Aalto University

# How Corruption and Government Dependency Affect Cash Holdings?

A cross-sectional study of twenty countries

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**Abstract**

This study provides new evidence on impacts of corruption. Consistent with Smith (2016) and Caprio et al. (2013), operating in a corrupt country decreases cash balances in the sample of 10,265 firms from twenty countries. Adding to the prior literature, the study provides evidence that government dependent firms in corrupt countries hold even less cash than non-government dependent firms do. The finding holds especially with firms with real size below the sample average. The findings are robust to several additional tests.


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Finance

Bachelor's Thesis

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# 1. Introduction

Six billion people around the globe live in a country with serious corruption problem. Every year more than 1 trillion dollars is lost to corruption in these countries[1]. The lost wealth does not only come from the private persons but the firms must also pay their share. A recent study done by Smith (2016) found evidence that even in a country with low corruption like the US, firms shelter their asset to limit the expropriation possibilities. In countries with high corruption, the financial policies matter even more.

Bai et al. (2014) model that public officials set the bribe rate and firms live with it until the bribes become unbearable and then move to another region. Firms pay the bribes until they cannot afford to pay anymore. Therefore, corruption forces firms to leave otherwise suitable regions. Public rent-seeking hurts innovative actions thus lowers the economic growth (Murphy et al., 1993). If possible, firms do not want to be situated in this kind of an environment. However, not every firm can or want to move to another region. The clientele may be in the corrupt area or the firm just cannot afford to move. What can firms do in a situation like this? Caprio et al. (2011) and Smith (2016) found that a way to deal with corruption, is to modify the balance sheet. Lower cash balances combined with higher leverage are visible for public officials which cannot ask for bribes if the firm is in a bad shape. Thus, sheltering assets can create value for the firm and its shareholders.

Even though there is a broad empirical literature about corruption and how it affects firm financial policies, a question rises about the firm characteristics. That is, what kind of firms are the most affected by public rent-seeking. To limit the scope, I examine industries which are the most or the least dependent on government spending. 2002 Input-Output table with the US firms, reveals which industries are the most exposed to government spending (Belo et al., 2013). They used this table to conclude top and bottom ten industries based on government dependency. Using their groups, I study if there are differences among the cash policies. Thus, my primary research question is as follows: does operating in a government dependent industry change the effects corruption has on firm cash policies.

[1] https://www.transparency.org/cpi2015/, date 04-Dec-16.

I structure my thesis in a following way: firstly, I study the corruption with the total panel data. After this I include government dependency into the picture to asses my primary research question and to see whether government dependency changes the results. The first part is tested with a panel data consisting of 125,737 firm-years from 10,265 unique firms whereas the latter part is tested using 868 firms with a total of 10,787 firm-years. Both panels contain observations from twenty countries (Table A2). My primary hypothesis in the first part is that firms hold less cash in corrupt areas. In the latter part my primary hypothesis is that government dependency increases the impact of corruption.

Using the US based industry groups reduces the credibility of my tests but the groups still provide a reference point for comparing industry groups. Namely, it can be argued that industries which are the most government dependent in the US are more likely government dependent around the globe than other industries even though the exact rankings are not the same. Therefore, I assume that the government dependency is somewhat universal subject. To better evaluate government dependency in each country, the similar analysis as Belo et al. (2013) did to the US industries should be done to every country.

The paper is organized as follows: after this first introductory section I will discuss the theoretical background and my hypotheses more precisely. The third section provides information about the data and its properties. The fourth section presents empirical results whereas the fifth section presents some alternative results to address the robustness. Finally, the sixth section concludes the paper.

# 2. Prior Studies and Hypotheses Development

There are two main theories on corruption. Neither of them cannot be stated as the overpowering one as there is empirical support for both theories. In the first one corruption is a form of taxation and the firms are obliged to pay bribes to receive public projects. The additional unofficial taxation must be paid to receive benefits from the public officials. Corruption especially in a form of public rent-seeking leads to lower growth opportunities and harms the economy as a whole (Murphy et al., 1993). When a firm is operating in a corrupt area, they are likely to be asked to pay bribes. The overall economic environment is not very growth-friendly. Many research e.g. (Fisman and Svensson, 2007) find that corruption is even more harmful to growth than taxation. Higher transaction costs which are due to uncertainty in the bribe payments make the corruption less predictable and hence more damaging than taxation.

The second main theory for corruption assumes that corruption is efficient and that firms can reduce bureaucracy and hence lower the costs related to it. Under this theory, firms that can pay bribes will gain economic benefits. Even though operating in a corrupt area could be seen harmful for the economy some firms could still benefit from paying the bribes. If paying bribes shortens the process time with public officials and eases the process overall, a single firm can gain benefits from paying bribes. (Wei, 1998, p. 14) states that “bribes often work as “grease” that can speed of wheels of commerce “.

These two theories lead to different assumptions about firm financial policies in corrupt areas. If the first theory is assumed to be true, it would be the most beneficial for the firms to shelter their assets in the corrupt areas. Klasa et al. (2009) find that firms in more unionized industries hold less cash to protect themselves from bargains and to shelter their corporate income. Also Smith (2016) finds that in the more corrupt areas of the United States firms hold less cash to shelter their assets from political corruption. Hence, one could make a shielding hypothesis which assumes firms limit the expropriation by favoring financial policies that keep the liquidity levels low. E.g. the empirical study done by Caprio et al. (2011) supports this hypothesis. Under this assumption firms hold less cash, have higher leverage, and keep more money in fixed assets. Thus, my first hypothesis is as follows:

**H1a**: *Firms in more corrupt countries have lower cash holdings*

The competing hypothesis for political corruption assumes that firms favor liquidity and flexibility to be able to pay bribes. The liquidity hypothesis assumes that paying bribes and political expropriation is not harmful for the firm. Firms are willing to pay bribes and hence keep cash ratios higher and less cash in fixed assets. Nevertheless, this hypothesis can be criticized by noting that firms which can pay bribes will pay bribes. If politicians and public officials want to maximize their personal gains, firms which can pay bribes will be asked to pay bribes until they are no longer able to pay them. Bai et al. (2014) model that public officials set the bribe rate. Firms then pay per this bribe rate or more to another region. If corruption is indeed beneficial for some firms, they should hold liquidity up to pay expected and unexpected bribes. Therefore, the second hypothesis which is against the first one is the following:

**H1b**: *Firms in more corrupt countries have higher cash holdings*

I test these two hypotheses first in my thesis to conclude what kind of effect corruption has on firms’ cash policies in my sample. If hypothesis one holds, firms should keep less cash to protect

their assets from political expropriation whereas if the second hypothesis holds firms should keep more cash to be able to pay expected and unexpected bribes.

As the political corruption is related to public officials and politicians, it can be assumed that firms which must do business with them more often are more likely to be asked for bribes. Hence these firms will suffer most from the expropriation. As the political corruption is harmful for the economy, I assume first that on industry-level sheltering assets is the best practice. Studies done by e.g. Smith (2016) and Fan et al. (2012) support this idea. My primary research question is: does operating in a government dependent industry change the effects corruption has on firm cash policies. In the third hypothesis, I assume that government dependent industries are the most vulnerable for political corruption, thus the impact of corruption is more powerful.

**H2a:** *Government dependency increases the impact of corruption*

It can also be that firms and industries that are the most dependent on government spending do not have higher probability to be asked for bribes than other industries. The government dependent industries may have to pay bribes to get the orders but the industries that are not equally government dependent also have to pay bribes. Additionally, the government dependent firms may have regular orders from the government and thus no bribes are needed (e.g. military industry). If this is true, private sector firms, must pay more bribes than the government dependent firms. There is evidence that differences in corruption level are due to culture (Murphy et al., 1993). A government dependent local firm may have adapted to the culture better than the firms operating merely in private sector around the world. Thus, these firms may be able to negotiate better deals with the public officials. Hence my fourth hypothesis is as follows:

**H2b:** *Government dependency decreases the impact of corruption*

To test these two hypotheses about government dependency, I will study if there are significant differences in the cash levels between the most government dependent and the least government dependent industries. A more comprehensive approach to the research question would be to examine all the industries but it is out of the scope of my thesis.

# 3. Data and Variables

## *3.1 The Initial Data*

In the thesis, I have two initial data sets. The first contains all publicly traded firms from twenty different countries with available financial data in Reuters Datastream. The data set contains

observations from 1998 to 2015. Firms with missing financial info are dropped from the panel data. The resulting panel contains 125,737 firms-years from 10,265 unique firms.

My second initial data set contains publicly traded firms from twenty different countries that belong to the most dependent or the least dependent industries. The data set is also obtained from Reuters Datastream and contains observations from 1998 to 2015. Like in the first data set, firms with missing financial information are dropped. Additionally, firms which do not report the Standard Industrial Classification (SIC) code are dropped from the panel. From this preliminary panel, I rule out the firms which do not belong to the industries of interest (Section 3.3). It is done by filtering the first reported SIC codes. By filtering the first reported SIC codes, I might trim some potentially relevant firms away but this approach makes the industry effects clearer (e.g. firms with the second SIC code belonging to the industries of interest are ruled out). Thus, the industry groups are defined strictly. After deleting firms with missing financial data, SIC data and limiting the SIC codes to the ones of my interest, I have a panel data of 10,787 firm-years from 868 unique firms. The data is obtained from Reuters Datastream. Table A2 reports the data sets used throughout the study.

### *3.2 The Dependent Variable*

Throughout my analysis, I use natural logarithm of cash divided by net assets as the dependent variable. According to Smith (2016) using this way avoids some of the econometrics problems related to cash ratio. Scaling the dependent and independent variables by total assets may cause issues if some of the firms have significantly larger cash ratios or other variables than others. Due to these kinds of issues many researches use the natural logarithm of the cash divided by net assets as the dependent variable. E.g. Opler et al. (1999) use this measure. However, the results I found in the analyses are similar if the dependent variable is cash divided by total assets.

### *3.2 Corruption Variables*

To assess the level of corruption in each of the countries, I calculated a corruption index. It uses the data from Transparency International's annual research which reports the perceived level of corruption. The Corruption Perception Index (CPI) reflects how corruption is perceived to be among public officials and politicians. I follow Fan et al. (2012) in the process of creating corruption index. For every country, I take the median of each year's rank in the research and rank these medians. Like the initial data sets, the corruption index contains observations from 1998 to 2015. From the ranked median, I create the corruption index ranging from zero to ten. The countries with low corruption have low value whereas countries with highly perceived corruption have higher value.

Using CPI as a base for my index has several reasons. One of the most rational arguments to use CPI is the great availability. The CPI index is available today for over 160 countries around the world. In addition, the time series data Transparency International provides, makes it possible to examine longer periods. Yet, using CPI as a measure for corruption has also some problems. Many researches use objective measures of corruption. Using perception based measures is not as valid as these objective measures but the downside with them is the availability. No objective corruption measure is available for twenty different countries. Additionally, Andersson and Heywood (2009) argue that the CPI has some conceptual difficulties that deteriorates the usage of the index. However, they also state that even though the CPI has some issues it still can be used as a measure for corruption.

I define the countries that have CPI of five or larger as corrupt and the countries with CPI ranging from zero to four as non-corrupt. The problem with countries that have a larger corruption index is the overall state of economy. Countries like Kenya, Nigeria and Vietnam do not necessarily have the same standards for reporting financial information as the firms in Finland and Denmark have, but as all the firms in the study are listed, they must have some level of reporting to be included in stock exchange. In developing economies firms lack the capability to apply IAS standards and therefore the reported numbers are not as reliable as in developed economies (Barth et al., 2008). I find that this is not a significant problem as all the firms are publicly traded. Nevertheless, the number of firms which must be excluded from the study due to missing financial information was greater in the most corrupt countries than in the least corrupt countries.

In addition to the CPI, I use two other corruption measures to ensure the robustness of my study. These measures are discussed in section five.

### *3.3 The Industries of Interest*

In the latter part of the thesis, I study the industries that Belo et al. (2013) define the most or the least government dependent. They calculated the industry exposure to government spending from 2002 Benchmark Input-Output table. Tables A3.1 and A3.2 show Standard Industrial Classification (SIC), I-O code and industry names. Industries that are the most dependent on government spending include shipbuilding, radio and television broadcasting as well as guided missile manufacturing whereas the industries that are the least dependent on government spending include industries that are more related to private sector such as food manufacturing and tobacco manufacturing.

The biggest problem with this approach to government dependency is that the industries defined by Belo et al. are the US industries. Excluding the United States from the study, sets all the other countries on the same line with these classifications. It is also reasonable to assume that there are global differences between these industry groups even though they are not exact for every country. To enhance the study results, the most and the least dependent industries should be calculated for every country. By conducting the study in this way, the results would be more reliable. However, for this study the previously done work is sufficient.

### *3.4 Descriptive Statistics*

Table 1 contains descriptive statistics by level of corruption. Table provides average values for financial policies and control variables as well as the p-value of the difference in means. The definitions of variables are provided in the Table A1. I define countries with the corruption index below five to be non-corrupt whereas countries with corruption index above four are defined as corrupt.

I calculate these variables by taking the sample median for every firm's time series of each variable. After this firms are matched in size and industry. I define that firms with the real size of total assets ranging from five to ten, ten to fifteen and fifteen to twenty belong to same groups. Industries are matched based on Standard Industrial Code's (SIC) first two digits. For these groups, I calculate the average value of each variable. (Gao et al., 2013) show that cash policies vary systematically by industry and that larger companies hold less cash due to economics of scale. Matching industries and real sizes consider these findings. I follow Smith (2016) in the process of matching firms in size and industry.

Examining the results reveals that there are differences in the average values of non-dependent and dependent industries. Cash ratio and natural logarithm of cash to net assets reveal significant differences (p-value below 1%). The difference implies that corruption does influence firms' cash policies. Additionally, one can note that in corrupt areas firms hold less cash than they do in non-corrupt regions. The results presented in the table are in line with the prior studies.

**Table 1**

Descriptive statistics by corrupt and non-corrupt areas

This table presents average values for each variable in corrupt and non-corrupt areas. For every firm, the sample median is calculated and the firms are matched in size and industry. Firms with real size between 5 to 10, 10 to 15 and 15 to 20 belong to same size groups. Industries are matched based on the first digits of Standard Industrial Coding (SIC). From these values, the average is calculated for corrupt and non-corrupt areas. P-value of difference reports the probability associated with Student's t-Test. I define corrupt areas to be countries with corruption index five or higher. The sample is taken from Reuters Datastream and it contains observations from 1998 to 2015 and from 10,265 unique firms totaling 125,737 firm-years. *, ** and *** denote significance at 10%, 5% and 1% level, respectively. Variable definitions in Table A1.

| | Corrupt | Non-corrupt | P-value of difference in means |
|---|---|---|---|
| Cash ratio | 0.044 | 0.149 | 0.008*** |
| ln (Cash/net assets) | -3.876 | -2.266 | 0.003*** |
| Leverage | 0.442 | 0.353 | 0.025** |
| Market-to-book | 1.452 | 2.119 | 0.094* |
| Capital expenditure | 0.059 | 0.051 | 0.129 |
| NWC | 0.086 | 0.072 | 0.209 |
| Dividends | 0.025 | 0.027 | 0.311 |
| PP&E | 0.408 | 0.336 | 0.241 |
| Cash Flow | 0.065 | 0.056 | 0.280 |
| EBITDA | 0.131 | 0.104 | 0.074* |
| Acquisitions | 0.000 | 0.007 | 0.222 |

Another notable point in Table 1 is the leverage. It seems that firms in corrupt areas hold significantly more debt than corresponding firms in non-corrupt areas do. In addition, market-to-book and EBITDA have significant p-value of differences. The higher leverage and lower cash balances imply that firms in corrupt areas shelter their assets more than firms in non-corrupt areas do. Holding less cash and more debt limits the expropriation possibilities which are more present in corrupt areas. The results support the hypothesis 1a: it seems that firms in corrupt areas hold significantly less cash. Table 1 does not provide evidence to support hypothesis 1b.

# 4. Results: The Association Between Corruption, Government Dependency, and Cash Holdings

In this section I examine the effect of corruption on firms' cash policies. Subsequently I examine how corruption and government dependency affect the results. The first section inspects corruption to assess hypothesis one. The Sections 4.2 and 4.3 further examine hypothesis two.

I conduct the analyses using firm's sample median as a unit of interest. Smith (2016) conducted his analyses in a similar way. Using firm sample median will set firms into similar weight. Missing years do not drive the result as every single firm is now set as one observation regardless of the number of years available in Reuters Datastream database.

## *4.1 Multivariate Analysis of Cash Holdings and Corruption*

Table 2 presents the results using natural logarithm of cash to net assets as dependent variable. The first model contains only the corruption index as independent variable. The model indicates that corruption has a strong negative effect on corporate cash holdings. The coefficient is significant at 1% level. The model one is per the Equation 1. The second model adds controls which are drawn from the previous researches (e.g. (Opler et al., 1999)). The results indicate that corruption has a negative effect on cash holdings. The results are significant at 1 % level. Adding the controls increases the adjusted R-squared from 9.6% to 27.4% which indicates that the controls are strong. The results from Table 2 imply that the hypothesis 1a seems to hold. Firms seem to hold less cash when situated in a corrupt area. Table 2 provides no evidence to support the hypothesis 1b.

(1) $$\ln\left(\frac{Cash_i}{net\ assets_i}\right) = \beta_0 + Corruption\ index_i + \varepsilon_i$$

**Table 2**

Cash holdings and corruption

This table presents results from ordinary least squares regressions estimating how cash holdings vary with corruption index. Regression one presents ordinary least squares results estimating how cash holdings are affected by corruption. Regression two adds controls. The sample is taken from Reuters Datastream and it has 10,265 unique firms totaling 125,737 firm-years from 1998 to 2015. The above value for each variable is the coefficient and below in parentheses is the standard error. *, ** and *** denote significance at 10%, 5% and 1% level, respectively. Variable definitions in Table A1.

| Dependent variable is ln (cash/net assets) | (1) | (2) |
|---|---|---|
| Corruption index | -0.247*** | -0.225*** |
| | (0.007) | (0.007) |
| Market-to-book | | 0.006*** |
| | | (0.001) |
| Leverage | | 0.028* |
| | | (0.015) |
| CF | | 0.021* |
| | | (0.015) |
| NWC | | -0.045*** |
| | | (0.016) |
| Negative NI | | -0.509*** |
| | | (0.047) |
| Real size | | 0.247*** |
| | | (0.006) |
| Intercept | -1.987*** | -5.117*** |
| | (0.033) | (0.083) |
| Number of observations | 125,737 | 125,737 |
| Adjusted R-squared | 0.096 | 0.274 |

## *4.2 Multivariate Analysis of Cash Holdings, Government Dependency, and Corruption*

Table 3 presents ordinary least squares regression results estimating how cash holdings vary with corruption index, government dependency and the interaction term between these two.

$$(2) \qquad \ln\left(\frac{Cash_i}{Net\ assets_i}\right) = \beta_0 + Corruption\ index_i + Government\ dummy_i + CorruptionGov_i + \varepsilon_i$$

The Equation 2 shows my main interest for the ordinary least squares regression. The first model contains no controls. The results show that each one of the terms is significant at 1% level. Corruption index has a negative effect on the dependent variable whereas the government dependency has a positive effect. The interaction term has also a negative effect on cash

holdings. This result indicates that government dependent firms in corrupt areas hold significantly less cash than non-government dependent firms.

**Table 3**

Cash holdings, corruption, and government dependency

This table presents results from ordinary least squares results estimating how corruption and government dependency affect cash holdings. The sample contains all the firms from industries defined as the most or the least government dependent. The sample is taken from Reuters Datastream and it has 870 unique firms totaling 10,787 firm-years from 1998 to 2015. The above value for each is the coefficient and below in parentheses is standard error. *, ** and *** denote significance at 10%, 5% and 1% level, respectively. Variable definitions in Table A1.

| Dependent variable is ln (cash/net assets) | (1) | (2) |
|---|---|---|
| Corruption index | -0.24*** | -0.155*** |
| | (0.029) | (0.035) |
| Government dummy | 0.382*** | -0.005 |
| | (0.127) | (0.004) |
| CorruptionGov | -0.734*** | -0.545* |
| | (0.223) | (0.293) |
| Market-to-book | | 0.168*** |
| | | (0.041) |
| Leverage | | -2.377*** |
| | | (0.326) |
| CF | | -1.775** |
| | | (0.788) |
| NWC | | -2.240 |
| | | (0.331) |
| Negative NI | | -0.486** |
| | | (0.237) |
| Real size | | 0.233*** |
| | | (0.026) |
| Intercept | -2.161*** | -4.165*** |
| | (0.152) | (0.432) |
| Number of observations | 10,787 | 10,787 |
| Adjusted R-squared | 0.150 | 0.513 |

The second model includes controls. The corruption index and the interaction term are significant at 10% level but the government dummy is no longer significant. The rise in adjusted R-square is high (from 0.152 to 0.513). It implies that the added controls are economically significant. The corruption index and the interaction term are significant and have negative signs. This suggests

that the hypothesis 2a seems to hold. The results imply that government dependent firms in corrupt areas hold less cash which is against my hypothesis 2b.

The controls are drawn from the previous researches (e.g. Opler et al. (1999) and Bates et al.(2009)). However, it is notable that not every control they included could be added to this regression. Research and development outlays as well as dividend payouts data are not comprehensive and hence they cannot be used here. I study these two variables later in Section 5. All the controls except for real size and market-to-book have a negative effect on the dependent variable in the third model. In the second and first model government dummy has a positive sign. In the third model government dummy has a negative sign but it is no longer a significant coefficient.

### *4.3 Subsample Multivariate Analysis of Cash Holdings*

In this section I further examine the firm cash policies. The Section 4.2 reveals results about cash holdings, corruption, and government dependency. Real size is a significant control in the regressions. As the results in the Model 2 in Section 4.3 indicate that government dependency is no longer a significant variable, I want to further study what causes it. To assess the problem, I match firms in size and evaluate if this changes the results. I do this by conducting the regressions with subsamples. The results are displayed in Table 4.

Table 4 displays ordinary least squares results for four different models. The first and second model use the Equation 2. The first one presents the results for firms which are in size below the sample average while the second model presents the results for firms in size above the sample average. The adjusted R-squared for model two is notably lower than the adjusted R-squared of the first model. This implies that for the larger firms, these variables are not as significant as for the smaller firms. Nonetheless, without any controls, all the coefficients are significant at 5% level.

Adding controls to the model increases the adjusted R-squared for both models. The third model contains the variables of interests as well as controls for the firms with size below the sample average. The fourth model presents the same results for larger firms. The results reveal that for the smaller firms, corruption index, government dummy and their interaction term are significant at 10% level. For larger firms the results are not equally significant as the corruption index loses its explanatory power. This finding drives the results in the regressions done in Table 3. As discussed previously, controlling for firm size makes economic sense when examining cash holdings.

**Table 4**

Subsample regression of cash holding, corruption, and government dependency

This table displays ordinary least squares results for the subsamples based on real size. The regressions estimate how cash holdings vary with corruption index, government dependency and the interaction term between the two. Results for firms with real size below the sample average are presented in (1) and (3) while results for firms with real size above the sample average are presented in (2) and (4). The sample is taken from Reuters Datastream and it has 870 unique firms totaling 10,787 firm-years from 1998 to 2015. The above value for each variable is the coefficient and below in parentheses is standard error. *, **, and *** denote significance at 10%, 5% and 1% level, respectively. Variable definitions in Table A1.

| Sample firm category | Small | Large | Small | Large |
|---|---|---|---|---|
| Dependent variable is ln (cash/net assets) | (1) | (2) | (3) | (4) |
| Corruption index | -0.268*** | 0.086*** | -0.225*** | 0.042 |
| | (0.041) | (0.048) | (0.040) | (0.043) |
| Government dummy | 0.176** | 0.502** | 0.020*** | 0.323* |
| | (0.007) | (0.010) | (0.007) | (0.170) |
| CorruptionGov | -0.044*** | -0.004* | -0.005*** | -0.003** |
| | (0.001) | (0.002) | (0.001) | (0.001) |
| Market-to-book | | | 0.057*** | 0.175** |
| | | | (0.013) | (0.071) |
| Leverage | | | -1.698*** | -3.200*** |
| | | | (0.265) | (0.414) |
| NWC | | | -1.037*** | -3.361*** |
| | | | (0.351) | (0.357) |
| Negative NI | | | -0.333* | -4.293** |
| | | | (0.171) | (1.701) |
| Intercept | -2.420*** | -2.282*** | -1.798*** | -1.160*** |
| | (0.194) | (0.336) | (0.235) | (0.326) |
| Number of observations | 6,175 | 4,612 | 6,175 | 4,612 |
| Adjusted R-squared | 0.281 | 0.125 | 0.336 | 0.311 |

The signs of coefficients are more in line while conducting the analysis this way. Government dummy and market-to-book have a positive sign while rest of the coefficients have a negative sign. However, for larger firms, corruption index has a positive sign. This implies that for larger firms, corruption should have a positive effect on cash holdings. This is not in line with previous researches, but as the coefficient is not significant when including the controls, I am not concerned about it. It seems that corruption does not affect larger firms as much as the smaller firms in the sample

The results of Table 4 support hypothesis 2a. It seems that for the smaller firms, government spending dependency is a significant variable when explaining variations in cash holdings. The government dependency itself does not reduce cash holdings but the corruption and government spending together reduce the cash ratios. The hypothesis 2a is consistent with my results as even in the fourth model in which corruption is no longer a significant variable, the interaction term has a negative sign and is a significant variable.

# 5. Addressing Robustness

The results presented in the previous section could be spurious despite the control variables included in the regressions. It could be that some unobserved variables drive the results. To address the concern, I conduct several other analyses which include alternative regression using cash to total assets as the dependent variable, OLS-regressions with additional variables and additional analysis using different measure for corruption. In Section 5.1 I conduct regressions using alternative corruption measures to evaluate if the results displayed in Section 4.1 change. Sections 5.2 and 5.3 concentrate on government dependent firms with real size below sample average. Since larger firms behaved differently than smaller firms, I examine if the results for smaller firms found in Section 4.3 hold.

## *5.1 Alternative Measures of Corruption*

Many prior studies use different methods for measuring corruption. They can be categorized into two: the perception based and objective. Smith (2016) uses yearly number of corruption conviction for each federal juridical districts and Olken (2005) comperes actual and reported costs for infrastructure projects as a measure for corruption. Using such objective measures to assess the level corruption is highly reliable as the results are not based on opinion but raw numbers. Perception based measures lack this feature but they are more accessible. Caprio et al. (2011) used four different perception based measures to study corruption. I follow them and use two of those measures to test the robustness of my results.

The first index applied here is named KKM corruption. It is based on a study done by Kaufmann et al. (2009). The corruption control (CC) captures how extensively public power is used to get private gain and it contains observations from 1996 to 2008. I scale the KKM corruption measure. The second measure for corruption is also applied from Caprio et al. (2011). It is called ICRG and it asses the level of corruption in within political system. The ICRG is developed and maintained by Political Risk Service Group[2]. Their researches are not publicly available and thus I collect the

[2] https://www.prsgroup.com/about-us/our-two-methodologies/icrg, date 04-Dec-16.

corruption indices from the Caprio et al. (2011) study. ICRG is not as comprehensive as CPI or KKM but using this as a proxy for corruption can still be argued as corruption is a deeply rooted, cultural and persistent phenomena. While studying diplomats parking tickets Fisman and Svensson (2007) found strong evidence to support the previous statement. Hence, I use ICRG as another measure for corruption. Conducting the regressions with KKM and ICRG should provide alternative perspective as they are not excessively correlated. There is a positive correlation between the measures but it is no surprise as they measure the same phenomenon. The KKM has correlation coefficient of 0.563 with Corruption index while ICRG has 0.735.

**Table 5**
Cash holdings and alternative corruption measures

This table presents ordinary least squares results estimating how cash holdings vary with corruption while using alternative measures of corruption. Models one and three use ICRG corruption as main explanatory variable whereas models two and four use KKM corruption. The sample contains 125,737 firm-years from 10,265 unique firms. The sample is obtained from Reuters Datastream and contains observations from 1998 to 2015. The above value for each variable is coefficient and below in parentheses is standard error. *, ** and *** denote significance at 10%, 5% and 1% level, respectively. Variable definitions in Table A1.

| Corruption measure | ICRG | KKM | ICRG | KKM |
|---|---|---|---|---|
| Dependent variable is ln (cash/net assets) | (1) | (2) | (3) | (4) |
| Alternative corruption measure | -0.117*** | -0.019*** | -0.022*** | -0.07*** |
| | (0.007) | (0.007) | (0.007) | (0.006) |
| Market-to-book | | | 0.006*** | 0.006*** |
| | | | (0.001) | (0.001) |
| Leverage | | | 0.005 | 0.013 |
| | | | (0.016) | (0.002) |
| CF | | | 0.012 | 0.017 |
| | | | (0.016) | (0.016) |
| NWC | | | -0.030** | -0.040** |
| | | | (0.016) | (0.017) |
| Negative NI | | | -0.304*** | -0.368*** |
| | | | (0.006) | (0.005) |
| Real size | | | 0.267*** | 0.288*** |
| | | | (0,006) | (0.006) |
| Intercept | -3.429*** | -3.038*** | -0.633*** | -0.612*** |
| | (0.037) | (0.039) | (0.079) | (0.080) |
| Number of observations | 125,737 | 125,737 | 125,737 | 125,737 |
| Adjusted R-squared | 0.022 | 0.001 | 0.198 | 0.207 |

Table 5 provides ordinary least squares regression results using the two alternative measures of corruption. The first and third model use ICRG corruption whereas the second and fourth use KKM corruption. Models do not reveal anything abnormal. When no controls included, the coefficients for corruption measures are negative and significant at 1% level. Adding controls reveal similar results.

The results presented in Table 5 serve as support for the hypothesis 1a. The negative corruption term implies that in corrupt countries firms shelter their assets more than they do in non-corrupt countries. Table 5 does not provide evidence to support the hypothesis 1b. In addition, it seems that the choice of corruption measure does not drive the results.

### *5.2 Alternative Measure of Cash Holdings*

Even though usage of natural logarithm of cash to net assets as dependent variable can be well argued, it can be that the choice drives the results. To address this concern, I conduct the regressions presented previously in Sections 4.2 and 4.3 using cash to total asset as the dependent variable. Caprio et al. (2011), Smith (2016) and Ramírez and Tadesse (2009) use cash to total assets as dependent variable despite the problems associated with it. The biggest reasons to use cash ratio as dependent variable are clearer economic interpretations. “I report results using only the cash ratio because economic magnitudes are simpler to demonstrate.” (Smith, 2016, p. 353).

Table 6 presents ordinary least squares regression results using cash ratio as dependent variable. Model one displays these results for smaller firms whereas the second model contains all firms and firm-years. These regressions reveal similar results as discussed earlier. The interaction term for corruption and government dependency has a negative sign and is significant in both models. Thus, the hypothesis 2a seems to hold. Firms located in corrupt areas and operating within a government dependent industry hold significantly less cash than firms operating within a non-government dependent industry. The government dummy itself has a positive sign (as in the previous regressions) which implies that differences between industry groups are not reducing cash ratios.

**Table 6**
Regressions using cash ratio as dependent variable

This table presents results from alternative regressions estimating how cash holdings vary with corruption index, government dependency and the interaction between these two. The coefficients are multiplied by hundred. Regression one presents contains firms with real size below the sample average. Regression two contains all the firms. The sample is taken from Reuters Datastream and it has 870 unique firms totaling 10,787 firm-years from 1998 to 2015.The above value for each variable is coefficient and below in parentheses is standard error. *, ** and *** denote significance at 10%, 5% and 1% level, respectively. Variable definitions in Table 1A.

| Sample | Size Below Average | Whole Sample |
|---|---|---|
| Dependent variable is cash/total assets | (1) | (2) |
| Corruption index | -0.141*** | -0.576** |
| | (0.027) | (0.286) |
| Government dummy | 0.031*** | 0.021** |
| | (0.000) | (0.005) |
| CorruptionGov | -0.167*** | -0.101** |
| | (0.005) | (0.046) |
| Leverage | 1.678*** | 2.608*** |
| | (0.184) | (0.189) |
| Negative NI | -1.989** | 0.1566 |
| | (0.982) | (0.097) |
| Market-to-book | 0.524*** | 0.754*** |
| | (0.009) | (0.100) |
| NWC | -1.453*** | -2.568*** |
| | (0.241) | (0.232) |
| Real size | 0.447* | 1.562*** |
| | (0.365) | (0.184) |
| Intercept | 1.994*** | 0.637** |
| | (0.1583) | (0.283) |
| Number of observations | 6,175 | 10,787 |
| Adjusted R-squared | 0.336 | 0.369 |

## *5.3 Additional Variables*

As data obtained from Reuters Datastream is not comprehensive and some variables contain more observations than others, the results could be driven by the variables which were not included in the original regressions. R&D intensive firms in corrupt countries prefer sole ownership over joint ventures while other firms favor joint venture structures as corruption affects them strongly (Javorcik and Wei, 2009). Hence, it can be well argued that R&D is one of the variables which are affected by corruption. Including R&D into the main control variables could be well argued as many prior researches have done it. However, due to inadequate data, including R&D

to my models does not provide much. Hence, I limit the sample size to the firms with R&D observations available to study its affects. Model 2 in Table 6 presents the results.

Another variable in this section is dividend payout. Per Pinkowitz et al. (2006) firms in corrupt areas pay significantly more dividends than firms in non-corrupt areas. In a perfect functioning market, there should be no findings like these. According to the famous Modigliani and Miller dividend irrelevancy theorem, dividends are more a managerial decision than a way to create value (Miller and Modigliani, 1961). However, corruption is a market inefficiency which disturbs their functioning. In corrupt areas, dividends may create shareholder value as they are taken away from cash reserves. The reduced cash balance limits expropriation possibilities which may be harmful for shareholders if the shielding hypothesis is assumed to hold. Hence dividends have a great effect on cash balance.

Including dividends as a control variable would be more than justifiable but data accessibility sets limits. To test if my previous findings hold when firms pay dividends, I conduct an additional regression which includes dividends. In the first model of Table 7, the dividend payout is considered. The number of observations is yet dropped from 6,175 to 3,096.

Table 7 presents ordinary least squares regression results for two additional regressions. Both the regressions are done with the subsample of firms with real size below the average. In the first model, I include the dividend payout variable. It is a significant control at 1% level. The results considering corruption, government dependency and their interaction remain the same. Corruption has still a negative effect on cash holdings whereas the government dependency has a positive sign. Their interaction term, which is my main interest, has a negative sign as in the previous regressions. These results are significant at 10% level.

The model 2 contains a R&D variable. Including the variable changes the results slightly. The interaction term is still negative as in the first model and in the previous models but the corruption and government dependency change signs. Corruption has now a positive effect on cash holdings and it is significant at 10% level. On the other hand, the government dependency has now a negative sign and is highly significant. These results are not in line with previous regressions and are somewhat controversial. According to the second model, corruption increases firms' cash holdings while government dependency decreases it. The result is inconsistent with the previous results. However, as the interaction term is negative, I still state that government dependent firms in corrupt areas are likely to shelter their assets more than non-government dependent firms. It seems that the hypothesis 2a holds here nevertheless.

**Table 7**
Alternative controls

This table presents results from ordinary least squares regressions estimating how cash holdings vary with corruption, government dependency and the interaction between the two. Regression one presents the results for the small firms with available dividend information. Regression two presents ordinary least squares results for the small firms with available R&D data. The initial sample is taken from Reuters Datastream and it has 870 unique firms totaling 10,787 firm-years. This table contains subsamples of firms with real size below the sample average. Missing observations limit the panel even more and for the regression one there are 3,096 firm-years from 253 unique firms. The second model has 1,686 firm-years from 140 unique firms. The above value for each variable is coefficient and below in parentheses is standard error. *, ** and *** denote significance at 10%, 5% and 1% level, respectively. Variable definitions in Table 1A.

| Dependent variable is ln (cash/net assets) | (1) | (2) |
|---|---|---|
| Corruption index | -0.241*** | 0.007* |
| | (0.033) | (0.004) |
| Government dummy | 0.015* | -0.144*** |
| | (0.008) | (0.040) |
| CorruptionGov | -0.268* | -0.040* |
| | (0.149) | (0.021) |
| Leverage | -1.552*** | -0.264*** |
| | (0.393) | (0.042) |
| Negative NI | -0.423* | -0.292** |
| | (0.427) | (0.122) |
| Market-to-book | 0.022* | 0.017*** |
| | (0.004) | (0.006) |
| R&D | | 0.889*** |
| | | (0.202) |
| Dividend | 4.593*** | |
| | (1.701) | |
| Intercept | -1.882*** | 0.196*** |
| | (0.265) | (0.033) |
| Number of observations | 3,096 | 1,686 |
| Adjusted R-squared | 0.312 | 0.283 |

# 6. Conclusion

In this thesis, I examined corruption, government dependency and the interaction between the two. Previous studies have found that corruption affects firms' financial policies. Many studies suggest that operating in a corrupt area decreases cash balances. This is due to asset sheltering.

Firms tend to shelter their assets if the risk of political extraction is high. Holding less liquid assets is one way to implement the asset sheltering. In the thesis, I studied firstly how corruption affects the sample firms. Subsequently, I studied whether the government dependency affects the results. More precisely, I examined if government dependent firms in corrupt areas hold less cash than non-government dependent firms do.

The hypothesis 1a is that corruption has a negative effect on firms' liquidity. The hypothesis seems to hold in my main test and in an additional robustness test. Firms seem to hold less cash in corrupt areas. The result is consistent with the previous studies. Another aspect of my thesis is government dependency. The hypothesis 2a is that government dependency increases the impact of corruption. The results reveal that the interaction between corruption and government dependency affects the cash holdings negatively. Since, it seems that the hypothesis 2a holds. However, the result is not as clear when studying all the firms as it is within smaller firms. This implies that my hypothesis seems to hold better with firms with real size below the sample average. For larger firms the effect is not as significant but it still is present. The results are somewhat robust against several additional tests. Only adding the R&D variable as control slightly alters the outcome, but government dependency in corrupt areas has still a negative effect on cash holdings. Other test reveal no surprising evidence.

The results concerning government dependency are interesting and worth studying further. As previous researches have not shown similar results, my thesis provides a new aspect to the impacts of corruption. Practically this means that for smaller government dependent firms in corrupt areas it is valuable to pay close attention to balance sheet structure. Nevertheless, the results are not strong enough to state that this holds generally for every firm. Further studying could reveal stronger results hence leading to more credible policy suggestions.

Future research could further inspect the government dependency. This could be done by studying the 2002 Benchmark Input-Output table further to conclude the government dependency for larger amount of industries, e.g. to inspect top and bottom quartile industries could be intriguing. Additionally, the industry groups could be calculated and defined to each of the countries to better evaluate the effects. As every country has own economic features, the latter approach could be highly interesting and rewarding. The third area worth studying further could be different firm characteristics and the impacts corruption has on these firms (e.g. studying the R&D intensive firms).

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# Appendix

**Table A1**

Variable definitions.

| Variable | Definition |
|---|---|
| Acquisitions | Net assets acquired divided by total assets |
| Capital expenditure | Capital expenditures divided by total assets |
| Cash ratio | Cash and equivalents divided by total assets |
| CF | EBITDA - taxes paid -interests paid - dividends paid divided by total assets |
| Corruption index | An index ranging from 0 to 10 with higher values meaning higher corruption. A median of country's index from 1998 to 2015. From Transparency International. |
| CorruptionGov | An interaction term between corruption index and government dummy |
| Dividends | Dividends paid divided by total assets |
| EBITDA | EBITDA divided by total assets |
| Government dummy | An indicator equal to one if firm's primary industry is a highly government spending dependent industry |
| ICRG | A corruption measure ranging from 0 to 10 with higher values meaning higher corruption. Applied from Caprio et al. 2011 |
| Leverage | Long-term debt and current debt divided by total assets |
| ln (Cash/net assets) | Natural log of cash divided by net assets |
| KKM | A corruption measure ranging from -2 to 1.5. Lower values indicate lower corruption. Applied from Kaufmann et al. 2009 |
| Market-to-book | Total assets - book value of equity + shares outstanding* share price at the year-end divided by total assets |
| Negative NI | An indicator equal to one if firm's median net income is a negative value |
| NWC | Net working capital divided by total assets |
| PP&E | Net property, plant and equipment divided by total assets |
| Real size | ln (Total assets in 2015 US dollars) |
| R&D | Research and development outlays divided by total assets |

**Table A2**

Summary statistics of countries and firm

This table contains summary statistics of countries. The data are obtained from Reuters Datastream and contain observations from 1998 to 2015. A higher value in Corruption Index indicates more severe corruption problem; the index is based on research published by Transparency International[3]. Column Government dependent reports firms which belong to the most government dependent industries whereas non-government dependent refers to the industries least dependent on government. Total industries of interest report the sum of the two categories per country. All firms -column refers to every firm obtained Reuters Datastream with available financial information.

| Country | Corruption Index | Government dependent | | Non-government dependent | | Total industries of interest | | All firms | |
|---|---|---|---|---|---|---|---|---|---|
| | | # firms | # firm-years | # firms | #firm-years | # firms | # firm-years | #firms | # firm-years |
| Denmark | 0 | 9 | 138 | 6 | 98 | 15 | 236 | 110 | 1,786 |
| Finland | 0 | 11 | 175 | 4 | 72 | 15 | 247 | 119 | 1,921 |
| Hong Kong | 0 | 69 | 920 | 39 | 495 | 108 | 1,415 | 1,464 | 18,449 |
| Belgium | 1 | 12 | 187 | 4 | 60 | 16 | 247 | 87 | 1,376 |
| Italy | 2 | 17 | 273 | 3 | 36 | 20 | 309 | 246 | 3,700 |
| Malaysia | 2 | 23 | 317 | 30 | 454 | 53 | 771 | 847 | 11,677 |
| Saudi Arabia | 3 | 2 | 26 | 4 | 45 | 6 | 71 | 115 | 1,241 |
| China | 4 | 165 | 2,005 | 37 | 451 | 202 | 2,456 | 2,521 | 31,279 |
| Thailand | 4 | 21 | 320 | 27 | 354 | 48 | 674 | 618 | 8,320 |
| India | 5 | 132 | 1,397 | 86 | 904 | 218 | 2,301 | 2,418 | 25,336 |
| Morocco | 5 | 1 | 11 | 4 | 54 | 5 | 65 | 50 | 588 |
| Egypt | 5 | 1 | 15 | 7 | 81 | 8 | 96 | 106 | 1,194 |
| Argentina | 6 | 5 | 60 | 1 | 18 | 6 | 78 | 67 | 1,057 |
| Philippines | 6 | 16 | 248 | 5 | 69 | 21 | 317 | 212 | 3,221 |
| Indonesia | 7 | 18 | 245 | 24 | 314 | 42 | 559 | 408 | 5,408 |
| Vietnam | 7 | 5 | 53 | 8 | 78 | 13 | 131 | 273 | 2,491 |
| Pakistan | 8 | 6 | 73 | 6 | 91 | 12 | 164 | 166 | 2,056 |
| Russia | 8 | 44 | 510 | 0 | 0 | 44 | 510 | 327 | 3,621 |
| Kenya | 9 | 1 | 11 | 2 | 23 | 3 | 34 | 35 | 361 |
| Nigeria | 9 | 5 | 33 | 8 | 73 | 13 | 106 | 76 | 655 |
| Total | | 563 | 7,017 | 305 | 3,770 | 868 | 10,787 | 10,265 | 125,737 |

[3] https://www.transparency.org/cpi2015/, date 04-Dec-16.

**Table A3.1**

Industries with high exposure to the government sector.

This table presents industries with high dependency on government spending by Belo et al. (2013). It is based on the 2002 Benchmark Input-Output Accounts table and presents the values for the US industries. The original I-O codes are supplemented with corresponding SIC codes. Gov is the measure to government spending in percent.

| I-O code | SIC code | Industry | Gov |
|---|---|---|---|
| 336414 | 3761 | Guided missile and space vehicle manufacturing | 94.7 |
| 336611 | 3731 | Shipbuilding and repairing | 67.3 |
| 515100 | 4832,4833 | Radio and television broadcasting | 54.7 |
| 541700 | 3721,3724 3728,3732 3761,3764 3769,8731 | Scientific research and development services | 47.0 |
| 335110 | 3641 | Electric lamp bulb and part manufacturing | 45.9 |
| 211000 | 1311,1321 2819 | Oil and gas extraction | 39.9 |
| 511110 | 2711 | Newspaper publishers | 28.3 |
| 334418 | 3577,3661 | Printed circuit assembly manufacturing | 24.0 |
| 334220 | 3663,3679 | Broadcast and wireless communications equipment | 22.6 |
| 322120 | 2611,2621 | Paper mills | 20.6 |

**Table A3.2**

Industries with low exposure to the government sector.

This table presents industries with low dependency on government spending by Belo et al. (2013). It is based on the 2002 Benchmark Input-Output Accounts table and presents the values for the US industries. The original I-O codes are supplemented with corresponding SIC codes. Gov is the measure to government spending in percent.

| I-O code | SIC code | Industry | Gov |
|---|---|---|---|
| 311225 | 2046,2074 2075,2076 2079 | Fats and oils refining and blending | 2.9 |
| 314110 | 2273 | Carpet and rug mills | 2.9 |
| 311410 | 2037,2038 | Frozen food manufacturing | 1.8 |
| 311820 | 2052,2045 2098,2099 | Cookie, cracker, and pasta manufacturing | 1.7 |
| 339910 | 3172,3479 3911,3914 3915,3961 | Jewelry and silverware manufacturing | 1.2 |
| 312110 | 2086,5149 2097 | Soft drink and ice manufacturing | 1.0 |
| 335224 | 3633 | Household laundry equipment manufacturing | 0.8 |
| 312120 | 2082 | Breweries | 0.8 |
| 3122A0 | 2111,2121 2131,2141 7389 | Tobacco product manufacturing | 0.4 |
| 713950 | 7933 | Bowling centers | 0.0 |