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## What drives bidder cash reserve effects in acquisitions: Agency conflicts or precautionary motive?

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# Working Paper Series

## **What Drives Bidder Cash Reserve Effects In Acquisitions: Agency Conflicts or Precautionary Motive?**

Ning Gao

Manchester Business School Working Paper No 625  
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## Abstract

A cash-rich company is less likely to be a bidder during 1994-2008 in the US, contrasting the findings based on earlier sample period. This is mainly due to the companies with high residual market-to-book ratios (i.e. the residual of the actual market-to-book ratio regressed on measures of agency conflicts). Higher bidder excess cash reserve reduces bidder return at deal announcement. The negative announcement effect is stronger for bidders of lower asset-tangibility, but insensitive to the level of agency conflicts. Post acquisition, a cash-rich bidder spends more funds on debt reduction, capital expenditure, but less on further acquisitions. Moreover, a cash-rich bidder has better operating performance when its residual market-to-book ratio is high. Our evidence suggests bidder cash reserve effects are more consistent with the precautionary motive than the agency theory. High cash reserve, to a great extent, indicates growth and overvaluation rather than agency conflicts.

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# What Drives Bidder Cash Reserve Effects In Acquisitions: Agency Conflicts or Precautionary Motive? <sup>†</sup>

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Aug., 2011  
(preliminary)

## Abstract

A cash-rich company is less likely to be a bidder during 1994-2008 in the US, contrasting the findings based on earlier sample period. This is mainly due to the companies with high residual market-to-book ratios (i.e. the residual of the actual market-to-book ratio regressed on measures of agency conflicts). Higher bidder excess cash reserve reduces bidder return at deal announcement. The negative announcement effect is stronger for bidders of lower asset-tangibility, but insensitive to the level of agency conflicts. Post acquisition, a cash-rich bidder spends more funds on debt reduction, capital expenditure, but less on further acquisitions. Moreover, a cash-rich bidder has better operating performance when its residual market-to-book ratio is high. Our evidence suggests bidder cash reserve effects are more consistent with the precautionary motive than the agency theory. High cash reserve, to a great extent, indicates growth and overvaluation rather than agency conflicts.

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# **What Drives Bidder Cash Reserve Effects In Acquisitions: Agency Conflicts or Precautionary Motive??**

## **Abstract**

A cash-rich company is less likely to be a bidder during 1994-2008 in the US, contrasting the findings based on earlier sample period. This is mainly due to the companies with high residual market-to-book ratios (i.e. the residual of the actual market-to-book ratio regressed on measures of agency conflicts). Higher bidder excess cash reserve reduces bidder return at deal announcement. The negative announcement effect is stronger for bidders of lower asset-tangibility, but insensitive to the level of agency conflicts. Post acquisition, a cash-rich bidder spends more funds on debt reduction, capital expenditure, but less on further acquisitions. Moreover, a cash-rich bidder has better operating performance when its residual market-to-book ratio is high. Our evidence suggests bidder cash reserve is more an indicator of growth and overvaluation than of agency conflicts.

## ***1. Introduction***

Previous M&A literature documents two important cash reserve effects for bidders. First, a cash-rich company is more likely to be a bidder than a cash-poor company (Harford, 1999). Second, a cash-rich bidder has worse abnormal returns at deal announcement than a cash-poor one (Lang et al., 1991; Freund et al., 2003; Schlingemann, 2004; and Harford, 1999). These findings have been interpreted in the framework of Jensen's (1986) agency costs of free cash flow. Specifically, when a company exhausts value-enhancing projects, self-serving managers tend to spend excessive cash on value-destroying acquisitions.

Nonetheless, underlying dynamics of such phenomenon can also relate to the precautionary motive of cash reserve. At the centre of the precautionary motive is the argument that value-maximizing managers prefer to reserve cash if they perceive future growth to be high and believe expensive external financing undermines their ability to invest. A buffer of cash reserve in such cases reduces managers' reliance on external financing (Myers and Majluf, 1984; Myers, 1977; Jensen and Meckling, 1976; Opler, Pinkowitz, Stulz, and Williamson, 1999). Under the precautionary motive, the amount of cash reserve positively relates to managers' perception of a company's growth. Meanwhile, since growth opportunities are difficult to evaluate, the level of misvaluation can also be high.

We expect that cash richness affects a company's probability of being a bidder in two ways. On the one hand, cash-rich (and therefore high growth) company is more likely to become a bidder. The Q theory of Brainard and Tobin (1977) point out that a high-growth (thus cash-rich) company invests more than other companies do. Jovanovic and Rousseau (2002) maintain that a high-growth company is more likely to be a bidder than a low-growth company does. On the other hand, a cash-rich (therefore high growth) bidder prefers to pay by stock in order to reserve cash. This contradicts a target's preference for a cash offer because target managers believe a high-growth bidder's stock is more difficult to evaluate. When company managers rationally expect such conflicts, they are reluctant to bid, reducing the probability of being a bidder. Consequently, the effect of cash reserve on acquisition probability is unrestricted. We leave it to the data to tell. To the extent cash richness positively relates to growth and high misvaluation, a cash-rich company is more likely to be a bidder and use overvalued equity to pay the target (Shleifer and Vishney, 2003; Rhodes-Kropf and Viswanathan, 2004; Rhodes-Kropf, Robinson, and Viswanathan, 2005). But the target wants to receive cash to exclude "lemon" bidders. Company managers rationally expect such conflict and refrain from bidding.

The effect of cash reserve on bidder announcement returns is also twofold under the precautionary motive. The effect depends whether growth dominate misvaluation or the

other way round.<sup>1</sup> When the growth effect dominates, a cash-rich bidder has better announcement effect than a cash-poor one. This is because the announcement of an acquisition resolves investment uncertainty and signals high growth (Schlingmann, 2004; Jovanovic and Rousseau, 2002; Dong, Hirshleifer, Richardson, and Teoh, 2006). When the overvaluation effect dominates, a cash-rich bidder has worse announcement effect than a cash-poor one because the announcement signals overvaluation. Revaluation occurs at deal announcement for two reasons. First, acquisitions are salient events and attract investor scrutiny (Dong et al., 2006), reducing overvaluation. Second, there is an adverse selection effect of corporate cash reserve, i.e., if investors know that a company does not have to issue (stock) to invest, an attempt to do so sends a strong signal of overvaluation (Gao, 2011). Building on the two-sided information framework of Rhodes-Kropf and Viswanathan (2004) and Brusco, Lopomo, Robinson and Viswanathan (2007), Gao (2011) finds that, for all-stock offers, adverse selection is the primary reason that cash-rich bidders have worse announcement returns. The first reason applies regardless of the means of payment. The second reason is true for stock offers. It is worth noting that the implications of precautionary motive for bidder announcement returns relates to new information revealed to the market. Therefore, under the precautionary motive, we expect the cash reserve effect is stronger when there is more bidder information uncertainty.

In this study, we empirically distinguish between the possible underlying dynamics of bidder cash reserve effects, namely the precautionary motive and the agency theory. In table 1, we summarize the predictions of cash reserve effect under the precautionary motive and the agency theory. The agency theory predicts that high cash reserve is associated with high probability of being a bidder, low announcement bidder returns and low post-acquisition operating performance. However, under the precautionary motive, the direction of cash reserve effect on probability of being a bidder and bidder announcement returns is not restricted, and cash reserve is positively associated with bidder post-acquisition operating performance.<sup>2</sup> Previous studies focus on the agency theory but ignore the precautionary motive. Our empirical strategy is that 1) when the precautionary motive and the agency theory have the same predictions, we introduce variation to the degrees of agency conflicts and precautionary motive and examine where the cash reserve effect is the strongest; 2) we

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<sup>1</sup> Misvaluation means over or under valuation. To the extent under valuation discourage a company to bid, it is more likely a bidder is overvalued. This is obvious for stock offers (Myers and Majluf, 1984). For cash offers, this is true because under valuation makes debt financing more difficult.

<sup>2</sup> Growth opportunities manifest themselves through better post-acquisition operating performance. Meanwhile, cash-rich bidders are more likely to be overvalued. Higher overvaluation leads to worse announcement effect and, therefore, the bidder and target require higher synergies to proceed with the acquisition. Higher synergies lead to better post-acquisition operating performance.

also examine post-acquisition operating performance and use of funds where cash reserve has different effects under the precautionary motive than the agency theory.

To measure a company's cash richness, we calculate excess cash reserve ratio. In particular, following Opler, et al. (1999), in each year we get the residual from an OLS regression of actual cash reserve ratio (i.e., cash and short-term investment divided by total assets net of cash and short-term investment) on a set of determinant variables for each of the Fama-French 12 industries. Under the agency theory, excess cash reserve is accumulated free cash flow and relates to the level of agency conflicts. Under the precautionary motive, the excess cash reserve reflects managers' perception of a company's future growth which may not be shared by the market and level of misvaluation. A second empirical issue is to find a suitable measure to introduce variation to the degree of precautionary motive. The market-to-book ratio, calculated as the sum of market value of equity and book value of long-term debt divided by the sum of book value of equity and book value of long-term debt, is a candidate. But it is contaminated by the influence of agency conflicts because a better governed company generates more market value for each dollar historically invested (Dong, et al., 2006). To remove the effect of agency conflicts on market-to-book ratio, each year, we regress the market-to-book ratio on the logarithm of 1 plus G-Index, and use the residual (call it residual market-to-book ratio henceforth) to measure the growth and misvaluation component (precautionary motive) of the actual market-to-book ratio. The variation in the residual market-to-book ratio is insensitive to the change in agency conflicts. A further breakdown of the market-to-book ratio into a growth and a misvaluation component is technically difficult.<sup>3</sup>

We document four sets of results at different stages of acquisition. First, using a logistic specification, we surprisingly find that high cash reserve reduces the likelihood a company being a bidder in both the entire sample period (1980–2008) and the late sample period (1994–2008). For our early sample period (1980–1993), cash reserve has a positive effect on the likelihood of being a bidder, same as what is documented by Harford(1999).<sup>4</sup> What we find is consistent with the precautionary motive but not with the agency theory. We further find that the negative effect of cash reserve is mainly from the companies with the highest residual market-to-book ratio. It suggests that when the precautionary motive is strong, the disagreement over means of payment between a bidder and a target is strong. A company

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<sup>3</sup> Rhodes-Kropf et al. (2005) propose a method to decompose the market-to-book ratio into firm-specific error, sector time-series error, and long-term value to book. However, the firm-specific error still captures firm-specific growth (e.g., a good management team can generate sustained returns that are higher than what is justified by risk; a patent granted can guarantee a company a sustained abnormal profit over a few decades), and the sector error may capture transitory growth of a sector (e.g., a short-term cut of government spending on railroad represents a transitory growth opportunities for the automobile sector).



rationality expects this and refrains from bidding. We don't find the effect of cash change according to the level of G-index (Gompers, Ishii, and Metrick, 2003), which is inconsistent with the agency theory.

In our second set of tests, we examine how cash reserve affects bidder abnormal returns at deal announcement. We use bidder asset tangibility to measure the degree of information uncertainty and use G-index to measure the level of agency conflicts. We find that higher cash reserve is associated with lower bidder announcement cumulative abnormal return (*CAR*), consistent with the findings of previous literature. We further find that the negative cash reserve effect vanishes when a bidder's asset tangibility is in the highest quartile of the sample. That means, when misvaluation is unlikely, the effect of cash reserve is weaker (consistent with the precautionary motive). We fail to reject the null hypothesis that the negative cash reserve effect is insensitive to the change in G-index. The negative effect of cash reserve on bidder announcement suggests that the misvaluation dominates growth in this scenario.

Our third set of results show that that annual post-acquisition abnormal operating performance is 1% higher if a bidder is cash-rich and its residual market-to-book ratio is high (strong precautionary motive). In contrast, we do not find better abnormal operating performance for a cash-rich bidder when G-index is high (high agency conflicts).

Our fourth and final set of tests show that a cash-rich bidder uses less funds on acquisitions, contrary to the prediction of agency theory (Jensen, 1986; Harford, 1999; Harford, Mansi, and Maxwell, 2008). Consistent with the precautionary motive, a cash-rich bidder spends more funds on long-term debt reduction. This is because overvalued companies tend to use more funds to retire long-term debt ((Stein, 1996; Hertz and Li, 2009; and Kim and Weisbach, 2006; Stein, 1996). We also find mixed evidence for growth: a cash-rich bidder uses more funds on capital expenditure but less on research and development (R&D).

Overall, our evidence is consistent with the precautionary motive. Our study makes three contributions. First, we highlight the importance of the precautionary motive in explaining cash reserve effects in acquisitions. The precautionary motive has solid theoretical foundation (Brainard and Tobin, 1977; Jovanovic and Rousseau, 2002; Rhodes-Kropf and Viswanathan, 2004; Brusco, et al., 2007), but has been ignored in previous literature on cash reserve effects in acquisitions. Second, we argue that the negative announcement effect of cash reserve is due to revaluation. The precautionary motive suggests a very different principle-agency relationship than the agency theory. Long-term shareholders are better off under the precautionary motive. Third, our study adds to a large literature on the information

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<sup>4</sup> The 1980–1993 sub sample period is consistent with the sample period of Harford (1999), which is 1977–1993.

effects of corporate cash reserve (Bhattachaya, 1979; Miller and Rock, 1985; John and Williams, 1985; Opler et al. 1999; Almeida, Campello and Weisbach, 2004; Bates, Kahle and Stulz, 2006; Gao, 2011).

The rest of this paper proceeds as follows. Section 2 reviews related literature in order to provide more context and motivation for this study; Section 3 describes sample and data; Section 4 formulates hypotheses, describes methodology and reports results from empirical analysis; and Section 5 concludes.

[Table 1]

## **2. Literature Review**

### **2.1 The Precautionary Motive and Its Implications in Acquisitions**

When the capital market is perfect, there is no need for a company to reserve cash as it can always raise external capital at the cost appropriate for risk. However, when there is information asymmetry (Myers and Majluf, 1984; Opler et al., 1999) or agency cost of debt (Myers, 1977; Jensen and Meckling, 1976), external capital is more expensive than internal funds. Companies may forego value-enhancing investment opportunities due to financial constraint. To avoid such underinvestment problem, the management of a company rationally stockpiles cash when it expects high growth in the future (Opler et al., 1999; Almeida, Campello and Weisbach, 2004; Bates, Kahle and Stulz, 2006).<sup>5</sup> A high cash reserve enables the management to take a value-enhancing investment project without resort to expensive external capital. In other words, financial slack adds value. Therefore, other things equal, higher cash reserve relates to higher growth. Meanwhile, a high-growth (thus cash-rich) company has more value uncertainty than a company of low growth because growth opportunities are more difficult to evaluate than assets in place. In this paper, we argue that the level of cash reserve reflects both growth and misvaluation. This in turn determines the effects of cash reserve in acquisitions.

Growth has two contrasting effects on the probability of being a bidder. On the one hand, a high growth (thus cash-rich) company has motives to make acquisitions. Brainard and Tobin (1977) maintain that a company of high Tobin's Q ratio (i.e., market value over replacement cost of capital) invests more than other companies do. Jovanovic and Rousseau (2002) argue that a high-Q company is more likely to become a bidder than a low-Q company. Dong et al. (2006) find evidence consistent with these arguments. On the other hand, a high-growth bidder is more likely to be at odd with its target in terms of the means of payment. Specifically, a target prefers cash payment as it believes the value of a stock offer

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<sup>5</sup> The market may not share the management's view.

from a high-growth bidder is difficult to judge. A high-growth bidder, however, prefers to pay by stock because it tends to reserve cash to fund future growth. Such potential conflicts discourage a company to bid and reduce a company's probability of being a bidder.

The precautionary motive also has twofold effects on a bidder's announcement returns. Growth has a positive effect on a bidder's announcement returns because a deal announcement resolves investment uncertainty (Schlingemann, 2004) and sends a signal of high growth (Jovanovic and Rousseau, 2002), which leads to a positive market response. On the other hand, a high-growth bidder is more likely to be overvalued. This is because undervaluation not only prevents a stock offer (Myers and Majluf, 1984; Rhodes-Kropf and Viswanathan, 2004), but also makes financing a cash offer more difficult.<sup>6</sup> At announcement, misvaluation is corrected through two mechanisms. First, acquisitions are salient events and attract much investor attention. Market scrutiny leads to revaluation of a bidder's stock (Dong, et al., 2006). Second, cash reserve has an adverse selection effect, i.e. if a company does not have to issue stock to invest, an attempt to do so sends a strong signal of overvaluation. Using a sample of all-stock offers, Gao (2011) finds that the negative wealth effect of cash reserve is mainly due to adverse selection. This argument builds on the two-sided information framework of Rhodes-Kropf and Viswanathan (2004) and Brusco, Lopomo, Robinson, and Viswanathan (2007). In particular, uncertainties exist for both deal synergies and bidder assets in place. An overvalued bidder proposes to pay by stock, but target managers are not easily fooled. They are rational and value-maximizing. They accept an offer only when the expected value of payment is greater than their reservation value. They are inclined to request cash payments in order to remove "lemon" bidders, but are not always successful due to their limited information set. In particular, as Bayesian updaters, target managers attribute a high stock offer to both high synergies and high overvaluation. When overvaluation is high, they expect synergies are high as well, and accept too many stock offers. However, stock market investors interpret a stock offer from cash-rich bidder as a strong signal of overvaluation, because they believe that a highly possible reason for a bidder to refuse to pay cash is that the stock offer is indeed overvalued.<sup>7</sup> The adverse selection effect suggests that the negative wealth effect of cash reserve is restricted to deals paid partially or entirely in stock. However, the market scrutiny argument suggests that the cash-reserve effect is present irrespective of the means of payment.

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<sup>6</sup> A potential bidder cannot raise cash through issuing equity as that greatly dilute existing shareholder stakes. It cannot raise cash through debt if creditors cannot distinguish under valuation from decrease in fundamental value due to financial distress.

<sup>7</sup> Several studies show that the stock market is efficient in extracting and processing information. See Pagano, Panetta and Zingales (1998), Subramanyam and Titman (1999) and Luo (2005).

## 2.2 The Agency Costs of Excess Cash Reserve and Its Implications in Acquisitions

Jensen (1986) maintains that when a company's cash flow is more than what is required for all positive NPV projects, self-serving managers prefer to keep an excessive amount of cash within the company and spend it on value-destroying investments.<sup>8</sup> Underlying is the notion that self-serving managers tend to keep more assets under control for their own benefits. Subsequent empirical studies find evidence consistent with Jensen's (1986) argument. Morck, Shleifer, and Vishney (1990) suggest that managerial objectives drive acquisitions. Lang, Stulz and Walkling (1989) find that announcement effect is worse for a poorly managed bidder. Lang, Stulz and Walkling (1991), Schlingemann (2004) and Harford (1999) use company cash flow or cash reserve as proxies for the degree of agency cost of free cash flow, and find that cash flow (or cash reserve) has a negative effect on bidder returns at acquisition announcement. Harford (1999), using a sample of acquisitions announced during 1976–1993, finds that a cash-rich company is more likely to be a bidder than a cash-poor one. To the extent that debt reduces the agency cost of free cash flow by forcing managers to pay out cash, Maloney and Mitchell (1993) find that a bidder of higher leverage ratio has better returns at acquisition announcement.

Yet, there is another thread of argument regarding the agency conflicts arising from excessive cash reserve: the managerial discretion motive. An excessive cash reserve can shield managers from the monitoring of external capital market, as managers do not rely on external investors to fund investments (Jensen, 1986; Opler et al. 1999; Harford, Mansi, and Maxwell, 2008). Insulated from external monitoring, managers are less bothered about their fiduciary duty when proposing acquisitions. They select a bad deal simply because they are less concerned about shareholders' wealth. The agency cost of free cash flow suggests that the excessive cash reserve is used for value-destroying acquisitions, and consequently the negative announcement effect of cash reserve should be most obvious for cash offers. The managerial discretion motive, however, suggests that the negative announcement of cash reserve is present regardless of the means of payment.

## 3. *Sample and Data*

Our initial sample of acquisitions is from the SDC M&A database covering the period of 1980–2008. We then impose several selection criteria. First, following previous literature, only the major types of acquisitions defined by SDC are included, namely merger and

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<sup>8</sup> Accumulation of free cash flow leads to excessive cash reserve.

acquisition of majority interests.<sup>9</sup> Second, both the bidder and the target are listed on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), or NASDAQ. Third, announcement date, effective or withdrawal date, and means of payment must be available from SDC. To mitigate the influence of recording error, we require that the sum of means of payment (i.e., the percentage of stock, cash, and mixed payment) is no less than 95% and no more than 105%. Fourth, deal value must be available, and no less than \$10 million. After imposing these criteria, we have a sample of 7844 deals. We then exclude utility bidders (SIC 4900-4999) which are intensively regulated and financial bidders (SIC 6000-6999) whose cash reserve should be interpreted differently from that of an industrial company. There are 5137 unique deals left. For each set of analysis, namely predicting bidder, announcement effects, and post-acquisition operating performance and use of funds, we require data available from CRSP and Compustat in order to calculate the variables needed for regression analysis. We adjust all required Compustat variables to the 1994 dollar using U.S. Consumer Price Index (CPI). We use Riskmetrics to compile the G-Index (the governance measure). Riskmetrics provides G-Index for 1990, 1993, 1995, 1998 and then biennially to the end of 2006. The G-Index is unavailable prior to 1990. Since the G-index changes slowly overtime, we use the 1990 G-Index for 1980–1989. For 1991 we use the 1990 G-index, while for 1992 we use the 1993 data, for 1994 the 1995 data, and so on. For 2007 and 2008, we construct the G-Index using provisions provided by RiskMetrics.<sup>10</sup> We provide a detailed tabulation of the variables described in Appendix I.

For the predicting bidder analysis, we use a panel data of all Compustat company-years that have required data. A dummy variable is used to flag a company-year in which the company announces one or more acquisitions. Table 2, panel A reports the summary statistics of the panel data.<sup>11</sup> Altogether, we have 22823 company-years with complete data. There are 2650 bidder company-years, in which a company announces at least 1 acquisition. This corresponds to 2975 acquisitions announced by 1097 companies. An average company has an excess cash reserve ratio of -0.02 in a typical year (median -0.054). It has total assets of \$974.609 million (median \$843.028 million). The market-to-book ratio of an average company-year is 2.269 (median 1.718), and the residual market-to-book ratio is -0.082 (median -0.526).<sup>12</sup> We further split the sample according to whether a company announces acquisition(s) or not in a year, and report the median of each variable for the bidder

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<sup>9</sup> According to the definitions of SDC, merger is a transaction where 100% of a company is bought; in an acquisition of majority interests, an acquirer holds less than 50% of the target's stake but holds more than 50% after the transaction.

<sup>10</sup> Our results are qualitatively the same if we restrict our sample period to 1990–2006 when G-index is directly available from RiskMetrics.

<sup>11</sup> All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles.

<sup>12</sup> It is the ranking of the residual market-to-book ratio that matters for our analysis, rather than its magnitude.

company-years and non-bidder company-years separately. We find that a bidder company-year has significantly (at 5%) lower excess cash reserve ratio than a non-bidder company-year (-0.058 vs. -0.053). Compared with a non-bidder company year, a bidder company-year has significantly (at 1%) higher market-to-book ratio (2.072 vs. 1.680), higher residual market-to-book ratio (-0.228 vs. -0.561), higher price-to-earning ratio (17.295 vs. 15.430), higher sales growth in the past 5 (at least 3) years (0.063 vs. 0.048), greater size (total assets of \$1626.198 million vs. \$781.332 million), and lower return volatility (0.022 vs. 0.023). Bidder and non-bidder company-years have similar average daily abnormal returns (calculated over rolling windows) over the past 3 years and similar leverage. Although rank-sum tests show that the difference in G-Index is statistically significant, the magnitude of the difference is not economically meaningful. In our logistic analysis, we control for these variables, which are suggested by the previous literature to affect the probability of being a bidder.

In the right-most section of panel A, we isolate the company-years whose excess cash reserve ratios are in the top quartile (high-excess-cash-reserve company-years) from other company-years.<sup>13</sup> The company-years of high excess cash reserve ratio have a median market-to-book ratio of 1.806, and a median residual market-to-book ratio of -0.481. Both are significantly (1%) higher than those of the company-years of low excess cash reserve ratio (1.697 for market-to-book ratio and -0.541 for residual market-to-book ratio). This is consistent with the view that high cash reserve is associated with high growth.

For our analysis of announcement effects, we use the cross section of all acquisition that has required data. Table 2, panel B reports the summary statistics. Altogether, we have 1017 acquisitions in the cross section announced by 605 bidders. The decrease in the number of acquisitions is mainly due to bidder *CAR* and the *Overpay* variable (used to control for the likelihood of overpaying the target) which requires the target market value, target *CAR*, and percentage of stake of target sought by the bidder. As the announcement effect of cash reserve is more pronounced for those bidders that the investors have not expected (Harford, 1999), we distinguish between the predicted and unpredicted bidders, and report the summary statistics for each type. We explain in detail how we classify predicted and unpredicted bidders in Appendix II. We calculate the cumulative abnormal return (*CAR*) from 2 days before to 2 days after the announcement day for both bidders and targets based on the market model. The estimation period is a 250-day window ending 15 trading days before the announcement day (we require at least 40 daily stock returns in the estimation window). Average bidder *CAR* is -0.008 (median -0.007) and significant at 1% (1%)

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<sup>13</sup> Quartiles are calculated for each year.

(significance not tabulated). Average bidder actual cash reserve ratio is 0.24 (median 0.118). Average excess cash reserve ratio is -0.031 (median -0.066). Asset tangibility (i.e., tangible assets over total assets) has a mean of 0.865 and a median of 0.917. G-Index has a mean value of 9.213 and a median value of 9.000. In columns 3–5, we separate the sample into a high- and a low-excess-cash-reserve group according to the 75th sample percentile of excess cash reserve ratio, and report the median values of the variables. Wilcoxon rank-sum test is used to test the statistical significance of the difference between these two groups. We note that the *CAR* of the high-excess-cash group (median -0.008) is lower than that of the low-excess-cash group (median -0.007), but the difference is statically insignificant. Later we use multivariate regression analysis to examine the cash-reserve effect on bidder announcement returns, controlling for other effect on bidder *CAR*. The high-excess-cash-reserve group has significantly (at 1%) higher tangible assets and higher sales growth, and significantly (at 10%) lower Overpay and market-to-book ratio, compared to the low-excess-cash-reserve group. Other variables do not differ significantly between the high- and low-excess-cash-reserve groups. Columns 6–8 separate the predicted bidders into a high- and a low-excess-cash-reserve group. The high-excess-cash-reserve group has a median *CAR* of -0.011, lower than the median of -0.006 for the low-excess-cash-reserve group. However, the difference is statistically insignificant. The high-excess-cash-reserve group has greater asset tangibility, higher return on assets, higher historical sales growth, and are less likely to overpay the target (all differences are statistically significant at 10% or above). Regarding other variables, the predicted bidders of high and low excess cash reserve are similar. Column 9–11 separate the unpredicted bidders into a high- and a low-excess-cash-reserve group. The median *CAR* for the high (low) -excess-cash-reserve group is -0.004 (-0.007), but the difference is statistically insignificant. The high-excess-cash-reserve group has higher asset tangibility and historical sales growth, but similar to the low-excess-cash-reserve group in terms of other variables. In our multivariate regression analysis, we control for these variables suggested by previous literature that affect bidder announcement returns.

[Table 2]

## ***4. Empirical Results***

### **4.1 Predicting Bidder**

We set out by estimating the cash reserve effect on the probability of being bidder. The baseline model is a logistic specification:

$$Acquisition_{i,t} = \alpha + \beta Excash_{i,t-1} + \gamma Controls_{i,t-1} + \delta YDUM_{i,t} + \lambda INDDUM_{i,t} + \varepsilon_{i,t} \quad (1)$$

where  $i$  and  $t$  index companies and years respectively. *Acquisition* is a dummy variable equal to 1 if a company announces one or more acquisitions in a year, and zero otherwise. *Excash* is  $\log(1 + \text{excess cash reserve ratio})$ . *YDUM* is a vector of year dummy variables from 1980 to 2008. *INDDUM* is a vector of industry dummy variables defined using Fama-French 12 industries. *Controls* is a vector of control variables. The set of control variables includes the logarithm of 1 plus market-to-book ratio, the logarithm of total assets, the logarithm of 1 plus the leverage ratio (defined as book value of long-term debt over book value of equity), mean abnormal return (defined as the average daily market-model-adjusted return over the 3 years prior to the announcement day), return standard deviation (defined as the standard deviation of daily stock returns over the 3 years prior to the announcement day), logarithm of 1 plus the average annual sales growth over the 5 (at least 3) years prior to announcement, price-to-earnings ratio, and the logarithm of G-Index. All the variables are measures at the last fiscal year end prior to the announcement day unless otherwise mentioned.<sup>14</sup>

Table 3, panel A reports the distribution of high- and low-cash-reserve companies across bidder company-years and non-bidder company-years. The left section separates the sample into high- and low-excess-cash-reserve groups based on the 75th sample percentile. In the high-excess-cash-reserve group, there are 682 (11.93%) bidder company-years and 5035 (88.07%) non-bidder company-years. In the low-excess-cash-reserve group, there are 1968 (11.50%) bidder company-years vs. 15138 (88.50%) non-bidder company-years. The Pearson's Chi-square statistic is 0.752, which does not reject the null hypothesis that the distribution of company-years across the bidder and the non-bidder categories does not change according to the level of excess cash reserve. In the middle section, we first segment the sample into a high residual market-to-book group and a low residual market-to-book group, according the 75th sample percentile. Within each group, we further separate the sample into a high- and a low-excess-cash-reserve group based on the 75th sample percentile. We find that, for the company-years of high residual market-to-book ratio, bidder company-years contributes a significantly (significant at 5%) smaller proportion to the high-excess-cash-reserve group (14.54%) than to the low-excess-cash-reserve group (16.77%). For the low residual market-to-book ratio company-years however, the bidder company-years contribute a significantly (significant at 10%) greater proportion to the high-excess-cash-

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<sup>14</sup> Logarithms are taken for those variables of high skewness so that we mitigate the bias introduced by skewness to the estimation.



reserve group (10.84%) than to the low-excess-cash-reserve group (9.98%). This suggests that when the residual market-to-book ratio is high, a cash-rich company is less likely to be a bidder. In the right section, we first separate the sample by G-Index then by excess cash reserve, using the 75th percentiles of each variable. However, we do not find any significant difference in the distribution of the high- and low-excess-cash-reserve groups across bidder and non-bidder company-years.

Table 3, panel B reports the logistic regression results based on equation (1). Model 1 is estimated for 1980–1993, a sample period similar to the period of 1976–1993 studied by Harford (1999). Consistent with Harford (1999), we find that the coefficient of  $\log(1 + \text{excess cash reserve})$  is 0.084 (significant at 10%), suggesting that, for an average company, a one standard-deviation increase in the excess cash reserve ratio increases the probability of it being a bidder next year by 0.13%. In model 2, we add G-Index to the specification. This dramatically reduces the sample size from 32343 to 8111. We find that for the group of company-years where G-Index is available (mostly large and medium-sized companies), the effect of cash reserve on the probability of being a bidder is much weaker (coefficient 0.015) and statistically insignificant. We next expand the sample period to 1980–2008, our full sample period, and re-estimate equation (1) with and without G-Index. In model 3,  $\log(1 + \text{excess cash reserve})$  has a coefficient of -0.042 (significant at 5%), suggesting that a one-standard-deviation increase in excess cash reserve ratio of an average company reduces the probability of it being a bidder next year by 0.09%. When we add G-Index to the specification, the coefficient of  $\log(1 + \text{excess cash reserve})$  is -0.065 but is only marginally significant with a p-value of 0.106. In model 5 and 6, we re-estimate equation (1) using the sample period of 1994–2008, with and without the G-Index. In model 5, the coefficient of  $\log(1 + \text{excess cash reserve})$  is -0.068 (significant at 1%), suggesting that a one-standard-deviation increase in the excess cash reserve of an average company reduces the probability of it being a bidder in the next year by 0.15%. In model 6, we estimate equation (1) adding G-Index as a control variable, and the coefficient of the  $\log(1 + \text{excess cash reserve})$  is -0.087 (significant at 10%). These results show that the positive effect of excess cash reserve on a company's probability of being a bidder is only true for small companies in the early sample period of 1980-1993. For the later sample period (i.e., 1994–2008), the cash reserve effect on probability of being a bidder is negative. When G-Index is required to be available (mainly large and medium-sized companies), the cash reserve effect is significantly (at 10%) negative for the later period (1994–2008) and marginally significantly negative for the full sample period. As is discussed in the introduction, the negative cash reserve effect on the probability of being a bidder is consistent with the argument that a high cash reserve is associated with high growth. High-growth bidders prefer stock payment but the targets

favour cash payment. A company rationally expects that such a conflict reduces the chance of being successful and refrains from making an offer.

We perform further analysis on how cash reserve affects the probability of being a bidder by introducing variation to the degrees of precautionary motive and agency conflicts. Using the residual market-to-book ratio (defined in the introduction), we ensure the variation in the market-to-book ratio independent of the variation of agency conflicts (measured by G-index). We use the following specifications:

$$\begin{aligned}
 Acquisition_{i,t} = & \alpha + \\
 & \beta Excash_{i,t-1} + \\
 & \varphi Excash_{i,t-1} \times High\ Residual\ Market\ -\ to\ -\ book\ dummy_{t-1} + \\
 & \gamma Controls_{i,t-1} + \delta YDUM_{i,t} + \lambda INDDUM_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

$$\begin{aligned}
 Acquisition_{i,t} = & \alpha + \\
 & \beta Excash_{i,t-1} + \\
 & \eta Excash_{i,t-1} \times High\ G\ -\ Index\ Dummy_{t-1} + \\
 & \gamma Controls_{i,t-1} + \delta YDUM_{i,t} + \lambda INDDUM_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{3}$$

, where *High Residual Market - to - book dummy* is 1 if a company's residual market-to-book ratio is above the 75<sup>th</sup> percentile of the sample in a year, and 0 otherwise. *High G - Index Dummy* is 1 if a company's G-Index is above the 75<sup>th</sup> percentile of the sample in a year, and 0 otherwise.

The precautionary motive suggests that high growth drives the relation between cash reserve and the probability of being a bidder. Therefore, the cash reserve effect on the probability of being a bidder should manifest itself more strongly for a company of higher residual market-to-book ratio (strong precautionary motive). The effect is, a priori, twofolded because, on the one hand, a high-growth company is more likely to make an acquisition, on the other hand, it refrains from making an offer because it rationally expect that the target will not cooperate on the means of payment. Which effect dominates for the group of strong precautionary motive is an empirical question. Therefore, our alternative hypothesize under the information theory is  $\varphi \neq 0$ .

Under the agency theory, a cash-rich company with greater agency problem (high G-index) is more likely to make an acquisition. The alternative hypothesis for the agency theory therefore is  $\eta > 0$ .

Table 3, panel C reports the results based on equation (2) (model 1) and (3) (model 2). Model 1 shows that the negative cash-reserve effect on the probability of being a bidder comes entirely from the high residual market-to-book ratio companies. The coefficient on the interaction term is -0.150. Combined with the coefficient of excess cash reserve, it suggests that, for a company of high residual market-to-book ratio, a one-standard deviation increase in its excess cash reserve ratio reduces the probability of being a bidder by 0.52%. In model 2 however, the coefficient of the interaction term is negative and statistically insignificant, inconsistent with the prediction of agency theory.

[Table 3]

#### 4.2 Excess Cash Reserve and Bidder Announcement Returns

To examine the announcement effect, we begin with estimating two baseline specifications below. We use weighted least square regressions to mitigate the possible bias of heteroskedasticity.

$$Bidder\ CAR_i = \alpha + \beta_1 Excash_i + \gamma Controls_i + \delta YDUM_i + \lambda INDDUM_i + \varepsilon_i \quad (4)$$

$$\begin{aligned} Bidder\ CAR_i = & \alpha + \\ & \beta_2 Excash_i \times Predicted\ Bidder\ Dummy_i + \\ & \beta_3 Excash_i \times Unpredicted\ Bidder\ Dummy_i + \\ & \gamma Controls_i + \delta YDUM_i + \lambda INDDUM_i + \varepsilon_i \end{aligned} \quad (5)$$

, where  $i$  indexes deals. *Bidder CAR* is bidder cumulative abnormal return from 2 days before to 2 days after the announcement day, estimated using a market model. *YDUM* is a vector of year dummy variables from 1980 to 2008. *INDDUM* is a vector of industry dummy variables defined based on the Fama-French 12 industries. *Controls* is a vector of control variables, it includes the logarithm of market value of equity, the logarithm of 1 plus market-to-book ratio, asset tangibility (defined as tangible assets over total assets), the logarithm of return on assets (defined as the ratio of net income to total assets), the logarithm of 1 plus the annual sales growth in the past 5 (at least 3) years, the pre-acquisition bidder cumulative abnormal return measured over a 240-day window ending 15 trading days before the announcement date, overpay (a measure of target gain relative to bidder size, calculated by first taking the product of target CAR, target market value of equity, and the percentage

target stake sought by the bidder, then dividing this product by bidder market value of equity), a dummy variable which is 1 for tender offers and 0 otherwise, a dummy variable which is 1 when a bidder and a target are in different Fama-French 12 industries and 0 otherwise, a dummy variable which is 1 for friendly acquisitions and 0 otherwise, relative deal value (defined as deal value divided by the sum of bidder market value of equity and book value of debt), logarithm of 1 plus leverage (defined as the ratio of book value of long-term debt to book value of equity), the logarithm of G-Index, and stock payment (defined as the percentage of stock in the consideration). Equation (1) does not distinguish between predicted and unpredicted bidders, but equation (2) does. Both the agency theories suggest that  $\beta_1$  is negative. Under the precautionary motive growth predicts that  $\beta_1$  is positive but overvaluation predicts  $\beta_1$  is negative.  $\beta_2$  and  $\beta_3$  are expected to have the same sign as  $\beta_1$ . Since the market only responds to unexpected news, we expect  $\beta_3$  is greater in absolute value than  $\beta_2$ .

Table 4, panel A reports the results based on equations (4) and (5). In model 1, excess cash reserve has a coefficient of -0.009 (significant at 1%), suggesting that a one-standard-deviation increase in the excess cash reserve ratio reduces the bidder *CAR* by 15 basis points. This translates into a value decrease of \$27 million for an average bidder in our sample. In model 2, we add stock payment to control for the effects of means of payment. Stock payment has a significantly (at 1%) negative coefficient of -0.025, consistent with previous findings of Travlos (1987), Franks, et al. (1988), Asquith, et al. (1987), Wansley, et al. (1987), Servaes (1991), and Martin (1996). The coefficient of excess cash reserve remains qualitatively unchanged. Models 3 distinguishes between the predicted and unpredicted bidders. We find that the negative effect of cash reserve is mainly from the unpredicted bidders. The coefficient of the interaction term of the unpredicted bidder dummy and excess cash reserve ratio is -0.012 (significant at 1%). In contrast, the coefficient of the interaction term between the predicted bidder dummy and the excess cash reserve ratio is -0.008 and statistically insignificant. In model 4, we add stock payment as an additional control variable, and the coefficient of the interaction term between cash reserve and unpredicted bidder dummy remains significant (at 1%) at -0.011. In models 5 and 6, we examine if the negative cash reserve effect for unpredicted bidders change according to the means of payment. In particular, we construct a dummy variable equal to 1 (0 otherwise) for all-stock offer and another dummy variable equal to 1 (0 otherwise) for all-cash offers. We then form a three-item interaction term using the all-stock (all-cash) dummy, the unpredicted bidder dummy and excess cash reserve ratio. In model 5, we find that the three-item interaction with all-cash dummy is insignificant, and the three-item interaction with all-stock dummy is 0.029

and significant at 10%. The interaction term of unpredicted bidder dummy and excess cash reserve is -0.22 and significant at 5%. In model 6, we add stock payment as a control variable. Neither of the two three-item interactions is significant, and the coefficient of the interaction term of unpredicted bidder dummy and excess cash reserve is -0.21 (significant at 5%). The results of models 5 and 6 suggest that the negative cash reserve effect for all-stock offers and for all-cash offers are the same as the cash reserve effect for mixed offers. The results in panel A of table 4 show that the negative cash-reserve effect on bidder announcement return documented by previous studies persists for our entire sample period, and does not vary according to the means of payment.

In table 4, panel B, we further examine whether the negative cash-reserve effect vary according to 1) the level of information uncertainty, and 2) the degree of agency conflicts. Under the precautionary motive, the negative announcement cash reserve effect is due to revaluation and is stronger when the bidder has greater information uncertainty. We use asset tangibility (tangible assets over total assets) as a proxy for information uncertainty because tangible assets more difficult to evaluate than intangible assets. We do not use the residual market-to-book ratio here because it measures both growth and misvaluation, and these two aspects of the precautionary motive has contrasting predictions of the cash reserve effects on bidder announcement returns. Under the agency theory, the cash reserve effect of a high-G-Index company should be greater than that of a low-G-Index company. Specifically, we estimate the following two specifications:

$$\begin{aligned}
 \text{Bidder } CAR_i = & \alpha + \\
 & \beta_2 \text{Excash}_i \times \text{Predicted Bidder Dummy}_i + \\
 & \beta_3 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i + \\
 & \beta_4 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High-Tangibility Dummy}_i + \\
 & \gamma \text{Controls}_i + \delta YDUM_i + \lambda INDDUM_i + \varepsilon_i
 \end{aligned} \tag{6}$$

$$\begin{aligned}
 \text{Bidder } CAR_i = & \alpha + \\
 & \beta_2 \text{Excash}_i \times \text{Predicted Bidder Dummy}_i + \\
 & \beta_3 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i + \\
 & \beta_5 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High-G-Index Dummy}_i + \\
 & \gamma \text{Controls}_i + \delta YDUM_i + \gamma INDDUM_i + \varepsilon_i
 \end{aligned} \tag{7}$$

, where *High-Tangibility Dummy* ( *High-G-Index Dummy* ) is 1 if a bidder's asset tangibility (G-Index) is in the top quartile of the sample and 0 otherwise. We expect  $\beta_4$  ( $\beta_5$ ) to be positive (negative) under the precautionary motive (agency theory). Model 1 of panel B

is based on equation (6). We find that  $\beta_4$  is 0.028 (significant at 1%). A Wald test fails to reject the null hypothesis that  $\beta_3 + \beta_4 = 0$ . It shows that, for a company of high asset tangibility, cash reserve does not have a significant effect on bidder announcement returns, consistent with the precautionary motive. Model 2 is based on equation (7). We find that  $\beta_5$  is 0.004 and statistically insignificant, contrary to the prediction of the agency theory.

We proceed to examine how asset tangibility alters the cash reserve effect for the sub samples with different means of payment (i.e., mixed offers, all-stock offers, and all-cash offers). Specifically, we use an all-stock offer dummy and all-cash offer dummy respectively to interact with the unpredicted bidder dummy, the high-asset tangibility dummy, and excess cash reserve to form a 4-item interaction term. We add these two additional four-item interaction terms to equation (6). The specification is as follows:

$$\begin{aligned}
 \text{Bidder } CAR_i = & \alpha + \\
 & \beta_2 \text{Excash}_i \times \text{Predicted Bidder Dummy}_i + \\
 & \beta_3 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i + \\
 & \beta_4 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High - Tangibility Dummy}_i + \\
 & \beta_6 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High - Tangibility Dummy}_i \times \text{all - stock dummy}_i + \\
 & \beta_8 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High - Tangibility Dummy}_i \times \text{all - cash dummy}_i + \\
 & \gamma \text{Controls}_i + \delta YDUM_i + \lambda INDDUM_i + \varepsilon_i
 \end{aligned} \tag{8}$$

Model 3 in panel B estimates equation (8). We find that  $\beta_6$  is 0.042 and  $\beta_8$  is 0.056 (significant at 10% and 5% respectively).  $\beta_4$  however, is insignificant. Wald tests fails to reject the null hypothesis that  $\beta_3 + \beta_4 + \beta_6 = 0$ , but rejects  $\beta_3 + \beta_4 + \beta_8 = 0$  at 10% significance level. Results of model 3 show that, when a bidder has high asset tangibility, the negative cash-reserve effect is present for mixed offers but vanishes for all-stock offers. For an all-cash offer, cash reserve has a positive effect, which suggests that a high cash reserve is associated with high growth.

We further examine how agency conflicts alter the effect of cash reserve for the sub samples with different means of payment (i.e., mixed offers, all-stock offers and all-cash offers). We formulate the following specification:

$$\begin{aligned}
\text{Bidder } CAR_i = & \alpha + \\
& \beta_2 \text{Excash}_i \times \text{Predicted Bidder Dummy}_i + \\
& \beta_3 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i + \\
& \beta_5 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High-G-Index Dummy}_i + \\
& \beta_7 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High-G-Index Dummy}_i \times \text{all-stock dummy}_i + \\
& \beta_9 \text{Excash}_i \times \text{Unpredicted Bidder Dummy}_i \times \text{High-G-Index Dummy}_i \times \text{all-cash dummy}_i + \\
& \gamma \text{Controls}_i + \delta YDUM_i + \lambda INDDUM_i + \varepsilon_i
\end{aligned} \tag{9}$$

Model 4 in panel B estimates equation (9). We find that  $\beta_5$  is insignificant, meaning that for a mixed offer, a cash reserve does not affect a high-G-Index company's returns. Neither  $\beta_7$  (-0.037) nor  $\beta_9$  (-0.025) is statistically significant. Wald tests fails to reject the null hypotheses that  $\beta_5 + \beta_7 = 0$  and  $\beta_5 + \beta_9 = 0$ . The results from model 4 suggest that cash reserve does not have a stronger effect on the announcement returns of a bidder with greater agency conflicts, inconsistent with the agency theory.

[Table 4]

#### 4.3 Post-acquisition Operating Performance

In this section, we examine how cash reserve relates to a bidder's post-acquisition operating performance. We perform our analysis using completed deals. The precautionary motive suggests that a cash-rich bidder have better operating performance for two reasons. First, high growth leads to better operating performance in the long-run. Second, high cash reserve also relates to high misvaluation and thus more dramatic price correction at deal announcement. When the price correction is more negative, higher synergies are necessary to attract the merging companies to participate. As synergies manifest themselves in the long-run, operating performance improves. In contrast, the agency theory predicts that a cash-rich bidder have worse operating performance in the long run.

To measure operating performance, we follow the spirit of Healy, Palepu, and Ruback (1992) and Harford (1999). We first calculate the actual operating performance as operating cash flow over total assets. We then, for every year, adjust the actual operating performance using the median value of other companies that belong to the same excess-cash-reserve quartile of the same Fama-French 12 industry. This is to address the concern that company characteristics may affect operating performance so that we cannot attribute the change in actual operating performance post acquisition entirely to the acquisition itself (Barber and

Lyon, 1996). The adjusted operating performances are averaged over 4 years both prior to the acquisition announcement and subsequent to the deal completion.

In model 1 of table 5, we estimate a regression of post-acquisition operating performance on pre-acquisition operating performance. The constant term is 0.007 (significant at 1%), suggesting that an average bidder has an annual abnormal operating performance of 0.7% in the 4 years after deal completion. In model 2, we add a dummy variable equal to 1 if a bidder's excess cash reserve ratio is in the highest within-sample quartile and 0 otherwise. The coefficient of the high-excess-cash-reserve dummy is -0.003 but statistically insignificant. In model 3, we further introduce a dummy variable which is 1 if a bidder is in the highest residual market-to-book quartile and belongs to the highest excess cash reserve quartile at the same time, 0 otherwise. We find that the coefficient of this dummy variable is 0.010 (significant at 5%). The coefficient of the high-excess-cash-reserve dummy variable however is -0.004 (significant at 10%), suggesting the agency theory has some weak effect. A Wald test shows that the sum of the coefficients of these two dummy variables is significant positive (at 10%), consistent with the argument that, for a bidder precautionary motive is strong, higher cash reserve is associated with better post-acquisition operating performance. In model 4, we introduce an alternative dummy variable equals 1 if a bidder is in the highest G-Index quartile and at the same time in the highest excess cash reserve quartile, 0 otherwise. Neither the coefficient of this new dummy variable nor the sum of the coefficients of this new dummy variable and the high-excess-cash-reserve dummy is statistically significant, contrary to the prediction of agency theory.

[Table 5]

#### 4.4 Post-acquisition Use of Funds

In this section, we further examine how a bidder's pre-acquisition excess cash reserve relates to its post-acquisition use of funds. The precautionary motive and the agency theory have contrasting predictions. When growth is high, a cash-rich bidder is more likely to use funds on capital expenditure, inventory, and R&D. When overvaluation is high, a cash-rich bidder is more likely to use funds to reduce long-term debt (Stein, 1996; Hertzal and Li, 2009; and Kim and Weisbach, 2006). When agency conflicts is high, a cash-rich bidder uses more funds on acquisitions (Jensen, 1986; Opler, et al. 1999; Harford, et al. 2008).

We follow the method of Hertzal and Li (2009) and Kim and Weisbach (2008) to track the amount of funds that a bidder uses on reduction of long-term debt, inventory, capital expenditure, R&D, and acquisitions. To control for company size, all accounting variables



are deflated by total assets measured at the last fiscal year end prior to deal announcement. Specifically, for the income statement and cash flow statement items (i.e., funds used on long-term debt reduction, capital expenditure, R&D, and acquisitions), we calculate the accumulation of each item since the first year after the acquisition, deflated by pre-acquisition total assets:  $\sum_{\tau=1}^t V_{\tau} / Asset_0$ , for  $t = 1$  to 4, where  $V$  is the accounting variable in question,  $t = 0$  is the last fiscal year prior to the announcement and  $t = 1$  to 4 are the first to the fourth fiscal year after deal completion/withdrawal. For the balance sheet variable (i.e., inventory), we calculate the change from the first year after deal completion/withdrawal to a post-acquisition year:  $(V_t - V_0) / Asset_0$ , for  $t = 1$  to 4. At  $t = 0$ , total assets and inventory are the sum of the bidder's figure and the target's figure when a deal is completed; if a deal is withdrawn, we use the bidder's figure. We use a set of regressions to estimate the relation between a bidder's pre-acquisition excess cash reserve and its post-acquisition use of funds, controlling for other effects. To a considerable extent, the amount of funds that a bidder generates post acquisition affects the bidder's use of funds. We therefore control for a bidder's total funds generated after an acquisition. We also include bidder pre-acquisition actual cash reserve ratio to control for all the missing factors that affect the actual level of cash reserve. Specifically,

$$\begin{aligned}
Y_t = & \beta_1 \log(1 + \text{Excess Cash Reserve Ratio}_0) + \beta_2 \log(\text{Cash Reserve Ratio}_0) \\
& + \beta_3 \log(1 + \text{Total Fund}_t / \text{Total Asset}_0) + \beta_4 \text{Relative Deal Value} + \beta_5 \text{Size}_0 \\
& + \sum_{i=1980}^{2007} \theta_i \text{YrDummy}_i + \sum_{j=1}^{11} \lambda_j \text{IndustryDummy}_j + \varepsilon_t
\end{aligned} \tag{10}$$

, where  $Y = \log[(\sum_{\tau=1}^t V_{\tau} / Asset_0) + 1]$  for  $V =$  (fund used on) long-term debt reduction, capital expenditure, R&D or acquisitions, and  $Y = \log[(V_t - V_0) / Asset_0 + 1]$  for  $V =$  inventory, for  $t = 1$  to 4.  $\text{Total Fund}_t$  includes all funds generated (or raised) from operations, investments and external fund raising activities, calculated as  $\sum_{\tau=1}^t (\text{total sources of funds}_{\tau})$ , for  $t = 1$  to 4.<sup>15</sup> Industry dummies are based on the Fama–French 12 industries. For each time horizon, i.e.,  $t = 1$  to 4, a cross-sectional regression is estimated for each of the five accounting variables. Equation (10) omits firm subscripts for the sake of brevity.

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<sup>15</sup> Total sources of funds is the sum of funds from operations (FOPT), sales of property, plant and equipment (SPPE), sale of common and preferred stock (SSTK), long-term debt issuances (DLTIS) and other sources of funds (FSRCO).

Table 6 reports regression results based on equation (10). We find mixed evidence for the hypothesis that high excess cash reserve relates to high growth. In the capital-expenditure regressions, the coefficients of  $\log(1 + \text{excess cash reserve ratio})$  are significantly (significant at 1%) positive for all post-acquisition years. But in the R&D regressions, the coefficients of  $\log(1 + \text{excess cash reserve ratio})$  are all significantly (1%) negative. In the inventory regressions, none of the coefficient of  $\log(1 + \text{excess cash reserve ratio})$  is significant except that for year 2 (-0.007 and significant at 10%). We find some support for overvaluation. In particular, in the regressions of long-term debt reduction, we document that coefficients of  $\log(1 + \text{excess cash reserve ratio})$  are 0.014, 0.014, 0.21, and 0.44 for years 1,2,3,and 4 respectively (all significant at 10% or above except for that of year 2). Contrary to the prediction of the agency theory, the coefficient of  $\log(1 + \text{excess cash reserve ratio})$  is significantly (10% or above) negative in all regressions that use (fund used on) acquisitions as the dependent variable.

[Table 6]

## **5. Conclusion**

In this study, we argue that the precautionary motive provides a meaningful theoretical framework to understand bidder cash reserve effects in acquisitions. The precautionary motive argues that, in an imperfect capital market, the level of a company's cash reserve reflects managers' perception of future growth and a company's value uncertainty. We find a cash-rich company is less likely to be a bidder in our sample period. This negative effect is particularly pronounced where precautionary motive is strong. We further find higher bidder cash reserve relates to lower bidder announcement returns, but such an effect vanishes when a bidder has little value uncertainty. In post acquisition years, cash-rich bidders outperform (in terms of operating performance) cash-poor bidders when the implications of precautionary motive are strong. However, cash-rich bidders do not underperform cash-poor ones when the agency conflicts are more severe. Finally, we find that, in post-acquisition years, cash-rich bidders spend more funds on capital expenditure and reduction of long-term debt but less on acquisitions. Overall, our evidence can be well explained using the framework of precautionary motive rather than the agency theory.

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## Appendix I: Variable Description and Definitions

Name	Definition	Calculation
Actual cash reserve ratio	Cash and short-term investment over total assets net of cash and short-term investment	$\frac{\text{Cash and Short-term Investment}}{\text{Total Assets} - \text{CHE}}$
Excess cash reserve ratio	The difference between the actual cash reserve ratio and the required cash reserve ratio estimated using a cross-sectional OLS regression for each of the Fama-French 12 industries in each year	Same as definition
Market-to-book ratio	The market to book ratio of capital	$\frac{\text{Price Close} - \text{Annual} - \text{Fiscal}}{\text{Stockholders' Equity} - \text{Total}} \times \frac{\text{Common Shares Outstanding}}{\text{SEQ}} + \frac{\text{Long-term debt}}{\text{DLTT}}$
Residual Market-to-book ratio	Each year, we regress the market-to-book ratio on the logarithm of 1 plus G-Index. The residual from the regressions are residual market-to-book ratio.	Same as definition
G-Index	The governance index designed by Gompers, Ishii, and Metrick (2003). The higher the governance index, the greater the agency conflicts.	See Gompers, Ishii, and Metrick (2003)
Average sales growth	Average sales growth of a company in the past 5 years (at least 3 years)	$\sum_{t=5}^{t-1} \frac{\text{Sales/Turnover (Net)}}{\text{SALE}_{t-1}} - \text{SALE}_{t-1}$
Price to earning	Share price at the fiscal year end over earnings per share	$\text{PRRCC\_F} \div \frac{\text{Earning-per-share}}{\text{EPSPX}} \text{ or } \text{PRRCC\_F} \div \left( \frac{\text{Net Income}}{\text{NI}} / \text{CSHO} \right)$
Total assets	Total assets	AT
Leverage	Book value of long-term debt over book value of total equity	$\frac{\text{DLTT}}{\text{Stockholders' Equity} - \text{Total}} \text{ SEQ}$
Mean abnormal returns	Mean abnormal return is the average daily market-model-adjusted returns measured over 3 years prior to the announcement day.	$AR_{i,t} = r_{i,t} - \hat{\alpha} - \hat{\beta} r_{m,t}$ is calculated for each trading day in the past 3 years before the announcement day. Then a time-series average of AR is taken. $\hat{\alpha}$ and $\hat{\beta}$ are estimated using a 250-day rolling window stopping 15 trading days before each day.
Return standard deviations	Return standard deviation is the standard deviation of daily stock returns measured over 3 years prior to the announcement day.	Same as definition

Appendix I: continued

CAR[-2, +2]	Bidder cumulative abnormal return from 2 days before to 2 days after the announcement day	$AR_{i,t} = r_{i,t} - \hat{\alpha} - \hat{\beta}R_{m,t}$ ; $CAR = \sum_{t=-2}^{+2} AR_{i,t}$ . $\hat{\alpha}$ and $\hat{\beta}$ are estimated using a 250-day window stopping 15 trading days before the announcement day.
CAR[-255, -15]	Bidder cumulative abnormal return from 250 days before to 15 days before the announcement day	$AR_{i,t} = r_{i,t} - \hat{\alpha} - \hat{\beta}R_{m,t}$ ; $CAR = \sum_{t=-255}^{-15} AR_{i,t}$ . $\hat{\alpha}$ and $\hat{\beta}$ are estimated using a 250-day window stopping 270 trading days before the announcement day.
Non-cash working capital	Working capital net of cash and short-term investment divided by total assets.	$\frac{\text{Current Assets - Total ACT} - \text{Current Liabilities - Total ACL} - \text{CHE}}{\text{AT}}$
Asset tangibility	Tangible assets over total assets	$\frac{\text{AT} - \text{Intangible assets INTAN}}{\text{AT}}$
Market value	Market value of equity, i.e. stock price multiplied by common share outstanding.	$\text{PRCC\_F} \times \frac{\text{Price Close - Annual - Fiscal}}{\text{Common Shares Outstanding CSHO}}$
Return on assets (ROA)	Net income over total assets.	$\frac{\text{NI}}{\text{AT}}$
Overpay	Measures target gain relative to bidder size. Calculated as a product of cumulative abnormal return of the target, its market value and percentage sought by the bidder divided by the bidder market value of equity.	$\text{Overpay} = \frac{\text{Target CAR} \times \text{Target Market Value} \times \text{Percentage Sought}}{\text{Bidder Market Value of Equity}}$
Relative deal value	Deal value over bidder market value of equity	$\text{Deal Value} = \frac{\text{Deal Value}}{\text{Bidder Market Value of Equity}}$

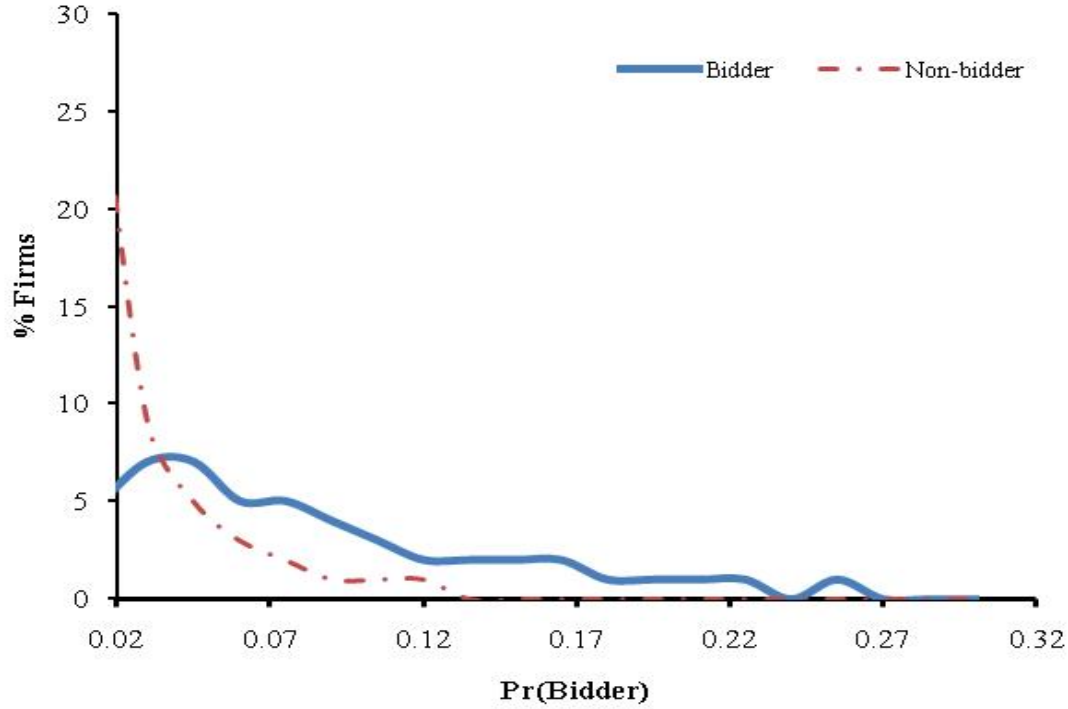


## Appendix II: Predicted and Unpredicted Bidders

**Table A1**

This table reports the fitted probabilities of being a bidder and the fitted probability of not being a bidder for our bidder sample. The first column gives the range of predicted probabilities. The second column shows the percentage of bidders that have fitted probabilities of being a bidder in that range. The third column shows percentage of bidders whose fitted probabilities of not being a bidder are in the given ranges. The number of firms' with fitted probabilities of more than 0.3 is small. So 20 equal intervals between 0 to 0.3 are generated. The two distributions are plotted in figure 1.

Probability				Bidder	Non-bidder	
(1)				(2)	(3)	
0.000	$\leq$	$p$	$<$	0.015	5	26
0.015	$\leq$	$p$	$<$	0.03	7	9
0.030	$\leq$	$p$	$<$	0.045	7	5
0.045	$\leq$	$p$	$<$	0.06	5	3
0.060	$\leq$	$p$	$<$	0.075	5	2
0.075	$\leq$	$p$	$<$	0.09	4	1
0.090	$\leq$	$p$	$<$	0.105	3	1
0.105	$\leq$	$p$	$<$	0.12	2	1
0.120	$\leq$	$p$	$<$	0.135	2	0
0.135	$\leq$	$p$	$<$	0.15	2	0
0.150	$\leq$	$p$	$<$	0.165	2	0
0.165	$\leq$	$p$	$<$	0.18	1	0
0.180	$\leq$	$p$	$<$	0.195	1	0
0.195	$\leq$	$p$	$<$	0.21	1	0
0.210	$\leq$	$p$	$<$	0.225	1	0
0.225	$\leq$	$p$	$<$	0.24	0	0
0.240	$\leq$	$p$	$<$	0.255	1	0
0.255	$\leq$	$p$	$<$	0.27	0	0
0.270	$\leq$	$p$	$<$	0.285	0	0
0.285	$\leq$	$p$	$<$	0.3	0	0



**Figure 1: Empirical PDFs for bidders.**

The probabilities are estimated using a logistic model. The PDFs for probability of being a bidder and not being a bidder cross at 0.03, which is a cut-off point for determining whether a bidder is predicted or not. Bidders with probabilities of being a bidder below the cut-off point are not expected to bid, while those with probabilities of being a bidder above the cut-off point are expected to bid.

We use a logistic model to predict bidders and non-bidders. We then first construct empirical distributions for the fitted probabilities of being a bidder and not being a bidder. Second, we divide the predicted probabilities between zero and 30 % into 20 equal intervals and calculate the percentage of bidders that fall into each interval (see table A1). Third and final, we graph the two distributions to determine the cross point for bidder and non-bidder probabilities. This method is similar to that applied by Harford (1999). It is clear from figure 1 that the distribution of the probability of not being a bidder dominates on the left, while the distribution of the probability of being a bidder dominates on the right. The two distributions cross over at 0.03. Therefore, firms with probabilities of being a bidder above 0.03 are classified as predicted bidders and those below 0.03 are classified as unpredicted bidders. The crossover point (0.03) is comparable to that reported by Harford (1999) which is 0.022.

**Table 1**  
**Predicted Effects of Corporate Cash Reserve in Different Stages of Acquisition**

This table summarizes the predicted effects of cash reserve on the probability of being a bidder, the bidder announcement returns, bidder post-acquisition operating performance, and bidder post-acquisition use of funds. (+) means a positive effect, and (-) means a negative effect. Detailed explanation are provided in the introduction and literature review sections.

	Effect on probability of being a bidder	Effect on bidder announcement returns	Effect on post- acquisition operating performance	Effect on post-acquisition use of funds
The agency thoery	(+)	(-)	(-)	A cash-rich bidder spends more on acquisitions than a cash-poor bidder (Jensen, 1986).
The precautionary motive				
Growth	(+), (-)	(+)	(+)	A cash-rich bidder spends more on capital expenditure (Capex), inventory, and research and development (R&D) than a cash-poor bidder (Kim and Weisbach, 2006; Hertzels and Li, 2009).
Overvaluation	(+), (-)	(-)	(+)	A cash-rich bidder spends more on debt reduction than a cash-poor bidder (Stein, 1996).

**Table 2**  
**Summary Statistics**

**Panel A: Summary Statistics for the Panel Data Used for Predicting Bidder**

Panel A reports mean and median (for the full sample) and median (for subsamples) of the variables that are used to predict bidders. The sample period is 1980 through 2008. Actual cash reserve ratio is cash and short-term investment divided by total assets net of cash and short-term investment. Excess cash reserve ratio is the difference between the actual cash reserve ratio and the required cash reserve ratio estimated using a cross-sectional OLS regression for each of the Fama-French 12 industries in each year. Market-to-book is the sum of market value of equity and book value of long-term debt divided by the sum of book value of equity and book value of long-term debt. Leverage is the ratio of book value of long-term debt to book value of equity. Mean abnormal return is the average daily market-model-adjusted returns over the 3 years prior to the announcement day. Return standard deviation is the standard deviation of daily stock returns measured over the 3 years prior to the announcement day. Average sales growth is measured over 5 (at least 3) years prior to announcement day. Non-cash working capital is working capital minus cash and short-term investment then divided by total assets. Price to earnings is the ratio of price to earnings per share. G-Index is the governance index of Gompers, Ishii, and Metrick (2003). Residual market-to-book is the residual from an OLS regression, estimated each year, of market-to-book ratio on the logarithm of 1 plus the G-Index. Subsamples are formed according to whether a company is a bidder or not in a year, or whether a bidder's excess cash reserve ratio is above or below the 75th percentile of the sample in a year. All variables except the G-Index are winsorized at the 1st and 99th percentile. Wilcoxon rank sum tests are used to test the significance of differences between the bidder and non-bidder company-years. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1% respectively.

	Full sample of company-years		Bidder or Non-bidder (Median)			High or Low Excess cash reserve ratio (Median)		
	Mean	Median	Bidder	Non-bidder	Z-stat	High	Low	Z-stat
Excess cash reserve ratio	-0.020	-0.054	-0.058	-0.053	-2.365**	0.228	-0.110	-111.994***
Market-to-book	2.269	1.718	2.072	1.680	17.735***	1.806	1.697	-8.153***
Residual market-to-book	-0.082	-0.526	-0.228	-0.561	17.41***	-0.481	-0.541	-7.694***
G-Index	8.853	9.000	9.000	9.000	6.153***	8.000	9.000	11.276***
Average sales growth	0.108	0.049	0.063	0.048	8.840***	0.058	0.047	-8.656***
Price to earnings	17.967	15.624	17.295	15.430	9.234***	15.570	15.651	0.217
Total assets(Mil.)	974.609	843.028	1626.198	781.332	22.165***	748.590	873.505	6.411***
Leverage	0.642	0.347	0.341	0.348	-0.384	0.386	0.341	-2.23**
Mean abnormal returns	0.000	0.000	0.000	0.000	0.348	0.000	0.000	1.053
Return standard deviations	0.026	0.023	0.022	0.023	-3.268***	0.025	0.023	-14.104***
Non-cash working capital	0.162	0.144	0.125	0.146	-5.359***	0.169	0.139	-11.593***
No of obs	22823	22823	2650	20173		5692	17131	

# Panel B: Summary Statistics for The Sample Used to Estimate the Bidder's Announcement Abnormal Returns

Panel B reports mean and median (for the full sample) and median (for the subsamples) of the variables used to estimate the effects of cash reserve on bidders' announcement abnormal returns. The full sample covers the period of 1980 through 2008. CAR(-2, +2) is the market-model-adjusted return from 2 days before to 2 days after the announcement day (day 0). Actual cash reserve ratio is cash and short-term investment over total assets net of cash and short-term investment. Excess cash reserve ratio is the difference between the actual cash reserve ratio and the required cash reserve ratio estimated using a cross-sectional OLS regression for each of the Fama-French 12 industries in each year. Market value is the product of stock price and number of common shares outstanding at fiscal year end. Market-to-book is the sum of market value of equity and book value of long-term debt divided by the sum of book value of equity and book value of long-term debt. Asset tangibility is the ratio of tangible assets to total assets. Return on assets (ROA) is the ratio of net income to total assets. Average sales growth is the annual growth in sales averaged over 5 (at least 3) years prior to the announcement day. CAR (-255,-15) is the cumulative abnormal returns from day -255 to day -15 based on market model. Overpay measures the target shareholders' gain relative to the size of a bidder. It is calculated by first taking the product of target CAR, target market value of equity, and the percentage target stake sought by the bidder, then dividing this product by bidder market value of equity. Leverage is the ratio of book value of long-term debt to book value of equity. G-Index is the governance index of Gompers, Ishii, and Metrick (2003). Post-acquisition operating cash flow performance is a bidder's annual operating performance averaged over 4 years after deal completion. Pre-acquisition operating performance is a market-value-weighted average of a bidder's and a target's annual operating performance, averaged over 4 years before deal announcement. Operating performance is measured as operating cash flow over total assets, adjusted by the median operating performance of other firms in the same excess cash reserve ratio decile of a same industry of the Fama-French 12-industry classification. Subsamples are formed according to whether a company's excess cash reserve is above or below the 75th sample percentile, and whether a bidder is predicted or not. All company characteristics are measured at the end of the fiscal year prior to deal announcement, unless otherwise described. Z-statistic is based on Wilcoxon rank sum test for median differences. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1% respectively.

	All Deals		All Deals			Predicted bidders			Unpredicted bidders		
	Mean	Median	High excess cash	Low excess cash	Z-stat	High excess cash	Low excess cash	Z-stat	High excess cash	Low excess cash	Z-stat
CAR (-2,-2)	-0.008	-0.007	-0.008	-0.007	1.247	-0.011	-0.006	1.421	-0.004	-0.007	0.501
Actual Cash reserve ratio	0.240	0.118	0.118	0.119	-0.168	0.121	0.132	0.877	0.115	0.108	-1.066
Excess cash reserve ratio	-0.031	-0.066	0.259	-0.125	-22.741***	0.245	-0.153	-15.705***	0.264	-0.111	-16.427***
Asset tangibility	0.865	0.917	0.962	0.900	-7.854***	0.974	0.887	-5.696***	0.957	0.910	-5.346***
G-Index	9.213	9.000	10.000	9.000	-0.580	10.000	9.000	-1.259	9.000	9.000	0.479
Market value (Mil.)	14234.840	2859.902	2684.475	2929.105	0.929	5026.747	3785.152	-0.446	1429.787	2074.578	1.616
Market-to-book	2.765	2.146	1.927	2.171	1.691*	2.166	2.382	1.472	1.866	2.071	0.757
Return on asset (ROA)	0.079	0.070	0.074	0.069	-1.077	0.081	0.070	-1.835*	0.066	0.069	0.295
Average sales growth	0.158	0.069	0.095	0.064	-3.221***	0.102	0.063	-2.827**	0.094	0.066	-1.729*
CAR (-255,-15)	-0.008	-0.007	0.000	-0.008	-0.825	0.004	-0.006	-0.898	-0.004	-0.010	-0.216
Overpay	0.036	0.010	0.008	0.011	1.791*	0.002	0.008	2.788**	0.013	0.013	0.028
Leverage	0.539	0.358	0.400	0.348	-1.384	0.373	0.331	-0.912	0.439	0.358	-1.103
Deal value	0.361	0.112	0.101	0.119	0.611	0.059	0.080	0.957	0.141	0.168	0.089
Average pre-operating performance	0.084	0.065	0.071	0.064	-0.878	0.062	0.067	-0.148	0.073	0.057	-1.076
Average post-operating performance	0.071	0.047	0.053	0.047	-0.159	0.067	0.048	-0.410	0.046	0.043	0.002
No of obs	1017	1017	260	757		119	355		141	402	

**Table 3**  
**The Effects of Excess Cash Reserve on the Probability of Being a Bidder**

This table reports the results of univariate analysis and logistic regression analysis that estimate how excess cash reserve affects the probability of a company being a bidder in a year. The analysis is based on a panel data set which covers the period from 1980 through 2008. The dependent variable is 1 if a company makes one or more acquisitions in a year, and 0 otherwise. Panel A reports the univariate results. The distribution of bidders and non-bidders are reported across sub samples. The sub samples are formed according to high and low excess cash reserve ratio (using the 75th percentile of the sample), high and low residual market-to-book ratio (using the 75th percentile of the sample), and high and low G-Index (using the 75th percentile of the sample). Pearson's Chi-square statistics is calculated to test the independence of the distributions of bidders and non-bidder company-years across different sub samples. Values in parentheses are the p-values of Chi-square statistics. Panel B estimates the base-line models for three sample periods. Model 1 and 2 replicate Harford's (1999) findings using a sample period similar to his (i.e., 1980-1993). Model 3 and 4 use the full sample period (i.e., 1980-2008). Model 5 and 6 use a sample period of 1994-2008. Actual cash reserve ratio is cash and cash equivalent divided by total assets net of cash and cash equivalents. Excess cash reserve ratio is the difference between the actual cash reserve ratio and the required cash reserve ratio estimated using a cross-sectional OLS regression for each of the Fama-French 12 industries in each year. Market-to-book is the sum of market value of equity and book value of long-term debt divided by the sum of book value of equity and book value of long-term debt. Leverage is the ratio of book value of long-term debt to book value of equity. Mean abnormal return is the average daily market-model-adjusted returns measured over 3 years prior to the announcement day. Return standard deviation is the standard deviation of daily stock returns measured over 3 years prior to the announcement day. Average sales growth is measured over 5 (at least 3) years prior to the announcement day. Non-cash working capital is working capital excluding cash and cash equivalents over total assets. Price-to-earning is the ratio of price to earning per share. G-Index is the governance index designed by Gompers, Ishii, and Metrick (2003). In panel C, we add two interaction terms separately to the base-line regression. One interaction is formed using the excess cash reserve and a high residual market-to-book dummy. Residual market-to-book is the residual from an OLS regression of market-to-book ratio of total assets on the logarithm of 1 plus the G-Index, estimated cross-sectionally each year. The high residual market-to-book dummy is 1 if a bidder is in the top quartile of the sample, and 0 otherwise. The G-index dummy is 1 if a bidder is in the top quartile of the sample, and 0 otherwise. Slopes are evaluated at the sample mean, and reported right to coefficients. p-values are in parentheses. \*, \*\*, \*\*\* indicate significance at 10%, 5% and 1% respectively.

Panel A										
	Excess cash reserve		High Resid. Market-to-book		Low Resid. Market-to-book		High G-index		Low G-index	
	High	Low	High excess cash	Low excess cash	High excess cash	Low excess cash	High excess cash	Low excess cash	High excess cash	Low excess cash
Bidder	682 (11.93%)	1968 (11.50%)	244 (14.54%)	675 (16.77%)	438 (10.84%)	1293 (9.89%)	200 (12.44%)	725 (12.11%)	482 (11.73%)	1243 (11.18%)
Non-bidder	5035 (88.07%)	15138 (88.50%)	1434 (85.46%)	3351 (83.23%)	3601 (89.16%)	11787 (90.11%)	1408 (87.56%)	5262 (87.89%)	3627 (88.27%)	9876 (11.82%)
Chi2 (p-value)	0.752 (0.386)		4.337 (0.037)**		3.122 (0.077)*		0.127 (0.721)		0.907 (0.341)	

Panel B												
	Model1		Model2		Model3		Model4		Model5		Model6	
	Coeff	Slope	Coeff	Slope	Coeff	Slope	Coeff	Slope	Coeff	Slope	Coeff	Slope
	1980-1993		1980-1993		1980-2008		1980-2008		1994-2008		1994-2008	
Log ( 1+ excess cash reserve ratio)	0.084*	0.003	0.015	0.001	-0.042**	-0.002	-0.065	-0.005	-0.068***	-0.004	-0.087*	-0.007
	(0.079)		(0.862)		(0.044)		(0.106)		(0.004)		(0.056)	
Log (1+market-to-book)	0.551***	0.021	0.513***	0.042	0.636***	0.031	0.668***	0.055	0.658***	0.037	0.704***	0.058
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Log (total assets)	0.419***	0.016	0.462***	0.038	0.395***	0.019	0.440***	0.036	0.376***	0.021	0.429***	0.035
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Log (1+leverage)	-0.070***	-0.003	0.002	0.000	-0.066***	-0.003	-0.046**	-0.004	-0.063***	-0.003	-0.065***	-0.005
	(0.002)		(0.949)		(0.000)		(0.020)		(0.000)		(0.005)	
Mean abnormal return	0.729***	0.028	1.16535	0.096	0.328***	0.016	0.576	0.005	0.232*	0.013	0.289	0.024
	(0.007)		(0.173)		(0.005)		(0.175)		(0.074)		(0.560)	
Return standard deviation	0.088***	0.003	0.169***	0.014	0.098***	0.005	0.113***	0.009	0.094***	0.005	0.087***	0.007
	(0.000)		(0.003)		(0.000)		(0.000)		(0.000)		(0.005)	
Log (1+average sales growth)	0.488***	0.019	0.969***	0.080	0.304***	0.015	0.772***	0.064	0.261***	0.015	0.733***	0.060
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Non-cash working capital	0.183	0.007	0.473	0.039	0.370***	0.018	0.423***	0.035	0.439***	0.024	0.431**	0.035
	(0.242)		(0.104)		(0.000)		(0.006)		(0.000)		(0.020)	
Price to earnings	0.000	0.000	-0.001	0.000	0.001***	0.000	0.000	0.000	0.001***	0.000	0.000	0.000
	(0.675)		(0.470)		(0.001)		(0.774)		(0.000)		(0.425)	
log(G-Index)			0.020	0.002			0.030***	0.002			0.034***	0.003
			(0.160)				(0.000)				(0.001)	
Constant	-5.619***		-6.460***		-9.123***		-9.366***		-8.997***		-9.309***	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
No of obs	32343		8111		81334		22823		48991		14712	
Prob>F	0.00***		0.00***		0.00***		0.00***		0.00***		0.00***	
chi2	1241.52		350.12		3897.19		1516.99		2492.78		1191.86	
Likelihood ratio	-6228.24		-2580.29		-18785.79		-7437.34		-12531.89		-4839.14	
Pseudo R-square	0.091		0.064		0.094		0.093		0.090		0.110	

Panel C (1980-2008)				
	Model1		Model2	
	Coeff	Slope	Coeff	Slope
Log (1+ excess cash reserve ratio)	0.006 (0.912)	0.000	-0.037 (0.431)	-0.003
High residual market-to-book dummy × Log ( 1+ excess cash reserve ratio)	-0.150** (0.048)	-0.012		
High G-Index dummy × Log ( 1+ excess cash reserve ratio)			-0.100 (0.222)	-0.008
Log (1 + market-to-book)	0.642*** (0.000)	0.053	0.665*** (0.000)	0.055
Log (total assets)	0.439*** (0.000)	0.036	0.439*** (0.000)	0.036
Log (1 + leverage)	-0.047** (0.017)	-0.004	-0.045** (0.020)	-0.004
Mean abnormal return	0.57041 (0.181)	0.047	0.58643 (0.168)	0.048
Return standard deviation	0.112*** (0.000)	0.009	0.112*** (0.000)	0.009
Log (1+average sale growth)	0.775*** (0.000)	0.064	0.774*** (0.000)	0.064
Non-cash working capital	0.423*** (0.006)	0.035	0.417*** (0.007)	0.034
Price to earning	0.000 (0.745)	0.000	0.000 (0.781)	0.000
log(G-Index)	0.238*** (0.001)	0.020	0.226*** (0.001)	0.019
Constant	-9.547*** (0.000)		-9.565*** (0.000)	
No of obs	22823		22823	
Prob>F	0.00***		0.00***	
chi2	1520.72		1518.08	
Likelihood ratio	-7435.47		-7436.79	
Pseudo R-square	0.093		0.093	
F Test: p-values in brackets				
Null: Log (1+ excess cash reserve ratio) + High residual market-to-book dummy × Log (1+ excess cash reserve ratio) = 0	[0.014]**			
Null: Log (1+ excess cash reserve ratio) + High G-Index dummy × Log (1+ excess cash reserve ratio) = 0	[0.053]*			



Table 4

## The Effect of Excess Cash Reserve on Bidder Announcement Return

This table reports weighted least square regression estimates of the effects of excess cash reserve on bidder announcement returns, for the period from 1980 through 2008. The dependent variable is bidder announcement CAR from day -2 to day 2 (day 0 is the announcement day) estimated using a market model. Actual cash reserve ratio is cash and short-term investment divided by total assets net of cash and short-term investment. Excess cash reserve ratio is the difference between actual cash reserve ratio and the required cash reserve ratio estimated using a cross-sectional OLS regression for each of the Fama-French 12 industries in each year. Market value is the product of stock price and number of common shares outstanding at a fiscal year end. Market-to-book is the sum of market value of equity and book value of long-term debt divided by the sum of book value of equity and book value of long-term debt. Asset tangibility is the ratio of tangible assets to total assets. High tangibility dummy is 1 if a bidder's asset tangibility is in the highest quartile of the sample, and 0 otherwise. Return on assets (ROA) is the ratio of net income to total assets. Average sales growth is the growth in sales measured over 5 (at least 3) years prior to announcement day. CAR (-255,-15) is the cumulative abnormal returns from day -255 to day -15 estimated using a market model. Overpay measures target shareholders' gain relative to the size of a bidder. It is calculated by first taking the product of target CAR, target market value of equity and the percentage target stake sought by the bidder, then dividing this product by bidder market value of equity. Tender dummy is a dummy variable equal to 1 for tender offers, and 0 otherwise. Diversify dummy is a dummy variable equal to 1 if a target and the bidder are in the same industry of the Fama-French 12-industry classification, and 0 otherwise. Friendly deal dummy is a dummy variable equal to 1 for friendly deals, and 0 otherwise. Relative deal value is deal value divided by bidder market value of total assets. Leverage is the ratio of book value of long-term debt to book value of equity. G-Index is the governance index of Gompers, Ishii, and Metrick (2003). High G-Index Dummy is 1 if a bidder's G-index is in the highest quartile of the sample, and 0 otherwise. Stock payments are stock payments as a percentage of the deal value. Predicted-bidder dummy is a dummy variable equal to 1 for predicted bidder, and 0 otherwise. Unpredicted-bidder dummy is a dummy variable equal to 1 for unpredicted bidder, and 0 otherwise. All-stock (all-cash) dummy is a dummy variable equal to 1 for pure stock (cash) payment, and 0 otherwise. All company characteristics are measured at the end of the fiscal year prior to deal announcement unless otherwise described. Regressions in panel A are based on equations (4) and (5). Regressions in panel B are based on equations (6) – (9). The values in parentheses are p-values. \*, \*\*, \*\*\* indicate significance at 10%, 5% and 1% levels.

Panel A						
Variables	Model1	Model2	Model3	Model4	Model5	Model6
Log (1+ excess cash reserve ratio)	-0.009*** (0.005)	-0.008** (0.010)				
Unpredicted-bidder dummy			-0.004 (0.372)	-0.005 (0.186)	-0.004 (0.336)	-0.005 (0.179)
Predicted-bidder dummy × Log (1+ excess cash reserve ratio)			-0.008 (0.191)	-0.003 (0.595)	-0.005 (0.462)	-0.004 (0.495)
Unpredicted-bidder dummy × Log (1+ excess cash reserve ratio)			-0.012*** (0.004)	-0.011*** (0.009)	-0.022** (0.024)	-0.021** (0.025)
Unpredicted-bidder dummy × all-stock dummy × Log (1+ excess cash reserve ratio)					0.029* (0.074)	0.022 (0.142)
Unpredicted-bidder dummy × all-cash Dummy × Log (1+ excess cash reserve ratio)					0.008 (0.452)	0.009 (0.333)
Log (market value)	0.000 (0.873)	-0.001 (0.363)	0.000 (0.781)	-0.002* (0.079)	-0.001 (0.364)	-0.002 (0.108)
Log (1+market-to-book)	-0.020*** (0.004)	-0.016** (0.027)	-0.023*** (0.003)	-0.014* (0.068)	-0.020** (0.014)	-0.016** (0.049)
Asset tangibility	0.035** (0.012)	0.028** (0.035)	0.038*** (0.008)	0.029** (0.034)	0.038** (0.011)	0.031** (0.023)
Log (ROA)	0.007* (0.061)	0.005 (0.130)	0.008** (0.037)	0.005 (0.144)	0.007* (0.075)	0.006 (0.126)
Log (1+average sale growth)	-0.012 (0.244)	-0.009 (0.366)	-0.009 (0.376)	-0.007 (0.478)	-0.01 (0.387)	-0.007 (0.472)
CAR (-255,-15)	-0.087** (0.027)	-0.075* (0.054)	-0.085** (0.048)	-0.045 (0.222)	-0.058 (0.137)	-0.049 (0.203)
Overpay	0.024 (0.626)	0.024 (0.602)	0.02 (0.686)	0.018 (0.705)	0.011 (0.845)	0.012 (0.797)
Tender dummy	0.010** (0.024)	0.004 (0.390)	0.009* (0.063)	0.006 (0.230)	0.011** (0.023)	0.006 (0.231)
Diversity dummy	0.002 (0.611)	0.002 (0.683)	0.003 (0.510)	0.002 (0.677)	0.002 (0.632)	0.002 (0.722)
Friendly deal dummy	0.009** (0.043)	0.014*** (0.003)	0.010* (0.051)	0.014*** (0.002)	0.010** (0.038)	0.014*** (0.003)
Relative deal value	-0.021*** (0.000)	-0.016*** (0.002)	-0.021*** (0.000)	-0.015*** (0.004)	-0.020*** (0.003)	-0.016*** (0.003)
Log (1+leverage)	0.003 (0.432)	0.001 (0.701)	0.003 (0.403)	0.001 (0.759)	0.003 (0.488)	0.001 (0.733)
log(G-Index)	-0.007 (0.236)	-0.008 (0.144)	-0.009 (0.171)	-0.008 (0.188)	-0.007 (0.269)	-0.009 (0.134)
Stock payment (%)		-0.024*** (0.000)		-0.024*** (0.000)		-0.023*** (0.000)
Constant	0.006 (0.857)	0.044 (0.132)	0.036 (0.253)	0.024 (0.475)	0.015 (0.695)	0.049 (0.113)
No of obs	1054	1055	1030	1033	1032	1033
Prob>F	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***

Panel B				
	Model1	Model2	Model3	Model4
Unpredicted-bidder	-0.010** (0.016)	-0.003 (0.451)	-0.006 (0.113)	-0.005 (0.161)
Predicted-bidder $\times$ log(1 + excess cash reserve ratio)	-0.004 (0.532)	-0.004 (0.537)	-0.007 (0.220)	-0.002 (0.710)
Unpredicted-bidder $\times$ log(1 + excess cash reserve ratio)	-0.021*** (0.000)	-0.014** (0.013)	-0.016*** (0.001)	-0.009 (0.115)
Unpredicted-bidder $\times$ high tangability dummy $\times$ log(1 + excess cash reserve ratio)	0.028*** (0.007)		-0.01 (0.508)	
Unpredicted-bidder $\times$ high tangability dummy $\times$ all-stock dummy $\times$ log(1 + excess cash reserve ratio)			0.042* (0.063)	
Unpredicted-bidder $\times$ high tangability dummy $\times$ all-cash dummy $\times$ log(1 + excess cash reserve ratio)			0.056** (0.010)	
Unpredicted-bidder $\times$ high G-Index dummy $\times$ log(1 + excess cash reserve ratio)		0.004 (0.660)		0.025 (0.198)
Unpredicted-bidder $\times$ high G-Index dummy $\times$ all-stock dummy $\times$ log(1 + excess cash reserve ratio)				-0.037 (0.143)
Unpredicted-bidder $\times$ high G-Index dummy $\times$ all-cash dummy $\times$ log(1 + excess cash reserve ratio)				-0.025 (0.203)
Log (Market value)	-0.002 (0.154)	-0.001 (0.297)	-0.001 (0.286)	-0.002 (0.268)
Log (1 + market-to-book)	-0.020** (0.030)	-0.016** (0.048)	-0.020** (0.011)	-0.023*** (0.007)
Asset tangibility	0.041*** (0.009)	0.027** (0.048)	0.031** (0.017)	0.028** (0.039)
Log (ROA)	0.006 (0.145)	0.004 (0.260)	0.007* (0.056)	0.008* (0.059)
Log (1+average sale growth)	-0.008 (0.459)	-0.007 (0.533)	-0.008 (0.438)	-0.007 (0.484)
CAR (-255,-15)	-0.017 (0.674)	-0.048 (0.202)	-0.067 (0.101)	-0.057 (0.126)
Overpay	0.013 (0.796)	0.023 (0.628)	0.013 (0.783)	0.003 (0.952)
Tender dummy	0.002 (0.732)	0.005 (0.398)	0.005 (0.355)	0.008 (0.100)
Diversify dummy	-0.001 (0.872)	0.002 (0.570)	0.002 (0.577)	0.003 (0.417)
Friendly deal dummy	0.022*** (0.000)	0.020*** (0.000)	0.014*** (0.002)	0.014*** (0.007)
Relative deal value	-0.017*** (0.002)	-0.016*** (0.003)	-0.015*** (0.004)	-0.016*** (0.003)
Log (1 + leverage)	-0.002 (0.647)	-0.001 (0.645)	0.001 (0.674)	0 (0.962)
log(G-Index)	-0.013** (0.048)	-0.008 (0.161)	-0.011* (0.060)	-0.011* (0.058)
Stock Payment(%)	-0.021*** (0.001)	-0.025*** (0.000)	-0.024*** (0.000)	-0.019*** (0.001)
Constant	0.052 (0.112)	0.04 (0.185)	0.036 (0.275)	0.035 (0.301)
No of obs	1019	1021	1033	1020
Prob>F	0.00***	0.00***	0.00***	0.00***
F Test (p-value in brackets)				
Null: Unpredicted-bidder $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ high tangability dummy $\times$ log(1 + excess cash reserve ratio) = 0	[0.439]			
Null: Unpredicted-bidder $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ G-Index dummy $\times$ log(1 + excess cash reserve ratio) = 0		[0.192]		
Null: Unpredicted-bidder $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ high tangability dummy $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ high tangability dummy $\times$ log(1 + excess cash reserve ratio) $\times$ all-stock dummy = 0			[0.333]	
Null: Unpredicted-bidder $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ high tangability dummy $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ high tangability dummy $\times$ log(1 + excess cash reserve ratio) $\times$ all-cash dummy = 0			[0.055]*	
Null: Unpredicted-bidder $\times$ High G-Index dummy $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ High G-Index dummy $\times$ log(1 + excess cash reserve ratio) $\times$ all-stock dummy = 0				[0.496]
Null: Unpredicted-bidder $\times$ High G-Index dummy $\times$ log(1 + excess cash reserve ratio) + Unpredicted-bidder $\times$ High G-Index dummy $\times$ log(1 + excess cash reserve ratio) $\times$ all-cash dummy = 0				[0.978]

**Table 5**  
**The Effect of Excess Cash Reserve on Bidders' Post-acquisition Operating performance**

This table reports the weighted least square regression estimates of the effects of excess cash reserve on a bidder's post-acquisition operating performance. Only completed acquisitions are examined. The dependent variable is bidder post-acquisition operating cash flow performance averaged over 4 years after deal completion. Pre-acquisition operating performance is a market-value-weighted average of a bidder's and the target's operating performance, averaged over 4 years before deal announcement. Operating performance is measured as operating cash flow over total assets, adjusted by the median performance of other firms that are in the same excess cash reserve ratio quartile of the same industry of the Fama-French 12-industry classification. Actual cash reserve ratio is cash and short-term investment over total assets net of cash and short-term investment. Excess cash reserve ratio is the difference between the actual cash reserve ratio and the required cash reserve ratio estimated using a cross-sectional OLS regression estimated for each of the Fama-French 12 industries in each year. The excess cash reserve dummy is 1 if a bidder's excess cash reserve is in the top quartile of the sample, and 0 otherwise. G-Index is the governance index of Gompers, Ishii, and Metrick (2003). The high G-Index dummy is 1 if a company is in the top quartile of the sample, and 0 otherwise. Residual market-to-book is the residual from an OLS regression of market-to-book ratio of total assets on the logarithm of 1 plus the G-Index, estimated each year. The high residual market-to-book dummy is 1 if the residual market-to-book ratio is in the top quartile of the sample, and 0 otherwise. The constant term captures abnormal operating performance after the acquisition attributable to the deal. The coefficient of the pre-acquisition operating performance captures the continuation of operating performance after the acquisition. Values in parentheses are p-values. \*, \*\*, \*\*\* indicate significance at 10%, 5% and 1% levels.

	Model1	Model2	Model3	Model4
Pre-acquisition operating performance	0.350*** (0.000)	0.412*** (0.000)	0.426*** (0.000)	0.417*** (0.000)
High excess cash reserve dummy		-0.003 (0.260)	-0.004* (0.096)	-0.004 (0.142)
High residual market-to-book dummy × high excess cash reserve dummy			0.010** (0.012)	
High G-Index dummy × high excess cash reserve dummy				0.004 (0.245)
Constant	0.007*** (0.000)	0.007*** (0.000)	0.007*** (0.000)	0.007*** (0.000)
No of obs	1360	1359	1278	1358
Prob>F	0.00***	0.00***	0.00***	0.00***
F Test (p-values in brackets)				
Null: High excess cash reserve dummy + high residual market-to-book dummy × high excess cash reserve dummy = 0			[0.095]*	
Null: High excess cash reserve dummy + high G-Index dummy × high excess cash reserve dummy = 0				[0.871]

**Table 6**  
**The Effects of Excess Cash Reserve on a Bidder's Post-acquisition Uses of Funds and Changes in Assets**

This table reports OLS regression results showing how a bidder's excess cash reserve relates to its post-acquisition uses of funds and changes in assets. The dependent

variable is  $Y = \ln[(\sum_{i=1}^t V_i / TotalAsset_0) + 1]$  for  $V =$  (funds used on) R&D, capital expenditure, long-term debt reduction and acquisitions, and

$Y = \ln[(V_t - V_0) / TotalAsset_0 + 1]$  for  $V =$  inventory, for  $t = 1$  to 4.  $t = 0$  denotes the fiscal year prior to deal announcement, and  $t = 1$  to 4 are the 1st to the 4th year after deal completion/withdrawal. At  $t = 0$ , total assets and inventory is the sum of the bidder's and the target's when a deal is completed; when a deal is withdrawn, the bidder's figure is used. At  $t = 1$  to 4, R&D, capital expenditure (*CAPEX*), long-term debt reduction (*LT Debt Reduction*), acquisitions, and inventory are for the bidder. *Actual cash reserve ratio* is cash and short-term investment over total assets net of cash and short-term investment. Excess cash reserve ratio is the difference between the actual cash reserve ratio and the required cash reserve ratio estimated using a cross-sectional OLS regression for each of the Fama-French 12 industries in each year. *Total fund* is the sum of funds from operations, sales of property, plant and equipment, sale of common and preferred stock, long-term debt issuances and other sources of funds, aggregated over the corresponding horizons. *Relative deal value* is deal value deflated by pre-acquisition bidder market value of assets. *Size* is the logarithm of a bidder's total assets in millions of dollars prior to acquisition announcement. \*, \*\* and \*\*\* indicate significance at 10%, 5% and 1% respectively. The cross-sectional regressions are specified below (firm subscripts are omitted for the sake of brevity).

$$\begin{aligned}
 Y_t = & \beta_1 \log(1 + Excess\ Cash\ Reserve\ Ratio_0) + \beta_2 \log(1 + Actual\ Cash\ Reserve\ Ratio_0) \\
 & + \beta_3 \log(1 + Total\ Fund_t / TotalAsset_0) + \beta_4 Relative\ Deal\ Value + \beta_5 Size_0 \\
 & + \sum_{i=1980}^{2007} \theta_i YrDummy_i + \sum_{j=1}^{11} \lambda_j IndustryDummy_j + \epsilon_t
 \end{aligned}$$


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<i>Y</i>	<i>t</i>	Log(1+ excess cash reserve ratio)	Log(1 + actual cash reserve ratio)	Total fund	Relative deal value	Size	Obs	Adj-Rsquared
$\sum LT\ Debt\ Reduction$	1	0.014**	-0.073***	0.041***	0.005	-0.011***	1527	0.331
	2	0.014	-0.143***	0.062***	0.038*	-0.029***	1461	0.352
	3	0.021*	-0.200***	0.073***	0.064**	-0.042***	1364	0.349
	4	0.044***	-0.280***	0.089***	0.057	-0.052***	1277	0.356
$\Delta\ Inventory$	1	0.001	0.01	0.009***	0.002	0.01	1560	0.107
	2	-0.007*	0.013	0.012***	-0.002	0.013	1465	0.142
	3	-0.001	0.021	0.014***	0.004	0.021	1359	0.133
	4	0.003	0.031*	0.014***	0.011	0.031*	1263	0.098
$\sum\ CAPEX$	1	0.013***	-0.016**	0.009***	-0.018**	0.002**	1570	0.234
	2	0.024***	-0.031**	0.016***	-0.030**	0.002	1479	0.243
	3	0.031***	-0.036*	0.021***	-0.049**	0.002	1373	0.253
	4	0.042***	-0.025	0.032***	-0.066**	0.004	1279	0.272
$\sum\ R\&D$	1	-0.010***	0.093***	0.003***	0.001	0.004***	1576	0.483
	2	-0.020***	0.156***	0.006***	-0.002	0.008***	1482	0.529
	3	-0.027***	0.205***	0.004**	-0.001	0.011***	1375	0.532
	4	-0.033***	0.271***	0.005**	0.001	0.016***	1281	0.521
$\sum\ Acquisition$	1	-0.013**	0.006	0.038***	0.064***	-0.014***	1345	0.293
	2	-0.026***	-0.008	0.029***	0.044**	-0.021***	1369	0.204
	3	-0.030***	0.000	0.026***	0.03	-0.025***	1292	0.178
	4	-0.020*	0.018	0.032***	0.052*	-0.027***	1220	0.154