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Norwegian School of Economics
Bergen, June 2013

How Does the Value of Corporate Cash Holdings Depend on Corporate Governance?

A Cross-country Analysis

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Master Thesis: Finance and Economic Analysis

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1 Abstract

The objective of this thesis is to quantitatively test how corporate governance influences the value of corporate cash holdings. More specifically, we examine whether valuation of corporate cash holdings is consistent with agency theory. To perform the analysis, we employ the methods used by Pinkowitz, Stulz and Williamson (2006). The sample data is hand collected from the Worldscope database and consists of 727,681 unique firm years. After the dataset was trimmed it finally consisted of 99,079 firm years. Based on these observations, we obtain our results using regression analysis. The analysis investigates two hypotheses:

1. Cash is valued at a discount in countries with weak investor protection.
2. Dividends contribute more to firm value in countries with weaker investor protection.

We split the sample data into high investor protection and low investor protection countries, based on seven different proxies for investor protection, to investigate the differences between the low protection and high protection group.

The results of our analysis provide strong support for hypothesis 1. However, they do not provide any support for hypothesis 2.

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2 Introduction

Corporate governance deals with *"the ways in which suppliers of finance assure themselves of getting a return on their investment"* (Shleifer & Vishny, 1997). The existence and quality of legal institutions in a country is one of the most important mechanisms in this context. Proper functioning of such institutions greatly impacts the firms who operate in the country's business environment. Throughout this thesis, we investigate the role and significance of a country's legal framework in the context of corporate governance. More specifically, we will analyze investor protection and how it impacts firm valuation through the value of cash.

The first section of this thesis will discusses corporations' motives for holding cash and how these impact the value of cash. Thereafter, we present data and test design in section 4. Next, we will present our results and proceed with a discussion regarding the results'robustness. Finally, we conclude based on our findings.

3 Theory

3.1 The motives for holding cash

A thorough understanding of companies' motives for holding cash is essential in order to investigate the influence of corporate governance on valuation of cash holdings.This section summarizes the most prevalent motives for holding cash. These motives have different implications for the value of cash.

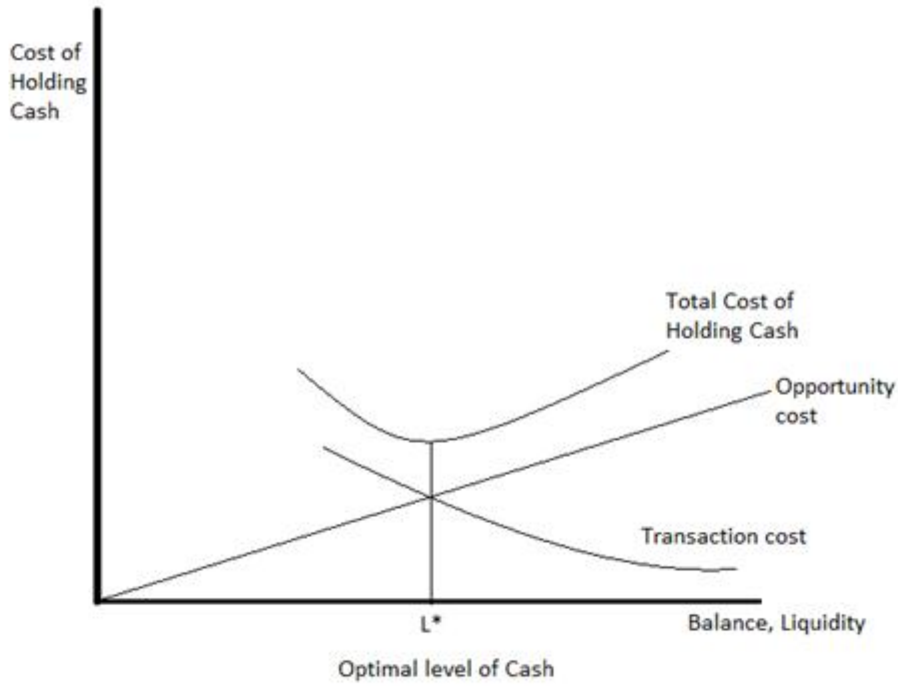
Bates, Kahle & Stulz (2009) show that, in the period from 1980 to 2006, companies in the United States have doubled the average cash ratio from 10.5% to 23.2%. They explain their findings by pointing to four general motives for holding cash:

- The transaction motive
- The precautionary motive
- The tax motive
- The agency motive

The transaction motive is based on classic financial models, such as Baumol (1952) and Miller & Orr (1966). These models derive the optimal amount of cash a firm should hold based on the transaction costs that incur when converting assets to cash in order to make current payments. It is necessary for companies to hold some cash for day to day business, because inflows and outflows of cash do not always match perfectly. By holding appropriate amounts of cash, firms can reduce transaction costs. As they will have the cash needed to make current payments, they avoid going to the market to raise cash, which would be costly. However, holding excess cash gives rise to higher opportunity costs, as these cash holdings could have been used to finance profitable projects. The transaction motive foresees an optimal level of cash where the opportunity cost of cash equals the cost of holding, as shown in this simple graph based on Baumol (1952).

Figure 1: The Transaction Motive

The transaction motive holds that cash is held to avoid transaction costs. The optimal level of cash is at the point where transation costs equals the opportuinity cost. At this point the total cost of holding cash is minimized.



The principle of economies of scale applies to the transaction motive. Thus large firms will in general hold relatively lower levels of cash (Mulligan, 1997).

The precautionary motive: In order to protect themselves against adverse shocks, firms hold cash to have easily accessible capital in times when raising capital in the market is expensive. Opler, Pinkowitz, Stulz, and Williamson (1999) find that firms with riskier cash flows hold more cash and thereby provide evidence for this motive. Their findings also support the hypothesis that firms with better investment opportunities will hold more cash, due to higher opportunity cost in the event of financial distress. Han and Qiu (2007) find that firms that are financially constrained have cash holdings that are sensitive to cash flow volatility. Because future cash flows are not diversifiable, the level of cash increases when the cash flow volatility rises. Bates, Kahle, and Stulz (2009) indicate that the precautionary motive is the main reason firms have increased their cash holdings from 1980 to 2006.

Looking at cash as liquidity for the firm, one might argue that cash and lines of credit would be substitutes. Lins, Servaes, and Tufano (2010) look at the differences between cash and lines of credit as liquidity sources. They find that cash and lines of credit are not merely substitutes but serve different purposes as liquidity sources. Lines of credit are used in good times to finance projects, while cash is used in bad times to make up for low inflows of cash. Additionaly, lower agency cost could be expected with lines of credits, as they promise a fixed part of the cash flow back to the creditors.

The tax motive arises from tax on repatriation of foreign earnings. If there are high tax costs associated with repatriating earnings, this will trigger higher levels of cash (Foley, Hartzell, Titman, and Twite, 2007). Also, if dividends are taxed, profits can be kept as cash in the firm in order to avoid this taxation, pending legislative changes.

The agency motive looks at cash held as a result of agency problems. Jensen (1986) argues that despite having poor investment opportunities, entrenched managers would keep excess cash in the firm rather than paying it out. Managers can ensure their controlling position in the firm by holding excess cash. Large cash holdings increase the amount of assets under control of the managers, enabling them to increase managerial discretion. The agency motive will increase corporate cash holdings above the level held as a result of the precautionary and the transaction motive. It is expected that cash held for this reason will have a lower value, as will be discussed further in the succeeding subsection.

3.2 The value of cash

As emphasized in the previous section, there are several motives for holding cash. The various motives will have different implications for the value of the cash holdings. Cash held due to precautionary motives will affect firm value in a different way than cash held as a result of controlling managers (the agency motive). Pinkowitz and Williamson (2007) analyze the value of corporate cash holdings. They find that the value of cash is higher when a firm's investment prospects and operating cash flows are more volatile. This indicates that cash held as a result of the precautionary motive will positively impact cash value. The same study shows that with poor investment opportunities and low volatility of investment plans and cash flows, cash will be valued at a discount. In this situation, the agency motive for holding cash dominates and the results imply that cash held as a result of this motive reduces the value of cash. Opler, Pinkowitz, Stulz, and Williamson (2001) and Lins, Servaes, and Tufano (2010) also argue that the agency motive for holding cash implies agency cost, and that an incremental dollar held for this motive will be valued at a discount. The transaction motive arises, as mentioned, from the direct cost of converting assets into cash or raising external funds. Holding everything else constant, a dollar held because of this motive is expected to have a positive impact on the valuation of cash, at worst no impact. The literature on cash held because of the tax motive is limited. Nevertheless, when cash is held to avoid taxation costs, this implies a positive value to shareholders. Further, this motive is aligned with the interest of the owners and should therefore not decrease cash value.

To conclude, the interest of the managers and shareholders are aligned when cash is held as a result of the transaction motive, the precautionary motive, and the tax motive. The agency motive constitutes a misalignment of interests and will be expected to reduce value for shareholders.

3.2.1 Agency costs of holding cash

The theoretical basis of this thesis is founded in agency theory and is similar to the foundation of the article “Does the Contribution of Corporate Cash Holdings and Dividends to Firm Value Depend on Governance? A Cross-country Analysis” by Pinkowitz, Stulz, and Williamson (2006). This thesis focuses on the agency motive for holding cash and investigates whether cash is valued at a discount in countries with lower investor protection. In countries with low investor protection one expects the agency problem to be present to a greater extent, and thereby the agency motive for holding cash to be more prominent than in countries with better investor protection. This results in cash being valued at a discount. Agency costs can emerge between managers and shareholders or between controlling shareholders and other owners. This thesis will discuss both cases.

According to agency theories, e.g. Jensen (1986), the agents, who control the firm, will always act in their own best interest. If owners’ (the principals) and managers’ (the agents) interests are not perfectly aligned the managers’ actions will be in conflict with the interests of the owners and one faces a so-called agency problem. Also, controlling shareholders’ interests may not be aligned with minority shareholders’ interests[1]. The role of corporate governance is to align the interests of the agents and the principals, and thereby eliminate the agency problem. If satisfactory corporate governance is not in place, the agents can act to achieve private benefits. Such actions will reduce corporate value. According to Myers and Rajan (1998), liquid assets are easier to turn into private benefits than are other assets, and are therefore well suited for measuring the extent of private benefits. Based on this insight, one

[1] Whether the problem is between owner and manager or controlling owner and minority shareholder, the effect and implications are the same. Managers and/or controlling shareholder could wish to hold more cash for private benefits and this reduces value for shareholders/minority shareholders.

could expect firms in countries with poor shareholder protection to overinvest in cash holdings because of the incentive to extract private benefits. Hence, shareholders should value liquid assets less in countries with poor shareholder protection compared to countries with good shareholder protection.

However, it could be argued that countries with poor investor protection are generally riskier and more volatile than countries with good shareholder protection, and that managers therefore need to hold more cash as a buffer. Holding large amounts of cash for this reason would be acting in the best interest of the owners. Thus it seems likely that the precautionary motive is strong in countries with low investor protection. Cash should then receive equal valuation in all countries, regardless of the level of shareholder protection. One could also make the case that cash should be valued at a premium in countries with poor investor protection. If low investor protection countries have poorly developed financial markets, it will make financing expensive. Lack of financing could make companies unable to pursue profitable projects. In this situation cash would contribute positively to firm value. Nevertheless, research shows that in countries with poor shareholder protection corporate governance is inferior and appropriation of private benefits is extensive (La Porta et al, 1998).

This thesis will investigate if there is a negative relation between poor shareholder protection in a country and valuation of liquid assets. In particular it will examine whether liquid assets are discounted at a higher rate in countries with poor shareholder protection. Two components will be used in determining shareholder protection: legal rights and law enforcement. These will be described in detail later.

An agency problem is present when there are difficulties with motivating one party to act in the interest of another. This is a common problem between managers and owners because their interests are not perfectly aligned. In many cases such problems will also be present between majority and minority shareholders. La Porta et al (1999) find that the controlling shareholders typically have control over the firm in excess of their rights to cash flows through pyramidal structures or through participation in management. Again, according to agency theory, the controlling shareholders or managers (the agents) will always act in their own best interest. Hence, if their interests are not perfectly aligned with those of the minority shareholders, the minority shareholders will not receive the best possible return on their investments. The controlling shareholders can expropriate the minority shareholders and take out some of the firm’s assets as private benefits of control. In other words, the controlling shareholders will maximize their own welfare at the expense of the minority shareholders. Protection of shareholder rights will determine to what extent the large shareholders can extract these private benefits of control. The cost of extracting these benefits will increase as minority shareholders receive better protection. Considering this, the external investors' valuation of a firm's cash holdings should fall when shareholder protection decreases. Given this relation, firm value ought to be lower in countries with poor shareholder protection than in countries with good shareholder protection – all other things equal.

When liquid assets are kept within a firm, the majority shareholders have the option and opportunity to use these assets to achieve private benefits. This could happen through various measures, for example tunneling[2], investing to secure their position, investing to expand their empire or outright theft. Therefore one would expect insiders to pursue a higher level of liquid assets in the firm compared to what would be the optimal amount from the minority shareholders' point of view. This is quite intuitive as it is easier to make liquid assets disappear than to make for example a plant disappear. In perfect financial markets, this would not happen, as firms would then invest in positive NPV[3] projects and pay out excess cash to the investors.

As discussed above, several motives for holding cash benefit all shareholders and one would therefore not expect controlling shareholders to extract all accessible cash. Cash can provide a buffer and increased flexibility (the precautionary motive), which enables the firm to handle shocks. Furthermore, from the controlling agents' perspective, excess cash makes it easier to retain control of the firm as one can protect oneself and the firm from having to go to financial markets to get cash. It enables the controlling agents to avoid a situation that could threaten their sovereign control of the firm. The controlling shareholder may take out private benefits from liquid assets at any time, either because it is felt that control is threatened or simply because one wants to cash out. It is therefore expected that a portion of a firm's cash holdings will be taken out as private benefits in the future and hence, cash should be valued at a discount by minority shareholders. Accordingly, we expect cash to be worth less in countries with poor shareholder protection when looking at cash holdings from the agency perspective. This is supported by Kalcheva and Lins (2007), who find that an incremental

[2] Johnson, La Porta, Lopes-de-silanes, and Shleifer (2000) define tunneling as "the transfer of assets and profits out of firms for the benefit of their controlling shareholders". An example of this is two firms A and B, where person X is the manager in A and 100% owner of B. If X decide that A should buy services from B, but B charges A an overprice, profits are tunneled out of A to the benefit of B (and X)

[3] NPV = Net present value. A project with a positive net present value will add to firm value

dollar in a country with poor shareholder protection is worth $0.76. If the managers are the largest shareholder (larger agency problems), the value is as low as $0.39.

Controlling shareholders clearly benefit from taking out cash from the firm after shares have been sold to minority shareholders. Nonetheless, they could also benefit if they were able to commit to paying out excess accumulated cash before selling shares for the first time. If they credibly commit to doing so, one would achieve a greater firm value and a higher price for offered shares, as minority shareholders would value the liquid assets at no discount. The problem however is credibility. There are many potential difficulties when trying to make such a credible commitment. First of all, there must be a clear definition of what the firm will treat as excess cash. Second, in countries where the political system functions poorly and the government is corrupt it would be possible for the firm's management to simply abandon such an agreement. In addition, the majority shareholders would have trouble committing to this policy as it would decrease their flexibility. This results in a narrower scope of action at times when action could be needed to increase firm value. Finally, countries with poor investor protection also tend to have undeveloped financial markets, which make the cost of raising capital high. Having strict rules on how much capital should be kept in the firm would force the firm to go to the capital markets more frequently resulting in high costs. This would neither benefit the majority nor the minority shareholders.

From earlier research (La Porta et al, 2000) it is clear that in countries with poor investor protection, firms face higher pressure to pay dividends than firms in countries with high investor protection. The reason for this is that in such countries the risk of cash being tunneled out of the company in benefit of the controlling shareholders is high. Cash being paid out as dividends in countries with poor investor protection is beneficial for minority shareholders, that is if the cash cannot be invested profitably inside the firm at a higher rate than what shareholders could achieve outside the firm. If one were to include taxes it would complicate this reasoning as dividends could be tax disadvantaged. However, if investor protection is sufficiently weak, it would more than offset the tax disadvantages. Thus, in addition to expecting that cash would be valued less, one would expect dividends to contribute more to firm value in countries with weak investor protection. Kalcheva and Lins (2007) find that when there is weak shareholder protection, paying dividends increases firm value and thereby support this argument.

4 Empirical Approach

We use the sample of hand collected data and the regression approach utilized by Pinkowitz, Stulz and Williamson in their paper "Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis" (2006) to test whether cash is valued at a discount in countries with poor investor protection and whether dividends receive higher valuation in countries with poor investor protection.

4.1 Data

The analysis requires firm specific data as well as country specific data on investor protection. The data we use covers the time period 1997 through 2008. We have put a considerable amount on work into collecting the data by manually downloading the firm specific data from Thomson Financial's Worldscope database using Datastream. Our sample contains 35 countries. In total we performed over 900 queries to get 727,681 observations with more than 70,000 unique firms. We downloaded the variables type (firm id), general industry classification, total assets, cash, dividends, market capitalization, total debt, research & development, interest expenses and earnings for each firm[4] for each year throughout the twelve year period. We will report the firm years 1998 through 2007. As the firm observations we use in the regressions are comprised of variables that rely on lead (t+1) and lagged (t-1) values, the first and last year only complete our 10 year period.

By using the period 1998 to 2007, the data will not be affected by the financial crisis. It could be interesting to include data from this period and investigate how the crisis affect the value of cash, but this is not within the scope of this thesis. However, the sample does include other major events with significant economic impact. Examples could be the Asian financial crisis (1998), burst of the dotcom or technology bubble (2000), terrorist attack in USA 9/11 (2001), the introduction of the Euro (1999 – 2002) and boom years for many countries. The tradeoff between a longer investigation period and the significant amount of time required to manually download the data, resulted in the final 10-year period between 1998 and 2007.

There are some concerns with using the Worldscope data. First of all the data is biased towards large firms and is thereby not comprehensive. Also, the sample includes data from many countries in which accounting standards differ and thus the data might not be identical across countries. However, there is no better way of making the data more comparable beyond what Worldscope already does.

[4] For more information on datastream codes and definition, see appendix

Table 1: Summary Statistics

Sample from Worldscope. Market to book is market value of equity plus debt divided by assets. Dividends and cash are also divided by assets. Each year the median of each variable is calculated and the reported statistic is the mean of these time-series medians in the period 1998 to 2007. The statistics on firm numbers show mean, median, minimum and maximum number of firms for the period.

	Market to book	Dividends	Cash	Mean numbers of firms per year	Median number of firms per year	Min. number of firms	Max number of firm per year.
Argentina	0.731	0.001	0.015	26.10	26	22	32
Australia	1.211	0.006	0.054	580.70	741	188	816
Austria	0.823	0.010	0.051	46.40	45.5	43	50
Belgium	0.898	0.009	0.033	58.10	60	46	65
Brazil	0.811	0.013	0.012	83.70	92	56	103
Canada	1.362	0.000	0.034	312.20	241.5	135	704
Chile	0.945	0.023	0.008	60.00	61.5	48	69
Denmark	0.997	0.009	0.054	73.30	69	63	102
Finland	1.041	0.022	0.043	69.60	70	55	82
France	0.828	0.007	0.047	374.80	390.5	275	442
Germany	0.827	0.005	0.058	326.50	338	271	353
Greece	1.261	0.008	0.032	113.20	123	79	134
Hong Kong	0.743	0.003	0.096	449.50	516.5	224	622
India	0.921	0.010	0.017	402.00	259	166	1479
Ireland	1.186	0.004	0.083	44.50	44	41	51
Italy	0.861	0.007	0.044	120.80	128.5	88	141
Japan	0.750	0.006	0.103	1453.70	1564	1105	1852
Korea (South)	0.668	0.003	0.035	535.50	466.5	204	1042
Malaysia	0.749	0.005	0.020	490.80	563.5	281	607
Mexico	0.795	0.002	0.022	23.60	25.5	9	38
Netherlands	0.997	0.009	0.041	110.10	108	105	122
New Zealand	1.117	0.029	0.015	39.60	40.5	33	47
Norway	1.006	0.006	0.083	63.40	66	46	78
Peru	0.918	0.010	0.016	18.80	20.5	11	24
Philippines	0.664	0.000	0.023	73.70	82	20	104
Portugal	0.857	0.004	0.022	20.70	21	15	26
Singapore	0.802	0.007	0.051	289.50	338.5	151	374
South Africa	0.999	0.018	0.094	102.70	108.5	64	125
Spain	0.997	0.009	0.021	72.70	73.5	65	79
Sweden	1.149	0.016	0.061	111.90	120	78	128
Switzerland	0.999	0.011	0.079	131.80	140.5	98	155
Thailand	0.809	0.010	0.032	221.60	235.5	164	263
Turkey	1.044	0.002	0.030	129.00	141	55	176
United Kingdom	1.078	0.010	0.071	1018.00	1054.5	809	1177
United States	1.387	0.000	0.067	1859.40	1882.5	1639	1988

Table 1 reports the dependent variable as well as the two main variables of interest from the Worldscope data. It includes the market value of the firm divided by book value of assets, cash and dividends both normalized by the book value of assets. The table also reports the number of firms in the sample available for each country. Compared to the dataset used by Pinkowitz, Stulz, and Williamson (2006), our dataset is much more comprehensive.

Specifically, we have significantly more observations than the original article. The lowest average number of firms per year is Peru with 18.8 and the highest is the United States with an average of 1751.2. Within the sample 20 countries have more than 100 firm observations on average per year. In comparison Pinkowitz, Stulz, and Williamson (2006) have only 13 countries with an average above 100 firms per year. From Table 1, we get the average market to book across countries of 0.949, dividends 0.008 and 0.045 for cash.

To test the two hypotheses, the sample of countries is divided into two groups: high and low investor protection. The objective is to examine whether results differ between the two groups. Investor protection has two dimensions: the rights given to investors and the enforcement of those rights. The quality of a country's institutions determines how well the rights granted to minority shareholders are respected and enforced. We use seven different measures of investor protection. Table 2 gives an overview and a description of the investor protection variables. These are identical to the measures used by Pinkowitz, Stulz and Williamson (2006).

The anti-director rights index of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) measures the rights granted to minority shareholders to protect them against being overruled by controlling shareholders. To be precise, we use Shleifers' revised index to have more up-to-date information (Harvard University Department of Economics, 2008). The index ranges from one to six, where countries with excellent shareholder protection will attain a score of six. Detailed information about the construction of this index and other variables can be found in Table 2. To measure the quality of institutions and enforcement of laws, two indices from the International Country Risk Group is used: the rule of law (*law and order)* and corruption. The formal rights of the investors will be without power in regimes where corruption is high or the judiciary in the country is poor. The rule of law assesses a country's tradition of law and order, while the corruption index assesses the risk of corruption of high government officials. The expropriation index (La Porta, Lopes-de-Silanes, Shleifer and Vishny, 1998) is used to measure the threat of "outright confiscation" or "forced nationalization". In addition we use two broader measures of investor protection. One is the International Country Risk Guide's assessment of the political risk in a country (ICRGP). It estimates the country's overall risk based on twelve components, which include corruption and the rule of law. The second is the Polcon V index (Henisz, 2000), which is a variable that measures the degree to which checks and balances are present in the political system in a country.

Table 2: Investor Protection Variables

Overview of investor protection variables: name, description, and source.

Variable	Description	Source
Anti-director index	Index that measures the degree to which shareholders rights are protected. The index is formed by adding 1 when; (1) the country allows shareholders to mail their proxy vote to the firm, (2) shareholders are not required to deposit their shares prior to the general shareholders' meeting, (3) cumulative voting or proportional representation of minorities in the board of directors is allowed, (4) an oppressed minorities mechanism is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10 percent, or (6) shareholders have preemptive rights that can be waived only by a shareholders' vote. The index ranges from zero to six.	Web page of Andrei Shleifer http://www.economics.harvard.edu/faculty/shleifer/paper
Law and Order	Assessment of the strength and impartiality of the legal system and observance of the law	World Bank (International Country Risk Guide)
Corruption	Assessment of corruption within a country that threatens development. Scale from 1 to 10, where low scores indicate that government officials are likely to demand special payments (higher corruption)	World Bank (International Country Risk Guide)
Expropriation risk Index	International Country Risk's assessment of the risk of confiscation or forced nationalization. Scale from 1 to 10, lower scores indicating higher risks.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
ICRGP	Measure of political stability based on a specific list of country risk factors	World Bank (International Country Risk Guide)
Polcon V	Measure of political concentration of power within a country	Web page of Witold Henisz http://www-management.wharton.upenn.edu/henisz/
Protecting investor ranking	Rank of based on the measurement of the strength of minority shareholder protection from misuse by directors.	Doing Business http://www.doingbusiness.org

The presence of checks and balances would imply better investor protection. The index ranges from zero (dictatorship) to one (democracy). The data from the International Country Risk Guide was obtained from the website of the World Bank, while the Polcon V index is downloaded from the Web page of Henisz. Finally, we use the assessment of Doing Business (a World Bank Group project). They investigate how well minority shareholders are protected against misuse of corporate assets by directors for personal gains (Doing Business, 2012). The assessment is comprised into a ranking of countries (Protecting investors ranking).

We use the seven different measures of investor protection discussed above to test our two hypotheses. By using a variety of measures the results are more generalizable than they would be if the analysis was limied to only one measure. In other words, the results will be more robust if we find equivalent results across different measures.

A concern that arises from using these seven measures of investor protection is that they could merely act as proxies for economic development. This would mean that we have an endogeneity problem in our regressions the results might be biased. For this reason, we want to investigate further whether the variables for investor protection are proxies for economic development. There are many different measures of financial development. We use stock market capitalization, stock market turnover, bond market capitalization (excluding government debt) and total market capitalization, all normalized by the per capita measure of GDP. Table 3 gives an overview of the variables for financial development.

Table 3: Economic/Financial Development Variables

Overview of economic and financial development variables: name, description, and source.

Variable	Description	Source
Stock Market Capitalization	Total stock market value normalized by GDP	World Bank
Stock Market Turnover	Total stock value traded divided by stock market capitalization, normalized by GDP	World Bank
Bond Market Capitalization	Total debt outstanding, excluding government debt normalized by GDP	World Federation of Exchanges and Securities Industry and Financial Markets Association
GDP (per capita)	Country gross domestic product per capita	World Bank
Total Market Capitalization	Stock Market Capitalization plus Bond Market Capitalization.	

Bond market capitalization is based on numbers from the World Federation of Exchanges. In our period we see large activity in the merger of stock exchanges. In the Nordic countries the Nordic stock exchange is the result of mergers between a number of the Nordic stock exchanges. Similarly, Euronext is a collection of merged stock exchanges in Europe. Where we do not have separate information on a country's stock exchange, we use bond market capitalization on a merged stock exchange divided by the sum of GDP as a proxy for each country[5]. Information on the bond market capitalization is not available for the Phillipines, Singapore and Ireland, so for these specific countries we use numbers from Pinkowitz, Stulz and Williamson (2006). The numbers from the United States are from the Securities Industry and Financial Association.

Table 4 gives an overview of the investor protection scores of all the countries in our sample. The numbers resemble the ones of Pinkowitz, Stulz, and Williamson (2006), but we see a general improvement in the anti-directory index scores. We observe great variation within the European countries in the score of the anti-director index. Additionally, together with the United States, the European countries score lower than the Asian countries on this variable. The European countries, especially the Nordic countries, achieve high scores on all other investor protection variables.

Looking at the scores for financial development in Table 4, the European countries in general have high scores on all measures, particularly GDP. Norway has the highest GDP per capita and is followed by most other European countries, together with the United States and Japan. In the other end of the scale we find India, the Philippines and Thailand. The United States are ranked 8th on stock market capitalization and 4th on total market capitalization. This is somewhat surprising as The United States' markets generally are considered to be the most developed.

[5] Bond market capitalization = $\sum_1^n BMC_i * \frac{GDPi}{\sum_1^n GDP_i} * \frac{1}{GDPi}$ where n equals the number of countries included in the stock exchange

Table 4: Investor Protection Scores and Financial Development Scores, Sorted by Country

The table shows the scores on the various investor protection variables and financial development variables for each country. *ICRGP*, the overall political risk measure, *Corruption*, the level of government corruption, and *Law/Order*, the law-and-order tradidion in each country are all from the International Country Risk Guide (ICRGP). Polcon V measures political stability, exprisk the expropriation risk, antidir is the anti-director index and ProtInvest is the protecting investors variable from Doing Business. In terms of the financial development variables, Scap is stock market capitalization, Sturn is stock market turnover, GDP is GDP per capita, Bcap is bond market capitalization and Tcap is total market capitalization. For all the investor protection measures a high score means better protection (e.g. lower corruption). The Protecting Investor variable shows the overall rank of the country. For the financial development measures a higher value on the different variables implies higher financial development.

	ICRGP	Corruption	Law/order	Polcon V	Exprisk	Antidir	ProtInvest, rank	Scap	Sturn	GDP	Bcap	Tcap
Argentina	72.08	4.66	5.50	0.59	5.91	2	117	0.44	0.12	5 789.038	0.04	0.48
Australia	88.76	8.13	9.72	0.87	9.27	4	70	1.14	0.73	26 881.047	0.03	1.17
Austria	89.30	8.13	10.00	0.75	9.69	2.5	100	0.29	0.37	31 527.336	0.24	0.53
Belgium	85.70	6.63	8.50	0.89	9.63	3	19	0.76	0.35	30 163.265	0.07	0.83
Brazil	66.28	5.03	4.09	0.76	7.62	5	82	0.46	0.43	4 241.773	0.03	0.49
Canada	89.17	8.50	10.00	0.86	9.67	4	4	1.14	0.67	28 800.457	0.23	1.37
Chile	79.38	6.72	8.50	0.76	7.5	4	32	0.98	0.12	6 151.481	0.18	1.16
Denmark	90.59	9.44	10.00	0.77	9.67	4	32	0.65	0.77	39 745.020	1.05	1.70
Finland	96.42	10.00	10.00	0.77	9.67	3.5	70	1.47	1.03	31 497.325	0.45	1.91
France	80.47	6.25	8.31	0.75	9.65	3.5	82	0.88	0.91	28 671.436	0.14	1.03
Germany	88.32	7.94	8.69	0.84	9.9	3.5	100	0.53	1.24	29 420.690	0.75	1.27
Greece	80.36	5.41	6.81	0.41	7.12	2	117	0.75	0.60	17 173.879	0.01	0.76
Hong Kong	77.12	6.44	8.22	0.67	8.29	5	3	3.71	0.52	25 639.831	0.33	4.04
India	67.56	4.56	7.00	0.74	7.75	5	49	0.54	1.50	606.744	0.02	0.56
Ireland	91.63	5.78	10.00	0.76	9.67	5	6	0.65	0.55	38 059.354	0.12	0.77
Italy	79.35	4.84	7.47	0.72	9.35	2	49	0.50	1.23	25 749.756	0.28	0.78
Japan	85.62	5.78	8.69	0.76	9.67	4.5	19	0.80	0.88	34 132.058	0.03	0.83
Korea (South)	77.88	5.13	7.94	0.75	8.31	4.5	49	0.63	2.56	13 840.989	0.19	0.82
Malaysia	73.08	4.84	6.44	0.65	7.95	5	4	1.46	0.34	4 603.805	0.02	1.47

Table 4 continued: Investor Protection Scores and Financial Development Scores, Sorted by Country

	ICRGP	Corruption	Law/order	Polcon V	Exprisk	Antidir	ProtInvest, rank	Scap	Sturn	GDP	Bcap	Tcap
Mexico	71.82	4.56	4.75	0.39	7.29	3	49	0.25	0.28	6 775.925	0.02	0.28
Netherlands	92.84	8.88	10.00	0.77	9.98	2.5	117	1.20	1.33	32 690.323	0.41	1.61
New Zealand	90.41	9.06	9.72	0.76	9.69	4	1	0.39	0.42	20 485.925	0.86	1.26
Norway	91.27	8.50	10.00	0.77	9.88	3.5	25	0.52	1.03	51 555.685	0.15	0.67
Peru	63.41	5.03	5.50	0.49	5.54	3.5	13	0.37	0.10	2 537.627	0.05	0.42
Philippines	69.61	4.28	4.66	0.47	5.22	4	128	0.46	0.22	1 149.552	0.00	0.46
Portugal	87.97	7.09	8.50	0.75	8.9	2.5	49	0.44	0.71	15 273.641	0.08	0.53
Singapore	86.59	7.56	9.06	0.67	9.3	5	2	1.89	0.58	25 984.731	0.19	2.09
South Africa	69.80	4.75	4.56	0.74	6.88	5	10	1.92	0.42	3 938.183	0.03	1.95
Spain	82.42	7.00	7.94	0.74	9.52	5	100	0.86	1.80	20 828.907	0.32	1.18
Sweden	92.40	9.06	10.00	0.77	9.4	3.5	32	1.14	1.13	35 048.357	0.43	1.58
Switzerland	90.54	7.94	8.88	0.87	9.98	3	169	2.58	0.96	43 745.299	0.79	3.37
Thailand	66.27	3.44	6.16	0.57	7.42	4	13	0.55	0.86	2 348.262	0.03	0.57
Turkey	63.74	4.66	7.47	0.72	7	3	70	0.28	1.56	5 354.552	0.01	0.29
United Kingdom	86.89	7.75	9.63	0.74	9.71	5	10	1.48	1.12	31 996.945	0.82	2.30
United States	84.98	7.38	8.88	0.85	9.98	3	6	1.42	1.61	38 483.809	0.67	2.09

As some of the investor protection measures seem somewhat puzzling, we want to investigate whether they are consistent with one another. As they are all intended to measure the same characteristic, they should be highly correlated. The correlation matrix for all seven variables is reported in Table 5. Most of the variables do correlate like one would expect them to do. However, the anti-directory index stands out again. This variable correlates negatively with three of our investor protection variables and two of the economic development measures. Therefore, there is reason to suspect that the anti-directory index is not a good criterion for measuring investor protection. The same can be said about the protecting investor variable, but as this is a ranking of 185 countries, looking at the correlation between this variable and the others is not as intuitive. In addition, we note that most of the investor protection variables are highly correlated with the three gauges of economic development. This causes a potential problem with causality which we will discuss in detail later.

Table 5: Correlation Matrix:

Correlation between the various investor protection and economic development variables. ICRGP, the overall political risk measure, Corruption, the level of government corruption, and Law/Order, the law-and-order tradidion in each country are all from the International Country Risk Guide (ICRGP). Polcon V measures political stability, exprisk the expropriation risk, antidir is the anti-director index and ProtInvest is the protecting investors variable from Doing Business. In terms of the financial development variables, Scap is stock market capitalization, Sturn is stock market turnover, GDP is GDP per capita, Bcap is bond market capitalization and Tcap is total market capitalization.

	ICRGP	*Corruption*	*Law/order*	*Polcon V*	*Exprisk*	*Antidir*	*ProtInvest*	*Scap*	*Sturn*	*GDP*	*Bcap*	*Tcap*
ICRGP	1											
Corruption	0.882	1										
Law/order	0.886	0.838	1									
Polcon V	0.576	0.587	0.650	1								
Exprisk	0.851	0.745	0.844	0.743	1							
Antidirr	-0.145	-0.088	-0.055	0.135	0.011	1						
ProtInvest	0.013	0.003	-0.147	-0.095	-0.115	-0.468	1					
Scap	0.193	0.231	0.183	0.215	0.206	0.326	-0.125	1				
Sturn	0.152	0.119	0.298	0.364	0.382	0.058	0.109	-0.012	1			
GDP	0.864	0.750	0.820	0.579	0.858	-0.138	-0.018	0.271	0.246	1		
Bcap	0.573	0.686	0.551	0.425	0.579	-0.013	0.012	0.249	0.252	0.570	1	
Tcap	0.365	0.437	0.349	0.333	0.379	0.274	-0.102	0.941	0.078	0.430	0.562	1

4.2 Test design

The regression approach used by Pinkowitz, Stulz and Williamson (2006) is well suited for our analysis. This model explains cross-sectional variation in firm values effectively in despite of it being ad-hoc in the sense that it does not specify a functional form resulting directly from a theoretical model. The goal of using this regression approach is to isolate the effect of liquidity by splitting assets up into two components: net assets and liquidity. The first regression model considers the change in cash:

(1) $V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dL_{i,t} + \beta_{16} dL_{i,t+1} + \beta_{17} dV_{i,t+1} + \varepsilon_{i,t}$

Where X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t-1* to year *t*, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t+1* , $X_{t+1} – X_t$. All variables are divided by the value of total assets. By doing this we adjust for firm size and reduce the potential problem of heteroscedasticity. Table 6 defines the variables in the regression.

Table 6: Explanatory Variables

Overview of the explanatory variables included in our regressions: name and definition

Variable name	Definition
V	Market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt.
E	Earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits
NA	Net assets= Total assets – liquid assets
RD	Research and Development (R&D) expense; 0 if value is missing.
I	Interest expense
D	Dividends calculated as common dividends paid
L	Liquid assets = cash plus marketable securities

Pinkowitz, Stulz & Williamson (2006) express concerns with regression model (1), as expectations about future growth may change when cash holdings increase. Even though the lead variable should pick up on expectations, they introduce a second regression model where the lead and lag of cash is replaced with the level of cash. We will do the same in our analysis, and thus additionally employ regression model (2).

(2) $V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} L_{i,t} + \beta_{16} dV_{i,t+1} + \varepsilon_{i,t}$

The objective is to test whether there is a difference in the value of cash and the value of dividends depending on the level of investor protection. The first hypothesis is that cash is valued at a discount in countries with low investor protection.

Hypothesis 1: Cash is valued at a discount in countries with weak investor protection

To test this we need to look at the estimated coefficient on the change in cash and level of cash; β_{15} in regression models (1) and (2). If hypothesis 1 holds, β_{15} should be larger in countries with high investor protection than in countries with low investor protection.

The second hypothesis resulting from agency theory is that dividends should be of greater value in countries with low investor protection. This gives us our hypothesis two:

Hypothesis 2: Dividends contribute more to firm value in countries with weaker investor protection.

Hypothesis 2 holds if the estimated coefficient on dividends; β_{12} in equation (1) and (2) is larger in countries with lower investor protection.

To investigate the hypotheses, we employ pooled OLS regressions to model (1) and (2). Formally, this entails pooling all observations before performing a standard OLS-regression. This implies that we assume all coefficients and intercepts to be identical across all firms. We thereby neglect the heterogeneity of the firms in our sample. If there are firm specific effects present in our sample, the error term will be correlated with the explanatory variables and our results arel possibly inconsistent and biased. A fixed effects regression eliminates time invariant firm specific effects and mitigates the potential bias. It utilizes more of the information in our sample and increases the robustness of the results. Corresponding results are presented in addition to the OLS estimates. (Note that the original article only presents OLS estimates). In all our regressions we controlled for heteroscedasticity by using robust standard errors.

5 Results

To test the two hypotheses we use regression models (1) and (2) and perform pooled OLS and fixed effects regressions as described in the previous section. Our original sample contains 727,680 observations with more than 70,000 unique firms**.** First, we drop the industries utility, banks, insurance and other financials because these industries will usually have abnormal capital structures and are not representative for firms in general. Thereafter we clean our data and construct the variables needed to perform our regressions. Finally we drop 0.5% in each tail of each variable to reduce the effect of outliers. Our final sample contains 99,079 observations.

We perform the regressions for different sub-samples of high and low investor protection. All the relevant results for our analysis are reported in Table 15 and 16 later in this chapter. For the variable corruption, we will give a comprehensive presentation of the results, showing all the regression transcripts. Corruption was chosen arbitrarily from the seven measures of investor protection. The method employed for the corruption variable is applied in the same way to the other six measures of investor protection. We only show the full regression transcripts for one variable because of the limited contribution of reporting the total of 56 regressions.

Countries with scores on corruption below the median value are classified as high corruption countries while countries with scores above median value are classified as low corruption countries. Thus, countries with little corruption are placed in the group for high investor protection and countries with more extensive corruption are placed in the low investor protection group. When dividing into groups based on the median, the group with low investor protection countries has a total of 46,640 observations, while the high investor protection group has a total of 52,439 observations. Table 7 shows the results of our regression using regression model (1) on high corruption countries. Table 8 shows corresponding results for countries with low corruption.

As mentioned, we need to study the estimated coefficient on liquidity, β_{15}, to analyze hypothesis 1 and the estimated coefficient on dividends, β_{12}, to analyze hypothesis 2. In countries with high corruption we estimate the value of β_{15} to 1.29, while in countries with low corruption the estimated value is 1.84, both statistically significant at a 1% level. Thus, a one-dollar increase in liquid assets is associated with a 1.29 dollar increase in firm value in countries with high corruption and a 1.84 dollar increase in firm value in countries with low corruption. The estimated coefficient on dividends is 12.8 in countries with high corruption and 14.65 in countries with low corruption. To test whether the differences between the estimated coefficients are statistically significant, we perform a regression with dummy variables (not reported). We introduce a dummy variable for corruption which equals 1 if the country is identified as low corruption and 0 if it is identified as high corruption to obtain the p-value of the difference. We let the dummy variable interact with all the independent variables in our regression and allow for the two groups to have different intercepts as well as different slopes. Finally we observe the t-statistic of the interaction variables to determine whether the difference between the samples in the value of cash and dividends is statistically significant. The t-statistic for the difference in dividends, β_{12}, is 1.25, making the difference between the groups insignificant. The difference in our estimated interaction variable for cash, β_{15}, has a t-statistic of 1.60, making this difference insignificant as well. These findings provide no support for hypothesis 1 or 2. We note that there is a substantial difference in the explained variance between the two regressions. Our model for low corruption countries has an R-squared value of 0.2726 while the R-squared value for high corruption countries is 0.0589. This means that more of the variation in the dataset is explained by the included independent variables for the low corruption countries than for the high corruption countries. In both regressions, most of the coefficients are significant at a 1% level. In the high corruption regression, the coefficient on dRD_{i+t} is significant only at a 10% level and $dE_{i,t+1}$ and $dV_{i,1+t}$ are insignificant. In both regressions, coefficients for $I_{i,t}$ and $dI_{i,t+1}$ are insignificant. The low t-statistics for interest expense is a result of the very limited number of observations for this variable.

Table 7 Regression Result Model (1) – High Corruption:

Results from OLS regression for countries with high corruption (low investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year t, $X_t - X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} - X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dL_{i,t} + \beta_{16} dL_{i,t+1} + \beta_{17} dV_{i,t+1} + \varepsilon_{i,t}$$

Linear regression	**Number of obs**	**46640**
	F(17, 46622)	**= 89.72**
	Prob > F	**= 0.0000**
	R-squared	**= 0.0589**
	Root MSE	**= 1.8228**

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Ei,t	-.7721699	.2495149	-3.09	0.002	-1.261223	-.283117
dEi,t	.5942984	.1058696	5.61	0.000	.3867924	.8018044
dEi,t+1	.4877639	.3646227	1.34	0.181	-.226902	1.20243
dNAi,t	.5158644	.0510776	10.10	0.000	.4157516	.6159771
dNAi,t+1	.6042426	.1508388	44.01	0.000	.3085962	.899889
RDi,t	5.103263	.4378224	11.66	0.000	4.245124	5.961401
dRDi,t	1.55452	.800116	1.94	0.052	-.0137188	3.122759
dRDi,t+1	4.909108	1.140965	4.30	0.000	1763423	7.145416
Ii,t	6.097404	13.18605	0.46	0.644	-19.74745	31.94225
dIi,t	1220.289	327.351	3.73	0.000	578.6766	1861.902
dIi,t+1	-340.2221	241.4499	-1.41	0.159	-813.4674	133.0232
Di,t	12.80872	.7739876	16.55	0.000	11.29169	14.32574
dDi,t	2.37948	.7075406	3.63	0.001	.9926899	3.76627
dDi,t+1	8.691523	1.067096	8.15	0.000	6.599998	10.78305
dLi,t	1.294662	.2524509	5.13	0.000	.7998549	1.78947
dLi,t+1	1.310766	.4530843	2.89	0.004	.4227137	2.198818
dVi,t+1	-.0884336	.1247174	-0.71	0.478	-.3328815	.1560143
Constant	.832873	.0129622	64.25	0.000	.8074669	.8582791

Table 8: Regression Result Model (1) – Low Corruption

Results from OLS regression for countries with low corruption (high investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year t, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dL_{i,t} + \beta_{16} dL_{i,t+1} + \beta_{17} dV_{i,t+1} + \varepsilon_{i,t}$$

Linear regression				**Number of obs**		**52439**
				F(17, 52421)		**= 109.59**
				Prob > F		**= 0.0000**
				R-squared		**= 0.2726**
				Root MSE		**= 2.9585**

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Ei,t	-3.942163	.325969	-12.09	0.000	-4.581065	-3.303261
dEi,t	.6614516	.1579207	4.19	0.000	.3519257	.9709776
dEi,t+1	-.9786003	.157971	-6.19	0.000	-1.288225	-.6689756
dNAi,t	1.401699	.1450834	9.66	0.000	1.117334	1.686064
dNAi,t+1	.8066034	.0781307	10.32	0.000	.6534665	.9597403
RDi,t	4.062311	.3865868	10.51	0.000	3.304598	4.820025
dRDi,t	3.352367	.7987293	4.20	0.000	1.78685	4.917883
dRDi,t+1	9.21493	.7846707	11.74	0.000	7.676968	10.75289
Ii,t	-288.7836	284.2177	-1.02	0.310	-845.8528	268.2856
dIi,t	1990.428	683.093	2.91	0.004	651.5594	3329.297
dIi,t+1	443.9569	672.3684	0.66	0.509	-873.8914	1761.805
Di,t	14.6473	1.248235	11.73	0.000	12.20075	17.09385
dDi,t	2.151714	.7357169	2.92	0.003	.7097017	3.593725
dDi,t+1	11.10699	.8355209	13.29	0.000	9.46936	12.74462
dLi,t	1.839369	.2268328	8.11	0.000	1.394775	2.283963
dLi,t+1	1.778643	.2273879	7.82	0.000	1.332961	2.224325
dVi,t+1	-.164827	.0387543	-4.25	0.000	-.2407857	-.0888683
Constant	1.21862	.0255064	47.78	0.000	1.168628	1.268613

Table 9: Regression Result Model (1) – Fixed-effects, High Corruption

Results from fixed-effects regression for countries with high corruption (low investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year *t*, $X_t - X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} - X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dL_{i,t} + \beta_{16} dL_{i,t+1} + \beta_{17} dV_{i,t+1} + \varepsilon_{i,t}$$

Fixed-effects (within) regression		**Number of obs =**	**46640**
Group variable: typenum		**Number of groups =**	**9054**
R-sq: within = 0.0576		**Obs per group: min =**	**1**
between = 0.0356		**avg =**	**5.2**
overall = 0.0389		**max =**	**10**
		F(17,9053) =	**22.49**
corr(u_i, Xb) = -0.0031		**Prob > F =**	**0.0000**

V	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
$E_{i,t}$	-.055523	.2209619	-0.25	0.802	-.4886583	.3776122
$dE_{i,t}$	.2027751	.1087887	1.86	0.062	-.0104753	.4160255
$dE_{i,t+1}$	.2103081	.1447566	1.45	0.146	-.0734475	.4940638
$dNA_{i,t}$	.2022612	.0806036	2.51	0.012	.0442601	.3602624
$dNA_{i,t+1}$	.5728721	.0979622	5.85	0.000	.380844	.7649002
$RD_{i,t}$	.1138903	1.122802	0.10	0.919	-2.087056	2.314837
$dRD_{i,t}$	2.240879	.8272428	2.71	0.007	.619296	3.862462
$dRD_{i,t+1}$	2.420318	1.033909	2.34	0.019	.3936231	4.447012
$I_{i,t}$	20.47317	8.587693	2.38	0.017	3.639353	37.30699
$dI_{i,t}$	592.3794	203.726	2.91	0.004	193.0304	991.7285
$dI_{i,t+1}$	-183.5251	197.3074	-0.93	0.352	-570.2922	203.242
$D_{i,t}$	7.475721	.9707349	7.70	0.000	5.572861	9.378581
$dD_{i,t}$	.7699078	.5702217	1.35	0.177	-.3478556	1.887671
$dD_{i,t+1}$	4.277066	.6603488	6.48	0.000	2.982634	5.571499
$dL_{i,t}$	.7466438	.172048	4.34	0.000	.4093908	1.083897
$dL_{i,t+1}$	.9868524	.3249072	3.04	0.002	.3499609	1.623744
$dV_{i,t+1}$	-.1905617	.0919518	-2.07	0.038	-.3708079	-.0103155
Constant	.9514833	.015178	62.69	0.000	.921731	.9812356
sigma_u	**1.7994794**					
sigma_e	**1.3570194**					
rho	**.63747313**	**(fraction of variance due to u_i)**				

Table 10: Regression result Model (1) – Fixed-effects, Low Corruption

Results from fixed-effects regression for countries with low corruption (high investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year *t*, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dL_{i,t} + \beta_{16} dL_{i,t+1} + \beta_{17} dV_{i,t+1} + \varepsilon_{i,t}$$

Fixed-effects (within) regression		**Number of obs =**	**52439**
Group variable: typenum		**Number of groups =**	**11928**
R-sq: within	**= 0.2290**	**Obs per group: min =**	**1**
between	**= 0.2395**	**avg =**	**4.4**
overall	**= 0.2600**	**max =**	**10**
		F(17,11927) =	**47.00**
corr(u_i, Xb)	**= 0.0407**	**Prob > F =**	**0.0000**

V	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
$E_{i,t}$	-3.455484	.8194449	-4.22	0.000	-5.06173	-1.849239
$dE_{i,t}$	.6358725	.2038662	3.12	0.002	.2362616	1.035483
$dE_{i,t+1}$	-1.039255	.2869374	-3.62	0.000	-1.601699	-.4768112
$dNA_{i,t}$	.9957965	.2291687	4.35	0.000	.5465885	1.445004
$dNA_{i,t+1}$	.9792396	.0532257	18.40	0.000	.8749086	1.083571
$RD_{i,t}$	2.419268	1.00387	2.41	0.016	.4515196	4.387015
$dRD_{i,t}$	1.966931	.7557984	2.60	0.009	.4854432	3.448419
$dRD_{i,t+1}$	6.769825	.9328837	7.26	0.000	4.941221	8.598429
$I_{i,t}$	-285.0692	601.1564	-0.47	0.635	-1463.434	893.2952
$dI_{i,t}$	784.7159	528.6943	1.48	0.138	-251.611	1821.043
$dI_{i,t+1}$	-2897.186	2122.477	-1.37	0.172	-7057.586	1263.214
$D_{i,t}$	12.87675	1.849572	6.96	0.000	9.251289	16.50221
$dD_{i,t}$	.280154	.6169275	0.45	0.650	-.9291244	1.489432
$dD_{i,t+1}$	8.114144	.9861898	8.23	0.000	6.181052	10.04724
$dL_{i,t}$	1.40197	.2330196	6.02	0.000	.9452139	1.858727
$dL_{i,t+1}$	1.877221	.176234	10.65	0.000	1.531774	2.222668
$dV_{i,t+1}$	-.2708412	.0257324	-10.53	0.000	-.3212808	-.2204015
Constant	1.353895	.0593848	22.80	0.000	1.237491	1.470299

sigma_u	**3.7149222**	
sigma_e	**1.9683859**	
rho	**.78079201**	**(fraction of variance due to u_i)**

The fixed-effects regressions (Table 9 and Table 10) give different results. The values of the estimated coefficients are lower than the values we find in the OLS regressions. In addition, both differences (in liquidity and dividends) are now significant. In the group of countries with high corruption, we estimate a β_{15} of 0.75, while countries with low corruption β_{15} has an estimated value of 1.40. The coefficient on dividends, β_{12}, has a value of 7.48 in high corruption and a value of 12.88 in low corruption countries. The t-statistics from the regression with interaction variables (not reported) has a value of 2.26 for the difference in β_{15} and 2.59 for β_{12}. This makes the differences statistically significant at the 5% and 1% level. This provides support for hypothesis 1. However, we find no support for hypothesis 2 as the relation for dividends is opposite of what we expect.

Table 11 through 14 show the results using regression model (2) – the level of cash. Again we perform regressions using corruption as the investor protection proxy. Table 11 and 12 report the results from the OLS regressions. When corruption is high, we estimate β_{15} to 1.96 and when corruption is low, the estimated value is 2.27. The estimated values for β_{12} are 11.9 for high corruption countries and 15.01 for low corruption countries. The t-statistics for the difference between the high and low investor protection groups is 1.23 for β_{15} and 2.10 for β_{12}, making the difference in β_{15} insignificant while β_{12} is significant at a 5%-level. The results do not provide support for hypothesis 1 and suggests rejection of hypothesis 2.

Furthermore we look at the results from the fixed-effects regression (Table 13 and 14). The estimated values of β_{12} are 7.02 for high corruption and 12.11 for low corruption. The estimated values of β_{15} are 0.93 and 1.11. The difference in β_{12} is significant at a 5%-level, but the difference in β_{15} is not significant. Again, we find no support for hypothesis 1 and suggested rejection of hypothesis 2.

Table 11: Regression Result Model (2) – High Corruption

Results from OLS regression for countries with high corruption (low investor protection) utlizing the approach of Pinkowitz, Stulz and Williamson (2006), model (2) level of cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year t, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} L_{i,t} + \beta_{16} dV_{i,t+1} + \varepsilon_{i,t}$$

Linear regression				**Number of obs**		**46640**
				F(16, 46623)		**= 110.26**
				Prob > F		**= 0.0000**
				R-squared		**= 0.0644**
				Root MSE		**= 1.8175**

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
$E_{i,t}$	-.7052	.2530104	-2.79	0.005	-1.201104	-.2092958
$dE_{i,t}$	.5923125	.1046473	5.66	0.000	.3872023	.7974227
$dE_{i,t+1}$	.5766837	.3634953	1.59	0.113	-.1357724	1.28914
$dNA_{i,t}$	.5711402	.0506522	11.28	0.000	.4718611	.6704193
$dNA_{i,t+1}$	.6195929	.1575143	3.93	0.000	.3108627	.9283232
$RD_{i,t}$	3.637929	.4360028	8.34	0.000	2.783357	4.492501
$dRD_{i,t}$	2.412007	.7838606	3.08	0.002	.8756283	3.948385
$dRD_{i,t+1}$	4.888275	1.099709	4.45	0.000	2.732829	7.043722
$I_{i,t}$	.0142754	13.46903	0.00	0.999	-26.38522	26.41377
$dI_{i,t}$	911.8356	352.3668	2.59	0.010	221.1914	1602.48
$dI_{i,t+1}$	-220.6921	240.7408	-0.92	0.359	-692.5476	251.1635
$D_{i,t}$	11.90224	.7986935	14.90	0.000	10.33679	13.46769
$dD_{i,t}$	2.331785	.703896	3.31	0.001	.9521382	3.711431
$dD_{i,t+1}$	8.346253	1.061013	7.87	0.000	6.266652	10.42585
$L_{i,t}$	1.959051	.1448954	13.52	0.000	1.675054	2.243048
$dV_{i,t+1}$	-.0740771	.1197274	-0.62	0.536	-.3087446	.1605904
Constant	.6927012	.0169297	40.92	0.000	.6595187	.7258836

Table 12: Regression Result Model (2) – Low Corruption

Results from OLS regression for countries with low corruption (high investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (2) level of cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year t, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} L_{i,t} + \beta_{16} dV_{i,t+1} + \varepsilon_{i,t}$$

Linear regression		
	Number of obs	**52439**
	F(16, 52422)	**= 133.04**
	Prob > F	**= 0.0000**
	R-squared	**= 0.2694**
	Root MSE	**= 2.965**

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
$E_{i,t}$	-3.820106	.3233665	-11.81	0.000	-4.453908	-3.186305
$dE_{i,t}$	.6287429	.1585007	3.97	0.000	.3180801	.9394056
$dE_{i,t+1}$	-.9639737	.1592286	-6.05	0.000	-1.276063	-.6518842
$dNA_{i,t}$	1.470733	.140873	10.44	0.000	1.194621	1.746846
$dNA_{i,t+1}$	.8184844	.0828359	9.88	0.000	.6561252	.9808436
$RD_{i,t}$	3.143251	.4184164	7.51	0.000	2.323151	3.963351
$dRD_{i,t}$	3.459761	.8085196	4.28	0.000	1.875055	5.044467
$dRD_{i,t+1}$	9.510461	.7850158	12.11	0.000	7.971823	11.0491
$I_{i,t}$	274.2882	479.4728	0.57	0.567	-665.4828	1214.059
$dI_{i,t}$	2698.084	483.0542	5.59	0.000	1751.293	3644.875
$dI_{i,t+1}$	1939.839	990.9272	1.96	0.050	-2.387309	3882.066
$D_{i,t}$	15.01147	1.247593	12.03	0.000	12.56618	17.45677
$dD_{i,t}$	1.199654	.72364	1.66	0.097	-.2186873	2.617995
$dD_{i,t+1}$	10.88694	.8424306	12.92	0.000	9.235769	12.53811
$L_{i,t}$	2.26916	.2060745	11.01	0.000	1.865252	2.673068
$dV_{i,t+1}$	-.1371213	.0363836	-3.77	0.000	-.2084335	-.0658092
Constant	1.019609	.0305213	33.41	0.000	.9597864	1.079431

Table 13: Regression Result Model (2) – Fixed-effects, High Corruption

Results from fixed-effects regression for countries with high corruption (low investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (2) level of cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year *t*, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} L_{i,t} + \beta_{16} dV_{i,t+1} + \varepsilon_{i,t}$$

Fixed-effects (within) regression		**Number of obs =**	**46640**
Group variable: typenum		**Number of groups =**	**9054**
R-sq: within = 0.0546		**Obs per group: min =**	**1**
between = 0.0462		**avg =**	**5.2**
overall = 0.0427		**max =**	**10**
		F(17,11927) =	**28.34**
corr(u_i, Xb) = 0.0123		**Prob > F =**	**0.0000**

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Ei,t	-.0320272	.2304717	-0.14	0.889	-.4838039	.4197495
dEi,t	.2138684	.1096155	1.95	0.051	-.0010028	.4287396
dEi,t+1	.2648688	.1497268	1.77	0.077	-.0286297	.5583672
dNAi,t	.2319401	.0830173	2.79	0.005	.0692075	.3946727
dNAi,t+1	.5811988	.1062987	5.47	0.000	.3728293	.7895682
RDi,t	-.0822903	1.12278	-0.07	0.942	-2.283192	2.118612
dRDi,t	2.294586	.8588165	2.67	0.008	.6111115	3.97806
dRDi,t+1	2.562752	1.025376	2.50	0.012	.5527841	4.57272
Ii,t	7.684242	16.08475	0.48	0.633	-23.8455	39.21398
dIi,t	113.1926	399.9189	0.28	0.777	-670.7388	897.124
dIi,t+1	154.6171	275.7838	0.56	0.575	-385.9815	695.2158
Di,t	7.023417	.9849153	7.13	0.000	5.092761	8.954074
dDi,t	.7698585	.5784237	1.33	0.183	-.3639827	2606738
dDi,t+1	4.124244	.6678444	6.18	0.000	2.815118	5.43337
Li,t	.929453	.2780242	3.34	0.001	.3844627	1.474443
dVi,t+1	-.1787743	.0883513	-2.02	0.043	-.3519628	-.0055859
Constant	.8847567	.0288906	30.62	0.000	.8281247	.9413888
sigma_u	**1.7910963**					
sigma_e	**1.3591606**					
rho	**.6345812**	**(fraction of variance due to u_i)**				

Table 14: Regression Result Model (2) – Fixed-effects, Low Corruption

Results from fixed-effects regression for countries with low corruption (high investor protection) utilizing the approach of of Pinkowitz, Stulz and Williamson (2006), model (2) level of cash. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year *t*, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities). The estimated regression is:

$$V_{i,t} = \beta_1E_{i,t} + \beta_2dE_{i,t} + \beta_3dE_{i,t+1} + \beta_4dNA_{i,t} + \beta_5dNA_{i,t+1} + \beta_6RD_{i,t} + \beta_7dRD_{i,t} + \beta_8dRD_{i,t+1} + \beta_9I_{i,t} + \beta_{10}dI_{i,t} + \beta_{11}dI_{i,t+1} + \beta_{12}D_{i,t} + \beta_{13}dD_{i,t} + \beta_{14}dD_{i,t+1} + \beta_{15}L_{i,t} + \beta_{16}dV_{i,t+1} + \varepsilon_{i,t}$$

Fixed-effects (within) regression		**Number of obs**	=	**52439**
Group variable: typenum		**Number of groups**	=	**11928**
R-sq: within	**= 0.2087**	**Obs per group: min**	=	**1**
between	**= 0.2447**	**avg**	=	**4.4**
overall	**= 0.2563**	**max**	=	**10**
		F(17,11927)	=	**45.78**
corr(u_i, Xb)	**= 0.0412**	**Prob > F**	=	**0.0000**

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
$E_{i,t}$	-3.390675	.8037863	-4.22	0.000	-4.966227	-1.815123
$dE_{i,t}$	.6368633	.2021792	3.15	0.002	.2405592	1.033167
$dE_{i,t+1}$	-1.013316	.283565	-3.57	0.000	-1.56915	-.4574823
$dNA_{i,t}$	1.048443	.239132	4.38	0.000	.5797056	1.517181
$dNA_{i,t+1}$	1.006044	.0609094	16.52	0.000	.8866515	1.125436
$RD_{i,t}$	2.914634	1.044948	2.79	0.005	.8663648	4.962903
$dRD_{i,t}$	1.860595	.7637846	2.44	0.015	.3634523	3.357737
$dRD_{i,t+1}$	7.61124	.9389494	8.11	0.000	5.770746	9.451734
$I_{i,t}$	152.1243	513.058	0.30	0.767	-853.553	1157.802
$dI_{i,t}$	1057.47	408.1801	2.59	0.010	257.3706	1857.57
$dI_{i,t+1}$	-395.0403	1016.846	-0.39	0.698	-2388.224	1598.144
$D_{i,t}$	12.11202	1.750228	6.92	0.000	8.681285	15.54275
$dD_{i,t}$	.0870225	.6167703	0.14	0.888	-1.121948	1.295993
$dD_{i,t+1}$	7.829299	.8958228	8.74	0.000	6.07334	9.585257
$L_{i,t}$	1.111743	.5445498	2.04	0.041	.0443369	2.17915
$dV_{i,t+1}$	-.2432629	.0249024	-9.77	0.000	-.2920757	-.1944502
Constant	1.250479	.1066945	11.72	0.000	1.04134	1.459618
sigma_u	**3.70265**					
sigma_e	**1.9941123**					
rho	**0.7751633**	**(fraction of variance due to u_i)**				

We now follow the same procedure and perform OLS and Fixed-effects regressions for all seven investor protection variables. The results are shown in Table 15 and 16. We only report the results for the two relevant coefficients, β_{12} and β_{15}. First we study hypothesis 1 by analyzing the results in Table 15.

All our OLS regressions, except the one where we measure investor protection by the anti-director index, give estimated coefficients on cash that are higher in high protection countries than in low protection countries. This difference is significant at a 1%-level for all investor protection variables, except corruption, which does not provide significant results. In section 2.1, we discuss some concerns we have regarding the anti-director measure. Low correlation with the other measures of investor protection is the source of our concern. Not surprisingly we again see a contrast between this proxy and the others in the regression results. The anti-directory index does not seem to measure investor protection appropriately and we will consider this variable less important in the following analysis. The regression results in Table 15 provide strong evidence towards hypothesis 1 that cash is worth more in countries with higher investor protection. More specifically, when looking at the coefficients from the OLS regressions for the various protection variables (excluding anti-director index), we get that a one dollar increase in cash holdings adds between 1.84 and 2.13 dollars to firm value in high investor protection countries, and between 0.84 and 1.29 in low investor protection countries.

We observe similar results from the fixed-effects regressions. In general, the estimated coefficients obtain lower values. Nevertheless, all the differences in the value of cash between high and low investor protection countries are significant at a 1%- or 5%-level, with cash being valued higher in high protection countries than low protection countries. Again, we see the anti-director index being the exception. Excluding the results for the anti-director index, a one dollar increase in cash is valued between 1.39 and 1.59 in high investor protection countries and 0.61 and 0.75 in low investor protection countries.

The regression analysis using model (1) provides support for hypothesis 1, except for when we use corruption or the anti-director index as a proxy for investor protection. We observe that the results from the FE-regression appear more realistic. Dollar values exceeding 1 seem unrealistic especially in countries where investor protection is poor. We will discuss possible explanations for the high coefficients in the next sub-section. Overall we conclude that our analysis provides extensive evidence that poor investor protection in a country leads to cash being valued at a discount.

Table 15: Regression Results Model (1), Change in Cash

Results from the OLS and fixed-effects regression utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash. The results are shown for the seven different investor protection measures. Protecting Investors is the protecting investor rank from Doing Business, Polcon V is the measure for political stability, Law/Order is the measure of the rule of law from international country risk group, ICRGP is the overall score form international country risk group, exprisk is expropriation risk, corruption is the measure of corruption for international country risk group and the anti-director index is the measure of minority shareholders rights. The results reported are the results for the coefficients β_{12} and β_{15}. The t-statistics for the difference between high and low investor protection countries is reported and together with the significance level of the difference. Regression model, change in cash:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dL_{i,t} + \beta_{16} dL_{i,t+1} + \beta_{17} dV_{i,t+1} + \varepsilon_{i,t}$$

Model (1) change in cash

Investor protection variable		OLS regressions: High protection	Low protection	T-stat of difference	Fixed effects regressions: High protection	Low protection	T-stat of difference
Protecting investors							
	β_{12} *(dividends)*	14.79	16.40	-1.16	11.84	10.25	0.78
	β_{15} *(change in cash)*	1.95	0.95	2.98 ***	1.43	0.61	3.02 ***
Polcon V							
	β_{12} *(dividends)*	15.15	16.06	-0.50	10.50	12.13	-0.57
	β_{15} *(change in cash)*	2.13	0.90	3.88 ***	1.59	0.69	2.78 ***
Law/order							
	β_{12} *(dividends)*	16.24	13.21	1.89 *	11.94	8.74	1.54
	β_{15} *(change in cash)*	1.94	0.85	2.95 ***	1.39	0.64	2.54 **
ICRGP							
	β_{12} *(dividends)*	16.26	13.23	1.89 *	11.88	8.82	1.48
	β_{15} *(change in cash)*	1.94	0.84	2.96 ***	1.39	0.65	2.50 **
Exprisk							
	β_{12} *(dividends)*	17.47	13.68	2.59 ***	12.03	9.89	0.94
	β_{15} *(change in cash)*	2.06	0.89	3.49 ***	1.48	0.66	2.94 ***
Corruption							
	β_{12} *(dividends)*	14.65	12.81	1.25	12.88	7.48	2.59 ***
	β_{15} *(change in cash)*	1.84	1.29	1.60	1.40	0.75	2.26 **
Anti-director index							
	β_{12} *(dividends)*	15.98	16.30	-0.16	11.57	10.47	0.41
	β_{15} *(change in cash)*	1.41	2.24	-2.04 **	0.71	1.86	-3.43 ***

Significance level difference: * 10%-level, ** 5%-level, *** 1%-level

The estimated coefficients for dividends, β_{12}, are evaluated to investigate hypothesis 2. The results from the OLS regressions show significant differences between high and low investor protection countries for Law/Order, ICRGP and exprisk. They all yield the result that dividends add more to firm value in countries with high investor protection than low protection countries. This is the opposite of what we expect. The results are significant at a 10%-level for Law/Order and ICRGP, and at a 1%-level for exprisk. The remaining results are insignificant. In our range of OLS regressions, one dollar of dividends is valued between 14.65 and 17.47 for high protection countries and between 12.81 and 16.40 in low protection countries. These coefficients are rather high, which we will discuss in further detail later.

The fixed-effects regressions show that only the corruption variable gives a significant result for the difference in the value of dividends. This regression shows dividends having a higher value in countries with high protection than countries with low protection. Again, this is contrary to what our hypothesis predicts. The difference is significant at a 1%-level. The value of one dollar dividends is between 10.50 and 12.88 in countries with high investor protection and between 7.48 and 12.13 in countries with low protection. Hence our analysis suggests rejecting hypothesis 2.

Using model (1), the analysis provides extensive support for hypothesis 1. However we find no support for hypothesis 2.

Table 16 shows the regression results using model (2), the level of cash. When investigating hypothesis 1, the OLS regressions using Polcon V, Law/Order and ICRGP provide significant results at the 1%-level that support our hypothesis. The estimates show cash having a higher value in high protection countries than low protection countries. Exprisk finds the same support at a 5%-level. Once again the anti-director index gives contradicting results, significant at the 1%-level. The protecting investors and corruption variables yield no significant results for cash. The results from the OLS regressions infer that one dollar of cash is worth between 2.27 and 2.72 in countries with high investor protection, excluding anti-director index. For low protection countries, the value is between 1.44 and 2.08.

Table 16: Regression Results Model (2), Level of Cash

Results from the OLS and fixed-effects regression utilizing the approach of of Pinkowitz, Stulz and Williamson (2006), model 2 level of cash. The results are shown for the seven different investor protection measures. Protecting Investors is the protecting investor rank from Doing Business, Polcon V is the measure for political stability, Law/Order is the measure of the rule of law from international country risk group, ICRGP is the overall score form international country risk group, exprisk is expropriation risk, corruption is the measure of corruption for international country risk group and the anti-director index is the measure of minority shareholders rights. The results reported are the results for the coefficients β_{12} and β_{15}. The t-statistics for the difference between high and low investor protection countries is reported and together with the significance level of the difference. Regression model, level of cash:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} L_{i,t} + \beta_{16} dV_{i,t+1} + \varepsilon_{i,t}$$

Model (2) level of cash

		OLS regressions			Fixed effects regressions		
Investor protection variable		High protection	Low protection	T-stat of difference	High protection	Low protection	T-stat of difference
Protecting Investors							
	β_{12} *(dividends)*	14.61	15.84	0.87	10.75	10.08	0.48
	β_{15} *(level of cash)*	2.45	2.08	-1.44	1.14	1.16	-0.12
Polcon V							
	β_{12} *(dividends)*	15.97	14.92	0.58	9.78	11.57	-1.33
	β_{15} *(level of cash)*	2.72	1.58	4.26 ***	1.20	1.00	1.13
Law/order							
	β_{12} *(dividends)*	16.60	12.34	2.61 ***	11.10	8.38	2.04 **
	β_{15} *(level of cash)*	2.36	1.46	3.26 ***	1.10	1.02	0.38
ICRGP							
	β_{12} *(dividends)*	16.62	12.36	2.61 ***	11.05	8.45	1.94 *
	β_{15} *(level of cash)*	2.37	1.44	3.37 ***	1.09	1.03	0.30
Exprisk							
	β_{12} *(dividends)*	17.73	12.77	3.34 ***	10.97	9.54	1.08
	β_{15} *(level of cash)*	2.48	1.81	2.46 **	1.11	1.11	0.01
Corruption							
	β_{12} *(dividends)*	15.01	11.90	2.10 **	12.11	7.02	2.53 **
	β_{15} *(level of cash)*	2.27	1.96	1.23	1.11	0.93	0.30
Anti-director index	β_{12} *(dividends)*	15.50	16.65	-0.58	11.08	9.64	1.02
	β_{15} *(level of cash)*	1.98	3.37	-3.57 ***	1.08	1.19	-0.65

Significance level difference: * 10%-level, ** 5%-level, *** 1%-level

For the fixed-effects regressions we find no significant results for the difference in the value of cash. The value of one dollar of cash in the fixed-effects regression is between 0.93 and 1.20 for both groups.

These findings provide support for hypothesis 1 using model (2). However, the findings are not as robust as for model (1), as all the fixed-effects regressions deliver insignificant results.

When we examine the estimated coefficients on dividends from the OLS regressions, and thereby test hypothesis 2, we find that dividends have a significantly higher value in high investor protection countries than in low investor protection countries using law/order, ICRGP, exprisk and corruption as proxies for investor protection. The differences are significant at a 1%-level for Law/Order, ICRGP and exprisk and at a 5%-level for corruption. These results provide additional support for rejecting hypothesis 2. The other investor protection variables show differences between low and high protection countries that are not significant. The value of one dollar in dividend is between 14.61 and 17.73 for high investor protection countries and between 11.90 and 15.84 for low protection countries.

The fixed-effects regressions deliver significant results for the difference in the value of dividends when using law/order, ICRGP and corruption as measures of investor protection, all with dividends having a higher value in high protection countries than low protection countries. Again we find results that contradict our expectations for hypothesis 2. The value of one dollar in dividends is between 9.78 and 12.11 for high protection countries and 7.02 and 11.57 for low protection countries. Using model (2) to test hypothesis 2, we find no support for this hypothesis.

The results from our regressions provide some conclusive evidence. All regressions – except when using anti-director index as the investor protection proxy – give the result that cash is worth more in countries with high investor protection than in countries with low investor protection, and thereby support hypothesis 1. For model (1), the results from both OLS regressions and fixed-effects regressions are significant at a 1%- or 5%-level, except the OLS result for corruption. Using model (2), the results are only significant using OLS regressions for some variables, and on a 5%- or 10%-level. In sum, we can conclude that our analysis does provide strong support for hypothesis 1 and that from our dataset it seems that cash really is valued at a discount when investor protection is poor.

Our analysis on dividends' contributions to firm value does not provide any support for hypothesis 2. Some of the regressions deliver insignificant results that support our hypothesis but many regressions indicate that the hypothesis should be rejected. We also observe that the coefficients on dividends seem exceptionally large. A possible explanation for this could be that many companies report dividends at zero. The data on this variable is very limited and the relationships we find might be due to other factors making the relations spurious. Other reasons will be discussed in the next sub-section.

5.1 Comparison of results

Some of our findings are interesting if one compares them with the findings of Pinkowitz, Stulz and Williamson (2006). First, while our results provide support for hypothesis 1, similarly to the results of Pinkowitz, Stulz and Williamson (2006), they do not provide the same support for hypothesis 2. There can be many reasons Pinkowitz, Stulz and Williamson (2006) find support for both hypotheses, while we do not. Our sample is much larger than their sample, which leads us to rely more on our results. The difference in results might also be related to the classification we obtain when dividing the countries based on the seven investor protection variables. Some of the countries are classified as high protection countries in our sample, but were classified as low protection countries in the original article. The change in classification is a result of uneven development of the assorted countries and it implies that our classifications are not identical to the classification in the original article.

When comparing our results to the results of Pinkowitz, Stulz and Williamson (2006), the coefficients we estimate for both cash and dividends (β_{12} and β_{15}) are prominently higher. First, regarding cash, we consistently find coefficients for cash with values exceeding 1, with the implication that one additional dollar in cash increases firm value by more than one dollar. An explanation for this could be that there is a shortage of liquidity in the market during our period, and that having one dollar in the company ensures the company's ability to undertake profitable investments. Furthermore, in connection to the precautionary motive, it is possible that the volatility is higher in our period and that this increases the value of those firms that hold precautionary cash holdings. Additionally, a possible explanation can be found in the tax motive. If there has been changes in tax regimes in our period, holding cash could be tax advantaged.

If we investigate the agency motive closer it is possible that our period has better governance than the period that Pinkowitz, Stulz and Williamson (2006) investigate. If this is the case, following hypothesis 1, we expect cash to be of greater value in our period, due to lower agency cost. We can briefly investigate this by looking at the investor protection variables. Table 17 shows the average and median for our investor protection variables and Pinkowitz, Stulz and Williamson's (2006) investor protection variables.

Table 17: Median and Average Investor Protection Comparisson

The median and average of the various investor protection variables are reported for this thesis and Pinkowitz Stulz and Williamson (2006). ICRGP is the overall score form international country risk group, corruption is the measure of corruption for international country risk group, law/order is the measure of the rule of law, Polcon V is the measure for political stability, exprisk is expropriation risk, anti-director is the anti-director index

	ICRGP	Corruption	Law/order	Polcon	Exprisk	Anti-director
This paper median	84.98	6.63	8.50	0.75	9.35	4.00
This paper average	81.43	6.60	8.04	0.72	8.63	3.76
PSW median	79.41	8.11	8.82	0.74	9.35	3.00
PSW average	75.44	7.56	8.40	0.73	8.63	3.17

We observe that both ICRGP and the anti-director index have much larger values on both the average and the median in our sample. This indicates better governance in general in our period. The differences within the other variables are not as prominent, except for the corruption proxy, which tells the opposite story. The increase in investor protection we observe in some of our measures of investor protection could explain some of the increase in the coefficients for cash.

With regards to dividends, β_{12}, a higher value of the estimated coefficient could be consistent with high agency problems. Nevertheless, a high value for cash, exceeding 1 – which indicates low agency problems – contradicts this. A possible explanation to such a high market valuation of dividends could be that fewer companies are paying dividends. The firms that do, may then receive high valuations of their dividends. Nonetheless, it is difficult to justify the exceptionally high values that we observe. A second explanation can be related to what kind of investors are present in the marketplace. If there are many investors that need a steady stream of cash and therefore particularly value dividend payments, for example pension funds, we could observe a very high valuation of dividends.

Finally, the unexpected results might occur because the regression specification is ad-hoc and does not result from a formal model. As such, there is a possibility of the model being misspecified.

6 Robustness tests and validity

6.1 Robustness

There are some potential problems related to our regression analysis. There could be autocorrelation, time trends or year specific effects. We tested our regression using corruption as the proxy for investor protection for year specific variation. We use the fixed-effects regressions and extend model (1) change in cash to control for year specific effects by introducing a dummy variable for each year. The results we obtain are reported in Table 18 and Table 19, and resemble the results from earlier regressions where we use corruption as an investor protection proxy. The estimated β_{12} in the regression for low investor protection countries obtains a value of 8, while the value is 12.78 in high investor protection countries. The difference is significant at a 5%-level. For β_{15}, low investor protection countries have a value of 0.74 and high investor protection countries have a value of 1.37. The difference is significant at a 5%-level.

Table 18: Regression Result –Dummy for Year, High Corruption

Results from fixed-effects regression for countries with high corruption (low investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash with adding year dummies. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year *t*, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities).

Fixed-effects (within) regression		**Number of obs**		**=**	**46640**
Group variable: typenum		**Number of groups**		**=**	**9054**
R-sq:	**within = 0.0633**	**Obs per group: min**		**=**	**1**
	between = 0.0345		**avg**	**=**	**5.2**
	overall = 0.0413		**max**	**=**	**10**
			F(26,9053)	**=**	**36.77**
corr(u_i, Xb) = -0.0049			**Prob > F**	**=**	**0.0000**

(Std.Err. Adjusted for 9054 clusters in typenum)

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
$E_{i,t}$	-.0744035	.2169239	-0.34	0.732	-.4996235	.3508164
$dE_{i,t}$	.2096417	.1090915	1.92	0.055	-.0042024	.4234858
$dE_{i,t+1}$	.1985523	.1445158	1.37	0.170	-.0847313	.4818358
$dNA_{i,t}$	.1822337	.0805547	2.26	0.024	.0243282	.3401391
$dNA_{i,t+1}$	.559278	.0977451	5.72	0.000	.3676755	.7508806
$RD_{i,t}$	1.260641	1.131232	1.11	0.265	-.95683	3.478112
$dRD_{i,t}$	1.490703	.823321	1.81	0.070	-.1231924	3.104598
$dRD_{i,t+1}$	2.254268	1.018581	2.21	0.027	.2576186	4.250917
$I_{i,t}$	-3.994482	11.47459	-0.35	0.728	-26.48726	18.4983
$dI_{i,t}$	712.2312	184.1416	3.87	0.000	351.2721	1073.19
$dI_{i,t+1}$	-203.8744	274.4457	-0.74	0.458	-741.8501	334.1012
$D_{i,t}$	8.008312	1.038161	7.71	0.000	5.973281	10.04334
$dD_{i,t}$	.7071157	.5830823	1.21	0.225	-.4358574	1.850089
$dD_{i,t+1}$	4.612554	.61919	7.45	0.000	3.398802	5.826306
$dL_{i,t}$	.7374024	.1708471	4.32	0.000	.4025034	1.072301
$dL_{i,t+1}$	.9747235	.3256387	2.99	0.003	.3363981	1.613049
$dV_{i,t+1}$	-.1903279	.0938972	-2.03	0.043	-.3743876	-.0062683
y2	.1636981	.041157	3.98	0.000	.0830211	.2443752
y3	.0901469	.082819	1.09	0.276	-.0721971	.252491
y4	-.10315	.0703992	-1.47	0.143	-.2411482	.0348483
y5	-.1916481	.0497203	-3.85	0.000	-.2891112	-.094185
y6	-.2082821	.0282104	-7.38	0.000	-.2635808	-.1529834
y7	-.1308431	.024218	-5.40	0.000	-.1783158	-.0833704
y8	-.0757183	.0227762	-3.32	0.001	-.1203648	-.0310718
y9	-.0208895	.0248814	-0.84	0.401	-.0696627	.0278837
y10	-.1338814	.0515093	-2.60	0.009	-.2348513	-.0329116
Constant	1.017455	.0399205	25.49	0.000	.9392021	1.095709
sigma_u	**1.800395**					
sigma_e	**1.3530904**					
rho	**.6390469**	**(fraction of variance due to u_i)**				

Table 19: Regression Result – Dummy for Year, Low Corruption

Results from fixed-effects regression for countries with low corruption (high investor protection) utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash with adding year dummies. X_t is the level of variable X in year *t*; dX_t is the change in the level of X from year *t*-1 to year *t*, $X_t – X_{t-1}$, divided by assets in year *t* ; dX_{t+1} is the change in the level of X from year *t* to year *t*+1 , $X_{t+1} – X_t$. All variables are divided by the value of total assets. V is the market value of the firm calculated at fiscal year end as the sum of market value of equity, the book value of short-term debt and book value of long-term debt. E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits. NA equals total assets minus liquid assets, RD, is Research and Development expense; 0 if value is missing, I is Interest expense, D is dividends calculated as common dividends paid, and L is liquid assets (cash plus marketable securities).

Fixed-effects (within) regression			**Number of obs**	=		**52439**
Group variable: typenum			**Number of groups**	=		**11928**
R-sq:	**within = 0.2384**		**Obs per group: min**	=		**1**
	between = 0.2388		**avg**	=		**4.4**
	overall = 0.2617		**max**	=		**10**
			F(26,11927)	=		**46.25**
corr(u_i, Xb) = 0.0380			**Prob > F**	=		**0.0000**

V	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
$E_{i,t}$	-3.496758	.822629	-4.25	0.000	-5.109245	-1.884271
$dE_{i,t}$	.6544786	.2046236	3.20	0.001	.2533831	1.055574
$dE_{i,t+1}$	-1.068187	.2880658	-3.71	0.000	-1.632843	-.5035311
$dNA_{i,t}$	.9268962	.2259109	4.10	0.000	.484074	1.369718
$dNA_{i,t+1}$	.9412912	.0529012	17.79	0.000	.8375962	1.044986
$RD_{i,t}$	2.421937	1.005011	2.41	0.016	.4519514	4.391922
$dRD_{i,t}$	1.763797	.7602317	2.32	0.020	.2736185	3.253975
$dRD_{i,t+1}$	6.477645	.9202959	7.04	0.000	4.673715	8.281575
$I_{i,t}$	-676.1949	714.5311	-0.95	0.344	-2076.792	724.4024
$dI_{i,t}$	998.3444	538.0002	1.86	0.064	-56.22356	2052.912
$dI_{i,t+1}$	-3128.382	2248.52	-1.39	0.164	-7535.847	1279.084
$D_{i,t}$	12.77816	1.709916	7.47	0.000	9.426445	16.12987
$dD_{i,t}$	-.1144406	.6070239	-0.19	0.850	-1.304306	1.075425
$dD_{i,t+1}$	7.990431	.9009798	8.87	0.000	6.224364	9.756498
$dL_{i,t}$	1.368832	.229548	5.96	0.000	.9188802	1.818783
$dL_{i,t+1}$	1.852898	.1760522	10.52	0.000	1.507807	2.197989
$dV_{i,t+1}$	-.273792	.0263651	-10.38	0.000	-.3254719	-.222112
y2	.0294106	.0551239	0.53	0.594	-.0786413	.1374624
y3	-.3150294	.0718293	-4.39	0.000	-.4558265	-.1742322
y4	-.5789684	.0781895	-7.40	0.000	-.7322326	-.4257042
y5	-.7861714	.081976	-9.59	0.000	-.9468578	-.6254851
y6	-.5404197	.0758181	-7.13	0.000	-.6890354	-.3918039
y7	-.4953068	.0758376	-6.53	0.000	-.6439608	-.3466528
y8	-.5024162	.0724994	-6.93	0.000	-.6445269	-.3603055
y9	-.4451996	.0777912	-5.72	0.000	-.5976829	-.2927162
y10	-.6028657	.096408	-6.25	0.000	-.7918411	-.4138902
Constant	1.81266	.0827612	21.90	0.000	1.650434	1.974885

sigma_u	**3.7163937**
sigma_e	**1.9565633**
rho	**.78298185 (fraction of variance due to u_i)**

6.2 Economic development

The regression analysis in this thesis is performed by using variables for investor protection to separate the countries in our sample. The variables measuring investor protection might merely act as proxies for economic and financial development. From Table 20 (correlation matrix, also presented in section 4, we observe that all our investor protection variables, with the exception of the anti-directory index and protecting investor variable, are highly correlated with our measures of economic and financial development, namely; Stock market capitalization (Scap), Stock market turnover (Sturn), GDP, bond market capitalization (Bcap) and Total market capitalization (Tcap). To investigate this issue further, we now apply regression model (1) and (2) using economic and financial development measures to split our group of countries in two: high and low economic/financial development.

Table 20: Correlation matrix

Correlation between the various investor protection and economic development variables. ICRGP, the overall political risk measure, Corruption, the level of government corruption, and Law/Order, the law-and-order tradidion in each country are all from the International Country Risk Guide (ICRGP). Polcon V measures political stability, exprisk the expropriation risk, antidir is the anti-director index and ProtInvest is the protecting investors variable from Doing Business. In terms of the financial development variables, Scap is stock market capitalization, Sturn is stock market turnover, GDP is GDP per capita, Bcap is bond market capitalization and Tcap is total market capitalization. The correlations between the investor protection measures and the financial development measures are highlighted in the grey frame.

	ICRGP	*Corruption*	*Law/order*	*Polcon V*	*Exprisk*	*Antidirr*	*ProtInvest*	*Scap*	*Sturn*	*GDP*	*Bcap*	*Tcap*
ICRGP	1											
Corruption	0.882	1										
Law/order	0.886	0.838	1									
Polcon V	0.576	0.587	0.650	1								
Exprisk	0.851	0.745	0.844	0.743	1							
Antidirr	-0.145	-0.088	-0.055	0.135	0.011	1						
ProtInvest	0.013	0.003	-0.147	-0.095	-0.115	-0.468	1					
Scap	0.193	0.231	0.183	0.215	0.206	0.326	-0.125	1				
Sturn	0.152	0.119	0.298	0.364	0.382	0.058	0.109	-0.012	1			
GDP	0.864	0.750	0.820	0.579	0.858	-0.138	-0.018	0.271	0.246	1		
Bcap	0.573	0.686	0.551	0.425	0.579	-0.013	0.012	0.249	0.252	0.570	1	
Tcap	0.365	0.437	0.349	0.333	0.379	0.274	-0.102	0.941	0.078	0.430	0.562	1

Table 21 and 22 show the results from our regression dividing our sample countries into groups of high and low economic development[6].

[6] We split using the median

Table 21: Regression Results Model (1), Change in Cash

Results from the OLS and fixed-effects regression utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (1) change in cash. The results are shown for the five different financial development measures. Sturn is stock market turnover, Scap is stock market capitalization, Bcap is bond market capitalization, Tcap is total market capitalization and GDP is GDP per capita.The results reported are the results for the coefficients β_{12} and β_{15}. The t-statistics for the difference between high and low financially developed countries is reported and together with the significance level of the difference. Regression model, change in cash:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dL_{i,t} + \beta_{16} dL_{i,t+1} + \beta_{17} dV_{i,t+1} + \varepsilon_{i,t}$$

Model (1) change in cash

		OLS regressions			Fixed regressions		
Economic development		High	Low	T-stat of difference	High	Low	T-stat of difference
Sturn							
	β_{12} *(dividends)*	19.38	13.10	3.37 ***	11.77	10.80	0.45
	β_{15} *(change in cash)*	2.09	1.32	1.98 **	1.50	0.57	3.36 ***
Scap							
	β_{12} *(dividends)*	15.95	13.23	1.83 *	12.73	8.21	2.26 **
	β_{15} *(change in cash)*	1.86	0.74	3.18 ***	1.35	0.28	3.57 ***
Bcap							
	β_{12} *(dividends)*	14.86	15.09	-0.16	12.01	9.82	1.05
	β_{15} *(change in cash)*	1.88	1.27	1.74 *	1.41	0.71	2.50 **
Tcap							
	β_{12} *(dividends)*	14.93	12.76	1.37	12.91	5.98	3.41 ***
	β_{15} *(change in cash)*	1.78	1.78	-0.01	1.33	0.75	1.88 *
GDP							
	β_{12} *(dividends)*	16.78	13.21	2.39 **	12.12	9.23	1.37
	β_{15} *(change in cash)*	1.91	0.84	2.82 ***	1.38	0.61	2.56 ***

Table 22: Regression Results Model (2), Level of Cash

Results from the OLS and fixed-effects regression utilizing the approach of Pinkowitz, Stulz and Williamson (2006), model (2) level of cash. The results are shown for the five different financial development measures. Sturn is stock market turnover, Scap is stock market capitalization, Bcap is bond market capitalization, Tcap is total market capitalization and GDP is GDP per capita.The results reported are the results for the coefficients β_{12} and β_{15}. The t-statistics for the difference between high and low financially developed countries is reported and together with the significance level of the difference. Regression model, level of cash:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} L_{i,t} + \beta_{16} dV_{i,t+1} + \varepsilon_{i,t}$$

Model (2) level of cash

		OLS regressions			Fixed regressions		
Economic development		High	Low	T-stat of difference	High	Low	T-stat of difference
Sturn							
	β_{12} *(dividends)*	19.27	12.58	3.54 ***	10.86	10.50	0.17
	β_{15} *(level of cash)*	2.45	1.96	1.61	1.18	1.02	0.24
Scap							
	β_{12} *(dividends)*	15.85	12.72	2.08 **	11.84	8.06	1.99 **
	β_{15} *(level of cash)*	2.36	1.60	2.54 **	1.13	1.14	-0.02
Bcap							
	β_{12} *(dividends)*	14.60	14.86	-0.18	10.97	9.53	0.73
	β_{15} *(level of cash)*	2.31	2.34	-0.11	1.15	1.13	0.03
Tcap							
	β_{12} *(dividends)*	14.74	12.50	1.41	12.04	5.75	3.20 ***
	β_{15} *(level of cash)*	2.22	2.19	0.12	1.12	1.02	0.18
GDP							
	β_{12} *(dividends)*	17.04	12.39	3.07 ***	11.32	8.83	1.23
	β_{15} *(level of cash)*	2.37	1.45	3.25 ***	1.10	1.14	-0.06

Significance level difference: * 10%-level, ** 5%-level, *** 1%-level

The results from using regression model (1) are presented in Table 21. We observe that our findings resemble those obtained using investor protection variables to divide our sample. This is something we would expect if investor protection simply act as a proxy for economic development. Our results show significant differences in β_{15}, indicating that cash is worth more in countries with high economic development. Further, the results for β_{12} also follow the same pattern as the results we find using investor protection proxies, but are somewhat less significant.

Table 22 shows the results using regression model (2). These results similarly resemble the results obtained in the main part of the thesis, with low significance levels of the differences between highly and less economically developed countries.

These observations and results raise a concern that the higher value of cash in countries with better investor protection is a result of the financial and economic development rather than investor protection. Haidar (2009) suggests that countries with better investor protection grow faster. This would imply that good investor protection leads to higher GDP. Such a relationship would imply a circular causality and would in practice make it close to impossible to separate the two effects. Nonetheless, our results provide a strong indication that proper investor protection does affect the valuation of cash positively.

7 Concluding remarks

In this thesis, our goal is to investigate whether the intensity of agency problems across countries affects the cross-country valuation of firms. We test this through two hypotheses. The first hypothesis states that cash should be valued at a discount in countries with poor investor protection. The second states that dividends add greater value to firms in countries with poor shareholder protection. Through regression analysis we find supportive evidence for hypothesis 1 however not for hypothesis 2. Our methods and analysis are based on the analysis done by Pinkowitz, Stulz and Williamson (2006). Our results differ from theirs as they find evidence for both hypotheses. Overall we conclude that from our data it appears that agency problems are of importance when it comes to assessing the value of a firm's cash. In terms of dividends the level of investor protection seems less relevant. We cannot rule out the possibility that our results merely reflect economic and financial development. Nevertheless, our study indicates a positive relationship between valuation of a firm's cash holdings and investor protection.

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9 Appendix

9.1 Appendix 1 – Overview of data from Thompson Worldscope database

Mnemonic code	Variable name
WC06010	Industry
1	Industrial
2	Utility
3	Transportation
4	Bank/savings -loan
5	Insurance
6	Other financial
WC02999	Total assets
WC02003	Cash
WC05376	Common dividends
WC 08001	Market capitalization
WC03255	Total debt
WC01201	Research and Developement
WC01075	Interest expence Total
WC19181	Earnings