

Corporate Cash Holdings and Ownership Structure: A Quantile Regression Analysis

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ABSTRACT

This study examines the impact of ownership structure on firm cash policy in varying cash holding regimes, using 131 Jordanian nonfinancial firms listed on Amman Stock Exchange for the period 2005-2013. This study allows for the possibility that the impact of explanatory variables can vary for different levels of cash holdings by utilizing a quantile regression estimation method. The study revealed empirical evidence confirming that the impact of ownership concentration will differ according to the examined quantile. Furthermore, controlling shareholders are expected to overinvest in liquid assets that are not subject to market discipline and are less costly to turn into private benefits compared to other assets. However, the ability of controlling shareholders to do so may be affected by the level of cash holdings. Therefore, the positive association between cash holdings and ownership is expected to be elevated in high cash holding firms. The findings of this study show that in estimation methods that focus on the central tendency of the distribution, ownership is not significantly related to cash holdings. However, in a quantile regression model, the findings demonstrate that ownership becomes more positive and significant in upper quantiles.

JEL classification:G30; G32; D92

Keywords: Cash holdings, quantile regression, agency problem, largest shareholder, Jordan.

INTRODUCTION

Under perfect capital market conditions, corporate liquidity is irrelevant because firms can raise external financing to meet unexpected changes in their cash flows or investment opportunity set at zero cost (Opler *et al.*, 1999; Demiroglu and James, 2011; Denis, 2011; Almeida *et al.*, 2014). However, due to transaction, information and agency costs associated with external financing cash may provide valuable financial flexibility to the firm (Opler *et al.*, 1999; Almeida *et al.*, 2004; Acharya *et al.*,

2007; Denis, 2011). However, determining the optimal cash holdings level is difficult when there are concerns about the agency costs of holding cash. On the one hand, cash holdings preserve the firm's flexibility to respond to unexpected needs (Kim *et al.*, 1998; Opler *et al.*, 1999; Almeida *et al.*, 2004; Acharya *et al.*, 2007; Denis, 2011). On the other hand, excess cash enables managers to pursue their own interests by spending it on value decreasing expenses and investments (Jensen & Meckling, 1976; Jensen, 1986; Harford *et al.*, 2008). Therefore, different levels of cash holdings raise different concerns for shareholders of the firm. This study investigates the association between cash holdings and the ownership of the largest controlling shareholder for firms with different levels of cash holdings for nonfinancial Jordanian firms.

Jordanian firms operate in an economy with low

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investor protection, and therefore, there is a large scope for controlling shareholders to derive substantial private benefits of control at the expense of other investors. Excess cash holdings may be a source of agency conflicts, as they represent resources not subject to market discipline under the control of managers and/or controlling shareholders (Jensen, 1986; Harford *et al.*, 2008). In addition, it is less costly to turn liquid assets into private benefits compared to other assets (Myers & Rajan, 1998). Accordingly, controlling shareholders in countries with weak protection of investors may overinvest in liquid assets (Dittmar *et al.*, 2003; Kalcheva and Lins, 2007) and the value of these liquid assets will be discounted by the firm's investors (Pinkowitz *et al.*, 2006).

However, conflicts of interests over the deployment of cash are expected to be minor for firms with low level of cash holdings, while the opposite is true for firms with a high level of cash. Therefore, the level of cash holdings can be an important factor in influencing the relation between cash holdings and corporate governance (Kuan *et al.*, 2012). The extant evidence documents that firms hold cash due to transaction and precautionary motives to gain financial flexibility when facing adverse shocks and/or unexpected investment opportunities (Opler *et al.*, 1999; Bates *et al.*, 2009). However, too much cash at the hands of controlling shareholders will increase agency costs resulting from conflict of interests between controlling and minority shareholders over the deployment of these cash balances. Nonetheless, these costs should be less severe in firms with low cash balances, and hence, shareholders may favor the flexibility provided by holding cash. Therefore, in firms with low cash balances, we expect the transaction and precautionary motives for cash holdings to dominate, and hence, we expect that the lower ownership of controlling shareholder the higher the cash holdings. Conversely, financial flexibility becomes of minor importance to shareholders in firms with large cash balances and agency costs become the dominant factor. Therefore, we expect

that the lower the ownership of controlling shareholder, the lower the cash holdings.

The aim of this study is to investigate the impact of ownership on cash holdings in publicly listed Jordanian firms. Studying the cash policy of Jordanian companies is interesting because their average cash holdings is substantially lower than the average cash ratio reported in MENA countries and in other emerging markets (Tayem, 2017). Studies on the agency cost of cash holdings usually deal with firms with high levels of cash (Harford *et al.*, 2008). Previous studies on the Jordanian market found no impact of ownership of controlling shareholder over cash holdings (Tayem, 2017). However, this no-result finding could be masked by the observation that ownership has different impacts for different levels of cash holding where at lower level of cash holdings, transaction and precautionary motives dominate, while agency cost dominates at higher level of cash holdings. The study of listed Jordanian firms is interesting since the distribution of levels in cash holdings among Jordanian firms is large.

The findings presented in this study have implications for the design of governance rules promoted by Amman Stock Exchange (ASE). Listed Jordanian companies are characterized by highly concerted ownership with average equity holdings of the largest, followed by the largest three shareholders, and largest five shareholders of 31.5 percent, 51.4 percent, 60 percent, respectively. The findings of this study show that there is an impact of ownership concentration on cash holdings in varying cash holding regimes. If there is a positive impact of ownership on cash holdings in cash rich firms, where agency costs are more likely to be high, then this signals that this subset of firms should be subject to rigorous corporate governance rules set by the ASE. Policy makers, therefore, are advised to make serious steps in enhancing the governance structure of listed firms and investor protection.

The rest of the study is organized as follows: the next section reviews the literature on cash holding

determinants with a focus on agency explanation of cash reserves. Section 3 presents the research model, and data is described in Section 4. The results and analysis are discussed in section 5 and the conclusion is presented in Section 6.

2. Literature and hypotheses

2.1 Agency conflicts

The decision of how to deploy cash holdings represents an interesting context to examine the agency conflicts within the firm. Firm management must decide on disgorging cash holdings to shareholders, spending them, or continue holding them. From an agency perspective, there are private benefits from accumulating cash and spending it sub-optimally and costs of discipline from holding excess cash or spending it sub-optimally (Harford *et al.*, 2008). Value maximizing firms have incentives to keep liquid resources in order to respond in a timely fashion to unexpected changes to their cash flows or set of investment opportunities (Demiroglu & James, 2011; Denis, 2011; Almeida *et al.*, 2014). However, managers and controlling shareholders may prefer to hold too much cash, more than what is required to maximize the value of the firm, because liquid assets reduce the firm's risk and increase their discretion (Opler *et al.*, 1999). Free cash flows increase the power of managers due to the existence of more "unmonitored" resources under their control (Jensen, 1986). Unlike internal funds, external sources of financing are monitored by market participants, and hence, it is less likely that managers can use external funds to finance negative present value projects. Therefore, controlling shareholders have incentives to accumulate cash to preserve flexibility not only in terms of facing adverse contingencies, but also in terms of evading capital market discipline. According to this hypothesis, there is a positive relation between ownership of the controlling shareholder and the level of cash holdings.

In this context, the following should be noted. First,

agency conflicts of the deployment of cash revolve around *excess* internal liquid assets. Having sufficient internal capital can maximize the firm's value as it provided financial flexibility to the firm. However, having too much liquid assets or spending it sub-optimally may result in agency costs that outweigh the benefits of financial flexibility. Therefore, the agency costs of cash holdings are most apparent for firms with large cash holdings, and it can vary with the level of cash holdings. Second, self-interested parties with control over cash can derive perquisite benefits from accumulating and spending excess cash. Therefore, it is important to analyze which parties in Jordanian firms have control over the deployment of cash and what limits this control. Shareholders with large cash flow rights are likely to exercise control over their firms through their voting rights, control of the board and by assuming managerial responsibilities. Control rights increase with larger cash flow rights, and hence, the larger the cash flow rights, the greater the ability and the incentives of the largest shareholder to control internal resources.

The documented empirical evidence suggests that there is a significant impact of governance quality on cash holdings using international and country specific contexts (Dittmar *et al.*, 2003; Kalcheva & Lins, 2007; Harford *et al.*, 2008; Kuan *et al.*, 2011). In Dittmar *et al.* (2003), the authors documented that the firm average cash holding is negatively related to a country's level of investor protection. Shareholders have incentives to limit the amount of liquid assets left to the managers' discretion, and they do so in countries with sufficient investor protection. Pinkowitz *et al.* (2006) and Kalcheva and Lins (2007) studied the value of cash holdings in environments with low investor protection. Pinkowitz *et al.* (2006) showed that minority shareholders value cash holdings less in countries characterized by low investor protection, while Kalcheva and Lins (2007) found an international evidence of a negative relationship between managerial control and value of cash holding. At a country level,

Harford *et al.* (2008) found that firms with weaker corporate governance, measured using insider ownership and the G Index, have smaller cash holdings. This finding supports their spending hypothesis: weakly governed firms deploy cash holdings in less than optimal projects. Closely related to this study is a paper from the emerging market of Taiwan. Kuan *et al.* (2012) examined the relation between excess control rights and cash holdings using quantile regression analysis. They found that excess control rights affect cash holdings negatively in low cash holding firms and positively in high cash holdings firms. This study is closely related to Kuan *et al.* (2012) as it examines the impact of ownership of the controlling largest shareholder on cash conditional on the cash level in the Jordanian context. However, Kuan *et al.* (2012) noted that using the Taiwanese market has its limitation with regard to the generalization of their results. The results of this study corroborate those of the Kuan *et al.* (2012) and highlight the importance of studying the cash decision conditional on the level of cash holding firms.

2.2 Trade-off and financing hierarchy

The extant literature introduces another two important explanations for hoarding cash: the trade-off and financing hierarchy theories (Opler *et al.*, 1999). Under the trade-off explanation of cash holding, there is an optimal level of cash holding that will be achieved by trading-off the marginal costs and benefits of holding cash. On the one hand, liquid assets produce low yield and in comparison to debt have tax disadvantages (Opler *et al.*, 1999). On the other hand, liquid assets reduce transaction costs, the transaction motive, other capital market costs, and the precautionary motive resulting from debt issuance (Keynes, 1936). Firms may save transaction costs, such as costs associated with issuing financial claims, caused by shortages of internal funds when they hoard cash (Opler *et al.*, 1999). In addition, firms with adverse shocks may find access to capital markets unavailable or costly, and therefore, they rely on internal

sources of financing instead (Myers, 1984; Myers & Majluf, 1984). Under this view, firms accumulate cash to meet unexpected contingencies, such as shortfall in income when the costs of other financing sources are high. Therefore, firms with larger transaction and precautionary motives are expected to hold significantly higher levels of liquid assets. The financing hierarchy explanation of cash holdings postulate that firms facing information asymmetries maintain a surplus of internal funds that can be used to provide financial flexibility (Opler *et al.*, 1999). In the presence of information asymmetry, external financing becomes more costly than internal resources, and hence, firms subject to high costs of information avoid issuing information-sensitive securities (Myers & Majluf, 1984). Under this view of cash holdings, changes in a firm's cash flow drive changes in a firm's cash holding (Opler *et al.*, 1999).

The literature suggests several variables based on the trade-off and financing hierarchy views of cash holding that capture the firm's motives for accumulating cash. Lines of credit are financial products intended to offer liquidity insurance when firms face unexpected contingencies that prevent them from investing in valuable projects (Boot *et al.*, 1987; Holmstrom & Tirole, 1998; Sufi, 2009). Therefore, lines of credit are expected to be negatively associated with cash holdings (Tayem, 2017). Leverage is also expected to be negatively related to cash holdings as a firm with internal resource surplus uses these resources to repay debt and/or save cash. However, when a firm is in deficit of internal resources, it exhausts its cash savings and/or issue debt (Opler *et al.*, 1999). The firm size is expected to be negatively related to a firm's holdings of cash. This is mainly due to the ability of large firms to benefit from the reduction of transaction costs associated with external financing by distributing the fixed cost component of issuing securities (Smith & Warner, 1979). In addition, from a financing hierarchy viewpoint, large firms are less likely to be subject to information asymmetry in comparison to small

firms (Fazzari & Petersen, 1993), and therefore, have fewer incentives to accumulate cash. Relatedly, old firms are expected to be less information problematic as they are more known to the market in comparison to small firms. Therefore, the firm's age is expected to be negatively related to cash holdings (Opler *et al.*, 1999). However, large and old firms are likely to be more successful in their business, and hence, they enjoy larger internal resources. Therefore, the firm's size and age are expected to be positively related to cash holdings.

Growth opportunities and cash holdings are expected to be positively related, as growth firms are subject to the underinvestment problem and they are more informationally opaque. Firms with large growth opportunities are better off funding their NPV projects with internal resources since added value of profitable project for firms with risky debt accrue to outstanding debtholders not to shareholders (Myers, 1977). From a financing hierarchy viewpoint, firms avoid issuing information-sensitive securities because information costs make these securities very expensive (Myers & Majluf, 1984). Firms with large growth opportunities are subject to greater information asymmetry, which can result in a premium for external financing (Myers & Majluf, 1984). Hence, they are likely to save cash flows into cash to fund their profitable investment opportunities. Furthermore, from a financing hierarchy perspective, firms prefer internal to external sources of financing in the presence of information asymmetry (Myers, 1984; Myers & Majluf, 1984). Therefore, firms with large cash flows will save cash flows into cash which induces a positive relation between cash flows and cash (Opler *et al.*, 1999; Ozkan & Ozkan, 2004). In addition, the volatility of cash flows is relevant in determining the reserves of cash holdings. Ozkan and Ozkan (2004) argued that firms with more volatile cash flows are expected to hold more cash in order to reduce the costs of sudden liquidity shortages.

Dividend cuts may be used as a substitute for cash. The firm can use other liquid assets in case of cash

shortfalls or cut its dividends (Opler *et al.*, 1999). In addition, firms with large investment opportunities are more likely to save cash and are less likely to pay dividends. Conversely, dividend-paying firms have incentives to keep cash buffers to avoid scenarios where they have insufficient internal cash flows needed to pay dividends (Ozkan & Ozkan, 2004). With regard to capital expenditures, the trade-off view predicts that firms with high growth opportunities invest heavily, and therefore, they accumulate large cash balance to support their capital expenditures. However, the financing hierarchy view predicts that firms that spend more on capital expenditures have fewer internal resources, and therefore, these firms have on average low cash balances.

3. Methodology

The aim of this study is to test the relation between cash holdings and the cash flow rights of the largest owner by estimating a cash model specified in equation 1:

$$Cash_{it} = \gamma_1 Largest_{it} + \sum_{j=1} \beta_j X_{jit} + v_{it} \quad (1)$$

Where $Cash_{it}$ is the ratio of cash holdings for firm i at year t divided by net assets (assets minus cash holdings). Therefore, it measures the composition of asset structure between completely liquid assets versus illiquid assets. This measure has been utilized by many studies, including the seminal work of Opler *et al.* (1999). $Largest_{it}$ proxies corporate governance in listed Jordanian companies and is computed as the percentage of ownership of the largest owner. X_{jit} is a vector of control variables that include the following variables: *Credit Line*, *Leverage*, *Cash Flow*, *Size*, *MTB*, *Volatility*, *Age*, *Dividends*, and *Capital Expenditures*. This study measures leverage (*Leverage*) as the amount of total debt divided by book value of assets. The firm's size (*Size*) is measured as the natural logarithm of total assets, while the firm's age (*Age*) is measured as the natural logarithm of the years since the firm's inception. Growth opportunities (*MTB*) are measured using the net market to book ratio which is

defined as the market value of equity plus book value of net assets minus book value of equity divided by net assets (Sufi, 2009). Following Sufi (2009), cash flow (*Cash Flow*) is measured as earnings before interest, taxes, and depreciation divided by total assets. Volatility (*Volatility*) is computed as the standard deviation of annual changes in the level of cash flows (earnings before interest, taxes, and depreciation) over a lagged four-year period, scaled by average non-cash assets in the lagged period. Dividends (*Dividends*) are measured by assigning a value of 1 for firm-years paying dividends and zero otherwise. Capital expenditures (*Capital Expenditures*) is measured as the change in net fixed assets between two consecutive years divided by capital at the beginning of the period.

This study examines the impact of ownership structure on firm cash policy with different cash holdings regimes using a quantile regression estimation method. Standard linear regression methods, such as OLS and Fixed Effect estimation methods, describe the average relationship between a set of controls and the dependent variable based on the conditional mean function $E(y|x)$. However, these methods do not summarize the relationship at different points in the distribution (Koenker & Hallock, 2001). Quantile regression, on the other hand, describes the impact of the regressors at different points of y (Koenker & Hallock, 2001). Mosteller and Tukey (1977) argued that while a standard regression curve gives a grand summary for the averages of the distributions corresponding to the set of X 's, what could be needed is to compute several regression curves corresponding to the various percentage points of the distributions in order to get a more complete picture of the set. Therefore, quantile regression provides a fuller description of the data, as it considers the impact of a regressor on the entire distribution of y and not only its conditional mean (Koenker & Hallock, 2001). Another advantage of quantile regression is that it is more robust to non-normal errors and outliers than least squares regression (Koenker

& Hallock, 2001).

Therefore, in this study, we investigate the impact of the ownership structure variables on different distributions of firm cash holdings by quantile regression. This study will estimate the coefficients at five quantiles, namely, the 10th, 25th, 50th, 75th, and 90th quantiles. This estimation method is particularly useful in the context of this study as the distribution of the cash to net asset ratio is skewed (see data description in the next section). In addition, there is considerable variation in the cash holdings of the sample firms, with the bottom 10 percent holding nearly zero cash for each JD100 of non-cash assets, and the upper 10 percent holding JD20 and more for each JD100 of non-cash assets. Therefore, regression methods that focus only on the central tendency of the distribution, such as OLS or the fixed-effect estimator are less useful in this context (Kuan *et al.*, 2012). This is because they do not allow for the possibility that the impact of explanatory variables can be different for the different levels of the independent variable (Kuan *et al.*, 2012).

The choice of specific quantiles is a theory-led approach. In section 2, we argued that the impact of ownership is expected to vary in different quantiles. We also note in the next section that the mean value of cash holdings is substantially larger than the median value, and that cash holdings are skewed with a long right tail. Therefore, it is reasonable to expect that upper-quantile firms are significantly different from the rest of the sample. In addition, we note that the holdings of cash increase substantially within the fourth quartile. Therefore, it is more appropriate to examine smaller points of the distribution; hence, we chose the centile levels of 0.1 and 0.9. In addition, our choice of these specific quantiles closely follows Kuan *et al.* (2012), who proposed using the 0.1, 0.25, 0.5, 0.75, and 0.9 quantiles to test the impact of corporate governance on cash holdings.

In order to mitigate the endogeneity problem, this

study follows Harford *et al.* (2008) by employing the lagged value of the control variables. In addition, this study uses OLS and Random Effect models (Tayem, 2017) as benchmark models to compare the results from standard linear regression model with those of the quantile regression model.

4. Data description

Similar to Tayem (2017), the sample of this study consists of Jordanian nonfinancial firms listed on the Amman Stock Exchange (ASE). The sample period extends from 2005 – 2013. Consistent financial data has been published annually by the ASE through their Annual Company Guides since 2002. However, the computation of the variable *Volatility* requires four years of data, which renders the data over the period 2002 – 2004 unusable. Ownership data was collected from the Company Guides until 2007. It was collected manually from the company financial reports afterwards. Because of the data limitation resulting from the costs of hand-collecting ownership data, our sample period ends in 2013. To perform the analysis, at least two consecutive years of complete data items is required. The sample consisted of 932 observations representing 131 companies.

Table 1 presents a summary statistics of the sample, including data distribution over the 10th, 25th, 50th, 75th, and 90th percentiles. The cash ratio, *Cash*, has a mean value of 8 percent and a median value of 2.3 percent. This indicates that the distribution of *Cash* among listed Jordanian firms is not symmetric with some firms holding very little cash, while others hoarding a large amount of cash. The percentiles of

Cash confirm this deduction with firms below the 25th distribution have between one to five Jordanian Dinars (JD) in cash for each JD 1,000 in non-cash assets. However, firms above the 75th percentile hold much larger amounts of cash: firms at the 75th and 90th percentiles hold JD8 to JD 20 for each JD 100 in non-cash assets, respectively. Examining higher percentiles (not reported), we also find that there are even larger jumps in cash with firms at the 95th and 99th percentiles holding JD 35 to JD78 for each JD100 in non-cash assets, respectively. This observation clearly shows that the distribution of cash holdings is not symmetric across the sample firms, and hence, the level of cash may influence the impact of other variables.

Other variables of interest include the variable *Largest* which has a mean of 32 percent and a median of 27 percent, indicating that the mean and median ownership of the largest owner of listed Jordanian companies is 32 percent and 27 percent, respectively. At the 10th percentile, *Largest* is recorded at 11.5 percent which indicates that most listed Jordanian firms have concentrated ownership structures. Around 60% of listed Jordanian firms have an access to a line of credit. However, their use of debt is not substantial, indicated by the mean leverage ratio of 7.7 percent and the median ratio of less than 2 percent. In terms of profitability and firm value, the mean and median values of *Cash Flow* are recorded at around 7 percent and the mean and median values of the *MTB* ratio are recorded at 1.406 and 1.129, respectively. Around 40% of listed Jordanian firms pay dividends and less than half of them invest in fixed assets.

Table 1: Summary statistics

	Mean	SD	Percentile					Skewness	Kurtosis
			10 th	25 th	50 th	75 th	90 th		
Cash	0.080	0.153	0.001	0.005	0.023	0.084	0.195	3.705	19.177
Largest	0.320	0.197	0.115	0.173	0.27	0.420	0.555	1.259	4.605
Credit Line	0.619	0.486	0	0	1	1	1	-0.491	1.241
Leverage	0.077	0.114	0	0	0.015	0.115	0.248	1.820	6.297
Cash Flow	0.076	0.131	-0.056	0.018	0.071	0.127	0.209	0.592	7.206
MTB	1.406	0.849	0.687	0.879	1.129	1.633	2.506	1.935	7.091
Size	16.810	1.371	15.150	15.967	16.728	17.596	18.369	0.327	3.555
Volatility	0.085	0.085	0.017	0.030	0.057	0.108	0.185	2.295	9.534
Dividends	0.421	0.494	0	0	0	1	1	0.322	1.103
Capital Expenditures	0.611	7.358	-0.138	-0.070	-0.019	0.084	0.378	17.922	355.017
Age	2.954	0.702	2.079	2.565	2.944	3.481	3.892	-0.499	3.372

Table 1 reports descriptive statistics for a sample of nonfinancial Jordanian firms listed on the ASE over the period 2005-2013. Variables are defined in Section 3.

In Table 2, we divide the sample into four quartiles based on the cash ratio and report the sub-sample mean for each quartile of the study variables. We also perform tests to calculate the difference in means and medians between the first and last quartile and report the results in the last two columns of Table 2. The average cash ratio ranges between 0.2 percent and 25.8 percent for the first and fourth quartiles. It should be noted that the cash ratio employed in this study is computed using the cash balance

divided by non-cash assets, and hence, this ratio exaggerates the level of cash in comparison to the ratio of cash divided by total assets. The data clearly shows that only firms in the fourth quartiles hoard cash, with the first three quartiles having very little cash on average. As expected, the differences in means and medians show that the differences between the two sub-samples are statistically significant for most variables.

Table 2: Firm characteristics by cash holding quartiles

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile	t-test	Chi ² Wilcoxon
Cash	0.002	0.012	0.047	0.258	-17.489***	466.00***
Largest	0.326	0.329	0.282	0.345	-1.014	0.6953
Credit Line	0.807	0.717	0.605	0.348	11.308***	-
Leverage	0.103	0.081	0.079	0.044	5.727***	45.743***
Cash Flow	0.030	0.047	0.073	0.153	-9.405***	84.129***
MTB	1.226	1.229	1.281	1.889	-7.594***	36.266***
Size	16.736	16.732	16.956	16.815	-0.603	0.695
Volatility	0.080	0.077	0.068	0.112	-3.462***	2.481
Dividends	0.249	0.330	0.494	0.609	-8.423***	61.806***
Capital Expenditures	0.736	0.553	0.276	0.881	-0.164	1.933
Age	2.90	2.950	2.950	3.020	-1.851*	5.375**

Table 2 reports firm characteristics by cash holding quartiles for a sample of nonfinancial Jordanian firms listed on the ASE over the period 2005-2013. Variables are defined in Section 3.

In addition, Table 2 shows the averages of each control variable computed for the four quartiles/ subsamples. The average of ownership of the largest controlling owner, *Largest*, is around 33 percent for the first two quartiles, while it decreases to 28 percent for the third quartile and increases to around 35 percent for the fourth quartile. This pattern shows that the distribution of cash flow rights in the high cash quartile is on average higher though not statistically significant from the first quartile. However, we examine the differences in means and medians between the first and tenth deciles and find that the *t*-test and Chi² are -3.075 and 8.132, which are significant at the 1% level. In addition, we examine the differences in means and medians between the tenth decile and the rest of the sample and find that the *t*-test and Chi² are -3.975 and 17.248, which are significant at the 1% level. This evidence shows that cash-rich firms are characterized by significantly larger ownership of the largest owner.

Lines of credit, which represent another source of liquidity, are decreasing with cash. While 80 percent of the

observations in the first low cash holding quartiles have lines of credit, only 35 percent of observations in the fourth high cash holding quartile have lines of credit. Similarly, *Leverage* is decreasing in cash holdings from 10 percent in the first quartile to only 4.4 percent in the fourth quartile. Cash flows are decreasing in cash quartiles with an average of only 3 percent of cash flow in the lowest cash quartile to a high of 15 percent in the highest cash quartile. Growth opportunities increase gradually over the first three quartiles then increase substantially in the fourth quartile. The firm size decreases in *Cash*, while *Volatility* increases with *Cash*. Finally, the proportion of dividend-paying firms increase with increases in cash holdings, while capital expenditures are best described as a U shaped relation with cash.

4. Regression analysis

This study argues that ownership of the largest controlling shareholder has a conditional impact on cash holdings depending on the level of cash. To identify the

effect of the ownership of the largest owner on the cash holdings, this study performs quartile regressions for five different cash endowed firms. The results are shown in Table 3. In this study, we do not make assumptions on whether the correlation between the independent variables and the unobservable effects is fixed or random. To test if the differences in coefficients in the fixed and random effects are not systematic estimators, we ran the Hausman test. The Hausman test shows that Chi^2 (30.91) is not significant, and therefore, we report the results of the random effects model (see Tayem, 2017 for a discussion on the use of different models to estimate the cash equation). The results of the random effects model show that ownership of the largest owner is not significantly associated with cash holdings. However, as we discuss in the introduction and as we point out in the data section, the distribution of the cash ratio is skewed with half of the firm-year observations having less than 2.3 percent in cash and the upper 25 percent observations having at least 8.4 percent. Therefore, estimation methods focusing on the central tendency of the distribution may fail to capture the incentives of large shareholders and minority shareholders to accumulate or deploy cash. Consequently, this study employs the quantile regression model to capture the above mentioned effects and report the results in Table 3.

Cash holdings provide financial flexibility for the firm; however, cash holdings can lead to increased agency costs resulting from the conflict of interests over the deployment of cash balances. Nonetheless, firms with low cash balances are expected to be subject to lower agency costs, and hence, financial flexibility becomes a dominant factor, while firms with high cash balances are expected to be subject to larger agency costs. Thus, financial flexibility becomes a less important incentive to accumulating cash. In low cash holding firms, we expect better governed firms characterized with less concentrated ownership to be geared towards financial flexibility, and hence, we expect

cash holdings to be negatively related with *Largest*. However, in high cash holding firms, we expect better governed firms characterized with less concentrated ownership to be geared towards reducing agency costs. This is achieved by investing less in liquid assets, while those characterized with more concentrated ownership are expected to be geared towards investing in liquid assets. Therefore, we expect a no or a negative relationship between *Largest* and *Cash* in the lower quantiles and a positive relationship between *Largest* and *Cash* in the upper quantiles. Table 3 reports the results for the 10th, 25th, 50th, 75th, and 90th quantiles. *Largest* is negatively and significantly related to *Cash* at the 25th and 50th quantiles. As Table 1 shows, *Cash* at the 50th percentile is 2.3 percent, while Table 2 shows that the average *Cash* in the second quartile is 1.2 percent. These figures indicate that the bottom half of Jordanian firms ranked by their cash holdings have very little cash in their asset structures. Hence, the finding of a negative relationship between *Largest* and *Cash* supports our view that in firms with low level of cash, firms with small shareholders accumulate more cash holdings. More importantly, we find that *Largest* is significantly and positively related to *Cash* at the 90th percentile. This finding supports the view that in firms with high level of cash holdings, agency conflicts dominate which causes firms with larger shareholders to hold more cash. Notably, the positive effect of *Largest* in the upper quartile is stronger than the negative effect in the lower quartiles. These findings correspond to the results reported in Kuan *et al.* (2012) using data from the emerging market of Taiwan. The authors find that excess control rights (the diversion between cash flow and control rights) affect cash holdings negatively in low cash holding firms and positively in high cash holding firms. The results of this study corroborate those of Kuan *et al.* (2012) and indicate the importance of studying the cash decision conditional on the level cash holding firms.

Table 3: Regression results of the cash model using random effects and quantile regression.

	OLS	Random Effects	Quantile Regression				
			10 th Quant	25 th Quant	50 th Quant	75 th Quant	90 th Quant
Largest	0.014 (0.82)	0.001 (0.05)	0.000 (0.08)	-0.007* (-1.86)	-0.019*** (-2.67)	0.006 (0.34)	0.089* (1.87)
Credit Line	-0.036*** (-6.94)	-0.015** (-2.28)	-0.002*** (-2.65)	-0.009*** (-4.93)	-0.025*** (-4.24)	-0.049*** (-4.75)	-0.096*** (-3.58)
Leverage	-0.108*** (-5.89)	-0.040* (-1.79)	-0.003* (-1.76)	-0.010** (-2.24)	-0.044*** (-3.02)	-0.083*** (-3.35)	-0.152** (-2.39)
Cash Flow	0.186*** (5.22)	0.136*** (3.47)	0.005 (1.61)	0.031*** (3.81)	0.078*** (3.76)	0.158*** (3.81)	0.249*** (2.69)
MTB	0.023*** (4.02)	0.014* (1.65)	0.001 (1.32)	0.001 (1.29)	0.012*** (4.41)	0.024*** (2.60)	0.040*** (2.76)
Size	0.002 (0.45)	-0.003 (-0.39)	0.000 (1.43)	0.001* (1.85)	0.003** (2.37)	0.001 (0.13)	0.003 (0.32)
Volatility	0.151*** (3.39)	0.110** (2.51)	0.005 (0.91)	0.038*** (2.71)	0.101*** (3.95)	0.228** (2.57)	0.345** (1.99)
Dividends	0.013** (2.33)	0.016*** (2.78)	0.001** (1.70)	0.005** (2.51)	0.014*** (3.84)	0.021** (2.21)	0.010 (0.71)
Capital Expenditures	-0.001*** (-2.68)	0.000 (-1.50)	0.000 (0.04)	0.000 (-0.22)	0.000 (-0.34)	-0.001 (-0.77)	-0.002 (-1.07)
Age (Years)	0.008 (1.65)	0.016* (1.88)	0.000 (0.94)	0.000 (0.63)	0.002 (1.07)	-0.005 (-0.84)	-0.007 (-0.76)

Table 3 reports estimation results of the cash model using random effects and quantile regression estimation methods. The sample consisted of nonfinancial Jordanian firms listed on the ASE over the period 2005-2013. Variables are defined in Section 3. *t*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10%, respectively.

With regard to other variables of interest, the signs of the coefficients are consistent with the trade-off and financing hierarchy views of cash flows. They also corroborate the evidence reported from international and emerging markets. The variable *Credit Line* is negatively and significantly related to *Cash*, which is consistent with the view that lines of credit substitute cash. However, the size of the coefficients varies across the quantiles with small coefficient size at the lowest quantile that increases gradually with higher quantiles. This finding indicates

that the substitution effect of lines of credit on cash becomes stronger for higher cash holding levels. Similar result and interpretation applies to *Leverage* that has a significant negative coefficient that increases gradually with higher quantiles. This result supports the empirical evidence documented in Opler *et al.* (1999) using a sample from the US; Ozkan and Ozkan (2004) using a sample from the UK; Guney *et al.* (2007) using an international sample including France, Germany, Japan, the UK and the US; Uyara and Kuzeya (2014) using a

sample from the Turkish market; Al-Najjar (2013) using a sample from four developing countries, namely, Brazil, Russia, India and China; and Al-Najjara and Clark (2017) using a sample from the MENA countries including: Jordan, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE, Egypt and Tunisia.

The variable *Cash Flow* is positive and significant in all regressions except for the 10% quantile regressions. Similar to *Credit Line* and *Leverage* the impact of *Cash Flow* on *Cash* becomes stronger at higher quantiles, indicating that firms with high levels of cash have higher propensity of saving cash. This result supports the empirical evidence documented in Opler *et al.* (1999) using a sample from the US; Ozkan and Ozkan (2004) using a sample from the UK; Ferreira and Vilela (2004) using a sample of the 12 EMU countries; and García-Teruel and Martínez-Solano (2008) using a sample of SME from Spain; Uyara and Kuzeya (2014) using a sample from the Turkish market; Al-Najjar (2013) using a sample from four developing countries, namely, Brazil, Russia, India and China; and Al-Najjara and Clark (2017) using a sample from the MENA countries.

MTB is positively related to cash holdings in all estimations; however, it is significant in upper quantiles. This result supports the empirical evidence documented in Opler *et al.* (1999) using a sample from the US; Ozkan and Ozkan (2004) using a sample from the UK; Ferreira and Vilela (2004) using a sample of the 12 EMU countries; Guney *et al.* (2007) using an international sample including France, Germany, Japan, the UK and the US; García-Teruel and Martínez-Solano (2008) using a sample of SME from Spain; and Uyara and Kuzeya (2014) using a sample from the Turkish market. *Volatility* is also positively and significantly related to cash holdings

in all estimations except for the 10% quantile. This results supports the empirical evidence documented in Ozkan and Ozkan (2004) using a sample from the UK; and Uyara and Kuzeya (2014) using a sample from the Turkish market. Similar to the variables discussed so far, *MTB* and *Volatility* coefficients increase in magnitudes for higher quantiles.

Other variables including *Size*, *Dividends*, *Capital Expenditures*, and *Age* are mostly insignificant with similar coefficient sizes across the quantiles. Generally speaking, the effect of *Credit Line*, *Leverage*, *Cash Flow*, *MTB*, and *Volatility* differs considerably across the quantiles. These variables have a strong effect on *Cash* at upper quantiles. The median estimate is similar to the random effect estimate. In addition, for the lowest quantile regression the impact of almost all variables is mostly insignificant.

We also present graphically how each covariate's effect vary across quantiles, and contrast them with the OLS estimates. Figure 1 plots the estimated coefficients of all the covariates against the five quantiles represented by the solid line and their 95% confidence intervals. In addition, the figure plots the OLS estimate represented by the dashed line and its 95% confidence intervals for the purpose of comparison. In terms of our main variable of interest, *Largest*, the estimated coefficient is positive but not significant indicating that there is no causality in mean between cash holdings and ownership of the largest shareholder. However, the quantile regression estimates of *Largest* vary with quantile and exhibit a U shape pattern. The relationship between *Largest* and *Cash* is negative at lower quantiles and positive at higher quantiles at upper quantiles with stronger quantile causal effects at upper quantiles.

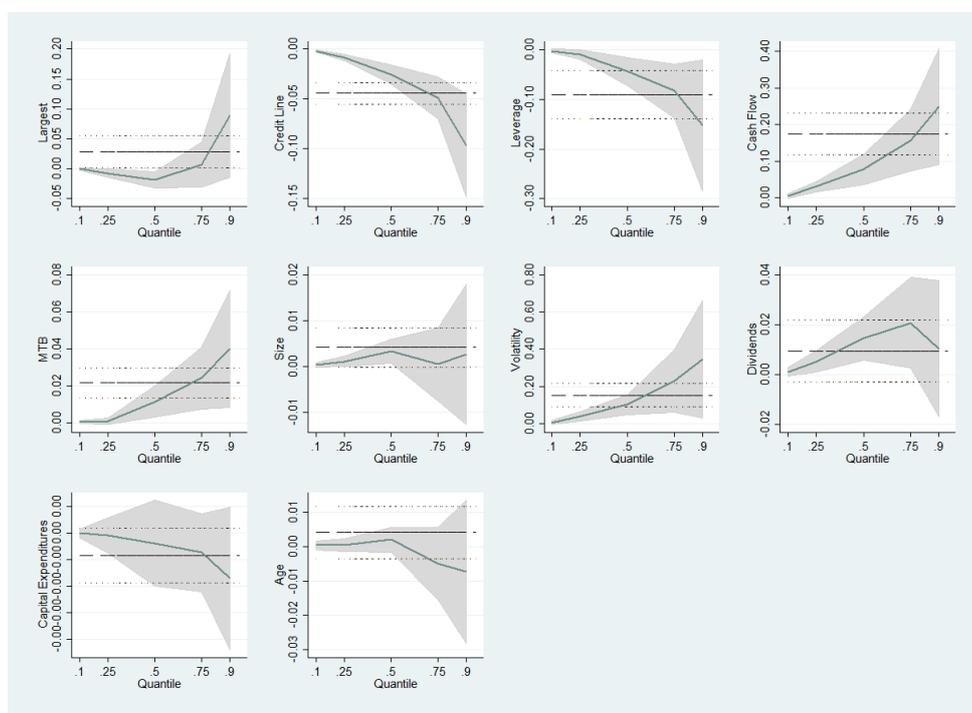


Figure 1: Quantile and OLS estimates of the covariate effects on cash holdings.

5. Conclusion

In a country characterized by weak investor protection, such as Jordan, one would expect that ownership by the largest-controlling owner to be positively related to cash holdings. This is because large shareholders have incentives and abilities to accumulate cash to pursue their own objectives and/or to avoid market discipline. Using standard regression estimation methods, we find that the relation between the two variables is insignificant. However, we observe that the distribution of cash holdings of Jordanian companies is not symmetric with only around 25 percent of the sample holding a net cash ratio of 8 percent and above. Therefore, the no-result finding can be explained by the possibility that ownership by the largest-controlling owner has a conditional impact on cash holdings depending on the level of cash. The findings of this study show that at low cash holding quantiles, the impact ownership of the controlling

shareholder on cash is negative. Better governed firms characterized with low ownership of the largest controlling shareholders are more concerned with preserving financial flexibility, and hence, there is a negative relation between ownership and cash. More importantly, this study finds that at high cash holding quantiles, the impact of ownership of the controlling shareholder on cash is positive. In high cash holding firms, additional ownership of the largest controlling shareholder incentivizes the controlling owner to increase the level of cash holdings. The results of this study corroborate the results reported in Kuan *et al.* (2012) on the impact of excess control rights on cash holdings using the Taiwanese case. Both studies find evidence supporting the notion that the cash decision exhibits significant differences between low and high level cash holding firms.

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الارتداد الديناميكي لأسعار الأسهم نحو الوسط: دليل من بورصة عمان للأوراق المالية

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ملخص

تقوم هذه الدراسة بفحص أثر هيكل الملكية على سياسات الشركات النقدية وذلك بالأخذ بعين الاعتبار حجم النقد الذي تملكه الشركة عن طريق استخدام عينة من الشركات الأردنية غير المالية المدرجة في سوق عمان المالي خلال الفترة 2005-2013. حيث تفترض هذه الدراسة أن أثر المتغيرات المستقلة على سياسة الشركة النقدية سيختلف بناء على حجم النقد الذي تملكه الشركة ومن أهم هذه المتغيرات المستقلة وجود مساهمين ذوي ملكية مسيطرة، حيث تفترض الدراسة أن وجود مثل هؤلاء المساهمين يؤثر ايجاباً على حجم النقد لدى الشركة، إذ إن المساهم المسيطر لديه الدوافع والقدرة على الاستثمار في الأصول ذات السيولة العالية إذ أنها لا تخضع لرقابة السوق كما أنها سهلة التحويل الى منافع خاصة. إلا أن قدرة المساهم المسيطر على الاستثمار في النقد تتأثر أيضاً بحجم النقد لدى الشركة حيث أن هذه العلاقة الايجابية ستظهر لدى الشركات ذات السيولة العالية. تشير نتائج هذه الدراسة إلى أن استعمال الطرق الاحصائية التقليدية لا يشير الى وجود علاقة ذات دلالة احصائية بين الملكية والنقدية. ولكن عند استخدام الاساليب الاحصائية التي تعتمد على فحص العلاقة بناء على الفئات عوضاً عن الميل الوسطي فإن النتائج تشير الى وجود علاقة ايجابية ذات دلالة احصائية بين الملكية والنقد في العشر الأخير من التوزيع.

الكلمات الدالة: النقد، تحليل الفئات، مشكلة الوكالة، المساهم المسيطر، الأردن.

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