WHEN IS CASH GOOD OR BAD FOR FIRM PERFORMANCE?

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ABSTRACT

Research Summary: Cash can create shareholder value when used for adaptation to unfolding contingencies, but can also reduce value when appropriated by other stakeholders. We synthesize arguments from the behavioral theory of the firm, economic perspectives like agency theory, and the value-creation versus value-appropriation literatures to argue that the implications of cash for firm performance are context-specific. Cash is more beneficial for firms operating in highly competitive, research-intensive, or growth-focused industries that are typical of contexts requiring adaptation in the face of uncertainties. Conversely, cash is more detrimental to performance in firms that are poorly governed, diversified, or opaque, as are typical of contexts where stakeholder conflicts, information asymmetries, or power imbalances can encourage value appropriation by other stakeholders.

Managerial Summary: Cash can create shareholder value when used for adaptation to unfolding contingencies, but can also reduce value when appropriated by other stakeholders. While cash-rich firms have higher performance on average, with those in the 75th percentile having a market-to-book value 15 percent higher than those in the 25th percentile, we find that the performance benefits of cash depend on the context. Cash is more beneficial for firms operating in highly competitive, research-intensive, or growth-focused industries that are typical of contexts requiring adaptation in the face of uncertainties. Conversely, cash is more detrimental to performance in firms that are poorly governed, diversified, or opaque, as are typical of contexts where stakeholder conflicts, information asymmetries, or power imbalances can encourage value appropriation by other stakeholders.

Keywords: Cash, behavioral theory of the firm, adaptation, information asymmetry, value creation, value appropriation.
“Conflicts of interest between shareholders and managers over payout policies are especially severe when the organization generates substantial free cash flow. The problem is how to motivate managers to disgorge the cash rather than investing it at below the cost of capital or wasting it on organization inefficiencies” (Jensen, 1986: 323).

“I have pledged – to you, the rating agencies and myself – to always run Berkshire with more than ample cash. We never want to count on the kindness of strangers in order to meet tomorrow’s obligations.” (Warren Buffet, quoted in Bershidsky, 2014).

**INTRODUCTION**

Is cash good or bad for firm performance? Media reports on the large cash stockpiles of US firms have voiced conflicting opinions about the value of holding cash. While some commentators argue that cash reserves can help firms avert another Lehman-like crisis or match the intensity of their rivals’ research and development (R&D) efforts, others lament how CEOs choose to earn a negative real return on idle cash that could be more productively invested elsewhere. Concurrently, academic researchers are also divided on the issue of the performance implications of cash.¹ While many studies show that cash improves firm performance (Daniel et al., 2004; Kim and Bettis, 2014), several find that cash is detrimental to performance (Dittmar, Mahrt-Smith, and Servaes, 2003; Harford, Mansi, and Maxwell, 2008), while some find an inverted “U” shaped association (Tan and Peng, 2003).

The mixed evidence suggests that firms may differ in the extent to which cash can enhance or reduce firm performance, implying that context may shape the performance consequences of cash. We therefore ask the question: when does cash create value and improve performance, and when does it lead to value appropriation and impaired performance? Our

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¹ A large literature in management has studied organizational slack and distinguishes between three different types, namely available slack, absorbed slack, and potential slack (Bourgeois, 1981; George, 2005; Tan and Peng, 2003). Consistent with Kim and Bettis (2014), we focus on cash, the most liquid and common form of available slack, which provides high discretion to managers to quickly deploy for adaptation, but can also be easily appropriated by stakeholders.
findings indicate that cash is beneficial in contexts where it is used for adaptation, but its benefits are eroded in contexts where it can be easily appropriated by other stakeholders.

Our research is grounded in three distinct but complementary perspectives. The first is the value creation and appropriation (VCA) framework (Coff, 1999). This perspective clarifies how valuable resources can create value, but may fail to enhance firm performance to the extent this value is appropriated by stakeholders other than shareholders. The second perspective is Cyert and March’s (1963) behavioral theory of the firm (BTF). According to the BTF, cash has the potential to enhance performance by facilitating the adaptation and innovation that confer competitive advantage and by buffering the firm from environmental turbulence. Conversely, the BTF also recognizes the possibility that cash can be a source of slack that is ‘up for grabs’, and powerful stakeholders (including managers) may bargain hard to appropriate the value created by cash, thereby undermining the performance benefits. Finally, some economic perspectives also support the idea of value creation from cash, arguing that because of inefficiencies in capital markets, cash-rich firms may have an advantage in more quickly adapting to environmental changes (Faulkender and Wang, 2006), thereby enhancing performance. Other economics-based approaches, such as agency theory, argue that free cash can be dissipated by managers for private benefit, resulting in value appropriation from cash and undermining performance (Jensen, 1986).

In this paper, we combine these three approaches (i.e., namely VCA, BTF, and economic) to provide a framework for understanding the contexts that shape the performance effects of cash.

Our paper makes two important contributions to the literature. First, using a framework based in current theory, it highlights the primacy of context in determining the cash-performance relationship. Our research builds on prior work that studied contextual moderators of the cash-performance association (Bradley, Wiklund, and Shepherd, 2011; George, 2005) by proposing a
dichotomous typology of contexts, namely value creation and value appropriation. We show that
cash creates more value in contexts where there is greater need for adaptation to unfolding
contingencies, while value tends to be appropriated in contexts where conflict over resources,
information asymmetry, and stakeholders’ bargaining power make it easier to appropriate.

Second, we also contribute to the literature by dovetailing the VCA perspective offered
by strategy scholars with the BTF and agency approaches adopted by extant studies on cash (Tan
and Peng, 2003), and then suggesting new contextual moderators of the cash-performance
relationship. These include three value creation moderators (or contexts), namely industry
competition, industry R&D intensity, and industry growth, and three value appropriation
moderators (or contexts), namely corporate governance, diversification, and corporate opacity.
While the corporate governance context for cash has been employed in some prior studies
(Dittmar and Mahrt-Smith, 2007; O’Brien and Folta, 2009), we put it into perspective by
situating it within a broader framework of contextual factors that promote either enhanced value
creation or stakeholder value appropriation.

Our empirical results show strong support for our hypotheses. We find that cash enhances
firm performance in all three value creation contexts, but that the benefits of cash are attenuated
in all three value appropriation contexts. These results contribute to the management literature by
showing how the VCA, BTF, and economic frameworks can be usefully integrated to better
understand the contingencies that determine when cash is good or bad for firm performance.

THEORY AND HYPOTHESES

Value Creation from Cash: Behavioral and Economic Approaches

The BTF posits that slack creates firm value by providing a cushion of resources that
allow firms to adapt in response to internal and external pressures (Bourgeois, 1981; Cyert and
March, 1963). Cash is a form of available (or unabsorbed) slack that provides high discretion to managers for reallocation to investments and stakeholders with a view to creating value. A growing body of research using the BTF finds empirical support for the view that cash results in improved financial performance (Daniel et al., 2004; George, 2005; Kim and Bettis, 2014).

Cash can create value by facilitating adaptation to complex environments and unfolding contingencies that increase the firm’s exposure to risks and uncertainty (Levinthal, 1997). Over time, new technologies may emerge, new products may be introduced, customer tastes and preferences may change, suppliers may restrict supplies or increase prices, employees may leave the firm, and the government may impose new taxes or change regulations. Such scenarios can entail significant uncertainty, and cash can enable adaptation, for example, by providing the means to delay decisions until such uncertainty is resolved (Kim and Bettis, 2014) and quickly invest when needed. Behavioral theory also suggests other ways in which cash can be used to adapt and create value. Cash can provide a buffer to protect a firm’s technical core against the risks of failure arising out of exogenous shocks (Thompson, 1967), foster exploration and growth via experimentation, innovation, and new entry (George, 2005; Mishina, Pollock, and Porac, 2004; Nohria and Gulati, 1996), and confer strategic advantages by serving as a deterrent against actions by powerful competitors (Smith, Ferrier, and Ndofor, 2001).

From an economic perspective, the finance literature has echoed the BTF argument that cash results in improved financial performance (Mikkelson and Partch, 2003). Similarly, the behavioral idea of adaptation under uncertainty finds support in economic studies that extol the virtues of large cash reserves in firms with riskier cash flows and higher susceptibility to adverse shocks (Bates, Kahle, and Stulz, 2009; Keynes, 1936; Opler et al., 1999). Likewise, behavioral conclusions about the strategic role of cash are supported by finance studies that suggest that “a
A cash-rich firm can use its war chest to finance competitive strategies” (Fresard, 2010: 1098). Cash can also be used to fund product market choices (e.g., aggressive pricing, targeted advertising, securing plant locations, building distribution networks) that influence competitors’ decisions, thereby increasing the cash-rich firm’s market share at the expense of its rivals (Campello, 2006; Fresard, 2010). For firms unable to raise money externally due to market frictions, cash can help them adapt to environmental contingencies, for example by taking advantage of newly discovered strategic investment opportunities (Faulkender and Wang 2006).

**Cash and Value Appropriation: Behavioral and Economic Approaches**

Although stakeholders generally cooperate to create value within an organization, they also compete to appropriate that value. Thus, while cash can help enhance value creation, it may fail to benefit shareholders if it is appropriated by other stakeholders like managers, employees, buyers, and suppliers (Brandenburger and Stuart, 1996; Coff, 1999; Cyert and March, 1963). The BTF views an organization as being comprised of “a coalition of groups and interests, each attempting to obtain something from the collectivity by interacting with others, and each with its own preferences and objectives” (Pfeffer and Salancik, 1978: 36). When a firm has substantial cash reserves, stakeholder groups will vie for power, influence, rewards, and the allocation of those resources (Cyert and March, 1963). This can increase political activity because “slack is ‘up for grabs’ and politically astute and motivated members of the dominant coalition will engage in the political behaviors necessary to capture some of the uncommitted spoils” (Bourgeois, 1981: 36).

Among all stakeholders, the role of managers is particularly salient in determining the extent of value appropriation from cash. Managers sit at the head of a nexus of relationships within the firm, and manage the complicated web by bargaining with the various coalitions
(March and Simon, 1958). As a result, “management may be in a better position to appropriate rent than all other stakeholders” (Ahuja, Coff, and Lee, 2005; Coff, 1999: 127). Powerful and self-serving managers in cash-rich firms may also collude with other stakeholders to appropriate value from shareholders by increasing their salaries, offering higher prices to suppliers and better credit terms for customers, introducing generous perks for employees, and so on.

Furthermore, consistent with the ideas of ‘bounded rationality’ and ‘satisficing’ (March and Simon, 1958; Simon, 1947), cash can facilitate sub-optimal behaviors by acting as “a relaxing agent in the search process”, and “this relaxation will limit the strategic alternatives considered by the organization” (Bourgeois, 1981: 36). Thus, while firms with resource constraints will strive to optimize the utilization of their scarce resources, managers of cash-rich firms are more likely to display laxity in spending cash (George, 2005). Cash can also make managers complacent and optimistic, and promote biased decisions and a lack of entrepreneurial initiative (Bromiley, 1991; George, 2005). These behavioral ideas are also supported by ‘quiet life’ arguments in the economics literature that suggest that managers will be “reluctant to undertake cognitively difficult activities” that may involve hard bargaining with stakeholders, such as “facing down unions” or changing the contract terms of an influential supplier (Bertrand and Mullainathan, 2003: 1067). Thus, managerial laxity and sub-optimal decisions may also lead to diminished value created by cash and more value being appropriated by other stakeholders.

These behavioral implications of value capture by competing stakeholders, and the role of managers in that process, are mirrored in economics-based approaches such as agency theory (Berle and Means, 1932; Jensen and Meckling, 1976). Agency conflicts may arise due to information asymmetry, motivating managers to keep cash reserves idle (thereby incurring opportunity costs), or to invest them in negative net present value (NPV) projects that entail
“waste, dissipation, and misallocation of cash to insiders’ own benefit” (Fresard and Salva, 2010: 360). As Jensen’s (1986) free cash flow hypothesis argues, agency costs associated with managerial discretion to spend cash can also arise because cash enables entrenched managers to avoid the scrutiny of capital markets, to have the flexibility to invest in projects that would otherwise not be financed externally, and to retain funds within the firm rather than paying it out to shareholders (Dittmar et al., 2003; Jensen, 1986; Opler et al., 1999; Pinkowitz, Stulz, and Williamson, 2006). Moreover, recent management research supports and extends the agency perspective regarding managerial opportunism to include other stakeholder groups like employees, suppliers, and customers (Hambrick, Werder, and Zajac, 2008; Werder, 2011).

The Importance of Context for Value Creation and Appropriation

The above discussion suggests that cash will generally be used to adapt in contexts where adaptation is critical for firm survival and success. Here, cash facilitates value creation for shareholders and enhances firm performance by providing the slack needed to exploit unfolding opportunities and avert potential threats. We call these the “value creation contexts”. Conversely, in certain other contexts, stakeholders may be more inclined or able to appropriate value. This may happen when there is a high potential for conflict over resources, when it is easy to conceal appropriation because of information asymmetry, and /or when stakeholders gain power to appropriate value for themselves. Because cash is more likely to be appropriated in these contexts and less likely to enhance firm performance, we call these the “value appropriation contexts”. Thus, the implications of cash for firm performance are largely context-specific.

Although value creation and value appropriation influences can occur simultaneously, we treat them as independent (albeit potentially correlated) processes and focus on explicating the circumstances that enhance each tendency. This approach enables us to present value creation
and value appropriation as related yet distinct categories based on the salience of contingent factors, and then study the performance outcomes of having cash under these different circumstances. However, in a post hoc analysis section, we also consider interactions between the two contexts. In that section, we examine whether a high need for adaptation may pressure stakeholders to desist from appropriating value, or, conversely, if threats to firm survival actually accentuate the tendency of stakeholders to appropriate value when conditions permit.

**VALUE CREATION CONTEXTS**

Holding other factors constant, certain contexts should make it more likely that cash will be used for adaptation. Cash creates value and enhances firm performance when circumstances induce managers to be more likely to use cash to make investments to respond to opportunities or to counter threats. We examine three such contexts where the need for adaptation using cash is especially high, namely industry competition, industry R&D intensity, and industry growth.

**Industry Competition**

Cash enables firms in highly competitive industries to adapt to the environmental turbulence and rapid pace of change typical of such industries (Bettis and Hitt, 1995; Levinthal, 1997). Cash also provides a buffer that can absorb the impact of competitor activities such as new market entry, price cuts, or an expansion of production capacity. Moreover, large cash reserves may allow a firm to take advantage of positive-NPV investment projects without the need to access external capital markets. As an example, cash-rich firms can use their funds to acquire key competitors without having to rely on more costly or risky sources of capital.

Cash can also be a source of strategic advantage in competitive industries. In particular, cash can be an effective deterrent against aggressive rival behavior, given the potent threat of retaliation implicit in having large cash balances (Fresard, 2010; Kim and Bettis, 2014). At the
same time, cash allows “firms facing uncertain future competitor investments to defer their own decisions regarding counter investments until uncertainty can be adequately resolved” (Kim and Bettis, 2014: 2057). Cash also enables firms operating in competitive contexts to improve market shares via competitive postures such as “aggressive pricing”, as well as “the location of stores or plants, the construction of efficient distribution networks, the use of advertising targeted against rivals, or even the employment of more productive workers” (Fresard, 2010: 1098).

Managers of firms operating in competitive industries are under immense pressure to maximize efficiency (Giroud and Mueller, 2011). That is because high competition affects the survival prospects of each firm (Barnett, 1997), and so there is little margin for error. In this context, the marginal value of an extra dollar of cash is likely to be high. Therefore, instead of breeding managerial complacency, cash should instead motivate managers towards efficient utilization that creates value. On a similar note, such contexts may also discourage stakeholder conflicts, since stakeholder losses should bankruptcy occur are likely to exceed the uncertain gains obtained by bargaining over cash. We can therefore hypothesize that:

*Hypothesis 1: The positive association between cash and performance is strengthened in competitive industries.*

**Industry R&D Intensity**

R&D-intensive industries such as aerospace, computers, consumer electronics, and pharmaceuticals are often characterized by uncertainty, complexity, rapid pace of technological change, and a focus on innovation. For example, there may be market uncertainty due to a change in customer demands, as well as technological uncertainty arising out of the quest for a dominant technology, and firms in such industries may need to create several R&D options, each with distinct investment trajectories (Oriani and Sobrero, 2008). It is here that cash can foster
adaptation by providing firms the slack resources necessary to create such strategic options. Similarly, cash can smooth out potential fluctuations in research spending during bad times, help in the marketing of new products, and allow firms to take advantage of expansion opportunities that can create value (O’Brien, 2003).

For firms in research-intensive industries, cash can also be a source of innovation that provides a competitive advantage against rivals. Cash allows firms to engage in experimentation and risk-taking in an environment where returns are often recoupable only in the long-run (Kim, Kim, and Lee, 2008; Nohria and Gulati, 1996). Also, because of exchange hazards associated with R&D investments (i.e., asset-specificity, uncertainty, and appropriability), boundedly rational firm managers may not find appropriate resolutions for unfolding contingencies (David, O’Brien, and Yoshikawa, 2008). These exchange hazards may not only make bankruptcy more likely for firms in high-R&D industries, they may also make it costlier (Opler et al., 1999). In these situations, large cash reserves can provide firms a buffer to absorb adverse shocks. Furthermore, firms in R&D-intensive industries may have to pay a considerable premium to raise capital externally (Himmelberg and Petersen, 1994; Levitas and McFadyen, 2009). Lenders, in particular, may be reluctant to extend loans because the assets generated from research are firm-specific and intangible, and thus cannot be used as collateral (Long and Malitz, 1985). Thus, having cash reserves can help compensate for the difficulties in finding external financing.

Hypothesis 2: The positive association between cash and performance is strengthened in research-intensive industries.

Industry Growth

Firms operating in high-growth industries generally have numerous attractive investment opportunities, and often make strategic investments (e.g., entering into a strategic alliance) that
take advantage of these opportunities (Park, Chen, and Gallagher, 2002). Other examples may include investments in core products or technologies (platform investments), joint ventures, greenfield operations, organizational capabilities such as information technology, and so on (Grant, 2013). Using a real options logic (Myers, 1977), investment opportunities in high-growth industries could be seen as growth options that the firm shares with other industry participants, for example in an emerging market or technology, or in a particular industry segment (Tong and Reuer, 2006). However, high-growth industries may also be characterized by uncertainties (Park et al., 2002). For example, firms may not know in advance when, in what sequence, or to what extent future growth opportunities will arise, and therefore may find it difficult to raise the requisite capital at the precise time it is needed.

Having large cash holdings can facilitate adaptation for firms in high-growth industries. Firms can use their cash resources to not only exploit emerging opportunities, but also to create a buffer that minimizes the downside risks of uncertain investments. Cash will be even more useful if the firm is additionally constrained in terms of its ability to obtain external funding for its proposed investments (Denis and Sibilko, 2009). As an example, cash would allow firms in high-growth industries the flexibility to create growth options that involve making small initial investments to create a portfolio of projects, without committing to the entire project (Grant, 2013; Tong and Reuer, 2007). This will result in value being created for the firm, given that firm value is the sum of the value of assets in place and the value of growth options (Tong, Reuer, and Peng, 2008). If a project needs to be modified or scaled up later, large cash reserves will also provide the firm a superior ability (versus rivals) to do so without having to access capital markets. Hence, relative to rivals, cash-rich firms are better positioned to take advantage of potential industry growth.
Hypothesis 3: The positive association between cash and performance is strengthened in high-growth industries.

VALUE APPROPRIATION CONTEXTS

Three factors underpin value appropriation: a higher potential for conflict over resources, which creates a motivation for appropriation; a greater likelihood that appropriation can be concealed, which makes appropriation easier; and an increase in stakeholder power, which enhances their ability to appropriate. If one or more of these factors exists, it enhances the likelihood of appropriation relative to using cash for adaptation, and hence the performance drawbacks of appropriation are more likely to prevail, ceteris paribus. Below, we identify three value appropriation contexts: corporate governance, diversification, and corporate opacity.

Corporate Governance

Corporate governance can affect goal conflict over resources, stakeholder power to appropriate value, and the ease of concealment of appropriation. Public corporations are characterized by a separation of ownership and control and incomplete contracting (Berle and Means, 1932; Jensen and Meckling, 1976). Divergent interests may cause owner-manager conflicts over the allocation of scarce firm resources, increase the scope for information asymmetry, moral hazard, and managerial self-dealing, and motivate managers to design structures and processes that increase their power to appropriate resources. “Opportunism risks,” however, can also arise from the conflicting interests of multiple other stakeholder groups, such as customers, suppliers, and employees (Hambrick et al., 2008: 383). Here all stakeholder groups become “opportunism interdependent in the sense that they have options to exploit other actors opportunistically and at the same time bear the risk of being opportunistically exploited by other actors” (Werder, 2011: 1348). In this scenario, goal conflicts can get accentuated and powerful
stakeholders may be motivated to capture value from cash that is ‘up for grabs’, especially if they can conceal self-dealing.

To mitigate the scope of value appropriation, firms put in place corporate governance mechanisms, defined as “the formal structures, informal structures, and processes” that provide oversight or facilitate incentive alignment (Hambrick et al., 2008: 381). These mechanisms may include different forms of firm ownership (Connelly et al., 2010), board of directors (Daily and Dalton, 1994), executive compensation (Core, Guay, and Larcker, 2003), and the market for corporate control (Manne, 1965). However, managerial tendencies towards appropriation of cash will be exacerbated if these mechanisms are weak. Indeed, prior studies have found that firms with poor governance waste their cash resources in value-destroying acquisitions (Harford, 1999; Harford et al., 2008), that “the value of an additional $1.00 of cash for a poorly governed firm is between $0.42 and $0.88” (Dittmar and Mahrt-Smith, 2007: 600), and that weakly-governed firms squander free cash flows on unprofitable sales growth (Brush et al., 2000). Along similar lines, O’Brien and Folta (2009) suggest that strong governance enhances the association between cash and firm value, while Werder (2011) asserts that firms should strengthen their governance mechanisms to curb stakeholder opportunism. Hence, weak governance should allow stakeholders to appropriate more value from cash reserves. Accordingly, we predict:

Hypothesis 4: The positive association between cash and performance is weakened in poorly-governed firms.

Diversification

High levels of diversification also raise goal conflicts, bring about power imbalances, and make it easier to conceal value appropriation. Internal power conflicts among various divisions of a diversified firm can cause the misallocation of firm resources and result in the cross-
subsidization of powerful but less efficient units (Rajan, Servaes, and Zingales, 2000). Hence, fungible cash resources should encourage competing divisional managers in a diversified firm to engage in intensive bargaining to appropriate that cash. Diversification also increases the complexity of a firm’s operations, “obscures data relating to the efficiency of individual divisions (firms only have to publish consolidated accounts)”, and therefore “exacerbates the information asymmetry between management and stakeholders” (Hill and Jones, 1992: 149).

The complexity that results from diversification may also impose governance constraints on the corporate headquarters in terms of monitoring and coordinating a diverse portfolio of businesses (Ng, 2007; Zhou, 2011), and further accentuate information asymmetries between the corporate center and divisional managers. These make it easier for both corporate and divisional managers to engage in behaviors aimed at rent-seeking (Ndofor, Wesley and Priem, 2015). Given access to discretionary cash reserves, managers of diversified firms will therefore be more motivated to spend that cash for private benefit, resulting in value capture from cash.

Diversification may also result in increased managerial bargaining power as it increases managerial entrenchment and makes it more costly for shareholders to replace managers who often possess idiosyncratic skills (Coff, 1999; Kang, 2013). Also, because divisional managers in a diversified firm have access to inside information about their divisions, it increases their “bargaining power when they negotiate a compensation package with the CEO” (Scharfstein and Stein, 2000: 2539). Applied to corporate cash resources, increased bargaining power will act as an added incentive for both corporate and divisional managers to appropriate value from cash.

Hypothesis 5: The positive association between cash and performance is weakened in firms with high levels of diversification.

Corporate Opacity
Firms vary in the extent to which they disseminate inside information to outsiders such as shareholders, analysts, regulators, or other stakeholders. While information asymmetries could arise between various firm constituents, we focus here on the information asymmetry between managers and other internal stakeholders on the one hand, and shareholders on the other. In general, higher corporate opacity (i.e., lower corporate transparency) makes external market scrutiny of managerial decisions difficult, and may exacerbate agency problems if insiders such as managers or other opportunistic stakeholders take advantage of their preferential access to information to obtain private benefits of control (Anderson, Duru, and Reeb, 2009).

When managers, acting either by themselves or in collusion with other stakeholders, have access to high cash reserves, it reduces their reliance on external financing. This in turn reduces external scrutiny of managerial actions by capital markets, and allows entrenched managers to invest in negative-NPV projects, or, in more extreme cases, directly expropriate the cash via increased salaries, perks, or transfer pricing (Dittmar et al., 2003; Fresard and Salva, 2010; Opler et al., 1999; Pinkowitz et al., 2006). These ideas are also in line with Jensen’s (1986) free cash flow hypothesis, which states that managers with access to free cash will dissipate it in value-destroying investments, and Myers and Rajan’s (1998) idea that assets like cash are easy to expropriate. Diminished external scrutiny can also encourage managerial laxity in utilizing cash resources, in line with the ‘quiet life’ arguments we made earlier. Hence, other informed stakeholders, such as employees or corporate trade partners, may also collude with managers to bargain over available cash resources. Therefore, given the negative implications of corporate opacity for monitoring of insider actions, there will be a greater likelihood of value appropriation from cash by managers and other stakeholders in firms that have lower levels of disclosure.
Hypothesis 6: The positive association between cash and performance is weakened in firms that are highly opaque.

METHODS

Data and Sample

We constructed a panel dataset to test our hypotheses. Data was extracted for all publicly-traded US firms in the COMPSTAT North America database (including the ‘Segments’ database) between 1993 and 2012, and supplemented with data from Risk Metrics, Center for Research in Security Prices (CRSP), and Institutional Brokers’ Estimate System (I/B/E/S). We excluded firms that belong to the following industries: utilities, financial institutions, governmental organizations, and non-classifiable establishments (O’Brien and Folta, 2009; Kim and Bettis, 2014). We also dropped observations with missing data and firm-year observations with asset values below USD 10 million (Kim and Bettis, 2014). All extreme values are removed, and upper and lower bounds imposed on certain variables, as noted below.

Due to data availability of the moderators, our analysis was conducted on four different sub-samples. For the regressions using the value creation moderators, the sample size is 9,298 firms and 65,784 firm-years. We call this the baseline file. The sample size for the diversification moderator is somewhat smaller (7,951 firms and 53,669 firm-years) as some observations are lost when using the Segments database. For the corporate opacity moderator, the sample was even smaller (5,827 firms and 35,549 firm-years) due to merging data from COMPUSTAT, CRSP, and I/B/E/S. Finally, the sample size is the smallest for corporate governance (1,969 firms and 15,899 firm-years) because the Investor Responsibility Research Center (IRRC, now owned by RiskMetrics) data on the G-index, which is used to measure governance, is not published every year. Even though we follow prior research and replace missing G-index values with those
from the most recent prior period (Core, Guay, and Rusticus, 2006; Humphery-Jenner, 2014), governance data is still not available for a large number of firms and is only available up to 2006.

**Dependent Variable**

Market-based measures of firm performance are better able to capture the costs and benefits to shareholders of holding cash (O’Brien and Folta, 2009; Kim and Bettis, 2014). Thus, we use *Tobin’s q* as our metric of firm performance, the dependent variable. Tobin’s *q* denotes the market value of a firm’s assets relative to replacement costs. However, given the difficulties in estimating replacement costs, we follow common practice and use the market-to-book (M/B) ratio as a proxy for Tobin’s *q* (Richard et al., 2009). The numerator is the market value of the firm, defined as the book values of long-term debt and debt in current liabilities plus the market value of equity plus preferred stock liquidation value minus deferred taxes and investment tax credit; and the denominator is the book value of the firm’s assets. Like other studies (Alti, 2006; Gatchev, Pulvino, and Tarhan, 2010), we employ ‘fiscal year end prices’ instead of ‘calendar year end prices’ to compute the market value of the firm. Also, following other studies (Alti, 2006; Baker and Wurgler, 2002), we drop observations where the M/B exceeds 10.

**Explanatory Variables**

Our main explanatory variable is *cash*, defined as the ratio of cash and short-term investments to the book value of total assets (Bates et al., 2009). All values of cash below zero and above 1 are dropped. *Industry competition* is operationalized using the Herfindahl index, defined as the sum of squared market shares of firms in an industry, where firm sales are used to compute market shares (Giroud and Mueller, 2011; Vomberg, Homburg, and Bornemann, 2014). Since the Herfindahl Index measures industry concentration, we subtracted this measure from 1 so that higher values equate to greater competition. *Industry R&D intensity* is defined as the mean R&D intensity of all firms in the focal industry (Gentry and Shen, 2013). Firm R&D
intensity is calculated as R&D expenses divided by sales. Following common practice, missing
R&D values are replaced with zeros (Hall, 1993) and the upper limit for R&D intensity is capped
at 1 (Kim and Bettis, 2014). To proxy for industry growth, we first computed the median M/B
ratio of each industry, the median of which across all industries was 1.08. We then created a
dummy variable that is equal to 1 if an industry’s median M/B exceeds 1.08, and zero otherwise.
Our results are substantially similar if we use the median industry values based on firms’ annual
sales growth. For industry-level variables, industries are defined at the four-digit SIC level.

*Corporate governance* is measured using the G-index, a summative index comprising 24
antitakeover provisions that assess the degree of restriction on shareholder rights (Gompers,
Ishii, and Metrick, 2003). The G-index is a widely-used proxy for corporate governance arising
out of managerial entrenchment (Giroud and Mueller, 2011; Humphery-Jenner, 2014), whereby
“[a] higher G-index is assumed to mean weaker shareholder rights and lower governance
quality.” (Core *et al*., 2006: 656). Prior research has employed various measures of
diversification (Robins and Wiersema, 1995; Speckbacher, Neumann, and Hoffmann, 2014).
Here we adopted Palepu’s entropy measure (Palepu, 1985) following studies like Kang (2013)
and Kim *et al.* (2013), and constructed this variable from the COMPUSTAT Segments database.
Our results are substantially similar if we replace the entropy measure with either a count-based
or a Herfindahl-type diversification measure.

*Corporate opacity* is measured using the opacity index developed by Anderson *et al.*
(2009). Four proxies for firm-level opacity are developed, namely trading volume, bid-ask
spread, analyst following, and analyst forecast errors. Trading volume is the natural logarithm of
the daily dollar trading volume for the year. Bid-ask spread is the ask price less the bid price
divided by the average of the bid and ask prices, averaged across all trading days in a year. Data
for these two proxies is obtained from CRSP. Analyst following is the natural logarithm of the number of analysts following each firm in a year, while analyst forecast error is the square of the difference between the mean analysts’ earnings forecast and actual firm earnings, scaled by the firm’s stock price. The data for analysts is obtained from I/B/E/S. These four proxies are then individually ranked into deciles, “with the most opaque firms taking a value of ten and the least opaque firms assuming a value of one. The four rankings are then summed and scaled by a factor of 40 (total possible points) to provide an index that ranges from 0.1 to 1.0. Lower values denote more transparent firms and higher values denote more opaque firms.” (Anderson et al., 2009: 209). In constructing the index, we follow these authors and assume that bid-ask spread and analyst forecast errors increase opacity while trading volume and analyst following reduce it.

**Control Variables**

We use *lagged Tobin’s q* to control for serial correlation among residuals arising out of the persistence of performance within a firm. *Firm size* is the natural logarithm of total assets. *Absorbed slack* is the ratio of selling, general, and administrative expenses to sales (Bromiley, 1991). Absorbed slack values below 0 and above 1 are dropped. *Potential slack* is the leverage ratio, or the ratio of total debt to total assets. Observations where leverage exceeds 1 are dropped (Alti, 2006). So that increasing values denote high potential slack, the leverage ratio is subtracted from 1. We control for firm profitability using an adjusted measure based on undistributed cash flow, which is defined as operating income before depreciation less total income taxes less the year-on-year changes in deferred taxes less gross interest expenses on total debt less the sum of preferred dividend payable on cumulative preferred stock and dividend paid on noncumulative preferred stock less the dividend declared on common stock (Kim and Bettis, 2014). This variable is scaled by total assets. *Firm R&D intensity* and *firm advertising intensity* are defined as R&D and advertising expenditures (respectively) scaled by sales, with all missing values
replaced with zeros and the upper limit of the variable capped at 1. *Firm capital intensity* is measured using capital expenditures scaled by total assets. Following Brush *et al.* (2000), we define *firm growth* as the compounded annual growth rate in sales, calculated as the natural logarithm of Sales\(_{J,T}\) divided by Sales\(_{J,T-1}\) for firm \(J\) in year \(T\). To control for the possibility of decreasing marginal returns to cash, we added the *square of cash* as a control variable only in the full models (e.g., model 1B) (Kim and Bettis, 2014). Across all models, we control for *industry Tobin’s q* with the mean value of the dependent variable at the four-digit SIC level. Finally, we control for *year fixed effects* to account for unobserved heterogeneity across time-periods.

**Analyses**

We took a number of steps to address important methodological issues that are common in panel data analysis. First, unobserved heterogeneity arising out of multiple observations per firm may be an issue, to attend to which we employ a firm fixed effects model. Hausman tests we conducted confirmed the superiority of fixed effects model over random effects \((p<0.001)\). Second, a modified Wald test confirmed the presence of heteroskedasticity in our fixed effects models, to address which we report robust standard errors that are White’s (1980) heteroskedasticity-consistent. Third, both a Woolridge test (Woolridge, 2002) and an Arellano–Bond test (Arellano and Bond, 1991) provide evidence of first-order autocorrelation in our panel dataset. As suggested by Greene (2003), we account for this by introducing a dynamic fixed effects model that includes the lagged dependent variable as a control variable in all our models (see also, Barnett and Salomon, 2012; Gentry and Shen, 2013). Fourth, an examination of the variance inflation factors (VIFs) confirmed the absence of multicollinearity in our datasets. Fifth, Cook’s distance tests that were conducted also confirmed the absence of influential outliers.
Endogeneity is another important methodological issue. It could arise due to omitted variables that are correlated with both the dependent variable and one or more of the independent variables, simultaneous causality, or errors-in-variables (Bascle, 2008). Instrumental variables (IV) estimators are often used to address the issue of endogeneity, although these techniques are inefficient due to large standard errors, and thus a variable should not be modeled as endogenous unless tests indicate that endogeneity induces a statistical problem (see chapter 15 of Woolridge, 2003). We therefore approached this potential problem by first including firm-fixed effects in our models. This can reduce endogeneity by factoring in time-invariant omitted variables, although it cannot control for omitted variables that vary over time. We further ameliorate the impact of endogeneity by including the lagged dependent variable in all our model specifications (O’Brien and Folta, 2009). Furthermore, we also tested whether cash, our main independent variable, created an endogeneity problem. Based on the literature, we identified three different instruments for cash, namely: lagged cash, cash dividend paid, and tangibility (Fresard, 2008; 2010). Of these, a Sargan test showed that only the cash dividend and tangibility instruments were statistically valid. Therefore, using these two instruments, we next conducted a Davidson–MacKinnon test of exogeneity. These tests were insignificant, indicating the absence of an endogeneity problem and the appropriateness of our dynamic fixed effects regressions models.

RESULTS

Table 1 presents the descriptive statistics for our sample, while Table 2 presents the results of our analysis of the value creation moderators, and Table 3 presents the results of our analysis of the value appropriation moderators. Our results show that across all models in Tables 2 and 3, cash has a strong significant positive main effect on performance, indicating that cash generally creates value. In terms of the control variables, the strong positive effects for both lagged performance and industry performance are in line with expectations. Firm size is found to
be negatively related to Tobin’s $q$, consistent with prior research (Welbourne and Andrews, 1996). Capital expenditures and sales growth are associated with higher performance, consistent with Kim and Bettis (2014). Also, profitability and potential slack are both positively associated with performance. Finally, we note that these models also have robust explanatory power, as the adjusted R-square values in the full models (1B, 2B, and 3B in Table 2; and 4B, 5B and 6B in Table 3) range from about 34 to 43 percent.

While we did not present hypotheses for the direct association between cash and performance, our regressions demonstrate a positive association consistent with the findings reported in Daniel et al.’s (2004) meta-analysis of the relationship between slack and performance. On average, we find that cash-rich firms enjoy higher performance, with those in the 75th percentile of cash holdings having a market-to-book value 15 percent higher than those in the 25th percentile. Models 1A-1B in Table 2 test hypothesis 1, which predicted that the cash-performance association is stronger in competitive industries. Model 1A contains the control variables, while Model 1B incorporates the main effects for cash and industry competition as well as the interaction term between the two. The interaction term is positive and statistically significant ($p < 0.001$), providing support for Hypothesis 1. These results are also graphically represented in Panel A in Figure 1. While performance generally improves as the level of cash increases, the slope of change in performance is much sharper in more competitive industries. This suggests that cash enables greater adaptation and value creation in competitive industries.

Models 2A-2B in Table 2 test Hypothesis 2, which argued that cash helps foster more appropriate adaptation in research-intensive industries. The positive and significant ($p < 0.001$) coefficient for the interaction between cash and industry R&D intensity supports this hypothesis. As shown in Panel B, the cash-performance association is sharper in high R&D industries.
Similarly, hypothesis 3, which predicted that cash is more beneficial in high-growth industries, is supported by the positive and significant \( p < 0.001 \) coefficient for the interaction between cash and industry growth in Model 3B. Panel C illustrates these findings and reveals that the cash-performance relationship is steeper in high-growth industries than in low-growth industries.

Hypotheses 4, 5, and 6 pertain to the value appropriation moderators, and are tested in Table 3. Hypothesis 4, which argued that the positive cash-performance association is weakened in poorly-governed firms, is supported by the negative and significant \( p < 0.001 \) cash-governance interaction term. Panel D graphically depicts these results. We also find that the interaction between cash and diversification is strongly negative \( p < 0.001 \), which supports Hypothesis 5 which predicted that the cash-performance association is weaker in firms with higher levels of diversification. Panel E illustrates these findings graphically. Finally, in regards to Hypothesis 6, we find that the interaction between cash and corporate opacity is negative and highly significant \( p < 0.001 \), and therefore Hypothesis 6 is also upheld. These results are depicted in Panel F. Thus, our empirical results provide strong support for all six hypotheses.

**POST HOC ANALYSIS**

*Fully specified model.* Since the data for our explanatory variables are drawn from different sources, putting them all together in a fully-specified model restricts the sampling period to 1993–2006, and sharply reduces the sample size to 11,164 observations. Hence, due to this sample size restriction and space limitations, we do not report such a model in our tables. We did, however, run some additional analysis to see if our findings are robust to a fully specified model. While including multiple interaction terms between cash and the six moderators in the same model resulted in extremely high multicollinearity, including all six moderators in the model and one interaction at a time did not create a problem. Thus, we tested a fully specified model with
all of the moderators and tested the interaction terms one at a time. Despite the reduced sample size, the results are qualitatively identical to our reported results except for the cash-opacity interaction, which was insignificant. In sum, five of the six interaction results we presented in Tables 2 and 3 are upheld in fully specified models with a vastly reduced sample size.

**Three-way interactions.** The slack afforded by large cash reserves can serve as a valuable resource in facilitating adaptation. Thus, the performance benefits of cash should be particularly apparent in contexts where the need for adaptation is high, which we term value creation contexts. However, certain contexts may allow for greater value appropriation by stakeholders, thereby eroding the performance benefits of cash. The interesting question is what happens when these distinct forces interact, so that we have a context where the potential for both value-creation and value-appropriation are high. Theoretically, the relationship is hard to predict *a priori*, and hence our hypothesis development has focused on the *ceteris paribus* effects of the value creation and value appropriation contexts. Nonetheless, in an unreported *post hoc* analysis, we examined this question empirically with three-way interactions.

Speculatively, if the need for adaptation is high and the firm’s survival is threatened, stakeholders may desist from appropriating value because doing so may impair adaptation and therefore prevent the firm from creating value for all stakeholders. On the other hand, however, if stakeholders lack a long-term commitment to the firm (and if the firm has not made one to them), they may attempt to ‘get what they can’ out of an endangered firm while it is still afloat. Alternatively, these factors may operate completely independently and hence there may be no significant three-way interaction between cash, value-creation contexts, and value-appropriation contexts.
To test this, we created a ‘high adaptation dummy’ that equals 1 when all three value-creation moderators exceed their respective median values, and zero otherwise. We then run three regression models separately for the three value-appropriation moderators. As an example, in the first regression model with governance as the moderator, we enter the three main effects (cash, high adaptation dummy, and governance), the three two-way interaction terms among these three variables, the 3-way interaction term (cash x high adaptation dummy x governance), and all controls. We next run similar models replacing governance with diversification and then opacity. Interestingly, the only three way interaction that was statistically significant was the opacity interaction, which revealed a weak positive effect ($\beta = 1.112; p < 0.05$). This suggests that the adaptation-related performance benefits of cash under high value-creation contexts trump any negative performance effects associated with high corporate opacity. This leads us to speculate that opacity represents a relatively weaker value-appropriation context, perhaps because it derives from information asymmetry as the single underlying source of value-appropriation. In contrast, governance and diversification derive strength from all three of the sources of value appropriation we discussed earlier. Overall, our results suggest that the effects of value creation and value appropriation contexts operate largely independent from each other.

**DISCUSSION**

More than three decades after the publication of Bourgeois’s (1981) seminal work on slack, there is still debate about the association between cash and performance. This study was motivated by the desire to resolve some of the ambiguity in current findings and provide a more nuanced explanation of that relationship. Our results suggest that although cash improves performance, the associated context can substantially moderate this relationship. Specifically, we find support for our hypotheses that cash creates more value, and improves performance, when
firms operate in industries that are highly competitive, research-intensive, or characterized by high growth. Conversely, there is greater value appropriation from cash, and hence performance suffers, in firms that are poorly-governed, more diversified, or opaque.

Our results show that cash is beneficial in contexts where there is a greater need for adaptation. Interestingly, however, our results indicate that even in contexts where the threat of stakeholder value appropriation is high, the cash-performance association is never strictly negative. At worst, the performance benefits of cash are attenuated in such contexts, so that cash either fails to enhance performance (as shown by the flat line for weak corporate governance in Panel D in Figure 1), or results in a lower increase in performance (see Panel E for high versus low diversification, and Panel F for high versus low opacity). Similarly, as seen in Panels A-C, cash improves performance even under conditions of low industry competition, low industry R&D intensity, and low industry growth. This suggests that even in these contexts, there is some need for adaptation, although that need is lower relative to high value creation contexts.

Our findings also have substantive economic significance. Take industry competition, for example. We find that relative to firms in industries with low competition, a 1-standard deviation (sd) increase in cash for firms in industries with high competition is associated with a 3.18 percent increase in mean Tobin’s $q$. For the other interactions, the corresponding differences in Tobin’s $q$ for a 1-sd increase in cash are as follows: industry R&D intensity (4.01 percent), industry growth (6.43 percent), corporate governance (6.03 percent), diversification (4.08 percent), and corporate opacity (3.68 percent). These effects are meaningful in relation to the direct association between cash and performance, where we find that for the cash main effect, a 1-sd increase in cash causes a 14.19 percent increase in mean Tobin’s $q$.

**Contributions**
Overall, our study underscores the importance of context in explaining the performance consequences of cash. It integrates ideas from the behavioral theory of the firm, economic perspectives like agency theory, and the value-creation versus value-appropriation literatures to frame contexts using a schema that builds on largely *ad hoc* attempts at contextualizing the cash-performance relationship. Moreover, this study also proposes novel moderators of the cash-performance relationship. Finally, we also empirically examine what happens when we relax the *ceteris paribus* condition of the two sets of contextual factors. While this is difficult to theorize *a priori*, our *post hoc* empirical analysis indicates that value creation contexts operate largely independently from the effects of value appropriation contexts, and vice versa.

**Practical Implications**

Our study has several practical implications. The increasing cash stockpiles of US firms have attracted intense public scrutiny in recent years. Commentators and policy makers alike have criticized these firms for hoarding cash that could have been productively invested outside the firm to stimulate economic growth and create jobs (Plender, 2013). Others suggest that firms hoard cash in overseas units to avoid paying high US taxes. On the other hand, managers often justify their large cash holdings in terms of their ability to meet working capital needs and provide enough savings for a rainy day. In this backdrop, our study shows that managers of firms operating in technology-driven or competitive industries that are rapidly-changing, uncertain, or have both a high upside potential for growth as well as a high downside risk of bankruptcy, have a stronger rationale for hoarding cash. Our study thus provides a point of justification for the large cash reserves of US technology behemoths like Apple, Microsoft, and Google, or US pharmaceutical companies like Pfizer, Johnson & Johnson, and Merck. Our study also underscores the need for commentators to avoid broad generalizations about the effects of cash
without investigating how, and why, such effects may vary across contexts both internal and external to the firm. For shareholders contemplating investment in a cash-rich firm, the framework we propose should help them better predict whether cash reserves will create much value for shareholders, something they can factor in as a key input into their investment decision.

**Future Research**

A direct extension of our study might be to examine how value creation versus value appropriation contexts can moderate the effects of cash on corporate and competitive strategies pursued by the firm. As an example, one may examine if cash promotes value-destroying acquisitions in more opaque corporate environments. Future research can also undertake more fine-grained empirical analysis that directly captures stakeholder behaviors. For instance, it could be examined if under conditions of weak firm governance, suppliers bargain hard for immediate cash payments, managers negotiate high cash bonuses, employees demand higher perks, and so on, and then link these behaviors to firm performance. Separately, the literature can also benefit from a systematic disaggregation of stakeholders, for example by type. Thus ‘relational’ stakeholders may be more invested in the firm than ‘transactional’ stakeholders, and therefore may not capture value from cash even in contexts with high potential for value appropriation, and vice versa (cf. David *et al.*, 2010). Another way to disaggregate stakeholders could be into individual and institutional (*i.e.*, corporate) components, and then examine differences in behaviors between these two groups. Finally, stakeholder reactions, and therefore the application of our study in specific contexts to explain the cash-performance association, may be different in countries like Germany and Japan that have traditionally been considered more stakeholder-oriented than the USA, and future research can therefore test our findings using non-US samples.
In this study we have explored some specific contingencies, and we hope this will spur future research interest in studying other contextual moderators. This will also help ascertain if our findings can be generalized to other contexts. Another possible avenue for research might be to introduce cash as a moderator in already-known relationships between other strategic or financial variables (like mergers & acquisitions, organizational learning, capital structure, etc.) and performance. Alternatively, it would be interesting to examine how contexts impact the accumulation of cash in the first place. For example, while any profitable firm should be able to accumulate cash over time, we would expect firms to accumulate less cash over time if value appropriation contexts are salient. Investigating these and related questions could be rewarding ways of extending the current study.

**Conclusion**

Our study helps contextualize opposing arguments in prior research that cash can be beneficial by fostering adaptation, but it can also be detrimental because cash is easily squandered. We synthesize behavioral and economic arguments to show that while cash generally enhances performance, the strength of that effect varies by context. Cash is most beneficial for performance in contexts where the need for adaptation is high, as when firms operate in industries that are highly competitive, research-intensive, or characterized by high growth. Conversely, value-appropriation by stakeholders may attenuate the benefits of cash in contexts characterized by stakeholder conflicts, information asymmetries, or acute power imbalances, as are common in firms that are poorly-governed, more diversified, or more opaque to outside investors. Our findings should help both managers and researchers better understand when cash is most likely to benefit firms and when it is more likely to be wasted.
REFERENCES


### TABLE 1
Descriptive Statistics and Correlations

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<tr>
<td>2 Firm size</td>
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<tr>
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<td>0.18</td>
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All means, standard deviations, and correlation values are based on the baseline file (9,298 firms and 65,784 firm-years), except those for corporate governance, diversification, and corporate opacity where the respective samples are used. Statistically significant correlations (p < 0.05), using two-tailed tests, are in bold. The actual means for the logged variables are: $2753.19 million (firm size) and 1.26 times previous year’s sales (firm growth). Industry growth is a dummy variable that takes on a value of either 0 or 1.
TABLE 2

Fixed Effects Regression Results for Cash and Value Creation Moderators on Firm Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Industry competition</th>
<th>Industry R&amp;D intensity</th>
<th>Industry growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1A</td>
<td>Model 1B</td>
<td>Model 2A</td>
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<tr>
<td>Intercept</td>
<td>0.996***</td>
<td>0.982***</td>
<td>0.996***</td>
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<td>Controls</td>
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<td>Lagged Tobin’s q</td>
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<td>0.311***</td>
<td>0.324***</td>
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<tr>
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<td>-0.214***</td>
<td>-0.222***</td>
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<tr>
<td>Absorbed slack</td>
<td>-0.303***</td>
<td>-0.349***</td>
<td>-0.303***</td>
</tr>
<tr>
<td>Potential slack</td>
<td>0.202***</td>
<td>0.042</td>
<td>0.202***</td>
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<td>-0.202</td>
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<td>-0.084</td>
<td>-0.148</td>
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<tr>
<td>Firm capital intensity</td>
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<td>0.519***</td>
<td>0.356***</td>
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<tr>
<td>Firm growth</td>
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<td>0.204***</td>
<td>0.194***</td>
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<tr>
<td>Cash</td>
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<td>Industry growth</td>
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<tr>
<td>Interactions</td>
<td></td>
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<td>Cash x Industry competition</td>
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<td>Cash x Industry R&amp;D intensity</td>
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<td>Cash x Industry growth</td>
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<td>391.19</td>
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<td>p-value</td>
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<td>Adjusted R²</td>
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<tr>
<td>Year fixed effects</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>N</td>
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</table>

The dependent variable is firm performance measured using Tobin’s q. The variables firm size and firm growth are logged. Year fixed effects are not reported for brevity. Unstandardized coefficients are used. Two-tailed tests are used, and statistical significance denoted using *** p < 0.001, ** p < 0.01, * p < 0.05.
### TABLE 3

Fixed Effects Regression Results for Cash and Value Appropriation Moderators on Firm Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Corporate governance</th>
<th>Diversification</th>
<th>Corporate opacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 4A</td>
<td>Model 4B</td>
<td>Model 5A</td>
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<tr>
<td><strong>Intercept</strong></td>
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<td>1.416***</td>
<td>1.041***</td>
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<td><strong>Controls</strong></td>
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<td>Lagged Tobin’s $q$</td>
<td>0.259***</td>
<td>0.243***</td>
<td>0.296***</td>
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<td>Firm size</td>
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<td>-0.249***</td>
<td>-0.241***</td>
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<td>Absorbed slack</td>
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<td>-1.218***</td>
<td>-0.363***</td>
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<tr>
<td>Potential slack</td>
<td>0.405***</td>
<td>0.279***</td>
<td>0.230***</td>
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<td>Cash flow</td>
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<td>1.167***</td>
<td>0.762***</td>
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<tr>
<td>Firm R&amp;D intensity</td>
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<td>-0.063</td>
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<td>Firm advertising intensity</td>
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<td>0.079</td>
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<td>Firm capital intensity</td>
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<td>0.432***</td>
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<td>Firm growth</td>
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<td>0.640***</td>
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<tr>
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<td>Cash x Corporate governance</td>
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<td>Cash x Diversification</td>
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</table>

The dependent variable is firm performance measured using Tobin’s $q$. The variables firm size and firm growth are logged. Year fixed effects are not reported for brevity. Unstandardized coefficients are used. Two-tailed tests are used, and statistical significance denoted using *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. 
Panels A, B, and C depict the moderators used for value creation, while panels D, E, and F depict the moderators used for value appropriation. In each panel, the y-axis denotes predicted firm performance while the x-axis plots the value of cash that varies between 0 and 1. The 99th and 1st percentiles are used to denote ‘high’ and ‘low’ values respectively.