



Contents lists available at ScienceDirect

Journal of Business Research



Is cash king? Market performance and cash during a recession

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ARTICLE INFO

Article history:

Received 4 January 2015

Received in revised form 29 February 2016

Accepted 1 March 2016

Available online xxxx

Keywords:

Cash holdings

Economic recession

Firm market performance

Curvilinear effects

ABSTRACT

During a recession firms face a dilemma between investing cash to take advantage of emerging opportunities and holding cash to buffer against the crisis. Given this tension, we ask: Is cash king during a recession? Using a sample of publicly traded manufacturing firms between 2004 and 2010, we use peer cash holdings to instrument for cash and examine whether the curvilinear relationship between cash and stock market performance (Tobin's Q) changes during the economic crisis. We find that the before-recession benefits of cash decline at very high levels of cash holdings (.9 of total assets), whereas the during-recession benefits begin to decline at medium levels of cash holdings (.4 of total assets). Our results reveal that the nature of the curvilinear relationship between cash and market performance shifts from a diminishing returns curve before-recession to a more pronounced inverse U-shaped relationship during-recession.

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1. Introduction

Holding cash has both benefits and costs. Depending on the theoretical lens used, cash holdings are either positively or negatively related to performance. On one hand, cash increases flexibility in strategic response and provides deterrence (Haushalter, Klasa, & Maxwell, 2007). When external financing is too costly, cash allows firms to invest in opportunities and reduces the risk of underinvesting in strategic opportunities (Garvey, 1992). On the other hand, excess cash leads to overinvesting in less profitable opportunities (Richardson, 2006), increases entrenchment (Jensen, 1986; Shleifer & Vishny, 1989), and results in poor governance (Kalcheva & Lins, 2007). More recently, Kim and Bettis (2014) found that Tobin's Q, a proxy for market performance, has an inverted-U type relationship with cash holdings, with the inflection point at very high levels of cash holdings (.89 of total assets).

Prior literature, however, has largely examined the cash-performance relationship during stable economic conditions. The decision to hold or use cash is particularly salient during a recession given increasing calls on firms to expend accumulated cash (Gulati, Nohria, & Wohlgezogen, 2010). Economic crisis brings both threats and opportunities, creating a dilemma for managers to either hold cash to buffer against threats or to expend cash to exploit emerging opportunities. Recent work has argued that firms making strategic investments during a recession improve their financial performance

and emerge stronger out of the recession (Gulati et al., 2010). However, holding cash during a recession could also allow a firm to remain flexible, limit risk-taking in the face of an uncertain and unpredictable environment, and hold cash as a potential strategic deterrent.

These facts beg the question: Does the stock market value cash holdings during a recession? Given the benefits and costs of holding cash during a recession, we examine the quadratic relationship between cash and market performance during a period of recession. Answering this research question is particularly relevant given that corporations were holding \$5 trillion in cash at the beginning of 2014, six years after the Great Recession of 2008 (Woodhill, 2014). Our study contributes to interdisciplinary streams of literature in both strategy and finance on the cash and market performance relationship.

2. Theoretical development and hypotheses

Cash has both transaction and precautionary benefits (Keynes, 1934). The transaction benefits of cash refer to savings from potentially costly efforts to raise capital, lower cost of capital, and greater liquidity (Keynes, 1934). As a precautionary benefit cash preserves the ability to invest in opportunities when other sources of financing are unavailable or when cash flows are volatile (Opler, Pinkowitz, Stulz, & Williamson, 1999).

The benefits of cash holdings are discussed both directly and indirectly in the strategy literature. Firms with excess cash take a real options approach to pursue multiple strategic alternatives (Courtney, 2001) and maintain credible threats without making irreversible resource commitments (cf. Ghemawat, 1991; Ghemawat & del Sol, 1998). As for the indirect evidence on benefits of holding cash, studies on unabsorbed slack in strategic management show that cash promotes

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innovation (Greve, 2003, 2007), facilitates adaptation (Courtney, 2001), and strengthens deterrence (Kim & Bettis, 2014). Unabsorbed slack stimulates research and development (Greve, 2003), experimentation (Nohria & Gulati, 1996), and exploration (Greve, 2007; Voss, Sirdeshmukh, & Voss, 2008).

Yet the influence of holding cash on performance has been debated widely. Hoarding cash on balance sheets has been lambasted as “dead money” and drawn the ire of politicians and activist investors who desire to see cash reserves put to productive use (Ablan & Gupta, 2013).

Beyond these arguments, research has also shown that cash holdings are associated with managerial entrenchment (Shleifer & Vishny, 1989), overinvestments (Richardson, 2006), and higher agency costs (Jensen, 1986). Managers prefer to hold cash to increase their discretion and influence (Opler et al., 1999), but cash holdings also lead to inefficient use of capital (Opler et al., 1999) and increased opportunity costs from missed investment opportunities (Garvey, 1992).

For these reasons, and in line with Kim and Bettis (2014), we propose the following:

Hypothesis 1. Cash has a quadratic relationship to firm market performance with a positive linear term and negative squared term.

2.1. Cash holdings during a recession

The relationship between cash and market performance, however, may not be the same during a recession. A period of recession realigns the strategic landscape and presents unpredictable environmental conditions for firms (cf. Wholey & Brittain, 1989). These tumultuous environmental conditions present both threats and opportunities. Crisis provides opportunities (Starbuck, Greve, & Hedberg, 1978) to reconfigure resources in novel ways (cf. Schumpeter, 1934) and exploit the growth opportunities (Haushalter et al., 2007). At the same time, the recession presents a major threat that reduces performance, constricts available growth opportunities, and weakens extant capabilities.

Research and popular discourse have prescribed alternative strategies, with conflicting prescriptions for cash holdings. We refer to the first major strategy as “innovate out” of a recession by using cash reserves. This approach calls on firms to go on a strategic offense to change “fundamental patterns of present and planned resource deployment” (Hofer & Schendel, 1978, page 25) and develop new competencies (Gulati et al., 2010). In the times of upheaval during a recession, organizational capabilities must be renewed to match the evolving industry landscape (cf. Amit & Schoemaker, 1993) (cf. Inkpen & Choudhury, 1995). By investing cash during a crisis, firms can develop new products, enter new markets, and orchestrate resources to increase growth and profitability (cf. Pearce & Robbins, 1993; Barker & Duhaime, 1997). Hoarding cash, in the “innovate out” view, decreases the firm’s sensitivity to environmental pressures (cf. George, 2005) and insulates a firm from making necessary changes during the turbulent recessionary period (Bromiley, 1991). Furthermore, cash holdings have clear opportunity costs and may result in threat rigidity (Staw, Sandelands, & Dutton, 1981) and managerial entrenchment (Jensen, 1986).

We refer to the second major strategy as “retrench and recover.” This defensive approach calls on firms to reduce investments, cut costs, and focus on increasing efficiency. According to this view, a recession is a threat and the gamble of strategic change could be too costly for a firm. With a significant number of firms facing decline and others filing for bankruptcy, investing cash to improve the firm’s strategic position could be risky. Increasing organizational control (Staw et al., 1981) and reducing risky actions (Sitkin & Pablo, 1992) could be realized through a greater focus on accumulating cash. According to “retrench and recover” view, committing resources to a course of action during a recession locks-in a firm (Ghemawat, 1991) and stifles its ability to react to quickly changing conditions during recession (Porac, Thomas, Wilson, Paton, & Kanfer, 1995). Cash holdings could act as a safety net

during recession, and provide financial flexibility in the face of unknown environments.

The foregoing discussion illustrates the conflicting motivations and prescriptions for firms seeking to navigate the changing landscape of a recession. We integrate these perspectives by suggesting that during a recession, the market will both reward and punish cash holdings according to the logic above, but these forces will be stronger than in prerecession periods.

Firms with low levels of cash holdings during a recession will be susceptible to failure. In this condition, the market will interpret lower levels of cash as a pre-cursor to insolvency. Cash will signal the availability of resources required to develop new capabilities, ward off competitors who seek to infringe on firm territory, and weather the tumultuous recessionary environment (Kim & Bettis, 2014).

At high levels of cash holdings during a recession, firms are well past the cash necessary for deterrence and investments in opportunities. The stock market will consider these firms as too threat rigid and unwilling to make important strategic changes (Staw et al., 1981). Investors will be concerned with strategic stagnation, despite the availability of cash, and strongly weigh the opportunity cost of cash holdings (Leibenstein, 1966; Fama, 1980). Excess cash will be further seen as promoting inefficiencies (Jensen, 1986). These firms may be criticized for having managers who are more sensitive to threats than to opportunities (Jackson & Dutton, 1988). Self-interested managers may be construed as attempting to preserve firm-specific human capital, maintain executive compensation, and reduce employment risk during a recession (Shleifer & Vishny, 1997; Wiseman & Gomez-Mejia, 1998). These factors will cause the market to react more strongly against firms holding excessive cash levels.

The above arguments suggest that during a recession the benefits to cash will be stronger at low levels, and the costs to cash will be stronger at high levels. At moderate levels, firms will receive higher market valuation. Firms with moderate levels of cash holdings will have the resources to invest in new capabilities and seize emergent growth opportunities. In addition, these firms will be construed as innovative rather than construed as threat rigid. Although firm valuations will generally be less favorable during a recession, our theoretical arguments suggest that the curvilinear relationship between cash and market performance will differ during a recession. Specifically, the inflection point of the curve will be at medium levels of cash compared to the diminishing returns model in Kim and Bettis (2014), where returns decline at 0.89—very high levels of cash holdings. In addition, due to lower valuations during a recession, the curve will be below the curve during a non-recession period, and the slope will be more positive at low levels of cash and more negative at high levels of cash (i.e., more inverted-U shaped). This leads to our second hypothesis:

Hypothesis 2. Cash has a more pronounced curvilinear relationship to firm market performance during a recession than pre-recession, such that the upward slope will be more positive and the downward slope more negative.

3. Methods and data

3.1. Sampling strategy and analytical setup

We draw on the entire population of 1733 publically traded US manufacturing firms as listed in COMPUSTAT (two-digit SIC codes 20–39) representing 6752 firm-year observations during the period 2004 to 2010. The fields in the parentheses in the variable description section are the variable names in COMPUSTAT. For several reasons, manufacturing firms represent a particularly salient set of firms to test our hypotheses. Compared to utilities and service firms, manufacturing firms are less likely to be subject to government regulations, which may alter firms’ strategic activities. Manufacturing firms invest in tangible assets,

and cash deployment requires active synthesis with existing resources and capabilities (compared to financial institutions who can quickly deploy cash through loans and investments). Furthermore, during the 2007 economic crisis, a significant number of service firms received government bailouts that could affect credit availability and the willingness of such firms to hold cash.

Because the Great Recession started in the latter half of 2007, for this reason we omit the year 2007 from the empirical analysis. The *recession dummy* takes the value of “1” between 2008 and 2010 (both years inclusive) and “0” between 2004 and 2006 (both years inclusive). Table 1 provides a detailed description of critical performance measures before (2004–2006) and during the recession (2008–2010). During the recession, industry weighted sales declined on average by more than 7.2%, and Tobin's Q declined by 22%. In addition, there was a significant decline in Altman's Z-scores, indicating reduced distance to bankruptcy. During the prerecession period, 26% of firms were below the 2.6 threshold of the Z-score (in the gray zone of bankruptcy risk) compared to 32% of firms during the recession.

3.2. Dependent variable

Based on past work, we use *Tobin's Q* as an outcome variable (Brush, Bromiley, & Hendrickx, 2000; O'Brien & Folta, 2009; Kim & Bettis, 2014). *Tobin's Q* is the total market value of the firm (MKVLT) divided by total assets (AT). Based on the efficient market hypothesis, because the value of a firm's actions will generally be incorporated in year *t* and not the year after, we do not lag the predictors.

3.3. Explanatory and moderator variables

Cash is measured as the sum of cash and short-term and investments (CHE) scaled by total assets (AT) (Opler et al., 1999; Haushalter et al., 2007; Kim & Bettis, 2014).

3.4. Instrumental variable

Because the relationship between cash and market performance may be endogenous, we use *peer cash holdings* as an instrument. Due to lending constraints at the industry level, peer firm cash holdings

are likely to influence a firm's level of cash holdings, but are less likely to impact a focal firm's market performance directly. Peer cash holdings are calculated by taking the average cash holdings of other firms in a focal firm's industry (i.e., industry average cash holdings minus focal firm cash holdings). To consider closest peers, we use the four-digit SIC codes for this calculation. We find that *peer cash holdings* is positively and significantly related to cash ($r = .53$), but not significantly related to Tobin's Q ($r = .007$).

We formally examine the strength of the instrument by following post-estimation analyses in line with recommendations from Stock, Wright, and Yogo (2002). We find an F-statistic of 750.67, which exceeds the recommended level of 10 for the two-stage least squares estimator to be reliable when there is one endogenous regressor (Stock et al., 2002). These results indicate the strength of using peer cash holdings as an instrument.

3.5. Control variables

Based on Kim and Bettis (2014) and O'Brien and Folta (2009), we control for several alternate explanations of market performance. *Absorbed slack* is the ratio of selling, general, and administrative expenses (XSGA) to sales (SALE). *Debt ratio* is debt (DLTT + DLC) to total assets (AT), and *capital intensity* is capital expenditure (CAPX) scaled by sales (SALE).

Because financial distress could lead to a very different market valuations (Shimizu, 2007), we control for Altman's Z-score. Using the original measure developed by Altman (1968) for publically traded manufacturing firms, Altman's Z is a composite calculated as follows: $Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5$ where X_1 represents working capital over total assets (WCAP/AT); X_2 is retained earnings over total assets (RE/AT); X_3 refers to earnings before interest and taxes divided by total assets (EBIT/AT); X_4 is the ratio of market value of equity to book value of total liabilities (MKVALT/LT); and X_5 is sales divided by total assets (SALE/AT). Higher values on a Z-score indicate greater distance from financial distress.

Firm size is the natural log of the number of employees (EMP). We also control for industry fixed-effects using four-digit SIC codes. Table 2 displays the means, standard deviations, range, and correlations for all variables used in the model.

Table 1
Mean industry performance pre- and during (in) recession.

2-Digit SIC	Name	# of observations		Sales growth		ROA		Tobin's Q		Altman's Z	
		Pre-	During	Pre-	During	Pre-	During	Pre-	During	Pre-	During
20	Food and kindred products	309	379	1.12	1.09	0.03	0.01	1.38	1.12	4.70	3.67
21	Tobacco products	20	27	1.03	1.07	0.11	0.12	2.31	2.29	3.61	3.67
22	Textile mill products	41	59	1.04	1.03	0.01	-0.03	1.69	1.13	5.59	5.01
23	Apparel, finished products from fabrics & similar materials	86	89	1.12	1.05	0.05	0.01	1.68	1.17	6.13	4.97
24	Lumber and wood products	33	42	1.06	0.93	0.06	-0.02	1.19	0.97	5.07	5.28
25	Furniture and fixtures	74	91	1.09	0.98	0.07	0.00	1.50	0.93	4.96	3.67
26	Paper and allied products	126	142	1.08	1.07	0.01	0.02	1.62	0.65	2.11	2.62
27	Printing, publishing and allied industries	163	200	1.09	1.05	0.03	-0.04	1.65	0.90	3.92	2.04
28	Chemicals and allied products	1240	1578	1.27	1.26	-0.25	-0.30	3.20	2.78	4.72	1.11
29	Petroleum refining and related industries	87	102	1.36	1.17	0.09	0.05	5.07	5.15	4.00	4.53
30	Rubber and miscellaneous plastic products	109	102	1.14	1.06	0.02	-0.01	1.26	1.30	4.08	4.61
31	Leather and leather products	57	58	1.16	1.02	0.10	0.02	2.14	0.98	9.03	6.00
32	Stone, clay, glass, and concrete products	75	66	1.18	0.97	0.02	-0.03	1.20	0.90	2.84	0.82
33	Primary metal industries	183	217	1.31	1.11	0.08	0.03	1.21	0.87	4.36	3.71
34	Fabricated metal products	143	188	1.15	1.05	0.03	0.01	1.50	1.06	5.37	4.49
35	Industrial and commercial machinery and computer equipment	715	848	1.17	1.10	-0.01	-0.01	1.62	1.21	4.48	3.53
36	Electronic, electrical equipment & components	1295	1538	1.19	1.11	-0.05	-0.07	1.89	1.46	5.68	3.64
37	Transportation equipment	286	359	1.13	1.09	0.01	-0.01	1.55	1.41	4.48	3.53
38	Measurement/analyze/control instruments; photo/medical/optical goods; watches/clocks	867	1041	1.22	1.13	-0.06	-0.12	2.39	1.85	7.43	4.17
39	Miscellaneous manufacturing industries	140	156	1.13	1.05	-0.02	-0.03	1.50	1.04	4.87	4.06
	Industry average			1.15	1.07	0.02	-0.02	1.88	1.46	4.87	3.76
	Average decline			-0.08		-0.04		-0.42		-1.11	
	Average % decline			-7.20%		-228.55%		-22.32%		-22.87%	

Table 2
Means, standard deviations, ranges and correlations.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1 Tobin's Q	2.31	31.57	1.00										
2 Absorbed slack	1.70	46.72	0.10	1.00									
3 Debt ratio	0.21	1.11	0.13	0.62	1.00								
4 Capital intensity	1.30	75.00	0.00	0.58	0.00	1.00							
5 Altman's Z	4.04	8.39	0.03	-0.08	-0.18	-0.02	1.00						
6 Firm size (ln employees)	0.11	2.24	-0.16	-0.07	-0.02	-0.01	0.04	1.00					
7 Cash	0.26	0.25	0.06	0.05	-0.05	0.02	0.12	-0.53	1.00				
8 Recession dummy	0.60	0.49	0.00	0.01	0.02	0.01	-0.12	0.02	0.00	1.00			
9 Operational similarity	-1.97	1.84	-0.16	-0.25	-0.15	-0.26	0.13	0.20	-0.03	0.02	1.00		
10 Industry concentration	0.07	0.06	0.00	-0.02	0.00	-0.01	0.01	0.20	-0.24	0.04	-0.15	1.00	
11 Peer cash holdings	0.27	0.17	0.01	0.06	0.02	0.02	-0.03	-0.40	0.53	-0.001	0.08	-0.38	1.00

Note.
All correlations above |.016| are significant at $p < .05$ (two-tailed).

4. Results

We use two-stage least squares instrumental variable regression analysis. Because the recession began during the year 2007, we exclude this year from the analysis to ensure a clear break between pre- and during-recession time periods. Because the Breusch–Pagan/Cook–Weisberg test reveals that heteroskedasticity is a concern in our data ($\chi^2 = 84,120.50$, $\text{Prob} > \chi^2 = 0.00$), we use robust standard errors. In the first stage, we use the instrument and all controls and predictors except for those with cash interaction terms to generate predicted values for cash. We label this predicted variable as “cash hat.” The results using the instrumented cash variable on Tobin's Q are presented in Table 3.

Examining the effects of the control variables, debt ratio is positively related to Tobin's Q. Capital intensity and firm size have a negative and significant relationship with Tobin's Q. Finally, as expected, Altman's Z has a significant positive relationship, indicating that firms further from financial distress have higher Tobin's Q values.

In the second stage results, cash hat has a positive overall effect on Tobin's Q ($\beta = 3.928$, $p < 0.01$). Supporting Hypothesis 1, the sign of

Table 3
2 SLS IV regression analysis.

Variables	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q
Absorbed slack	0.010 (0.013)	0.011 (0.013)	0.010 (0.013)	0.011 (0.013)
Debt ratio	5.238 ^a (0.485)	5.226 ^a (0.480)	5.240 ^a (0.486)	5.217 ^a (0.481)
Capital intensity	-0.167 ^b (0.073)	-0.169 ^b (0.072)	-0.167 ^b (0.072)	-0.171 ^b (0.071)
Altman's Z	0.151 ^a (0.011)	0.159 ^a (0.014)	0.142 ^a (0.012)	0.150 ^a (0.015)
Firm size (ln employees)	-0.135 ^a (0.032)	-0.152 ^a (0.030)	-0.101 ^a (0.031)	-0.123 ^a (0.030)
Cash Hat	2.170 ^a (0.677)	3.928 ^a (1.132)	3.354 ^a (0.732)	3.620 ^a (1.223)
Cash Hat squared		-4.538 ^b (2.136)		-1.797 (2.300)
Recession dummy			-0.168 ^b (0.067)	-0.379 ^a (0.096)
Recession × Cash Hat			-0.609 ^b (0.295)	2.125 ^c (1.236)
Recession × Cash Hat squared				-5.647 ^b (2.683)
Constant	-0.707 (0.451)	-0.781 (0.507)	-0.683 (0.459)	-0.648 (0.492)
Observations	8463	8463	8463	8463
R-squared	0.873	0.874	0.874	0.874

Robust standard errors in parentheses.

- ^a $p < 0.01$.
- ^b $p < 0.05$.
- ^c $p < 0.1$.

the squared term of cash hat is negative and significant ($\beta = -4.538$, $p < 0.05$). In Model 3, recession is negatively related to Tobin's Q ($\beta = -0.168$, $p < 0.05$) and the Cash Hat × Recession term ($\beta = -0.609$, $p < 0.05$) is also significant. The relationship between the squared term of Cash Hat × Recession is negatively related to performance ($\beta = -5.647$, $p < 0.05$) is also supported.

4.1. Inflection point for inverted-U effect

Kim and Bettis (2014) identified 0.89 (range 0 to 1) as the inflection point where returns from cash holdings decline; this is a very high level of cash holdings beyond a standard deviation from average cash holdings. For this reason, we take a closer look at the marginal effects of cash (pre- and during the recession) across the full range of the cash holdings variable (0 to 1). Fig. 1 presents the graphical effects. The figure illustrates the effects of holding cash at all levels of cash represented in the sample, lowering the range restriction. During prerecession times, we find a curve of diminishing returns very similar to that espoused by Kim and Bettis (2014), but the curve is sharper during the recession. At low levels of cash, gains in market performance from cash increase more than during the prerecession (the slope of the line toward the left is steeper during the recession than the slope before the recession), and firms are penalized much more severely for increases in cash at medium levels (the downward slope on the right is steeper during the recession than the slope before the recession). This provides strong support for Hypothesis 2 and our general theoretical development. Evidence from the detailed marginal effects results reveals that the highest significance level of Tobin's Q before the recession is at cash = 0.9, and

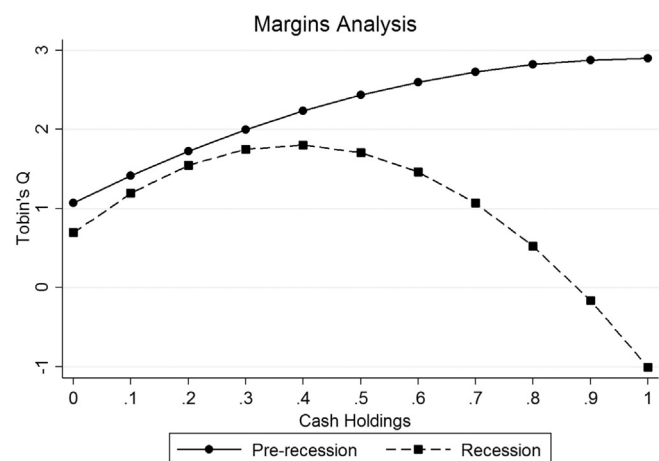


Fig. 1. Marginal effects of cash across full range of cash and over recession. Note: This graph was generated by employing the margins command (followed by marginsplot) in STATA. It examines the marginal effects of Cash Hat from 0 to 1 at 0.1 intervals over the period pre- and during recession.

Tobin's $Q = 2.87$ [95% C.I. = 0.568, 5.180]. However, the inflection point during the recession is at cash = 0.4 and Tobin's $Q = 1.800$ [95% C.I. = 1.553, 2.047], indicating that during the recession, the returns start to decline at 0.4 levels of cash compared to returns declining at 0.9 levels of cash before recession.

5. Robustness checks

We tested several alternative specifications to our model to ensure the robustness of the results.

5.1. Alternate measure of Tobin's Q

We tested whether inferences differed using Kim and Bettis (2014) formula for Tobin's Q , who followed Brush et al. (2000) operationalization of Tobin's Q . This alternative operationalization increased the mean value of Q , because it includes both long- and some short-term debt in the numerator (a change from 2.3 in our sample to 2.8 using their measure). However, their operationalization is highly correlated ($r = 0.9996$) with the operationalization of Tobin's Q in our main results. In addition, the results remain consistent using this alternative measure (Cash Hat \times Recession: $\beta = 3.16$, $p < .1$; Cash Hat Squared \times Recession: $\beta = -7.88$, $p < 0.05$).

5.2. Recession dates

Because the precise date for the start of recession is subject to debate, we run our model including 2007 in the analysis to ensure that this omission is not driving results. We find consistent results. Supporting Hypothesis 1, there is an overall curvilinear relationship between cash and market performance (Cash Hat: $\beta = 4.22$, $p < .01$; Cash Hat Squared: $\beta = -4.70$, $p < .01$). Supporting Hypothesis 2, we find that the interaction with the recession dummy alters the shape of the curve (Cash Hat \times Recession: $\beta = 2.92$, $p < .1$; Cash Hat Squared \times Recession: $\beta = -7.70$, $p < 0.05$).

5.3. Accounting based performance measure

As performance is a heterogeneous construct (Miller, Washburn, & Glick, 2013), we test our model with Return on Assets (ROA) as an alternate performance measure. Extending Kim and Bettis (2014) market-based performance findings, we find support for a curvilinear effect of cash on ROA (Cash Hat: $\beta = .88$, $p < .01$; Cash Hat Squared: $\beta = -2.68$, $p < .01$). We also confirm that ROA is lower during a recession (Recession: $\beta = -.03$, $p < .05$), but do not find support for different effects of cash on ROA during a recession (Cash Hat \times Recession: $\beta = .04$, $p > .1$; Cash Hat Squared \times Recession: $\beta = .33$, $p > 0.1$). This indicates that the effect of cash holdings on performance during a recession is different for market-based measures compared to accounting-based measures, and the main findings must be interpreted in line with market-based performance and not accounting performance. This draws attention to important differences between performance outcomes and may be driven by forward-looking stock market compared to the past oriented accounting measures.

5.4. Robustness of instrument

To further ensure the validity of our instrument, we used peer cash holdings at the two-digit industry level rather than the four-digit industry level as an instrument. With this revised instrument, we continue to find support for the curvilinear effects of cash on Tobin's Q during a recession (Cash Hat \times Recession: $\beta = 6.80$, $p < .01$; Cash Hat Squared \times Recession: $\beta = -15.86$, $p < 0.01$).

6. Discussion

Some researchers have pointed to the precautionary benefits of cash (Opler et al., 1999; Mikkelsen & Partch, 2003), whereas others have emphasized the adaptive benefits of cash (e.g., Denis & Sibilkov, 2010; Brown & Petersen, 2011). Research that draws attention to the downside of cash holding has found detrimental effects on market performance only at very high level of cash holdings (e.g., >89% of assets; Kim & Bettis, 2014). We found that the benefits and costs of cash holdings are exacerbated during a recession. As presented in Fig. 1, we find a much more pronounced inverse-U shaped relationship between cash and market performance during a recession compared to the diminishing returns curve for before-recession. There are higher benefits to cash holdings at low levels during a recession (from 0 up to 0.4), but the penalty for holding cash starts much earlier (0.4) than in pre-recession period (0.9).

Studying effects of cash holdings during a recession is important for the both finance and strategy literature. During a recession, the decision to hold or spend cash is particularly salient; holding cash buffers a firm from threats, but spending cash also allows firms to exploit new opportunities. The dilemma has caused substantial debate in public discourse. Bank of Canada Governor Mark Carney called out companies for hoarding cash during a recession—going as far as calling their cash reserves “dead money.” In line with this narrative, a significant body of work on recession calls for making investments to emerge successfully from the recession; indeed, activist investors have even brought lawsuits to compel firms to use their cash holdings (cf. Ablan & Gupta, 2013).

Corporations, meanwhile, defend the decision to hold cash, arguing that cash is king during a recession (Froot, 1992; Haushalter et al., 2007). Corporations argue that cash reserves are necessary to maintain competitive positions and provide response flexibility in uncertain environments. This position, however, is also in line with agency theoretic reasoning that managers will seek to hold cash balances instead of committing to risky investments. Intuition suggests that holding cash could lead to missing out on potential growth opportunities that could improve the firm's competitive position during a recession.

Our results suggest that cash holdings are neither dead money nor king during a recession. Contrary to dead money arguments, cash is positively related with Tobin's Q during a recession at low levels of cash holdings. Indeed, the stock market rewards “safety first” at low- to medium levels of cash holdings during a recession. However, effects do not rise to “cash is king” levels. The impact of cash on market performance is below the prerecession levels (the line for during recession is below the line for prerecession in Fig. 1) and holding high levels of holding cash is much more severely punished by the market. In essence, the market tightens its valuations on high cash holdings from prerecession and seeks to compel organizations to use cash reserves during the recession.

Our findings extend recent theorizing on cash in the traditions of behavioral strategy and competitive dynamics. Kim and Bettis (2014) develop a theoretical rationale for the value of cash as a strategic deterrent. We highlight the defensive value of cash in addition to its strategic value advocated by media or policy makers and explore these dynamics within the particular context of a recession. Future research may extend these arguments by examining further nuances in competitive dynamics during recession. For example, the value of cash holdings may be conditional on competitive interdependencies and industry structures (Haushalter et al., 2007).

The context of the study—the 2007–2009 economic crisis—calls for more discussion. It is likely that this crisis was not similar to other crises. However, the exogenous shock of the recession also provides a unique opportunity to examine the cash–market performance relationship. We include prerecession years in the panel data, thereby lowering effects of unobserved heterogeneity of a firm before and after the recession. Including both pre- and during recession levels of cash controls for unobserved factors such as a firm's preference to hold cash

against a potential downturn (cf. Lins, Servaes, & Tufano, 2010), governance characteristics (Harford, Mansi, & Maxwell, 2008), agency costs (Jensen, 1986), liquidity preferences (Opler & Titman, 1994), and most important, growth opportunities before recession (Pinkowitz & Williamson, 2007).

6.1. Managerial and policy implications

Resource allocation decisions during a recession are particularly challenging. Should managers invest resources aggressively to improve competitive position or conserve resources to limit further decline in market performance? Deploying cash increases uncertainty in outcomes, which in turn increases risks to executives' firm-specific human capital and employment. This, in turn, impels executives to hold cash. The findings show that cash holdings are a mixed bag and the value in increasing cash holdings is contingent on current cash levels. At least during the Great Recession of 2008, firms with cash holdings between 0 and 0.3 of total assets benefitted from increasing cash holdings, whereas firms with current levels at 0.4 or above paid a strong penalty. This provides important insight on calibrating cash holdings to improve market performance. Policy makers are also concerned about the significant cash holdings by US corporations in 2011, as limited investments from corporations have stifled economic recovery. For legislators contemplating regulatory action to stimulate investment, the present study highlights the need to take into account the benefits of cash holdings—strategic deterrence and pursuing opportunities—for firms.

6.2. Limitations and future research directions

The results must be interpreted in the light of limitations of the study. First, similar to extant studies using archival COMPUSTAT data, complex combinations of strategic, psychological and behavioral factors could impact deployment or holding of cash. By including prerecession panel observations, we control for several unobserved factors ranging from growth opportunities to past market performance to past resource allocation preferences. We call on future studies to assess behavioral strategy components to understand cash holdings in pre- and during-recession periods. Second, although widely espoused as a fungible resource, how firms convert cash to a firm-specific resource is less understood. The first step in converting cash into capabilities would be acquiring resources from factor markets, building capacity, or developing and refining capabilities. Such investments could come to fruition over a longer time span. In pursuing opportunities related to exploitative knowledge, which is closer to the firm's resource base, cash could be deployed at a relatively faster rate. Thus, a temporal component of cash deployment is central to understanding the value of fungible resources and therefore cash.

7. Conclusion

In the past several decades, researchers in strategy and finance have questioned whether holding more cash leads to higher market performance. During a recession, its benefits decline at medium levels of cash compared to declining benefits at very high levels of cash in pre-recessionary periods. However, the overall benefits are lower than in the pre-recessionary period. The stock market values cash holding, up to a certain level, both before and during a recession, but to a lesser extent during a recession.

Acknowledgments

We appreciate feedback from the Editor, two anonymous reviewers and Ravi Dharwadkar on earlier versions of this manuscript.

References

- Ablan, J., & Gupta, P. (2013). *Einhorn sues Apple, marks biggest investor challenge in years*. Reuters <http://www.reuters.com/article/2013/02/08/us-apple-greenlight-idUSBRE9160MI20130208>.
- Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), 589–609.
- Amit, R., & Schoemaker, P. (1993). Strategic assets and organizational rent. *Strategic Management Journal*, 14(1), 33–46.
- Barker, V. L., & Duhaime, I. M. (1997). Strategic change in the turnaround process: Theory and empirical evidence. *Strategic Management Journal*, 18(1), 13–38.
- Bromiley, P. (1991). Testing a causal model of corporate risk taking and performance. *Academy of Management Journal*, 34(1), 37–59.
- Brown, J. R., & Petersen, B. C. (2011). Cash holdings and R&D smoothing. *Journal of Corporate Finance*, 17(3), 694–709.
- Brush, T. H., Bromiley, P., & Hendrickx, M. (2000). The free cash flow hypothesis for sales growth and firm performance. *Strategic Management Journal*, 21(4), 455–472.
- Courtney, H. (2001). *20/20 foresight: Crafting strategy in an uncertain world*. Boston, MA: Harvard Business School Press.
- Denis, D. J., & Sibilkov, V. (2010). Financial constraints, investment, and the value of cash holdings. *Review of Financial Studies*, 23(1), 247–269.
- Fama, E. F. (1980). Agency problems and the theory of the firm. *The Journal of Political Economy*, 88(2), 288–307.
- Froot KA. Intel Corporation, 1992
- Garvey, G. T. (1992). Leveraging the underinvestment problem: How high debt and management shareholdings solve the agency costs of free cash flow. *Journal of Financial Research*, 15(2), 149–166.
- George, G. (2005). Slack resources and the performance of privately held firms. *Academy of Management Journal*, 48(4), 661–676.
- Ghemawat, P., & del Sol, P. (1998). Commitment versus flexibility? *California Management Review*, 40(4), 26–42.
- Ghemawat, P. (1991). *Commitment*. New York: Simon and Schuster.
- Greve, H. R. (2003). A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of Management Journal*, 46(6), 685–702.
- Greve, H. R. (2007). Exploration and exploitation in product innovation. *Industrial and Corporate Change*, 16(5), 945–975.
- Gulati, R., Nohria, N., & Wohlgezogen, F. (2010). Roaring out of recession. *Harvard Business Review*, 88(3), 62–69.
- Harford, J., Mansi, S. A., & Maxwell, W. F. (2008). Corporate governance and firm cash holdings in the US. *Journal of Financial Economics*, 87(3), 535–555.
- Haushalter, D., Klasa, S., & Maxwell, W. F. (2007). The influence of product market dynamics on a firm's cash holdings and hedging behavior. *Journal of Financial Economics*, 84(3), 797–825.
- Hofer, C. W., & Schendel, D. (1978). *Strategy formulation: Analytical concepts*. Vol. 1986, St. Paul, MN: West Publishing Company.
- Inkpen, A., & Choudhury, N. (1995). The seeking of strategy where it is not: Towards a theory of strategy absence. *Strategic Management Journal*, 16(4), 313–323.
- Jackson, S. E., & Dutton, J. E. (1988). Discerning threats and opportunities. *Administrative Science Quarterly*, 33(3), 370–387.
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, 76(2), 323–329.
- Kalcheva, I., & Lins, K. V. (2007). International evidence on cash holdings and expected managerial agency problems. *Review of Financial Studies*, 20(4), 1087–1112.
- Keynes, J. M. (1934). *The applied theory of money*. Vol. 2. London: Macmillan and Co.
- Kim, C., & Bettis, R. A. (2014). Cash is surprisingly valuable as a strategic asset. *Strategic Management Journal*. <http://dx.doi.org/10.1002/smj.2205>.
- Leibenstein, H. (1966). Allocative efficiency vs. “X-efficiency”. *The American Economic Review*, 56(3), 392–415.
- Lins, K. V., Servaes, H., & Tufano, P. (2010). What drives corporate liquidity? An international survey of cash holdings and lines of credit. *Journal of Financial Economics*, 98(1), 160–176.
- Mikkelsen, W. H., & Partch, M. M. (2003). Do persistent large cash reserves hinder performance? *Journal of Financial and Quantitative Analysis*, 38(02), 275–294.
- Miller, C. C., Washburn, N. T., & Glick, W. H. (2013). Perspective—the myth of firm performance. *Organization Science*, 24(3), 948–964.
- Nohria, N., & Gulati, R. (1996). Is slack good or bad for innovation? *Academy of Management Journal*, 39(5), 1245–1264.
- O'Brien, J. P., & Folta, T. B. (2009). A transaction cost perspective on why, how, and when cash impacts firm performance. *Managerial and Decision Economics*, 30(7), 465–479.
- Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1), 3–46.
- Opler, T. C., & Titman, S. (1994). Financial distress and corporate performance. *Journal of Finance*, 49(3), 1015–1040.
- Pearce, J. A., & Robbins, K. D. (1993). Toward improved theory and research on business turnaround. *Journal of Management*, 19(3), 613–636.
- Pinkowitz, L., & Williamson, R. (2007). What is the market value of a dollar of corporate cash? *Journal of Applied Corporate Finance*, 19(3), 74–81.
- Porac, J. F., Thomas, H., Wilson, F., Paton, D., & Kanfer, A. (1995). Rivalry and the industry model of Scottish knitwear producers. *Administrative Science Quarterly*, 40(2), 203–227.
- Richardson, S. (2006). Over-investment of free cash flow. *Review of Accounting Studies*, 11(2–3), 159–189.
- Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Vol. 55, Transaction publishers.
- Shimizu, K. (2007). Prospect theory, behavioral theory, and the threat-rigidity thesis: Combinative effects on organizational decisions to divest formerly acquired units. *Academy of Management Journal*, 50(6), 1495–1514.

- Shleifer, A., & Vishny, R. W. (1989). Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics*, 25(1), 123–139.
- Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *Journal of Finance*, 52(2), 737–783.
- Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behavior. *Academy of Management Review*, 17(1), 9–38.
- Starbuck, W. H., Greve, A., & Hedberg, B. (1978). *Responding to crises: Arbetslivscentrum*.
- Staw, B. M., Sandelands, L. E., & Dutton, J. E. (1981). Threat-rigidity effects in organizational behavior: A multilevel analysis. *Administrative Science Quarterly*, 26(4), 501–524.
- Stock, J. H., Wright, J. H., & Yogo, M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business & Economic Statistics*, 20(4).
- Voss, G. B., Sirdeshmukh, D., & Voss, Z. G. (2008). The effects of slack resources and environmental threat on product exploration and exploitation. *Academy of Management Journal*, 51(1), 147–164.
- Wholey, D. R., & Brittain, J. (1989). Research notes: Characterizing environmental variation. *Academy of Management Journal*, 32(4), 867–882.
- Wiseman, R. M., & Gomez-Mejia, L. R. (1998). A behavioral agency model of managerial risk taking. *Academy of Management Review*, 23(1), 133–153.
- Woodhill, L. (2014). *Why American companies are holding onto \$5 trillion in 'cash'*.