DOKUZ EYLÜL UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF BUSINESS ADMINISTRATION
ACCOUNTING AND FINANCE PROGRAM
MASTER'S THESIS

AN EMPIRICAL ANALYSIS OF THE DETERMINANTS OF CASH HOLDINGS OF NON-FINANCIAL TURKISH LISTED COMPANIES

SIMON VERDUYN

Supervisor
PROF. DR. MÜBECCEL BANU DURUKAN

IZMIR - 2013

MASTER THESIS/PROJECT
APPROVAL PAGE

University	: Dokuz Eylül University
Graduate School	: Graduate School of Social Sciences
Name and Surname	: SİMON VERDUYN
Title of Thesis	: An Empirical Analysis of the Determinants of Cash Holdings of Non-financial Turkish Listed Companies

Defence Date	: 07.10.2013
Supervisor	: Prof.Dr.Mübeccel Banu DURUKAN

EXAMINING COMMITTE MEMBERS

Title, Name and Surname	University	Signature
Prof.Dr.Mübeccel Banu DURUKAN	DOKUZ EYLUL UNIVERSITY	
Prof.Dr.Pınar EVRİM MANDACI	DOKUZ EYLUL UNIVERSITY	
Prof.Dr.Serdar ÖZKAN	İZMİR UNIVERSITY OF ECONOMICS	

Unanimity　　　　(✓)

Majority of votes　　( )

The thesis titled as "**An Empirical Analysis of the Determinants of Cash Holdings of Non-financial Turkish Listed Companies**" prepared and presented by SİMON VERDUYNis accepted and approved.

Prof.Dr. Utku UTKULU
Director

DECLARATION OF OATH

I hereby declare that this master's thesis titled as "An Empirical Analysis of the Determinants of Cash Holdings of Non-Financial Turkish Listed Companies" has been written by myself in accordance with the academic rules and ethical conduct. I also declare that all materials benefited in this thesis consist of the mentioned resources in the reference list. I verify all these with my honour.

Date

…/…/…….

Simon VERDUYN

Signature

ÖZET

Yüksek Lisans Tezi
Borsada İşlem Gören Finansal Olmayan Türk Şirketlerinin Nakit Düzeylerinin Belirleyicilerinin Ampirik Analizi
Simon VERDUYN

Dokuz Eylül Üniversitesi
Sosyal Bilimler Enstitüsü
İngilizce İşletme Anabilim Dalı
İngilizce Muhasebe ve Finansman Tezli Yüksek Lisans Programı

Elde tutulan nakit, iş alanındaki birçok sorunun ve politikanın kökü ve kaynağıdır. Fakat elde tutulan nakdin tutarı ne kadardır ve hangi faktörlerin elde nakit tutma unsurunu etkilediği sorusunun yanıtını arayan araştırmalar son on yıllık dönemde artmıştır. Ancak Türkiye'de bu konuda yapılan çalışmalar sınırlı kalmıştır. Bu tez Türkiye'de elde tutulan nakde ilişkin belirleyicileri inceleyerek literatürde mevcut olan boşluğu doldurmayı amaçlamaktadır. Elde tutulan nakde ilişkin olası belirleyiciler üç dominant elde tutulan nakit teorisinden ve üç elde nakit tutma güdüsünden kaynaklanmaktadır. Bu belirleyicilerin elde tutulan nakde etkileri çeşitli regresyon modelleri ile test edilmektedir. Bu çalışmada Borsa İstanbul'da işlem gören 191 finansal olmayan Türk şirketinin verilerinden yararlanılarak bu belirleyicilerin test edilmesi amaçlanmıştır. Regresyon sonuçları temettü ödemeleri, şirket büyüklüğü ve karlılık değişkenlerinin elde tutulan nakit ile istatistiksel anlamlılığa sahip pozitif yönlü bir ilişkiye sahip olduğunu göstermektedir. Elde tutulan nakit ile istatistiksel anlamlılığa sahip negatif yönlü ilişkiye sahip olan faktörler ise kaldıraç, likit varlık ikamesi, sermaye harcamaları, şirket yaşı, yatırım fırsatları, faiz oranları ve en büyük hissedarın hisselerinin büyüklüğüdür. Tüm bu değişkenler finansal olmayan Türk şirketlerinin elde tuttuğu nakdin büyüklüğünün belirleyicileridir. Bu ilişkilerin kombinasyonu hiyerarşi teorisi ve vekâlet teorisini destekler niteliktedir.

Anahtar kelimeler: Elde Tutulan Nakit, Finansal Belirleyiciler, Türkiye, Hasılat ve Maliyet Dengesi Teorisi, Hiyerarşi Teorisi, Vekâlet Teorisi, Önlem Nedeni, İşlem Güdüsü, Vergi Güdüsü.

ABSTRACT

Master's Thesis

An Empirical Analysis of the Determinants of Cash Holdings of Non-Financial Turkish Listed Companies

Simon VERDUYN

Dokuz Eylül University
Graduate School of Social Sciences
Department of Business Administration
Master of Accounting and Finance Program With Thesis

Cash holdings have been the root and origin of many business questions and policies. However, the appropriate amount of cash to hold and which factors determine the cash holdings is a question that has gained popularity in academic research over the past decade, but when it comes to studies in Turkey, the literature is limited. This thesis aims to fill that gap in the literature by examining the determinants of cash holdings in Turkey. Possible determinants of cash holdings are derived from the three dominant cash holding theories and the three motives of holding cash. These determinants are then entered into various regression models that test the variations and changes in cash holdings. This study aims to test the determinants of cash holdings using a sample of 191 non-financial Turkish companies listed on the Istanbul Stock Exchange. The regression results show statistically significant positive relationships with cash holdings and dividend payout, company size and profitability. Statistically significant negative relationships with cash holdings were found for leverage, liquid asset substitutions, capital expenditures, company age, investment opportunities and the interest rate and the size of the largest owner's shares. The combination of these relationships also provides support for the pecking order theory and the agency theory.

Keywords: Cash holdings, Financial Determinants, Turkey, Trade-Off Theory, Pecking Order Theory, Agency Theory, Precautionary Motive, Transaction Motive, Tax Motive

AN EMPIRICAL ANALYSIS OF THE DETERMINANTS OF CASH HOLDINGS OF NON-FINANCIAL TURKISH LISTED COMPANIES

CONTENTS

CHAPTER ONE

BACKGROUND AND THEORY

CHAPTER TWO

LITERATURE, HYPOTHESES, DATA AND METHODOLOGY

CHAPTER THREE

DESCRIPTIVE STATISTICS AND REGRESSIONS

ABBREVIATIONS

a.p.	Appendices Page Number
BRIC	Brazil, Russia, India and China
CBD	Cash before Delivery
CIA	Cash in Advance
COD	Cash on Delivery
e.g.	Exempli Gratia, "for example"
EMU	European Monetary Union
EU	European Union
FMCG	Fast Moving Consumer Goods
HX	Hypothesis number
ISE	Istanbul Stock Exchange, a.k.a. Borsa Istanbul
IFRS	International Financial Reporting Standards
JIS	Just-In-Sequence
JIT	Just-In-Time
NPV	Net Present Value
OLS	Ordinary Least Squares
p.	Page Number
pp.	Paginae, "pages"
R&D	Research and Development
ROE	Return on Equity
SMCG	Slow Moving Consumer Goods
TCMB	Türkiye Cumhuriyet Merkez Bankası, Turkish Central Bank
UK	The United Kingdom
US	The United States (of America)
WTO	World Trade Organization

TABLES LIST

FIGURES LIST

APPENDICES LIST

INTRODUCTION

In recent years financial media have reported enormous corporate cash holdings. On February 7th 2013 Stanford C. Bernstein Senior Analyst Toni Sacconaghi appeared on CNBC's "Squawk on the Street" and reported that Apple was sitting on a 137 billion dollars cash reserve and that it is adding about 40 billion dollars extra to that each year. He also noted that corporate America has seen a 10% yearly growth in aggregate cash holdings over the past decades, totaling about 5 trillion dollars in 2011. This certainly shows that companies have been amassing cash and it prompts the question why. This question has been avidly researched in the US and in most Western and developed markets, but literature is scarce when it comes to developing and undeveloped countries. Among the emerging markets, the BRIC (Brazil, Russia, India and China) countries traditionally get the most attention. There are, however, other emerging markets that merit the same amount of research and currently draw a blank when it comes to answers for cash holding questions. This study aims to fill that gap for Turkey by looking into the determinants for its listed companies' cash holdings.

Cash holdings have traditionally been studied from the perspective of three dominant cash holding theories: Kraus and Litzenberger's trade-off theory, Myers and Majluf's pecking order theory and Jensen and Meckling's agency theory. The trade-off theory advocates that cash holdings are the result of a trade-off between the benefits and costs associated with holding cash. The pecking order theory champions a financing hierarchy in which the cheapest sources of cash are prioritized and more expensive ways of raising cash are to be avoided as much as possible. In this view, cash holdings are the result of this equation. Lastly, the agency theory believes that cash holdings are the result of management entrenchment. If investment opportunities are scarce and the management is severely entrenched, it will prefer holding cash in the company instead of paying it out to shareholders.

Closely related to these theories are the three motives of holding cash. The precautionary motive states that companies hold cash as a buffer against future

uncertainty. The transaction motive states that cash holdings are a tool to lower transaction costs, as this cash can be used to make payments rather than having to liquidate assets. The third motive is the tax motive, which argues that companies hold cash in order to avoid repatriation taxes and double dividend taxation.

The literature over the past decade has focused on the determinants of cash holdings, namely which variables explain cash holdings and what are their respective impacts on cash holdings. This thesis aims to do the same for Turkish listed companies by using a sample of 191 companies listed on the Istanbul Stock Exchange between 2006 and 2011. The thesis contributes to the literature by filling the gap in literature that exists for Turkey. It also adds to the literature by including variables that are not commonplace in previous research. In order to gauge the determinants of cash holdings of Turkish companies, Ordinary Least Squares (OLS) regressions are run. These regressions determine which variables are significant determinants of cash holdings and also what their impact on cash holdings is.

This study is divided into three chapters. The first chapter of this study reviews and summarizes the background on cash management, working capital management and other aspects of corporate finance related to cash and cash holdings. The purpose of this chapter is to provide some insight into the workings of cash holdings and how these holdings are established. It aims to establish an understanding of terminology and concepts used in later chapters. This chapter also reviews the cash holding theories and provides background on cash holdings and the motives for holding cash. Cash is defined within the scope of this study and is subsequently placed in context. After, the cash holding theories and the research questions surrounding them are explained in detail.

The second chapter starts by listing and briefly discussing previous studies conducted on the determinants of cash holdings, after which hypotheses are formed based on derivations from theory and earlier research. An overview of the study's and the theories' predicted relationships is also given in this chapter. After the literature and hypotheses, this chapter touches upon the study's data and

methodology. It explains the methods used to construct the sample and frames the sample within context. After, more information on the models that will be used to test the hypotheses is given. Argumentation as to why the different models are used and what their purposes are is also provided. The last part of the chapter defines all the variables and accounts for all the formulae used to calculate said variables.

The third chapter takes a closer look at the general statistics of the possible determinants of cash holdings. First, the statistics for the sample as a whole are discussed, followed by the determinants ordered chronologically and segregated by their respective sectors so that other trends in the determinants may be found. A deeper look into the ownership statistics of the sample companies is also provided. After, the determinants are tested against the cash holding variables. This allows conclusions to be drawn as to which possible determinants are actual determinants of cash holdings for the sample. The study closes with its final conclusions, which can be found at the very end.

CHAPTER ONE
BACKGROUND AND THEORY

The first chapter of this study reviews and summarizes the background on cash management, working capital management and other aspects of corporate finance related to cash and cash holdings. The purpose of this chapter is to provide some insight into the workings of cash holdings and how these holdings are established. It will aid the reader in understanding terminology and concepts used in later chapters. This chapter also reviews the cash holding theories and provides background on cash holdings and the motives for holding cash. Cash is defined within the scope of this study and is subsequently placed in context. After, the cash holding theories and the research questions surrounding them are explained in detail.

1.1. CASH MANAGEMENT

A company is successful if it can generate a sustainable cash flow and deliver a superior return on investment to its investors. Holding cash in hand or in a bank account does not help achieve this goal, thus having a lot of cash does not necessarily mean that the company is doing well. That is why it is important to make a clear distinction between these two terms; cash and cash flow.

1.1.1. Cash and Cash Flow

The cash flow is the movement of money in and out of the company. Cash can thus be viewed as the result of the cash flow. It serves as a reservoir that can be used to make payments to suppliers and creditors and that is filled by payments made by customers and debtors. The cash holdings should thus be great enough that all the company's financial obligations can be met in due time, but not so great that there is an excess that is not being properly utilized or paid out to the shareholders. The size of this 'reservoir' cash holding is largely determined by the nature of the company's business. Supermarket chains, for example, have a predictable and steady cash flow. Customers' payments are received immediately (as customers pay with cash, debit or credit cards) while the company enjoys a trade credit with its suppliers that – for

Turkey – lasts about 80 days (Bastos and Pindado, 2013). Thus, these supermarkets have little need of cash reserves. Construction companies, on the other hand, make fewer and more irregular sales and have to pay subcontractors and suppliers frequently. That is why they will have substantial cash holdings that act as a buffer against unpredictable receipts.

1.1.2. Cash and Profit

Generating a lot of cash through a positive cash flow does not necessarily translate into high profitability, nor does profitability act as a sign of a positive cash flow. This is due to the mismatch in time between recognizing a cost or revenue and the actual payment (The Economist, 2012). A transaction is recorded when goods or services change hands, but due to trade credit terms the gap between recording and payment can be long. Thus an income statement could show profits, while the company is unable to meet its financial obligations due to a cash shortage.

1.1.3. Cash Forecasting and the Balance Sheet

An imperative tool for efficient cash management is cash forecasting. By determining when cash is expected to come in and go out the company is able to avoid liquidity crises in the future. Cash forecast is not an easy process though, as cash decisions ripple through all the aspects of the company. Another consideration that has to be made is the value of assets as recorded in the balance sheet. This is important because these assets might be substituted into cash if needed. As of 2013, International Financial Reporting Standards (IFRS) require that companies record their asset values at fair value instead of the market value (IFRS 13). Recording assets at market value means recording them at the price the assets would fetch were they to be sold on the market. This price is not necessarily equivalent to the purchase price. Recording at fair value is recording the assets at the price the buyer is prepared to offer for them. This differs from the market value, because a certain buyer may value the asset more or less than other buyers.

When making the cash forecast it is important that these valuing methods are taken into account, as the balance sheet value will most likely not reflect the current market value. This is because the book value recorded in the balance sheet is a historical cost – the cost of the asset when it was purchased in the past. Added to this are depreciations. The system of depreciation allows a company to spread the cost of purchasing fixed assets over a number of years. Thus the fixed asset's value will steadily decline over the depreciation period. If assets were to be sold for cash in order to overcome deficiencies, the price would probably not equal the book value.

1.1.4. Common Cash Pooling Practices

Cash pooling is a practice where a company pools all its cash together on one or a few bank accounts (Messner, 2001). This is done in order to avoid a number of costly bank fees and to reduce the chance of damaging the company's reputation through negative cash balances. One cash pooling technique is notional cash pooling. Notional cash pooling pools all the company's accounts into one 'virtual' account in which all the debit and credit on the pooled accounts are gathered and are calculated as one, eliminating the need for intercompany loans. Another technique for cash pooling is cash concentration. This is done to gain interests on the company's cash in bank accounts. The company can concentrate all its cash into one central account, this serves to avoid charges and fees, but by pooling all the cash together the company can also gain some interest on the excess amount on the account. The practice of cash pooling helps the company's cash management by providing better oversight on the operational cash flow and to avoid unnecessary banking fees and costs.

1.1.5. Short-Term Financing

Companies face cash shortfalls sooner or later and will need some form of short-term financing to overcome it. There are various types of short-term financing offered by banks and specialized financial institutions that cater to companies' specific needs and situations. However, a company can also issue its own debt to

raise cash in the short-term. Some of the more common forms of short-term financing – as explained in Brealey, Marcus and Myers (2007) - are listed below.

1.1.5.1. Bank Loans

Banks provide several formulae for short-term day-to-day operational loans. The most commonly used form of short-term financing is the line of credit. A line of credit is an agreement in which the bank allows a company to take credit up to a certain amount, without the need for formal loan applications. The company can borrow and repay whenever it wants, for any amount, as long as it does not exceed the line of credit limit. The company will always pay interest on the amount it borrows, but might sometimes be required to also pay an unused line fee on the money not withdrawn. This is largely dependent on the company's reputation and creditworthiness. Lines of credit are reviewed on an annual basis and the bank might change the limit or refuse to provide a line of credit any further. The company can avoid the possibility of termination by taking out a revolving credit agreement. In a revolving credit agreement, the bank formally commits to make funds available to the company for a number of years. However, the bank will require the company to pay a commitment fee of a percentage on any unused credit amount.

1.1.5.2. Secured Loans

The loans discussed in the previous paragraph are all unsecured loans, which means that the bank is forced to trust the client on his word and does not have further assurances. When the creditworthiness of the company is in question or if the amount the company wishes to borrow is relatively large to its size, the bank may not be prepared to offer unsecured loans and will ask the company to put up collateral. Since these loans are short-term, they are usually covered by liquid assets such as inventories, receivables and securities. However, when the bank makes a secured loan, they will usually not lend the full value of the collateral. The difference between the loan amount and the value of the collateral is a safety margin known as a 'haircut'. The size of the haircut differs on the basis of the nature of the collateral. If

receivables are given as collateral, the company will assign the receivables to the lender. This means that when receivables are collected, the cash will be transferred to the lender. This repeats until the loan is paid back. Since the ownership of the receivables never changes hand, the company is still exposed to the receivables' default risk.

If the default risk is really a clear and present issue, the company might prefer to sell these receivables, as not every company has a legal department that can occupy itself with receivables collection. There are financial institutions known as 'factors' that purchase receivables at a discount. The receivables' ownership is transferred when the sale is made, thus the factor bears all the responsibility on collecting and assumes the default risk. Factoring is an expensive form of short-term financing, since the factor assumes the default risk and bears the cost of running the credit operation.

Companies can also give up their inventories as collateral for a loan, though several problems arise with putting up inventory as collateral. The lender might not accept all types of inventory, he will most likely only take inventories that are non-perishable, carry their value steadily and are sold easily. He might also be reluctant to leave the borrower in possession of said inventories, as the borrower might use or sell them and default on its loan. To this end field warehousing was invented; the lender hires and independent warehousing space where the inventories will be stored as long as they serve collateral. The lender releases the inventories back to the borrower as the borrower pays off the loan. If the borrower defaults on the loan, the lender will sell off the inventory to recover its money.

1.1.5.3. Commercial Paper

The company can also bypass financial institutions by issuing its own debt to large investors. This type of debt is called commercial paper and is largely reserved for big companies with good reputations. Companies that can issue commercial paper also enjoy lower bank interest rates. Commercial paper is unsecured and

companies will often take up a special credit line at a bank to reassure investors. A company's credit rating is an important tool when it comes to commercial paper, as investors will only buy the debt if the company is solvent enough to repay it. Less solvent companies will have to pay higher interest rates to investors, at which point it might be more desirable to take out a normal bank loan.

1.2. WORKING CAPITAL MANAGEMENT

Working capital is the collection of all the short-term assets and short-term liabilities (Brealey, Marcus and Myers, 2007). When one refers to working capital, one often – wrongly - refers to net working capital, which is the net difference between the short-term assets and short-term liabilities. Working capital management thus involves managing these short-term asset and short-term liabilities. It is used as a tool to make sure that the company has enough cash flow to sustain operations and meet its short-term financial obligations. In more severe cases it can also be used to free up and/or generate cash.

1.2.1. The Cycle of Operations

The cycle of operations best explains the scope of working capital (Brealey, Marcus and Myers, 2007). However, before the cycle of operations can be laid out, it is important to understand its components. The first component of the cycle of operations is cash. Cash is necessary to buy the raw materials needed to start the production process. These purchases translate themselves into the second component of the cycle of operations – inventories. These inventories will eventually be sold to customers and become accounts receivable, the third component of the cycle of operations. Now that the three essential components of the cycle of operations have been established, the process can be laid out on the basis of the balance sheet. The cycle of operations is started in the cash and cash equivalents account. If you look further ahead in time you will find that an amount of the cash and cash equivalents has been transferred to the inventories account, signaling that a purchase has taken place. After another time skip the inventories will have been reduced and the accounts receivables will have gone up. This is the result of inventories having been sold, but the cash not being paid yet. When the cash is eventually received, the receivables will be reduced and the cash account will be filled up by a higher amount than was originally subtracted at the beginning of the cycle of operations.

1.2.2. The Cash Conversion Cycle

The value amount of the components can change throughout the cycle of operations, but the amount of capital tied up in the operations is constant per unit (Brealey, Marcus and Myers, 2007). This is shown most clearly by looking at the cash side of the cycle of operations. If instead of on the basis of the balance sheet a look is taken into the process on the basis of the cash and cash equivalents account, another perspective is exposed. When the company purchases raw materials from its suppliers it does not pay for them immediately, because suppliers generally allow deferred payment. This period is known as trade credit. The company can take possession of the materials and start processing them before payment has been made. When the goods are processed and sold the company will have to offer the same trade credit to its customers. Thus, the goods will have been sold but payment will not be made immediately. The period between the actual payment for the raw materials and receiving actual payment for the sales is known as the cash conversion cycle. It is the net time that the company is out of cash, reduced by the time it takes to pay its own bills. The length of this period has a high influence on the cash tied up in the cycle of operations. Long cash conversion cycles will require the company to keep more cash tied up and vice versa.

1.2.3. The Working Capital Trade-Off

Managing the costs and benefits of various amounts of working capital is an essential key to financial success. If the company is short on cash it might defer its own payments to suppliers or demand earlier payment from its customers. Even though it would raise cash in the short term, suppliers and customers might deter from doing any repeat business in the future. This example shows how there are costs and benefits in the management of the working capital. The costs and benefits of properly managing the working capital (Rehn, 2012, Brealey, Marcus and Myers, 2007) are explained in greater detail below.

1.2.3.1. Receivables Management

Receivables play an important role in cash and working capital management. It was established in previous paragraphs that receivables can be used as collateral in loans and can be sold to a factoring agency to raise cash quickly. Receivables are also an important component of the cash conversion cycle and can server to reduce the permanent working capital tied up in the cycle of operations. This is done in the following ways:

When goods are sold, there are conditions to the sale called terms of sale. These terms of sale establish when and how the goods are to be paid for. Examples are Cash in Advance (CIA) where the buyer needs to pay before an order will be shipped, Cash before Delivery (CBD) where no deliveries are made until payment is received and Cash on Delivery (COD) where payment (including transportation costs) needs to be made in full to the transportation company upon release of the goods. However, these terms of sale are less common than normal trade credit. Normal trade credit is when the seller allows the buyer to defer payment for a certain payment. This period is denoted by 'net X', where X represents the number of days of allowed credit. Most companies will also allow discounts if payment is made shortly after the invoice's date. This is usually denoted as e.g. 3/15, net 60. This means that a 3 percent discount is offered if payment is made within 15 days after the invoice's date. The trade credit offered in the example is 60 days.

The risk of default on receivables can also be minimized through credit analysis. Credit analysis tries to quantify the chance a customer might default on its financial obligation to the company. The easiest way to check a customer's creditworthiness is by looking at his history of prompt payment. If a customer always paid in time, ceteris paribus, it can be assumed that he will continue to do so in the future. There are also agencies that specialize in credit checks. They sell complete databases or detailed profiles on companies and their creditworthiness. If the customer is a public company or entity, rating agencies like Moody's or Standard & Poor's offer credit ratings on their commercial paper, which can act as a proxy to the

company's creditworthiness. Banks also offer credit checks on customers. A credit check is when the company's bank contacts the customer's bank and asks about the customer's average account balances, access to credit and reputation and relationship with its bank. All these inquiries can provide the company with better insight about its customers.

The cash conversion cycle can be reduced by offering shorter trade credit or steeper early payment discounts. Some of the terms of sale, such as CIA, can effectively eliminate trade credit. By checking customers on their creditworthiness before a sale is made, the company can minimize the default risk on receivables. The drawback to reducing trade credit offered, imposing terms of sale or any other measures that can be taken to reduce the cash conversion cycle is that customers might not do any repeat business or that the company forgoes sales that would not have been defaulted on.

1.2.3.2. Inventory Management

Two major costs related to the working capital are carrying costs and shortage costs. Carrying costs contain all the costs concerning the storing and maintaining of inventories. The opportunity cost, storage expenses, insurance costs and other costs make holding large inventories comparatively expensive. This would encourage companies to hold smaller inventories, but smaller inventories carry the risk of higher shortage costs. Shortage costs are costs derived from running out of inventory to process. This might force a company to shut down production, pay out technical unemployment wages or might prevent the company from delivering any goods to its customers. Brealey, Myers and Marcus (2007, p. 554) provide a list of four lessons to be learned from mathematical models that try and establish optimal inventory levels. The items are as follows:

- Carrying costs include both the cost of storing goods and the cost of capital tied up in inventory.

- Optimal inventory levels are lower when carrying costs are high, and they are higher when the cost of restocking inventories is high. If order costs are high, you will want to make larger and therefore less frequent orders, even at the expense of somewhat higher average carrying costs.
- Average inventory levels are higher when there is more uncertainty about sales and the flow of goods out of inventory.
- Optimal levels of inventories do not rise in direct proportion to sales. As sales increase, the inventory level rises, but less than proportionately.

These remarks demonstrate that serious thought has been put into inventory management and consequently many methods that increase inventory efficiency have been established. These include, amongst others, demand planning, advanced delivery and logistics methods and production process optimization. Demand planning involves mapping expected customer demand in order to reduce inventory and servers to improve the ability to deliver the right quantities at the right time. Advanced delivery and logistics methods remove the need to keep large inventories. Just-In-Time (JIT) Just-In-Sequence (JIS) supply chain delivery schemes transmit the required input to suppliers in such a way that there is never any unused inventory present in the company. This is similar to vendor-managed-inventory schemes, the difference being that in JIT and JIS schemes the company establishes the required input, whereas in vendor-managed-inventory schemes the supplier establishes it. Lastly, production process optimization involves making the production process as efficient and cost-effective as possible by eliminating non-value-adding time, excessive inventory between production phases and aligning the production process more with the customer demand than with the production capacity.

1.3. CASH HOLDING THEORIES

1.3.1 Cash

Colloquially, cash refers to physical money. They are the banknotes and coins that allow us to exchange goods on a daily basis. But when the word cash is used in this study, it refers to the balance sheet's cash accounts. The balance sheet is a listing of all the company's assets and liabilities at a given time and is called a balance sheet because the assets and the liabilities on it balance each other out. The cash and cash equivalents account is found on the asset side of the balance sheet since it has positive economic value. This account groups all the company's most liquid assets together, of which cash is the most liquid one. On the balance sheet, cash includes all physical and electronic money that the company owns and that immediately can be used to pay for purchases and wages. This is in contrast with the cash equivalents that need to be converted into cash before they can be used. Typically, cash equivalents are defined as assets that mature in less than 3 months (e.g.: short-term bonds, marketable securities and commercial paper). So from here on out when cash is mentioned it refers to the amount in the cash and cash equivalents account. This is in accordance with IFRS definitions.

Cash is important to the company for various reasons. First of all, cash is the only resource a company has that is not dependent on its availability, utilization, market demand and the economic climate. It maintains a constant value and is easily turned into other assets or resources. A company cannot survive without any cash. If the company fails to meet its financial obligations, it will be pushed into bankruptcy and the company will be dissolved. In order to avoid bankruptcy the company will keep a financial buffer in its cash accounts. It is a certain amount of cash that will make sure that the company can pay its debts when they are due. A slightly larger buffer also protects the company from future uncertainty – be it a global crisis, labor strike or hostile take-over attempt. This cash also has a transactional advantage; the use of cash is a cheaper payment method than the use of fixed assets. Another important use of cash is to make investments when they arise. When investment

opportunities appear, companies need money to invest. If they do not have sufficient cash at hand, they will be forced to raise cash externally – which is significantly more expensive. Cash is also useful for acquisitions.

Companies can hold different motives to acquire competitors' assets; to create synergy, to integrate the business vertically/horizontally or simply to increase their revenues. These revenues are owned by the shareholders and they will expect some return on their investments in the form of dividends. These dividends originate in the free cash flow that the company generates. Thus, if the company does not generate cash, it cannot pay any dividends. To keep the faith with the owners, management will make sure there is cash available so dividends can be given. And cash is important to the other stakeholders as well. The employees expect the company to have cash to pay their wages, the suppliers expect their invoices to be paid, lenders expect their loans to be repaid and the government will collect owed taxes when they are due. All of this makes holding cash an important aspect of running a business.

Nonetheless, the question remains. What amount of cash holding is an appropriate amount for a certain company? If a company does not hold enough cash it faces the risk of bankruptcy. If it holds too much it is not making the best return on its available funds. The trade-off theory argues that there is an optimal level of cash holding – a level where the costs and benefits of holding cash are balanced (Kraus and Liztenberger, 1973). This optimal level of cash holding maximizes the shareholder's wealth, as there are no inefficiency losses. However, agency problems between the shareholders and the management lead to the different parties requiring different levels of cash holdings. Management could prefer to hold cash levels higher than the optimal cash level, as it allows a certain level of discretionary spending and can be used as a means to reduce company risk.

Explaining cash holding levels is not an easy task. The cash holding theories try to explain these highly complex environments of the different parties involved and the various conflicts of interest between them to the best of their ability, but are

often inconclusive on their own. These theories are explained in greater detail later in this chapter.

1.3.2. The Trade-Off Theory

The central thought of Kraus and Litzenberger's (1973) trade-off theory is the striking of a balance between the costs and benefits of holding cash. When all the costs and benefits cancel each other out, a point that is referred to as the optimal level of cash holding is reached. It is therefore imperative that one has a clear understanding of all the costs and benefits of holding cash.

1.3.2.1. Costs of Holding Cash

From an investment perspective, cash is not a high yield investment. If inflation is taken into account cash even is a negative yield investment. And when compared to other investments with the same amount of risk, cash seriously underperforms. Thus, if the company is not capitalizing on all its resources, they are losing potential returns. Dittmar et al. (2003) call this the cost-of-carry; the difference between the return on cash and the return on an investment with same risk.

Companies prefer investing their cash in cash equivalents rather than keeping it in bank accounts. Cash equivalents are very liquid securities that can be converted into cash quickly, but that offer higher rates of return than bank account rates. One problem arising from this investing of cash is that the generated gains will be taxed as income on year's end. If cash is treated as the property of the shareholder, it can be assumed that they would rather see this cash in their own pocket than not being used for any purpose other than short term investments. The easiest way for shareholders to claim this cash is through dividends. There lies the problem; dividends are also taxed as income on the individual level, thus leading to the same cash being taxed twice. So either the cash is held and reaches the shareholder as a capital gain, or the cash is immediately turned out as a dividend. As one excludes the other, shareholders believe that there is a taxation cost to holding cash.

Management can also make holding cash costly. Excesses of cash could be used by management to invest in projects that benefit them privately or give them leverage over the shareholders. Most often, these projects do not add as much value to the shareholders as the alternatives. This is possible because when management uses internal cash sources they do not have the same scrutiny that comes with using external sources.

1.3.2.2. Benefits of Holding Cash

The first benefit of holding cash is the reduction of transaction costs, as proposed by Baumol (1952). This is called the transaction minimization motive. If there is not enough cash available to pay the bills, the company will have to raise cash somewhere else. Options include; liquidating existing assets, reducing dividends, raising funds in the capital markets, renegotiate existing financial contracts. If the company holds enough cash for its investments, it does not pay any transaction costs. If it does not, it will incur fees and costs to raise more cash. Liquidating fixed assets is often costly; finding a buyer, legal fees, notary costs and other costs make it undesirable for the company to raise cash this way. Not to mention the possible destruction of company value through forced liquidation.

A difference in costs also exists in the amount of cash the company is in need of. If the company has a small shortfall it can cope by slightly decreasing investment, cutting dividends or raising funds externally through security issuances or asset sales. On the other hand, if the shortfall is big the company will have to take more drastic measures, which incur greater costs. There are ways for companies to limit the cost of raising cash. If the company has an existing and accurate credit rating its debtors will charge a lower interest rate, because they have a better overview of the state of the company. Credit lines also give the company a way to raise cash easily, but they may be unreliable because the providers of these credit lines might cancel them when the company accumulates too much debt. These considerations give the company a strong incentive to hold enough cash to at least finance all small and periodical expenditures.

Holding cash also prevents the company from missing out on good investment opportunities. If a good investment opportunity unexpectedly presents itself and the company is short on cash, it will have to miss out. The cost of having some extra cash at hand makes up for this potential loss, especially in sectors where research and development is important. The same holds true for companies with long cash conversion cycles (the number of days between spending and collecting cash), because the company does not generate cash frequently. Keeping a buffer of cash against future uncertainty is the second benefit of holding cash and was first proposed by Keynes in 1936. It is known as the precautionary motive.

Holding cash can also offer fiscal benefits. Some countries tax foreign income, but allow companies to defer those taxes until the cash is repatriated. Companies might be reluctant to repatriate earnings for this reason and will just hold that cash abroad until investment opportunities are found. From this point of view holding cash is beneficial to the company's overall financial position. Another fiscal benefit is the avoidance of double taxation − as discussed earlier in this chapter. By holding cash in the company, instead of paying it out, shareholders can increase their wealth in the form of capital gains as long as the company is able to invest that cash at a later date. These fiscal benefits fall under Foley, Hartzell, Titman and Twite (2007)'s tax motive of holding cash.

1.3.3. Pecking Order Theory

Myers and Majluf (1984)'s pecking order theory, or financing hierarchy model, challenges the trade-off theory by rejecting the existence of an optimal level of cash holdings. It tries to explain cash holdings not as a result of a balance between costs and benefits, but as the result of an elimination process based on the cost of financing. This cost of financing increases with asymmetric information. Information asymmetry manifests when one party has more or better information than the other. Applied on the pecking order theory, it gives a clear view of how the financing hierarchy works.

If the cheapest source of financing is the one with the lowest information asymmetry, internal sources are the primary source for any company because it only has to deal with itself – effectively eliminating information asymmetry since there is only one party involved in the transaction. If internal sources are insufficient, external ones have to be used. There are two distinct forms of external sources: debt and equity. These outside sources of finance are expensive because the outsiders buying the securities possess less information than the management issuing them. It is assumed that management has more and better knowledge about the company's prospects, risks and value. The outsiders therefore will discount the securities to make sure they are not overpriced and this might dissuade the management to issue securities, as raising the funds could turn out more expensive than first thought. Debt is cheaper than equity because the risk posed by the information asymmetry is lower as fewer parties are involved in the transaction and the debt agreements are safer, as the debtee has certain guarantees. Thus, after depleting internal sources the company will issue debt. When raising more debt is no longer feasible, the company will issue new equity. This is the financing hierarchy. Equity is a last resort method because it brings new ownership into the company, distorting the established ownership structure and reducing the value of each individual stock.

According to the pecking order theory, changes in the internal funds drive the level of cash holdings. When the company has a surplus of internal funds it accumulates cash and pays back its debt. But if it has a shortage of internal funds it will spend its cash and it will have to raise funds externally. There are, nonetheless, some problems with this theorem. If the company keeps accumulating cash it will create an excess and stockholders will pressure management to release that cash to them in the form of dividends or share repurchases. This suggests that there are limits to the explanatory powers of the pecking order theory.

There is also a signaling effect to the pecking order theory that has to be taken into consideration. Investors and debtors do careful analyses of the company and will look for signals that explain management's behavior. In this respect investors are particularly interested in the investment strategy, especially in how investments will

be financed. The issuance of debt generally is well received, since it shows that the company is confident that the investment is profitable and that the stock price is undervalued. Alternatively, if the company issues equity it would signal that the management believes the stock price is overvalued and that could cause the stock price to fall.

1.3.4. The Agency Theory

1.3.4.1. Agency Costs of Managerial Discretion

Jensen and Meckling (1976, p. 5) define an agency relationship as *a "contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent"*. This effectively means that ownership is fully or partially separated from day to day operational control and this – in turn – might cause conflicts of interest. The principal is inherently in charge, since it delegates its power to the agent. For this reason, the principal might want to limit divergences from its interest by offering incentives and by incurring monitoring costs that serve to rein in the agent's activities. Another way to prevent divergences is through bonding. Bonding costs are costs that are incurred by the principal to convince the agent to act in principal's best interest. However, it is virtually impossible to perfectly align the agent's interest with that of the principal and the subsequent reduction in welfare experienced is known as the cost of the agency relationship, or the residual loss. The sum of the monitoring expenditures by the principal and the residual loss makes up the total agency cost.

This cost can be substantial because the agent has various ways to resist the pressures from the principal. One such way is entrenchment (Jensen and Meckling, 1976). Entrenchment is best defined as the degree to which management is making itself valuable to shareholders and costly to replace. The first way management can entrench itself is by excessively investing in assets that complement their skillset and by divesting assets that do not. By shifting the company's focus this way,

management becomes harder to replace and thus more entrenched. Another way for management to entrench itself is through explicit contracts. When management signs a contract it can demand covenants that make it more entrenched. Examples of such covenants are covenants in debt contracts that make debt due when management changes, or a covenant in the management's employment contract that stipulates a huge bonus if management is fired before the contract expires. Next to explicit contracts, there are also implicit contracts and these are often backed by management's reputation, rather than the company's. This makes the management's reputation a valuable asset to the company and can entrench management even more. Management can also entrench itself through the loyalty of the employees. By promising them promotions, perquisites and wage increases, the employees will feel that their career advancement is dependent on the current management. If employees are more productive because of this loyalty, it increases the value and entrenchment of the management.

Still, there are ways for the principal to prevent the management entrenching itself. In order to rein in management, it can implement mechanisms to counter entrenchment or at least make it more difficult for management to entrench itself. One such mechanism is capital rationing. The principal can impose higher cost of capital for investment consideration or can set a ceiling on the specific sections of the investment budget. This way management is prevented from investing in management specific projects that would entrench it more. The principal might also use hurdle rates to this end. Hurdle rates are higher than normal return on investment rates, so that management is limited to invest only in projects that really add value to the shareholders. The downside of these hurdle rates is that they might slow the rate of investment and that some good, but entrenching, projects are not invested in. The covenants in employment contracts discussed earlier can also serve to prevent entrenching investment by management. Granting management some insulation from job competition and contract termination bonuses, they will feel less need to entrench themselves.

1.3.4.2. Agency Costs of Debt

Agency costs of debt are similar to the agency costs of managerial discretion, but instead of conflicts between the principal and the management it are conflicts between the principal and the debt holders or conflicts between various classes of debt holders. It might be the case that management is pressured by the shareholders to pay dividends. If this is the case the debt holders could object because dividends and interests are paid from the same pool of cash. In order to prevent such conflicts, the debt holders will put covenants into the debt agreement or charge higher interest rates when they make the loan offer. Such a covenant could be that certain debt holders' interests need to be paid before any other interest payments are made.

These measures create an extra cost and it is exactly this cost that makes it very hard for leveraged companies to raise additional debt or renegotiate existing debt contracts. Because of these costs, companies that have valuable investment opportunities will hold more cash so they do not have to raise costly outside funds.

CHAPTER TWO
HYPOTHESES DEVELOPMENT, DATA AND METHODOLOGY

This chapter starts by listing and briefly discussing previous studies conducted on the determinants of cash holdings, after which hypotheses are formed based on derivations from theory and earlier research. An overview of the study's and the theories' predicted relationships is also given in this chapter. After the literature and hypotheses, this chapter touches upon the study's data and methodology. It explains the methods used to construct the sample and frames the sample within context. After, more information on the models that will be used to test the hypotheses is given. Argumentation as to why the different models are used and what their purposes are is also provided. The last part of the chapter defines all the variables and accounts for all the formulae used to calculate said variables.

2.1. PREVIOUS EMPIRICAL STUDIES

One of the first empirical studies on this topic was done by Opler et al. (1999). They examined the determinants of cash holdings for a sample of US listed companies between 1971 and 1994. They find that small companies and companies with stronger growth opportunities hold more cash compared to their counterparts. They believe that large companies hold less cash because they have comparatively better access to the capital markets. They also show that cash is positively related with acquisitions and dividend payout. Their results support the trade-off theory, but they did comment that n their study, the variables that make debt costly for a company are also the variables that make holding cash advantageous. They conclude by questioning to what extent cash holdings and debt are intertwined.

Ferreira and Vilela (2004) find support for both the trade-off and pecking order theories with their sample of publicly traded companies from European Monetary Union (EMU) countries. The sample has 6387 company-year observations between 1987 and 2000. In their sample a positive relationship is found for the

investment opportunities and a negative relationship is found for liquidity, leverage and size.

Ozkan and Ozkan (2004) are one of the first to account for ownership in their empirical analysis of cash holdings. They form a sample of 1,029 listed UK companies during the period 1984-1999. Their findings suggest that cash holdings are negatively impacted at low levels of ownership but that the impact is reversed at higher levels of ownership. The sign of the relationship is also impacted by the presence of ultimate controllers. Companies with controllers generally have higher cash holding levels. The study also evidences a positive relationship for growth opportunities and a negative relationship of liquidity on cash holdings.

Ramirez and Tadesse (2009)'s study is one of the few that focusses on foreign sales. They formed a sample with over 120 thousand company-year observations from 49 countries during the period 1990-2004. They found a positive relationship between cash holdings and foreign sales in all their models and subsamples. This way they confirmed Foley et al. (2007)'s repatriation tax explanation of cash holdings for multinational companies.

Maher (2010) uses a sample of 60,000 public and private UK companies between 1985 and 2005. She found a negative relationship between company size, liquidity, capital expenditures and leverage. When she examined the relationship between cash holdings and agency problems, she found that higher ownership concentrations translate in lower cash levels. She notes that due to the quality of the private companies' data and the low R-squared found in the regression, results might have been subject to some discrepancies.

Gogineni et al. (2012) compared private and public companies in the UK through a sample of 280,000 private companies and 1,400 listed companies between 1994 and 2010. They find negative relationships for company size and leverage, and a positive relationship for investment opportunities. Their study also confirms that the size of the net working capital is an acceptable proxy for liquidity.

Ogundipe et al. (2012) study the Nigerian market through a small sample of 54 companies listed on the Nigerian Stock Exchange between 1995 and 2009. They find a positive relationship between cash holdings and leverage, and a negative relationship between cash holdings and liquidity. Also noticeable in their study is the fact that they did not find a significant relationship for investment opportunities and company size. Their seven independent variables regression has an R-SQUARED of 50%.

Schuite et al. (2012) investigate the cash holding determinants for listed German companies over the period 2000-2010. They find a negative relationship for investment opportunities and a positive relationship for capital expenditures, liquidity and leverage. They also studied the effect of the global financial crisis and found that cash holdings increased over the 2008-2010 period.

Al-Najjar (2013) studies cash holdings in emerging markets that differ from developed markets due to their governance and institutional frameworks. He uses a sample based on market capitalization, consisting of 83 Brazilian companies, 93 Russian companies, 542 Indian companies and 494 Chinese companies across the period 2002-2008. He finds that factors determining cash holdings are largely similar for developed and emerging countries. Due to the nature of the sample, he finds different signs for determinants in different countries. Nonetheless, all the determinants (dividend payout, leverage, liquidity, size and profitability) are significant throughout the sample.

Anjum and Malik (2013) look at the determinants of cash holdings for Pakistani companies. They construct a sample containing 395 companies listed on the Karachi Stock Exchange. They did not find a significant relationship between cash holdings and investment opportunities, but they found a positive relationship for company size and liquidity. A negative relationship was found between cash holdings and leverage. Their five independent variables regression has an R-SQUARED of 66%.

2.2. HYPOTHESES DEVELOPMENT

The previous subsection handled only studies on the determinants of cash holdings. However, this subsection reviews all literature relevant to the variables used in this study, which do not necessarily aim to solve the same question as this study. After reviewing theory and previous empirical results, testable hypotheses are formed about the relationships between cash holdings and its determinants.

2.2.1. Capital Expenditures

The trade-off theory suggests a positive relationship between cash holdings and capital expenditures. Companies that have high capital expenditures will need to hold more cash in order to keep the transaction costs associated with external capital low. This relationship is confirmed by Opler et al. (1999).

The pecking order theory on the other hand claims a negative relationship between cash holdings and capital expenditures. Companies that have high capital expenditures will have their cash holdings drained and thus have lower cash holdings as capital expenditures go up. This view is supported by studies such as Lee and Song (2007) and Bates et al. (2009), though the latter proposes an alternative theory.

Bates et al. (2009) argue that capital expenditures increase debt capacity, because these new assets can serve as collateral for debt. As debt capacity increases, the need to hold cash and the cash holdings decreases and a negative relationship between cash holdings and capital expenditures exists.

The large evidence for a negative relationship leads to the following hypothesis:

H1: there is a negative relationship between cash holdings and capital expenditures.

2.2.2. Dividend Pay-Outs

The trade-off theory suggests that dividend paying companies can raise funds by cutting dividend payments, while companies that do not pay any dividends can only raise funds through the capital markets. This leads to the argument that dividend paying companies hold less cash than their counterparts. However, other things need to be taken into consideration as well. Companies might want to avoid a situation where they are unable to pay dividends, since it could adversely affect their reputation and standing with the shareholders. For this reason companies might hold more cash if they pay dividends compared to if they did not.

Research results are divided on the subject. Opler et al. (1999) find the trade-off theory to hold true in a study of US companies, but other research has shown that not all countries share this trait. Ozkan and Ozkan (2004) find a positive − albeit a weak − relationship for UK companies. Ferreira and Vilela (2004) and Al-Najjar (2013) respectively find mixed results for EMU and emerging countries. Since previous research has only shown conclusive results for the trade-off theory in the US, the hypothesis is as follows:

H2: there is a positive relationship between cash holdings and dividend pay-outs.

2.2.3. Company Age

The relationship between the age of the company and its cash holdings does not have a lot of basis in empirical research, as it – except in management literature - has largely been ignored so far. A hypothesis will thus have to be based on theories that remain untested for cash holdings.

There is the argument that age enhances the company's performance. As companies age they become more efficient in their business dealings, processes and capital market transactions, which in turn proves the success of the company's operations through time and should lead to a stronger reputation. These older

companies should also be able to obtain better terms when raising capital, since the amount of information about the company and its activities has a longer – and proven - track-record. This in turn lowers the company's need to hold cash. According to this argument, a negative relationship is expected between the company's age and cash holdings.

Alternatively, there is the argument that age impairs the company's performance. As a company progresses through time it will try to codify its success with organizational measures, rules of conduct and best practices. However, by focusing too much on what works, a company loses flexibility. This in turn can lead to the company missing valuable signals that change is needed. The older the company, the more rigid it becomes – as shown by Hannan and Freeman (1984) and Tripsas and Gavetti (2000). Supporting this view is Olson (1982)'s theory of collective action. Applied to companies, this theory states that special-interest groups and shareholder coalitions will form in time. The older a company gets, the more pre-eminent these groups become. They will often place their own interest over those of the company, by rent-seeking or demanding dividends no matter the state or prospects of the company. These views predict a positive relationship between company age and cash holdings.

Just like Faulkender (2002), Koh and Jang (2011) include age as a determinant of cash holdings in their models and find a weak positive relationship. Derived from all of the above, it is hypothesized:

H3: a weak relationship is expected between cash holdings and the age of the company.

2.2.4. Company Size

The trade-off theory proposes a negative relationship between cash holdings and company size. The Miller and Orr (1966) model shows that there are economies of scale in cash management. This means that larger companies would have less need

to hold a buffer of cash and thus lower levels of cash holdings. Petersen and Rajan (2003) also argue that bank loan fees are fixed costs that are not influenced by the amount borrowed. This would give larger companies a relative advantage over smaller ones. The ability to diversify also gives larger companies a lower probability of financial distress, as documented by Rajan and Zingales (1995).

The pecking order theory states that larger companies have been more successful and should have more cash. This would lead to a positive relationship between cash holdings and company size.

The agency theory relates ownership dispersion to managerial discretion. Larger companies with more ownership dispersion have less monitoring and scrutiny, thus allowing more managerial discretion and more cash hoarding. A positive relationship is expected and has been found for Pakistani companies in Anjum and Malik (2013).

Previous research has not provided conclusive evidence on the relationship between cash holdings and company size yet. Positive relationships have been found in research done for US companies (Opler et al. 1999), mixed results have been found for emerging markets (Basil Al-Najjar 2013) and countries recovering from economic crises (Lee and Song 2007), while Ferreira and Vilela (2004) found a negative relationship for EMU countries. Based on previous research:

H4: there is a weak relationship between cash holdings and company size.

2.2.5. Foreign Sales

Foreign sales are related to cash holdings in numerous ways. Foley et al. (2007) argue that companies active on a global scale keep cash in subsidiaries in order to avoid high repatriation taxes. They also show that these high cash levels abroad are not offset by lower cash levels at home, thus leading to higher overall levels of cash holdings. Their internationalization also increases their need for

holding cash, because they need to bridge longer terms of credit and maintain larger inventories. International companies generally have a larger network of subsidiaries and associates, which in turn increases the number and degree of contingencies that can be expected in future. To guard against the former, a larger buffer of liquid assets needs to be maintained. Messner (2001) and Menyah (2005) also analyzed at the cash pooling and netting practices of international companies. They found that these practices lead to lower cash holdings, as a centralized cash account cuts down on fees and excesses, and allocates resources more effectively. Evidence suggests a positive relationship, ergo:

H5: there is a positive relationship between cash holdings and foreign sales.

2.2.6. Interest Rate

When the interest rate falls, so does the opportunity cost. According to the trade-off theory and the transaction motive, cash holdings should increase in this situation. Thus, a negative relationship can be observed between the interest rate and cash holdings.

This relationship is confirmed by Opler et al. (1999), Ferreira et al. (2005), Teruel and Solano (2008) Bates et al. (2009) and Stone and Gup (2013).

H6: there is negative relationship between the interest rate and cash holdings.

2.2.7. Investment Opportunities

The trade-off theory suggests that companies with better investment opportunities will hold more cash in order to prevent a cash shortage when and if a positive NPV project presents itself. In this view the cost of holding more cash outweighs the cost of missing out on valuable investment opportunities. At the same time, the trade-off theory also relates higher financial distress costs to companies with better investment opportunities, because the future income of the investments

are forfeit if the company goes bankrupt. For these reasons the trade-off theory proposes a positive relationship between cash holdings and investment opportunities.

The pecking order theory resembles the trade-off theory when it comes to investment opportunities. Companies with better investment opportunities need more cash, because external financing is more costly and might make otherwise profitable investments unprofitable. So if the company wants to enjoy a maximum of valuable investment opportunities, it will hold a larger cash reserve and a positive relationship between cash holdings and investment opportunities can be found.

Managers of companies with poorer investment opportunities will hold more cash according to the agency theory. Managers are under pressure to deliver results and if good investment opportunities are scarce or non-existent, they will invest in any growth project, whether the NPV is positive or negative. That is why the agency theory proposes a negative relationship between cash holdings and investment opportunities.

Previous research has provided evidence of a positive relationship between cash holdings and investment opportunities. Based on Opler et al. (1999), Ferreira and Vilela (2003), Lee and Song (2007), Bates et al. (2009) and Bigelli and Vidal (2009) the following hypothesis is formulated:

H7: there is a positive relationship between cash holdings and investment opportunities.

2.2.8. Leverage

The trade-off theory suggests that companies will hold more cash as leverage increases in order to reduce the probability of financial distress. However, at the same time it also suggests the opposite. When leverage is seen as an ability to issue debt, it would be expected that higher leverage means lower cash, because new debt

could easily be issued. Due to this contradiction, it is impossible to base a hypothesis on the trade-off theory.

The pecking order theory states that debt levels are directly related to investment and retained earnings. When investments exceed retained earnings, debt levels increase. When they fall short, debt levels decrease. This also influences cash holdings, since cash is the residual to the previous equation. Thus, the pecking order theory suggests a negative relationship between leverage and cash holdings.

The agency theory also intrudes on leverage. Lower debt levels mean less monitoring and scrutiny for the company and subsequently allowing for more managerial discretion. Therefore a negative relationship between leverage and cash holdings should exist.

Previous research in developed and emerging countries (Opler et al. 1999, Ozkan and Ozkan 2004, Al-Najjar and Belghitar 2011) has found there to be a negative relationship between cash holdings and leverage. Though previous research also has focused on the role of bankruptcy costs (Booth et al. 2001) and monitoring (Ferreira and Vilela 2004) in leverage, they all support the negative relationship between cash holdings and leverage. Therefore:

H8: there is a negative relationship between cash holdings and leverage.

2.2.9. Liquid Asset Substitutions

Companies with highly liquid assets will hold less cash because those assets can easily be converted in case of a cash shortage. That is why the trade-off theory suggests a negative relationship between cash holdings and the amount of liquid asset substitutes. This is confirmed by Opler et al. (1999), Ferreira and Vilela (2003), Ozkan and Ozkan (2004), Tong (2006), Song (2007), Bates et al. (2009), Lee and Song (2010) and Al-Najjar and Belghitar (2011).

The pecking order theory and agency theory do not propose any relationship between cash holdings and liquid asset substitutes, therefore:

H9: there is a negative relationship between cash holdings and liquid asset substitutes.

2.2.10. Ownership Structure

The relationship between ownership structure and cash holdings is dominated by the agency theory. In order to prevent management from acting in its own interest instead of the shareholders', they should be monitored. The cost of monitoring is likely to be larger than the benefits of doing so for a small shareholder. On the other hand, large shareholders – who have a claim on a larger fraction of the free cash flows – can monitor management more efficiently. This monitoring lowers the cost of external financing and makes companies less in need of holding high levels of cash (Shleifer and Vishny, 1986). A negative relationship between having large shareholders and cash holdings should be found.

Furthermore, there is evidence to support the notion that the identity of the ultimate controller is significant, as some controllers will exert tighter monitoring than others. Family controlled companies are more likely to be directly involved in the management of the company. This is in stark contrast with more passive controllers like banks or pension funds. The agency theory predicts that family owned companies would hold more cash and cash equivalents than the others and that significant differences occur under different controllers. This was shown by Daher (2010). Other aspects of this theory have been researched. Faccio and Lasfer (2000), for example, have found that pension funds do not add monitoring value. The same is true for financial institutions in the UK, as evidenced by Franks et al. (2001).

Ozkan and Ozkan (2004) find that the presence of a controller has a positive impact on cash holdings, but that the type of controller does not have a positive nor negative impact on cash decisions. Faulkender (2002) finds contradictory evidence in

his research. He found that cash holdings decline as the ownership of the largest shareholder increases, suggesting a negative relationship. Due to the conflicting empirical findings:

H10: there is a negative relationship between cash holdings and controller ownership.

H11: the identity of the ultimate controller has a relationship with cash holdings.

2.2.11. Profitability

Kim et al. (1998) and Ozkan and Ozkan (2004) confirm the trade-off theory's prediction of a negative relationship between cash holdings and profitability. They show that profitable companies have enough cash flow to avoid underinvestment problems.

Ferreira and Vilela (2004) find support for the pecking order theory and profitability. They show that cash holdings fluctuate with cash flows in EMU countries. Almeida et al (2004) confirm this for financially constrained companies. Profitable companies are more able to pay their debt payments and dividend payments. Unprofitable companies need to issue debt or equity, the latter being a choice of last resort because of the high costs associated with issuing equity. This is confirmed by Dittmar et al. (2003) and Al-Najjar and Belghitar (2011). Based on these findings and the pecking order theory:

H12: there is a positive relationship between cash holdings and profitability.

2.2.12. Sales

According to the pecking order theory, companies prefer to finance their projects with internal funds. Higher sales equal a higher pool of internal funds, and thus sales should be positively related to cash holdings. The agency theory supports this view by stating that information asymmetries make outside funds more

expensive. The company will want to keep considerable buffers of internal funds and thus should have larger cash holdings as sales go up.

Because there is no prior evidence to be found on the relationship between sales and cash holdings, it is hypothesized that:

H13: there is a positive relationship between cash holdings and sales.

Variable	Trade-off theory	Pecking order theory	Agency theory	Study's prediction
Capital Expenditures	Positive	Negative		Negative
Dividend Pay-Outs	Indecisive			Positive
Company Age				Weak
Company Size	Negative	Positive	Positive	Weak
Foreign Sales				Positive
Interest Rate	Negative	Negative		Negative
Investment Opportunities	Positive	Positive	Negative	Positive
Leverage		Negative	Negative	Negative
Liquid Asset Substitutions	Negative			Negative
Ownership Size			Negative	Negative
Controller Identity				Relationship present
Profitability	Negative	Positive		Positive
Sales		Positive	Positive	Positive

Table 1
Theory and Model Predictions Overview
This table gives an overview per variable of the relationships predicted by the cash holding theories and the prediction made for this study. Blank spaces signify that there is no predicted relationship derived from the theory.

2.3. SAMPLE CONSTRUCTION

The sample for this empirical analysis is constructed from the Istanbul Stock Exchange (ISE) archives (2006-2008) and the ISE's Public Disclosure Platform (2009-2011). The dataset takes its information from the companies' quarterly balance sheets and footnotes. The founding dates provided by the companies in their footnotes are used to calculate the age of the companies. If the founding date is not mentioned in the footnotes, the founding date from the company's website is used. Data is collected for all 420 listed companies during the period 2006-2011. The final sample is formed by excluding the following:

- Financial companies and investment vehicles. These are excluded because of the influence of statutory capital requirements and other governmental regulatory requirements on their cash holdings.

- Utilities and government controlled/owned companies. These are excluded because their cash holdings are under regulatory supervision.

- Companies that do not close their annual accounts on December 31st. These are excluded because of the difficulties that spring from measuring first and last quarters differently in statistical programs.

- Quarters with negative sales, negative total assets, negative equity or negative cash.

- The lowest and highest one percent of all variable observations. This is done in order to prevent outliers from contaminating the results.

As a result, the final sample includes approximately 4000 quarterly company observations between 2006 and 2011 for 191 listed companies. The sample also allows companies to freely enter and exit the market in order to prevent survivorship bias.

2.4. METHODOLOGY

In order to analyze how company characteristics explain changes in cash holdings, Ordinary Least Squares (OLS) regressions models are formed.

2.4.1. Model 1

Model 1 runs the regression of the cash ratio on all explanatory variables that aren't mutually exclusive, either due to multicollinearity or due to the nature of their respective formulae. An example: both dispersion and controller in effect measure the same variable, namely ownership. Because they tread on the same ground, they should not be run together as they might distort the results. Therefore model 1 does not include any variables of this nature. The dependent variable CASH is replaced with the dependent variable CASH2 in every model as well, as a robustness test for the model.

$$CASH_{it} = \alpha + \beta_1 DIV_{it} + \beta_2 L\_ASSETS_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LIQUIDITY_{it} +$$
$$\beta_5 PROFITABILITY_{it} + \beta_6 CAPEX_{it} + \beta_7 AGE_{it} + \beta_8 INVESTMENT\_OP_{it} + \varepsilon$$

Where:

CASH represents the dependent variable for Cash Holdings;

DIV represents the independent variable for Dividend Pay-Outs;

L_ASSETS represents the independent variable for Company Size;

LEVERAGE represents the independent variable for Leverage;

LIQUIDITY represents the independent variable for Liquid Asset Substitutions;

PROFITABILITY represents the independent variable for Profitability;

CAPEX represents the independent variable for Capital Expenditures;

AGE represents the independent variable for Company Age;

INVESTMENT_OP represents the independent variable for Investment Opportunities.

$$CASH2_{it} = \alpha + \boldsymbol{\beta}_1 DIV_{it} + \boldsymbol{\beta}_2 L\_ASSETS_{it} + \boldsymbol{\beta}_3 LEVERAGE_{it} + \boldsymbol{\beta}_4 LIQUIDITY_{it} +$$
$$\boldsymbol{\beta}_5 PROFITABILITY_{it} + \boldsymbol{\beta}_6 CAPEX_{it} + \boldsymbol{\beta}_7 AGE_{it} + \boldsymbol{\beta}_8 INVESTMENT\_OP_{it} + \varepsilon$$

Where:

CASH2 represents the revised formula dependent variable for Cash Holdings;

All other variables as explained above.

2.4.2. Model 2

Another way to test the validity of the result is through the use of control variables. Control variables are variables of which the value is constant throughout the sample and does not change for observations. These variables strongly influence the independent variables and are a great way to test their relative impact. Model 2 includes Model 1 but adds 2 control variables to the equation. Again, CASH2 is used as a robustness test.

$$CASH_{it} = \alpha + \boldsymbol{\beta}_1 DIV + \boldsymbol{\beta}_2 L\_ASSETS_{it} + \boldsymbol{\beta}_3 LEVERAGE_{it} + \boldsymbol{\beta}_4 LIQUIDITY_{it} +$$
$$\boldsymbol{\beta}_5 PROFITABILITY_{it} + \boldsymbol{\beta}_6 CAPEX_{it} + \boldsymbol{\beta}_7 AGE_{it} + \boldsymbol{\beta}_8 INVESTMENT\_OP_{it} +$$
$$\boldsymbol{\beta}_9 SECTOR_i + \boldsymbol{\beta}_{10} YEAR_t + \varepsilon$$

Where:

SECTOR represents the independent variable for the Company Sector;

YEAR represents the independent variable for the observation's year;

All other variables as explained above.

$$CASH2_{it} = \alpha + \boldsymbol{\beta}_1 DIV + \boldsymbol{\beta}_2 L\_ASSETS_{it} + \boldsymbol{\beta}_3 LEVERAGE_{it} + \boldsymbol{\beta}_4 LIQUIDITY_{it} +$$
$$\boldsymbol{\beta}_5 PROFITABILITY_{it} + \boldsymbol{\beta}_6 CAPEX_{it} + \boldsymbol{\beta}_7 AGE_{it} + \boldsymbol{\beta}_8 INVESTMENT\_OP_{it} +$$
$$\boldsymbol{\beta}_9 SECTOR_i + \boldsymbol{\beta}_{10} YEAR_t + \varepsilon$$

Where:

All variables as explained before.

2.4.3. Model 3

In order to test all the hypotheses, variations of the second model are tested, as not all explanatory variables are included in the first two models. Model 3 adds the interest rate to the equation and eliminates the control variable YEAR. The year variable is deducted because of a high and significant correlation to the interest rate (the correlation matrix can be found in the appendix). The high correlation can be explained as the YEAR variable proxies for the economic environment, which is the main determinant of the interest rate. If YEAR is not removed, multicollinearity will negatively influence the results. That is also the reason why the interest rate was not included in the previous models. CASH2 is used as a robustness test.

$$CASH_{it} = \alpha + \beta_1 DIV + \beta_2 L\_ASSETS_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 CAPEX_{it} + \beta_7 AGE_{it} + \beta_8 INVESTMENT\_OP_{it} + \beta_9 INTEREST\_RATE_{it} + \beta_{10} SECTOR_i + \varepsilon$$

Where:
INTEREST_RATE represents the independent variable for the interest rate;
All other variables as explained above.

$$CASH2_{it} = \alpha + \beta_1 DIV + \beta_2 L\_ASSETS_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 CAPEX_{it} + \beta_7 AGE_{it} + \beta_8 INVESTMENT\_OP_{it} + \beta_9 INTEREST\_RATE_{it} + \beta_{10} SECTOR_i + \varepsilon$$

Where:
All variables as explained before.

2.4.4. Model 4

The fourth model includes the second model and adds sales variables to it. This regression is run with both sales variables SALES and MULTINATIONALITY included and each of them separately as well. The reasoning behind this is that they only share commonalities in their respective formulae, but do not investigate the same thing. Thus, by running them separately and together, deeper insights can be discovered. CASH2 is used as a robustness test.

$$CASH_{it} = \alpha + \beta_1 DIV_{it} + \beta_2 L\_ASSETS_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 CAPEX_{it} + \beta_7 AGE_{it} + \beta_8 INVESTMENT\_OP_{it} + \beta_9 MULTINATIONALITY_{it} + \beta_{10} SALES_{it} + \beta_{11} SECTOR_i + \beta_{12} YEAR_t + \varepsilon$$

Where:

MULTINATIONALITY represents the independent variable for Foreign Sales;

SALES represents the independent variable for Sales;

All other variables as explained above.

$$CASH2_{it} = \alpha + \beta_1 DIV_{it} + \beta_2 L\_ASSETS_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 CAPEX_{it} + \beta_7 AGE_{it} + \beta_8 INVESTMENT\_OP_{it} + \beta_9 MULTINATIONALITY_{it} + \beta_{10} SALES_{it} + \beta_{11} SECTOR_i + \beta_{12} YEAR_t + \varepsilon$$

Where:

All variables as explained before.

2.4.5. Model 5

The fifth and last model takes a closer look at the ownership variables. The ownership variables will also been run together as well as separately, so that strong conclusions can be drawn. Just as for all the previous models, CASH2 will be used a robustness test.

$$CASH_{it} = \alpha + \beta_1 DIV_{it} + \beta_2 L\_ASSETS_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 CAPEX_{it} + \beta_7 AGE_{it} + \beta_8 INVESTMENT\_OP_{it} + \beta_9 DISPERSION_{it} + \beta_{10} CONTROLLER_{it} + \beta_{11} SECTOR_i + \beta_{12} YEAR_t + \varepsilon$$

Where:

DISPERSION represents the independent variable for the Ultimate Controller Identity;

CONTROLLER represents the independent variable for the size of the controlling party's shareholding;

All other variables as explained above.

$$CASH2_{it} = \alpha + \beta_1 DIV_{it} + \beta_2 L\_ASSETS_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 CAPEX_{it} + \beta_7 AGE_{it} + \beta_8 INVESTMENT\_OP_{it} + \beta_9 DISPERSION_{it} + \beta_{10} CONTROLLER_{it} + \beta_{11} SECTOR_i + \beta_{12} YEAR_t + \varepsilon$$

Where:

All variables as explained before.

2.5. VARIABLES

2.5.1. The Dependent Variable

The dependent variable (CASH) is the cash holdings ratio. This ratio is the expression of the balance sheet's cash and cash equivalents account divided by the balance sheet's total assets account. Nonetheless, the literature is divided on the calculation of this ratio. Others like Opler et al. (1999), Dittmar et al. (2003), Pinkowitz et al. (2013), Ramirez and Tadesse (2009) argue that it should be divided by total assets minus cash and cash equivalents, since cash is not an asset in place and does not generate profits. This is a popular view in the literature, and should not be discarded easily. Hence, the variable (CASH2) – calculated following this argument - is used as the dependent variable in testing for robustness. (CASH2) makes a good dependent variable for robustness testing, since the divisor is scaled down considerably and the differences between observations' cash holdings become bloated and thus more apparent. These larger gaps between numbers make relationships sturdier and allow for less error.

2.5.2. Independent Variables

The independent variable (AGE) represents the age of the company. It is calculated as the current year minus the year in which the company was founded. The founding date is the date on which the corporate entity was founded – ignoring whether it immediately started operating or not.

The independent variable (CAPEX) represents the capital expenditures ratio and serves as a proxy for growth opportunities. Capital expenditures are expenditures that create income or benefits that extend further than the current fiscal year. It is measured as the ratio of additions to fixed assets over total assets. The same formula is used in Ramirez and Tadesse (2009). Other formulae have been used in studies (such as change in total assets plus depreciation over total assets by Gogineni et al. 2012), but have been neglected because depreciation data could not be obtained for this sample.

The independent variable (CONTROLLER) represents the size of the controlling party's shareholdings (level of ownership), regardless of its identity. It is measured as owned shares over total shares issued. If there is no controlling party the largest ownership block's size is taken.

The independent variable (DISPERSION) represents the identity of the controlling party. The controlling party is defined as the type of owner that holds more than 50% of outstanding shares. If no party holds a majority, (DISPERSION) gets a numerical value that shows there is no controller and that ownership is dispersed. (DISPERSION) is an ordinal variable.

The independent variable (DIV) is a dummy variable that represents whether dividends were paid out or not in each year. If the company distributed dividends to the shareholders, the variable takes the value of 1. If they did not, the variable gets a value of 0.

The independent variable (FGN_S) represents the degree of internationalization of the company. It is measured as foreign sales over total sales.

The independent variable (INTEREST_RATE) represents the Turkish benchmark interest rate through time. The benchmark rate is the 1 week repo lending rate offered by the Central Bank of Turkey.

The independent variable (INVESTMENT_OP) is investment opportunities. In most previous empirical research, investment opportunities have been measured as the market-to-book ratio (Ogundipe et al., 2012, Koshio and de Sales Cia, 2003, Ferreira and Vilela, 2004). This, however, requires data on the market value of companies, which have not been included in the dataset. Bigelli and Vidal (2009), Daher (2010) and Anjum and Malik (2013) propose another formula to measure investment opportunities; the yearly sales growth rate – the same formula that is used in this study.

The independent variable (L_ASSETS) measures company size as the natural logarithm of the book value of total assets. A multitude of variables used in the literature were also employed in the models and no significant differences were found between them. The other size measures tested were: the capital employed, the number of employees (both generic and EU definitions were tested) and the natural logarithm of total sales. Due to the extensive use of the natural logarithm of total assets as a proxy for company size in previous empirical studies, the findings for this measure will be reported.

The independent variable (LEV) represents the company's leverage ratio - a proxy for the capital structure. It is measured as the sum of all debts divided by total assets. The leverage ratio is also used as a proxy to capture the precautionary demand for cash (Bates et al., 2009).

The independent variable (LIQ) represents the company's ability to convert assets into cash. This variable is often named 'liquid asset substitutions' in the literature. It is calculated as net working capital over total assets. Net working capital is defined as current assets minus current liabilities minus cash and cash equivalents. The same calculation for liquid asset substitutions can be found in Ozkan and Ozkan (2004), Song and Lee (2007), Daher (2010), Schuite et al. (2012) and Pinkowitz et al. (2013).

The independent variable (PROFITABILITY) represents the company's degree of profitability. Following Al-Najjar (2011), the net income divided by the owner's equity (ROE) will be used as a measure of profitability. This shows how much return was realized on the shareholders' investment in the company.

The final independent variable (SALES) represents the total sales of the company, as found in their respective income statements.

2.5.3. Control Variables

The first control variable (SECTOR) represents the sector in which the company is active. More information as to how the sectors were framed and established can be found in the next chapter.

The second control variable (YEAR) represents the year and quarter of the observation.

These control variables serve to test the relative impact of independent variables in the model. They have a constant, unchanging value and exert a high influence on the independent variables. By testing for these control variables, the validity of the model's results can be increased.

2.5.4. Omitted Variables

The first omitted variable was a dummy variable denoting the financial crisis period. After running it through various models and using lagged periods, no conclusive evidence was found that there was any sort of influence on sample companies' cash holdings by any kind of financial crisis. Therefore, a crisis variable was excluded from this study.

The second omitted variable was a variable denoting the inflation rate. It was removed because of the high correlation with the interest rate, which was predictable as the interest rate takes into account the inflation.

CHAPTER THREE
DESCRIPTIVE STATISTICS

This chapter covers the general statistics of the possible determinants of cash holdings. First, the statistics for the sample as a whole are discussed, followed by the determinants ordered chronologically and segregated by their respective sectors so that other trends in the determinants may be found. A deeper look into the ownership statistics of the sample companies is also provided. After, the determinants are tested against the cash holding variables. This allows conclusions to be drawn as to which possible determinants are actual determinants of cash holdings for the sample.

3.1. ANALYSIS OF THE DETERMINANTS OF CASH HOLDINGS

Table 2 presents summary statistics of the determinants of cash holdings for the full sample. It shows that for the period 2006-2011 the average sample company's cash holding size was 9.69% of total assets. The distribution of cash holdings is positively skewed, meaning that the data distributes with a right tail (*Appendix 2*). A positive skew has its mean on the right of its median, which is 5.59%. The median and mean show that large amounts of lower cash holding percentages are off-set by a lower amount of high cash holding percentages – that relatively weigh in more on the sample. The maximum of 90.23% confirms that some companies hold enormous amounts of cash. This is magnified by the revised cash holdings formula CASH2, where the divisor - total assets - has cash and cash equivalents subtracted from it. A higher mean of 12.21% is found, but the median does not differ much from the normal cash holdings calculation. The standard deviation can shed some light on this matter, as CASH2's 17.16% is higher than CASH's 11.52%. It shows that CASH2's distribution is wider and thus makes CASH2 more volatile. It is a logical consequence of the revised formula, since it allows for cash holdings to surpass a 100%.

The statistics for capital expenditures are a little warped due to the nature of the used calculation method. Capital expenditures are generally calculated as the increase in fixed assets plus the total amount of depreciation over total assets. This study does not include depreciation and thus imposes greater restrictions, leading to a more robust test. A negative value would show that capital expenditures are smaller than depreciations – unless the company is downsizing its assets - and that the company is not maintaining itself in the long run. Capital expenditures have a mean of 0.92% and a standard deviation of 6.04%. The observations are also fairly evenly distributed (*Appendix 4*). On one side there are companies heavily investing and on the other there are companies that are stagnating or even shrinking. The correlation matrix (*Appendix 1*) shows that there are no significant correlations between capital expenditures and other determinants.

The dividend statistics only show that during the full sample period 38.02% of companies paid out dividends. The average age of listed companies is 40 years, with the youngest being only 6 years and the oldest being 115 years. Company size is fairly evenly distributed (*Appendix 6*) with a natural logarithm mean of 8.40, a median of 8.31 and a standard deviation of 0.7. More than 75% of sample companies make sales abroad, implying that they are internationalized. The average total foreign sales amount to 21.71% of total assets. There are – albeit few – companies that only sell their products abroad. The investment opportunities are measured as the yearly sales growth. The average sales growth throughout the sample is 12.62% with a median of 12.20%. Taking a closer look at the distribution (*Appendix 8*) one can see a distribution with a heavier right tail. This suggests that companies as a whole have sufficient opportunities to grow. On average, sample companies hold 47.21% of their liabilities in debt and have a liquid asset substitution capacity of 8.80%. This can support the notion that sample companies in general are not especially risk-taking. The largest shareholder type holds - on average - 66.55%, or just about two thirds of total outstanding shares. Average profitability, on the other hand, is low at an average ROE of 3.09%. Its 17.84% standard deviation does show rather volatile behavior.

Table 2
General Descriptive Statistics of the Variables

The sample used is constructed from the Istanbul Stock Exchange's archives and its Public Disclosure platform. It contains 3,803 quarterly company observations for 191 companies between 2006 and 2011. Financial companies, investment vehicles, utilities and government owned/controlled companies were excluded from the sample. The same is true for companies that do not close their accounts on December 31st and companies with missing variables or negative values for sales, total assets, equity or cash. P-values smaller than 0.01 are significant at a 1% level. P-Values lower than 0.05 and 0.1 are significant at a 5% level and a 10% level respectively.

Variable	Observations	Mean	Median	Minimum	Maximum	St. Dev.	P-value
CASH	3803	9.69%	5.59%	0.00%	90.24%	11.52%	0.000000
CASH2	3803	12.21%	5.82%	0.00%	143.65%	17.16%	0.000000
CAPEX	3612	0.92%	0.07%	-88.22%	67.41%	6.04%	0.000000
DIV	3803	38.02%					0.000000
AGE	3803	40	41	6	115	16	0.000000
SIZE	3803	8.40	8.31	6.46	10.23	0.70	0.000000
FGN SALES	3803	21.71%	13.98%	0.00%	100.00%	23.51%	0.000000
INVESTMENT O	2882	12.62%	12.20%	-100%	221.96%	31.39%	0.000000
LEV	3803	47.21%	47.87%	0.54%	99.65%	22.32%	0.000000
LIQ	3803	8.80%	9.46%	-76.99%	65.16%	18.61%	0.000000
CONTROLLER	3803	66.55%	65.30%	30.86%	100%	14.77%	0.000000
PROFITABILITY	3803	3.09%	3.66%	-98.92%	97.45%	17.84%	0.000000

3.2. ANALYSIS OF THE EVOLUTION OF THE DETERMINANTS OF CASH HOLDINGS

Table 3 at the end of this section shows the quarterly evolution of the determinants of cash holdings through time. The differences in cash holdings in each quarter are not statistically significant based on the F-test. Nevertheless, the raw data does support Khokhar (2012), who proved that American companies 'dress up' their cash holdings near year's end in order to make the books look more attractive to investors in the annual report. Looking at the numbers for the sample companies, the same conclusion could be drawn. This is further supported by the fact that cash holdings always drop in the second and third quarter. The same observation can be made when looking at the capital expenditures, which also peaks in the last quarter of each year. Since it is calculated as the increase in fixed assets, it is probable that a form of window dressing is also present in accounts other than cash holdings. Another observation is the upward trend in cash holdings – as evidenced in Figure 1. Upward trends in cash holdings after the global financial crisis of 2007-2008 have been showing in other countries as well. Pinkowitz et al. (2013) show this for the US and Schuite et al. (2012) show it in Germany.

Figure 1: Evolution of Cash Holdings
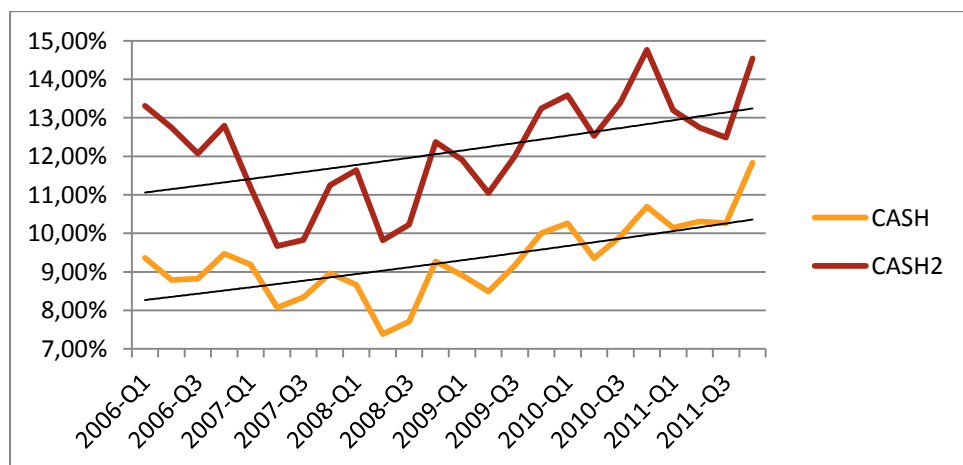
The differences in mean capital expenditures between the quarters are significant and share similarities with the cash ratios - in particular the spikes in the fourth quarter as shown in Table 3. Thus it could be argued that companies mock up

their capital expenditures before closing their accounts. Another explanation has to do with IFRS accounting standards. Capital expenditures cannot be deducted from taxes as a cost and thus need to be laid-out over the investment's life expectancy. The later in the year you make the capital expenditure, the faster you can write it off. This – in effect – makes capital expenditures preferable later in the fiscal year.

The amount of companies paying dividends was at a high in 2007-2008 and took a plunge in 2009, as shown in Figure 2. The mean differences are not significant at acceptable levels as depicted by Table 3, but one could speculate that the financial crisis hit sample companies late 2008.

Figure 2: Evolution of the Number of Companies Paying Dividends
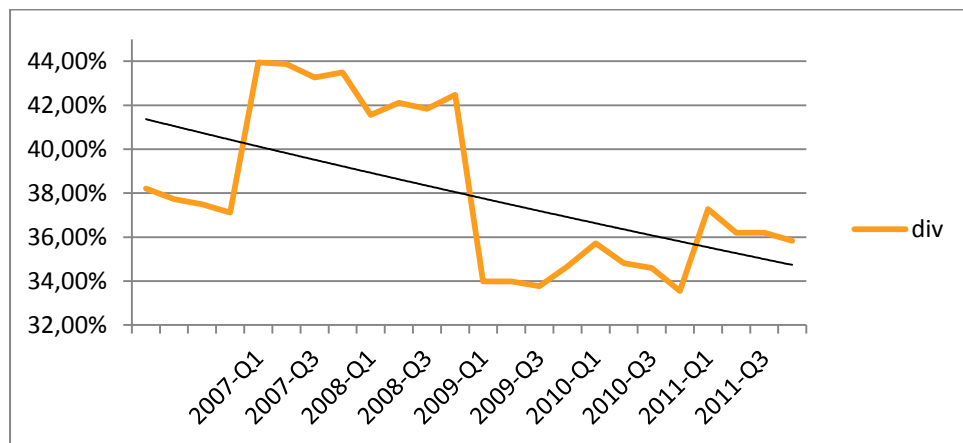
Similar evidence can be found in the statistics for investment opportunities, as exhibited in Figure 3. Investment opportunities are proxied by the growth in sales. Sales growth has been strong the last decade, but data shows that a decline was set in motion mid-2007 and culminated in sales shrinking during 2009. Though it did recover and then some in 2010, the mean differences between the quarters are statistically significant. This implies that there were ample to no investment opportunities between mid-2007 and 2009. Afterwards, from early 2010 onwards, investment opportunities rebounded. This could possibly be translated to the economic climate.

Figure 3: Evolution of Investment Opportunities
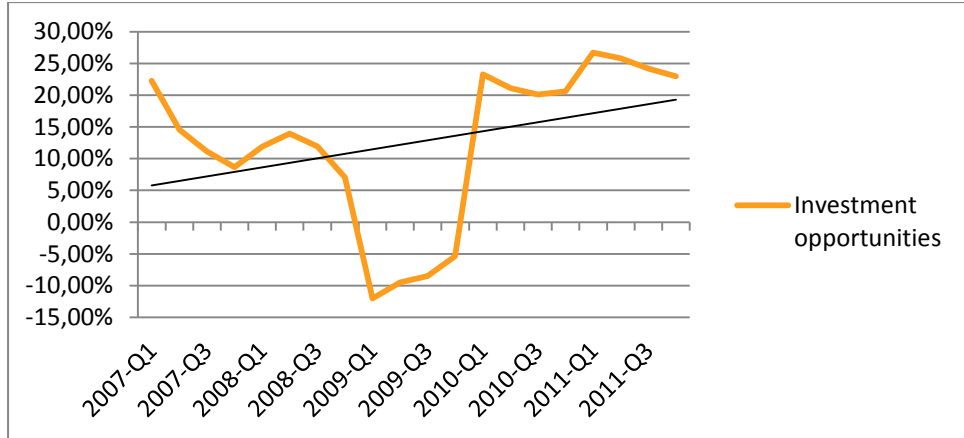
Foreign sales have remained stable throughout the 2006-2012 period, except for 2011 (Table 3) – as depicted in Table 3. This dip in foreign sales could be explained by the European sovereign debt crisis. Foreign sales are largely dependent on demand and the European debt crisis created a decline in European demand. According to official EU (2013) trade documents, more than 45% of Turkey's total exports are to the European Union. This could provide an explanation for the 2011 foreign sales statistics.

As shown in Figure 4, leverage is following an upward trend. This could be explained by a more stable, accessible and reliable credit market. Interest rates have dropped and stabilized over the past decade, from around an average of 75% to levels below 10%, as found in the databases on the Central Bank of Turkey's website (TCMB).

Figure 4: Evolution of Leverage Ratios
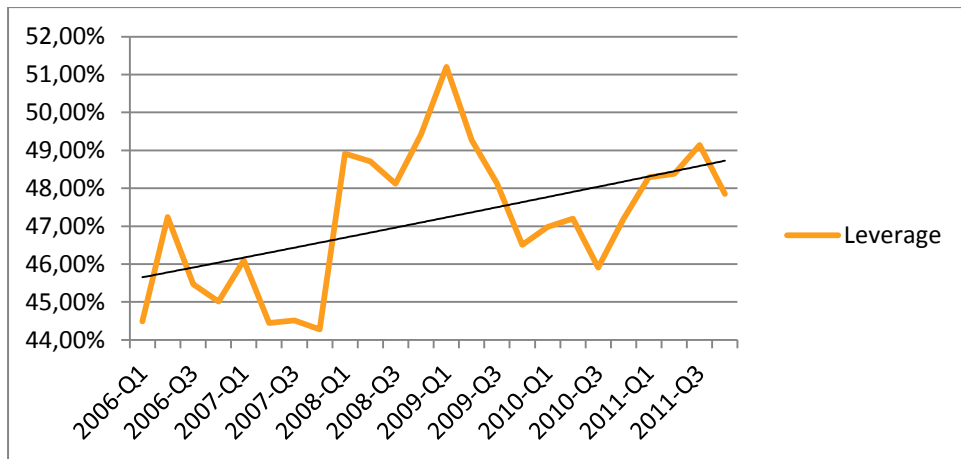
Liquidity shows a negative trend for the full sample, as depicted in Figure 5. Liquidity seems to be dropping steadily and has a negative spike around the year 2009. Combining these 2 observations, a likely explanation is that sample companies have already been converting their assets for some time. The strong macroeconomic improvement of the Turkish economy and its currency may be an important explanatory factor. This would contribute to companies holding more hard cash instead of cash substitutes.

Figure 5: Evolution of Liquid Asset Substitutions
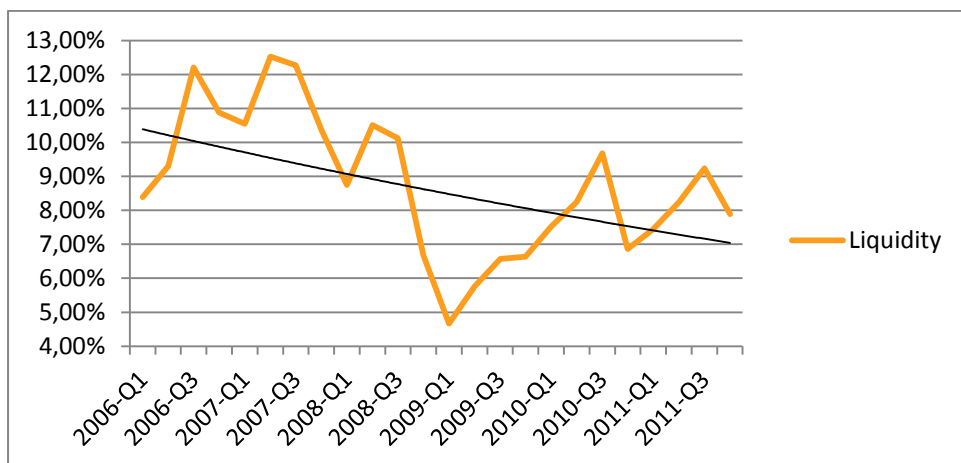
Figure 6 shows a graphical representation of profitability's evolution. The trend line predicts a near neutral negative evolution. Profitability started rising in 2006 and ultimately reached levels above 9% mid-2007, after which it took a plunge

throughout 2008 and 2009. As a whole, it did recover somewhat from 2010 onwards, but the trend suggests that it may not climb back up to 2007 levels.

Figure 6: Evolution of Profitability Ratios

YEAR	CASH	CASH2	CAPEX	DIV	FGN SALES	INVEST MENT OP	LEV	LIQ	PROFIT-ABILITY
2006-1	9.76%	13.31%		38.22%	21.60%		44.49%	8.39%	0.92%
2006-2	9.14%	12.74%	0.54%	37.74%	20.96%		47.24%	9.30%	-0.12%
2006-3	9.18%	12.08%	0.43%	37.50%	20.84%		45.47%	12.20%	4.88%
2006-4	9.75%	12.79%	0.98%	37.11%	21.63%		45.01%	10.88%	7.85%
2007-1	9.57%	11.19%	0.75%	43.95%	23.40%	22.25%	46.10%	10.55%	2.11%
2007-2	8.48%	9.68%	0.91%	43.87%	21.72%	14.56%	44.45%	12.52%	6.57%
2007-3	8.66%	9.83%	0.38%	43.23%	22.11%	11.13%	44.51%	12.27%	9.12%
2007-4	9.35%	11.25%	1.15%	43.51%	22.49%	8.64%	44.28%	10.38%	8.85%
2008-1	9.00%	11.64%	0.90%	41.56%	24.28%	11.90%	48.91%	8.75%	-1.92%
2008-2	7.74%	9.82%	1.19%	42.11%	23.49%	13.97%	48.71%	10.51%	2.47%
2008-3	8.01%	10.23%	0.91%	41.83%	23.09%	11.92%	48.12%	10.12%	2.78%
2008-4	9.62%	12.37%	1.62%	42.48%	24.74%	7.03%	49.43%	6.67%	1.14%
2009-1	9.34%	11.91%	0.91%	33.99%	23.93%	-12.01%	51.20%	4.67%	-6.81%
2009-2	8.86%	11.06%	0.67%	33.99%	22.21%	-9.48%	49.27%	5.76%	0.27%
2009-3	9.57%	12.01%	0.02%	33.77%	22.12%	-8.48%	48.13%	6.57%	1.41%
2009-4	10.45%	13.24%	1.32%	34.67%	23.31%	-5.34%	46.51%	6.64%	3.45%
2010-1	10.65%	13.58%	0.41%	35.71%	22.97%	23.28%	46.98%	7.52%	1.40%
2010-2	9.73%	12.53%	-0.09%	34.81%	21.83%	21.10%	47.20%	8.25%	3.07%
2010-3	10.26%	13.40%	0.44%	34.59%	21.32%	20.10%	45.91%	9.68%	6.11%
2010-4	11.07%	14.77%	2.65%	33.54%	20.16%	20.59%	47.19%	6.86%	5.22%
2011-1	10.42%	13.19%	1.14%	37.28%	18.09%	26.70%	48.29%	7.45%	0.65%
2011-2	10.59%	12.74%	1.15%	36.21%	18.19%	25.77%	48.38%	8.24%	3.52%
2011-3	10.49%	12.50%	0.98%	36.21%	18.34%	24.16%	49.14%	9.25%	4.74%
2011-4	12.10%	14.54%	1.64%	35.84%	20.10%	22.96%	47.85%	7.89%	5.66%
Anova F-test	0.2343	0.4013	0.0725	0.6022	0.4842	0.0000	0.3315	0.0029	0.0000
Welch F-test	0.2293	0.3140	0.0017	0.6306	0.4262	0.0000	0.3353	0.0048	0.0000

3.3. DETERMINANTS OF CASH HOLDINGS BREAKDOWN BY SECTOR

This section takes a closer look at the differences of the determinants of cash holdings in the various sectors in Turkey. It is important to clearly frame the scope of each sector – as defined by and for this study, since some of them are the result of mergers between traditional sectors and some of them include companies that are only part of the sector in a strict sense (Appendix 6 shows a per company list).

Table 4: Sector Structures and Explanations

Agriculture	The agricultural sector includes companies that specialize in farming and animal husbandry. Agriculture also includes one company that produces agricultural chemicals and pesticides. It was included in agriculture because it evolves closer with the agricultural sector than the chemical sector. Do note that there is no separate sector for chemical companies.
Automotive	The automotive sector includes producers of vehicle components, cars, tires, trucks and light buses. It also includes tractor manufacturers, which have been added here instead of with the agricultural sector because the EU classifies them as such.
Capital goods	The capital goods sector comprises of companies that do not produce final goods known as consumer goods. To be more specific, the products produced by these companies will be used to produce other goods. This sector includes a wide range of companies; companies in packaging, paints, construction materials, bottling plants, smelting, molding, casting, valves, windows, ink, dyes, plastics, pipes, drills, batteries, processed foods and printing.
Care services	The care services sector includes hospitals and pharmacy companies – both production and retail. Because only two pharmaceutical companies are listed in Turkey, they were included in the care services sector.
Commodities	This study classifies companies as commodity companies when they produce or mine commodities. Most of these companies dabble in cement, sodium sulfate, cotton, precious stones, sugar, coal or any other kind of mining.
Construction	The construction sector exclusively contains construction companies.
Electronic appliances	The electronic appliances sector is formed by companies producing and distributing consumer electronics.

Energy	The energy sector is made up of companies that deal in fossil fuels – either in production, distribution or refining – and energy infrastructure. As noted in the sample construction, utility companies have been excluded.
FMCG	The Fast Moving Consumer Goods sector consists of companies selling consumer goods with a life expectancy of less than one year. The sample mostly deals with companies active in selling drinks, food, meat and delis, frozen and canned wares, natural oils and paper products.
Media	The media sector includes newspapers, books and magazine publishers, cinema companies and television stations.
Retail	The retail sector contains classic retail companies like supermarkets, department stores and shopping malls. Two additions that need to be noted are computer retailers and a car retailer. They have been classified as retailers, as they create the demand that influences the technology and automotive sector respectively.
SMCG	The Slow Moving Consumer Goods consists of companies selling consumer goods with a life expectancy of more than one year. Examples of included companies are; office supplies, glassware, leather products, furniture, kitchens and bathrooms.
Technology	The technology sector includes companies that develop applications and technology for various sectors. They range from soft- and hardware IT products to military grade electronics, communications wiring and plastic card and security systems.
Telecom	The telecom sector consists of mobile phone service providers and telephone infrastructure developers.
Textile	The textile sector exists out of any company that produces textile products. These could be apparel, yarns, fabrics, wool, acrylic fibers, home textiles or multipurpose textiles, and also include companies that dye, print or stamp textile products.
Tourism	The tourism sector consists mostly of hotels and recreational parks, but also includes companies that produce souvenirs and similar products – as their target groups are tourists.
Transportation	The transportation sector exists of logistics companies, public transportation companies, aviation services and airline companies. The sector also includes airport exploitation services and in-flight meal producers. They are included in the sector as they depend on the demand for transportation, and not vice versa as was the case in retail.

Figure 7 shows the average cash levels for each sector. The highest cash holdings can be found in the Transportation sector. Any kind of transportation is heavily dependent on fuel. With relatively high fuel prices, companies in the transportation business keep a lot of cash at hand to keep their business up and running. Some transportation companies that particularly deal with individuals instead of other businesses will have higher cash holdings as they primarily take payment in cash. Since investment is highly dependent on demand for the transportation sector, there is little overinvestment. The telecom sector has traditionally been a cash cow. Long-term subscriptions and pre-paid formulae make their earnings reliable and their forecasts accurate. They have a strong tradition of dividends and thus will always keep enough cash to pay them out. The low cash holdings in the tourism sector are probably due to the good timing of cash in- and cash outflows. The general observation in cash holdings over the sectors seems to be that companies with intensive labor costs hold less cash than their counterparts, which have comparatively larger investment expenditures.

Figure 7: Cash Holdings per Sector
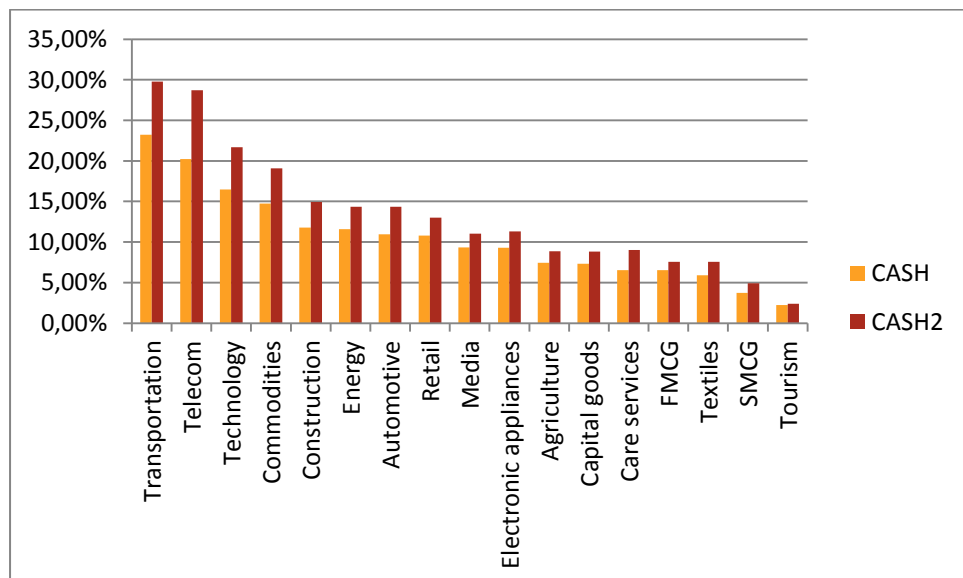
The capital expenditures show how much a company is investing in the future, as graphically presented in Figure 8. The big investors are energy companies, transportation and care services, retail and telecom. The energy sector leads capital expenditures in Turkey. The Turkish investment support and promotion agency (2013) provides the following: "high growth potential of the Turkish energy sector compared with other European countries", "Advantage of Turkey operating as an energy hub between Europe and the Middle East", "Privatization of state-owned generation assets" and "high gas demand drives growth potential". This shows why energy companies are keen to invest. The other four leaders in capital expenditures have similar perspectives.

On the other side of the spectrum are the ailing sectors; the automotive sector, the Slow Moving Consumer Goods producers and the textile sector. These sectors have been struggling with the rapidly growing competition. Textile manufacturers have been a locomotive for Turkey's economic growth around the turn of the century, but after WTO quotas were lifted and government incentives started to dry up from 2005 onwards the sector started suffering from Chinese and Indian competition.

Figure 8: Capital Expenditures per Sector
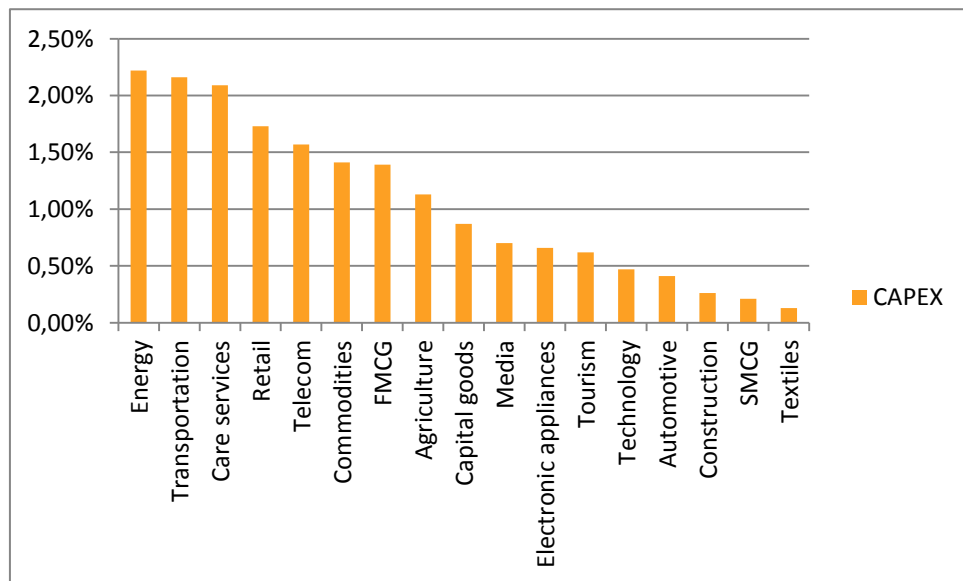
Figure 9 shows average ownership holding size statistics of ultimate controllers for different sectors. The higher the percentage, the more tightly controlled a sector is. The graph shows that the automotive, care services, agricultural and electronic appliances sectors are most tightly controlled. The telecom, tourism, technology and transportation sectors are least tightly controlled. The automotive and media sector are generally owned by large business or family groups. Automotive companies enter the Turkish market as joint ventures, while media groups are popular subsidiaries for business groups that have political interests or deal extensively with government. The agricultural and care services sector are tightly owned, as most of these grew organically from small businesses – unlike their public counterparts.

The more widely held sectors have different reasons for the controller ownership. The telecom and transportation sectors contain a lot of previously government-owned companies that were privatized at one point. These companies are usually sold to a couple of big investors and thus high shareholdings by one party are uncommon. Companies in the tourism sector do not often go public, as the loss of ownership deters most owners. But the ones that have ambitions surpassing what can be financed privately, do go public and generally only have public ownership to contest with. Not many institutional, corporate or private investors are eager to take shares in listed tourism related enterprises. The low ownership in the technology sector could be explained by high research and development expenditures. It is hard to borrow privately for R&D projects, thus these companies have to finance their projects internally or by issuing equity.

Figure 9: Largest Ownership Shareholding per Sector
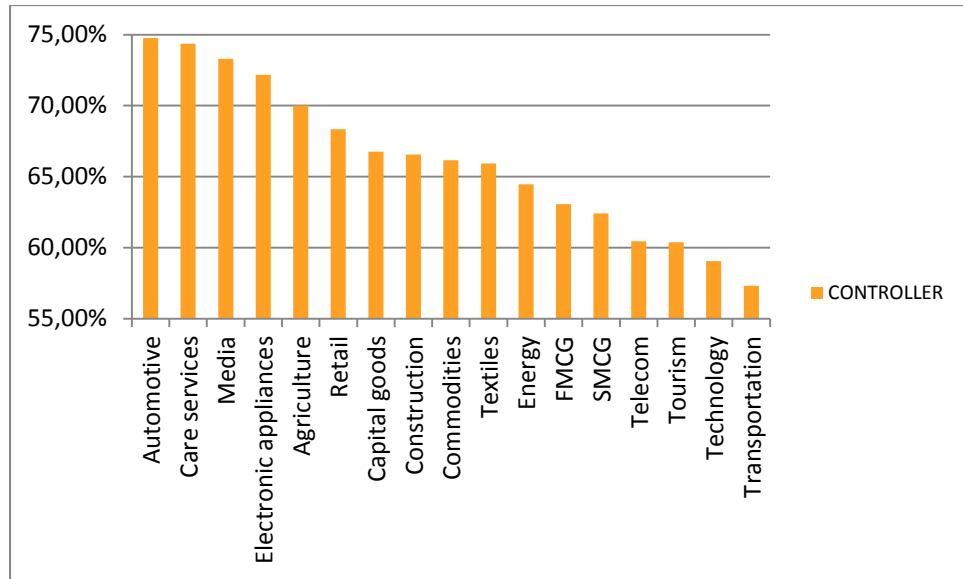
The amount of companies that pay out dividends varies per sector, ranging from over 80% to a mere 5% - as depicted in Figure 10. The commodities producers are by far the most reliable dividend payers. Runner-ups are the automotive sector, the technology sector, the construction sector and the telecom sector. The media, textile and tourism sectors are the least dividend paying sectors in the sample. This can most likely be attributed to the profitability in these sectors – as evidenced in Figure 15.

Figure 10: Number of Companies Paying Dividends per Sector
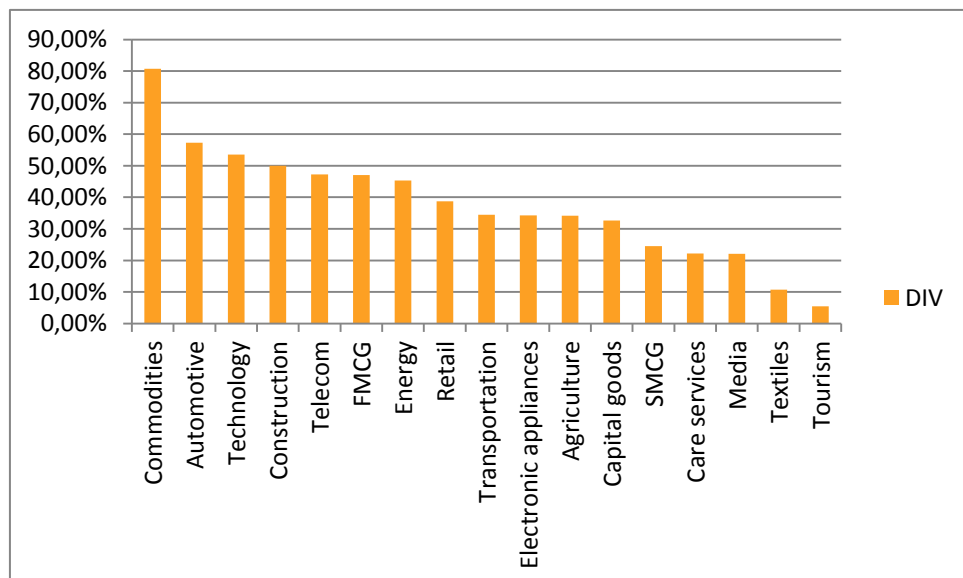
Figure 11 shows how exposed the sectors are to foreign markets. This needs to be said with caution though, particularly when looking at the chart's last observation – tourism. The United Nations World Tourism Organization ranks Turkey as the 6th most popular travel destination in the world (2013). One thus can assume that the Turkish tourism sector is likely to be dependent on foreign markets. However, just as with the construction companies, listed companies in these sectors are a small minority. The listed companies in the tourism sector barely register any foreign sales. This could be because all their sales are handled in Turkey and thus would not show up as foreign sales.

There is also substantial domestic tourism, which sometimes is rather separated from foreign tourism. This could also contribute to this result. The care services also register low, which is expected as they service domestically to Turkish people. Foreign sales are not absent though, as there is some medical tourism in Turkey and/or visitors/expats in need of urgent medical attention. Retail follows a similar pattern, as they also service locally to local people. Leaders in foreign exposure are labor intensive sectors. This is predictable, as Turkey offers a relatively good price/quality market close to Europe. Foreign companies and individuals also seem to prefer Turkish transportation options over their domestic choices.

Figure 11: Foreign Sales per Sector
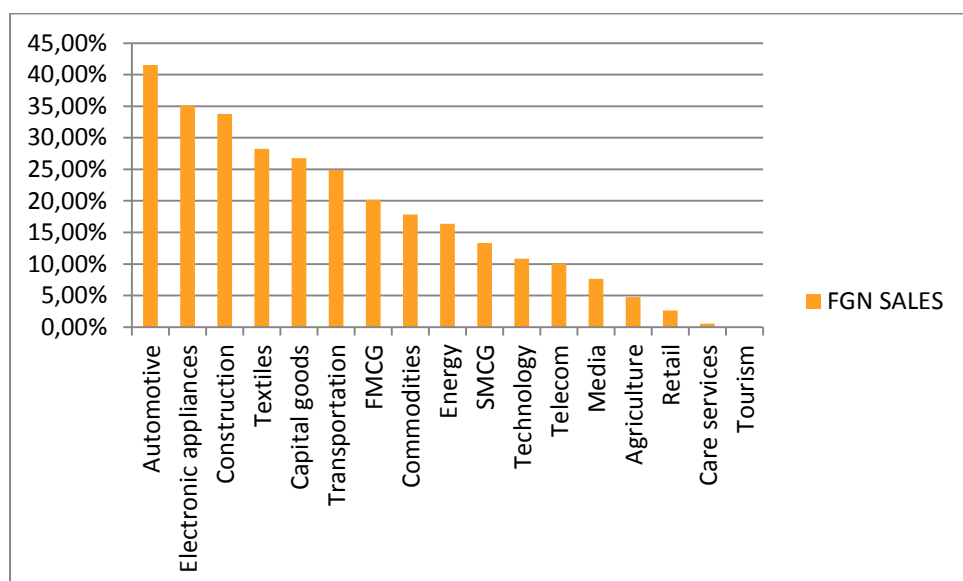
Figure 12 presents the investment opportunities per sector, which can be taken as a proxy for future growth potential. For the textile sector, this would indicate that there is little room for growth left for them. The opposite is true for the agricultural sector. Modernizing farming plots and techniques, strong demand from abroad and long-term government policies supported by subsidies (Semerci, 2013) all agree with this result. The tourism sector has a high level of investment opportunities, despite the negative profitability. As the investment opportunities are measured by sales growth, this is most likely a result of overcapacity, more than the presence of actual investment opportunities. A similar consequence can be drawn for the automotive sector. Despite low capital expenditures it still manages to top investment opportunities. It indicates that most investments already have been made and that they are not producing at full capacity at this time. The low result for the media sector is probably due to the fact that the market is already very saturated and that growth is only possible at the expensive of the competition.

Figure 12: Investment Opportunities per Sector
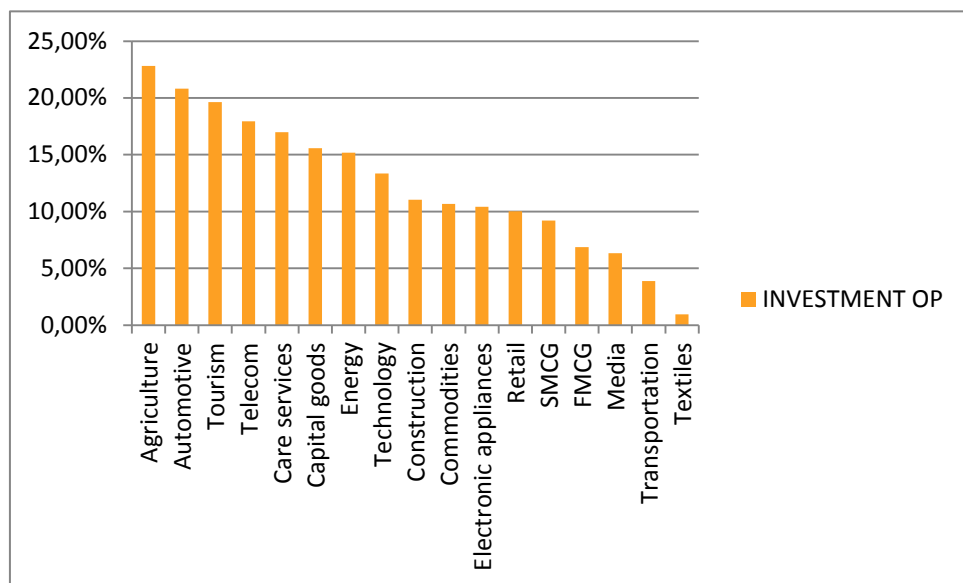
The levels of leverage described in Figure 13 show that sample companies generally have about a 50-50 debt/equity financing. The most noteworthy result comes from the commodities sector. The commodities sector only has 20% debt financing, which is a low number compared to market averages. The ownership in

the commodities sector could provide some answers. The commodities sector is dominated by foreign ownership and has a high stake of fund ownership. This type of ownership and the high profitability in the sector make it a good long-term, high yielding investment. This would make it easy for commodity companies to fund most investments with internally generated cash. Relatively strong capital expenditures and steady dividend payout may confirm high internal cash revenues.

Figure 13: Leverage Ratios per Sector
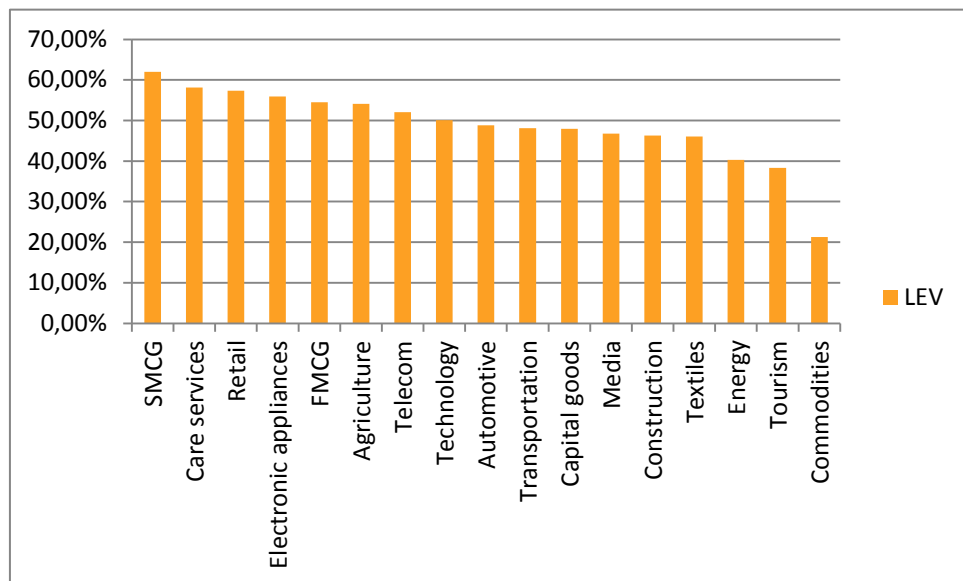
The liquid asset substitutions per sector are shown in Figure 14. The negative results for the telecom, media, tourism and retail sectors are a results of their in- and outflow timing. These sectors are able to sell their products during the credit term given by the supplier. This, in effect, means that they are able to sell products before they need to pay for having bought them. The telecom sector does this through the sale of subscriptions, in which they can perfectly forecast their income – making their cost structures much more effective and manageable. Technology and agricultural companies generally maintain high working capital rates and have relatively little fixed assets – as they do not need a lot of buildings, land or vehicles. This leads to their high liquidity rates.

Figure 14: Liquid Asset Substitutions per Sector
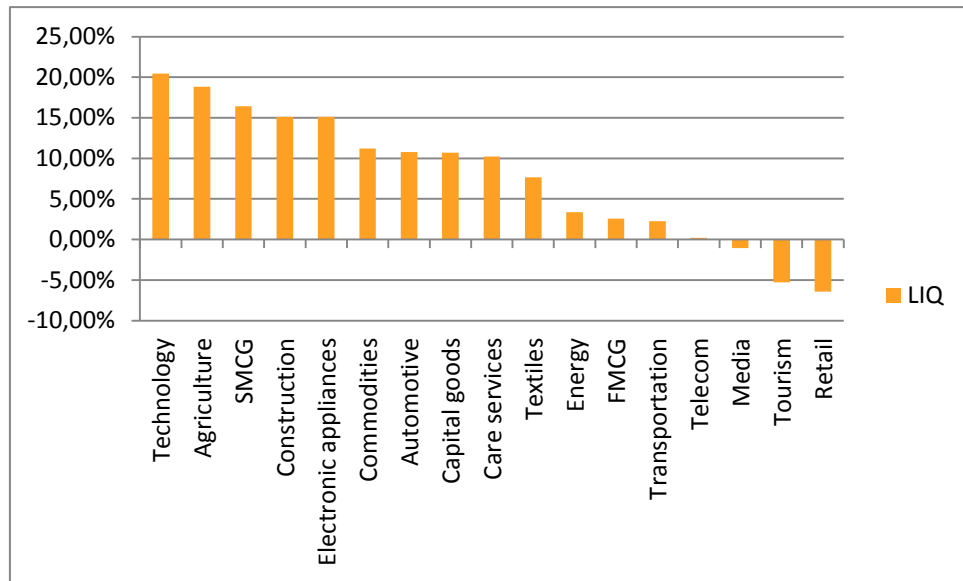
Figure 15 gives the results for the profitability over the various sectors. It seems to be closely related to the amount of dividend paying companies. Looking at Table 5, it is reasonable to assume that high profitability sectors generally contain more dividend paying firms in the sample.

Figure 15: Profitability per Sector
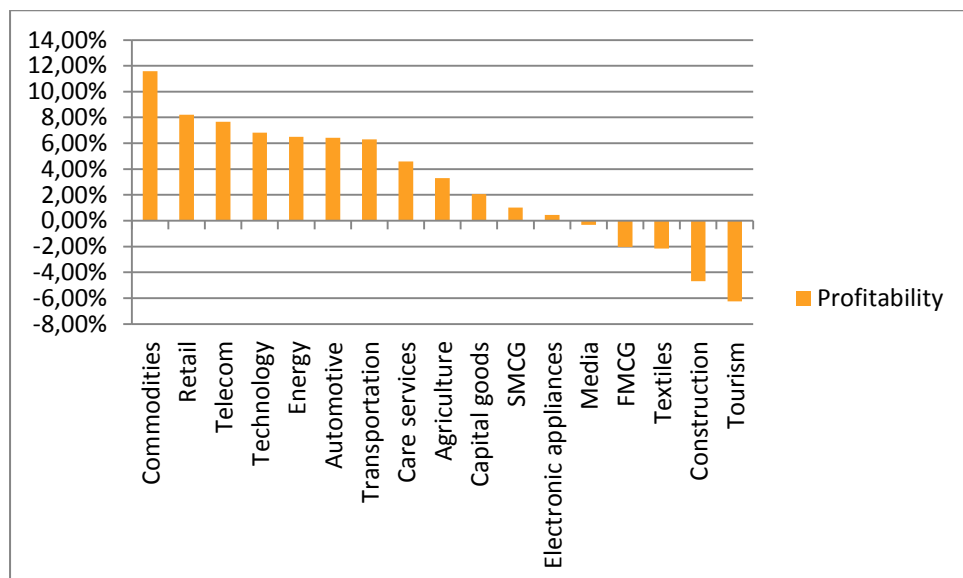
Figure 16 shows the Total Asset Turnover per sector for the sample. It evaluates how efficient the total assets (previous investments into the company) are at generating sales. Theory dictates that companies with higher total asset turnovers have lower profit margins, and vice versa (Bodie, Kane and Marcus, 2004). Retail traditionally enjoys a big lead on all the other sectors, because margins are typically low due to the intensity of competition in the sector. However, if margins are an indication for the total asset turnover some of the results from the sample contradict with the expectations for sectors. Technology, for example, is normally a high margin sector. Figure 16 would indicate that for the sample it is not. Technology companies generally make low or no profits before they mature, thus it could indicate that listed technology companies in the sample are still young or that the young outweigh the mature companies - if there are any. Theory expects that companies are all doing well and it does not really account for ailing companies or sectors. Thus, the results for the sectors on the lower end of Figure 16 are more the result of the state of the sector than that they are the result of the margins made by those companies. Many questions arise when interpreting this figure and additional research into this could be advised.

Figure 16: Total Asset Turnover per Sector
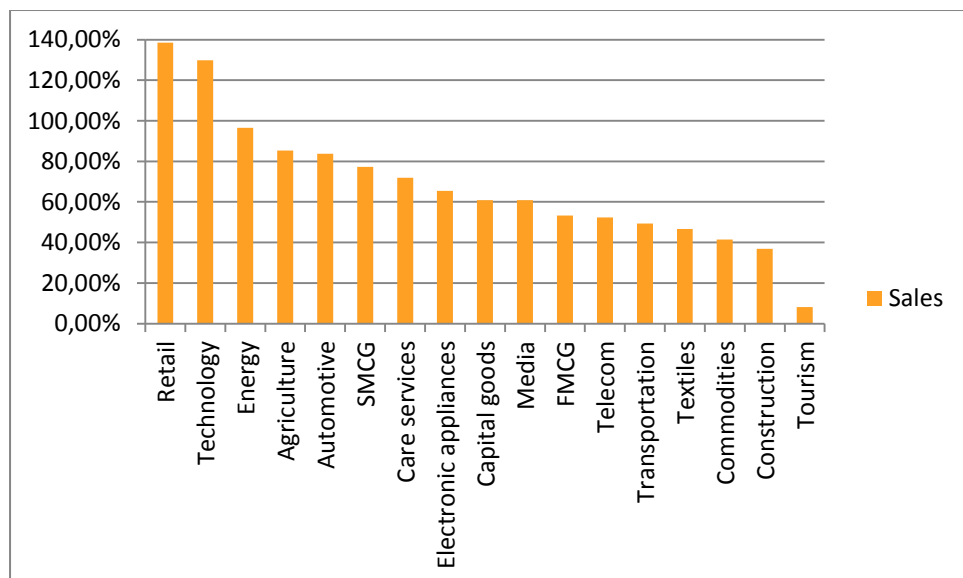
Table 5
Descriptive Statistics of the Variables per Sector

The sample used is constructed from the Istanbul Stock Exchange's archives and its Public Disclosure platform. It contains 3,803 quarterly company observations for 191 companies between 2006 and 2011. Financial companies, investment vehicles, utilities and government owned/controlled companies were excluded from the sample. The same is true for companies that do not close their accounts on December 31st and companies with missing variables or negative values for sales, total assets, equity or cash. The values for the Anova F-test and the Welch F-test are P-values. P-values smaller than 0.01 are significant at a 1% level. P-Values lower than 0.05 and 0.1 are significant at a 5% level and a 10% level respectively.

SECTOR	CASH	CASH2	CAPEX	CONTROLLER	DIV	FGN SALES	INVESTMENT OP	LEV	LIQ	PROFIT-ABILITY	TOTAL ASSET TURNOVER
Automotive	10.94%	14.36%	0.41%	74.77%	57.28%	41.51%	20.81%	48.80%	10.78%	6.42%	83.67%
Electronic appliances	9.28%	11.32%	0.66%	72.18%	34.24%	35.07%	10.41%	55.93%	15.10%	0.44%	65.39%
Agriculture	7.43%	8.86%	1.13%	70.00%	34.18%	4.74%	22.82%	54.10%	18.83%	3.29%	85.38%
Retail	10.80%	12.99%	1.73%	68.35%	38.71%	2.62%	10.03%	57.32%	-6.44%	8.20%	138.55%
FMCG	6.53%	7.58%	1.39%	63.07%	47.06%	20.17%	6.87%	54.50%	2.57%	-2.04%	53.29%
Energy	11.59%	14.33%	2.22%	64.47%	45.28%	16.39%	15.17%	40.26%	3.35%	6.50%	96.55%
Telecom	20.24%	28.70%	1.57%	60.46%	47.27%	10.10%	17.93%	52.05%	0.20%	7.66%	52.31%
Capital goods	7.31%	8.83%	0.87%	66.76%	32.65%	26.78%	15.58%	47.91%	10.70%	2.06%	60.91%
Care services	6.55%	9.03%	2.09%	74.35%	22.22%	0.54%	16.99%	58.13%	10.21%	4.60%	71.95%
SMCG	3.74%	4.93%	0.21%	62.42%	24.49%	13.34%	9.22%	61.96%	16.43%	1.03%	77.20%
Textiles	5.90%	7.55%	0.13%	65.92%	10.76%	28.22%	0.96%	46.07%	7.66%	-2.16%	46.66%
Transportation	23.23%	29.79%	2.16%	57.31%	34.45%	24.87%	3.87%	48.09%	2.25%	6.30%	49.27%
Commodities	14.73%	19.08%	1.41%	66.16%	80.77%	17.85%	10.67%	21.29%	11.20%	11.58%	41.43%
Construction	11.79%	14.94%	0.26%	66.55%	50.00%	33.76%	11.05%	46.27%	15.12%	-4.69%	36.96%
Tourism	2.22%	2.41%	0.62%	60.39%	5.44%	0.00%	19.63%	38.32%	-5.28%	-6.25%	8.18%
Technology	16.47%	21.68%	0.47%	59.06%	53.57%	10.85%	13.36%	50.10%	20.43%	6.83%	129.76%
Media	9.33%	11.04%	0.70%	73.29%	22.05%	7.63%	6.32%	46.80%	-1.04%	-0.31%	60.84%
Anova F-test	0.0000	0.0000	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Welch F-test	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

3.4. OWNERSHIP STRUCTURE STATISTICS

Figure 17 shows the identity of the ultimate controller for each sector. The last column in the figure shows the results for the full sample. Taking the whole sample into account, it can be stated that 60% of the sample's companies are owned by a form of corporation, such as a company, a holding or a business group. Whether these owners are in turn owned by other entities was not taken into account. The second largest type of ownership in the sample is the public ownership. This study classifies the ownership type as public when the majority of shares is 'free-floating', meaning that they are on the market and available for purchase and sale through a stock exchange. This type of ownership represents dispersion, as no single shareholder can have more than 5% of the total shares in the free-float. The third group is the individuals group. Individuals denote that a private person or a few private persons together own more than half of the stock. These are often families or people who invested in the company before it went public. It does not equal family owned business groups, as these individuals' ownership stops at company level. Funds and institutional investors only make up 4% of owners for the full sample. It should be noted that there are no observations in which banks or other financial institutions directly hold shares in the sample's companies. The last type of owner identity in this study is the 'no majority' type; where there is no one type of owner holding more than 50% of the outstanding shares.

The automotive sector is dominated by corporate majority ownership. Most of these companies are set up as joint ventures or run on licensing deals, thus these results fall within normality. The individual owner majorities can be found in specialty manufacturing, which requires less seed capital in the early years. Extreme levels of corporate majority ownership can also be found in the electronic appliances sector, the energy sector, the care services sector and the media sector. Some of these holdings can be explained due to the substantial amount of start-up capital that is needed for basic operations, others are the results of specific corporate behavior. An example is the media sector: most large corporate groups in Turkey also own several media outlets. Therefore, it can be assumed that corporate ownership in some sectors

can be explained by this phenomenon. The agriculture sector stands out, as it is the only one without corporate ownership and a high individual ownership. Such amounts of individual ownership are also found in the SMCG sector, but are not found in any other sectors.

Public ownership is prevalent in the energy, transportation and construction sectors, but does not appear in significant amounts in other sectors. The only type of ownership that is unable to demand a large share in any sector is the no majority type. This indicates that there generally is an ultimate controller in the company. Exact numbers can be found in Table 6.

Figure 17: Ownership Majority per Sector
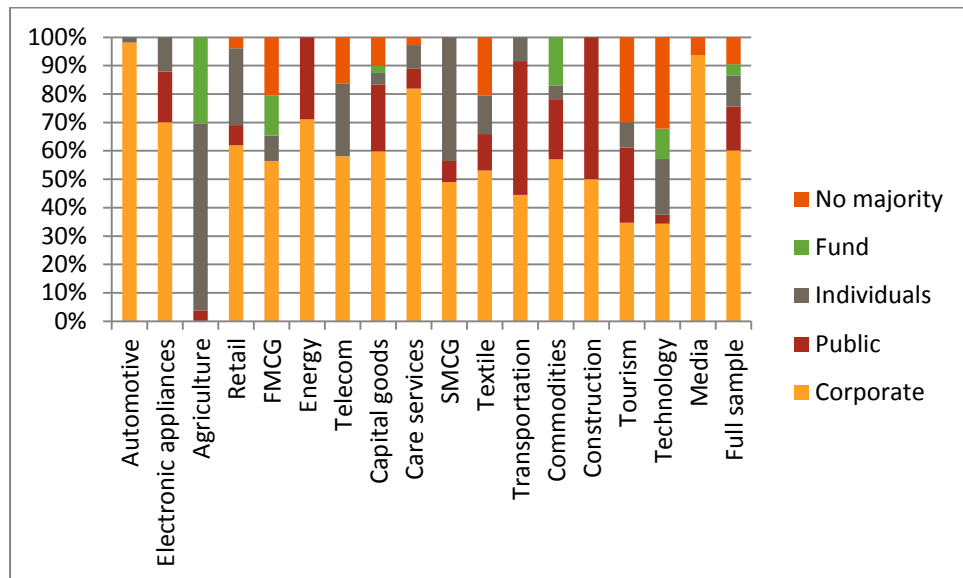
Table 6
Descriptive Statistics of Majority Ownership Type per Sector
The sample used is constructed from the Istanbul Stock Exchange's archives and its Public Disclosure platform. It contains 3,803 quarterly company observations for 191 companies between 2006 and 2011. Financial companies, investment vehicles, utilities and government owned/controlled companies were excluded from the sample. The same is true for companies that do not close their accounts on December 31st and companies with missing variables or negative values for sales, total assets, equity or cash. The sector definitions can be found in the beginning of this chapter.

	Corporate	Public	Individuals	Fund	No Majority	Number of Observations
Automotive	98,10%	0,00%	1,90%	0,00%	0,00%	316
Electronic appliances	70,04%	17,90%	12,06%	0,00%	0,00%	257
Agriculture	0,00%	3,80%	65,82%	30,38%	0,00%	79
Retail	61,94%	7,10%	27,10%	0,00%	3,87%	155
FMCG	56,47%	0,00%	8,82%	14,12%	20,59%	170
Energy	71,07%	28,93%	0,00%	0,00%	0,00%	159
Telecom	58,18%	0,00%	25,45%	0,00%	16,36%	110
Capital goods	59,80%	23,57%	4,08%	2,45%	10,10%	980
Care services	81,94%	6,94%	8,33%	0,00%	2,78%	72
SMCG	48,98%	7,48%	43,54%	0,00%	0,00%	147
Textile	53,02%	12,86%	13,65%	0,00%	20,47%	381
Transportation	44,54%	47,06%	8,40%	0,00%	0,00%	119
Commodities	57,05%	21,15%	4,81%	16,99%	0,00%	312
Construction	50,00%	50,00%	0,00%	0,00%	0,00%	58
Tourism	34,69%	26,53%	8,84%	0,00%	29,93%	147
Technology	34,38%	3,13%	19,64%	10,71%	32,14%	224
Media	93,70%	0,00%	0,00%	0,00%	6,30%	127
Full sample	60,11%	15,45%	10,97%	3,93%	9,54%	3803

3.5. REGRESSIONS

Model 1 is the basic regression model with non-mutually exclusive explanatory variables. The regression results can be found in Table 7. The results show statistically significant relationships for all of the explanatory variables in the model. This means that all of the variables in model 1 have significant explanatory power for sample companies' cash holdings.

Dividend pay-out is positively related to cash holdings for sample companies and has a relatively higher impact on cash holdings when compared to other countries (Al-Najjar, 2013 and Ozkan and Ozkan, 2004). Thus, **H2** 'there is a positive relationship between cash holdings and dividend pay-outs' is accepted. When this result is framed in a trade-off theory manner it could be argued that sample companies value reputation to a degree that they hold more cash to prevent cash shortages when dividend payments are expected. The relationship is significant at a 1% level, which means that the chance of this result being a random chance occurrence rather than a pattern is less than one in a hundred.

The size variable L_ASSETS shows a weak positive relationship between company size and cash holdings, confirming **H4** 'there is a weak relationship between cash holdings and company size'. This is in accordance with the pecking order and agency theories, but not the trade-off theory. It proves that larger sample companies will hold comparatively larger amounts of cash compared to their smaller counterparts. It also suggests that large sample companies do not fully profit from economies of scale.

Leverage and cash holdings are negatively related with a coefficient of -0.18 and this leads to the acceptance of **H8** 'there is a negative relationship between cash holdings and leverage'. The coefficient shows that if cash increases from 0% to a 100%, leverage decreases by 18%. This negative relationship is in accordance with the pecking order and agency theories' predictions – of which the last would claim a significant influence on cash holdings by monitoring the management.

Table 7
OLS Regressions Testing the Determinants of Cash Holdings

The sample used in the regressions is constructed from the Istanbul Stock Exchange's archives and its Public Disclosure platform. It contains 3,803 quarterly company observations for 191 companies between 2006 and 2011. Financial companies, investment vehicles, utilities and government owned/controlled companies were excluded from the sample. The same is true for companies that do not close their accounts on December 31st and companies with missing variables or negative values for sales, total assets, equity or cash. P-values that determine determinant significance are reported in parentheses. P-values smaller than 0.01 are significant at a 1% level. P-Values lower than 0.05 and 0.1 are significant at a 5% level and a 10% level respectively.

	Model 1		Model 2		Model 3	
Dependent variable	CASH	CASH2	CASH	CASH2	CASH	CASH2
Intercept	0.116	0.131	-8.521	-10.441	0.157	0.196
	(0.000)	(0.000)	(0.001)	(0.005)	(0.000)	(0.000)
DIV	0.033	0.042	0.034	0.043	0.034	0.043
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L_ASSETS	0.010	0.016	0.008	0.013	0.008	0.013
	(0.001)	(0.000)	(0.012)	(0.005)	(0.011)	(0.005)
LEV	-0.180	-0.250	-0.185	-0.259	-0.185	-0.259
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	-0.146	-0.182	-0.149	-0.188	-0.148	-0.187
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFITABILITY	0.098	0.116	0.099	0.118	0.098	0.117
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAPEX	-0.010	-0.126	-0.096	-0.121	-0.094	-0.117
	(0.005)	(0.016)	(0.006)	(0.020)	(0.008)	(0.024)
AGE	-0.000	-0.001	-0.000	-0.001	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INVESTMENT_OP	-0.014	-0.005	-0.017	-0.009	-0.015	-0.008
	(0.023)	(0.566)	(0.005)	(0.299)	(0.009)	(0.383)
INTEREST_RATE	--------	--------	--------	--------	-0.125	-0.162
	--------	--------	--------	--------	(0.001)	(0.004)
SECTOR	--------	--------	-0.001	-0.002	-0.001	-0.002
	--------	--------	(0.010)	(0.001)	(0.010)	(0.001)
YEAR	--------	--------	0.000	0.000	--------	--------
	--------	--------	(0.001)	(0.004)	--------	--------
Observations	2882	2882	2882	2882	2882	2882
Adjusted R-SQUARED	21.69%	18.31%	22.13%	18.77%	22.10%	18.78%
F-Stat	100.73	81.41	82.86	67.30	82.72	67.32
Probability	0.000	0.000	0.000	0.000	0.000	0.000

A negative relationship is also found for liquid asset substitutions and **H9** 'there is a negative relationship between cash holdings and liquid asset substitutions' is accepted. This relationship is conforms to the trade-off theory. This implies that

sample companies indeed do convert assets into cash to compensate for cash shortages and will invest their excess cash into assets when possible. The model also positively relates profitability to cash holdings. Thus, **H12** 'there is a positive relationship between cash holdings and profitability' is accepted. Sample companies with higher profitability hold higher amounts of cash, as stipulated by the pecking order theory. The notion that profitable companies invest all their proceeds to avoid underinvestment proposed by the trade-off theory, is not supported by the findings. This supports the argument that sample companies do not necessarily invest their income to avoid underinvestment.

Capital expenditures and cash holdings are negatively related according to the model, confirming the pecking order theory and leading the acceptance of **H1** 'there is a negative relationship between cash holdings and capital expenditures'. It shows that companies drain their cash reserves when they make high capital investments. Following Bates et al. (2009), it could be argued that these capital investments increase debt capacity and allow companies to decrease cash holdings since external capital is more accessible. This cannot be stated with certainty though, as no model in this study specifically checks for this.

A weak negative relationship is found for company age and **H3** 'a weak relationship is expected between cash holdings and the age of the company' is accepted. Coupled with previous findings it could be argued that older companies have a sturdier reputation and can use this to keep debt cheap and suppliers reliable which leads to lower cash holdings.

The negative relationship between cash holdings and investments opportunities is the only one not significant at a 1% level, but instead is significant at a 5% level. Hence **H7** 'there is a positive relationship between cash holdings and investment opportunities' cannot be accepted. The negative sign is only supported by the agency theory, which supports irresponsible investment because of low good positive value NPV projects.

The model as a whole is significant at a 1% level and has an adjusted R-SQUARED of 21.69%. The R-SQUARED shows to which degree the model explains variations in the dependent variable. In other words, model 1's variables explain 21.69% of the cash holdings of the sample's companies. It also shows support for both the pecking order theory and the agency theory, but rejects the trade-off theory for the sample. It also accepts the hypotheses except for H7's relationship between investment opportunities and cash holdings – which is negative instead of the predicted positive relationship.

Model 1 is also run with CASH2 as the dependent variable. This is done for comparative purposes and as a robustness test. The resulting coefficients all take a higher value than the model with CASH as a dependent variable. This is expected, as the nature of the CASH2 formula makes cash holdings relatively higher. One noticeable difference lies with the INVESTMENT_OP variable, which is no longer significant. This is the result of discrepancies between the formulae. CASH and INVESTMENT_OP both rely on total assets for their values, but CASH2 reduces total assets with cash and cash equivalents, which makes them significantly lower and distorts data cohesion. If CASH2 wasn't run as a test, the INVESTMENT_OP variable would also make use of the total assets minus cash and cash equivalents. If variables are significant with both dependent variables without changing any independent variable's formula, it can be safely argued that they are strongly significant for the sample – which is true for all the variables except investment opportunities. Model 1 with CASH2 as a dependent variable is also significant at a 1% level, but has a slightly lower adjusted R-SQUARED of 18.31%.

Control variables are introduced in model 2 as shown in table 7. The results show that both of the control variables do not really change any variables' coefficients, significance or signs. Model 2 confirms the strength of the variables as significant determinants of cash holdings. The model is significant and gains some explanatory power over model 1. The same conclusions apply to model 2 run with CASH2 as a dependent variable.

Model 3 replaces the year variable with the interest rate variable. The year control variable is removed as it is correlated with the interest rate, as shown in the correlation matrix in the appendix. The results show that there is a highly significant negative relationship between the interest rate and cash holdings. This is as predicted and is in accordance with previous research. Thus, **H6** 'there is a negative relationship between the interest rate and cash holdings' is accepted. It shows that sample companies will be more inclined to hold cash when the interest rate is low, because the opportunity cost is positively related to the interest rate. It has to be noted that the impact of the coefficient is rather high, but looking at the history of the Turkish interest rate, that is not abnormal. All the other explanatory variables remain statistically significant. When model 3 is run with CASH2 as the dependent variable, the results are in line with previous findings. Only investment opportunities become insignificant. Thus, the interest rate stands out as a strong determinant of cash holdings. Both model 3 versions are significant and have comparative adjusted R-SQUAREDs to previous models.

Sales related variables are introduced in model 4 that can be found in Table 8. The model is run in 3 variations, one includes only multinationality, one only sales and one runs both multinationality and sales. The explanatory variables that were run in model 1 and 2 are identical in model 4 and share the same conclusions. The model reveals that neither MULTINATIONALITY nor SALES are statistically significant to cash holdings in any way. Thus, **H5** 'there is a positive relationship between cash holdings and foreign sales' and **H12** 'there is a positive relationship between cash holdings and sales' are both rejected. The model provides evidence that these two variables cannot be accepted as determinants of cash holdings for the sample. The model itself is significant at a 1% level in each of its variations and does not show a noticeably different adjusted R-SQUARED value when compared to previous models.

Table 8
OLS Regressions Testing the Determinants of Cash Holdings

The sample used in the regressions is constructed from the Istanbul Stock Exchange's archives and its Public Disclosure platform. It contains 3,803 quarterly company observations for 191 companies between 2006 and 2011. Financial companies, investment vehicles, utilities and government owned/controlled companies were excluded from the sample. The same is true for companies that do not close their accounts on December 31st and companies with missing variables or negative values for sales, total assets, equity or cash. P-values that determine determinant significance are reported in parentheses. P-values smaller than 0.01 are significant at a 1% level. P-Values lower than 0.05 and 0.1 are significant at a 5% level and a 10% level respectively.

| | Model 4 | | | | | |
| | Minus sales | | Minus mutlinationality | | Both variables | |
Dependent variable	CASH	CASH2	CASH	CASH2	CASH	CASH2
Intercept	-8.110	-9.673	-8.362	-10.226	-7.941	-9.426
	(0.001)	(0.009)	(0.001)	(0.006)	(0.002)	(0.012)
DIV	0.034	0.044	0.033	0.043	0.033	0.043
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L_ASSETS	0.008	0.013	0.008	0.013	0.008	0.013
	(0.011)	(0.005)	(0.011)	(0.005)	(0.010)	(0.004)
LEV	-0.184	-0.258	-0.188	-0.263	-0.187	-0.262
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	-0.148	-0.187	-0.150	-0.190	-0.150	-0.189
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFITABILITY	0.098	0.115	0.096	0.115	0.095	0.111
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAPEX	-0.096	-0.120	-0.096	-0.120	-0.096	-0.119
	(0.006)	(0.021)	(0.006)	(0.021)	(0.006)	(0.021)
AGE	-0.000	-0.001	-0.000	-0.001	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INVESTMENT_OP	-0.015	-0.006	-0.017	-0.009	-0.015	-0.006
	(0.012)	(0.515)	(0.006)	(0.310)	(0.013)	(0.536)
MULTINATIONALITY	-0.002	0.001	--------	--------	-0.001	0.002
	(0.833)	(0.924)	--------	--------	(0.872)	(0.888)
SALES	--------	--------	0.003	0.004	0.003	0.004
	--------	--------	(0.415)	(0.460)	(0.382)	(0.394)
SECTOR	-0.001	-0.002	-0.001	-0.002	-0.001	-0.002
	(0.010)	(0.002)	(0.010)	(0.001)	(0.011)	(0.002)
YEAR	0.000	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.008)	(0.001)	(0.005)	(0.001)	(0.010)
Observations	2882	2882	2882	2882	2882	2882
Adjusted R-SQUARED	22.01%	18.68%	22.12%	18.76%	22.00%	18.68%
F-Stat	74.83	60.87	75.38	61.22	68.65	55.85
Probability	0.000	0.000	0.000	0.000	0.000	0.000

Table 9 shows the fifth regression model including ownership variables. Just like model 4, it is run in 3 variations; one with only the controller identity variable, one with only the ownership size variable and one with both of them. The explanatory variables run in model 1 and 2 are identical in model 5 and provide similar results. The controller identity variable DISPERSION is not statistically significant when it is run alone in the first regression variable. But when it is run with both variables in the third variation, it becomes significant at the 10% level in the CASH2 regression equation.

The size of the largest ownership shareholding is significant at a 1% level when it is run alone in the CASH regression equation, but is significant at only a 5% level in the CASH2 regression equation. In the third variation, the largest ownership shareholding is significant at a 1% level in both regression equations. The third variation of model 5 shows that the largest ownership shareholding variable has a positive effect on the controller identity. Strong support is found for a negative relationship between cash holdings and ownership shareholding size and **H10** 'there is a negative relationship between cash holdings and controller ownership' is accepted. The regressions also suggest that the controller identity is not a significant determinant of cash holdings. This leads to a rejection of **H11** 'the identity of the ultimate controller has a relationship with in cash holdings'. The model and all its variations are significant at a 1% level and have comparable adjusted R-SQUARED's to previous models.

Table 9
OLS Regressions Testing the Determinants of Cash Holdings

The sample used in the regressions is constructed from the Istanbul Stock Exchange's archives and its Public Disclosure platform. It contains 3,803 quarterly company observations for 191 companies between 2006 and 2011. Financial companies, investment vehicles, utilities and government owned/controlled companies were excluded from the sample. The same is true for companies that do not close their accounts on December 31st and companies with missing variables or negative values for sales, total assets, equity or cash. P-values that determine determinant significance are reported in parentheses. P-values smaller than 0.01 are significant at a 1% level. P-Values lower than 0.05 and 0.1 are significant at a 5% level and a 10% level respectively.

| | Model 5 | | | | | |
| | Minus controller | | Minus dispersion | | Both variables | |
Dependent variable	CASH	CASH2	CASH	CASH2	CASH	CASH2
Intercept	-8.503	-10.455	-9.144	-11.200	-9.257	-11.382
	(0.001)	(0.010)	(0.000)	(0.003)	(0.000)	(0.002)
DIV	0.033	0.043	0.031	0.039	0.031	0.040
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L_ASSETS	0.008	0.013	0.010	0.015	0.009	0.014
	(0.011)	(0.007)	(0.002)	(0.001)	(0.004)	(0.003)
LEV	-0.185	-0.259	-0.185	-0.260	-0.184	-0.258
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	-0.149	-0.188	-0.147	-0.185	-0.147	-0.185
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFITABILITY	0.099	0.118	0.099	0.118	0.098	0.118
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAPEX	-0.096	-0.120	-0.109	-0.134	-0.107	-0.130
	(0.006)	(0.021)	(0.003)	(0.014)	(0.003)	(0.017)
AGE	-0.000	-0.001	-0.000	-0.001	-0.000	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
INVESTMENT_OP	-0.017	-0.009	-0.017	-0.009	-0.017	-0.008
	(0.005)	(0.302)	(0.005)	(0.323)	(0.006)	(0.355)
DISPERSION	0.001	-0.000	--------	--------	-0.002	-0.003
	(0.695)	(0.784)	--------	--------	(0.138)	(0.054)
CONTROLLER	--------	--------	-0.039	-0.044	-0.048	-0.059
	--------	--------	(0.002)	(0.020)	(0.001)	(0.004)
SECTOR	-0.001	-0.002	-0.001	-0.002	-0.001	-0.002
	(0.009)	(0.002)	(0.004)	(0.001)	(0.006)	(0.001)
YEAR	0.000	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.004)	(0.000)	(0.003)	(0.000)	(0.002)
Observations	2882	2882	2882	2882	2882	2882
Adjusted R-SQUARED	22.10%	18.75%	22.28%	18.78%	22.31%	18.86%
F-Stat	75.32	61.17	75.02	60.48	68.98	55.81
Probability	0.000	0.000	0.000	0.000	0.000	0.000

CONCLUSION

A sample of 191 Turkish listed companies between 2006 and 2011 was studied for this thesis. The data shows a positive trend for cash holdings, which are at an average of 9.69% during the sample. There is reason to believe that sample companies partake in window dressing of their accounts, but it is also credible that these results are due to the year-end financial audits – which tend to have a strong impact on the fourth quarter's numbers. Companies that hold the highest cash levels in Turkey can predominantly be found in the three T's; transportation, telecom and technology.

Furthermore, the regression results provided some strong evidence for the determinants of cash holdings. Capital expenditures are a significant determinant for cash holdings and have a negative impact on cash holdings. Providing support for the notion that sample companies with high capital expenditures will have their cash reserves severely drained. Dividend payout is also a significant determinant of cash holdings and has a positive impact on cash holdings. The trade-off theory for dividends suggests that sample companies want to prevent damaging their reputation by not being able to pay an expected or scheduled dividend payout. Company age is also a significant determinant of cash holdings and has a negative impact on cash holdings, suggesting that older companies are more adept at managing cash and have a stronger reputation that can be used to get better credit terms and credit accessibility. Company size is another significant determinant of cash holding and has a positive impact on cash holdings. This is most likely explained due to the fact that larger companies have been more successful and thus should have relatively more cash, as explained by the pecking order theory. The interest rate is also a determinant for cash holdings. It has a negative impact on cash holdings. This is due to the positive relationship between the interest rate and the opportunity cost of holding cash, thus sample companies hold more cash as the interest rate drops – which has been the case for sample companies in the past decade. The amount of investment opportunities a company has appears to be a determinant for cash holdings, but this cannot be said with certainty as it did not pass the robustness test.

Further research into this variable is necessary. Leverage is a determinant for cash holdings and has a negative impact on cash holdings. This determinant merged with company size provides ample evidence that monitoring costs play an important role in sample companies' cash holding decisions. Liquid assets substitution is also found to be a determinant of cash holdings and it has a negative impact on cash holdings. It proves that sample companies will substitute their assets into cash and vice versa depending on the state of their cash holdings. The study also found the size of the largest shareholding to be a determinant for cash holdings. The size of the largest shareholding has a negative impact on cash holdings, implying that monitoring costs are indeed a strong influence on sample cash holdings. Lastly, the regression has also shown that profitability is a determinant of cash holdings. Profitability has a positive impact on cash holdings, proving that profitable companies are more able to serve their debt and dividend payments and do not need to issue debt or equity to raise cash for investment.

The results of this study provide evidence that the pecking order theory and the agency theory play an important role in understanding financial decisions. This is in accordance with the conclusions drawn for other emerging markets in Al-Najjar (2013). The results from this study have also evidenced that monitoring plays an important role in sample companies' cash holding decision making. But it is unsure exactly how this monitoring manifests from a corporate governance perspective. A different approach to this finding could shed more light into monitoring and monitoring costs in Turkey. The study found dividend pay-outs to have a higher impact on cash holdings than found for other countries. Previous research has shown that most emerging and EMU countries' dividend impact closely circles around 0, some positive, some negative (Al-Najjar 2013, Ferreira and Vilela 2004). It could be interesting to see how Turkey differs from its peers and close neighbors. Not only for dividends, but also as whole. The literature is scarce when it comes to comparative studies for Turkey and other countries. Most studies focusing on emerging countries include only the BRIC countries and leave Turkey aside. A further look into this could provide the literature with crucial information for Turkey.

REFERENCES

Al-Najjar, B. "The Interrelationship between Capital Structure and Dividend Policy: Empirical Evidence from Jordanian Data", **International Review of Applied Economics**, Vol.: 25, No.: 2, 2011, pp. 209-224.

Al-Najjar, B., Y. Belghitar. "Corporate Cash Holdings and Dividend Payments: Evidence from Simultaneous Analysis", **Managerial and Decision Economics**, Vol.: 32, No.: 4, 2011, pp. 231-241.

Al-Najjar, B. "The Financial Determinants of Corporate Cash Holdings: Evidence from Some Emerging Markets", **International Business Review**, Vol.: 22, No.: 1, 2013, pp. 77-88.

Almeida, H., M. Campello, M.S. Weisbach. **The Demand for Corporate Liquidity: A Theory and Some Evidence**, (Working Paper), University of Illinois and New York University, 2002.

Anjum, S., Q.A. Malik. "Determinants of Corporate Liquidity – An Analysis of Cash Holdings", **Journal of Business and Management**, Vol.: 7, No.: 2, 2013, pp. 94-100.

Bastos, R., J. Pindado. "Trade Credit During a Financial Crisis: A Panel Data Analysis", **Journal of Business Research**, Vol.: 66, No.: 5, 2013, pp. 614-620.

Bates, T., K. Kahle, R. Stulz. "Why Do U.S. Companies Hold So Much More Cash than They Used To?", **Journal of Finance**, Vol.: 64, No.: 5, 2009, pp. 1985-2021.

Baumol, W. J. "The Transactions Demand for Cash: An Inventory Theoretic Approach", **Quarterly Journal of Economics**, Vol.: 66, 1952, 545-556.

Bigelli, M., J. Vidal. :**Cash Holdings in Private Companies**, (Working Paper), University of Bologna Universidad Politecnica de Cartagena, 2009.

Bodie, Z., A. Kane, A.J. Marcus. **Essentials of Investments**, McGraw-Hill Irwin, New York, 2004.

Booth, L., V. Aivazian, A. Demirguc-Kunt, V. Maksimovic. "Capital Structures in Developing Countries", **Journal of Finance**, Vol.: 56, 2001, pp. 87-130.

Brealey, R. A., S. C. Myers, A. J. Marcus. **Fundamentals of Corporate Finance Fifth Edition**, McGraw-Hill Irwin, New York, 2007.

Daher, M. **The Determinants of Cash Holdings in UK Public and Private Companies**, (Thesis), Lancaster University Management School, 2010.

Dittmar, A., J. Mahrt-Smith, H. Servaes."International Corporate Governance and Corporate Cash Holdings", **Journal of Financial and Quantative Analysis**, Vol.: 38, No.: 1, 2003, pp. 111-133.

European Commission, "Turkey – EU bilateral trade and trade with the world", **Trade Document**, 23.5.2013, http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_113456.pdf

European Commission, "Directives and regulations – tractors", http://ec.europa.eu/enterprise/sectors/automotive/documents/directives/tractors/

Faccio, M., A.M. Lasfer. "Do Occupational Pension Funds Monitor Companies in Which They Hold Large Stakes?", **Journal of Corporate Finance**, Vol.: 6, 2000, pp. 71-110.

Faulkender, M. W. **Cash Holdings Among Small Businesses**, (Working Paper), University of Maryland, 2002.

Ferreira, A., S. Vilela. "Why Do Companies Hold Cash? Evidence from EMU Countries", **European Financial Management**, Vol.: 10, No.: 2, 2004, 295-319.

Foley, C.F., J. Hartzell, S. Titman, G. Twite. "Why Do Companies Hold So Much Cash? A Tax-Based Explanation", **Journal of Financial Economics**, Vol.: 86, No.: 3, 2007, pp. 579-607.

Franks, J., C. Mayer, L. Renneboog. "Who Disciplines Management in Poorly Performing Companies?", **Journal of Financial Intermediation**, Vol.: 10, 2001, pp. 209-248.

Gogineni, S., S.C. Linn, P.K. Yadav. **Evidence on the Determinants of Cash Holdings By Private and Public Companies**, (Working Paper), University of Wyoming and University of Oklahoma, 2012.

Hannan, M.T., J. Freeman. "Structural Inertia and Organizational Change", **American Sociological Review**, Vol.: 49, No.: 2, 1984, pp. 149-164.

International Financial Reporting Standards Foundation, "IFRS 13 Fair Value Measurement", **Technical Summary**, 01.2013, http://www.ifrs.org/IFRSs/IFRS-technical-summaries/Documents/English%20Web%20Summaries%202013/IFRS%2013.pdf

Investment Support and Promotion Agency of Turkey, "Turkish Energy Industry Report", **Industry Report**, 08.2010, http://www.invest.gov.tr/en-US/infocenter/publications/Documents/ENERGY.INDUSTRY.PDF

Jensen, M., W. Meckling. "Theory of the Company: Managerial Behavior, Agency Costs and Ownership Structure", **Journal of Financial Economics**, Vol.: 3, 1976, pp. 305-360.

Keynes, John Maynard. **The General Theory of Employment, Interest and Money**, Macmillan, London, 1936.

Khokhar, R. **Window Dressing in Corporate Cash Holdings: Evidence from Quarterly Financial Statements**, (Working Paper), McMaster University, 2012.

Kim, C., D.C. Mauer, A.E. Sherman. "The Determinants of Corporate Liquidity: Theory and Evidence", **Journal of Financial and Quantative Analysis**, Vol.: 33, 1998, 335-359.

Koh, J.H., S. Jang. **Cash Holdings of Hotel Companies: The Financial Constraints Perspective**, (Dissertation), University of Massachusetts Amherst and Purdue University. 2011.

Koshio, S., J.N. de Sales Cia. **The Determinants of Corporate Cash Holdings in Brazil**, (Working Paper), EAESP, 2003.

Kraus, A., R.H. Litzenberger. "A State-Preference Model of Optimal Financial Leverage", **The Journal of Finance**, Vol.: 28, 1973, pp. 911-922.

Lee, Y., K. Song. **Why have East Asian Companies Increased Cash Holdings so much after the Asian Financial Crisis?** (20th Australian Finance and Banking Conference Paper), 2007.

Messner, W. "The Practice of Cash Pooling", **Banking and Information Technology**, The Information Management Group, 2001

Menyah, K. "International Cash Management in the 21st Century: Theory and Practice", **Managerial Finanace**, Vol.: 31, No.: 100, 2005, pp. 3-17.

Miller, M.H., Orr, D. "A Model of the Demand for Money by Companies", **Quarterly Journal of Economics**, Vol.: 80, No.: 3, 1966, pp. 413-435.

Myers, S.C. "The capital Structure Puzzle", **Journal of Finance**, Vol.: 39, No.:3, 1984, pp. 575-592.

Myers, S.C., N.S. Majluf. "Corporate Financing and Investment Decisions When Companies Have Information That Investors Do Not Have", **Journal of Financial Economics**, Vol.: 13, 1984, pp. 187-221.

Ogundipe L.O., S.E. Ogundipe, S.K. Ajao. "Cash Holding and Company Characteristics: Evidence from Nigerian Emerging Market", **Journal of Business, Economics and Finance**, Vol.: 1, No.: 2, 2012, pp. 45-58.

Olson, Mancur. **The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities**, Yale University Press, 1982.

Opler, T., L. Pinkowitz, R. Stulz, R. Williamson. "The Determinants and Implications of Corporate Cash Holdings", **Journal of Financial Economics**, Vol.: 52, 1999, pp. 3-46.

Ozkan, A., N. Ozkan. "Corporate Cash Holdings: An Empirical Investigation of UK Companies", **Journal of Banking and Finance**, Vol.: 28, 2004, pp. 2103-2134.

Petersen, M.A., R.G. Rajan. "The Benefits of Lending Relationships: Evidence from Small Business Data", **Journal of Finance**, Vol.: 49, 1994, pp. 3-37.

Pinkowitz, L., R.M. Stulz, R. Williamson. **Multinationals and the High Cash Holdings Puzzle**, (Working Paper), NBER, 2012.

Rehn, E. **Effects of Working Capital Management on Company Profitability**, (Thesis), Hanken School of Economics, 2012.

Ramirez, A., S. Tadesse. "Corporate Cash Holdings, Uncertainty Avoidance and Multinationality of Companies", **International Business Review**, Vol.: 18, 2009, pp. 387-403.

Rajan, R.G., L. Zingales. "What Do We Know About Capital Structure? Some Evidence from International Data", **Journal of Finance**, Vol.: 50, 1995, pp. 1421-1460.

Schuite, S., V. Loannidou. **Cash Holdings in German Companies**, (Working Paper), Tilburg University, 2012.

Semerci, A., "The Effects of Agricultural Subsidies Applied in Turkey on Sunflower Cultivation Area and the Producers' Income", **African Journal of Agricultural Research**, Vol.: 8, 2013, pp. 1059-1065.

Shleifer, A., R.W. Vishny. "Large Shareholders and Corporate Control", **Journal of Political Economy**, Vol.: 94, No.: 3, 1986, pp. 461-488.

Shyam-Sunder, L., S.C. Myers. "Testing Static Trade-Off Against Pecking Order Models of Capital Structure", **Journal of Financial Economics**, Vol.: 51, 1999, pp. 219-244.

Stone, A., B. Gup. **Corporate Cash Holdings and Interest Rates: 1970-2011**, (Working Paper presented at Midwest Finance Association), 2013.

Teruel, P.J., P. Solano. "On the Determinants of SME Cash Holdings: Evidence from Spain", **Journal of Business Finance and Accounting**, Vol.: 35, No.: 1-2, 2008, pp. 127-149.

The Economist. **Guide To Cash Management: How To Avoid a Business Credit Crunch**, Profile Books Ltd., London, 2012.

Tong, Z. **Risk Reduction as a CEO's Motive for Corporate Cash Holdings**, (Working Paper), University of Exeter, 2006.

Tripsas, M., G. Gavetti. "Capabilities, Cognition and Inertia: Evidence from Digital Imaging", **Strategic Management Journal**, Vol.: 21, No.: 10/11, 2000, pp. 1147-1161.

United Nations World Tourism Organization, "UNWTO Tourism Highlights", **Booklet**, 2013, http://dtxtq4w60xqpw.cloudfront.net/sites/all/files/pdf /unwto_highlights13_en_hr_0.pdf
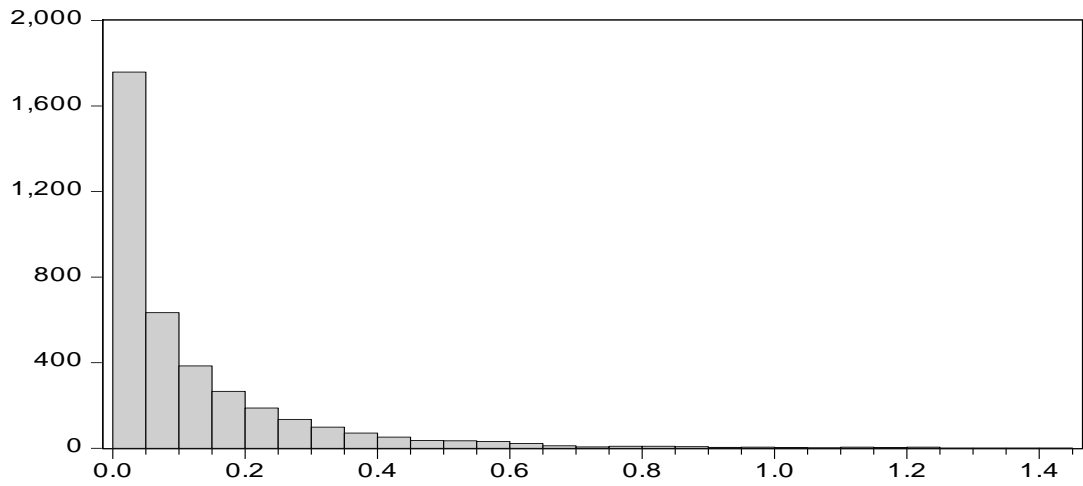
APPENDİX

	CASH	CASH2	DIV	L_ASSETS	LEVERAGE	LIQUIDITY	PROFIT ABILITY	CAPEX	AGE	MULTINAT IONALITY	INTEREST _RATE	INVESTM ENT_OP	DISPERSI ON	CONTRO LLER	SALES	SECTOR	YEAR
DIV	0.258265	0.137858	1.000000														
L_ASSETS	0.133057	0.003728	0.320238	1.000000													
LEVERAGE	-0.319169	-0.199153	-0.241367	0.112294	1.000000												
LIQUIDITY	-0.053474	-0.083338	0.139400	-0.204642	-0.444280	1.000000											
PROFITABILITY	0.066619	0.037825	0.085974	0.058204	-0.125909	0.111493	1.000000										
CAPEX	-0.018881	-0.028452	0.020411	0.070353	-0.000908	-0.063521	0.013391	1.000000									
AGE	-0.034741	-0.012074	0.068254	0.257277	-0.057021	0.083845	0.020288	0.007240	1.000000								
MULTINATIONALITY	-0.018706	-0.037983	0.016904	0.126471	0.001697	0.092930	0.011316	-0.045882	0.194496	1.000000							
INTEREST_RATE	-0.053369	-0.004597	0.051946	-0.090070	-0.045801	0.072942	0.021462	0.002363	0.025327	0.041567	1.000000						
INVESTMENT_OP	-0.034345	-0.030341	-0.020138	-0.007994	0.031090	-0.025893	0.007095	0.014058	-0.034249	-0.028691	-0.028409	1.000000					
DISPERSION	-0.013496	0.004838	-0.040498	-0.211278	-0.010829	-0.009385	-0.002877	0.026336	-0.165668	-0.199351	0.000254	0.028975	1.000000				
CONTROLLER	-0.078159	-0.068783	-0.009592	0.142162	0.045384	0.071775	-0.003952	0.002797	0.128186	-0.058437	-0.044024	0.011399	-0.451695	1.000000			
SALES	-0.017162	-0.037234	0.107219	0.037886	0.233059	0.039662	0.051651	-0.023603	-0.120802	-0.048966	-0.028449	0.010116	-0.025825	0.011732	1.000000		
SECTOR	0.033423	0.051319	-0.031799	-0.162668	-0.197097	-0.013208	0.013342	-0.001892	-0.109556	-0.244617	0.002256	-0.023484	0.172534	-0.190506	-0.088136	1.000000	
YEAR	0.048222	0.006540	-0.040393	0.099603	0.060349	-0.068421	-0.035856	0.017018	-0.030272	-0.045209	-0.927480	0.046062	0.006724	0.043441	0.073252	-0.003433	1.000000

Appendix 2: Distribution of Cash Observations
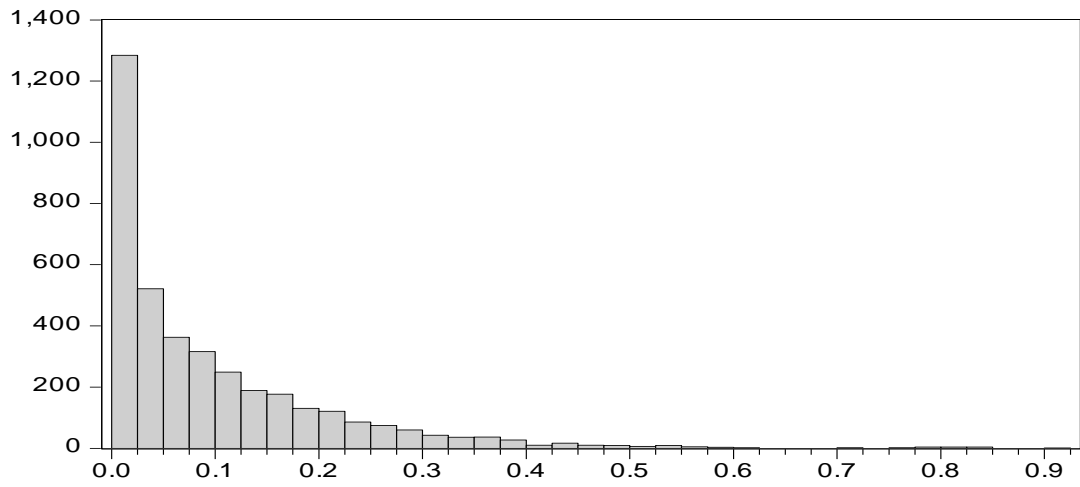
Appendix 3: Distribution of Cash2 Observations

Appendix 4: Distribution of Capital Expenditures Observations
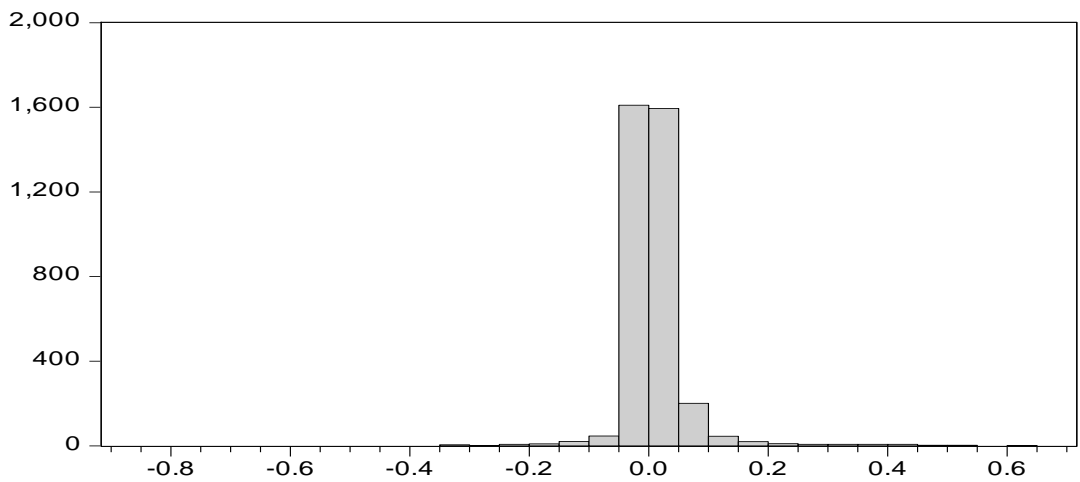
Appendix 5: Distribution of Company Age Observations
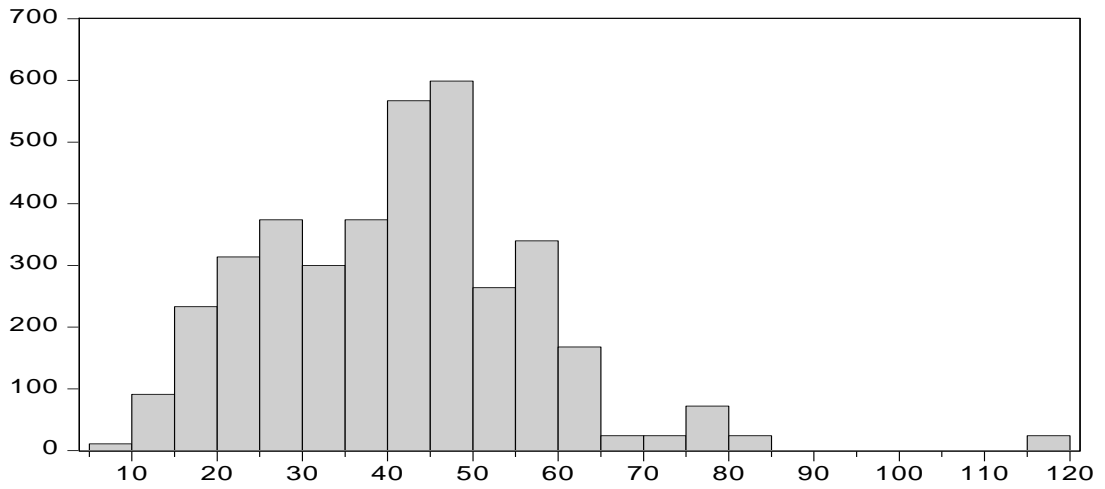
Appendix 6: Distribution of Company Size Observations
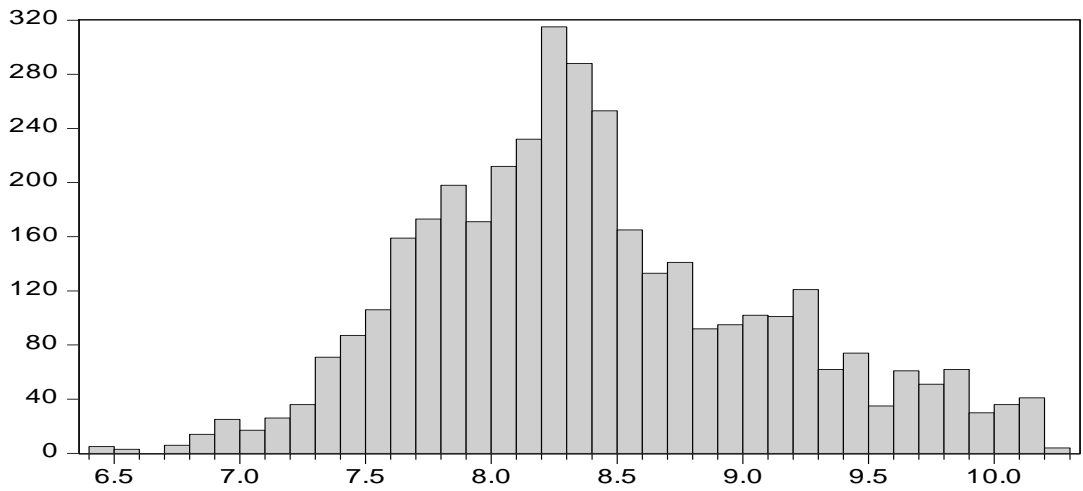
Appendix 7: Distribution of Foreign Sales Observations
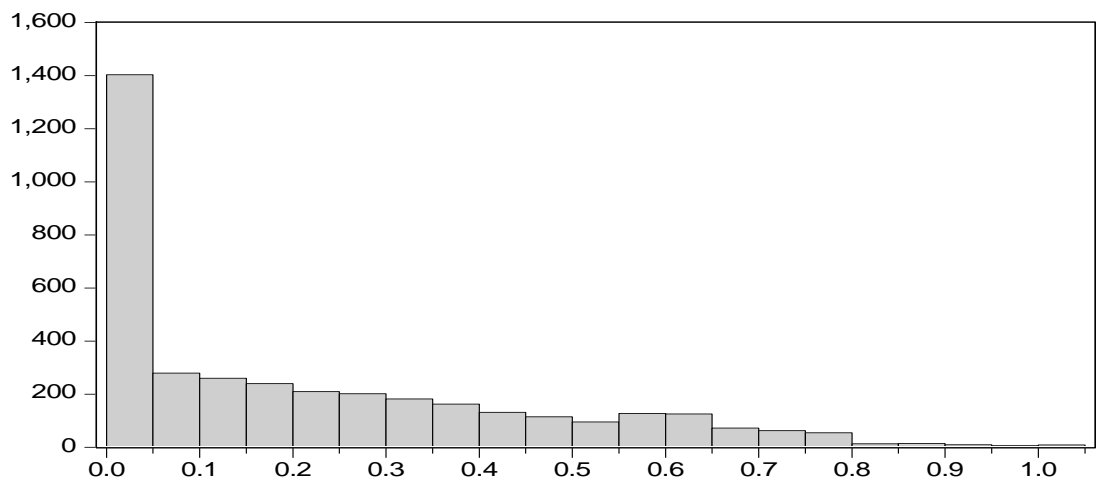
Appendix 8: Distribution of Investment Opportunities Observations
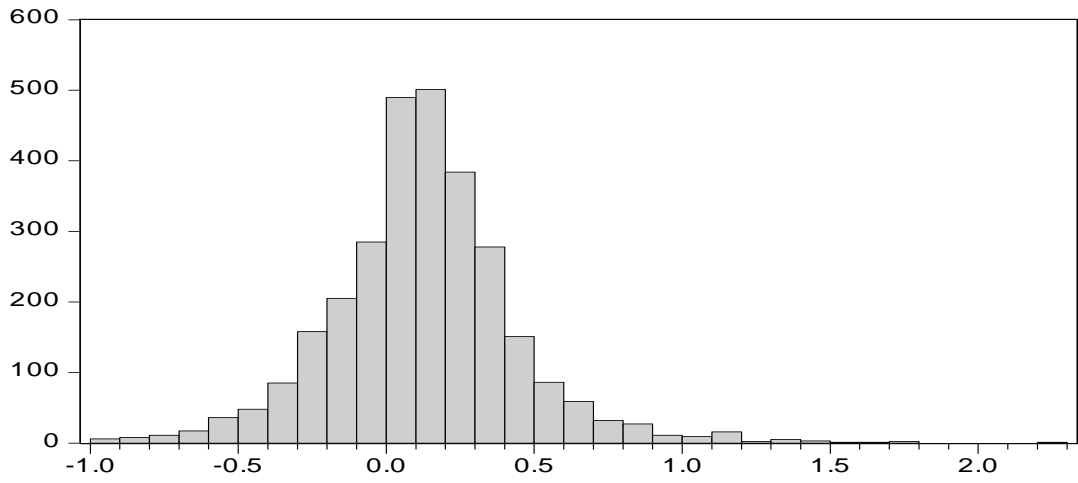
Appendix 9: Distribution of Leverage Observations

Appendix 10: Distribution of Liquid Asset Substitutions Observations

Appendix 11: Distribution of Majority Ownership Size Observations

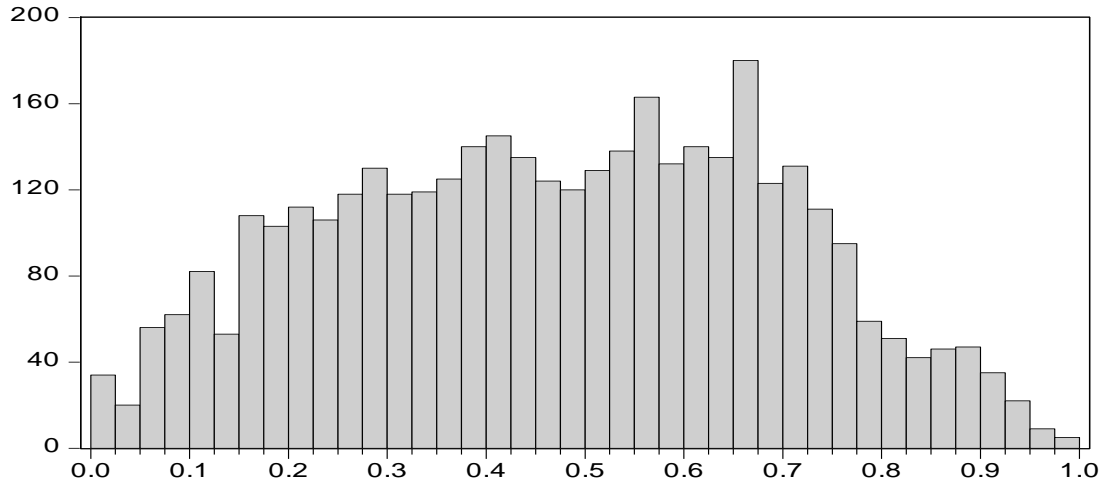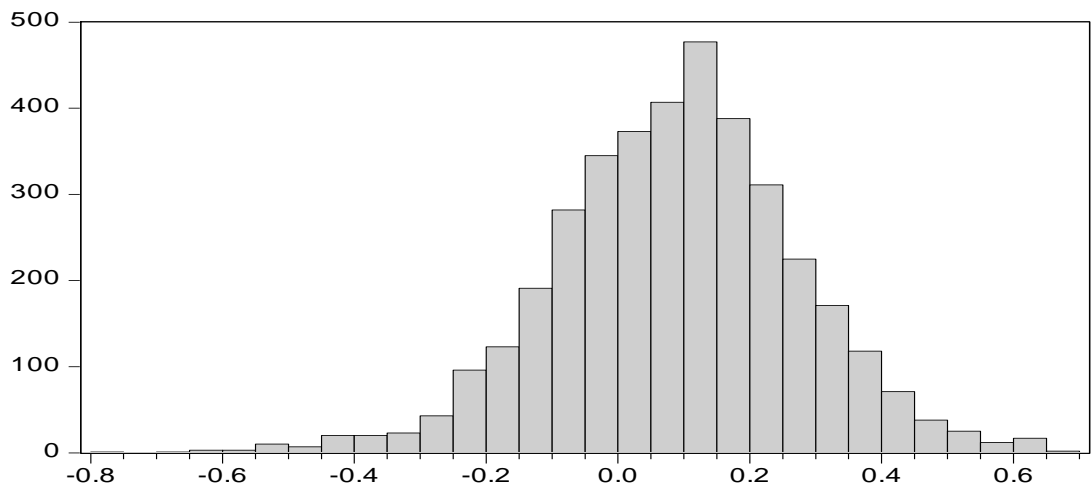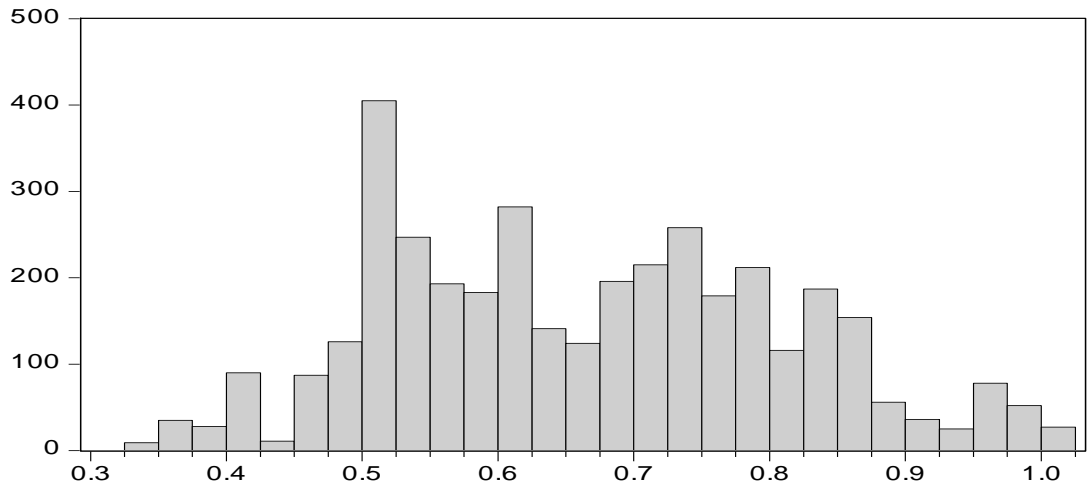**Appendix 12:** Distribution of Profitability Observations
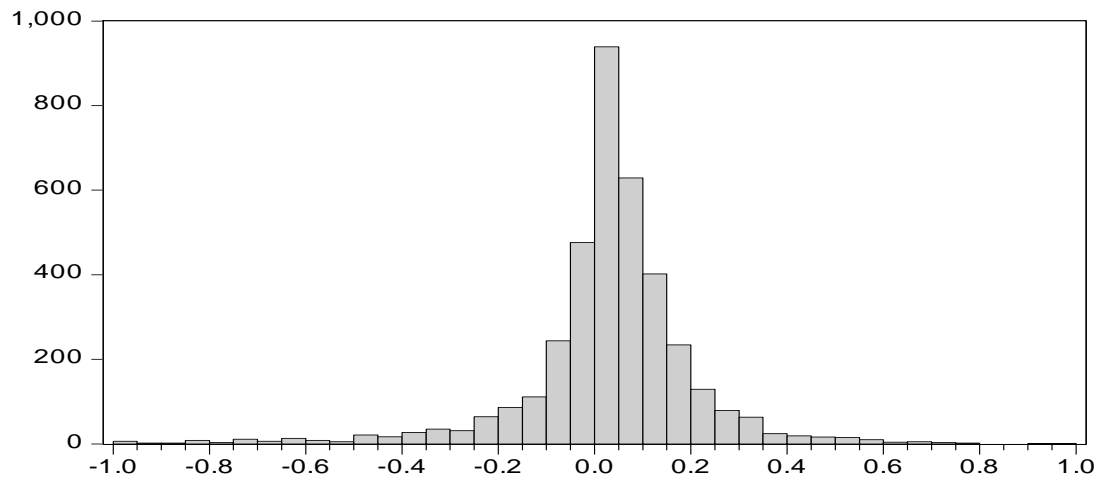
Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Abana Elektromeka	ABANA	No Longer Listed	No Longer Listed	Capital Goods	Engines and Engine Parts
Acibadem Saglik Hizmetleri	ACIBD	No Longer Listed	No Longer Listed	Care Services	Hospital Services
Adana Cimento	ADANA	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Adel Kalemcilik	ADEL	Manufacturing Industry	Other Manufacturing	Slow Moving Consumer Goods	Office Supplies
Adese Alisveris Merkezleri	ADESE	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Retail	Shopping Malls
Anadolu Efes Biracilik ve Malt	AEFES	Manufacturing Industry	Beverages	Fast Moving Consumer Goods	Drinks
AFM Uluslararasi Film Produksiyon	AFMAS	Education, Health, Sports and Other Social Services	Social Services	Media	Cinemas
Afyon Cimento	AFYON	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Akal Tekstil	AKALT	No Longer Listed	No Longer Listed	Textiles	Yarns and Fabrics
Akcansa Cimento	AKCNS	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Aksu	AKIPD	No Longer Listed	No Longer Listed	Textiles	Yarns and Fabrics
Aksa Akrilik Kimya	AKSA	Manufacturing Industry	Chemical Industry	Textiles	Acrylic Textiles
Alarko Carrior	ALCAR	Manufacturing Industry	Metal Items	Electronic Appliances	
Alcatel-Lucent Teletas Telekomunikasyon	ALCTL	Technology	Informatics	Telecom	Infrastructure
Alkim Kagit	ALKA	Manufacturing Industry	Paper and Paper Products	Fast Moving Consumer Goods	Paper Products
Alkim Alkali Kimya	ALKIM	Manufacturing Industry	Other Chemical Products	Commodities	Sodium Sulfate
Altinyildiz Mensucat ve Konfeksiyon Fabrikalari	ALTIN	Manufacturing Industry	Weaving	Textiles	Apparel
Andaolu Cam	ANACM	Manufacturing Industry	Glass and Glass Products	Capital Goods	Bottles
Anal Telekomunikasyon Elektronik Sistemleri	ANELT	Technology	Informatics	Telecom	Infrastructure
Arat Tekstil	ARAT	No Longer Listed	No Longer Listed	Textiles	Apparel
Arcelik	ARCLK	Manufacturing Industry	Electronic Appliances	Electronic Appliances	
Arena Bilgisayar	ARENA	Technology	Informatics	Technology	IT
Armada Bilgisayar Sistemleri	ARMDA	Technology	Informatics	Technology	IT
Arsan Tekstil	ARSAN	Manufacturing Industry	Weaving	Textiles	Yarns and Fabrics
Aselsan Elektronik	ASELS	Technology	Defense Contracting	Technology	Military Grade Economics

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Aslan Cimento	ASLAN	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Anadolu Isuzu Otomotiv Sanayi	ASUZU	Manufacturing Industry	Automotive Industry	Automotive	Trucks and light buses
Akin Tekstil	ATEKS	Manufacturing Industry	Weaving	Textiles	Apparel
Altinyunus Cesme Turistik	AYCES	Wholesale and Retail Trade, Hotels and Restaurants	Restaurants and Hotels	Tourism	Hotels, Parks, ...
Aygaz	AYGAZ	Manufacturing Industry	Various Petrol and Coal Derivatives	Energy	Fossil Fuels
Bagfas Bandirma Gubre Fabriklari	BAGFS	Manufacturing Industry	Chemical Industry	Capital Goods	Fertilizers
Bak Ambalaj	BAKAB	Manufacturing Industry	Printing, Press and Related	Capital Goods	Packaging
Banvit Bandirma Vitaminli Yem	BANVT	Manufacturing Industry	Food Production	Agriculture	Poultry
Grundig Elektronik	BEKO	Manufacturing Industry	Electronic Appliances	Electronic Appliances	
Bosch Fren Sistemleri	BFREN	Manufacturing Industry	Automotive Industry	Automotive	Components
Bim Birlesik Magazalar	BIMAS	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Retail	Supermarket
Bisas Tekstil	BISAS	Manufacturing Industry	Weaving	Textiles	Yarns and Fabrics
Bizim Toptan Satis Magazalari	BIZIM	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Retail	Supermarket
Bimeks Bilgi Islem	BMEKS	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Electronic Appliances	
Bolu Cimento	BOLUC	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Bossa Ticaret	BOSSA	Manufacturing Industry	Weaving	Textiles	Apparel
Boyner Buyuk Magazacilik	BOYNR	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Retail	Department Stores
Brisa Bridgestone Sabanci Lastik	BRISA	Manufacturing Industry	Elastic Products	Automotive	Tires
Birko Birlesik Koyunlulular Mensucat	BRKO	Manufacturing Industry	Weaving	Textiles	Yarns and Fabrics
Birlik Mensucat	BRMEN	Manufacturing Industry	Weaving	Textiles	Home Textiles
Borova Yapi Endustri	BROVA	Construction and Public Works	Construction and Public Works	Construction	
Borusan Mannesmann Boru	BRSAN	Manufacturing Industry	Iron and Steel	Capital Goods	Construction Materials
BSH Ev Aletleri	BSHEV	Manufacturing Industry	Electronic Appliances	Electronic Appliances	
Batisoke Soke Cimento	BSOKE	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Baticim Bati Anadolu Cimento	BTCIM	Manufacturing Industry	Stone and Soil Based	Commodities	Cement

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Bursa Cimento	BUCIM	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Burcelik Bursa Celik Dokum	BURCE	Manufacturing Industry	Iron and Steel	Capital Goods	Smelting, Moulding and Casting
Burcelik Vana	BURVA	Manufacturing Industry	Iron and Steel	Capital Goods	Valves
Boyasan Tekstil	BYSAN	No Longer Listed	No Longer Listed	Textiles	Dying, Printing and Stamping
Carrefoursa Carrefour Sabanci	CARFA	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Retail	Supermarket
Coca-Cola Icecek	CCOLA	Manufacturing Industry	Food Production	Fast Moving Consumer Goods	Drinks
Celik Halat ve Tel	CELHA	Manufacturing Industry	Iron and Steel	Capital Goods	Rope, Wiring and Tubing
Cemas Dokum	CEMAS	Manufacturing Industry	Iron and Steel	Capital Goods	Smelting, Moulding and Casting
Cemtas Celik Makina	CEMTS	Manufacturing Industry	Iron and Steel	Capital Goods	Smelting, Moulding and Casting
Cimsa Cimento	CIMSA	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Celebi Hava Servisi	CLEBI	Manufacturing Industry	Transportation	Transportation	Airport Services and Exploitation
Camis Lojistik Hizmetleri	CMLOJ	No Longer Listed	No Longer Listed	Transportation	Logistics
Componenta Dokumculuk	COMDO	Manufacturing Industry	Iron and Steel	Automotive	Components
Dagi Giyim	DAGI	Manufacturing Industry	Clothing Wear Products (Excluding Shoes)	Textiles	Apparel
Denizli Cam	DENCM	Manufacturing Industry	Glass and Glass Products	Slow Moving Consumer Goods	Glassware
Dentas Ambalaj ve Kagit	DENTA	Manufacturing Industry	Paper and Paper Products	Capital Goods	Packaging
Derimod Konfeksiyon Ayakkabi	DERIM	Manufacturing Industry	Leather, Leatherlike and Corque Products	Slow Moving Consumer Goods	Leather Products
Despec Bilgisayar	DESPC	Technology	Informatics	Technology	Hardware and Related Services
Deva Holding	DEVA	Manufacturing Industry	Other Chemical Products	Care Services	Pharmaceutical
Datagate Bilgisayar Malzemeleri	DGATE	Technology	Informatics	Technology	Hardware and Related Services
Dogan Gazetecilik	DGZTE	Manufacturing Industry	Printing, Press and Related	Media	Newspapers
Ditas Dogan Yedek Parca Imalat ve Teknik	DITAS	Manufacturing Industry	Automotive Industry	Automotive	Components
Demisas Dokum Emaye Mamulleri	DMSAS	Manufacturing Industry	Iron and Steel	Capital Goods	Smelting, Moulding and Casting
Dogus Otomotiv Servis	DOAS	Wholesale and Retail Trade, Hotels and Restaurants	Wholesale Trade	Retail	Cars
Dogan Burda Dergi Yayincilik	DOBUR	Manufacturing Industry	Printing, Press and Related	Media	Magazines

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Duran Dogan Basim ve Ambalaj	DURDO	Manufacturing Industry	Printing, Press and Related	Capital Goods	Packaging
Dogan Yayin Holding	DYHOL	Manufacturing Industry	Printing, Press and Related	Media	Bookpublishing
Dyo Boya Fabrikalari	DYOBY	Manufacturing Industry	Other Chemical Products	Capital Goods	Paint
Ege Endustri	EGEEN	Manufacturing Industry	Automotive Industry	Automotive	Components
Ege Gubre	EGGUB	Manufacturing Industry	Chemical Industry	Capital Goods	Fertilizers
Ege Profil	EGPRO	Manufacturing Industry	Previously Finished Plastic Products	Capital Goods	Construction Materials
Ege Seramik	EGSER	Manufacturing Industry	Pots, Ceramics, China, Porselin	Capital Goods	Construction Materials
Ekiz Yag ve Sabun	EKIZ	Manufacturing Industry	Food Production	Fast Moving Consumer Goods	Oils
Emek Elektrik Endustri	EMKEL	Manufacturing Industry	Electronic Appliances	Energy	Infrastructure
Eminis Ambalaj	EMNIS	Manufacturing Industry	Metal Items	Capital Goods	Packaging
Enka Insaat	ENKAI	Construction and Public Works	Construction and Public Works	Construction	
Erbosan Erciyas Boru	ERBOS	Manufacturing Industry	Iron and Steel	Capital Goods	Pipes and Rods
Eregli Demir ve Celik Fabrikalari	EREGL	Manufacturing Industry	Iron and Steel	Capital Goods	Smelting, Moulding and Casting
Ericom Telekomunikasyon ve Enerji Teknolojileri	ERICO	Technology	Informatics	Capital Goods	Batteries (Industrial, Cars and Services)
Escort Teknoloji Yatirim	ESCOM	Technology	Informatics	Retail	Computer
Fenis Aluminyum	FENIS	Manufacturing Industry	Other Metals	Capital Goods	Smelting, Moulding and Casting
Federal-Mogul Izmit Piston ve Pim Uretim Tesisleri	FMIZP	Manufacturing Industry	Automotive Industry	Automotive	Components
Ford Otomotiv	FROTO	Manufacturing Industry	Automotive Industry	Automotive	Cars
Favori Dinlenme Yerleri	FVORI	Wholesale and Retail Trade, Hotels and Restaurants	Restaurants and Hotels	Tourism	Hotels, Parks, ...
Cimsan Gediz Iplik ve Mensucat	GEDIZ	Manufacturing Industry	Weaving	Textiles	Yarns and Fabrics
Gentas Genel Metal	GENTS	Manufacturing Industry	Wood Products and Furniture	Capital Goods	Construction Materials
Gersan Elektrik	GEREL	Manufacturing Industry	Electronic Appliances	Energy	Infrastructure
Goodyear Lastikleri	GOODY	Manufacturing Industry	Elastic Products	Automotive	Tires
Gubre Fabrikalari	GUBRF	Manufacturing Industry	Chemical Industry	Capital Goods	Fertilizers
Hateks Hatay Tekstil Isletmeleri	HATEK	Manufacturing Industry	Weaving	Textiles	Multipurpose Textiles

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Hektas	HEKTS	Manufacturing Industry	Other Chemical Products	Agriculture	Various
Hurriyet Gazetecilik ve Matbaacilik	HURGZ	Manufacturing Industry	Printing, Press and Related	Media	Newspapers
Haznader Refrakter	HZNDR	Manufacturing Industry	Stone and Soil Based	Capital Goods	Construction Materials
Idas Istanbul Doseme	IDAS	Manufacturing Industry	Weaving	Slow Moving Consumer Goods	Furniture
Ihlas Ev Aletleri Imalat	IHEVA	Manufacturing Industry	Metal Items	Electronic Appliances	
Ihlas Gazetecilik	IHGZT	Manufacturing Industry	Printing, Press and Related	Media	Newspapers
Ihlas Holding	IHLAS	No Longer Listed	No Longer Listed	Electronic Appliances	
Ihlas Madencilik	IHMAD	Mining	Mining	Commodities	Mining
Indeks Bilgisayar Sistemleri Muhendislik	INDES	Technology	Informatics	Technology	Hardware and Related Services
Intema Insaat ve Tesisat Malzemeleri	INTEM	Wholesale and Retail Trade, Hotels and Restaurants	Wholesale Trade	Slow Moving Consumer Goods	Kitchens, Bathrooms, ...
Izmir Demir Celik	IZMDC	Manufacturing Industry	Iron and Steel	Capital Goods	Smelting, Moulding and Casting
Izocam	IZOCM	Manufacturing Industry	Glass and Glass Products	Capital Goods	Construction Materials
Kaplamin Ambalaj	KAPLM	Manufacturing Industry	Paper and Paper Products	Capital Goods	Packaging
Karel Elektronik	KAREL	Technology	Informatics	Telecom	Infrastructure
CLK Holding	KARKM	No Longer Listed	No Longer Listed	Capital Goods	Mining and Drilling Products and Services
Karsan Otomotiv	KARSN	Manufacturing Industry	Automotive Industry	Automotive	Trucks and light buses
Kartonsan Karton	KARTN	Manufacturing Industry	Paper and Paper Products	Capital Goods	Packaging
Katmerciler Arac Ustu Ekipman	KATMR	Manufacturing Industry	Automotive Industry	Automotive	Trucks and light buses
Kiler Alisveris Hizmetleri Gida	KILER	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Fast Moving Consumer Goods	Frozen and Canned Wares
Klimasan Klima	KLMSN	Manufacturing Industry	Electronic Appliances	Electronic Appliances	
Koza Anadolu Metal Madencilik	KOZAA	Mining	Mining	Commodities	Mining
Koza Altin Isletmeleri	KOZAL	Mining	Mining	Commodities	Precious Stones
Kardemir Karabuk Demir Celik	KRDMD	Manufacturing Industry	Iron and Steel	Capital Goods	Smelting, Moulding and Casting
Kron Telekomunikasyon Hizmetleri	KRONT	Technology	Informatics	Technology	Hardware and Related Services
Latek Lojistik	LATEK	Transportation, Telecommunication and Storage	Transportation	Transportation	Logistics

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Link Bilgisayar Sistemleri Yazilimi ve Donanimi	LINK	Technology	Informatics	Technology	Software Development
Lokman Hekim Engurusag Saglik, Turizm, Egitim Hizmetleri ve Insaat Taahhut	LKMNH	Education, Health, Sports and Other Social Services	Medical Services	Care Services	Hospital Services
Marmaris Altinyunus Turistik Tesisler	MAALT	Wholesale and Retail Trade, Hotels and Restaurants	Restaurants and Hotels	Tourism	Hotels, Parks, ...
Makina Takim Endustri	MAKTK	Manufacturing Industry	Metal Items	Capital Goods	Drills and Screwdriver Heads
Matas Matbaacilik Ambalaj	MATAS	Manufacturing Industry	Printing, Press and Related	Slow Moving Consumer Goods	Office Supplies
Meges Boya	MEGES	No Longer Listed	No Longer Listed	Capital Goods	Paint
Mepet Metro Petrol ve Tesisleri	MEPET	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Energy	Fossil Fuels
Merko Gida	MERKO	Manufacturing Industry	Food Production	Capital Goods	Processed Foods, Concentrates, Natural Products
Metemtur Otelcilik ve Turizm Isletmeleri	METUR	Wholesale and Retail Trade, Hotels and Restaurants	Restaurants and Hotels	Tourism	Hotels, Parks, ...
Migros	MGROS	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Retail	Supermarket
Marshall Boya ve Vernik	MRSHL	Manufacturing Industry	Other Chemical Products	Capital Goods	Paint
Mutlu Aku ve Malzemeleri	MUTLU	Manufacturing Industry	Electronic Appliances	Capital Goods	Batteries (Industrial, Cars and Services)
Netas Telekomunikasyon	NETAS	Technology	Informatics	Technology	IT
Net Turizm	NTTUR	Wholesale and Retail Trade, Hotels and Restaurants	Restaurants and Hotels	Tourism	Souvenirs
Okan Tekstil	OKANT	No Longer Listed	No Longer Listed	Textiles	Apparel
Olmuksan International Paper Ambalaj	OLMKS	No Longer Listed	No Longer Listed	Capital Goods	Packaging
Otokar Otomotiv ve Savunma	OTKAR	Manufacturing Industry	Automotive Industry	Automotive	Trucks and light buses
Oysa Nigde Cimento	OYSAC	No Longer Listed	No Longer Listed	Commodities	Cement
Ozbal Celik Boru	OZBAL	Manufacturing Industry	Iron and Steel	Capital Goods	Pipes and Rods
Parsan Makina Parcalari	PARSN	Manufacturing Industry	Automotive Industry	Capital Goods	Machine Parts
Petkim Petrokimya Holding	PETKM	Manufacturing Industry	Various Petrol and Coal Derivatives	Energy	Fossil Fuels

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Pimas Plastik Insaat Malzemeleri	PIMAS	Manufacturing Industry	Previously Finished Plastic Products	Capital Goods	Construction Materials
Plastikkart Akilli Kart Iletisim Sistemleri	PKART	Technology	Informatics	Technology	Plastic Cards and Security Systems
Turk Prysmian Kablo ve Sistemleri	PRKAB	Manufacturing Industry	Electronic Appliances	Technology	Communications Wiring and Lines
CBS Printas Oto Boya ve Gerecleri	PRTAS	Manufacturing Industry	Other Chemical Products	Capital Goods	Ink and Dye
OMV Petrol Ofisi	PTOFS	Manufacturing Industry	Various Petrol and Coal Derivatives	Energy	Fossil Fuels
Ran Lojistik Hizmetleri	RANLO	Transportation, Telecommunication and Storage	Transportation	Transportation	Logistics
Reysas Tasimacilik ve Lojistik	RYSAS	Transportation, Telecommunication and Storage	Transportation	Transportation	Logistics
Saray Matbaacilik Kagitcilik Kirtasiyecilik	SAMAT	Manufacturing Industry	Printing, Press and Related	Capital Goods	Printing
Sanko Pazarlama Ithalat Ihracat	SANKO	Wholesale and Retail Trade, Hotels and Restaurants	Wholesale Trade	Textiles	Yarns and Fabrics
Sarkuysan Elektrolitik Bakir	SARKY	Manufacturing Industry	Other Metals	Capital Goods	Rope, Wiring and Tubing
Selcuk Ecza Deposu	SELEC	Wholesale and Retail Trade, Hotels and Restaurants	Wholesale Trade	Care Services	Pharmaceutical
Silverline Endustri	SILVR	Manufacturing Industry	Electronic Appliances	Electronic Appliances	
Turkiye Sise ve Cam Fabrikalari	SISE	Manufacturing Industry	Glass and Glass Products	Capital Goods	Glass and Windows
Seker Pilic ve Yem	SKPLC	Manufacturing Industry	Food Production	Agriculture	Poultry
Sonmez Filament Sentetik Iplik ve Elyaf	SONME	Manufacturing Industry	Weaving	Textiles	Yarns and Fabrics
Turkcell Iletisim Hizmetleri	TCELL	Transportation, Telecommunication and Storage	Communications	Telecom	Cell Service
Tek-Art	TEKTU	Wholesale and Retail Trade, Hotels and Restaurants	Restaurants and Hotels	Tourism	Hotels, Parks, ...
Turk Hava Yollari	THYAO	Transportation, Telecommunication and Storage	Transportation	Transportation	Aireal Transport

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Mondi Tire Kutsan Kagit ve Ambalaj	TIRE	Manufacturing Industry	Paper and Paper Products	Capital Goods	Packaging
Tofas Turk Otomobil Fabrikasi	TOASO	Manufacturing Industry	Automotive Industry	Automotive	Cars
Turcas Petrol	TRCAS	Manufacturing Industry	Various Petrol and Coal Derivatives	Energy	Fossil Fuels
Trakya Cam	TRKCM	Manufacturing Industry	Glass and Glass Products	Capital Goods	Glass and Windows
Turk Telekomunikasyon	TTKOM	Transportation, Telecommunication and Storage	Communications	Telecom	Cell Service
Turk Traktor ve Ziraat Makineleri	TTRAK	Manufacturing Industry	Metal Items	Automotive	Tractors
Turk Demir Dokum Fabrikalari	TUDDF	Manufacturing Industry	Metal Items	Electronic Appliances	
Tukas Gida	TUKAS	Manufacturing Industry	Food Production	Fast Moving Consumer Goods	Frozen and Canned Wares
Tupras-Turkiye Petrol Rafinerileri	TUPRS	Manufacturing Industry	Petroleum Refinery	Energy	Fossil Fuels
Usas Ucak Servisi	UCAK	Transportation, Telecommunication and Storage	Transportation	Transportation	Aireal Transport
UKI Konfeksiyon Imalat	UKIM	No Longer Listed	No Longer Listed	Textiles	Apparel
Ulker Biskuvi	ULKER	Manufacturing Industry	Food Production	Fast Moving Consumer Goods	Food
Untar Unal Tarim Urunleri	UNTAR	No Longer Listed	No Longer Listed	Agriculture	Various
Unye Cimento	UNYEC	Manufacturing Industry	Stone and Soil Based	Commodities	Cement
Usak Seramik	USAK	Manufacturing Industry	Pots, Ceramics, China, Porselin	Capital Goods	Interior Decoration Materials
Utopya Turizm Insaat Isletmecilik	UTPYA	Wholesale and Retail Trade, Hotels and Restaurants	Restaurants and Hotels	Tourism	Hotels, Parks, ...
Uyum Gida ve Ihtiyac Maddeleri	UYUM	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Retail	Supermarket
Uzel Makina	UZEL	No Longer Listed	No Longer Listed	Automotive	Tractors
Vakko Tekstil ve Hazir Giyim	VAKKO	Wholesale and Retail Trade, Hotels and Restaurants	Retail	Textiles	Apparel
Vanet Gida	VANET	No Longer Listed	No Longer Listed	Fast Moving Consumer Goods	Meat and Deli
Vestel Beyaz Esya	VESBE	Manufacturing Industry	Electronic Appliances	Electronic Appliances	
Vestel Elektronik	VESTL	Manufacturing Industry	Electronic Appliances	Electronic Appliances	
Viking Kagit ve Seluloz	VKING	Manufacturing Industry	Paper and Paper Products	Fast Moving Consumer Goods	Paper Products

Company Name	Company Ticker	Borsa Istanbul Sector	KAP Subsector	Study Sector Classification	Study Subsector Classification
Yaprak Sut ve Besi Ciftlikleri	YAPRK	Agriculture, Wood Products and Fishing	Agriculture, Wood Products and Fishing	Agriculture	Cattle
Yatas Yatak ve Yorgan	YATAS	Manufacturing Industry	Weaving	Slow Moving Consumer Goods	Furniture
Yunsa Yunlu	YUNSA	Manufacturing Industry	Weaving	Textiles	Wool