar for all firms in a given year. They are mainly used to control for macro-economic factors that affect all firms regardless of their business nature. Industry dummies are applied in order to control for differences in cash holding decisions between industries (see section 4.2.4). Industry dummies control for unobservable heterogeneity without

adding a considerable amount of dummy variables that consume degrees of freedom like fixed effect models, and/or having a strict exogeneity assumption like fixed and random effect models.

In addition to applying OLS, fixed effect and random effect estimators, some papers in the cash holding literature such as Opler *et al.* (1999) and Ferreira and Vilela (2004) apply Fama-Macbeth. It has also been widely used in the analysis of the cross-section of stock returns (Skoulakis, 2008). This is because Fama-Macbeth addresses cross sectional correlation problems and is specifically designed for data that is cross-sectionally correlated like return. Cross-sectional correlation may not be the main concern in cash holding analysis, but serial autocorrelation is a more common problem in corporate finance research.

Fama-Macbeth treats each year as an independent cross section (Tong, 2010). As a result of this, Fama-Macbeth assumes that explanatory variables do not vary with time which is a very restrictive and unrealistic assumption in application (Skoulakis, 2008). In the case of this study, the determinants of cash holdings do vary with time. Fama-Macbeth will yield inconsistent biased estimators if there is high serial autocorrelation. Chen (2008) confirms that cash holdings are serially related.

To sum up, a number of studies use OLS estimator (Ferreira and Vilela, 2004; Harford *et al.*, 2008; Al-Najjar, 2013), while others use fixed effect estimator (Bates *et al.*, 2009), while a third group of academics use random effect estimator (Dittmar *et al.*, 2003; Drobetz and Grüninger, 2006). Also some studies like Ferreira and Vilela (2004) apply Fama-Macbeth regression (see Appendix 2). All estimators have been considered through their different applications. The advantages and disadvantages of each estimator have been evaluated. OLS, fixed effect and random estimators have been critically analysed in previous sections with a detailed discussion of the reasons, assumptions and testing of each

estimator. One of the important assumptions of OLS is that the independent variables and the error term must be uncorrelated, known as the assumption of strict exogeneity. As mentioned before, fixed effect and random effect estimators also have a strict exogeneity assumption. If independent variables are correlated with the error term, then there is a problem of endogeneity. The problem of endogeneity is addressed using an extension of ordinary least squares regression, which is the two-stage least squares regression.

4.5 Two-Stage Least Squares Regression (2SLS)

Two-stage least squares regression (2SLS) is an extension to the ordinary least squares regression (OLS) to address problems related to endogeneity. Chen (2008) argues that many corporate decisions are endogenously determined. Ozkan and Ozkan (2004) state that when analysing cash holdings it is not appropriate to assume that its determinants are strictly exogenous because random shocks affecting cash holdings are likely to affect its determinants as well. Endogeneity occurs when the independent variables are correlated with the error term. 2SLS is an instrumental variable approach to address the problem of endogeneity of the independent variables (Wooldridge, 2009). Instrumental variables are added to the endogenous independent variables. Wooldridge (2009) explains that an instrumental variable must be highly correlated with the independent variable but uncorrelated with the error term. When time series data is available, there is a natural source of instruments that will satisfy these conditions (Wooldridge, 2009). These instruments are the lagged values of the independent variables because they will be correlated with the current values of the independent variables but uncorrelated with the current error term. Second lags are preferred because they are not correlated with the current error term like first lags (Mileva, 2007). The 2SLS procedure is composed of two stages. The first stage is estimating the equation using OLS and saving the fitted values for the dependent variable (Brooks, 2008). The second stage is replacing any endogenous

variable with their stage 1 fitted values and estimating the structural equations using OLS (Brooks, 2008).

It is important to note that any estimator that uses instrumental variables will have higher variance than OLS due to the increased uncertainty introduced by the instruments (Wooldridge, 2009). Also the R^2 in an instrumental variable estimator has no interpretation (Wooldridge, 2009). It is not the percentage of explained variation of the dependent variable y because when there is endogeneity, it is not possible to divide the variation of y into two components (Wooldridge, 2009).

Even though endogeneity is an important issue when analysing cash holdings, there still remains a gap in the literature in addressing this issue. D'Mello *et al.* (2008) use OLS and also 2SLS to address the problem of endogeneity. Gao *et al.* (2013) use instrumental variable approach to measure the effect of a firm being public on cash holdings. However, only the public firm indicator variable is treated as endogenous. Al-Najjar (2013) uses the Hausman test to detect endogeneity and applies 2SLS instrumental variable analysis. Al-Najjar (2013) controls for endogeneity of financial policies, namely endogeneity between capital structure, dividend policies and cash holdings. Al-Najjar (2013) uses only asset tangibility and free cash flows as instruments. It is also important to consider the studies that formulate more dynamic models than the ones previously mentioned.

"Many economic relationships are dynamic in nature and one of the advantages of panel data is that they allow the researcher to better understand the dynamics of adjustment" (Baltagi, 2005, p.135).

Ozkan and Ozkan (2004), Dittmar and Duchin (2011) and Ogundipe *et al.* (2012) use the Generalized Method of Moments (GMM) to construct dynamic models in order to investigate if firms are able to adjust to their target cash ratios. GMM also helps in solving endogeneity problems. Since some studies have also implemented the use of GMM when studying cash holdings, the next section presents an overview of these studies, further

explaining the motive of using a dynamic model. Additionally, the dynamic panel estimation is discussed in details in order to understand how the speed of adjustment of firms towards their target cash ratios can be determined from the dynamic panel model.

4.6 Dynamic Panel and Generalized Method of Moments (GMM)

When analysing cash holdings, it is important to investigate whether firms set target cash levels and whether they seek to achieve those targets. This is done through investigating whether cash holdings revert back to the mean (Opler *et al.*, 1999). Studies such as Opler *et al.* (1999), Ozkan and Ozkan (2004), Al-Najjar and Belghitar (2011) and Ogundipe *et al.* (2012) prove that firms have target cash levels and try to adjust to these targets. Opler *et al.* (1999) prove this by using a first order autoregressive model. However, Ozkan and Ozkan (2004) criticize the simple target adjustment model used by Opler *et al.* (1999) because it only tests if changes in cash are explained by deviations of current cash levels from their targets without including other determinants in the model. In this case, the adjustment coefficient would be biased. In the empirical analysis of cash holdings, it is very important to consider the effect of endogeneity problems. This is because shocks affecting cash holdings will affect its firm-level determinants as well (Ozkan and Ozkan, 2004). Therefore, in order to measure if firms are able to adjust their current cash levels to their target cash levels a dynamic estimation model is required. For this reason, studies like Ozkan and Ozkan (2004) and Ogundipe *et al.* (2012) address this issue by applying the Generalized Method of Moments (GMM) estimation.

4.6.1 Motive

Ozkan and Ozkan (2004) claim that static cash holding models used in previous research assume that firms can instantly adjust to their target cash levels after changes in firm specific characteristics and/or random shocks. In order to prove that delays may occur in

the adjustment process towards the target cash level, a lag in adjusting to changes to the target cash level must be introduced to the model. For this reason, studies analysing the determinants of corporate cash holdings through constructing a dynamic model, add a lagged cash ratio variable as an independent variable. As mentioned in section 4.3.3.2 Wilkins (2014) state that lagged dependent variables are used to create a dynamic model and to eliminate autocorrelation in the residuals. Studies such as Ozkan and Ozkan (2004), Drobetz and Grüninger (2007), Al-Najjar and Belghitar (2011), Dittmar and Duchin (2011), Shah (2011), Ogundipe *et al.* (2012), Gao *et al.* (2013), Guizani (2017), Martínez-Sola *et al.* (2018) and Orlova and Rao (2018) all use dynamic panel estimation models in order to analyse the speed of adjustment of firms towards their target cash ratios (see chapter 2, section 2.7).

In the case of this research, the dependent variable would be the cash holdings of the current year and the independent variables will include cash holdings of the previous year alongside other determinants. Adding a lagged dependent variable violates some of the Gauss-Markov assumptions. It violates assumption 4 which states that independent variables of a model must not be randomly chosen. As the lagged dependent variable is considered to be a random variable, this assumption is violated. The more important problem is that it violates assumption 7 which states that independent variables and error terms must be uncorrelated. Adding a lagged dependent variable increases the risk of having an independent variable that is correlated with the error term, known as the endogeneity problem. This means that the cash holdings of the previous year will be correlated with the current error term. Due to this reason, when adding a lagged dependent variable Ordinary Least Squares (OLS), fixed effect and random effect estimators will lead to biased results (Baltagi, 2005). In order to address this endogeneity problem when using lagged dependent variables it is not possible to use OLS, and a dynamic estimation model such as Generalized Method of Moments (GMM) must be used instead.

Chen (2008) use OLS estimation to analyse the effect of corporate governance on cash holdings but the study also implements GMM estimations. Kuan *et al.* (2011) suggest the use of GMM estimation because the determination of cash holdings and corporate governance are simultaneous and so endogeneity problems must be handled correctly. To avoid such endogeneity problems they also use Heckman two-stage estimation. Al-Najjar and Belghitar (2011) also use GMM to analyse the relationship between cash holdings and dividends and the simultaneity between them. When they carry out GMM to apply a dynamic approach, they find similar results to that of the static approach.

Ogundipe *et al.* (2012) investigate the determinants of corporate cash holdings of a panel of 45 companies listed on the Nigerian Stock Exchange from 1995-2009. They use a dynamic panel model in order to analyse if firms have a target cash ratio and adjust their current cash to be closer to that target cash. However, the adjustment is not immediate. Ogundipe *et al.* (2012) explains that when a lagged dependent variable is added to the model, OLS will not consistently estimate the coefficient parameters because there will be correlation between the lagged dependent variable and error terms. They also argue that shocks affecting cash holdings of firms are also likely to affect some of the independent variables and so the independent variables may be correlated with the past and present error terms. For these reasons, they explain that in dynamic panel estimation generalized least squares and fixed effect cannot be used and so they use the generalized method of moments. Ogundipe *et al.* (2012) find that the cash holdings of the previous year positively and significantly affect the cash holdings of the current year. Firms cannot adjust to target cash levels immediately which could be due to high costs associated with the adjustment process (Ogundipe *et al.*, 2012).

Dittmar and Duchin (2011) apply OLS regression while including lagged cash flows in the model following Bates *et al.* (2009). However, using a lagged dependent variable violates

the assumptions of OLS. They also estimate another model by adding fixed effects to control for omitted variables that may occur due to firm heterogeneity. However, Dittmar and Duchin (2011) criticize fixed effect estimators because they cause bias in small samples. Consequently, Dittmar and Duchin (2011) apply the GMM estimation procedure in Blundell and Bond (1998). They suggest that even though this estimator may be biased in some contexts, it should be unbiased when only a few firms have cash ratios equal to zero.

Ozkan and Ozkan (2004) apply a dynamic panel estimation model to investigate firm's behaviour as a partial adjustment to its target cash ratio. The model suggests that the change in a firm's cash ratio is influenced by the deviation of the current cash ratio from the target cash ratio. They use a partial adjustment model allowing for the possibility of delay of firms when adjusting to their target cash ratios. Ozkan and Ozkan (2004) explain that this delay may be caused in imperfect markets because of adjustment and transaction costs that firms could face when adapting to new situations. In order to construct a dynamic panel, Ozkan and Ozkan (2004) add the lagged cash ratio as an independent variable and use GMM which provides consistent parameter estimates. They find that there are significant dynamic effects in the determination of firms' cash holdings.

Drobetz and Grüninger (2007) use dynamic panel models with the first lag of the dependent variable as an independent variable following Ozkan and Ozkan (2004). In this case, the independent cash ratio will be correlated with the error term and so the Arellano and Bond (1991) two-step GMM is used. Drobetz and Grüninger (2007) find that Swiss firms adjust to target cash ratios much slower than other countries and so they keep higher levels of cash to avoid cash shortages.

Also following Ozkan and Ozkan (2004), Garcia-Teruel and Martinez-Solano (2008) consider that there is an optimal cash level for each firm depending on firm specific

characteristics plus a random error. They construct a panel regression model through adding a lagged dependent variable as an independent variable. OLS estimation becomes inconsistent due to the problem of autocorrelation so Arellano and Bond (1991) GMM is applied on the equation in first differences. They conduct all estimations using the two-stage GMM estimator, since the one-stage estimation can present problems of heteroscedasticity. Garcia-Teruel and Martinez-Solano (2008) confirm a dynamic behaviour of the cash decision by finding a significant positive relationship between the cash ratio and the lagged cash ratio. Chen and Chuang (2009) also use first-difference GMM estimations following Ozkan and Ozkan (2004) to decrease endogeneity problems caused by the adjustment delay of cash structure.

4.6.2 Dynamic Panel Estimation

In order to construct a dynamic panel estimation following Ozkan and Ozkan (2004), the lagged dependent variable $CASH_{i,t-1}$ which represents the cash ratio of the previous year is added as an independent variable alongside to all the other firm specific independent variables in model 1:

$$CASH_{i,t} = \gamma_1 CASH_{i,t-1} + \gamma_2 DIV_{i,t} + \gamma_3 INVEST_{i,t} + \gamma_4 LIQ_{i,t} + \gamma_5 LEV_{i,t} + \gamma_6 SIZE_{i,t} + \gamma_7 CF_{i,t} + \gamma_8 VOL_{i,t} + \gamma_9 DEBTMAT_{i,t} + \gamma_{10} CAPEX_{i,t} + \alpha_t + \mu_{i,t} \quad (4\text{-}3)$$

The speed of adjustment for firms toward their target cash ratios is represented by the adjustment coefficient, thereafter denoted as λ. In order to understand the derivation of this model, it is important to start by understanding how the adjustment coefficient λ is obtained. Firstly, it is assumed that the target cash ratio of a firm $CASH^*_{i,t}$ is a function of the independent variables mentioned above. Hence, the equation to estimate the target cash ratio would be the summation of the independent variables K and the error term $\mu_{i,t}$, where i represents the firms and t represents the years. Additionally, α_t represents yearly dummies to control for time effects. It is important to include time effects to capture

macro-economic factors that are beyond firm control. Ozkan and Ozkan (2004), Al-Najjar and Belghitar (2011), Bigelli and Sánchez-Vidal (2012) and Ogundipe *et al.* (2012) include yearly dummies to control for time effects. Accordingly, the function to account for the target cash ratio $CASH^*_{i,t}$ of firm i at time t, can be represented as follows:

$$CASH^*_{i,t} = \sum_k \beta_k x_{kit} + \alpha_t + \mu_{i,t} \quad (4\text{-}4)$$

If firms are able to adjust immediately to their target cash ratios with no adjustment costs, the cash ratio would be exactly equal to the target cash ratio, hence $CASH_{i,t} = CASH^*_{i,t}$. However, if firms take some time to adjust to their target cash ratios, then there would be a partial adjustment mechanism. In this case, the change in cash from one year to another would be affected by the adjustment coefficient λ.

$$CASH_{i,t} - CASH_{i,t-1} = \lambda(CASH^*_{i,t} - CASH_{i,t-1}) \quad (4\text{-}5)$$

The value of the adjustment coefficient λ lies between 0 and 1. If λ=1 it shows that firms are able to adjust immediately to their target cash ratios because the change in actual cash is exactly the same as the change in target cash. However, if λ=0 it shows that the adjustment costs are large and firms are not able to adjust their current cash ratios to reach their targets (Ozkan and Ozkan, 2004). It is important to note that the speed of adjustment is inversely related to adjustment costs (Ogundipe *et al.*, 2012). According to Ozkan and Ozkan (2004), if the adjustment coefficient is higher than 0.6, then firms are able to adjust to their target cash ratios relatively quickly. Rearranging the partial adjustment model in equation 4-5, will eventually lead to equation 4-10 as presented below:

$$CASH_{i,t} - CASH_{i,t-1} = \lambda(CASH^*_{i,t} - CASH_{i,t-1}) \quad (4\text{-}6)$$

$$CASH_{i,t} = CASH_{i,t-1} + \lambda(CASH^*_{i,t} - CASH_{i,t-1}) \quad (4\text{-}7)$$

$$CASH_{i,t} = CASH_{i,t-1} + \lambda CASH^*_{i,t} - \lambda CASH_{i,t-1} \quad (4\text{-}8)$$

$$CASH_{i,t} = CASH_{i,t-1} - \lambda CASH_{i,t-1} + \lambda CASH^*_{i,t} \quad (4\text{-}9)$$

$$CASH_{i,t} = CASH_{i,t-1}(1-\lambda) + \lambda CASH^{*}_{i,t} \quad (4\text{-}10)$$

Substituting the target cash variable $CASH^{*}_{i,t}$ in equation 4-10 with the target cash function in equation 4-4, generates the final model as presented below:

$$CASH_{i,t} = CASH_{i,t-1}(1-\lambda) + \sum_{k} \lambda \beta_k x_{kit} + \alpha_t + \mu_{i,t} \quad (4\text{-}11)$$

$$CASH_{i,t} = \gamma_1 CASH_{i,t-1} + \sum_{K=1} \gamma_k x_{kit} + \alpha_t + \mu_{i,t} \quad (4\text{-}12)$$

As seen in equation 4-11, the adjustment coefficient λ is given by 1 minus the coefficient of the lagged cash variable $CASH_{i,t-1.}$ Therefore, the coefficient $(1-\lambda)$ in equation 4-11 is denoted as γ_1 in equation 4-12. Additionally, In order to formulate a dynamic panel model, instrumental variables are used. Therefore, as represented in equation 4-11, β_k is multiplied by λ and thus represented by γ_k in equation 4-12. Therefore, the first dynamic model in equation 4-3 can be summarized as equation 4-12.

As mentioned before, when adding a lagged dependent variable, OLS becomes inconsistent because the lagged dependent variable will be correlated with the error term. Ozkan and Ozkan (2004) state that in dynamic specification of cash holdings there is another estimation problem, which is that other independent variables may also be correlated with error terms of current and past periods. This is because shocks affecting cash holdings are likely to affect some firm specific characteristics as well. They confirm this by finding that in dynamic cash holding models, independent variables are not strictly exogenous. Ozkan and Ozkan (2004) explain that GMM solves this problem by adding instruments to the lagged dependent variable and the independent variables. Instruments must be highly correlated with the endogenous independent variable x_{it}, but uncorrelated with the current error term u_{it} (Wooldridge, 2009). Wooldridge (2009) state that in the case of time-series data availability, lagged values of the independent variables act as natural instruments because they will be highly correlated with the current independent variables

but uncorrelated with the current error term. Ozkan and Ozkan (2004) use instruments dated t-2 for each independent variable following Blundell *et al.* (1992). Ozkan and Ozkan (2004) report two dynamic models. In the first model, all variables are treated as exogenous except lagged cash which is the only one treated as endogenous. In the second model, all independent variables including lagged cash are treated as endogenous. They find that both models give similar results. Nevertheless, Ozkan and Ozkan (2004) claim that when all variables are treated as exogenous except lagged cash in the first model, there is misspecification. This confirms their view that in dynamic cash holding models, all variables should be treated as endogenous. For a detailed review on the speed of adjustment found in previous research see chapter 2, section 2.7. The following section presents the sampling and data collection procedures followed in this research.

4.7 Sampling and Data Collection Procedures

The data collected for this research is a sample of the firms listed on the Egyptian stock market. The data collected is divided into two main categories, namely financial data for model 1 and corporate governance data for model 2. All of the data gathered for this research is based on secondary data disclosed by companies listed on the Egyptian stock exchange. Based on the research models and the variables previously discussed in section 4.2, the first part of data collection comprises of financial data based on actual figures extracted from official audited financial statements. However, the second part of data collection includes figures related to corporate governance structures. The following sections present the data collection procedures in details.

4.7.1 Financial Data

The population data are companies listed on the Egyptian stock market. Bloomberg is used to gather financial data originally extracted from official audited financial statements

published by listed companies. Based on the Egyptian stock market reports, the companies listed on the Egyptian stock market in 2015 are 221 companies. Firstly, the data for the whole population is extracted from Bloomberg from 2003-2015. Then the data is filtered, sorted and updated as follows:

- Companies from the banking and financial services sectors are removed as they have different reasons behind holding cash. Banking and financial service companies also fall under certain regulations according to the central bank of Egypt. The companies listed on the Egyptian stock market are categorized under 17 different sectors (see chapter 1, section 1.4.1). After removing companies from the banking and financial services sectors, the data in this study consists of listed companies from 15 different sectors. The sectors are classified according to the Egyptian exchange official website (http://www.egx.com.eg/English/ListedStocks.aspx).
- Data for the years from 2003-2006 are removed due to significant missing data points during earlier years. This leaves data from 2007-2015. (The year 2007 is only used as a year to calculate change in fixed assets in order to calculate capital expenditure).
- Companies that have significant missing data points or fields not applicable are removed. For a company to stay in the sample, it must have at least 3 out of 8 observations and must exist on the Egyptian stock exchange official website.
- After filtering the data, companies that still have missing data points for certain years are completed and cross referenced from Thomson Reuters EIKON.
- Macro-economic variables are downloaded from World Bank data indicators (http://data.worldbank.org/indicator).
- Finally, observations with remaining missing data are removed.

The 2 final panel data sets for model 1 over 8 years from 2008-2015 are:

- A balanced Panel of 135 Companies which comprises 1080 observations
- An unbalanced Panel of 157 companies which comprises 1191 observations

The unbalanced panel is used throughout the analysis to ensure the largest possible sample and the balanced panel is used for comparing subsamples in order to ensure more adequate comparison.

4.7.2 Corporate Governance Data

Corporate governance data is related to ownership structure and board characteristics. Ownership structure data related to insider ownership and institutional ownership are both extracted from Bloomberg. Any missing data is completed and cross-referenced from Thomson Reuters EIKON. The data for the percentage of government ownership is extracted from Thomson Reuters EIKON.

The latest code of corporate governance was published in 2011 (see chapter 1, section 1.4.2.1). Board data is only published consistently for listed companies since 2012, following arrangement 18 in the listing requirements of the Egyptian stock market. Therefore, corporate governance data used in this research is only from 2012-2015. The report that includes board data is a yearly report filed by listed companies called a disclosure report which includes data regarding board of directors and ownership structure. Most research on corporate governance in Egypt that include samples before 2012 use the 50 most active companies listed on the Egyptian stock market (Abdelsalam *et al.*, 2008; Soliman *et al.*, 2012; Wahba, 2014; Sakr *et al.*, 2016). However, a major drawback of using the most active companies only is that it creates significant survivorship bias. Survivorship bias occurs when the data focuses only on entities that meet a certain selection process. In this case, focusing only on the most active companies significantly

increases the risk of generating biased results. Even though board data may be available for some companies through their websites for the current year, there is no database for historical board data. For this reason, studies such as Afify (2009), Aly, Simon and Hussainey (2010), Samaha, Dahawy, Hussainey and Stapleton (2012) and Shahwan (2015) use cross sectional data for a single year and obtain the most recent data from company websites. Using cross sectional data for a single year does not gain advantages of panel data (see section 4.4). A recent cross-country study by Al-Najjar and Clark (2017) on the MENA region was able to get corporate governance data for 13 companies only from Egypt.

Board data is not available on Bloomberg or Thomson Reuters EIKON. Consequently, the disclosure reports are obtained from Egypt for Information Dissemination Company (EGID). Board size, non-executive directors, CEO-duality and percentage of women on the board are extracted manually from these disclosure reports. Most companies do not report independent directors. Since the data for independent directors is not consistently reported in Egypt, the data for non-executive directors is used as a proxy for board independence (see section 4.2.3).

Some noticed facts regarding board reports include that CEO duality is very common in Egypt. Furthermore, a few companies do not have most of their board members as non-executive directors which does not comply with the code of corporate governance of Egypt (European Corporate Governance Institute, 2011). Some companies have less than 5 board members which also violates the Egyptian code of corporate governance (European Corporate Governance Institute, 2011). Finally, data on company auditor is collected from Bloomberg.

The final panel data set for model 2 over 4 years from 2012-2015 is:

- An unbalanced Panel of 157 companies which comprises 614 observations.

4.7.3 Data Limitations

This section presents the limitations regarding data collection in this study. The limitations can be summarized into the following:

- There are a limited number of listed companies on the Egyptian stock market. The number of listed companies in Egypt is only 221 companies in 2015.
- Corporate Governance data in Egypt is not available before 2012. This is due to the fact that the disclosure of board data and ownership structure is only a compulsory requirement for listed firms after 2011.
- Data regarding research and development is not available in Egypt.
- Data for independent directors is not reported in Egypt.

4.7.4 Validity and Reliability

Research findings must have certain evaluation criteria regarding validity and reliability. Validity is divided into internal validity and external validity. Internal validity is the criterion that evaluates if the identified cause truly creates the interpreted effects (Gill and Johnson, 2002). On the other hand, external validity evaluates the generalizability of the findings beyond the sample of the study. External validity is divided into population validity and ecological validity. Population validity deals with generalizing from the sample involved in the research to a larger population. However, ecological validity deals with generalizing from the actual social context in which the data of the research is gathered to other contexts (Gill and Johnson, 2002). This research aims for population

validity in which the findings of the sample can be generalized to all firms listed on the Egyptian stock market and large Egyptian corporations.

Reliability is the criterion evaluating the consistency of the results of a research. If the research is recreated by another researcher under exactly the same design and conditions, it should generate the same results. If this is true, then the findings of the original research are consistent and the reliability criterion is met (Gill and Johnson, 2002). In the case of this research, all appropriate diagnostic tests are carried out in order to generate the highest robustness of the results and ensure reliability. As for the sampling procedure, the data is almost the population of listed companies. Additionally, data sources are reliable and cross referenced.

After reviewing different regression estimators and presenting the research sample, the final procedure that best fits the research model is discussed in the following section in order to reach the most robust research design.

4.8 Procedure

According to the evaluation of different regression estimators in previous sections, a procedure is carried out in order to report the results of the regression analysis of model 1. Firstly, variables are winsorized at the 1st and 99th percentile to avoid problems of outliers (Dittmar *et al.*, 2003; Chang and Noorbakhsh, 2006; Bates *et al.*, 2009; Tong, 2010; Kusnadi, 2011; Wu *et al.* 2012; Zeng and Wang, 2014; Locorotondo *et al.* 2014; Kusnadi *et al.*, 2015; Boubaker and Derouiche, 2015; Cai *et al.*, 2016). Outliers are observations that include extreme values and cause distortion of the data resulting in misleading outcomes. Winsorizing a variable is generating a new variable that is exactly similar to the original variable but assigning the outliers a lower weight. The values of the outliers are set equal to the defined percentile observation (Kennedy, Lakonishok and Shaw, 1992). In this

case, the defined percentile is the 1st and 99th percentile. Consequently, the extreme values are changed slightly so that they are closer to the data set. Winsorizing creates less bias than removing the observation all together. Kennedy *et al.* (1992) perform a research comparing between different ways to deal with outliers such as ignoring them, winsorizing and trimming observations. They find that winsorizing is the best adjustment procedure to deal with outliers.

Before starting regression analysis, summary statistics are performed to show the nature of the data in general and specifically show the average cash ratio in the sample. Additionally, correlation analysis is performed in order to give a guideline about the relationships between all variables and check for multicollinearity problems. Shapiro-Wilk test of normality is used to determine if Pearson or Spearman correlation matrix should be used.

Ordinary least squares regression is carried out for the models previously formulated (see section 4.2.5). Since the models used in this study are used to analyse the determinants of corporate cash holdings as measured in the literature, the models predominantly include a large set of independent variables. It is important to try to include the independent variables that can explain the maximum variation in cash holdings according to the trade-off, pecking order and agency cost of free cash flow theories. These large models significantly increase the risk of multicollinearity which may lead to biased estimators. In order to decrease this problem of multicollinearity and achieve accurate estimators, the number of variables must be decreased. However, removing important variables increases the risk of omitted variable bias and may cause a regression model to be underspecified. For these reasons, stepwise regression is used. Stepwise regression keeps only important variables and removes less important ones, hence creating a more robust regression model decreasing the problem of multicollinearity and achieving more accurate estimators.

Stepwise regression is a procedure of building a regression model through adding or removing independent variables. There are two types of stepwise regression procedures, namely forward and backward. Forward stepwise regression starts with no variables in the model and then adds on variables in a step by step manner starting with the most important variable which is the one with the lowest p-value (Brooks, 2008). The variables are then included one by one until a specified threshold value after which no more variables are added to the model. This threshold value is a significance level of 0.10. On the other hand, backward stepwise regression starts with the complete model and then removes the unimportant variables in a stepwise manner. In both cases, the stepwise approach creates a more simplified model which attempts to explain the maximum variability in the dependent variable, using the minimum number of independent variables. Backward stepwise is preferred over forward stepwise because variables have a higher chance of being retained in the model.

Diagnostic testing is performed on the model to ensure the most possible robust procedure. As shown in diagram 4.1, there are five diagnostic tests. Firstly, in order to check that the model is correctly specified, the Ramsey (1969) RESET test is performed which is a general test for functional form misspecification (Brooks, 2008). It is tested to check for omitted variable bias and data linearity. If the test gives significant results, then the model is misspecified and there could be omitted variables. However, if the test gives insignificant results, then there are no omitted variables and there are no nonlinear functions (squares and cubes) of the independent variables that will be significant to the model.

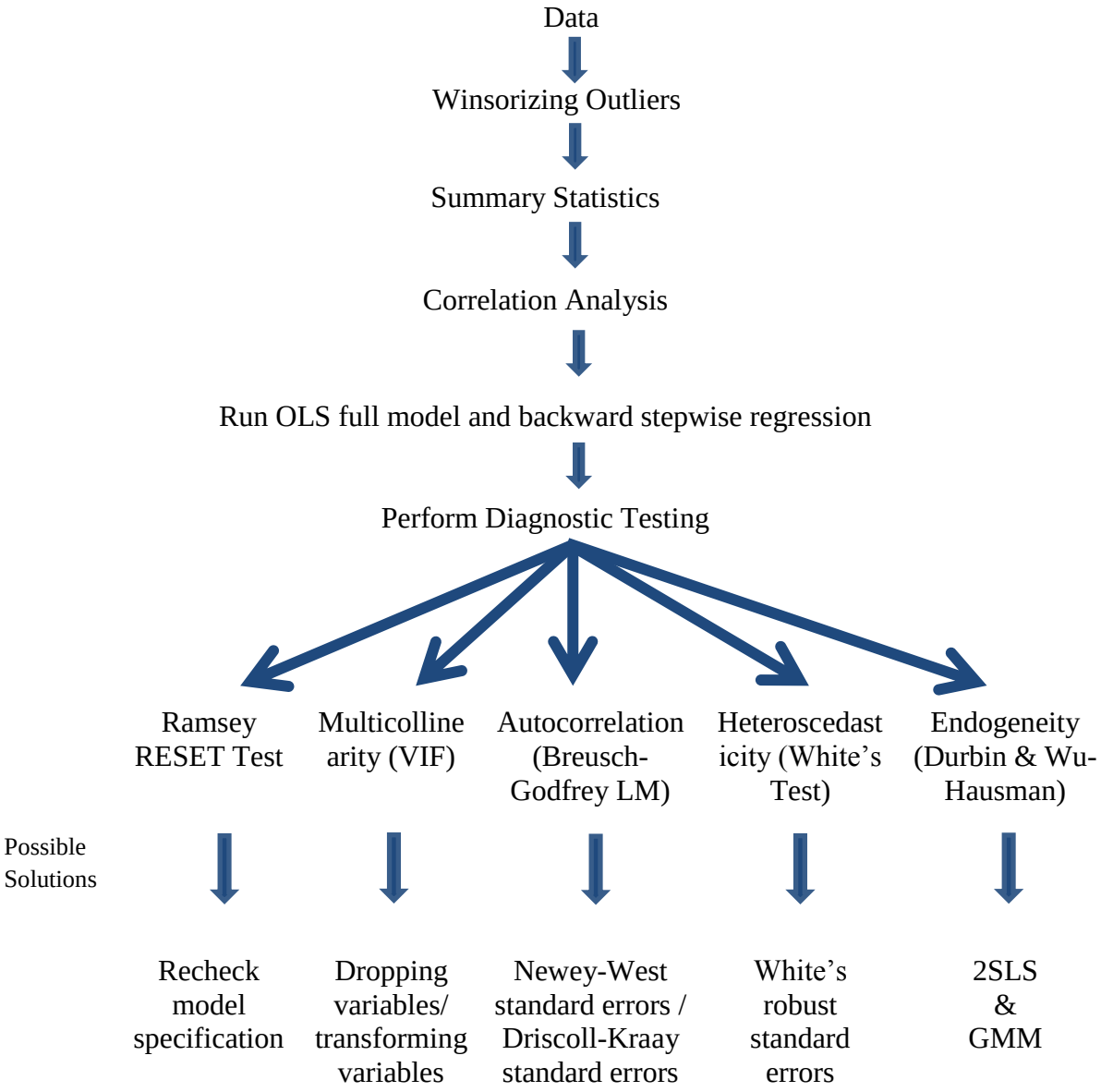
Secondly, a regression model that includes a large set of independent variables will face the risk of multicollinearity. Therefore, multicollinearity is tested using the Variance Inflation Factor (VIF) test in order to highlight the independent variables that are highly

correlated. A common critical point for the VIF test is 5, but can be extended in large models (Studenmund, 2014). Due to the large number of independent variables used in this research, the adopted threshold for the VIF test is 10.

Thirdly, Autocorrelation is tested using the Breusch-Godfrey LM test which tests for multiple serial autocorrelation. If the test gives significant results indicating that autocorrelation is present, standard errors are corrected using Newey-West standard errors and Driscoll-Kraay standard errors. Subsequently, the results are to be reported and compared to the original results.

Heteroscedasticity is tested using the White's test. If the test shows significant results, then there is a problem of heteroscedasticity. If heteroscedasticity is present in the sample, it is addressed by means of the White's robust corrected variance estimates. Diagram 4.1 illustrates the procedure.

Diagram 4. 1 : The Procedure



Source: Author

The two-stage least squares are performed in order to increase robustness and to address problems of endogeneity. All firm specific variables are treated as endogenous according to Ozkan and Ozkan (2004). The Durbin and Wu-Hausman tests are conducted to confirm endogeneity of independent variables. Second lags of the independent variables are used as instruments. Robust standard errors are used to deal with heteroscedasticity and autocorrelation. Similar to OLS, year and industry dummies are used to control for macroeconomic variables and differences across industries.

Finally, in order to estimate a dynamic panel model and analyse if firms revert back to their target cash ratios, a dynamic panel model is applied (Ozkan and Ozkan, 2004; Drobretz and Gruninger, 2007; Chen, 2008; Chen and Chuang, 2009; Al-Najjar and Belghitar, 2011; Shah, 2011; Ogundipe *et al.*, 2012). More specifically, two-stage generalized method of moments is applied. Bigelli and Sánchez-Vidal (2012) explain that according to Blundell and Bond (1998) two-stage is more efficient than the one stage in case of heteroscedastic disturbances of extensive samples. This is because the two-stage employs the residuals of the one-stage to create an optimum weighting matrix. Garcia-Teruel and Martinez-Solano (2008) confirm that two-stage GMM estimator is preferred because one-stage estimation can present problems of heteroscedasticity.

Due to the relatively small sample size in this research, system GMM with orthogonal deviations is used. System GMM which was developed by Arellano and Bover (1995) and Blundell and Bond (1998) is used instead of the Arellano and Bond (1991) difference GMM because system GMM has much smaller finite sample bias (Shah, 2011). Blundell and Bond (1998) find that system GMM has significantly smaller bias and generates more precise estimates compared to difference GMM. Shah (2011) and Al-Najjar and Belghitar (2011) use system GMM. Orthogonal deviations is an alternative to differencing that preserves sample size in panels with gaps (Roodman, 2006).

Lagged values of all the independent variables are used as instruments (Ozkan and Ozkan, 2004; Pal and Ferrando, 2010; Al-Najjar and Belghitar, 2011; Begelli and Sanchez-Vidal, 2012; Ogundipe *et al.*, 2012; Martinez-Sola, 2013). The instruments are lagged to period t-2 similar to Ozkan and Ozkan (2004) and Al-Najjar and Belghitar (2011). Second lags are required because they are not correlated with the current error term like the first lag, but further lags decrease the sample size (Mileva, 2007).

Arellano and Bond (1991) use robust standard errors and include time dummy variables in all equations. Therefore, standard errors robust to heteroscedasticity are used similar to Ozkan and Ozkan (2004). Additionally, yearly time dummies are included in order to control for time effects following Ozkan and Ozkan (2004), Al-Najjar and Belghitar (2011), Bigelli and Sánchez-Vidal (2012) and Ogundipe *et al.* (2012).

When lags are used as instruments, if errors are serially correlated, estimators become inconsistent (Arellano and Bond, 1991). Therefore, Sargan Test of over-identified restrictions is implemented to indicate if the instruments and residuals are independent (Ozkan and Ozkan, 2004; Chen and Chuang, 2009; Al-Najjar and Belghitar, 2011; Ogundipe *et al.*, 2012; Guizani, 2017). Additionally, the Arellano and Bond (1991) test of second order serial correlation AR (2) is applied to check that there is no second order autocorrelation (Ozkan and Ozkan, 2004; Al-Najjar and Belghitar, 2011; Guizani, 2017). If the Sargan test and AR (2) show insignificant results, this suggests that the instruments used in the model are valid and that there is no second order serial correlation (Ullah and Kamal, 2017).

Finally, an extended analysis is performed in order to measure the effect of political stability on cash holdings in Egypt. In doing so, a political stability variable is added to the financial determinants tested in model 1. The political stability variable is an index formed by World Bank to measure the perceptions of the probability that the government will be destabilized by unauthorized means such as violence or terrorism. The index ranges from -2.5 to +2.5 with -2.5 corresponding to weak political stability and +2.5 representing strong political stability. To ensure the highest robustness, the analysis is carried out using OLS and 2SLS with robust standard errors. For further analysis, a subsample regression is performed to analyse the difference in the determinants of corporate cash holdings before and after the Egyptian revolution of 2011. The first subsample is from 2008-2011 and the

second subsample is from 2012-2015. Wilcoxon Mann-Whitney test is used to compare means of the variables between both subsamples.

Conclusion

This chapter presents the philosophical underpinning of this research. The philosophical underpinning of this research is informed by objectivism ontology, positivism epistemology and quantitative research methodology. The study aims to analyse the determinants of corporate cash holdings of firms listed on the Egyptian stock market. According to the trade-off, pecking order and agency cost of free cash flow theories and the detailed literature review in chapters 2 and 3, two multivariate regression models are formulated. In order to address the research questions, the first model incorporates firm specific determinants and the second model incorporates corporate governance and firm specific determinants. The detailed calculations of all the determinants are presented with support of previous literature. After a thorough analysis of different regression estimators, the fourth research objective is met through building a procedure to ensure the most robust research design. Ordinary least squares regression is used along with diagnostic testing and possible solutions for model specification, multicollinearity, heteroscedasticity and autocorrelation. Two-stage least squares regression is used for endogeneity. Finally, generalized method of moments is used for dynamic panel estimation.

Chapter 5: Findings and Discussion

Introduction

The aim of this research is to analyse the determinants of corporate cash holdings of firms listed on the Egyptian stock market. The analysis is carried out in accordance with the procedure described in the research methodology chapter (see chapter 4, section 4.8). This chapter starts with descriptive statistics so that the reader becomes familiar with the data set and has an opportunity to relate average cash holdings in Egypt to previous research in other contexts. Then correlation analysis is presented in order to describe the relationships among all variables and expose any multicollinearity problems. Subsequently, the regression results are presented and analysed along with all the appropriate diagnostic tests. This chapter discusses the findings of the research and compares the results with the relevant literature. The aim of the research is met by analysing the factors that affect the cash holding decisions of Egyptian listed firms and test the established cash holding theories in the Egyptian context.

5.1 Descriptive Statistics

The average cash ratio for the full sample, reported in table 5.1, shows that firms in Egypt keep relatively high levels of cash on their balance sheets. The cash ratio is measured as cash and equivalents over the book value of assets less cash and equivalents. The average cash ratio for the full sample is 18.54%. As mentioned before, in the study carried out by Dittmar *et al.* (2003) Egypt had the highest average cash ratio out of 45 countries. The average cash ratio is compared with the average cash ratios of major studies that use exactly the same calculation. Opler *et al.* (1999) find an average cash ratio of 17% in the U.S. and Kusnadi (2011) find 17% in Singapore. Ferreira and Vilela (2004) and Drobetz and Gruninger (2007) report 14.8% in Europe and Switzerland, respectively. All of these

studies show average cash ratios that are lower than the average cash ratio reported in this study. Regarding recent studies in developing economies, Wu *et al.* (2012) and Chen *et al.* (2014) find the average cash ratio as 21.1% and 19.9%, respectively in China. These figures are only slightly higher than the average cash ratio of the sample in this study. Rezaei and Saadati (2015) find the average cash ratio in Iran 13.5%. Guizani (2017) report the average cash ratio 14% when analysing a sample of firms in the Kingdom of Saudi Arabia. Masood and Shah (2014) and Ullah and Kamal (2017) find the average cash ratio in Pakistan only 4.93% and 5.2%, respectively. These figures are significantly lower than most studies, including the sample in this study. Compared to studies in other contexts, the average cash ratio in Egypt is considered relatively high. Overall, the results confirm the fact that firms in Egypt keep significant portions of their assets in cash.

Table 5. 1 : Average Cash Ratios over Time

The sample consists of 157 companies listed on the Egyptian stock market from 2008-2015. The mean and median cash ratios are presented for the full sample and then for each year individually. The cash ratio is calculated as cash and equivalents over the book value of assets less cash and equivalents.

Year	Mean	Median
Full Sample	0.1854365	0.082208
2008	0.203519	0.1247565
2009	0.223311	0.117894
2010	0.218411	0.092996
2011	0.188735	0.0740965
2012	0.159628	0.065592
2013	0.157418	0.08008
2014	0.169197	0.069215
2015	0.169563	0.072131

Even though firms in Egypt hoard significant cash balances, an interesting finding is that the average cash ratio of Egyptian listed firms has been decreasing throughout the period under analysis. The mean of the cash ratio started with 20.35% in 2008 and dropped to

16.96% in 2015. The decrease in cash holdings throughout the years is demonstrated in figure 5.1. Dittmar *et al.* (2003) found the median cash ratio of Egypt in 1998 to be 29.57%. However, the overall median cash ratio in this sample is significantly lower than this figure. The median cash ratio started with almost 12.48% in 2008 and has been declining throughout the years until reaching 7.21% in 2015. Even though corporate cash holdings have always been high in Egypt, this is evidence that cash holdings have been declining in Egypt throughout the years.

Figure 5. 1 : Average Cash Ratios over Time

Source: Author

The findings of the decrease in cash holdings through time are contradictory to studies in developed economies that find that cash holdings increase over the years. Bates *et al.* (2009) find that cash holdings in the U.S. more than doubles over the years from 1980 to 2006. Similarly, Gao *et al.* (2013) find that the average cash ratio of U.S. firms increased from 13.53% in 1995 to 20.54% in 2011 in public firms and from 7.18% to 11.85% in private firms. The reason for the increase in cash holdings throughout time in the U.S. could be that corporate governance is already strong and investors do not discount the value of cash, even if firms keep significant cash balances (Kalcheva and Lins, 2007). Iskandar-Datta and Jia (2012) also find that cash holdings increase though time in the U.S., U.K., Canada, Australia, Germany and France from 1991 to 2008. The only country that had a decrease in cash holdings is Japan. Iskandar-Datta and Jia (2012) justify that this is due to Japan's strong banking sector which provides effective monitoring. However,

Pinkowitz and Williamson (2001) state that banks in Japan encourage firms to keep high levels of cash so that the banks benefit from the cash reserves. The decrease in cash holdings in Egypt in the recent years could be a sign of strength of the banking sector which provides more effective monitoring functions. However, this explanation cannot be confirmed unless regression analysis is performed. Alternatively, the decrease in cash holdings could be an indication of lower agency problems, brought about by higher monitoring and stronger corporate governance structures enforced by the latest code of corporate governance, which was released in 2011.

Table 5.2 presents the descriptive statistics for all other variables used in this study. All continuous variables are winsorized at the 1st and 99th percentile to avoid problems of outliers (see chapter 4, section 4.8). The sample consists of 157 companies listed on the Egyptian stock market from 2008-2015. All firm specific variables comprise of 1191 observations while corporate governance variables comprise of 614 observations.

Table 5. 2 : Descriptive Statistics

This table presents the descriptive statistics of all variables used in the study. The sample consists of 157 companies listed on the Egyptian stock market from 2008-2015. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. Cashflow is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio. Debtmat is the total debt less debt repayable in less than one year over total debt. Capex is capital expenditure to assets calculated as the change in fixed assets plus depreciation over total assets. Insider is the percentage of outstanding shares held by insiders. Inst is the ratio of shares that institutions own in the firm divided by the total number of shares outstanding. Boardsize is the number of directors on the board over the natural logarithm of total assets. Boardindep is the ratio of non-executive directors to total directors. Duality is a dummy variable set to one if the chairman of the board is also the CEO and zero otherwise. Gov is the percentage of outstanding shares held by the government of Egypt. Women is the percentage of women directors on the board to total directors. Audit is a dummy variable set to one if the company auditor is one of the big four audit firms and zero otherwise. All continuous variables are winsorized at the 1st and 99th percentile.

Variable	Observations	Mean	Median	Minimum	Maximum
Div	1191	0.5584299	1	0	1
Invest	1191	1.423406	1.16288	0.451624	6.01201
Liq	1191	0.0839628	0.058674	-0.749091	0.756863
Lev	1191	0.5104803	0.480598	0.021029	1.83963
Size	1191	20.19576	20.0711	15.17123	24.94605
Cashflow	1191	0.0610957	0.052975	-0.270013	0.329664
Vol	1191	0.0472727	0.032911	0.005444	0.195243
Debtmat	1191	0.1963004	0.105146	0	0.814638
Capex	1191	0.0241441	0.004132	-0.152226	0.316099
Insider	614	0.0648763	0	0	0.792
Inst	614	0.3216755	0.265945	0	0.95885
Boardsize	614	0.3853968	0.385369	0.165193	0.741383
Boardindep	614	0.7032858	0.777778	0	1
Duality	614	0.6530945	1	0	1
Gov	614	0.239803	0.058871	0	0.965929
Women	614	0.0933095	0	0	0.428571
Audit	614	0.3355049	0	0	1

In order to understand the data set and the nature of the companies in the sample, an overview of the mean, median, minimum and maximum values is presented for firm

characteristics and corporate governance variables. Dividend dummy shows a mean percentage of 55.84%, indicating that just above half the companies in the sample pay-out dividends. Investment opportunity indicates that companies do have investment activities ahead, showing an average market to book ratio of 142.34%. Liquid asset substitutes (calculated as the percentage of net working capital to assets) shows an average percentage of almost 8.4%. Since the average is a positive number, this indicates that mostly companies keep sufficient current assets to cover their current liabilities. Nevertheless, the percentage is still relatively low, indicating that on average companies do not prefer to keep high levels of current assets (excluding cash). The percentage of net working capital to assets ranges from -74.91% to 75.69%. This indicates that some companies follow a very aggressive working capital strategy without having sufficient current assets to cover current liabilities. Whereas, other companies follow a very conservative working capital strategy, keeping high levels of current assets.

The average debt to assets ratio is 51.05%, indicating on average companies finance half of their assets from debt. The cash flow to assets ratio ranges from -27% to 32.97%. Since cash flow is calculated as net income plus depreciation over total assets, statistics indicate that some companies are making profits, whereas others are making losses. On average, the cash flow to assets ratio is only 6.11%. Debt maturity shows that the reliance on long term financing in Egyptian listed companies is on average 19.63%. Capital expenditure indicates that some companies have increased their spending on fixed assets, while other companies have decreased their spending on fixed assets. The findings show that the average of capital expenditure to assets is only 2.41%, indicating that firms are not very keen on investing in fixed assets or creating company expansions. These companies may be keeping a large portion of their assets in current assets.

Regarding corporate governance variables, the average insider ownership in Egyptian listed firms is only 6.49%. Studies such as Abdelsalam *et al.* (2008) and Wahba (2014) also find low managerial ownership percentages in Egypt of 6.51% and 8.52%, respectively. According to the agency theory, insider ownership is a strong governance mechanism that aligns the goals of managers with the goals of shareholders (Jensen, 1986). The low percentage of insider ownership shows that this governance mechanism is not widely implemented, and that the awareness of stock based incentives is still under-developed in Egypt. The average institutional ownership in Egyptian listed firms is around 32.17%. This is in line with previous research in Egypt that find high percentages of institutional ownership such as Abdelsalam *et al.* (2008) 19.43%, Soliman *et al.* (2012) 52.43% and Wahba (2014) 24.497%.

The average board independence reported in table 5.2 is 70.33% indicating that a large portion of the board of directors of Egyptian listed firms are non-executive directors. This indicates good corporate governance practices because non-executive directors bring higher monitoring powers (Ullah and Kamal, 2017). Research has found that more independent boards exert higher monitoring and cause lower managerial opportunism (Kusnadi, 2011; Boubaker and Derouiche, 2015). Nevertheless, the percentage of non-executive directors ranges from 0 to 100%, which indicates that some companies do not have any non-executive directors on the board. This does not comply with the code of corporate governance of Egypt (European Corporate Governance Institute, 2011).

Duality shows that the majority of companies listed on the Egyptian stock market, have the Chief Executive Officer (CEO) and the Chairman of the Board (COB) as the same person. This indicates that duality is a major issue in Egyptian corporate governance because when CEO-duality exists, the board's monitoring effectiveness decreases (Drobetz and Grüninger, 2007; Kuan *et al.*, 2011; Kusnadi, 2011; Boubaker and Derouiche, 2015). The

percentage of government ownership in the sample ranges from 0 to 96.59%. This shows that some companies in the sample have no government ownership at all, whereas others are almost completely controlled by the government of Egypt. Most companies are privately owned, because the mean government ownership is only 23.98% and the median is as low as 5.89%. Nevertheless, there remains to be a significant portion of listed companies owned by the government of Egypt. This is in line with previous research such as Omran *et al.* (2008), Abdelsalam *et al.* (2008) and Wahba (2014) that find that the average government ownership in Egyptian listed firms to be 34%, 29.97% and 10.937%, respectively.

The variable 'Women' shows that on average only 9.3% of company boards are female directors. The median indicates that most companies do not have women directors on the board at all. An obvious finding is that the maximum percentage of women on the board is only 42.86%. This shows that absolutely no company in the sample has more than half of its directors as women. This is indication of poor corporate governance practices, because previous research has shown that women increase board monitoring effectiveness (Adams and Ferreira, 2009). Finally, the audit dummy variable shows that the majority of companies do not have one of the big four audit firms as their auditors. This is evidence of relatively poor audit quality. This is contrary to expectations that the companies listed on the Egyptian stock market would mostly hire one of the big four audit firms as their auditors. Overall, the descriptive statistics exposes some major deficiencies in corporate governance practices in Egypt.

5.2 Model 1: The Financial Determinants of Corporate Cash Holdings

The trade-off, pecking order and agency cost of free cash flow theories are the three main theories that attempt to explain corporate cash holdings (see chapter 2). According to the trade-off theory, cash holdings are determined by weighing the benefits and costs of

holding cash (Drobetz and Grüninger, 2007). The pecking order theory explains cash holdings from the view that firms keep cash because they prefer internal finance over external finance (Myers, 1984). Finally, the agency cost of free cash flow theory attempts to explain cash holding decisions from an agency perspective, predominantly that managers build up cash reserves for their own private benefits and to increase resources under their control (Jensen, 1986). Under each of these theories, there is a set of financial determinants that attempt to explain cash holding decisions which formulate model 1 (see chapter 4, section 4.2.5). The following sections present the findings and the discussion of the results for model 1. First, correlation analysis is tested to provide an indication about the relationships of all variables and expose any multicollinearity problems. Then diagnostic tests are preformed to address any issues related to multivariate regression. Finally, the results of the multivariate regression results are presented.

5.2.1 Correlation Analysis for Model 1

One of the important assumptions of Ordinary Least Squares (OLS) regression is that there should not be perfect multicollinearity between the independent variables (Brooks, 2008). Multicollinearity is measured using two methods, namely a correlation matrix and the Variance Inflation Factor (VIF) test. Firstly, to differentiate between using Pearson and Spearman correlation, the Shapiro-Wilk normality test is conducted in table 5.3.

Table 5. 3 : Shapiro-Wilk Test of Normality

Variable	Prob>z
Lncash	0
Div	0.98671
Invest	0
Liq	0
Lev	0
Size	0
Cashflow	0
Vol	0
Debtmat	0
Capex	0

According to the Shapiro-Wilk test of normality, all variables are not normal except dividend dummy. Therefore, spearman correlation is used because it is a non-parametric test (Artusi, Verderio and Marubini, 2002). The spearman correlation matrix is presented in table 5.4. According to spearman correlation, there is no obvious problem of multicollinearity between any variables in model 1.

Table 5. 4 : Spearman Correlation Matrix for Model 1

This table presents spearman correlation matrix for all variables used in model 1. Lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. CF is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio. Debtmat is the total debt less debt repayable in less than one year over total debt. Capex is capital expenditure to assets calculated as the change in fixed assets plus depreciation over total assets.

	Lncash	Div	Invest	Liq	Lev	Size	CF	Vol	Debtmat	Capex
Lncash	1									
Div	0.3581	1								
Invest	0.2539	-0.0198	1							
Liq	0.0219	0.0379	-0.1156	1						
Lev	0.0216	-0.0944	0.1908	-0.5036	1					
Size	-0.0301	0.1838	-0.182	-0.243	0.2078	1				
CF	0.4341	0.5382	0.2894	0.1559	-0.2043	0.0929	1			
Vol	0.1142	-0.1479	0.2802	-0.1649	0.0283	-0.1882	-0.0437	1		
Debtmat	-0.1557	-0.1123	-0.1009	-0.157	0.076	0.3103	-0.1613	-0.0201	1	
Capex	-0.0108	-0.0402	0.0434	-0.0424	-0.0297	0.0036	0.0843	0.0036	0.1215	1

With regard to cash, the highest correlation is with cash flow and the lowest correlation is with capital expenditure. According to all other variables, the highest correlation is between dividends and cash flow of 0.5382. However, the correlation is not considered strong, because it is less than 0.7. Therefore, no problem of multicollinearity is evident between the variables of model 1.

5.2.2 Diagnostic Testing for Model 1

In order to carry out regression analysis, five diagnostic tests for the Gauss-Markov assumptions are performed for model 1. The Gauss-Markov assumptions are discussed in details in chapter 4, section 4.3. According to the set procedure (see chapter 4, section 4.8), firstly the Ramsey Reset test is conducted in order to test for functional form misspecification. The Ramsey Reset test in table 5.5 shows an insignificant result

indicating that the model is correctly specified. This test ensures the data is in linear form and that there is no omitted variable bias.

The second assumption is that there should not be perfect collinearity between the independent variables. Even though the spearman correlation matrix shows no obvious problem of multicollinearity, the Variance Inflation Factor (VIF) test is conducted as a more formal method to test for multicollinearity. The VIF test in table 5.5 shows that there is no problem of multicollinearity. Even through there is no formal table for the VIF test results, a rule of thumb states that the common critical point for the VIF test is 5 (Studenmund, 2014). In table 5.5, all variables show values significantly lower than 5. The highest VIF level is leverage with a value of only 1.72.

The third Gauss-Markov assumption is that the variance of the error term must be homoscedastic. If the error terms are not constant and not random around the line of best fit, then the errors are heteroscedastic. Heteroscedasticity is expected to be evident in scalar variables. The Breusch-Pagan / Cook-Weisberg test and the White's test reported in table 5.5, show evidence of heteroscedasticity. In order to address the problem of heteroscedasticity, White’s robust standard errors are used (see chapter 4, section 4.3.2.2).

The fourth assumption is the assumption that the error terms should not be correlated. If error terms are serially correlated then there is a problem of autocorrelation. The Breusch-Godfrey LM test reported in table 5.5 shows that the model has a problem of autocorrelation. Autocorrelation is addressed using Newey-West and Driscoll-Kraay standard errors (see chapter 4, section 4.3.3.2).

Table 5. 5 : Diagnostic Testing for Model 1

This table presents the diagnostic testing for model 1. Model specification is tested using the Ramsey Reset Test. Multicollinearity is tested using the Variance Inflation Factor (VIF) test. Heteroscedasticity is tested using Breusch-Pagan / Cook-Weisberg and White's test. Autocorrelation is tested using the Breusch-Godfrey LM test.

Model Specification		**Multicollinearity**		**Heteroscedasticity**		**Autocorrelation**	
Test	**P-value**	**Variable**	**VIF**	**Test**	**P-value**	**Test**	**p-value**
Ramsey Reset Test	0.07600	Lev	1.72	Breusch-Pagan / Cook-Weisberg	0.0000	Breusch-Godfrey LM test	0.0000
		Liq	1.67				
		Cashflow	1.65	White's test	0.0000		
		Div	1.41				
		Size	1.31				
		Invest	1.23				
		Debtmat	1.17				
		Vol	1.14				
		capex	1.09				

Finally, in order for ordinary least squares regression to be the Best Linear Unbiased Estimator (BLUE), the independent variables must be uncorrelated with the error terms. This is known as the assumption of strict exogeneity. If this assumption is not valid, then there is a problem of endogeneity. In this case, endogeneity is addressed using the Two-Stage Least Squares (2SLS) estimator, which is an extension to OLS. According to Ozkan and Ozkan (2004), the determinants of corporate cash holdings should be treated as endogenous, because shocks affecting cash holdings will affect its determinants as well. 2SLS is an instrumental variable approach (Wooldridge, 2009). In 2SLS endogeneity is solved by using instruments that are uncorrelated with the error term but highly correlated

with the independent variables. The second lags of the independent variables are used as instruments (see chapter 4, section 4.5).

5.2.3 Regression Results for Model 1

Table 5.6 presents the regression results for model 1. According to the set procedure and the diagnostic tests performed, the first column shows results for the Ordinary Least Squares (OLS) regression for the full model. The second column shows the results of the OLS backward stepwise regression, which is used to create a more simplified model, attempting to explain the maximum variability in the dependent variable using the minimum number of independent variables. The backward stepwise regression starts with the complete model and then removes the insignificant variables in a stepwise manner. For column 1 and 2, White's robust standard errors are used to correct for heteroscedasticity. Newey-west and Driscoll-Kraay standard errors are reported in column 3 and 4, respectively to control autocorrelation. Finally, column 5 presents results of the Two-Stage Least Squares (2SLS) instrumental variable approach to address endogeneity, along with robust standard errors to solve heteroscedasticity problems. The Durbin and Wu-Hausman Tests at the bottom of column 5 confirm that the firm specific variables are endogenous and that 2SLS must be used to address this issue. The main results do not change under all estimators in column 1 through 5.

Table 5. 6 : Regression Results for Model 1

This table presents regression results for model 1. The sample consists of 157 companies listed on the Egyptian stock market from 2008-2015. The dependent variable is Lncash. Lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. Cashflow is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio. Debtmat is the total debt less debt repayable in less than one year over total debt. Capex is capital expenditure to assets calculated as the change in fixed assets plus depreciation over total assets. All continuous variables are winsorized at the 1st and 99th percentile. All models include year and industry dummies.

Lncash	1 **OLS full model White's Robust standard errors**	2 **Stepwise White's Robust standard errors**	3 **Newey-West standard errors**	4 **Stepwise Driscoll-Kraay standard errors**	5 **2 SLS Robust standard errors**
Div	0.83559***	0.82411***	0.82411***	0.81333***	1.87134***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Invest	0.15983***	0.16179***	0.16179**	0.16035***	0.73790***
	(0.00300)	(0.00200)	(0.02500)	(0.00100)	(0.00200)
Liq	0.77639***	0.76897***	0.76897*	0.75940***	1.45883***
	(0.00200)	(0.00300)	(0.07500)	(0.00100)	(0.00100)
Lev	1.61697***	1.61262***	1.61262***	1.64745***	1.51946***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00100)
Size	-0.06410**	-0.06190**	-0.0619	-0.06203*	-0.10890**
	(0.04700)	(0.04200)	(0.24100)	(0.07400)	(0.01600)
Cashflow	5.33592***	5.34371***	5.34371***	5.41994***	1.55172
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.55800)
Vol	5.42040***	5.40906***	5.40906***	5.68091***	-
	(0.00000)	(0.00000)	(0.00900)	(0.00100)	
Debtmat	0.06958	-	-	-	-
	(0.77200)				
Capex	0.42955	-	-	-	-
	(0.55000)				
Constant	-3.548058***	-3.55722***	-3.55722***	-3.676536***	-2.901589***
	(0.0000)	(0.0000)	(0.006)	(0.0000)	(0.0100)
Observations	1191	1191	1191	1191	877
Adjusted R^2	0.29340	0.29310	-	0.29230	0.18870
Model Significance	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Ramsey Reset Test	0.07600	0.49190	-	-	-
Durbin and Wu-Hausman Tests	-	-	-	-	0.00000

Notes:
- The p-values are reported in brackets.
- Significance levels:
* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

There are many important findings from the regressions reported in table 5.6. The results show a significant positive relationship between cash holdings and dividend payments. This is contradictory to the traditional trade-off theory which states that firms that pay dividends hold low levels of cash because they can easily cancel dividends and raise cash when needed (Ferreira and Vilela, 2004). In fact, the results show that firms that pay-out dividends refuse to cut-off these dividends, therefore accumulate cash in order to avoid future liquidity problems. The results support the signalling theory which proposes that information asymmetry between managers and investors can signal the firm's financial position (see chapter 2, section 2.2.1). Since managers have more information about the firm's future, when firms keep paying dividends, a positive signal regarding the firm's future financial position is sent to investors (Al-Najjar and Belghitar, 2011). Firms that pay dividends keep high levels of cash in order to keep paying dividends regularly and sustain a good corporate image and a strong reputation. Firms keep high levels of cash in order to continue paying dividends regularly improving the company's reputation, while possibly still trying to improve the firm's financial positions.

The results are contradictory to studies in the U.S. which find a negative relationship between dividends and cash holdings (Jensen, 1986; Guney *et al.*, 2007; Harford *et al.*, 2008; Bates *et al.*, 2009; Iskandar-Datta and Jia, 2012; Gao *et al.*, 2013). Companies in the U.S. do not need to send strong future signals or improve their reputation by constant dividend payments. In fact, U.S. companies that pay dividends keep low levels of cash because they can raise cash from dividends when needed, without losing their reputations. However, in developing economies, companies try to gain investors' trust by paying constant dividends and also keeping enough cash in order to try to improve the firm's financial position. The results here support the findings of Shah (2011) and Masood and Shah (2014) in Pakistan. Also, the results support the findings of Wu *et al.* (2012) and Chen *et al.* (2014) in China and Al-Najjar (2013) in Brazil. Song and Lee (2012) also find

a positive relationship between cash holdings and dividends in East Asia. Drobetz and Gruninger (2007), Guney *et al.* (2007), Bigelli and Sánchez-Vidal (2012) and Iskandar-Datta and Jia (2012) all provide evidence of a positive relationship between cash holdings and dividends in different countries in Europe.

The findings show a significant positive relationship between investment opportunity and cash holdings. This is in line with the trade-off theory and the pecking order theory but contradictory to the agency theory. In accordance with the trade-off theory, results show that firms with good investment opportunities ahead, keep high levels of cash in order to meet these opportunities and avoid the opportunity cost of forgone return (Ozkan and Ozkan, 2004). Moreover, these firms keep excess cash levels in order to avoid the risks of financial distress, once the investments have been made (Ferreira and Vilela, 2004). Similarly, the results are in line with the pecking order theory. The positive relationship between cash holdings and investment opportunity indicates that firms keep cash in order to invest in these opportunities and try to avoid financing from expensive external sources (Ferreira and Vilela, 2004). This indicates that raising external funds in Egypt is relatively difficult or costly. This is confirmed with the relatively high interest rates in Egypt. The results support the findings of most studies such as Dittmar *et al.* (2003), Ozkan and Ozkan, (2004), Ferreira and Vilela (2004), Kusnadi (2005), Guney *et al.* (2007), Harford *et al.* (2008), Iskandar-Datta and Jia (2012), Ogundipe *et al.* (2012), Song and Lee (2012), Chen *et al.* (2014) and Kusnadi *et al.* (2015). The results do not support the agency theory perspective that managers do not identify positive net present value projects and thus just waste corporate resources (Jensen, 1986). In fact, the results show the motives of Egyptian managers to accumulate cash for precautionary motives when they have upcoming investment opportunities. Managers keep cash in order to meet these opportunities and avoid facing opportunity costs of forgone return. This finding also shows an indication of transaction motives of Egyptian managers. This is evident by the fact that they keep

sufficient cash reserves in order to invest in upcoming investment opportunities without having to resort to expensive external financing and pay significant transaction costs.

Most previous studies support the trade-off theory by finding a negative relationship between cash holdings and liquid asset substitutes (net working capital). According to the trade-off theory, liquid assets are regarded as a substitute to cash, therefore firms with high levels of liquid assets have a lower need to keep significant cash balances (Opler *et al.*, 1999; Dittmar *et al*., 2003; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004; D'Mello *et al.*, 2008; Garcia-Teruel and Martinez-Solano, 2008; Bates *et al.*, 2009; Bigelli and Sánchez-Vidal, 2012; Iskandar-Datta and Jia, 2012; Ogundipe *et al.*, 2012; Song and Lee, 2012; Wu *et al.*, 2012; Al-Najjar, 2013; Orens and Reheul, 2013; Chen *et al.*, 2014; Locorotondo *et al.*, 2014; Masood and Shah, 2014; Guizani, 2017). Contrary to expectations, results show evidence of a positive relationship between cash holdings and liquid asset substitutes, supporting the findings of Guney *et al.* (2007). The positive relationship between net working capital and cash holdings indicates that liquid assets do not act as a substitute to cash in Egypt. This shows that access to external finance is difficult in Egypt and so firms hoard cash, even if they have high account receivable and inventory balances. Accounts receivables is a stronger substitute for cash, when firms have easy access to external finance (Wu *et al.*, 2012). This indicates that firms cannot rely on accounts receivables as a liquidity tool, which could be an indication of risks of bad debts. Ogundipe *et al.* (2012) explain that firms keep high cash reserves in order to cover possible losses that could occur due to bad debts or late payments. The positive relationship between cash holdings and liquid assets could also indicate that firms in Egypt are not able to sell inventory quickly and thus need to have cash surplus for precautionary motives to decrease risks of financial distress. This could also be an indication of high risk of obsolescence of inventory (Ogundipe *et al.*, 2012).

According to the trade-off theory, there are two different views regarding the relationship between leverage and cash holdings (see chapter 2, section 2.2.4). The first view proposes a positive relationship between leverage and cash holdings. According to this view, firms that have high leverage keep high cash balances to avoid risks of financial distress and to be able to pay obligations on time (Ferreira and Vilela, 2004). The second view proposes a negative relationship between leverage and cash holdings, because high leverage indicates the ability of firms to issue debt suggesting that leverage and cash are considered to be substitutes (Ferreira and Vilela, 2004).

Results show a positive relationship between leverage and cash holdings. This supports the first view of the trade-off theory which proposes that firms in Egypt that have high leverage, keep high levels of cash in order to be able to pay off obligations as they come due and decrease risks of financial distress in the future. The results indicate high precautionary motives by managers of Egyptian firms. The results support the findings of Garcia-Teruel and Martinez-Solano (2008), Al-Najjar and Belghitar (2011), Ogundipe *et al.* (2012) and Locorotondo *et al.* (2014). However, the results contradict the second view to the trade-off theory that leverage and cash are substitutes and that leverage acts as a proxy for a firm's ability to issue debt. This justification is not evident in the Egyptian context because financial markets are considered weak and Egypt has a bank-oriented financial system (Demirguc-Kunt and Levine, 1999). In a bank-oriented system, firms rely more on bank loans as a source of long term finance, rather than relying on issuing debt securities. Therefore, the argument that cash acts as a proxy for the firm's ability to issue debt securities is not evident here.

The results are also contradictory to the pecking order and agency theories found by Opler *et al.* (1999), Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Drobetz and Grüninger (2007), D'Mello *et al.* (2008), Harford *et al.* (2008), Iskandar-Datta and Jia (2012), Song

and Lee (2012), Wu *et al.* (2012), Belghitar and Khan (2013), Gao *et al.* (2013), Orens and Reheul (2013), Chen *et al.* (2014), Masood and Shah (2014), Kusnadi *et al.* (2015), Guizani (2017) and Al-Najjar and Clark (2017). There is no evidence that leverage leads to higher monitoring for Egyptian firms and forces managers to invest excess cash. Even though Egypt has a bank-oriented financial system, it is clear that banks do not perform a strong monitoring function. The perspective explained by Iskandar-Datta and Jia (2012) that banks perform strong monitoring functions and so force managers to decrease cash holdings is not evident. In fact, this could be an indication that banks encourage firms to accumulate cash, so that the banks themselves benefit from large deposits (Pinkowitz and Williamson, 2001).

All estimators show a significant negative relationship between cash holdings and firm size, except under the Newey-west standard errors which shows a negative but insignificant result. The negative relationship between cash holdings and firm size is supportive of the trade-off theory but contradictory to the pecking order and agency theories. The results support the findings of major researches including Opler *et al.* (1999), Dittmar *et al.* (2003), Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Drobetz and Grüninger (2007), D'Mello *et al.* (2008), Bigelli and Sánchez-Vidal (2012), Ogundipe *et al.* (2012), Wu *et al.* (2012), Gao *et al.* (2013) and Locorotondo *et al.* (2014). Again, the results confirm trade-off considerations of Egyptian managers. The trade-off theory proposes that managers of large firms do not need to keep cash for precautionary or transaction motives. Large firms are expected to be more diversified and have lower probability of financial distress and thus managers of large firms do not need to accumulate cash for precautionary motives (Ferreira and Vilela, 2004). Furthermore, large firms are expected to have easy access to external finance, therefore they do not need to hoard cash for transaction motives either (Ferreira and Vilela, 2004). Ozkan and Ozkan (2004) support this view by reporting that large firms are subject to lower information asymmetry, face

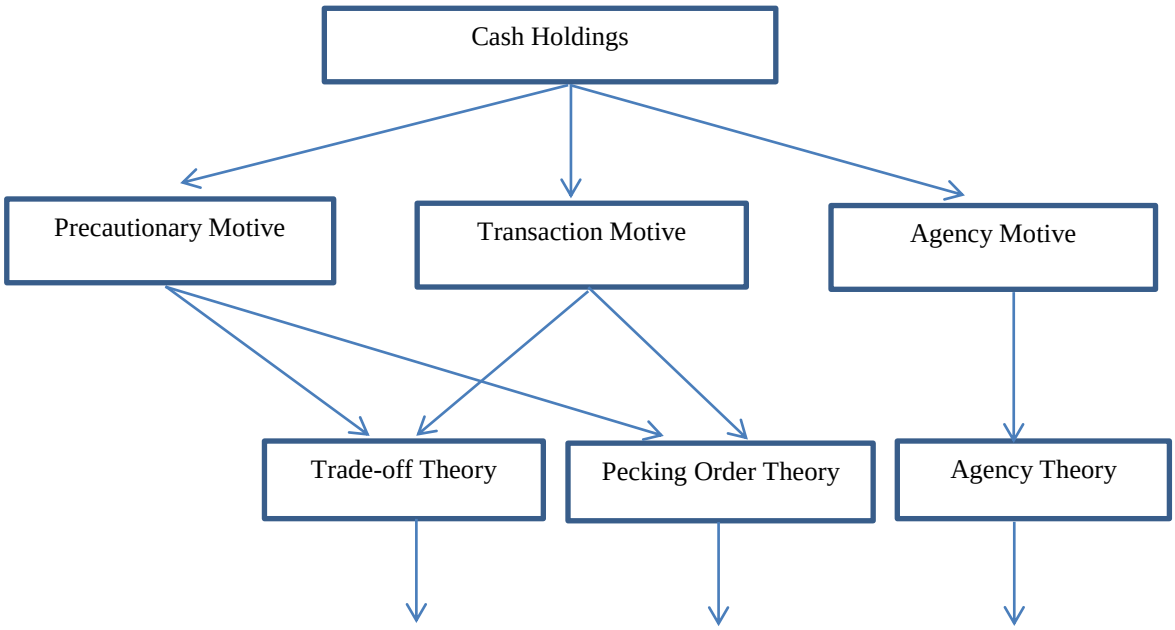
fewer borrowing constraints and enjoy lower costs of external financing. The pecking order theory which states that larger firms are more successful and so accumulate more cash in order to avoid external financing is not supported here. Also, the agency perspective that managers of large firms are able to accumulate cash due to shareholder dispersion is not supported.

Regression results show a significant positive relationship between cash holdings and cash flows. Ferreira and Vilela (2004), Drobetz and Grüninge (2007), Garcia-Teruel and Martinez-Solano (2008), Harford *et al.* (2008), Song and Lee (2012), Wu *et al.* (2012), Gao *et al.* (2013), Orens and Reheul (2013), Chen *et al.* (2014), Masood and Shah (2014) and Kusnadi *et al.* (2015) all find a positive relationship between cash holdings and cash flows. The finding is in support of the pecking order theory. The results indicate that firms with higher cash flows keep more cash to decrease the reliance on expensive external financing. The trade-off view that firms with high cash flows have low cash holdings because they are regarded as substitutes is not supported here. Even though all regression estimators in column 1 to 5 in table 5.6 show similar results, the positive relationship between cash holdings and cash flows is significant when using OLS but becomes insignificant when using 2SLS. Iskandar-Datta and Jia (2012) and Ogundipe *et al.* (2012) also find an insignificant relationship between cash holdings and cash flows.

Results indicate that cash flow volatility impacts cash holdings positively. According to Opler *et al.* (1999), firms with riskier cash flows keep more cash for precautionary motives. The result is supportive of almost all previous research (Opler *et al.*, 1999; Saddour, 2006; Guney *et al.*, 2007; Harford *et al.*, 2008; Bates *et al.*, 2009; Bigelli and Sánchez-Vidal, 2012; Gao *et al.*, 2013; Iskandar-Datta and Jia, 2012; Belghitar and Khan, 2013; Chen *et al.*, 2014; Locorotondo *et al.*, 2014; Guizani, 2017). When firms have higher cash flow volatility, they are subject to higher risks of financial distress and thus managers

keep cash for precautionary motives. This supports the trade-off theory. Under the 2SLS approach, cash flow volatility is removed due to collinearity with the instruments. Debt maturity and capital expenditure show insignificant impacts on cash holdings under all estimators. D'Mello *et al.* (2008) also finds an insignificant relationship between capital expenditure and cash holdings. Overall, most findings support the trade-off theory indicating that Egyptian managers hoard cash for precautionary and transaction motives. Referring back to the diagram from the hypotheses development in chapter 2 (section 2.8), the same diagram is presented but with the findings of the regression model highlighted in bold and italic.

Diagram 5. 1: The Financial Determinants of Corporate Cash Holdings Findings



Determinant	Expected Relationship	Expected Relationship	Expected Relationship
Dividend Payments	Negative	-	-
Investment Opportunity	***Positive***	***Positive***	Negative
Liquid Assets Substitutes	Negative	-	-
Leverage	***Positive***/ Negative	Negative	Negative
Firm Size	***Negative***	Positive	Positive
Cash Flow	Negative	***Positive***	-
Volatility	***Positive***	-	-
Debt Maturity	Negative	-	-
Capital Expenditure	Positive	Negative	-

Source: Author

The results present mostly evidence of the trade-off theory and partial evidence of the pecking order theory. The financial determinants show that managers of Egyptian listed firms mainly keep cash for precautionary and transaction motives. This indicates that the market risks and instability of the Egyptian economy cause managers to hoard cash in order to decrease future risks of financial distress. Furthermore, the difficulty and high costs associated with external finance in Egypt lead managers to accumulate cash in order

to have sufficient funding for daily operations and investing requirements. The agency view that managers keep cash for their own private benefits at the expense of shareholders is not evident by the firm characteristics. However, in order to confirm if the agency cost of free cash flow theory influences cash holding decisions in Egypt, corporate governance determinants must be analysed.

5.3 Model 2: The Corporate Governance Determinants of Corporate Cash Holdings

The agency cost of free cash flow hypothesis states that managers prefer to build cash reserves to increase their discretionary powers and gain control over the firm's investment decisions **(**Jensen, 1986). Previous studies have proposed that managers keep high levels of cash for their own private benefits and at the expense of the shareholders' benefits (Dittmar *et al.*, 2003; Ferreira and Vilela, 2004). According to the agency theory, when there are strong corporate governance mechanisms, agency problems decrease and so managers are forced to invest excess cash in positive net present value projects or distribute cash to shareholders as dividends. In order to test the agency theory, corporate governance variables are added to the firm specific variables in model 1 to formulate model 2 (see chapter 4, section 4.2.5). There is specifically significant importance regarding the impact of corporate governance on cash holdings in developing economies, where investor protection is predominantly weak. This is supported by previous research suggesting that firms in countries with weak shareholder protection hold more cash due to higher discretionary powers exercised by top management (Dittmar *et al.*, 2003; Pinkowitz *et al.*, 2006; Al-Najjar, 2013). Al-Najjar (2013) specifically highlights the importance of investigating the impact of board and CEO characteristics as well as audit features on cash holdings in developing economies. Similarly, Rezaei and Saadati (2015) recommend the investigation of ownership structure and board parameters. The following sections present the results for model 2, using the same procedure for model 1. First, correlation analysis is

presented, followed by diagnostic testing and finally the results of the regression analysis are discussed.

5.3.1 Correlation Analysis for Model 2

The same procedure as for model 1 is applied to model 2. The Shapiro-Wilk test for data normality shows that all variables are not normal except for the dummy variables. Therefore, spearman correlation is used.

Table 5. 7 : Shapiro-Wilk test for Normal Data

Variable	Prob>z
Lncash	0
Div	0.95734
Invest	0
Liq	0
Lev	0
Size	0
Cashflow	0
Vol	0
Debtmat	0
Capex	0
Insider	0
Inst	0
Boardsize	0
Boardindep	0
Duality	0.92784
Gov	0
Women	0
Audit	0.36336

The correlation matrix in table 5.8, shows that there is no obvious problem of multicollinearity. The highest correlation shown is between leverage and liquid assets substitutes with value of 0.5633, indicating only moderate correlation.

Table 5. 8 : Spearman Correlation Matrix for Model 2

This table presents spearman correlation for model 2. The sample consists of 157 companies listed on the Egyptian stock market from 2012-2015. Lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. CF is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio. Debtmat is the total debt less debt repayable in less than one year over total debt. Capex is capital expenditure to assets calculated as the change in fixed assets plus depreciation over total assets. Insider is the percentage of outstanding shares held by insiders. Inst is the ratio of shares that institutions own in the firm divided by the total number of shares outstanding. Bsize is the number of directors on the board over the natural logarithm of total assets. Bindep is the ratio of non-executive directors to total directors. Duality is a dummy variable set to one if the chairman of the board is also the CEO and zero otherwise. Gov is the percentage of outstanding shares held by the government of Egypt. Women is the percentage of women directors on the board to total directors. Audit is a dummy variable set to one if the company auditor is one of the big four audit firms and zero otherwise

	Lncash	Div	Invest	Liq	Lev	Size	CF	Vol	Debtmat	capex	Insider	Inst	Bsize	Bindep	Duality	Gov	Women	Audit
Lncash	1																	
Div	0.3623	1																
Invest	0.2138	-0.0464	1															
Liq	0.019	0.0622	-0.1312	1														
Lev	0.0372	-0.0605	0.2129	-0.5633	1													
Size	0.0338	0.1934	-0.1204	-0.2466	0.2565	1												
CF	0.4228	0.5204	0.2342	0.2615	-0.1932	0.1043	1											
Vol	0.1538	-0.096	0.3629	-0.1215	0.1325	-0.179	-0.0364	1										
Debtmat	-0.1436	-0.1274	-0.0594	-0.1868	0.0381	0.227	-0.1537	-0.0779	1									
Capex	0.0396	-0.0763	-0.0073	0.0096	-0.0032	0.003	0.0365	-0.1056	0.1191	1								
Insider	-0.147	-0.0928	-0.0945	0.117	-0.0979	-0.0818	0.0248	-0.017	0.0744	0.0251	1							
Inst	0.0899	0.2013	-0.1052	-0.1498	0.06	0.3195	-0.0026	-0.0591	0.0728	0.0446	-0.2898	1						
Bsize	0.0879	0.1975	0.0716	0.0185	-0.1138	0.1437	0.1698	0.088	0.0859	-0.015	0.035	0.0884	1					
Bindep	-0.0643	0.0202	-0.0401	-0.0168	-0.0951	0.0836	0.0124	0.0409	0.1127	0.0097	-0.076	0.1083	0.5085	1				
Duality	0.1221	0.071	-0.0393	0.0668	0.0332	0.0205	0.0662	-0.1761	-0.0704	0.0029	-0.0984	0.1356	-0.0197	-0.147	1			
Gov	0.255	0.3107	0.0311	-0.0126	0.0172	0.2203	0.1248	-0.0318	-0.107	-0.0802	-0.3032	0.4331	0.154	0.1273	0.2799	1		
Women	0.0076	0.0262	0.0982	0.0263	-0.096	-0.1066	0.0463	0.043	0.1053	0.0827	0.0558	0.0049	0.208	0.0787	0.065	0.0055	1	
Audit	0.037	0.0425	0.0409	-0.0912	0.191	0.3394	0.105	0.026	0.0801	0.0681	-0.0123	0.0612	0.1617	0.1786	-0.1706	-0.1657	-0.0481	1

5.3.2 Diagnostic Testing for Model 2

Similar to the procedure for model 1, diagnostic tests are performed for model 2. The Ramsey Reset Test in table 5.9 shows an insignificant result indicating that the model is correctly specified. This test ensures the data is in linear form and that there is no omitted variable bias. The VIF test in table 5.9 shows that there is no problem of multicollinearity. A common critical point for the VIF test is 5 (Studenmund, 2014). If a model includes a large number of independent variables, this value can increase (Studenmund, 2014). Even though model 2 includes many independent variables, all variables show values significantly lower than 5. The highest VIF level is leverage with a value of 2.15. Regarding heteroscedasticity, the Breusch-Pagan / Cook-Weisberg and White's tests reported in table 5.9 show presence of heteroscedasticity. For Autocorrelation, the Breusch-Godfrey LM test shows that there is evidence of serial correlation.

Table 5. 9 : Diagnostic Testing for Model 2

This table presents the diagnostic testing for model 2. Model specification is tested using the Ramsey Reset Test. Multicollinearity is tested using the Variance Inflation Factor (VIF) test. Heteroscedasticity is tested using Breusch-Pagan / Cook-Weisberg and White's test. Autocorrelation is tested using the Breusch-Godfrey LM test.

Model Specification		**Multicollinearity**		**Heteroscedasticity**		**Autocorrelation**	
Test	**P-value**	**Variable**	**VIF**	**Test**	**P-value**	**Test**	**P-value**
Ramsey Reset Test	0.0604	Lev	2.15	Breusch-Pagan / Cook-Weisberg	0.0000	Breusch-Godfrey LM test	0.0000
		Liq	2.02				
		Cashflow	1.76				
		Gov	1.63	White's test	0.0000		
		Size	1.58				
		Div	1.56				
		Boardsize	1.48				
		Inst	1.48				
		Audit	1.42				
		Boardindep	1.4				
		Vol	1.3				
		Invest	1.27				
		Insider	1.21				
		Duality	1.2				
		Women	1.11				

Since model 2 includes many independent variables, and the diagnostic tests show evidence of heteroscedasticity and autocorrelation, backward stepwise ordinary least squares regression is performed with robust standard errors. Autocorrelation is addressed using Newey-West and Driscoll-Kraay standard errors. Subsequently, for more robustness and to address problems of endogeneity, two-stage least squares regression is performed with robust standard errors (see chapter 4, section 4.8).

5.3.3 Regression Results for Model 2

Table 5.10 presents the regression results for model 2. Model 2 includes the firm specific variables in model 1, in addition to corporate governance variables. Since model 2 includes a large set of variables, stepwise approach is used in order to formulate a more simplified and efficient model. Therefore, stepwise OLS with robust standard errors are reported, along with Newey-west and Driscoll-Kraay standard errors. The main results of the firm specific variables do not change.

Table 5. 10 : Regression Results for Model 2

This table presents OLS regression results for model 2. The sample consists of 157 companies listed on the Egyptian stock market from 2012-2015. The dependent variable is Lncash. lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Cashflow is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio. Duality is a dummy variable set to one if the chairman of the board is also the CEO and zero otherwise. Insider is the percentage of outstanding shares held by insiders. Gov is the percentage of outstanding shares held by the government of Egypt. Boardsize is the number of directors on the board over the natural logarithm of total assets. All continuous variables are winsorized at the 1st and 99th percentile. Year and industry dummies are included.

Lncash	**OLS Stepwise Robust Standard errors**	**Newey-West Standard errors**	**Stepwise Driscoll-Kraay Standard errors**
Div	0.444254***	0.45173***	0.454511*
	(0.00200)	(0.00400)	(0.05400)
Invest	0.146892*	-	-
	(0.07000)	-	-
Liq	-	-	-
	-	-	-
Lev	1.058354***	1.080126***	1.295939***
	(0.00000)	(0.00000)	(0.00300)
Size	-	-	-0.0582***
	-	-	(0.00400)
Cashflow	5.427356***	5.676479***	5.942181***
	(0.00000)	(0.00000)	(0.00000)
Vol	6.169005***	7.137136***	5.868185**
	(0.00100)	(0.00200)	(0.04800)
Duality	0.284224**	0.299646**	-
	(0.01900)	(0.04500)	-
Insider	-0.88977**	-	-0.90362**
	(0.04800)	-	(0.01200)
Gov	0.719796***	0.860526***	0.857571***
	(0.00000)	(0.00000)	(0.00200)
Boardsize	0.891359*	0.963854*	0.508019*
	(0.05500)	(0.09600)	(0.08100)
Constant	-4.81835***	-4.86648***	-3.5031***
	(0.00000)	(0.0000)	(0.00000)
Observations	614	614	614
Adjusted R^2	0.3299	-	0.3112
Model Significance	(0.0000)	(0.0000)	(0.0211)

Notes:
- The p-values are reported in brackets.
- Significance levels:
 * Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

For corporate governance variables, the four significant variables shown by the stepwise regression are CEO duality, insider ownership, government ownership and board size.

CEO duality shows a significant positive impact on cash holdings. CEO duality occurs when the Chief Executive Officer (CEO) and Chairman of the Board (COB) are the same person. The findings are consistent with the view that companies with high CEO duality keep more cash than companies with CEO and COB separation (Drobetz and Grüninger, 2007). Results indicate presence of the agency theory, showing that when there is CEO duality, boards become less effective in monitoring and so managers have higher discretion to hoard cash. The positive relationship between CEO duality and cash holdings is an indication that CEOs allow high cash reserves in order to enable insider expropriation (Boubaker and Derouiche, 2015). The results support the findings of recent research including Kuan *et al.* (2011), Kusnadi (2011) and Boubaker and Derouiche (2015). The descriptive statistics show that CEO duality is high in the sample. The suggestion here is that CEO duality should decrease in Egyptian companies, because in the presence of duality the monitoring effectiveness of the board decreases. In this case, CEOs have higher managerial discretion and keep high levels of cash for their own private benefits. These benefits could include job protection through showing better performance, or even insider expropriation. However, keeping significant amounts of cash could decrease shareholder wealth, due to the idle investment and opportunity cost of lost returns that could have been generated if the cash was invested in positive net present value projects.

The findings show a significant negative relationship between insider ownership and cash holdings. The results support the agency theory, indicating that managerial ownership decreases agency problems (Jensen, 1986). This supports the interest alignment hypothesis. When managers hold more shares in the company, the interests of managers and shareholders are aligned, thus managers keep low levels of cash. Since goal congruence occurs with managerial ownership, managers could invest excess cash in positive net present value projects or distribute cash as dividends. The findings support those reported by Drobetz and Grüninger (2007). They prove that when managers have a higher

percentage of ownership in the firm, the incentives of managers and shareholders are aligned and thus managers are encouraged to keep lower levels of cash. According to Jensen and Meckling (1976) managerial ownership decreases the manager's incentive to take actions that are value destroying to shareholders. The result is in line with findings of Masood and Shah (2014) in Pakistan. The result here contradicts the findings of Harford *et al.* (2008) and Chen and Chuang (2009) in the U.S. and Belghitar and Khan (2013) in the U.K. who support the entrenchment hypothesis. The entrenchment hypothesis states that managerial ownership increases the motive for managers to hoard cash for their own private benefits. The negative relationship between managerial ownership and cash holdings shows that managerial ownership is an effective tool in Egypt to decrease agency problems. Aligning the interests of managers and shareholders motivates managers to invest the cash in projects that will increase shareholder wealth.

The results show a significant positive relationship between cash holdings and government ownership. Contrary to expectations, the fact that government ownership increases monitoring, hence forcing managers to decrease cash holdings is not supported here. Interestingly, the results are totally contradictory to the view explained by Wu *et al.* (2012) and Megginson *et al.* (2014) in China. The authors argue that government controlled firms keep low levels of cash because they have easy access to external finance from state-owned banks. In fact, results indicate that when government ownership increases, managers keep higher levels of cash. The finding shows that the government of Egypt does not play a strong monitoring function for listed firms. The government is unable to force managers to invest cash in positive net present value projects. It is evident that managers of firms with high government ownership seek to increase their job security and show that they are performing well, by keeping large cash balances on the balance sheet. Managers could be hoarding cash for precautionary motives in order to meet future obligations as they come due and decrease risks of financial distress. Nevertheless, the high cash balances

have an opportunity cost of lost returns that could have been generated if the cash was invested in positive net present value projects. According to Shleifer and Vishny (1997), state owned firms are typically inefficient. Executive remuneration schemes in government owned companies could be linked to firm size, hence encouraging managers to accumulate cash regardless of future profitability prospects. The government of Egypt should perform a higher monitoring function and force managers to invest cash in projects that will benefit the firm by generating higher future returns. This will only happen when there is increased awareness regarding the effect of the agency theory on corporate cash holdings.

Board size shows a significant positive relationship with corporate cash holdings. The significance level is at 10%. According to Harford *et al.* (2008), previous studies have found contradicting evidence regarding the effectiveness of board size. Some studies like Kuan *et al.* (2012), Masood and Shah (2014) and Al-Najjar and Clark (2017) find that larger boards are more effective and provide better monitoring. Consequently, these studies provide evidence of a negative relationship between board size and cash holdings. On the other hand, studies such as Kusnadi (2005) and Ullah and Kamal (2017) argue that larger boards are actually less effective causing weaker corporate governance practices and less effective monitoring. Their findings are supported through a positive relationship between board size and cash holdings.

The evidence provided here show that when board size increases, cash holdings also increase. The findings support the traditional view that larger boards are less effective because the large number of members slows down the decision process (Jensen, 1993). Larger boards provide less effective monitoring and so are unable to force managers to invest the excess cash in positive net present value projects or distribute dividends to shareholders. Additionally, larger boards could be less effective due to high costs of coordination and free riding problems (Chen and Chuang, 2009). The results are supportive

to the findings of Ullah and Kamal (2017) who also find a significant positive relationship between board size and cash holdings in Pakistan. However, the results are contradictory to the findings of Al-Najjar and Clark (2017) who find a negative relationship between board size and cash holdings in the MENA region.

In order to address endogeneity problems, two-stage least squares is used for model 2. All the firm specific variables are treated as endogenous variables like model 1, and the second lags of independent variables are used as instruments. Separate tests for endogeneity are implemented for corporate governance variables. Durbin and Wu-Hausman tests of endogeneity reported in table 5.11 show that corporate governance variables are exogenous. Therefore, firm specific variables are treated as endogenous whereas corporate governance variables are treated as exogenous. The model is tested from 2012-2015 and the instrumental variables used for the endogenous firm-specific variables are lagged for two years up to 2010.

Table 5. 11 : Tests of Endogeneity for Corporate Governance Variables

Test	**P-value**
Durbin	0.1991
Wu-Hausman	0.2533

Table 5.12 shows results of the two-stage least squares regression for model 2. The model includes robust standard errors to deal with heteroscedasticity and autocorrelation problems. The model includes year and industry dummies to control for macro-economic events and industry effects, respectively. The main results for the firm specific variables are similar to those reported using 2SLS in model 1. The three corporate governance variables that show significant results under 2SLS are board independence, government ownership and percentage of women on the board.

Table 5. 12 : Two-Stage Least Squares Regression (2SLS) for Model 2

This table presents 2SLS regression results for model 2. The sample consists of 157 companies listed on the Egyptian stock market from 2012-2015. The dependent variable is Lncash. Lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. Cashflow is cash flow to assets ratio calculated as net income plus depreciation over total assets. Insider is the percentage of outstanding shares held by insiders. Inst is the ratio of shares that institutions own in the firm divided by the total number of shares outstanding. Boardsize is the number of directors on the board over the natural logarithm of total assets. Boardindep is the ratio of non-executive directors to total directors. Duality is a dummy variable set to one if the chairman of the board is also the CEO and zero otherwise. Gov is the percentage of outstanding shares held by the government of Egypt. Women is the percentage of women directors on the board to total directors. Audit is a dummy variable set to one if the company auditor is one of the big four audit firms and zero otherwise. All continuous variables are winsorized at the 1st and 99th percentile. Year and industry dummies are included.

Lncash	**2SLS**
Div	0.9511706*
	(0.085)
Invest	0.627906***
	(0.007)
Liq	1.198702**
	(0.021)
Lev	1.141754**
	(0.019)
Size	-0.0926916*
	(0.055)
Cashflow	2.752031
	(0.29)
Insider	-0.7429144
	(0.149)
Inst	0.0418492
	(0.871)
Boardsize	0.9446415
	(0.11)
Boardindep	-0.5564625*
	(0.058)
Duality	0.2058014
	(0.143)
Gov	0.4699997*
	(0.086)
Women	-0.9681864*
	(0.074)
Audit	0.1482593
	(0.318)
Constant	-2.674874**
	(0.015)
Observations	594
R^2	0.2898
Model Significance	(0.0000)

Notes:
- The p-values are reported in brackets.
- Significance levels:
* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level

Results show a significant negative relationship between board independence and cash holdings. The result totally supports the agency theory. The findings indicate that when board independence increases, there is higher board monitoring effectiveness and managers are forced to decrease cash holdings. Higher board independence improves monitoring effectiveness because independent directors are not closely involved in setting firm strategies and policies and thus are able to assess managers more objectively than executive directors (Jizi *et al.*, 2014). Moreover, firms that have more independent boards, face lower information asymmetry and have easier access to external financing (Chen, 2008). Thus, these firms have a lower need to hoard cash. The results are consistent with the findings of Kusnadi (2011) and Boubaker and Derouiche (2015) who agree than when board independence increases, monitoring effectiveness increases and managers invest the excess cash or pay-out dividends. However, the results are contradictory to the findings of Kuan *et al.* (2011), Kuan *et al.* (2012) and Ullah and Kamal (2017). Egyptian listed firms should continue to increase the percentage of non-executive and independent board members in order to increase the monitoring effectiveness of company boards and decrease agency problems. Results also show a significant positive relationship between government ownership and cash holdings, similar to the findings reported and discussed by the OLS model.

The negative relationship between women on the board and cash holdings indicates that when the percentage of women on the board increases, cash holdings decrease. Again, the results are supportive of the agency theory. Results indicate that when there are more women on the board, monitoring effectiveness increases and so managers decrease cash holdings. The results prove the view that women perform better monitoring than men (Adams and Ferreira, 2009). This is because women have been found to attend more board meetings and are assigned more monitoring roles. The results support the recent findings of Ullah and Kamal (2017) in Pakistan. The view that women are more risk averse and so

encourage managers to keep more cash for precautionary motives is not supported here. Even though Loukil and Yousfi (2016) find that the percentage of women on the board increases cash holdings for precautionary motives in Tunisia, the results are different for Egyptian firms. The percentages of women on the boards of Egyptian listed firms are still considered relatively low. Increasing the percentage of women on company boards, will create higher monitoring and decrease agency problems. This will in turn result in managers investing the excess cash in positive net present value projects that will generate returns, increasing shareholder wealth and reflecting improvements on the Egyptian economy in general.

5.4 Dynamic Panel Estimation

Investigating whether firms have target cash ratios is done through investigating if cash holdings revert back to the mean (Opler *et al.*, 1999). Studies such as Ozkan and Ozkan (2004) and Ogundipe *et al.* (2012) find that firms have target cash ratios and try to adjust back to their targets through a partial adjustment mechanism. Following Ozkan and Ozkan (2004), a dynamic panel GMM model is applied to show if firms adjust to their target cash levels. Delays in the adjustment process may be due to transaction costs and other adjustment costs. A dynamic panel model requires a lagged dependent variable to be added with the other independent variables. Ozkan and Ozkan (2004) use the lagged cash ratio as an independent variable, whereas Drobretz and Gruninger (2007) use the lagged natural logarithm of the cash ratio when applying GMM. When a lagged dependent variable is used, it becomes correlated with the error term causing OLS to be inconsistent. For this reason, a dynamic panel GMM model is required to analyse firm's target cash ratios and address endogeneity problems.

Ozkan and Ozkan (2004) state that in dynamic cash holding models it is inappropriate to assume that independent variables are strictly exogenous. This is because shocks affecting

cash holdings are likely to affect its firm-level determinants as well. Following this recommendation, all firm specific variables in this study are treated as endogenous. Also, independent variables may be correlated with current and past errors (Ozkan and Ozkan, 2004).

The Sargan test of over-identified restrictions, reported in table 5.13, shows an insignificant result which indicates that the instruments and residuals are independent. The Arellano and Bond (1991) test of second order serial correlation AR (2) shows insignificant results indicating that the instruments used in the model are valid and that there is no second order serial correlation.

Table 5. 13 : Dynamic Panel Model

This table presents dynamic panel GMM regression results. The sample consists of 157 companies listed on the Egyptian stock market from 2008-2015. The dependent variable is Lncash. Lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. $Cash_{t-1}$ is the natural logarithm of the cash ratio lagged to one period. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. Cashflow is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio. All continuous variables are winsorized at the 1st and 99th percentile. The model includes yearly dummies. The second lags of all independent variables are used as instruments. AR(1) and AR(2) are test statistics for first and second order serial correlation, respectively. Sargan and Hansen tests are tests of over identifying restrictions.

Lncash	**GMM**
$Cash_{t-1}$	0.4932489***
	(0.0000)
Div	1.139309**
	(0.0230)
Invest	0.188668
	(0.3260)
Liq	0.7359767
	(0.3800)
Lev	0.5359751
	(0.5020)
Size	-0.1728914***
	(0.000)
Cashflow	1.704979
	(0.3600)
Vol	12.85218
	(0.1530)
Observations	1033
Model Significance	(0.00000)
AR (1)	0.00000
AR(2)	0.5990
Sargan Test	0.47900
Hansen Test	0.56500

Notes:
- The p-values are reported in brackets.
- Significance levels:
* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

The findings of the dynamic panel model reported in table 5.13, indicate that firms have a target cash ratio which they try to reach. Firms try to adjust their current cash ratios to reach their target levels. This is evident by the significant relationship between the lagged cash and current cash levels. The adjustment coefficient is 0.5067511 (1-0.4932489) (see chapter 4, section 4.6.2). This indicates that firms are unable to adjust to their target cash ratios immediately. If the adjustment coefficient is close to 1, then it means firms adjust quickly to their target cash ratios with low cost, because the target cash is close to the actual cash. However, if the adjustment coefficient is close to zero, this indicates that adjustment costs are high and firms are unable to adjust quickly to their targets. It is important for managers to adjust relatively quickly to their target cash ratios in order to have sufficient funds for day to day operations and undertake profitable investment opportunities without having to bear significant adjustment costs (Martínez-Sola *et al.*, 2018). Ozkan and Ozkan (2004) find the adjustment coefficient above 0.6, concluding that U.K. firms adjust relatively quickly to their target cash ratios. They suggest that firms keep their cash holdings relatively close to the target in order to avoid adjustment costs. Here the adjustment coefficient is only 0.5, similar to the findings of Al-Najjar and Belghitar (2011) and Shah (2011), indicating that firms do not adjust immediately to their target cash ratios. This implies that firms face adjustment costs for deviating from their target cash ratios. Firms in Egypt are expected to hold relatively large cash balances in order to avoid costs of adjusting to target cash levels such as transaction costs. Similarly, a recent study by Orlova and Rao (2018) shows an adjustment coefficient of 0.54 in the U.S. The adjustment coefficient in this sample is significantly lower than the adjustment coefficient of 0.85 reported by Guizani (2017) in Saudi Arabia. This shows that the speed of adjustment to the target cash ratio in Egypt is slower than Saudi Arabia. Nevertheless, the adjustment coefficient in this sample is still higher than that reported by Dittmar and Duchin (2011) of

only 0.38 in the U.S. It is also higher than the adjustment coefficient between 0.35 and 0.5 reported by Drobetz and Grüninger (2007) in Switzerland.

The main findings of other determinants do not change when GMM is used. All independent variable show the same results as the OLS and 2SLS models previously reported, in terms of signs. However, when using GMM only dividend payments and firm size show significant results. This is because GMM uses many instrumental variables. Instrumental variable estimators have larger asymptotic variance than OLS due to the additional uncertainty caused by the instruments, which are imperfectly correlated with the independent variables (Wooldridge, 2009).

5.5 Political Stability

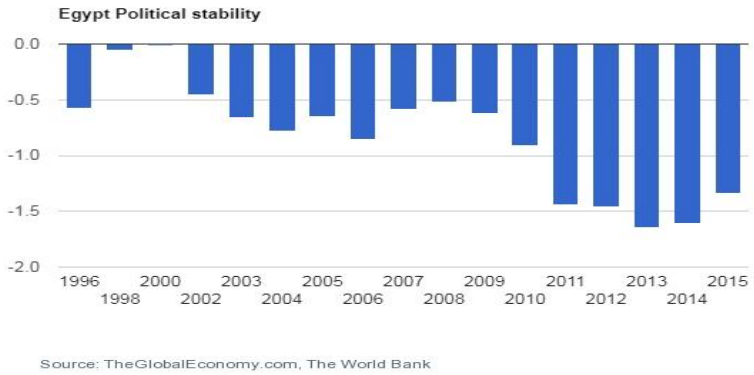
This section presents further analysis by investigating the effect of political stability on corporate cash holdings in Egypt. This study is the first to investigate the effect of political stability on corporate cash holdings. Additionally, a subsample analysis is performed in order to compare the determinants of corporate cash holdings before and after the Egyptian revolution of 2011. For this part of the analysis the balanced panel data set is used.

5.5.1 Political Stability and Cash Holdings

At times of low political stability, managers may be reluctant to undertake risky investments and choose to accumulate cash in order to hedge against risks of future cash shortages and financial distress. In order to determine if Egyptian firms increase cash holdings at times of low political stability, a political stability variable is added to the regression model. The World Bank indicator for political stability is used as a measure for political stability and is extracted from http://databank.worldbank.org/data/reports.aspx?source=worldwide-governance-indicators. The political stability variable is defined by World Bank as an index that is an average of

several other indices, in order to measure the perceptions of the probability that the government will be destabilized by unauthorized means such as violence or terrorism. The index ranges from -2.5 to +2.5, with -2.5 being weak political stability and +2.5 being strong political stability. It is important to note that out of 194 countries, Egypt is ranked number 177 on the political stability index (Source: World Bank, 2018, http://www.theglobaleconomy.com/rankings/wb_political_stability/). Figure 5.2 shows political stability in Egypt throughout the years.

Figure 5. 2 : Political Stability in Egypt



Political stability is important in emerging market economies because it directly affects investor and consumer confidence (Euromonitor International, 2014). Overall, political stability has an impact on investment, consumption and economic growth. Out of 25 major emerging market economies, Egypt has experienced the highest deterioration in political stability since the revolution in 2011 (Euromonitor International, 2014). In order to analyse the effect of political stability on corporate cash holdings in Egypt, the political stability variable is regressed against cash holdings. This is to test if political instability affects the tendency for Egyptian firms to hoard cash balances. The firm specific variables previously analysed in model 1 are used to control for the financial determinants of corporate cash holdings.

Table 5. 14 : The Effect of Political Stability on Cash Holdings

This table presents OLS and 2SLS regression results to show the effect of political stability on cash holdings. The sample consists of 135 companies listed on the Egyptian stock market from 2008-2015. The dependent variable is Lncash. Lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. Cashflow is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio. Political Stability is an index measuring political stability by world bank. Robust standard errors are used.

Lncash	**OLS**	**2SLS**
Div	0.839408***	1.683698***
	(0.00000)	(0.00000)
Invest	0.190769***	0.733999***
	(0.00200)	(0.00800)
Liq	0.911882***	1.504728***
	(0.00000)	(0.00100)
Lev	1.764306***	1.638244***
	(0.00000)	(0.00100)
Size	-0.09439***	-0.11253**
	(0.00100)	(0.02900)
Cashflow	5.492701***	2.023255
	(0.00000)	(0.42100)
Vol	5.345983***	-
	(0.00000)	-
Politicalstability	-0.18813*	-0.64932**
	(0.08500)	(0.03300)
Constant	-3.30304***	-3.91623***
	(0.00000)	(0.00500)
Observations	1080	810
Adjusted R^2	0.2594	0.2096
Model Significance	(0.00000)	(0.00000)

Notes:
- The p-values are reported in brackets.
- Significance levels:
* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

The results of the regression model show a significant negative relationship between political stability and corporate cash holdings in Egypt. For robustness, the results are carried out using OLS and 2SLS, with robust standard errors. The results could be

explained through the trade-off perspective. When political stability increases, cash holdings decrease because firms do not need to keep high cash holdings for precautionary motives. This means that at times of political instability, firms hoard cash because managers are fearful of the uncertainty caused by political instability. Managers keep high cash balances at these times, in order to decrease the risks of financial distress and avoid cash shortages. Furthermore, transaction motives may be evident here. Firms increase cash holdings at times of political instability due to the difficult access to external financing at these times. Additionally, managers may hoard cash at times of political instability due to agency motives. Managers may be facing job insecurities at times of political instability. At these difficult times, managers may keep high cash levels to show that they are well-performing without having to bear significant risks which could be job threatening. Furthermore, the regression analysis for the financial determinants of corporate cash holdings is conducted using subsamples.

5.5.2 Subsample Analysis

Subsample analysis is tested for model 1 to analyse if the determinants of corporate cash holdings in Egypt have changed before and after the Egyptian revolution of 2011. There are no corporate governance data available before 2012 to perform this test on model 2. Therefore, the subsample analysis is performed for model 1 only. The first thing to be tested is whether the cash ratios of firms in the sample differ before and after 2011. In order to do so, first normality of the dependent variable is tested using the Shapiro-Wilk test. The normality test shows significant results of 0.000 indicating that the data is not normal and accordingly the Wilcoxon test which is a non-parametric test is used. The Wilcoxon test compares the means of cash holdings under the two subsamples. The first subsample is from 2008-2011 and the second subsample is from 2012-2015.

Table 5. 15 : Wilcoxon (Mann-Whitney)

Sample	Observations	Ranksum	Expected	Prob > |z|
2008-2011	540	302406	291870	0.0398
2012-2015	540	281334	291870	

The p-value of the Wilcoxon Mann-Whitney tests reported in table 5.15, shows significant results which indicates that cash holdings are different before and after the Egyptian revolution of 2011. Therefore, the regression analysis is conducted under 2 separate sub-samples to show if the results of the original regression models are different. The first sub-sample is from 2008-2011 and the second from 2012-2015. In order to test if the coefficients of the independent variables are different between sub samples, the Wilcoxon Mann-Whitney test is reported in table 5.16 for all non-normal variables and the Analysis of Variance (ANOVA) is reported for dividends, which is the only normal variable.

Table 5. 16 : Sub-Sample Analysis

This table presents regression results for sub-sample analysis. The full sample includes 135 companies listed on the Egyptian stock market. The first sub-sample is from 2008-2011 and the second from 2012-2015. The dependent variable is Lncash. Lncash is the natural logarithm of the cash ratio calculated as cash and equivalents over the book value of assets less cash and equivalents. Div is a dummy variable that is set to one if the firm paid dividends and zero otherwise. Invest is the market-to-book ratio calculated as the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets. Liq is the net working capital to assets ratio calculated as current assets minus total cash and equivalents minus current liabilities over the total book value of assets minus cash and equivalents. Lev is total debt over total assets less cash and equivalents. Size is the natural logarithm of total assets. Cashflow is cash flow to assets ratio calculated as net income plus depreciation over total assets. Vol is the standard deviation of the cash flow ratio.

Lncash	**2008-2011**	**2012-2015**	**Wilcoxon Mann-Whitney / ANOVA**
Div	0.90141***	0.58242***	0.49500
	(0.00000)	(0.00000)	
Invest	0.18865**	0.22214**	0.00000***
	(0.01700)	(0.02900)	
Liq	0.87033**	0.99085**	0.25510
	(0.01900)	(0.01100)	
Lev	1.65699***	1.62861***	0.21250
	(0.00000)	(0.00000)	
Size	-0.13906***	-0.03800	0.01460**
	(0.00400)	(0.41400)	
Cashflow	5.28534***	5.44576***	0.00000***
	(0.00000)	(0.00000)	
Vol	3.37650*	7.39940***	1.00000
	(0.08200)	(0.00000)	
Constant	-1.88139	-4.01502***	
	0.11100	0.00000	
Observations	540	540	
R^2	0.30270	0.32580	

Notes:
- The p-values are reported in brackets.
- Significance levels:
* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level

According to the Wilcoxon Mann-Whitney test reported in table 5.16, the variables that show significant differences under the 2 subsamples are investment opportunity, firm size

and cash flows. The positive relationship between cash holdings and investment opportunity increases after the Egyptian revolution. This indicates that after the revolution, firms hold more cash for precautionary motives and to be able to have sufficient cash reserves for upcoming investment opportunities. Moreover, the fact that companies keep more cash for investment indicates that companies prefer not to resort to external financing. This translates into more difficult access to external finance after the revolution.

Even though the relationship between cash holdings and firm size is negative in both subsamples, it becomes insignificant after the revolution. The trade-off view that larger firms do not need to hoard cash because they are more diversified and less subject to financial distress is not evident after the revolution. Finally, the positive relationship between cash flows and cash holdings becomes stronger after the revolution. This indicates that the motivation of managers to keep more cash in order to decrease reliance on expensive external financing increased after the revolution. Again, this is an indication of more difficult access to external financing in the recent years.

Conclusion

This chapter addresses the fifth research objective by analysing the empirical findings in comparison with previous literature in order to provide a basis for recommendations for companies, managers, investors and policy makers. The financial determinants of corporate cash holdings show that dividend payments, investment opportunity, liquid asset substitute, leverage, cash flow and cash flow volatility impact cash holdings positively, whereas firm size impacts cash holdings negatively. The financial determinants show evidence of the trade-off and pecking order theories. As for the corporate governance determinants, CEO-duality, government ownership and board size impact cash holdings positively. This is contrary to insider ownership, board independence and percentage of women on the boards, all affecting cash holdings negatively. The results show evidence of

the agency cost of free cash flow theory. The hypotheses previously formulated (see chapter 2, section 2.8 and chapter 3, section 3.8) help answer the research questions through investigating the financial and corporate governance determinants of corporate cash holdings of firms listed on the Egyptian stock market. The findings contribute to the existing literature by analysing the determinants of corporate cash holdings and revealing which cash holding theories are best applicable to the Egyptian context. The following table summarizes the findings, clarifying which finding is supportive of which cash holdings theory. The table also shows the research hypotheses that are accepted and rejected.

Table 5. 17: Summary of Findings

Determinants	**Findings**	**Supporting Theory**	**Hypotheses**
Financial Determinants			
Dividend Payments	Positive	-	Reject H1
Investment Opportunity	Positive	Trade-off/Pecking order	Accept H2
Liquid Asset Substitutes	Positive	-	Reject H3
Leverage	Positive	Trade-off	Accept H4
Firm Size	Negative	Trade-off	Accept H5
Cash Flow Ratio	Positive	Pecking order	Accept H6
Cash Flow Volatility	Positive	Trade-off	Accept H7
Debt Maturity	Insignificant	-	Reject H8
Capital Expenditure	Insignificant	-	Reject H9
Political Stability	Negative	-	Accept H10
Corporate Governance Determinants			
Insider Ownership	Negative	Agency	Accept H11
Institutional Ownership	Insignificant	-	Reject H12
Government Ownership	Positive	Agency	Reject H13
Board Size	Positive	Agency	Accept H14
Board Independence	Negative	Agency	Accept H15
CEO-Chairman Duality	Positive	Agency	Accept H16
Percentage of Women on the Board	Negative	Agency	Accept H17
Audit Quality	Insignificant	-	Reject H18

The dynamic panel model shows that Egyptian firms are unable to adjust immediately to their target cash ratios. Finally, the relationship between political stability and cash

holdings is negative indicating that at times of low political stability managers hoard cash due to precautionary motives.

Chapter 6: Conclusion

Introduction

Holding cash has many benefits such as decreasing the risk of financial distress and decreasing the reliance on expensive external sources of finance or the fire sale of assets (Opler *et al.*, 1999). However, holding cash has an opportunity cost of forfeited returns that could be generated from more profitable investments (Ferreira and Vilela, 2004). Therefore, it is important to analyse cash holdings because of the associated opportunity costs of not investing in positive net present value projects (Al-Najjar, 2013). The three theories that attempt to explain corporate cash holdings are the trade-off, pecking order and agency cost of free cash flow theories.

This chapter provides a revision of the research aims and objectives. The chapter proceeds by explanation of how the research findings contribute to the existing literature and practice, along with providing recommendations for companies listed on the Egyptian stock market. Finally, the limitations of the study are presented, followed by recommendations for further research.

6.1 Revisiting Research Aims and Objectives

This thesis aims to analyse the determinants of corporate cash holdings of firms listed on the Egyptian stock market. Most research on corporate cash holdings have been conducted in developed economies such as Ozkan and Ozkan (2004), Ferreira and Vilela (2004), Drobetz and Gruninger (2007), Harford *et al.* (2008) and Bates *et al.* (2009). Even though some recent studies such as Al-Najjar (2013), Chen *et al.* (2014) and Kusnadi *et al.* (2015) have started to focus on emerging market economies, there still remains a gap in the literature relating to developing economies, and in particularly Egypt. It is important to investigate Egypt because previously studies have reported that Egyptian companies hoard

significantly larger cash balances compared to other countries (Dittmar *et al.*, 2003). Additionally, the high political and economic instability in Egypt in the recent years provides an ideal context for testing well-established cash holding theories.

From an agency perspective, analysing the effect of the agency theory on cash holdings is more important in developing economies because research has found that firms in countries with weak shareholder protection hold significantly more cash than firms in countries with strong shareholder protection (Dittmar *et al.*, 2003; Pinkowitz *et al.*, 2006; Al-Najjar, 2013). This is due to higher discretionary powers exercised by top management and inability of investors to rely on appropriate market mechanisms to force adequate dividend pay-outs. More specifically, studies such as Al-Najjar (2013) and Rezaei and Saadati (2015) recommend further academic enquiry into investigating the effect of firm-level corporate governance variables such as ownership structure and board characteristics in developing economies. This thesis fills the gap in the literature by combining firm characteristics with firm-level governance variables and measuring their effect on the level of cash holdings of Egyptian listed firms.

The research objectives are met through providing a detailed literature review on studies analysing corporate cash holdings in different contexts and through different theoretical perspectives. An overview of the Egyptian economy and stock market is also presented in order to introduce the Egyptian context in light of the major political and economic events of the recent years. More specifically, prominent corporate governance issues in Egypt are discussed in order to establish theoretical links to corporate cash holdings. The theories are subsequently tested with the analysis of the obtained data set by means of a variety of regression estimators. This is done in accordance with the detailed research procedure which is described in the methodology chapter of this thesis. The research findings are then thoroughly analysed and compared to previous studies. A detailed analysis is carried out on

how the research findings contribute to theoretical research and practical implications in order to provide recommendations for companies, boards of directors, managers, investors and policy makers. Finally, the limitations of the study and recommendations for future research are presented.

6.2 Contribution of Findings

This thesis contributes to existing research by combining firm characteristics and corporate governance variables to investigate the factors that affect managerial decisions regarding cash holdings of Egyptian listed firms. Findings confirm that Egyptian listed firms keep relatively significant cash balances on their balance sheets. This thesis fills the gap in the literature by explaining the reasons causing managers to hoard such significant cash balances. Therefore, financial and corporate governance determinants are analysed to test the trade-off, pecking order and agency cost of free cash flow theories. This research is the first to examine the determinants of corporate cash holdings in Egypt from the stated perspective. This section explains how the research findings contribute to theoretical research and practical implications.

6.2.1 Financial Determinants

Regarding financial determinants, findings show evidence of the trade-off theory and partial evidence of the pecking order theory. Results prove that dividend payments, investment opportunities, liquid asset substitutes, leverage, firm size, cash flows and cash flow volatility are all important financial determinants of corporate cash holdings for firms listed on the Egyptian stock market.

According to the trade-off theory, cash holding decisions are identified through weighing the benefits and costs of holding cash (Opler *et al.*, 1999; Ferreira and Vilela, 2004; Drobetz and Grüninger, 2007). Holding cash has many benefits such as avoiding cash

shortages, decreasing risks of financial distress and decreasing dependence on expensive external financing or fire sale of assets (Opler *et al.*, 1999). The research findings provide strong evidence of the trade-off theory. More specifically, the findings show that investment opportunity, leverage and cash flow volatility impact cash holdings positively, whereas firm size impacts cash holdings negatively.

The research findings suggest that firms with upcoming investment opportunities keep sufficient cash reserves in order to invest in them. Moreover, firms with higher leverage keep cash in order to be in the position to pay back outstanding debt. The findings show that firms with high cash flow volatility keep cash to decrease risks of financial distress. Similarly, smaller firms keep cash because they have higher risks of financial distress and less reliable access to external financing. Accordingly, the research findings support the trade-off theory suggesting that Egyptian managers keep high cash balances for precautionary motives. Managers accumulate cash in order to provide sufficient funding for day to day operations, decrease risks of financial distress and avoid cash shortages. However, it is important to reiterate that holding cash has an opportunity cost of lost returns that could have been earned, had the company invested in positive net present value projects (Ferreira and Vilela, 2004). If managers invest the excess cash in positive net present value projects and generate returns, this will increase shareholder wealth and thus attract more investors.

Interestingly, findings show that firms in Egypt hoard cash in order to keep paying dividends and maintain a strong corporate image. Firms try to send strong positive signals to the market through paying dividends. Furthermore, findings show that liquid assets are not a substitute to cash which indicates problems with accounts receivables and inventory management. This is evidenced by the positive relationship between liquid asset substitutes (net working capital) and cash holdings. According to Wu *et al.* (2012), accounts

receivables are a stronger substitute for cash when firms have easy access to external finance. Therefore, the inability of companies to rely on liquid assets indicates difficulty of access to external finance in Egypt. Consequently, the difficulty of access to external finance causes managers to hoard cash even if they have high account receivable and inventory balances. Therefore, if interest rates decrease, firms will have access to cheaper external finance when needed and will not choose to hoard significant cash balances that result in idle funds.

According to the pecking order theory, firms hoard cash to finance projects internally and avoid expensive external financing (Myers, 1984). Findings show that firms with greater cash flows keep higher cash balances in support of the pecking order theory. If there is easier access to external finance facilitated by liquid capital markets or the efficient banking sector at low costs in Egypt, managers would not hoard such significant cash balances to avoid external financing and would rather benefit from investing cash in positive net present value projects.

Finally, the speed of adjustment of firms in Egypt towards their target cash ratio is relatively slow. This indicates high adjustment costs. A significant portion of adjustment costs comes from transaction costs of having to raise capital from external sources or distribute cash as dividends to bring the current cash level to the target cash level (Orlova and Rao, 2018). If adjustment costs decrease, firms would be able to reach their optimal cash levels relatively quickly.

6.2.2 Corporate Governance Determinants

According to the agency cost of free cash flow theory, managers keep cash for their own private benefits such as increasing their discretionary powers and providing higher job security (Jensen, 1986). The research findings show that the improvement of corporate

governance practices has a significant impact on corporate cash holding decisions of managers in Egyptian listed firms. If firms improve corporate governance practices, there will be higher monitoring and less managerial discretion. Consequently, managers will be forced to invest the excess cash to generate higher profits or distribute the excess cash as dividends to shareholders. In both cases, shareholder wealth will increase, attracting more investors to the market and hence improving the Egyptian stock market and the economy as a whole. Increased awareness of corporate governance by managers, boards of directors, investors and policy makers is necessary in order to improve corporate governance practices in Egypt. According to the findings, recommendations for improvement of corporate governance practices can be in several ways:

1- If managerial ownership increases, agency problems will decrease due to interest alignment between managers and shareholders (Jensen, 1986). Research findings provide evidence that managerial ownership is a strong corporate governance mechanism which creates a reduction in cash holdings. When there is goal congruence between managers and shareholders, managers will be encouraged to invest cash in positive net present value projects in order to generate higher future returns. It is recommended that companies increase managerial ownership to create higher goal congruence and thus decrease agency problems. Goal congruence can be achieved through performance related remuneration schemes.

2- Findings show that government ownership does not provide a strong monitoring function. In fact, the managers of companies with high government ownership hoard more cash. This indicates that managers of government controlled firms are more concerned about decreasing risks of financial distress and increasing their own job security. If government ownership provides a stronger monitoring function, managers would be forced to invest the excess cash in order to generate higher returns. Compensation of managers in government owned firms could be

improved through performance related incentives or stock option compensation plans. Consequently, managers will have a higher incentive to improve performance and corporate wealth.

3- Findings show that larger boards are less effective and thus enable managers to hoard cash. Larger boards are less effective due to high costs of coordination and free riding problems (Chen and Chuang, 2009). Moreover, in the presence of large boards, the decision process becomes slower (Jensen, 1993). Therefore, companies listed on the Egyptian stock market are advised to decrease board size in order to provide more effective monitoring over managerial decisions regarding cash.

4- Results prove that non-executive directors provide higher board monitoring effectiveness and thus decrease cash holdings. Even though many companies in the sample have non-executive directors on their boards, some companies have all of their board members as executives. Understanding the importance of the existence of non-executive directors on company boards will improve corporate governance practices and force managers to invest idle cash in positive net present value projects.

5- When CEO-chairman duality exists, managers keep high cash balances which in turn increase risks of insider expropriation. This is evident by the positive relationship between CEO duality and cash holdings. It is important to understand that the separation of the CEO and the chairman of the board is an important issue that relates to monitoring effectiveness and addresses the agency conflict. The suggestion here is for companies to decrease CEO duality in order to enhance monitoring effectiveness and decrease agency problems.

6- The findings suggest that women on company boards provide higher monitoring effectiveness and are able to force managers to invest excess cash. The percentages of women on company boards are relatively low in Egypt. When boards of

directors, managers and investors realise that women encourage stronger monitoring, women will have higher chances of being appointed to the board positions and thus agency problems will decrease. If policy makers re-enforce a place for women on company boards, monitoring effectiveness will increase and thus managers will be forced to invest excess cash.

6.2.3 Political Stability

The findings provide evidence that firms in Egypt keep higher cash balances at times of low political stability. Understanding how political stability affects cash holdings will have an impact on investment and economic growth. Investors should be able to rely on appropriate market mechanisms in order to force investments of excess cash or divided payments, especially at times of low political stability. Times of low political stability are the times in which the economy is at greatest need to gain investor confidence and improve the market to enhance economic growth. The comparison between the determinants of corporate cash holdings before and after the Egyptian revolution of 2011 shows more difficult access to external finance after the revolution. In order to regain economic stability, access to external finance should be facilitated. Decreasing interest rates could be an effective way to facilitate external finance for Egyptian companies. This will discourage companies from hoarding unnecessary cash balances.

6.3 Limitations of the Study

This study has a number of limitations. Firstly, the research is limited to companies listed on the Egyptian stock market only. In Egypt, the number of companies listed on the stock market is relatively small. Only 221 companies were listed on the Egyptian stock market in 2015. Secondly, corporate governance data is not available before 2012 because companies were not obligated to disclose this information. The Egyptian Financial Regulatory

Authority issued article 18 in 2011 stating that companies must disclose ownership structure and board of directors in details in a separate disclosure report. The disclosure report includes the names of the directors, their job titles and whether they are executives or non-executives. Finally, some variables such as independent directors and research and development expenditure are not available in Egypt.

6.4 Recommendations for Further Research

There are a few lines of further enquiry to extend the research on corporate cash holdings in Egypt. The first line of enquiry is evaluating the impact of excess cash holdings on firm value. This will allow the understanding of how investors perceive the value of excess cash. There are different strands of research in this area including measuring the effect of corporate governance, shareholder protection, diversification and financial constraints on the value of cash. The second line of enquiry is analysing the cash flow sensitivity of cash and how financial constraints may affect this sensitivity. Cash flow sensitivity is the firm's intention to save cash from cash inflows (Almeida *et al.*, 2004).

For the determinants of corporate cash holdings in Egypt, other factors concerning firm structure can be analysed. These factors may include firm diversification, corporate life cycle or the multinationality of firms.

Regarding corporate governance, findings show that managerial ownership is an important determinant of corporate cash holdings in Egypt due to goal congruence between managers and shareholders. It could be beneficial to analyse how different CEO characteristics such as age, gender and compensation can affect managerial decisions regarding cash. More specifically, CEO incentives can be analysed to determine if long term incentive plans cause managers to focus on long term shareholder value maximization.

Appendices

Appendix 1: Summary of Literature Review Findings

Appendix 1a: Summary of Literature Review on Financial Determinants

Trade-off	Pecking Order	Agency	No Evidence
Dividend Payments **Negative:** Jensen (1986)-U.S Guney *et al.* (2007)-U.S Harford *et al.* (2008)-U.S. Bates *et al.* (2009)-U.S. Iskandar-Datta and Jia (2012)- U.S., U.K., Canada and Australia Al-Najjar (2013) – Russia Belghitar and Khan (2013)-U.K. SMEs Gao *et al.* (2013)-U.S. Al-Najjar and Clark (2017)-MENA **Contradict (positive):** Drobetz and Gruninger (2007)- Switzerland Guney *et al.* (2007)-Germany Shah(2011)-Pakistan Bigelli and Sánchez-Vidal (2012)-Italy Iskandar-Datta and Jia (2012)-Germany, France and Japan			**Dividend Payments** **Insignificant:** Ozkan and Ozkan (2004)- U.K Guney *et al.* (2007)-France, Japan and U.K. Guizani (2017)-Saudi Arabia

Trade-off	**Pecking Order**	**Agency**	**No Evidence**
Song and Lee (2012)-East Asia Wu *et al*. (2012)-China Al-Najjar (2013)-Brazil Chen *et al.* (2014)-China Masood and Shah (2014)-Pakistan			
<u>Investment Opportunity</u> **Positive:** Dittmar *et al.* (2003)-cross-country Ozkan and Ozkan, (2004) –U.K. Kusnadi (2005)-Singapore Guney *et al.* (2007)-Cross Country Harford *et al.* (2008) - U.S. Iskandar-Datta and Jia (2012)- Cross Country Ogundipe *et al.* (2012)-Nigeria Chen *et al.* (2014)-China Kusnadi *et al.* (2015) – China	**<u>Investment Opportunity</u>** **Positive:** Ferreira and Vilela (2004)-EMU Song and Lee (2012)- East Asia Kusnadi *et al.* (2015) – China	**<u>Investment Opportunity</u>** **Negative:** Jensen (1986)-U.S. Rezaei and Saadati (2015)-Iran	**<u>Investment Opportunity</u>** **Insignificant:** Drobetz and Gruninger (2007)- Switzerland D'Mello *et al.* (2008)-U.S. Shah (2011)-Pakistan Guizani (2017)-Saudi Arabia
<u>Liquid Assets Substitutes</u> **Negative:** Opler *et al.* (1999)-U.S.			**<u>Liquid Assets Substitutes</u>** **Insignificant:** Al-Najjar (2013)-Brazil and Russia

Trade-off	Pecking Order	Agency	No Evidence
Dittmar *et al*. (2003)- Cross-country Ferreira and Vilela (2004)-EMU Ozkan and Ozkan, (2004)- U.K. D'Mello *et al.* (2008)- U.S. Garcia-Teruel and Martinez-Solano, (2008)- Spain Bates *et al.* (2009)- U.S.- Inventory Bigelli and Sánchez-Vidal (2012) –Italy Iskandar-Datta and Jia (2012)- Cross Country Ogundipe *et al.* (2012)- Nigeria Song and Lee, (2012)- East Asia Wu *et al.* (2012)- China Al-Najjar, (2013)- India Orens and Reheul (2013) -Belgium-SMEs Chen *et al.* (2014)- China Locorotondo *et al.* (2014) -Belgium Masood and Shah (2014)-Pakistan Guizani (2017)- Saudi Arabia			

Trade-off	Pecking Order	Agency	No Evidence
Cotradict (Positive): Guney *et al.* (2007)- Cross Country			
<u>Leverage</u> **Positive:** Garcia-Teruel and Martinez-Solano (2008)- Spain SMEs Al-Najjar and Belghitar, (2011)-U.K. Ogundipe *et al.* (2012)- Nigeria Locorotondo *et al.* (2014)- -Belgium **Negative:** Ferreira and Vilela (2004)- EMU Ozkan and Ozkan (2004)- U.K. D'Mello *et al.* (2008)- U.S. Harford *et al.* (2008)- U.S. Iskandar-Datta and Jia (2012)- Cross Country Wu *et al.* (2012)-China Belghitar and Khan (2013)-U.K. SMEs Chen *et al.* (2014)- China Guizani (2017)- Saudi Arabia Al-Najjar and Clark (2017)-MENA	**<u>Leverage</u>** **Negative:** Opler *et al.* (1999)- U.S. Ferreira and Vilela (2004)- EMU Ozkan and Ozkan (2004)- U.K. Drobetz and Grüninge (2007)- Switzerland Harford *et al.* (2008)- U.S. Song and Lee (2012)- East Asia Wu *et al.* (2012)- China Gao *et al.* (2013)-U.S. Orens and Reheul (2013) - Belgium-SMEs Chen *et al.* (2014)- China Masood and Shah (2014)- Pakistan Kusnadi *et al.* (2015)- China	**<u>Leverage</u>** **Negative:** Ferreira and Vilela (2004)- EMU Ozkan and Ozkan (2004)-U.K. Drobetz and Grüninger (2007)- Switzerland Harford *et al.* (2008)-U.S. Song and Lee (2012)-East Asia Chen *et al.* (2014)-China Masood and Shah (2014)-Pakistan Kusnadi *et al.* (2015)-China	**<u>Leverage</u>** **Insignificant:** Al-Najjar (2013)-Brazil

Trade-off	Pecking Order	Agency	No Evidence
	Al-Najjar and Clark (2017)- MENA		
Firm Size **Negative:** Opler *et al.* (1999)- U.S. Dittmar *et al.* (2003) – Cross Country Ferreira and Vilela, (2004)- EMU Ozkan and Ozkan (2004)- U.K. Drobetz and Grüninger (2007)-Switzerland D'Mello *et al.* (2008)- U.S. Bigelli and Sánchez-Vidal (2012) -Italy Ogundipe *et al.* (2012)- Nigeria Wu *et al.* (2012)-China Al-Najjar (2013)- India Gao *et al.* (2013)-U.S. Locorotondo *et al.* (2014)- -Belgium	**Firm Size** **Positive:** Al-Najjar and Belghitar (2011)- U.K Shah(2011)- Pakistan Song and Lee (2012)- East Asia Al-Najjar (2013)- China Al-Najjar and Clark (2017)- MENA	**Firm Size** **Positive:** Al-Najjar and Belghitar (2011)- U.K. Song and Lee (2012)-East Asia Al-Najjar (2013)- China	**Firm Size** **Insignificant:** Guney *et al.* (2007)- Cross Country Garcia-Teruel and Martinez-Solano (2008)- Spain SMEs Al-Najjar (2013)- Russia and Brazil Orens and Reheul (2013) -Belgium-SMEs Masood and Shah (2014)-Pakistan
Cash Flow **Negative:** Iskandar-Datta and Jia (2012)- U.K. and Germany	**Cash Flow** **Positive:** Ferreira and Vilela (2004) Drobetz and Grüninge (2007)- Switzerland		**Cash Flow** **Insignificant:** Iskandar-Datta and Jia (2012)- U.S., Canada, Australia, France and Japan Ogundipe *et al.* (2012)- Nigeria

Trade-off	Pecking Order	Agency	No Evidence
	Garcia-Teruel and Martinez-Solano (2008) - Spain Harford *et al.* (2008)- U.S. Song and Lee (2012) –East Asia Wu *et al.* (2012)-China Gao *et al.* (2013)-U.S. Orens and Reheul (2013) - Belgium-SMEs Chen *et al.* (2014)- China Masood and Shah (2014)-Pakistan Kusnadi *et al.* (2015)- China		
<u>Volatility</u> **Positive:** Opler *et al.* (1999)-U.S. Saddour (2006)- France Guney et al. (2007)-U.S. Harford et al. (2008) –U.S. Bates et al. (2009)-U.S. Bigelli and Sánchez-Vidal (2012)-Italy Gao *et al.* (2013)-U.S.			**<u>Volatility</u>** **Insignificant:** Shah (2011)-Pakistan

Trade-off	Pecking Order	Agency	No Evidence
Iskandar-Datta and Jia (2012)- Cross Country Belghitar and Khan (2013)-U.K. SMEs Chen *et al.* (2014)-China Locorotondo *et al.* (2014)-Belgium Guizani (2017)-Saudi Arabia			
Debt Maturity **Negative:** Ferreira and Vilela (2004)- EMU Saddour (2006)- France Garcia-Teruel and Martinez-Solano (2008)- Spain Shah (2011)-Pakistan **Contradict (Positive):** Wu *et al.* (2012)-China			
Capital Expenditure **Positive:** Kusnadi (2005)-Singapore	**Capital Expenditure** **Negative:** Guney *et al.* (2007)- Cross Country Harford *et al.* (2008)- U.S. Bates *et al.* (2009)- U.S. Iskandar-Datta and Jia (2012)-Cross Country		**Capital Expenditure** **Insignificant:** D'Mello *et al.* (2008)-U.S.

Trade-off	Pecking Order	Agency	No Evidence
	Wu *et al.* (2012)-China Gao *et al.* (2013)-U.S. Chen *et al.* (2014)- China Locorotondo *et al.* (2014) - Belgium Masood and Shah (2014)-Pakistan Guizani (2017)-Saudi Arabia		

Appendix 1b: Summary of Literature Review on Corporate Governance Determinants

	Negative	**Positive**	**No Evidence**
Ownership Structure			
Managerial Ownership	**Negative (interest alignment)** Drobetz and Grüninge (2007)- Switzerland Jensen and Meckling (1976) Chen (2008)- U..S. (old economy firms) Masood and Shah (2014)-Pakistan	**Positive (Entrenchment)** Harford *et al.* (2008)- U.S. Chen and Chuang (2009)- U.S. (interest alignment because high tech firms) Belghitar and Khan (2013)-U.K.- SMEs	**Insignificant:** Chen (2008)- U..S. (new economy firms) Kalcheva and Lins (2007)- cross country
Ownership Concentration	**Negative:** Kusnadi (2005)- Singapore Kusnadi *et al.* (2015)- China Kuan *et al.* (2011)- Taiwan Kuan *et al.* (2012)- Taiwan Guney *et al.* (2007)- Cross Country	**Positive:** Harford *et al.* (2008)- U.S. Masood and Shah (2014)-Pakistan Belghitar and Khan (2013)-U.K.-SMEs AL-Najjar and Clark (2017)-MENA	
Government Ownership	**Negative** Megginson *et al.* (2014)-China Wu *et al.* (2012)- China		

Board Characteristics			
Board Size	**Negative:** Masood and Shah (2014)-Pakistan Kuan et al. (2012)-Taiwan Al-Najjar and Clark (2017)-MENA	**Positive:** Kusnadi (2005)-Singapore Chen and Chuang(2009)- U.S. Ullah and Kamal (2017)-Pakistan	**Insignificant:** Harford et al. (2008)-U.S. Kusnadi (2011)-Singapore and Malaysia Boubaker and Derouiche (2015)-France
Board Independence	**Negative:** Kusnadi (2005)-Singapore Kusnadi (2011)-Singapore and Malaysia Boubaker and Derouiche (2015)-France	**Positive:** Kuan *et al.* (2011)-Taiwan Ullah and Kamal (2017)-Pakistan Kuan *et al.* (2012)-Taiwan	**Insignificant:** Ozkan and Ozkan (2004)- U.K. Chen (2008)- U..S. (old economy firms) Al-Najjar and Clark (2017)-MENA Belghitar and Khan (2013)-U.K. SMEs
CEO-Duality		**Positive:** Drobetz and Grüninge (2007)- Switzerland Kusnadi (2011)-Singapore and Malaysia Boubaker and Derouiche (2015)-France Kuan *et al.* (2011)-Taiwan	
Women on the Board	**Negative:** Ullah and Kamal (2017)-Pakistan	**Positive:** Loukil and Yousfi (2016)-Tunisia	
Auditor			**Insignificant:** Kusnadi (2005)-Singapore

Appendix 2: Summary of Regression Estimators used in Previous Research

Regression Estimator	References
Ordinary Least Squares Regression (OLS)	Opler *et al.* (1999) Dittmar *et al.* (2003) Ferreira and Vilela (2004) Saddour (2006) Guney *et al.* (2007) Harford *et al.* (2008) Chen (2008) Tong (2010) Shah (2011) Filpse (2012) Wu *et al.* (2012) Al-Najjar (2013) Gao *et al.* (2013) Orens and Reheul (2013) Masood and Shah (2014) Megginson *et al.* (2014) Kusnadi *et al.* (2015) Al-Najjar and Clark (2017) Guizani (2017) Orlova and Roa (2018)
Fixed Effect	Opler *et al.* (1999) Drobetz and Grüninger (2006) Chen (2008) Bates *et al.* (2009) Tong (2010) Shah (2011) Filpse (2012) Iskandar-Datta and Jia (2012) Masood and Shah (2014) Megginson *et al.* (2014) Boubaker and Derouiche (2015) Guizani (2017) Orlova and Roa (2018)
Random Effect	Dittmar *et al.* (2003) Drobetz and Grüninger (2006) Shah (2011) Masood and Shah (2014) Guizani (2017)
Fama- Macbeth	Opler *et al.* (1999) Ferreira and Vilela (2004) Tong (2010) Filpse (2012) Iskandar-Datta and Jia (2012)
Instrumental Variable Approach	Gao *et al.* (2013) Al-Najjar (2013) Al-Najjar and Clark (2017) Martinez-Sola *et al.* (2018)

Regression Estimator	**References**
Generalized Method of Moments (GMM)	Ozkan and Ozkan (2004) Drobetz and Grüninger (2006) Chen (2008) Dittmar and Duchin (2011) Shah (2011) Bigelli and Sánchez-Vidal (2012) Ogundipe *et al.* (2012) Megginson *et al.* (2014) Ullah and Kamal (2017) Guizani (2017) Orlova and Roa (2018)

Appendix 3: List of Companies in the Sample

NUMBER	CODE	COMPANY NAME	INDUSTRY
1	OCIC EY Equity	Orascom Construction Industries (OCI)	Construction and Materials
2	TMGH EY Equity	T M G Holding	Real Estate
3	GTHE EY Equity	Global Telecom Holding	Telecommunications
4	ETEL EY Equity	Telecom Egypt	Telecommunications
5	ABUK EY Equity	Abou Kir Fertilizers	Chemicals
6	EMOB EY Equity	Egyptian Company for Mobile Services (MobiNil)	Telecommunications
7	EAST EY Equity	Eastern Tobacco	Personal and Household Products
8	SWDY EY Equity	ELSWEDY ELECTRIC	Industrial Goods and Services and Automobiles
9	EFID EY Equity	Edita Food Industries S.A.E	Food and Beverage
10	JUFO EY Equity	Juhayna Food Industries	Food and Beverage
11	MNHD EY Equity	Medinet Nasr Housing	Real Estate
12	SKPC EY Equity	Sidi Kerir Petrochemicals	Chemicals
13	HELI EY Equity	Heliopolis Housing	Real Estate
14	PHDC EY Equity	Palm Hills Development Company	Real Estate
15	SUCE EY Equity	Suez Cement	Construction and Materials
16	PHAR EY Equity	Egyptian International Pharmaceuticals (EIPICO)	Healthcare and Pharmaceuticals
17	ESRS EY Equity	Ezz Steel	Basic Resources
18	IRAX EY Equity	EL Ezz Aldekhela Steel - Alexandria	Basic Resources
19	AUTO EY Equity	GB AUTO	Industrial Goods and Services and Automobiles
20	ALCN EY Equity	Alexandria Containers and goods	Industrial Goods and Services and Automobiles
21	ORWE EY Equity	Oriental Weavers	Personal and Household Products
22	OCDI EY Equity	Six of October Development and Investment (SODIC)	Real Estate

NUMBER	CODE	COMPANY NAME	INDUSTRY
23	AMOC EY Equity	Alexandria Mineral Oils Company	Oil and Gas
24	MBSC EY Equity	Misr Beni Suef Cement	Construction and Materials
25	IRON EY Equity	Egyptian Iron and Steel	Basic Resources
26	SVCE EY Equity	South Valley Cement	Construction and Materials
27	ORHD EY Equity	Orascom Hotels And Development	Travel and Leisure
28	MCQE EY Equity	Misr Cement (Qena)	Construction and Materials
29	EITP EY Equity	Egyptian International Tourism Projects	Travel and Leisure
30	ALEX EY Equity	Alexandria Cement	Construction and Materials
31	POUL EY Equity	Cairo Poultry	Food and Beverage
32	SCEM EY Equity	Sinai Cement	Construction and Materials
33	EGAL EY Equity	Egypt Aluminum	Basic Resources
34	CSAG EY Equity	Canal Shipping Agencies	Industrial Goods and Services and Automobiles
35	EGCH EY Equity	Egyptian Chemical Industries (Kima)	Chemicals
36	SUGR EY Equity	Delta Sugar	Food and Beverage
37	UNIT EY Equity	United Housing and Development	Real Estate
38	SCTS EY Equity	Sues Canal Company For Technology Settling	Technology
39	TORA EY Equity	Torah Cement	Construction and Materials
40	EGTS EY Equity	Egyptian for Tourism Resorts	Travel and Leisure
41	NCEM EY Equity	National Cement	Construction and Materials
42	ELKA EY Equity	El Kahera Housing	Real Estate
43	ZMID EY Equity	Zahraa Maadi Investment and Development	Real Estate
44	MRCO EY Equity	Misr Conditioning (Miraco)	Construction and Materials
45	BIOC EY Equity	Glaxo Smith Kline	Healthcare and Pharmaceuticals
46	PACH EY Equity	Paint and Chemicals Industries (Pachin)	Construction and Materials

NUMBER	CODE	COMPANY NAME	INDUSTRY
47	BISM EY Equity	Bisco Misr	Food and Beverage
48	ACGC EY Equity	Arab Cotton Ginning	Personal and Household Products
49	GPPL EY Equity	Golden Pyramids Plaza	Travel and Leisure
50	MEGM EY Equity	Middle East Glass Manufacturing	Industrial Goods and Services and Automobiles
51	CERA EY Equity	Arab Ceramics (Aracemco)	Construction and Materials
52	MPRC EY Equity	Egyptian Media Production City	Media
53	UEGC EY Equity	Elsaeed Contracting and Real Estate Investment Company SCCD	Construction and Materials
54	RTVC EY Equity	Remco for Touristic Villages Construction	Travel and Leisure
55	EHDR EY Equity	Egyptians Housing Development and Reconstruction	Real Estate
56	EFIC EY Equity	Egyptian Financial and Industrial	Chemicals
57	ELEC EY Equity	Electro Cable Egypt	Industrial Goods and Services and Automobiles
58	PHTV EY Equity	Pyramisa Hotels	Travel and Leisure
59	LCSW EY Equity	Lecico Egypt	Construction and Materials
60	EGSA EY Equity	Egyptian Satellites (NileSat)	Technology
61	NCMP EY Equity	National company for maize products	Food and Beverage
62	ADPC EY Equity	The Arab Dairy Products Co. ARAB DAIRY	Food and Beverage
63	UEFM EY Equity	Upper Egypt Flour Mills	Food and Beverage
64	MIPH EY Equity	Minapharm Pharmaceuticals	Healthcare and Pharmaceuticals
65	RAYA EY Equity	Raya Holding For Technology And Communications	Technology
66	EGAS EY Equity	Natural Gas and Mining Project (Egypt Gas)	Utilities
67	ESGI EY Equity	Egyptian Starch and Glucose	Food and Beverage
68	SBAG EY Equity	Suez Bags	Industrial Goods and Services and Automobiles
69	ELSH EY Equity	El Shams Housing and Urbanization	Real Estate

NUMBER	CODE	COMPANY NAME	INDUSTRY
70	MFSC EY Equity	Misr Duty Free Shops	Retail
71	ASCM EY Equity	Asek Company for Mining - Ascom	Basic Resources
72	GGCC EY Equity	Giza General Contracting	Construction and Materials
73	NCGC EY Equity	Nile Cotton Ginning	Personal and Household Products
74	WCDF EY Equity	Middle and West Delta Flour Mills	Food and Beverage
75	CIRF EY Equity	Cairo Development and Investment	Real Estate
76	MICH EY Equity	Misr Chemical Industries	Chemicals
77	SDTI EY Equity	Sharm Dreams Co. for Tourism Investment	Travel and Leisure
78	ACRO EY Equity	Acrow Misr	Construction and Materials
79	ATQA EY Equity	Misr National Steel - Ataqa	Basic Resources
80	SPIN EY Equity	Alexandria Spinning and Weaving (SPINALEX)	Personal and Household Products
81	ECAP EY Equity	El Ezz Porcelain (Gemma)	Construction and Materials
82	AJWA EY Equity	AJWA for Food Industries company Egypt	Food and Beverage
83	GSSC EY Equity	General Silos and Storage	Retail
84	KABO EY Equity	El Nasr Clothes and Textiles (Kabo)	Personal and Household Products
85	CEFM EY Equity	Middle Egypt Flour Mills	Food and Beverage
86	MHOT EY Equity	Misr Hotels	Travel and Leisure
87	CPCI EY Equity	Cairo Pharmaceuticals	Healthcare and Pharmaceuticals
88	NASR EY Equity	El Nasr Transformers (El Maco)	Industrial Goods and Services and Automobiles
89	EDFM EY Equity	East Delta Flour Mills	Food and Beverage
90	AXPH EY Equity	Alexandria Pharmaceuticals	Healthcare and Pharmaceuticals
91	APSW EY Equity	ARAB POLVARA SPINNING and WEAVING CO.	Personal and Household Products
92	UASG EY Equity	United Arab Shipping	Industrial Goods and Services and Automobiles
93	MILS EY Equity	North Cairo Mills	Food and Beverage

NUMBER	CODE	COMPANY NAME	INDUSTRY
94	MOIL EY Equity	Maridive and oil services	Industrial Goods and Services and Automobiles
95	DAPH EY Equity	Development and Engineering Consultants	Real Estate
96	PRCL EY Equity	Ceramic and Porcelain	Personal and Household Products
97	NHPS EY Equity	National Housing for Professional Syndicates	Real Estate
98	ISMA EY Equity	Ismailia Misr Poultry	Food and Beverage
99	RREI EY Equity	Arab Real Estate Investment CO.-ALICO	Real Estate
100	IFAP EY Equity	International Agricultural Products	Food and Beverage
101	DSCW EY Equity	Dice Sport and Casual Wear	Personal and Household Products
102	IDRE EY Equity	Ismailia Development and Real Estate Co	Real Estate
103	ELWA EY Equity	El Wadi Co. For Touristic Investement	Travel and Leisure
104	DCRC EY Equity	Delta Construction and Rebuilding	Construction and Materials
105	ENGC EY Equity	Engineering Industries (ICON)	Industrial Goods and Services and Automobiles
106	NDRL EY Equity	National Drilling	Oil and Gas
107	ETRS EY Equity	Egyptian Transport (EGYTRANS)	Industrial Goods and Services and Automobiles
108	KZPC EY Equity	Kafr El Zayat Pesticides	Chemicals
109	AFMC EY Equity	Alexandria Flour Mills	Food and Beverage
110	SPHT EY Equity	El Shams Pyramids For Hotels and Touristic Projects	Travel and Leisure
111	NINH EY Equity	Nozha International Hospital	Healthcare and Pharmaceuticals
112	COSG EY Equity	Cairo Oils and Soap	Food and Beverage
113	ZEOT EY Equity	Extracted Oils	Food and Beverage
114	SMPP EY Equity	Modern Shorouk Printing and Packaging	Industrial Goods and Services and Automobiles
115	RAKT EY Equity	Rakta Paper Manufacturing	Basic Resources
116	AMES EY Equity	Alexandria New Medical Center	Healthcare and Pharmaceuticals

NUMBER	CODE	COMPANY NAME	INDUSTRY
117	AALR EY Equity	General Company For Land Reclamation, Development and Reconstruction	Real Estate
118	ROTO EY Equity	Rowad Tourism (Al Rowad)	Travel and Leisure
119	NCCW EY Equity	Nasr Company for Civil Works	Construction and Materials
120	MMAT EY Equity	Marsa Alam For Tourism Development	Travel and Leisure
121	MENA EY Equity	Mena Touristic and Real Estate Investment	Real Estate
122	EPCO EY Equity	Egypt for Poultry	Food and Beverage
123	NIPH EY Equity	El-Nile Co. For Pharmaceuticals And Chemical Industries	Healthcare and Pharmaceuticals
124	WATP EY Equity	Modern Company for water proofing (Bitumode)	Construction and Materials
125	MPCO EY Equity	Mansourah Poultry	Food and Beverage
126	EIUD EY Equity	Egyptians For Investment and Urban Development	Real Estate
127	ELNA EY Equity	El Nasr For Manufacturing Agricultural Crops	Food and Beverage
128	ALUM EY Equity	Arab Aluminum	Basic Resources
129	SCFM EY Equity	South Cairo and Giza Mills and Bakeries	Food and Beverage
130	GMCI EY Equity	GMC Group for Industrial Commercial and Financial Investments	Oil and Gas
131	ALRA EY Equity	Atlas For Land Reclamation and Agricultural Proccessing	Food and Beverage
132	SNFC EY Equity	Sharkia National Food	Food and Beverage
133	NRPD EY Equity	National Real Estate Bank for Development	Real Estate
134	GTWL EY Equity	Golden Textiles and Clothes Wool	Personal and Household Products
135	TOUR EY Equity	Tourism Urbanization	Travel and Leisure
136	EPPK EY Equity	El Ahram Co. For Printing And Packing	Industrial Goods and Services and Automobiles
137	MPCI EY Equity	Memphis Pharmaceuticals	Healthcare and Pharmaceuticals
138	MOSC EY Equity	Misr Oils and Soap	Food and Beverage
139	UNIP EY Equity	Universal For Paper and Packaging Materials (Unipack	Industrial Goods and Services and Automobiles

NUMBER	CODE	COMPANY NAME	INDUSTRY
140	INFI EY Equity	Ismailia National Food Industries	Food and Beverage
141	AREH EY Equity	Egyptian Real Estate Group	Real Estate
142	CCRS EY Equity	Gulf Canadian Real Estate Investment Co.	Real Estate
143	ADCI EY Equity	Arab Pharmaceuticals	Healthcare and Pharmaceuticals
144	EDBM EY Equity	Egyptian for Developing Building Materials	Construction and Materials
145	RUBX EY Equity	Rubex Plastics	Construction and Materials
146	MEPA EY Equity	Medical Packaging Company	Healthcare and Pharmaceuticals
147	SIMO EY Equity	Paper Middle East (Simo)	Basic Resources
148	EALR EY Equity	El Arabia for Land Reclamation	Real Estate
149	WKOL EY Equity	Wadi Kom Ombo Land Reclamation	Real Estate
150	EEII EY Equity	El Arabia Engineering Industries	Industrial Goods and Services and Automobiles
151	OBRI EY Equity	El Obour Real Estate Investment	Real Estate
152	SMFR EY Equity	Samad Misr -EGYFERT	Chemicals
153	AITG EY Equity	Assiut Islamic Trading	Retail
154	GIHD EY Equity	Gharbia Islamic Housing Development	Real Estate
155	NEDA EY Equity	Northern Upper Egypt Development and Agricultural Production	Food and Beverage
156	OCPH EY Equity	October Pharma	Healthcare and Pharmaceuticals
157	TRTO EY Equity	TransOceans Tours	Travel and Leisure

Appendix 4: List of Data Sources

Data	**Source**
Financial variables Ownership structure Company auditor	Bloomberg
Financial variables	Thomson Reuters EIKON
Board of directors	Egypt for Information Dissemination
Political stability	World Bank http://data.worldbank.org/indicator
Industry classifications	Egyptian Exchange Website http://www.egx.com.eg/English/ListedStocks.aspx

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