Does an Acquiring Firm's Cash Reserve Have a Negative Wealth Effect in the U.K.?[†]
Shortened title: Cash Reserve Effects for Bidders in the U.K.

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Abstract

Using a sample of U.K. bidder companies from 1984 through 2007, we find that announcement returns are better for bidders of higher excess cash reserve. This suggests that acquisitions by high excess cash reserve bidders are not necessarily value-decreasing as is suggested by the agency theory and found in the U.S. market. Managers may need cash to ensure that all potential good investment opportunities are financed internally if not externally due to high costs of external funds. Moreover, a company of higher excess cash reserve is more likely to be a bidder, and a bidder of higher excess cash reserve has better operating performance than a low-excess-cash-reserve bidder in post-acquisition years. Overall, our results suggest that, in the U.K., growth opportunities dominate agency conflicts as the underlying mechanism that drives the wealth effects of corporate cash reserve in acquisitions. This possibly can be explained by the fact that the U.K. regulation of takeovers attempts to ensure that actions taken by managements should be preceded by close shareholder scrutiny.

Key words: cash reserve, acquisition, growth, information theory, agency theory.
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1. Introduction

Previous literature of mergers and acquisitions (M&A) has documented that a cash-rich (i.e., high cash reserve) company in the U.S. is more likely to be a bidder than a cash-poor (i.e., low cash reserve) company (Harford, 1999). Further, a cash-rich U.S. bidder tends to have low cumulative abnormal returns during the announcements (Harford, 1999; Schlingemann, 2004; Gao, 2009).

Nonetheless, the underlying dynamics of such phenomenon remain ambiguous. Consequently, the direction of cash-reserve's wealth effect is not a priori non-debatable. Finance theories provide two frameworks of the wealth implications of corporate cash reserve. The first is based on the agency cost of free cash flow (i.e., the agency theory) proposed by Jensen (1986). The agency theory suggests that uncontrolled managers are more likely to spend excess cash (i.e., cash that is left over after all positive-NPV projects have been funded) on value-destroying takeovers than managers who are frequently monitored (Morck, Shleifer and Vishny, 1990; Schlingemann, 2004; Harford, 1999; and Harford, Mansi, and Maxwell, 2008). The second is based on information (i.e., the information theory), which has received little attention in the literature relative to the agency theory. It maintains that cash reserve conveys information on a company's growth opportunities, in that managers of a high-growth company proactively reserve cash to ensure all the good investment opportunities are funded internally if the cost of external capital is too high due to market imperfections (Myers and Majluf, 1984; Myers, 1977; Opler, Pinkowitz, Stulz, and Williamson, 1999).[1] If a high cash reserve is a result of high growth, a cash-rich bidder should have better announcement returns. Complicating the announcement effect however is the misevaluation ramification of the information theory. Specifically, if a greater proportion of a company's value is derived from growth opportunities, such a company is more likely to be misvalued (because growth opportunities are more difficult to evaluate than assets in place).[2] Building on the two-sided asymmetric information framework of Rhodes-Kropf and Viswanathan (2004) and Brusco, Lopomo, Robinson and Viswanathan (2007), Gao (2009) argues that corporate cash reserve has an adverse selection effect. Simply put, if a company does not have to issue to invest, an attempt to do so sends a strong signal of overvaluation. Gao (2009) finds, for a U.S. sample of all-stock takeovers, that adverse selection explains why cash reserve has a negative announcement effect. Moreover, under the information theory, the negative announcement effect of cash reserve can simply be a result of revaluation by investors (rather than adverse selection) because acquisitions are salient events and attract a lot of market scrutiny (Dong, Hirshleifer, Richardson, and

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[1] It is useful to bear in mind that cash reserve reflects managers' perception of company growth and therefore may not be available to the market. In other words, cash reserve may provide information that is not reflected in market valuation ratios.

[2] It is right to note that misvalueation is two-sided in that a company can be either over- or under-valued. The direction of misvaluation is de facto an empirical issue.

Teoh, 2006). In a nut shell, agency conflicts, growth, and misvaluation may all underlie the cash reserve effect in an acquisition. Agency conflicts suggest a positive announcement effect, growth a positive effect, and misvaluation two-sided.[3]

The information theory, as does the agency theory, also potentially explains that a cash-rich company is more likely to acquire other companies. This is because a high-growth company (thus higher cash reserve) tends to acquire so that assets are deployed to better use (Jovanovic and Rousseau, 2002). There is flipping side of the cash-reserve effect on the probability of being a bidder however. In particular, a bidder of high growth prefers to pay using stock in order to reserve cash (Dong et al., 2006; Harford et al., 2008), while the target prefers cash payment as a high-growth bidder's stock is difficult to evaluate. A cash-rich company rationally expects such conflicts and refrain from making an offer. Once more, misvaluation may complicate the issue in that a high-growth company is more likely to be misvalued, and overvaluation drives takeovers (Rhodes-Kropf and Viswanathan, 2004; Shleifer and Vishny, 2003; Martin, 1996; Dong, Hirshleifer, Richardson and Teoh, 2006).

The aim of this study is to examine whether in the U.K., the information theory dominates the agency theory as an underlying mechanism for the wealth effects of an acquiring firm's cash reserve. It is well documented in the previous literature that the policy and institutional setting of the U.K. are less favourable for managers than those of the U.S. (Franks and Mayer, 1996; Franks and Mayer, 1997; Holl and Kyriazis, 1997). Mergers and acquisitions are regulated by the City Panel on Takeovers and Mergers in accordance to the City Code on Takeovers and Mergers. The Code is designed to ensure that any actions taken by the management must be preceded by close shareholder scrutiny. Moreover, managers in the U.K. are likely to be held accountable for a bad acquisition decision. The Royal Bank of Scotland's acquisition of ABN Amro in 2007, and the Lloyds TSB's acquisition of HBOS in 2008 are good examples. Consequently, managers in the U.K. are less likely to pursue private interests in takeover than their U.S. counterparts. Taken together, the U.K. regulation framework suggests that there is probably a greater opportunity in the U.K. than in the U.S. to find evidence consistent with the information theory. We therefore hypothesize that, in the U.K., the wealth effect of an acquiring firm's cash reserve is likely to reflect a principal-agent relationship that maximizes shareholders' value.

Empirically, we measure a company's cash reserve the company's demand for cash. This is because two companies of the same level of actual cash reserve ratio (i.e. the sum of cash and cash equivalents over total assets) might be one classified as cash-rich and the other cash-poor according to their respective demand for cash. We estimate a company's required cash reserve ratio using a pooled

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[3] Growth and misvaluation are two ramifications of the information theory.

time-series cross-sectional OLS regression with industry dummies, following Opler et al. (1999). The difference between the actual cash reserve ratio and its required level (termed as excess cash reserve ratio) is used to measure a company's cash availability. [4]

We document three sets of results in three different stages of acquisition, namely announcement effects, predicting bidder, and post-acquisition operating performance.

Our first set of results shows that, in the U.K., a bidder' cumulative abnormal return (*CAR*) during the announcement period is positively related to its excess cash reserve. This finding supports the growth ramification of the information theory that higher cash reserve is associated with higher growth. It suggests that growth dominates agency conflicts and misevaluation in driving the announcement wealth effect of cash reserve for U.K. bidders. The positive wealth effect of cash reserve at deal announcement in the U.K. contrasts the negative cash-reserve effects well documented in the U.S. (Harford 1999). It indicates that high cash reserve of a U.K. bidder reflects a principal-agency relationship that is favourable to the shareholders rather than to the managers. We further separate the bidders into predicted and unpredicted bidders. We find that the positive effect of cash reserve is mainly from bidders that are not expected to bid.[5] As market price changes only to reflect news that is not already anticipated, the cash reserve effects largely disappear for predicted bidders.[6]

We perform further analysis based on decompositions of company market-to-book ratios. Further tests based on the market-to-book decompositions provide further insights into the cash-reserve effects. Growth opportunities may arise in various ways. Some opportunities are long lasting, for example 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, or a high sector entry requirement protects the abnormal returns of all companies in an industry. Other opportunities are short lived, for example a new product that can be easily mimicked by competitors, or a short-term cut of government spending on railroad represents a transitory growth opportunities for the automobile sector. Some opportunities are due to industrial factors and therefore are available to all companies in the industry, while others are firm-specific. It is therefore meaningful to understand what kind of growth opportunities underlies the positive cash reserve effect at acquisition announcement. Decomposition of the market-to-book ratio grants yet another benefit. The market-to-book ratio is an ambiguous measure of growth in that it also measures misvaluation (Lee and Swaminathan, 1999; Rhods-Kropf and Viswananthan, 2004; Rhodes-Kropf et al. 2005; Dong et al. 2006). The decompositions allow us to isolate a component that is purely growth (a long-term growth

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[4] Section 3.1 provides a more detailed description of the procedure.
[5] Interestingly, a large proportion of U.K. bidders are unexpected (65 expected vs. 145 unexpected) while in the U.S. (Harford 1999) only a small proportion of bidders are unexpected (356 expected vs. 131 unexpected).
[6] See Dasgupta, Gan, and Gao (2010) for a similar notion of price reaction to unanticipated news.

component) from other parts that may capture both growth and misvaluation. In particular, we follow Rhods-Kropf et al. (2005) and decompose the market-to-book ratio of equity into a long-term growth component, a transitory sector component, and a transitory firm-specific component.[7] We find that the positive cash reserve effect is mainly from the bidders of high long-term growth. The transitory sector component and transitory firm-specific component capture, apart from growth, transitory sector misvaluation and transitory firm-specific misvaluation. Misvaluation biases against finding stronger positive cash reserve effect when growth is high. Indeed, the transitory sector component and transitory firm-specific component does not vary the cash reserve effect. The complication of misvaluation is absent for the long-term growth component however. Finally, we examine how the cash-reserve effect changes when the level of agency conflicts varies. We follow Hall and Liebman (1998) and Baker and Hall (2004) to measure the level of agency conflict using the pound value of a CEO's total ownership (call it total wealth hence forth) in his company. Higher total wealth means less agency conflicts. We find that a bidder's cash reserve has no significant effect (a positive effect) when the agency conflict is strong (weak). Therefore, we do not find support for the agency theory, but the positive cash reserve effect for weak agency conflicts goes with our conjecture that, in the U.K., the cash reserve effect reflects an agency-principal relationship more favourable to shareholders.

Our second set of results show that a company of more cash reserve is more likely to be a bidder. This result is consistent with both the agency and the information theory. Under the agency theory, less controlled managers tend to spend excessive cash on value-destroying acquisitions. Under the information theory, the prediction is two-sided. On the one hand, a high-growth (and thus cash-rich) company intend to acquire other companies (Jovanovic and Rosseau, 2002). On the other hand, a bidder tends to disagree with its target on the terms of payment. In particular, a bidder of high growth prefers to use stock to reserve cash (Dong et al., 2006; Harford et al., 2008), while the target prefers cash as they find the bidder's stock is difficult to evaluate. A cash-rich company rationally expects such conflicts and refrains from offering to takeover. We find that the positive cash reserve effect on the probability of being a bidder is stronger for a firm with higher transitory sector component of market-to-book ratio, but remains the same when the transitory firm-specific component or the long-term growth component is higher. The stronger positive cash reserve effect on the probability of being a bidder when transitory sector component is high suggests that industrial consolidations may give rise to growth opportunities as real assets are redeployed (Brainard and Tobin, 1977), and a high cash

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[7] Section 3.2 provides a more detailed discussion of the decompositions. Admittedly, this procedure per se is still imperfect in that it cannot entirely separate misvaluation from growth. However, it is useful for us to gain further insights of the cash reserve effect.

reserve enables a company to capture such opportunities.[8] Finally, bidder CEO's total wealth does not alter the cash-reserve effect on the probability of being a bidder, contrary to the prediction of agency theory.

Our final set of results shows that, on average in the 3 years after acquisition, a cash-rich bidder's annual post-acquisition operating performance is 5.3% higher than that of a cash-poor bidder's. Such difference in operating performance is stronger for the group of bidders of higher long-term growth component or higher transitory firm-specific component. For example, for the subsample of bidders with greater-than-sample-median long-term growth component, a cash-rich bidder's annual performance is 6.6% higher than a cash-poor bidder's in the 3 years after acquisition. This provides further support for the growth argument of information theory, rather than for the agency theory.

Overall, our study makes three contributions. First, we find that the cash-reserve wealth effects of U.K. bidder companies reflect a principal-agency relationship that favours the shareholders. Excess cash reserve is associated with better announcement bidder returns and better post-acquisition operating performance, which contrasts the U.S. results. Such finding can be probably attributed to the policy and institutional setting in the U.K. which is less favourable to managers. Second, our study suggests that a single theoretical framework based on agency theory cannot explain the cash reserve effects in various stages of acquisitions. Growth is an important factor that drives the role of cash reserve in acquisitions. Third, the focus of M&A literature in the U.K. has been on how bidder returns are related to bidder market ratios (Robert, Gosh, Paul and Hughes 2005; Sudarsanam and Mahate 2003; Coakley, Fu and Thomas 2009, and Bi and Gregory 2009). Our study adds to the literature by studying the effects of cash reserve on bidder performance both at the announcement and in post-acquisition years.

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 describes methodology, and section 5 performs empirical analysis and reports results. Conclusion and summary are in section 6.

2. Literature review

2.1. Cash, Growth, and Takeover

Finance theories suggest that a company of high growth is 1) have strong intention to reserve cash, and 2) more likely to be a bidder.

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[8] Since the transitory sector component and transitory firm-specific component also measures misvaluation, the results here need to be interpreted with caution.

For a company that operates in an imperfect capital market, adverse selection in the equity markets (Myers and Majluf, 1984) and the agency cost of debt (Myers, 1977; Jensen and Meckling, 1976) may cause the company to miss value-enhancing investment opportunities. Firm value can be enhanced if a company has more cash reserve that enables it to invest when external funds are too expensive. Consequent, a firm of higher growth is likely to reserve more cash than a firm of lower growth (Opler et al. 1999; Almeida, Campello and Weisbach, 2004; Bates, Kahle and Stulz, 2006).

Brainard and Tobin (1977) maintain that a firm of high Q-ratio (i.e., the ratio of market value of assets over the replacement cost of capital, and is usually measured by the market-to-book ratio of assets) is likely to make more investments than a firm of low Q-ratio. Jovanovic and Rousseau (2002) argue that a merger is unlikely if two firms have the same market-to-book ratio, and arises when two firms' market-to-book ratios differ. They argue that profitable asset re-allocation arises as a high market-to-book company buys a low market-to-book company.

2.2. The Agency Cost of Free Cash Flow

The agency theory of free cash flow has received tremendous attention in the literature. Jensen (1986) uses free cash flow to refer to the cash flow in excess of what is required to finance all positive-NPV projects. He maintains that uncontrolled managers are likely to waste the free cash flow on value-destroying projects. Morck, Shleifer and Vishney (1990) find that acquisitions are driven by mangers' private benefits. They argue that managers are likely to overpay targets, motivated by high private benefits associated with acquisitions. Lang, Stulz and Walkling (1989) find that well-managed bidder firms' benefit by taking over poorly-managed targets, but not vice verca. They argue that the contrast is due to the fact that takeovers create wealth through better use of target resources, a technique in which poorly-managed bidders' lack. Subsequent studies by Lang, Stulz and Walkling (1991), Schlingemann(2004) and Harford (1999) examine agency cost of free cash flow using company cash flow or cash reserve as a proxy for the level of agency conflicts.[9] They independently find that bidder cash flow (or reserve) has a negative announcement effect. Harford (1999) points out that the negative cash reserve effect is the results of cash-rich firms making value-destroying acquisitions. Maloney and Mitchell (1993) find that debt mitigates the agency costs of free cash flow, by subjecting managers to periodic payments to bondholders. To put differently, leveraged firms force managers to take extra care in making cash flow decision, due to the required cash payments to bond holders. As a consequence, a bidder of high leverage experiences higher announcement returns than a bidder with low leverage. These studies are based on the U.S. market, while the U.K. market remains unexplored.

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[9] Excess cash reserve is the accumulation of free cash flow.

2.3. Cash, Two-sided Information Asymmetry, Adverse Selection, Misvaluation and Announcement Effect

A high cash reserve can be associated with high misvaluation in that high growth leads to higher cash reserve, and meanwhile the present value of growth opportunities are more difficult to evaluate than that of assets in place. A large body of literature shows that overvaluation drives takeovers. Shleifer and Vishney (2003) and Rhodes-Kropf and Viswanathan (2004), on different assumptions of market rationality and principal-agency relationship, find that overvaluation leads to merger waves. Rhodes-Kropf et al. (2005) and Dong et al. (2006) find evidence in support of the argument that overvaluation drives acquisitions. Consistent with the overvaluation motive of acquisitions, several studies document negative market responses to stock offers at deal announcements (e.g., Travlos, 1987; Franks, Harris and Mayer, 1988; Asquith, Bruner and Mullins, 1987; Wansley, Lane and Yang, 1987; Servaes, 1991; Martin, 1996).

The overvaluation argument is also consistent with the finding in the U.S. that high cash reserve has a negative announcement wealth effect for the bidders. Gao (2009) finds that the negative announcement effect of cash reserve for stock offers is due to adverse selection. His 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 in both deal synergies and a bidder's standalone value. An overvalued bidder tends to pay the target using overvalued stock, but target managers are not easily fooled. They are rational and try to maximize shareholders' value. They will not accept an offer unless they expect the value of payment is greater than their reservation value. They will request cash payments in order to remove "lemon" bidders if they believe overvaluation is likely, but are not always successful due to their limited knowledge about the bidder's stand-alone value and the deal synergies. In particular, as Baysian updaters, they attribute a high stock offer to both high synergies and high overvaluation. When overvaluation is high, they expect high synergies and therefore accept too many stock offers. However, investors in the market would interpret a stock offer from a cash-rich bidder as a strong signal of overvaluation.[10] However, Gao (2009) investigates only stock offers in the U.S. and not all types of offers.

The negative price reaction to high cash reserve can also be due to, apart from adverse selection, revaluation of bidder shares as a result of closer market scrutiny. This is because acquisitions are salient events and attracts a lot of attention from the market (Dong et al., 2006).

In a nut shell, the information theory has two ramifications. First, a higher cash reserve means higher growth, and therefore a positive effect of cash reserve on bidder announcement returns.

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[10] Several studies show that the stock market is efficient in extracting and processing information, for example see Pagano, Panetta and Zingales (1998), Subramanyam and Titman(1999) and Luo (2005).

Second, a higher cash reserve means higher misvaluation and/or stronger adverse selection, which in turn suggests a negative wealth effect of cash reserve. The misvaluation ramification of the information theory potentially complicates our analysis. However it should bias against we finding a positive effect for cash reserve.

Previous studies on the effects of cash reserve are solely based on the U.S. market, while a market like the U.K. remained unexplored. The focus of M&A literature in the U.K. has been on how bidder returns are related to bidder market ratios (Robert, Gosh, Paul and Hughes 2005; Sudarsanam and Mahate 2003; Coakley, Fu and Thomas 2009, and Bi and Gregory 2009). Our study adds to the literature by studying the effects of cash reserve on bidder performance both at the announcement and in post-acquisition years.

3. Methodology

3.1. Measuring Excess Cash Reserve Ratio

We estimate a firm's required level of cash reserve following Opler et al. (1999). In particular, we estimate the required cash reserve through a pooled time series cross-sectional OLS regression with year dummies (model 2 in table 4 of Opler et al., 1999, p25). The sample used for estimation includes all Datastream firm–years during 1984 through 2007 subject to data availability. We specifically estimate the following equation:

$$Cash\ Reserve\ Ratio_{it} = \beta_1 MTB_{it} + \beta_2 SIZE_{it} + \beta_3 CFAST_{it} + \beta_4 NWCAST_{it}$$
$$+ \beta_5 CAPEXAST_{it} + \beta_6 LEV_{it} + \beta_7 R\&D + \gamma YDUM_t + \varepsilon_{it} \quad (1)$$

where i and t index firms and years. Cash reserve ratio is cash and cash equivalent over total assets. MTB is market-to-book ratio of assets. SIZE is the logarithm of total assets in millions of 1994 GBP. CFAST is net income before depreciation and amortization over book value of assets. NWCAST is net working capital over book value of assets. CAPEXAST is capital expenditure over book value of assets. LEV is total debt over total assets. R&D is expenditure on research and development normalized by net sales. YDUM are year dummies. The residual of Equation (1) is a measure of excess cash reserve ratio.

3.2. Decomposing Market-to-book Ratio

As is discussed in the introduction, growth opportunities are of various natures. Some opportunities are long lasting, while others are short lived. Some opportunities are due to industrial factors and therefore are available to all companies in the industry, while others are firm-specific. It is

therefore meaningful to understand what kind of growth opportunities underlies the positive cash reserve effect at acquisition announcement. Decomposition of the market-to-book ratio also has another benefit. In particular, the market-to-book ratio is an ambiguous measure of growth in that it also reflects misvaluation (Lee and Swaminathan, 1999; Rhods-Kropf and Viswananthan, 2004; Rhodes-Kropf et al. 2005; Dong et al. 2006). The decompositions allow us to isolate a component that is purely growth (a long-term growth component) from other parts (name the transitory firm-specific component and the transitory sector component) that may as well reflect misvaluation.

We follow the spirit of Rhods-Kropf et al. (2005) to decompose the market-to-book ratio of equity into three components: a long-term growth component, a transitory sector component, and a transitory firm-specific component. The three components of market-to-book ratio are estimated for a firm i, in a sector j, at time t, using the following equation:

$$m_{it} - b_{it} = \underbrace{m_{it} - v(\theta_{it}; \alpha_{jt})}_{\text{transitory firm-specific component}} + \underbrace{v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)}_{\text{transitory sector component}} + \underbrace{v(\theta_{it}; \alpha_j) - b_{it}}_{\text{long-run growth component}} \tag{2}$$

,where m_{it} is the logarithm of market value of equity for firm i at time t and b_{it} is the logarithm of book value of equity for firm i at time t. θ_{it} is a vector of accounting variables for firm i at year t. α_j is a vector of multiples that are attached by investors to the set of accounting variables in the long-run. α_{jt} is a vector of multiples that are attached by investors to the set of accounting variables in year t. To estimate α_{jt}, we run annual cross-sectional regressions (Equation 3) on firms grouped by 10 Fama-French industries (Financial and Utility firms are excluded from the estimation).

$$m_{it} = \alpha_{0jt} + \alpha_{1jt} b_{it} + \alpha_{2jt} \text{Ln(NI)}_{it} + \alpha_{3jt} I(<0)\text{Ln(NI)}_{it} + \alpha_{4jt} \text{LEV}_{it} + \varepsilon_{it} \tag{3}$$

, where NI is the absolute value of net income, $I(<0)$ is an indicator for observations with negative net income, and LEV is the leverage ratio. The estimated value of $v(\theta_{it}; \alpha_{j_t})$ for firm i in sector j at time t is given by the parameter estimates from Equation 3,

$$v(\theta_{it}; \alpha_{jt}) = \hat{\alpha}_{0jt} + \hat{\alpha}_{1jt} b_{it} + \hat{\alpha}_{2jt} \text{Ln}(NI)_{it} + \hat{\alpha}_{3jt} I(<0)\text{Ln(NI)}_{it} + \hat{\alpha}_{4jt} LEV_{it} + \varepsilon_{it} \tag{4}$$

. $v(\theta_{it}; \alpha_j)$ is obtained by averaging each coefficient in Equation (4) over time $\overline{\alpha}_{kj} = 1/T \sum \alpha_{kjt}$, $k = 0, 1, 2, 3, 4$, T is the number of years in the whole times series for a company, then calculate,

$$v(\theta_{it};\alpha_j) = \bar{\alpha}_{0j} + \bar{\alpha}_{1j}b_{it} + \bar{\alpha}_{2j}\mathrm{Ln}(NI)_{it} + \bar{\alpha}_{3j}I(<0)\mathrm{Ln}(NI)_{it} + \bar{\alpha}_{4j}LEV_{it} + \varepsilon_{it} \tag{5}$$

The transitory firm-specific component, $m_{it} - v(\theta_{it};\alpha_{jt})$, captures transitory growth opportunities available to a firm. The transitory sector component, $v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$, captures transitory growth opportunities available to all the firms in an industry. The long-term growth component, $v(\theta_{it};\alpha_j) - b_{it}$, captures long-term growth opportunities to a firm and/or to an industry. According to Rhodes-Kropf et al. (2005), the transitory firm-specific component and transitory sector component also capture temporal misvaluation at both the firm and the sector level. Therefore we should exert extra caution when trying to interpret the results that has to do with the two transitory components. The long-term growth component does not have the complications of misevaluation, if we believe price converges to the fundamental value over the long run. In the absence of better methodology, we are not able to further separate misevaluation from growth for the transitory firm-specific component and the transitory sector component.

3.3. Predicting bidder.

The baseline model we estimate is a logistic model estimated on 10713 firm-years, with 282 bidder firm-years where a company announces one or more acquisitions. The period is from 1984 through 2007. Specifically, we estimate the following model:

$$Bidder_{i,t} = \alpha + \beta_1 Excash_{i,t-1} + \lambda Controls_{i,t-1} + \gamma YDUM_{i,t} + \delta INDDUM_{it} + \varepsilon_{i,t} \tag{6}$$

, where i and t index the companies and the years respectively. *Bidder* is a dummy variable equal to 1 if a company announces one or more acquisitions in a year and 0 otherwise. *Excash* is log(1 + excess cash reserve ratio). *YDUM* is a vector of year dummy variables from 1984 to 2007. *INDDUM* is a vector of industry dummy variables defined based on Fama-French 10 industries. *Controls* is a vector of control variables. The control variables include log of total assets, log of leverage (defined as a ratio of book value of debt to book value of equity), log of market-to-book ratio of equity, return on assets (defined as ratio of operating income to total asset), mean abnormal returns over the past 3 years, average standard deviations of daily stock returns over the past 3 years, non-cash working capital (defined as working capital minus increase/decrease in cash divided by total asset).[11] Due to the non-linear nature of logistic model, the parameters do not have a direct interpretation; hence we also compute the marginal effect (slope) of the coefficients (see Greene 2000, p812–816 for the

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[11] The mean abnormal returns are computed as daily abnormal returns averaged over 3 years prior to the announcement. Abnormal returns are estimated using a market model approach over rolling windows.

calculation of marginal effects).The overall fit of the model is determined by likelihood ratio test and pseudo R-square.

In addition to the baseline model, we also add interaction terms between cash reserve and the 3 components of market-to-book ratio respectively. The purpose is to examine whether the effect of cash reserve on the probability of being a bidder vary according to the level of different types of growth opportunities. Specifically, we use the following specification,

$$
\begin{aligned}
Bidder_{i,t} = &\ \alpha + \beta_1 Excash_{i,t-1} + \\
&\ \beta_2 Excash_{i,t-1} \times Transitory \quad Firm\text{-}specific \ component \quad Dummy_{t-1} + \\
&\ \beta_3 Excash_{i,t-1} \times Transitory \quad Sector \ Component \quad Dummy_{t-1} + \\
&\ \beta_4 Excash_{i,t-1} \times Long\text{-}term \ growth \quad Dummy_{t-1} + \\
&\ \lambda Controls_{i,t-1} + \gamma YDUM_{i,t} + \delta INDDUM_{it} + \varepsilon_{i,t}
\end{aligned}
\tag{7}
$$

, where the dummy variables are defined based on sample medians.

To find out if the level of agency conflict alters the effect of cash reserve on the probability of being a bidder, we introduce the interaction between cash reserve and a total wealth dummy variable. The total wealth dummy variable is 1 if for firms above the sample median and 0 otherwise. Specifically,

$$
\begin{aligned}
Bidder_{i,t} = &\ \alpha + \beta_1 Excash_{i,t-1} + \\
&\ \beta_5 Excash_{i,t-1} \times Total \quad Wealth \quad Dummy_{t-1} + \\
&\ \lambda Controls_{i,t-1} + \gamma YDUM_{i,t} + \delta INDDUM_{it} + \varepsilon_{i,t}
\end{aligned}
\tag{8}
$$

3.4. Predicted and Unpredicted Bidders

If stock prices move only to reflect unanticipated news, we would expect the announcement effects of cash reserve is strongest for bidders that are unexpected. Therefore, in our *CAR* regressions, we further separate the bidders into predicted and unpredicted bidders. Specifically, we first use a logistic model (Equation 6) to predict bidders, and estimate the fitted probabilities for being a bidder and for being a non-bidder respectively. Then, we plot the distributions of these two sets of fitted probabilities. Finally, we find the crossover point for the bidder and non-bidder distributions. A bidder that falls to the right (left) of the cross point is predicted (unpredicted). This method is similar to that applied by Harford (1999). Figure 1, shows the two distributions and they cross at 0.15.

3.5. Announcement effect

We use the following two baseline models to estimate the bidder announcement returns,

$$CAR_i = \alpha + \beta_1 Excash_i + \lambda Controls_i + \gamma YDUM_i + \delta INDDUM_i + \varepsilon_i \qquad (9)$$

$$\begin{aligned}
CAR_i = {} & \alpha + \beta_2 Excash_i \times Predicted\text{-}bidder\ Dummy_i + \\
& \beta_3 Excash_i \times Unpredicted\text{-}bidder\ Dummy_i + \\
& \eta Unpredicted\text{-}bidder\ \ Dummy_i + \lambda Controls_i + \gamma YDUM_i + \delta INDDUM_i + \varepsilon_i
\end{aligned} \qquad (10)$$

, where i indexes acquisitions. *CAR* is the bidder cumulative abnormal return estimated from a market model for a 5-day period from 2 trading days before to 2 trading days after the announcement day (day 0). If the announcement day is a public holiday, we use the first subsequent trading day as day 0. The estimation period is a 250-day window ending 15 trading days before the announcement day (we require at least 30 daily stock returns in the estimation window). The 5-day test period is chosen to accommodate the concern that the announcement date recorded by SDC is inaccurate. *Unpredicted-bidder Dummy* is 1 for an unexpected bidder and 0 otherwise. *predicted-bidder Dummy* is 1 for an expected bidder and 0 otherwise (see section 3.4 for a more detailed explanation of predicted and unpredicted bidder). *Controls* is a vector of control variables, it includes size, asset tangibility, returns on asset, log of average sales growth, log of market-to-book ratio, log of leverage and relative deal value (Appendix I provide a detailed description of the variables).

To examine how the different types of growth opportunities alter the cash reserve effect on bidder announcement returns, we introduce interaction terms between cash reserve and the 3 components of market-to-book. Specifically, we estimate the following model,

$$\begin{aligned}
CAR_i = {} & \alpha + \\
& \beta_2 Excash_i \times Predicted\text{-}bidder\ Dummy_i + \\
& \beta_3 Excash_i \times Unpredicted\text{-}bidder\ Dummy_i \\
& \beta_4 Excash_i \times Unpredicted\text{-}bidder\ Dummy_i \times Component\ Dummy_i + \\
& \eta Unpredicted\text{-}bidder\ Dummy_i + \gamma YDUM_i + \delta INDDUM_i + \varepsilon_i
\end{aligned} \qquad (11)$$

, where *Component Dummy* is 1 if the transitory firm-specific component (or the transitory sector component, or the long-term growth component) is above the sample median and 0 otherwise.

To find out if agency conflicts affect the cash reserve effect at announcement, we add an interaction term of cash reserve with a total wealth dummy variable. The total wealth dummy variable is 1 if a CEO's total wealth in his company is above the sample median and 0 otherwise. Sepcifically,

$$CAR_i = \alpha +$$

$$\beta_2 Excash_i \times Predicted\text{-}bidder\,Dummy_i +$$

$$\beta_3 Excash_i \times Unpredicted\text{-}bidder\,Dummy_i \tag{12}$$

$$\beta_4 Excash_i \times Unpredicted\text{-}bidder\,Dummy_i \times Total\,Wealth\,Dummy_i +$$

$$\eta Unpredicted\text{-}bidder\,Dummy_i + \gamma YDUM_i + \delta INDDUM_i + \varepsilon_i$$

[PLEASE INSERT FIGURE 1 HERE]

3.6. Operating performance

An examination of post-acquisition operating performance provides more knowledge on the value creation/destruction of the acquisitions by cash-rich firms. We measure a bidder's operating cash flow performance as cash flow normalized by total assets. Barber and Lyon (1996) show the importance of controlling for abnormal firm characteristics when designing a test for operating performance. The objective is to eliminate the effects of firms' characteristics on post-event abnormal operating performance that is related to the event itself. We adjust a firm's performance in each year by subtracting the median performance of firms that belong to the same excess cash reserve ratio deciles in the same 2-digit SIC industry. This method is similar to that of Healy, Palepu, and Ruback (1992), Harford (1999) and Gao (2009). We analyse operating performance of deals that are completed. Prior to the announcement, the target and bidder performances are combined into one figure, weighted by their relative market values. Post deal completion, the combined firm's performance is used. Average annual operating cash flow performance is calculated over 3 years for pre the announcement and post deal completion. The regression specification is:

$$PostAcquisition\,OPF_i = \alpha + \beta_1 PreAcquisition\,OPF_i + \varepsilon_i \tag{13}$$

, where *i* indexes deals. *OFP* is operating cash flow performance; β_1 measures the continuation of preacquisition performance for the bidder and target firms. *α* measures any improvements or deterioration over post-merger years relative to the preacquisition years. A significant positive *α* suggests that takeover is value-enhancing, while a significant negative *α* suggests that takeover is value-decreasing.

4. Data

Our initial sample of acquisitions is gathered from the SDC M&A database from 1984 through end of 2007.[12] We impose several criteria of sample selection. First, only acquisition of shares are considered, namely merger, acquisition of majority interests, acquisition of remaining interests and

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[12] This database covers public and private acquisition deals of at least 5% ownership of a target company.

acquisition of partial interests.[13] Second, both the bidder and the target must be public companies listed on the London Stock Exchange (LSE). Third, means of payment (i.e. stock, cash or mixed) must be recorded in SDC. To mitigate the influence of recording error by SDC, we require that the sum of means of payment is above 95% and below 105%. Fourth, deal value must be available, and no less than GBP 10 millions. Fifth, announcement date must be available. In post-acquisition analysis, we require the effective/withdrawal date to be available. These give us an initial sample of 921 deals. We then exclude financial bidders (SIC 6000-6999) and intensively regulated utility bidders (SIC 4900-4999). There are 639 unique deals remaining. We further require that DataStream/Thomson One Banker data must be available to calculate variables of a bidder or a deal for regression analysis, namely excess cash reserve ratio, market-to-book ratio, decompositions of market-to-book ratio, leverage, asset tangibility, research and development (R&D), return on asset (ROA), relative deal value, announcement cumulative abnormal return (*CAR*) and average sales growth in the past two years before the announcement. Subsequent to this restriction, we are left with 282 bidder firm-years deals for the panel data (246 bidders), and 210 for the cross-sectional sample (Appendix I provides a detailed description of the variables). The small sample of public deals is due to the fact that a large fraction of U.K. acquirers engage in acquiring private targets (Antoniou et al. 2007).[14]

In our predicting bidder analysis, we use a panel of all DataStream firm-years that have required data. A dummy variable (call in bidder firm-year dummy) is used to flag a firm-year in which a company announces one or more acquisitions. The bidder firm-year dummy is 1 if a company announces one or more takeover offers in that year and 0 otherwise. In our announcement effect and operational performance analysis, we use the cross section of all takeover offers that satisfy our sample selection criteria. We use BoardEX database to collect CEO ownership data. BoardEX provides ownership data from 1999 to the end of 2007. For the panel data, we measure our explanatory variables in the fiscal year prior to the year of dependent variable (i.e., the bidder-firm-year dummy). For cross-sectional analysis, we measure bidder characteristics in the fiscal year ending prior to deal announcement, except for sales growth, which is averaged over two year pre the deal announcement. We hand collected accounting data for about 30 percent of our cross sectional sample.[15] In some analysis, the sample size reduces further when required data is not available for some variables. For instance, in Table 4 Model 7 (i.e. the announcement affects analysis), the sample

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[13] These are definitions by SDC and are commonly used in the M&A literature. A merger is the acquisition of all the shares of one company by another. An acquisition of majority interests is a transaction where the acquirer has less than 50% before but owns more than 50% of the target after the transaction. An acquisition of minority interest is a transaction where the acquirer has less than 50% before and owns less than 50% of the target after the transaction. An acquisition of remaining interests is a transaction where the acquirer has more than 50% of the target before the acquisition and owns the entire target after the transaction.

[14] All variables are measured in real term 1994 value.

[15] DataStream codes are available for the bidding firms, but accounting information are missing. Hence we hand collected accounting data from annual report available on Thomson one Banker.

size is 53 and it is due to the fact that the CEO ownership data begins in 1999 and not every listed firm in the U.K. is covered.

Table 1, Panel A reports summary statistics for the full panel data and a sub sample for which ownership data are available. The main variable in the analysis, excess cash reserve ratio, has a mean of -8.3 percent, and a median of -33.3 percent with a standard deviation of 89.2 percent. We use the log of 1 plus excess cash reserve ratio as the key variable in the regression analysis. Our sample firms have a mean size of GBP 47.57 millions and a median of 37.42 Millions. In our sample some firms are highly levered, with average leverage of 45.2 percent. The market-to-book ratio for the sample has a mean of 2.467 and median of 1.544. In the estimation, we use log of these variables to mitigate the bias introduced by possible skewness. Return on assets has a mean of 46.9 percent. The mean abnormal returns has a mean (median) of 2.3 percent (1.7 percent). The standard deviation averaged over 3 years prior to the announcement has a mean more than 200 percent. Noncash working capital is on average negative but the median is positive. On average, a CEO owns 3.119 millions in his bidding firm (the median is 1.081 millions). The great difference between mean and median of total wealth indicates that there are a small number of CEOs whose ownership is particularly high.

Panel B, provides a comparison of median characteristics between bidder firm-years and non-bidder firm-years, high and low excess cash reserve firm-years, high and low transitory firm-specific component firm-years, high and low sector component firm-years, and high and low long-run growth component firm-years. Bidder firm-years have higher median excess cash reserve ratio (-0.223) than non-bidder firm-years (-0.285), but the difference is statistically insignificant. It is evident from the table that bidder firm-years have greater size, leverage, return on asset, mean abnormal returns, standard deviation, transitory firm-specific component, and transitory sector components than non-bidder firm years (significant at 1%). Market-to-book ratio is economically similar between the bidder and non-bidder firm-years (1.25 vs.1.491), but statistically significantly different (at 1%). We document low median size, leverage, market-to-book, and transitory firm-specific component for cash-rich firms than for cash-poor firms. All differences in firm characteristics between cash-rich and cash-poor firms are statistically significant at 10% or above. A comparison between firms of high and low transitory sector component shows that firms of high transitory sector component are characterised by higher median size, leverage and mean abnormal returns relative to firms of low transitory sector components. The differences are highly significant at 1% (Z-test) except for return on assets and mean abnormal return wherein the differences are insignificant. Similarly, high transitory firm-specific component firms are characterised by higher market-to-book, return on asset, and return standard deviation than firms of low transitory firm-specific component. Interestingly, firms of low long-term growth component are more volatile than those of high long-term growth component (1.76 vs. 1.80), and the difference is statistically significant at 10%.

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Table 2, Panel A reports summary statistics for our cross sectional sample and a sub sample of which ownership data are available. Bidders have a mean CAR of -0.5% from 2 trading days before to 2 trading days after the announcement day, a median CAR of -0.03%. The mean excess cash reserve is -6.2% (median is -4.2%). An average bidder in our sample has a size of 12.13 millions and a leverage of 61.9%. Market-to-book has a mean (median) of 4.75% (2.52%), while return on asset has a mean (median) of 6.3% (7.8%). Bidders have a mean asset tangibility of 62.8% compared to a median of 50.4%. The average sales growth is 58%, and median is 13.2%. In terms of deal characteristics, the average deal value is about 12% of the bidder market capitalization. On average, a bidder has a transitory sector-specific component of 24.9%, a transitory firm-specific component of 26.4%, and a long-term growth component of about 108%. It shows that the long-term growth is the main component of the market-to-book ratio. For the sub sample where ownership data is available, mean market-to-book, return on asset, transitory sector component, transitory firm-specific component, and long-term growth component are higher than for the full sample. On average, CEO total wealth in the bidder firm is 5.571 million (median is 2.830 millions). Panel B reports the median values of the variables by high/low excess cash reserve, high/low transitory long-term growth component, high/low transitory sector component, and high/low transitory firm-specific component. Cash-rich bidders have greater size (GBP 257.81 millions vs. GBP 95.79 millions) and higher market-to-book ratio (3.07 vs. 2.02) than cash-poor bidders (both significant at 1%). Meanwhile, cash-poor bidders have significantly (1%) higher median leverage and relative deal value than cash-rich bidders. Firms of high transitory sector or firm-specific components tend to have higher median size and leverage than firms with low transitory sector or firm-specific components. For firms of high long-term growth component firms, the median excess cash reserve, and return on asset are higher than for low long-term growth component firms. Panel C reports summary statistics for several sub samples. The sub samples are formed by first dividing the entire cross-section using the medians of the long-term growth component, the transitory sector component, or the transitory firm-specific component, and then further separating the sub samples by the sample median of excess cash reserve. The results show that when the long-term growth component is high (low), a high excess cash reserve bidder has higher (lower) CAR relative to a low excess cash reserve bidder (but statistically insignificant). Similar results are true for both the transitory sector component and the transitory firm-specific component. It suggests that the cash reserve effect is likely to be positive when a market-to-book component is high. In our regression analysis, we perform more systematic analysis regarding the conjectured positive relation between cash reserve and bidder CAR.

5. Empirical results

5.1. Announcement Effects of Cash Reserve

We discussed earlier in the introduction that agency conflicts, growth, and misevaluation can all underlie the cash reserve effects on a bidder's announcement returns. Which factor prevails is an empirical question. In the U.K., regulation is more favourable for shareholders, and therefore it is more likely we find positive cash reserve effect (driven by growth) in the U.K. than in the U.S.

Table 3, panel A provides summary statistics comparing the median characteristics and CARs of the cash-rich and cash-poor bidders, for the predicted-bidder group and the unpredicted-bidder group separately. We find that the CAR is lower for cash-rich bidders (-0.009) than for cash-poor bidders (0.004) when the bidders are predicted. When a bidder is unpredicted, cash-rich bidders have higher CAR (-0.002) than cash-poor bidders (-0.003). However, none of the two differences are statistically significant. For predicted bidders, there is no variation between cash-rich and cash-poor bidders in size, leverage, market-to-book, return on assets and the market-to-book components. Nonetheless, for unpredicted bidders, cash-rich firms have higher median size, market-to-book, transitory sector component, and long-term growth component than cash-poor firms. The median leverage is significantly lower for cash-rich firms than for cash-poor firms when a bidder is unexpected to bid.

Table 3, panel B reports the regression results based on equation (9)-(10). Model 1 shows that log(1+excess cash reserve ratio) has a positive and significant (at 5%) coefficient of 0.023. This means that a 1% increase in the excess cash reserve ratio for an average bidder increases the CAR by 1.06%. This evidence contrasts the U.S. finding that cash reserve has a negative announcement effect (Harford, 1999). It is consistent with the argument under information theory that cash reserve reflects a company's growth opportunities perceived by managers. In model 2, we have cash reserve interacted with the predicted-bidder dummy and the unpredicted-bidder dummy. We find that the positive cash reserve effect is mainly from the unpredicted bidders. The coefficient of the interaction term with unpredicted bidder is 0.032 and statistically significant at 1%. The coefficient of the interaction term with predicted bidder is economically weak -0.006 and statistically insignificant (p-value 0.802). In model 3, we add two three-item interactions formed using cash reserve, the unpredicted bidder dummy, and a all-stock offer dummy or a all-cash offer dummy. The all-stock (all-cash) offer dummy is 1 if the deal is entirely funded by stock (cash) and 0 otherwise. We find that the coefficient on the two-item interaction formed using cash reserve and the unpredicted bidder dummy is qualitatively unchanged. The coefficient of the three-item interaction term formed using all-stock

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offer dummy is significantly (at 1%) negative at -0.053. A Wald test fails to reject the null hypothesis that the sum of the coefficients of the two-item interaction term and that of the current three-item interaction is significantly different from zero. The coefficient of the three-item interaction term formed using the all-cash offer dummy is 0.001 and statistically insignificant (p-value 0.935). The positive effect of cash reserve therefore is only from all-cash and mixed offers. It is reasonable to argue that misvaluation is the greatest in all-stock offers (e.g., Travlos, 1987; Franks, Harris and Mayer, 1988; Asquith, Bruner and Mullins, 1987; Wansley, Lane and Yang, 1987; Servaes, 1991; Martin, 1996), and therefore the misvaluation ramification of the information theory is likely to be most pronounced for the all-stock offers. This offsets the positive cash reserve effect on announcement returns arising from growth.

[PLEASE INSERT TABLE 3 HERE]

Table 4 reports the results based on equation (11)-(12), where we introduce cash reserve interacted with dummy variables formed from market-to-book components and CEO total wealth. In model 1, 2, and 3, we add to equation (10) the long-term growth component, the transitory sector component, and the transitory firm-specific component respectively. The purpose is to examine how the market-to-book components affect bidder announcement return. Model 1 shows that the long-term growth component has a significantly (at 5%) positive effect on bidder CAR, consistent with the view that the long-term growth component captures long-run growth at both the firm and the industry level. Model 2 shows that the transitory sector component has a significantly (at 10%) negative effect on bidder CAR. This suggests that the transitory sector component mostly reflects misvaluation at the deal announcement, rather than growth. Model 3 shows that the transitory firm-specific component has no significant effect on bidder CAR, consistent with the view that the transitory firm-specific component measures both growth and misevaluation at the announcement. Model 4 estimates equation (11) where we add the three-item interaction term formed using a dummy variable that is 1 for high long-term growth component (defined using sample median) and 0 otherwise. The coefficient on the interaction term is significantly positive (5%) at 0.076. The coefficient on the interaction of the unpredicted bidder dummy and cash reserve become insignificant. This finding suggests that the positive cash reserve effect on bidder CAR is mainly from the bidders of high long-term growth. Model 5 estimates equation (11) where we add the three-item interaction term formed using a dummy for high transitory sector component dummy. The coefficient of the three-item interaction is insignificant (p-value 0.210). A possible interpretation is that the cash reserve effect via growth (positive) and the effect via misevaluation (negative) offset each other when a bidder has a high transitory sector component. Similarly, we find no effect of cash reserve when a bidder's transitory firm-specific component is high (model 6). Model 7 is based on equation (12) where we add the

interaction of cash reserve with a dummy variable for high CEO total wealth. High CEO total wealth means low agency conflicts. We find that the positive cash reserve effect is mainly from the bidders of low agency conflict. This is consistent with the growth ramification of information theory because value-maximizing managers are more likely to add value to their shareholders using the profitable asset re-allocation opportunities that arise from acquisitions made by high-growth companies (Javonovic and Rousseau, 2002). This result however, runs against the agency theory which suggests managers are self-serving. We have only 53 observations for model 7 due to limited data availability of CEO ownership data. The result of model 7 therefore should be interpreted with caution.

[PLEASE INSERT TABLE 4 HERE]

5.2. Logistic Estimation of the Probabilities of Being a Bidder

This section examines how cash reserve affects the probability of being a bidder. The agency and the information theory predict that a cash-rich company is more likely to become a bidder because less-controlled managers tend to spend excessive cash on value-destroying acquisitions. Under the information theory, however, the prediction is two-folded. On the one hand, a cash-rich company tend to acquire other companies because high growth drives both high cash reserve and high probability of being a bidder, as is discussed in the introduction. On the other hand, the bidder and target tend to disagree on the terms of payment. Specifically, a bidder of high growth prefers to pay by stock in order to reserve cash (e.g., Dong et al., 2006; Harford et al., 2008), while the target prefers cash payment as the bidder's stock is difficult to evaluate. A cash-rich company rationally expects such conflicts and refrain from making an offer.

To test the predictions of different arguments, we construct a high CEO total wealth dummy (using median) to reflect the variation in a company's potential agency cost (Jensen and Meckling, 1976; Harford, 1999, Hall and Liebman, 1998; and Baker and Hall, 1998). Similarly, we construct dummy variables (using median) based on the long-term growth component, the transitory sector component, and the transitory firm-specific component. The value of 1 indicates high long-term growth opportunities for the long-term growth component, and high transitory growth (or temporal misevaluation) at the sector or firm level for the transitory sector component and the transitory firm-specific component respectively.

Table 5 reports the regression results based on equation (6)-(8). Model 1 shows that the coefficient of log(1+ excess cash reserve ratio) is 0.208 (significant at 1%), suggesting that a one-standard-deviation increase in a company's log(1+ excess cash reserve ratio) increases the probability of being a bidder by 1% (see Greene 2000, p812–816 for the calculation of marginal effects). These results are

consistent with Harford's (1999) findings for the U.S. firms that cash reserve and the probability of subsequent acquisition are positively related. In model 2, the coefficient of log(1+ excess cash reserve ratio) remains positive after we have added the transitory firm-specific component, the transitory sector component and long-term growth component. The results of model 2 show that the transitory firm-specific component and transitory sector component has a coefficient of 0.159 (significant at 1%) and 0.179 (significant at 5%) respectively, while the long-term growth component has no effect. This suggests that the benefits of asset reallocation due to transitory growth opportunities at both the sector and the firm level overweight a company's concern about the potential disagreement between a bidder and a target regarding means of payment. The companies of high long-term growth component, however, seem to be more concerned about the conflicts over means of payment between a bidder and a target than the companies of high transitory components. Therefore, they are on average not keener to make an acquisition offer than other companies. Combined with a result from section 5.1 (model 1 of table 4), it shows that although a firm of long-term growth is not more eager than other companies to acquire, once it makes an offer the market interpret the offer favourably.

Model 3, 4 and 5 include cash reserve interacted with the dummy variables for the transitory firm-specific component, the sector specific component, and the long-term growth component respectively. The interaction term of cash reserve are insignificant except for the one with transitory sector component dummy (model 4) where the effect is positive (0.169) and significant at 10%. This shows that a firm with high transitory sector component has a positive cash-reserve effect on the probability of being bidder. The evidence persists after controlling for cash reserve interacted with the transitory firm-specific component and the long-term growth component (model 6). The stronger positive effect of cash reserve for firms with high transitory sector component is consistent with the information theory. It suggests that industrial consolidations may give rise to growth opportunities when assets are redeployed (Brainard and Tobin, 1977; Jovanovic and Rousseau, 2002), and a high cash reserve enables a company to capture such opportunities. The absence of a stronger effect for a firm with high transitory firm-specific component or high long-term growth component is consistent with the view that, when transitory firm-specific component or long-term growth component is high, a cash-rich firm tends to acquire, but meanwhile it rationally expects that the target has different preference of the means of payment and therefore is reluctant to bid. These two effects offset.

Model 7 is based on equation 8. The coefficient of the interaction term between cash reserve and the CEO total wealth dummy is positive but statistically insignificant. This is inconsistent with the prediction of the agency theory. Requiring ownership data to be available dramatically reduce our sample of firm-years from 10713 to 1977. It suggests that we should interpret the result of model 7 with caution.

5.3. Operating performance.

An analysis of bidder post-acquisition operating performance is necessary to understand the synergies of an acquisition, because synergies manifest in the long run via changes in the operating performance. The information theory suggests two reasons that a cash-rich bidder has better post-acquisition performance. First, a high cash reserve is associated with high growth, and therefore with better operating performance; second, Rhodes-Krops and Viswananthan (2004) and Gao (2009) point out that a bidder's gain comes from synergies and market timing. High synergies motive a bidder to participate, and a target to accept an offer even when a bidder is overvalued (Gao, 2009). Taken together, a cash-rich bidder is expected to have a better performance than a cash-poor bidder. In contrast, the agency theory suggests a negative relation between cash reserve and post-acquisition operating performance.

Table 6 reports the regression results for post-acquisition operating performance based on equation (13). Model 1 shows that, in the 3 years after acquisitions, the abnormal operating performance due to acquisition is negative but insignificant. In model 2, we add a high cash reserve dummy (defined according to sample median), and find that the coefficient of the cash reserve dummy is 0.027 (significant at 10%). Meanwhile, the constant term is -0.026 (significant at 5%). Therefore, on average, a cash-rich bidder's annual operating performance is 5.3% higher than that of a cash-poor bidder's. Model 3 (4) replicates model 2 using the bidders of high (low) long-term growth component. We find that the positive relation between high cash reserve dummy and operating performance is present only for the bidders of high long-term growth component. For the group of bidders of high long-term growth component, a cash-rich bidder outperforms a cash-poor bidder by 6.6% in terms of annual operating performance. Model 5 (6) replicates model 2 for the bidders of high (low) transitory sector component. However, we do not find any significant effect of cash reserve, inconsistent with the information theory. Model 7 (8) repeats the estimation of model 2 for the bidders of high (low) transitory firm-specific component. For bidders of high transitory firm-specific component, a cash-rich bidder outperforms a cash-poor bidder by 5.2% annually, but when the transitory firm-specific component is low, there is no significant difference between the operating performance of cash-rich and cash-poor bidders.[16]

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[16] The results with transitory components should be interpreted with caution because the transitory components may also reflect misvaluation. With the long-term growth component, there is complication of misvaluation.

In general, these results show that cash-rich bidders do better than cash-poor bidders, especially when a bidder has better growth opportunities.[17] In contrast, Harford (1999) finds in the U.S. that cash-rich firms make poor acquisition relative to cash-poor firms.

[PLEASE INSERT TABLE 6 HERE]

6. Conclusion

We examine the effects of cash reserve in acquisitions made by U.K. companies. The policy and institutional setting of U.K. ensures a principal-agency relation less favourable to the managers. We find a cash-rich bidder has better announcement returns and better post-acquisition operating performance. This contrasts the previous finding in the U.S.. Our results can be explained by an information-based framework that relates cash reserve to company growth opportunities. Meanwhile, the supporting evidence for the agency theory is meagre.

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[17] Except for the results based on the transitory sector component.

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Figure 1: **Predicting bidder and non-bidder**
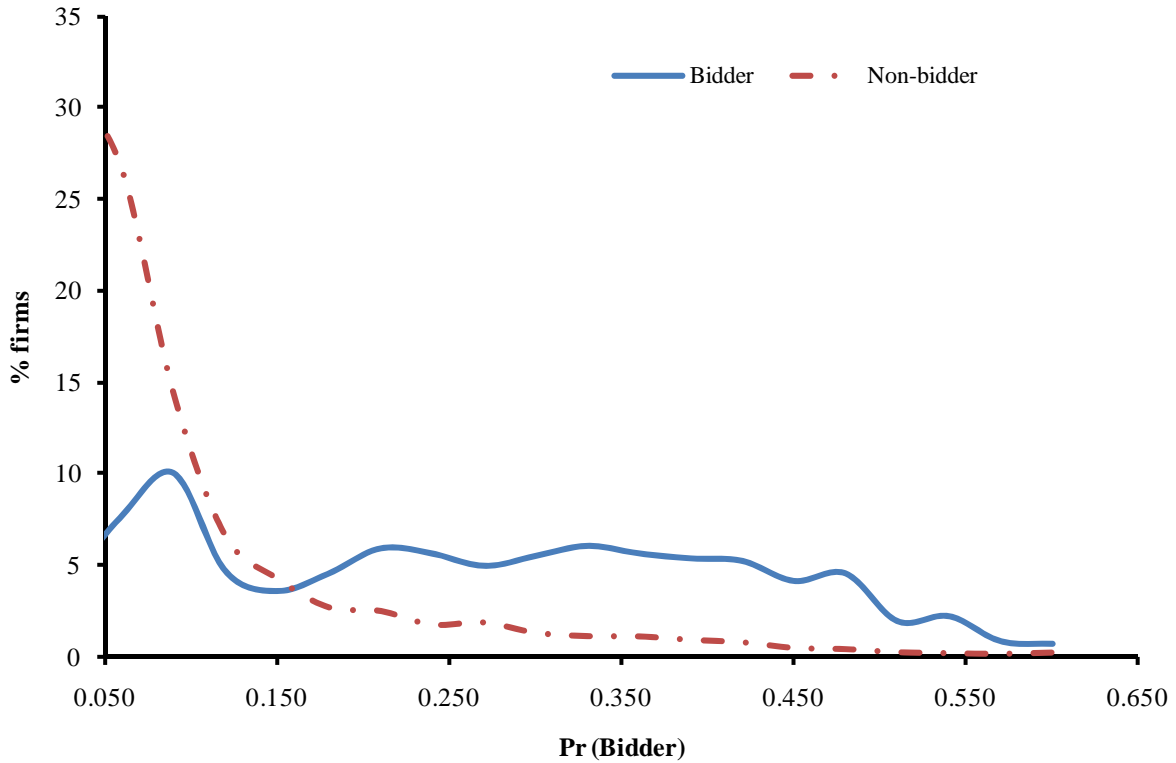
Figure 1: Empirical PDFs for bidders: The probabilities are estimated using a logit model. The PDFs for bidders and non-bidders cross at 0.15, which is a cut-off point for determining whether a firm is expected to bid or not. Firms with probabilities below the cut-off point are not expected to bid, while those with probabilities above the cut-off point are expected to bid.

We first use a logistic model (Equation 6) to predict bidders, and estimate the fitted probabilities for being a bidder and for being a non-bidder respectively. Then, we plot the distributions of these two sets of fitted probabilities. Finally, we find the crossover point for the bidder and non-bidder distributions. A bidder that falls to the right (left) of the cross point is predicted (unpredicted). This method is similar to that applied by Harford (1999).

Table 1: Descriptive statistics for the Panel data (Predicting bidder sample)

This table shows the descriptive statistics for the panel data from 1984 through 2007. Panel A shows mean, median, standard deviations, minimum and maximum of the continuous variables. Panel B shows median values by bidder non-bidder firms, high low excess cash reserve, high low sector specific error, high low firm specific error and high low firm long run value to book. Excess Cash Reserve Ratio is calculated at the end of the previous year (year -1). It is a raw Cash Reserve Ratio in excess of the required level estimated using a pooled time-series cross-sectional OLS regression with year dummies, following Opler et al (1999). Size is measured by logarithm of book value of asset. Leverage measured as a ratio of book value of debt to book value of equity. Market to book (M/B) is measured as ratio of market value plus long term liability to book value of equity plus long term liability. Return on asset is the ratio of operating income to total asset. Mean abnormal returns are the average cumulative abnormal returns over 3 years prior to the announcement day. Average standard deviation is the standard deviation averaged over 3 years prior to the announcement day. Non-cash working capital is working capital minus increase/decrease in cash divided by total asset. Total wealth is CEO ownership in a company in absolute term. Sector specific components is the valuation implied by sector multiple deviating from valuation implied by long run multiple. Firm specific components is firm specific deviation from valuation implied by sector multiple calculated at time *t*. Long run value to book is the difference between valuation implied by long-run multiple and current book value. These variables are estimated using RKV (2005) approach. Z-test is based on Wilcoxon rank sum test for median differences. All variables are measured at the end of the fiscal year prior to announcement.

Panel A	Full sample (1984-2007)						With ownership data (1999-2007)					
	N	Mean	Median	STD	Min	Max	N	Mean	Median	STD	Min	Max
Excess cash reserve ratio	10713	-0.083	-0.333	0.892	-0.823	4.881	1977	-0.075	-0.297	0.804	-0.823	4.881
Size	10713	10.777	10.533	1.547	6.219	15.802	1977	11.872	11.544	1.777	7.301	15.802
Leverage	10713	0.452	0.137	0.943	0.000	6.543	1977	0.572	0.220	1.055	0.000	6.543
Market to book	10713	2.467	1.544	3.136	0.004	28.154	1977	2.682	1.764	3.057	0.083	28.154
Return on asset	10713	0.469	0.179	0.789	-0.047	4.634	1977	0.362	0.162	0.678	-0.635	4.013
Mean abnormal returns	10713	0.023	0.017	0.110	-0.440	0.464	1977	0.024	0.017	0.117	-0.440	0.464
Average standard deviations	10713	2.064	1.783	1.125	0.000	8.600	1977	2.371	2.087	1.185	0.000	8.600
Non cash working capital	10713	-0.240	0.035	1.548	-8.679	2.849	1977	-0.212	-0.002	1.303	-8.679	2.849
Total wealth	-	-	-	-	-	-	1977	3.119	1.081	4.702	0.000	18.039
Sector specific components	10713	0.012	-0.010	0.520	-1.642	2.683	1977	-0.099	-0.081	0.572	-1.642	2.682
Firm specific components	10713	-0.013	-0.104	0.839	-1.858	2.854	1977	0.077	0.000	0.812	-1.858	2.854
Long run value to book	10713	1.021	0.968	1.345	-3.890	4.915	1977	0.905	0.848	1.328	-3.890	4.915

Table 1 continues

Panel B	Bidder	Non-bidder	Z-test	High Excess cash reserve	Low Excess cash reserve	Z-test	High firm specific components	Low irm specific components	Z-test	High sector specific components	Low Sector specific components	Z-test	Hig firm long run value to book	Low firm long run value to book	Z-test
Excess cash reserve ratio	-0.223	-0.285	1.612	-0.013	-0.484	-2.881***	-0.335	-0.331	-0.814	-0.309	-0.360	-7.492***	-0.320	-0.347	-2.889**
Size	10.449	10.189	3.895***	10.119	10.917	-33.848***	10.791	10.323	16.761***	10.614	10.449	-5.588***	10.696	10.365	9.385***
Leverage	0.145	0.074	2.632***	0.077	0.183	-13.533***	0.215	0.087	19.878***	0.156	0.121	-5.329***	0.194	0.101	15.961***
Market to book	1.251	1.491	-3.47***	1.390	1.643	-11.100***	1.860	1.349	19.488***	1.466	1.622	6.466***	2.316	1.137	29.713***
Return on asset	0.194	0.123	6.26***	0.274	0.150	34.540***	0.164	0.192	-10.622***	0.174	0.182	1.120	0.221	0.152	14.523***
Mean abnormal returns	0.022	-0.004	3.674***	0.019	0.016	1.856*	0.017	0.017	1.710*	0.018	0.017	-1.019	0.024	0.011	-1.710*
Average standard deviations	1.942	1.776	3.200***	1.793	1.774	2.498**	1.794	1.766	3.538***	1.760	1.805	2.331**	1.764	1.802	-1.836*
Non cash working capital	0.009	0.005	0.023	-0.022	0.073	-20.426***	0.004	0.111	-17.441***	0.011	0.078	10.43***	0.009	0.101	-16.127***
Sector specific components	0.134	-0.019	-9.250***	0.026	-0.039	-9.960***	-0.032	0.009	6.708***	0.174	-0.227	-7.615***	-0.036	0.018	12.052***
Firm specific components	0.045	-0.097	-3.591***	-0.110	-0.100	-1.107	0.373	-0.523	9.446***	-0.157	-0.059	8.041***	-0.035	-0.185	-10.646***
Long run value to book	0.924	0.986	-0.062	1.054	0.913	4.942***	1.100	0.890	10.256***	0.875	1.042	9.147***	1.689	0.388	-8.705***
No of obs	*282*	*10431*		5023	5690		5430	5283		5500	5213		5411	5302	

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Table 2: Summary statistics for bidder firms (Cross sectional sample).

This table reports the descriptive statistics for the cross sectional sample between 1984 and 2007. Panel A shows mean, median, standard deviations, minimum and maximum of the continuous variables, while Panel B shows median values by high low excess cash reserve, high low long run value to book firms, high low sector specific error and high low firm specific error. Panel C shows the breakdown of the variables by high low long run value to book, high low sector specific error and high low firm specific error. Excess Cash Reserve Ratio is calculated at the end of the previous year (year -1). It is a raw Cash Reserve Ratio in excess of the required level estimated using a pooled time-series cross-sectional OLS regression with year dummies, following Opler et al (1999). Size is measured by logarithm of book value of asset. Leverage measured as a ratio of book value of debt to book value of equity. Market to book (M/B) is measured as ratio of market value plus long term liability to book value of equity plus long term liability. Return on asset is the ratio of operating income to total asset. Asset Tangibility is measure by a ratio of intangible asset to total asset. Average sale growth is growth in sale over 2 years prior to year 0 (i.e. year of announcement). Deal value is computed as value over pay divided by bidder market value. Total wealth is CEO ownership in a company in absolute term. Sector specific components is the valuation implied by sector multiple deviating from valuation implied by long run multiple. Firm specific components is firm specific deviation from valuation implied by sector multiple calculated at time t. Long run value to book is the difference between valuation implied by long-run multiple and current book value. These variables are estimated using RKV (2005) approach Cumulative abnormal returns (-2, +2) is computed as the sum of abnormal returns over -2 days prior to the announcement and +2 days post even. Z-test is based on Wilcoxon rank sum test for median differences. All variables are measured at the end of the fiscal year prior to announcement

Panel A	Full sample						With ownership data					
	N	Mean	Median	STD	Min	Max	N	Mean	Median	STD	Min	Max
CAR (-2,+2)	210	-0.005	-0.003	0.060	-0.174	0.177	53	-0.019	-0.010	0.049	-0.174	0.034
Excess cash reserve ratio	210	-0.062	-0.048	0.507	-2.510	2.051	53	-0.094	-0.098	0.297	-0.797	0.483
Size	210	12.136	11.793	2.279	6.370	18.700	53	13.246	13.299	1.979	10.478	16.851
Leverage	210	0.619	0.175	2.186	-0.460	18.239	53	0.399	0.155	1.089	0.000	5.338
Market to book	210	4.756	2.529	8.400	-0.495	65.332	53	5.493	4.663	3.469	0.930	16.511
Return on asset	210	0.063	0.078	0.140	-0.542	0.479	53	0.136	0.126	0.093	0.004	0.419
Asset tangibility	210	0.628	0.504	0.979	-0.254	9.449	53	0.556	0.549	0.270	0.056	1.284
Average sale growth	210	0.580	0.132	1.731	-0.415	12.868	53	0.251	0.182	0.309	-0.154	0.994
Relative deal value	210	0.120	0.027	0.390	0.000	3.020	53	0.039	0.019	0.071	0.000	0.287
Total wealth	-	-	-	-	-	-	53	5.571	2.830	6.576	1.580	2.416
Sector specific componetns	210	0.249	0.059	1.965	-2.723	25.610	53	0.462	-0.067	4.089	-2.548	5.610
Firm specific components	210	0.264	0.051	0.990	-1.854	3.618	53	0.477	0.109	1.198	-1.063	3.618
Long run value to book	210	1.082	0.966	1.682	-5.577	5.484	53	1.260	1.088	1.551	-2.506	4.955

Table 2 continued

Panel B

Panel B	High Excess cash reserve	Low Excess cash reserve	Z-test	Hig firm long run value to book	Low firm long run value to book	Z-test	High Sector specific components	Low Sector specific components	Z-test	High Firm specific components	Low Firm specific components	Z-test
CAR (-2,+2)	-0.003	-0.003	0.575	-0.007	-0.002	1.512	-0.001	-0.008	-1.804*	-0.002	-0.006	-0.894
Excess cash reserve ratio	0.062	-0.127	14.249***	-0.033	-0.068	2.074**	-0.039	-0.059	-1.591	-0.042	-0.055	-0.901
Size	12.467	11.472	3.106***	12.446	12.063	1.536	12.482	11.793	-2.487**	12.690	11.767	3.605***
Leverage	0.161	0.235	-2.813***	0.209	0.199	0.753	0.212	0.188	-0.548	0.220	0.189	1.945*
Market to book	3.073	2.027	2.618***	2.619	2.272	1.244	2.463	2.474	0.980	2.706	2.474	0.608
Return on asset	0.083	0.074	1.331	0.100	0.082	2.577**	0.085	0.090	1.028	0.080	0.102	-2.449**
Asset tangibility	0.467	0.516	-0.751	0.466	0.496	-1.703*	0.484	0.504	-0.163	0.441	0.508	-1.697*
Average sale growth	0.133	0.129	0.872	0.135	0.112	0.925	0.137	0.106	-1.438	0.114	0.133	-0.557
Relative deal value	0.019	0.041	-3.132***	0.025	0.033	-0.584	0.027	0.032	0.919	0.028	0.028	0.148
Sector specific components	0.201	-0.013	-3.676***	0.050	0.084	1.830*	0.280	-0.144	-9.85***	0.072	0.047	-0.553
Firm specific components	0.000	0.075	0.172	0.206	-0.030	2.392**	0.070	0.015	0.498	0.749	-0.368	13.496***
Long run value to book	1.104	0.948	1.153	1.902	0.326	13.375***	0.899	1.101	1.885*	0.970	0.966	0.229
No of obs	*105*	*105*		*105*	*105*		*105*	*105*		*105*	*105*	

Panel C

Panel C	High Long run value to book			Low Long run value to book			High Sector specific components			Low Sector specific components			Hig Firm sepcific components			Low Firm sepcific components		
	Hig	Low	Z-test	High	Low	Z-test	Hig	Low	Z-test	High	Low	Z-test	Hig	Low	Z-test	High	Low	Z-test
CAR (-2,+2)	-0.005	-0.010	-0.829	-0.003	-0.002	0.849	0.001	-0.002	-0.122	-0.008	-0.003	0.580	0.000	-0.003	-0.494	-0.008	-0.003	0.518
Excess cash reserve ratio	0.042	-0.110	-9.137***	0.042	-0.132	-7.711***	0.057	-0.120	-8.441***	0.027	-0.120	-8.526***	0.042	-0.110	-8.430***	0.037	-0.121	-8.089***
Size	12.848	11.857	-2.168**	12.592	11.524	-2.905**	12.874	11.931	-3.046***	12.276	11.510	-1.739*	13.587	12.063	-3.363***	12.212	11.373	-1.320
Leverage	0.131	0.294	2.798**	0.209	0.152	-0.271	0.179	0.282	1.645*	0.190	0.188	0.952	0.194	0.305	1.922*	0.125	0.235	2.071**
Market to book	3.379	2.034	-2.494**	2.653	2.023	-0.637	3.054	2.011	-1.676*	2.943	2.249	-1.760*	3.342	2.329	-1.489	2.883	2.139	-1.208
Return on asset	0.106	0.089	-1.229	0.084	0.080	-0.564	0.088	0.082	-0.937	0.097	0.084	-1.138	0.080	0.083	0.011	0.110	0.088	-1.598
Asset tangibility	0.466	0.465	0.298	0.445	0.531	1.989*	0.483	0.513	0.306	0.432	0.536	1.850*	0.426	0.475	0.919	0.490	0.523	0.699
Average sale growth	0.149	0.120	-0.630	0.097	0.128	0.884	0.132	0.141	0.074	0.108	0.105	0.233	0.124	0.096	-0.614	0.103	0.141	1.156
Relative deal value	0.015	0.043	2.907***	0.025	0.045	1.768*	0.015	0.045	3.100**	0.022	0.045	1.226	0.018	0.041	2.941**	0.019	0.047	1.691*
Sector specific component	0.079	-0.024	-1.258	0.335	-0.010	1.418	0.387	0.162	-0.908	-0.087	-0.209	0.649	0.192	0.021	1.407	0.194	-0.031	-0.446
Firm specific components	0.287	0.041	-1.258	-0.100	0.093	1.418	0.051	0.075	-0.908	-0.018	0.109	0.649	0.679	0.797	-0.354	-0.370	-0.329	1.165
Long run value to book	1.893	1.902	-0.444	0.347	0.314	0.237	0.896	0.901	0.022	1.334	1.017	-2.133**	1.307	0.760	-1.565	0.917	1.017	0.132
No of obs	*74*	*31*		*61*	*44*		*77*	*28*		*58*	*47*		*69*	*36*		*64*	*41*	

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Table 3: Predicted and unpredicted bidder firms' statistics and excess cash effect on announcement returns.

The table shows in Panel A, median values of the continuous variables for predicted and unpredicted bidder firms by high low excess cash reserve. Panel B shows the robust regression estimates correcting for heteroskedasticity. The dependent variable is cumulative abnormal returns (-2,+2). Cumulative abnormal returns (-2, +2) is computed as the sum of abnormal returns over -2 days prior to the announcement and +2 days post event. Excess Cash Reserve Ratio is calculated at the end of the previous year (year -1). It is a raw Cash Reserve Ratio in excess of the required level estimated using a pooled time-series cross-sectional OLS regression with year dummies, following Opler et al (1999). Size is measured by logarithm of book value of asset. Leverage measured as a ratio of book value of debt to book value of equity. Market to book (M/B) is measured as ratio of market value plus long term liability to book value of equity plus long term liability. Return on asset is the ratio of operating income to total asset. Asset Tangibility is measure by a ratio of intangible asset to total asset. Average sale growth is growth in sale over 2 years prior to year 0 (i.e. year of announcement). Deal value is computed as value over pay divided by bidder market value. Firm specific components is firm specific deviation from valuation implied by sector multiple calculated at time *t*. Sector specific components is the valuation implied by sector multiple deviating from valuation implied by long run multiple. Long run value to book is the difference between valuation implied by long-run multiple and current book value. These variables are estimated using RKV (2005) approach. Z-test is based on Wilcoxon rank sum test for median differences. Tend is a dummy variable equal to 1 for tender offers, 0 otherwise. Diversity is a dummy variable equal to 1 if the target and the bidder are in the same 2-digit SIC industry and 0 otherwise. Attitude is a dummy variable equal to 1 for friendly deals, 0 otherwise. Pure stock and pure cash are dummy variables taking a value of 1 for pure stock or pure cash in the acquisition and 0 otherwise. Bidder is a dummy variable taking a value of 1 for predicted bidder and 0 otherwise. Non bidder is a dummy variable taking a value of 1 for unpredicted bidder and 0 otherwise. Excess cash reserve is interacted with bidder and non-bidder dummies, non-bidder pure stock and non-bidder pure cash dummies. The values in parenthesis are p-values. *,**,*** indicate significance at 10%, 5% and 1% levels. All variables are measured at the end of the fiscal year prior to announcement.

Panel A	Predicted bidder			Unpredicted bidder		
	High Excess cash	Low Excess cash	Z-test	High Excess cash	Low Excess cash	Z-test
CAR (-2,+2)	-0.009	0.004	-1.245	-0.002	-0.003	-1.126
Excess cash reserve ratio	0.023	-0.097	5.196***	0.076	-0.133	13.292***
Size	13.587	12.633	1.285	11.780	11.335	2.17**
Leverage	0.218	0.266	-0.844	0.093	0.214	-2.917**
Market to book	3.308	2.464	1.521	2.949	1.929	2.040**
Return on asset	0.098	0.091	0.067	0.080	0.072	0.994
Asset tangibility	0.465	0.444	0.415	0.488	0.524	-0.487
Average sale growth	0.093	0.091	0.495	0.166	0.133	1.481
Relative deal value	0.007	0.015	-1.046	0.023	0.047	-2.467**
Sector specific components	0.334	0.067	-1.384	0.127	-0.013	-2.785***
Firm specific components	0.411	0.244	0.079	-0.033	0.024	-0.411
Long run value to book	0.747	1.248	-1.049	1.151	0.933	1.829*
No of obs	*39*	*26*		*62*	*83*	

Panel B	Full sample 1984-2007		
	Model 1	Model 2	Model 3
Bidder X log(1+ Excess cash reserve)		-0.006	0.014
		(0.802)	(0.516)
Non-bidder X log(1+Excess cash reserve)		0.032***	0.067***
		(0.002)	(0.000)
Non-bidder X Pure stock X log(1+Excess cash reserve)			-0.053***
			(0.009)
Non-bidder X Pure cash Xlog(1+ Excess cash reserve)			0.001
			(0.935)
Non-bidder (Dummy)		-0.004	-0.004
		(0.647)	(0.631)
Log (1+ Excess cash reserve ratio)	0.023**		
	(0.015)		
Log (1+Size)	0.002	0.001	0.001
	(0.299)	(0.678)	(0.605)
Asset Tangibility	-0.003*	-0.003	-0.002
	(0.092)	(0.119)	(0.267)
Return on assets	0.019**	0.021**	0.009
	(0.017)	(0.015)	(0.329)
Log (1+Average Sale Growth)	0.007*	0.007*	0.008**
	(0.070)	(0.060)	(0.028)
Log (1+M/B)	-0.010**	-0.013***	-0.014***
	(0.020)	(0.004)	(0.001)
Log (1+Leverage)	0.009	0.008	0.011*
	(0.146)	(0.237)	(0.087)
Relative Deal Value	-0.019**	-0.019**	-0.016**
	(0.013)	(0.016)	(0.033)
Tend	-0.021***	-0.022***	-0.016***
	(0.000)	(0.000)	(0.005)
Diversity	0.001	0.001	-0.004
	(0.837)	(0.834)	(0.435)
Attitude	0.008	0.008	0.010
	(0.249)	(0.247)	(0.140)
Pure Cash (Dummy)			0.003
			(0.672)
Pure Stock (Dummy)			-0.01
			(0.501)
Constant	-0.008	0.011	-0.001
	(0.779)	(0.744)	(0.979)
No of obs	210	210	210
Prob>F	0.00***	0.00***	0.00***
Pseudo R-square	0.54	0.539	0.629

Table 4: Excess cash effect on announcement returns

This table reports robust regression estimates correcting for heteroskedasticity. The dependent variable is bidder announcement CAR from day -2 to day 2 from a market model. Excess Cash Reserve Ratio is a raw Cash Reserve Ratio in excess of the required level estimated using a pooled time-series cross-sectional OLS regression with year dummies, following Opler et al (1999). Size is measured by logarithm of book value of asset. Asset Tangibility is measure by a ratio of intangible asset to total asset. Return on asset is the ratio of operating income to total asset. Average sale growth is growth in sale over 2 years prior to year 0 (i.e. year of announcement). M/B is measured as ratio of market value plus long term liability to book value of equity plus long term liability. Leverage measured as a ratio of book value of debt to book value of equity. Relative Deal Value is deal value in millions of dollars divided by bidder market value of assets. Tend is a dummy variable equal to 1 for tender offers, 0 otherwise. Diversity is a dummy variable equal to 1 if the target and the bidder are in the same 2-digit SIC industry and 0 otherwise. Attitude is a dummy variable equal to 1 for friendly deals, 0 otherwise. Long run value to book is the difference between valuation implied by long-run multiple and current book value. Sector specific components is the valuation implied by sector multiple deviating from valuation implied by long run multiple. Firm specific components is firm specific deviation from valuation implied by sector multiple calculated at time t. These variables are estimated using RKV (2005) approach. Total wealth (dummy) is a dummy variable equal to one for CEO total wealth above the median and zero otherwise. Bidder is a dummy variable taking a value of 1 for predicted bidder and 0 otherwise. Non bidder is dummy variable taking a value of 1 for unpredicted bidder and 0 otherwise. Excess cash reserve is interacted with bidder and non-bidder dummies, non-bidder long run value to book, non-bidder sector specific error, non-bidder firm specific error and non-bidder total wealth. The values in parenthesis are p-values. *,**,*** indicate significance at 10%, 5% and 1% levels.

| | Full sample 1984-2007 | | | | | | With ownership data |
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Non-bidder X log(1+Excess cash reserve)	0.046**	0.049**	0.046*	0.005	0.109***	0.047*	-0.027
	(0.050)	(0.050)	(0.070)	(0.865)	(0.000)	(0.089)	(0.275)
Bidder X log(1+ Excess cash reserve)	0.004	0.000	0.001	-0.018	-0.032	0.012	-0.017
	(0.896)	(0.992)	(0.974)	(0.599)	(0.292)	(0.736)	(0.681)
Non-bidder X long run value to book X log(1+Excess cash reserve)				0.076**			
				(0.014)			
Non-bidder X sector specific error X log(1+Excess cash reserve)					-0.119		
					(0.210)		
Non-bidder X firm specific error X log(1+Excess cash reserve)						-0.029	
						(0.598)	
Non-bidder X total wealth X log(1+Excess cash reserve)							0.084***
							(0.000)
Non-bidder (Dummy)	0.004	0.006	0.010	0.005	0.004	0.007	-0.003
	(0.648)	(0.523)	(0.340)	(0.602)	(0.618)	(0.484)	(0.864)
Log (1+Size)	0.001	0.003	0.001	0.001	0.002	0.000	0.005*
	(0.713)	(0.340)	(0.746)	(0.565)	(0.394)	(0.913)	(0.090)
Asset Tangibility	0.026	0.037**	0.038**	-0.004	-0.005**	-0.004*	-0.051***
	(0.127)	(0.048)	(0.044)	(0.072)	(0.021)	(0.083)	(0.001)
Return on assets	0.019	0.022	0.021	0.014	0.042***	0.022	-0.091**
	(0.183)	(0.160)	(0.188)	(0.365)	(0.003)	(0.207)	(0.022)
Log (1+Average Sale Growth)	0.014	0.018	0.016	0.006	0.006	0.011	-0.038**
	(0.170)	(0.113)	(0.146)	(0.585)	(0.566)	(0.325)	(0.033)
Log (1+M/B)	-0.007***	-0.005**	-0.002	-0.003	-0.004**	-0.003	-0.012
	(0.009)	(0.030)	(0.308)	(0.159)	(0.015)	(0.155)	(0.139)
Log (1+Leverage)	0.028*	0.018	0.022	0.012	0.016	0.009	0.000
	(0.064)	(0.269)	(0.197)	(0.417)	(0.201)	(0.537)	(0.963)
Tend	-0.024***	-0.020***	-0.021***	-0.020***	-0.020***	-0.019**	0.006
	(0.001)	(0.010)	(0.006)	(0.007)	(0.003)	(0.014)	(0.621)
Diversity	0.021***	0.023***	0.022***	0.016**	0.019***	0.020**	0.037**
	(0.005)	(0.004)	(0.007)	(0.042)	(0.008)	(0.011)	(0.018)
Attitude	0.011	0.017*	0.013	0.013	0.015*	0.007	-0.011
	(0.207)	(0.073)	(0.166)	(0.145)	(0.063)	(0.402)	(0.419)
Relative Deal Value	-0.023*	-0.025*	-0.025*	-0.023*	-0.018	-0.030**	
	(0.064)	(0.058)	(0.063)	(0.071)	(0.119)	(0.022)	
Long run value to book	0.004**						
	(0.049)						
Sector specific components		-0.005*					
		(0.071)					
Firm specific components			-0.003				
			(0.572)				
Total wealth (dummy)							0.015
							(0.154)
Constant	-0.022	-0.073	-0.051	-0.022	-0.018	0.005	0.017
	(0.613)	(0.125)	(0.297)	(0.588)	(0.626)	(0.911)	(0.713)
No of obs	158	158	158	159	159	158	53
Prob>F	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
Pseudo R-square	0.566	0.677	0.672	0.558	0.666	0.67	0.612

Table 5: Excess cash effect on the probability of being a bidder.

This table reports the results of logistic regressions that examine how excess cash reserve affects the probability of bidding firms. Sample period is 1984–2007. The dependent variable is one if a firm engaged in an acquisition, and zero otherwise. Excess Cash Reserve Ratio is raw Cash Reserve Ratio in excess of the target level (estimated using a pooled time-series cross-sectional OLS regression with year dummies, following Opler et al. (1999). Size is measured by logarithm of book value of asset. Leverage measured as a ratio of book value of debt to book value of equity. M/B is measured as ratio of market value plus long term liability to book value of equity plus long term liability. Return on asset is the ratio of operating income to total asset. Mean abnormal returns are the average cumulative abnormal returns over 3 years prior to the announcement day. Average standard deviation is the standard deviation averaged over 3 years prior to the announcement day. Non-cash working capital is working capital minus increase/decrease in cash divided by total asset. Firm specific components is firm specific deviation from valuation implied by sector multiple calculated at time *t*. Sector specific components is the valuation implied by sector multiple deviating from valuation implied by long run multiple. Long run value to book is the difference between valuation implied by long-run multiple and current book value. These variables are estimated using RKV (2005) approach. Excess cash reserve is interacted with firm specific components, sector specific components, long run value to book and CEO total wealth. Total wealth (dummy) is a dummy variable equal to one for CEO total wealth above the median and \zero otherwise. Slopes are evaluated at the sample mean, and reported next to coefficients. All company characteristics are measured at the end of the fiscal year prior to deal announcement. The values in parenthesis are p-values. *,**,*** indicate significance at 10%, 5% and 1% levels.

| | Full sample 1984-2007 | | | | | | | | | | | | With-ownership | |
| | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | | Model 6 | | Model 7 | |
	Coeff	Slope	Coeff	Slope	Coeff	Slope	Coeff	Slope	Coeff	Slope	Coeff	Slope	Coeff	Slope
Log (1+ Excess cash reserve ratio)	0.208***	0.010	0.148**	0.007	0.245***	0.012	0.114	0.006	0.254***	0.012	0.185	0.009	0.317	0.008
	(0.002)		(0.039)		(0.006)		(0.148)		(0.004)		(0.141)		(0.377)	
Log (1+Size)	0.293***	0.014	0.286***	0.014	0.291***	0.014	0.295***	0.014	0.292***	0.014	0.292***	0.014	0.321***	0.008
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Log (1+Leverage)	0.018	0.001	0.027	0.001	0.02	0.001	0.015	0.001	0.023	0.001	0.022	0.001	-0.052	-0.001
	(0.601)		(0.416)		(0.564)		(0.646)		(0.505)		(0.533)		(0.522)	
Log (1+M/B)	0.016	0.001			0.013	0.001	0.018	0.001	0.01	0.000	0.012	0.001	0.029	0.001
	(0.643)				(0.712)		(0.587)		(0.776)		(0.751)		(0.786)	
Return on assets	0.073***	0.003	0.069**	0.003	0.075***	0.004	0.073***	0.004	0.076***	0.004	0.077***	0.004	0.133**	0.003
	(0.005)		(0.011)		(0.002)		(0.006)		(0.003)		(0.001)		(0.020)	
Mean Abnormal Return	-0.406	-0.02	-0.325	-0.015	-0.412	-0.02	-0.418	-0.02	-0.409	-0.02	-0.426	-0.02	-0.669	-0.017
	(0.262)		(0.370)		(0.250)		(0.240)		(0.260)		(0.227)		(0.522)	
Average Standard Deviation	0.075***	0.004	0.064**	0.003	0.074***	0.004	0.074***	0.004	0.076***	0.004	0.074***	0.004	0.01	0.000
	(0.004)		(0.018)		(0.004)		(0.004)		(0.003)		(0.004)		(0.924)	
Non cash working capital	-0.047**	0.000	-0.041*	0.000	-0.047**	0.000	-0.047**	0.000	-0.047**	0.000	-0.046**	0.000	0.007	0.000
	(0.034)		(0.055)		(0.037)		(0.033)		(0.035)		(0.036)		(0.941)	
Firm specific components			0.159***	0.000										
			(0.004)											
Sector specific components			0.179**	0.009										
			(0.012)											
Long run value to book			-0.049	-0.002										
			(0.155)											
Firm specific components X log(1+Excess cash reserve)					-0.069	-0.003					-0.048	-0.002		
					(0.389)						(0.539)	(0.541)		
Setor specific components X log(1+Excess cash reserve)							0.169*	0.008			0.161*	0.008*		
							(0.066)				(0.083)	(0.081)		
Long run value to book X log(1+Excess cash reserve)									-0.100	-0.005	-0.087	-0.004		
									(0.393)		(0.468)	(0.470)		
Total wealth (dummy)													0.497*	0.012
													(0.069)	
Total wealth X Log(1+Excess cash reserve ratio)													0.297	0.008
													(0.361)	
Constant	-3.836***		-3.821***		-3.807***		-3.864***		-3.842***		-3.847***		-6.461***	
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
No of obs	10713		10713		10713		10713		10713		10713		1977	
Likelihood ratio	-2367.71		-2357.3		-2367.49		-2366.4		-2367.27		-2365.94		-317.49	
Pseudo R-square	0.084		0.088		0.084		0.084		0.084		0.084		0.16	

Table 6: Excess cash effect on Bidders post acquisition operating performance

This table reports regression estimates of a bidder's post-acquisition abnormal operating cash flow performance. Only completed deals are examined. The dependent variable is annual operating cash flow performance of the combined firm averaged over 3 years after the acquisitions. In each pre-acquisition year, the target and bidder performances are combined into one figure by weighting each by their relative market values. The independent variable is the combined pre-acquisition annual operating performance averaged over 3 years before the announcement. In each year, operating cash flow performance is measured as operating cash flow over total assets, then adjusted by the median performance of those firms in the same excess cash reserve ratio decile of the same 2-digit SIC industry. Excess cash reserve (dummy) is dummy variable taking a value of 1 for bidders with excess cash reserve above the median and 0 otherwise. Bidder firms are divided into high low long run value to book, high low sector specific components and high low firm specific components. The constant term captures any abnormal performance after the acquisition attributable to the deal. The coefficient on Pre-acquisition Operating Performance captures the continuation of operational performance after the acquisition. The values in parenthesis are p-values. *,**,*** indicate significance at 10%, 5% and 1% levels.

	All bidder	All bidders	High Long run value to book	Low Long run value to book	High sector specific components	Low sector specific components	High firm specific components	Low firm specific components
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-acquisition operating performance	0.151***	0.158***	0.144***	0.142**	0.166**	0.151***	0.169***	0.187***
	(0.000)	(0.000)	(0.002)	(0.020)	(0.026)	(0.000)	(0.000)	(0.003)
Excess cash reserve (Dummy)		0.027*	0.048**	-0.009	0.033	0.046	0.035**	0.005
		(0.090)	(0.024)	(0.680)	(0.890)	(0.119)	(0.048)	(0.847)
Constant	-0.014	-0.026**	-0.018	-0.015	-0.010	-0.016	-0.017*	0.004
	(0.179)	(0.012)	(0.323)	(0.170)	(0.480)	(0.129)	(0.082)	(0.813)
No of obs	284	282	113	112	115	110	111	103
Adjusted R-square	0.103	0.115	0.205	0.11	0.09	0.23	0.244	0.137

Appendix I: **Variables definitions**

X_t(control variable)			
Operational performance	Operating income deflated by total value of assets then subtracted median operational performance of firms in the same industry	$OP = \sum \dfrac{\frac{Operating\ income}{AT} - \overset{Median\ \text{Industry}}{Operating\ income}}{T}$	
Mean abnormal returns	Daily abnormal returns averaged over 3 years prior to the announcements. Abnormal returns estimated using a market model.	$AR_{it} = R_{it} - \hat{\alpha} - \hat{\beta}R_{mt}$ $R_{it} = \dfrac{RI_t - RI_{t-1}}{RI_{t-1}}$ $Mean\ abnormal\ return = \sum_{N=-3}^{N=-1} \dfrac{AR_{it}}{N}$	
Mean standard deviation	Daily standard deviation averaged over 3 years prior to the announcements. Standard deviation is estimated using daily returns.	$\sigma_{it} = \sqrt{\dfrac{\sum (R_{it} - \bar{R}_{it})^2}{N-1}}$ $R_{it} = \dfrac{RI_t - RI_{t-1}}{RI_{t-1}}$ $Mean\ s\tan dard\ devia tion = \sum_{N=-3}^{N=-1} \dfrac{\sigma_{it}}{N}$	
Size.	Logarithm of the book value of total asset in millions.	LOG (AT)	
ROA	Operating income over book total asset	$\dfrac{Operating\ income}{AT}$	
Relative deal value	Deal value deflated by bidder market value of equity.	$\dfrac{Value\ over\ pay}{Bidder\_MV}$	
N-W-Capital	Non-cash working capital. Working capital minus increase/decrease in cash divided by total asset	$\dfrac{Working\ capital - Increase\ (decrease)\ cash}{AT}$	
Leveraged	Book value of long-term debt to book value of equity	$\dfrac{Longterm\ debt}{Book\ value\ of\ equity}$	
Asset tangibility	tangible asset over total asset	$\dfrac{AT - \text{int} angibl\alpha sset}{AT}$	
Market to book ratio	Market value of equity plus long-term debt over book value of equity plus long-term debt.	$\dfrac{MV + Long\ term\ debt}{Book\ value\ of\ equity + Long\ term\ debt}$	
Average sales growth	Average sale growth is growth in sale over 2 years prior to year	$\sum_{t_i=1}^{t_n} \dfrac{Sales_t - Sales_{t-1}}{Sales_{t-1}}$	
Firm specific components	Firm specific error is firm specific deviation from valuation implied by sector multiple calculated at time t	$m_{it} - v(\theta_{it}; \alpha_{j_t})$	RKV (2005)
Sector specific components	Sector specific error is the valuation implied by sector multiple deviating from valuation implied by long run multiple.	$v(\theta_{it}; \alpha_{j_t}) - v(\theta_{it}; \alpha_j)$	RKV (2005)
Long run value to book	Long run value to book is the difference between valuation implied by long-run multiple and current book value.	$v(\theta_{it}; \alpha_j) - b_{it}$	RKV (2005)