Corporate Liquidity, Acquisitions, and Macroeconomic Conditions

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Abstract

This paper evaluates how the relation between firms' cash holdings and their acquisition decisions changes over macroeconomic cycles using a sample of 47,615 acquisitions from 36 countries between 1997 and 2014. Higher cash holdings and stronger macroeconomic conditions each increase the likelihood that a firm will make an acquisition. However, larger cash holdings decrease the sensitivity of acquisitions to macroeconomic factors, suggesting that cash holdings lower financing constraints during times when the cost of external finance is high. Announcement day abnormal returns for acquirers follow a consistent pattern: They decrease with acquirer cash holdings and with better macroeconomic conditions.

I.   Introduction

One of the most important decisions a financial manager must make is to determine how liquid his firm's balance sheet should be. More liquidity means that a firm can make investment decisions without having to raise external capital.[1] Consequently, liquidity on the balance sheet is most valuable to a firm when the cost of external finance is relatively high. One such time occurs during poor macroeconomic conditions, since both practitioners' viewpoints and the academic literature

[1]The idea that liquidity can mitigate the cost of external financing was introduced in Keynes (1936) and developed by many others, most notably by Myers and Majluf (1984). The seminal paper about the way in which agency problems can occur when firms have too much liquidity is Jensen (1986), and many authors have provided related evidence.

suggest that most firms' ease of financing is strongly procyclical.[2] Therefore, liquidity should be particularly important in facilitating firms' abilities to invest efficiently during poor macroeconomic conditions.

Liquidity, however, comes at a cost. In addition to being inefficient from a tax perspective, too much liquidity can exacerbate agency problems, since managers are less likely to face capital market discipline for their investments. In other words, if firms hold sufficient liquidity to ensure optimal investments even in bad times, then they will have too much liquidity in normal times, when cash flows tend to be larger and financial markets have fewer frictions. A cost of having too much liquidity is that firms potentially will use this excess liquidity to make value-reducing investments.

This paper provides evidence on the nature of this trade-off. It considers the way that macroeconomic conditions and firms' liquidity affect firms' acquisition decisions, one of the most important investment decisions that firms face. The idea is that a firm chooses its liquidity with these factors (and possibly others) in mind. Once the choice is made, it will affect a firm's future investment decisions in predictable ways. A more liquid balance sheet should provide insurance against unreliable capital markets in bad times at the potential cost of exacerbating the firm's free cash flow problem and leading to value-reducing investments in good times.

We study the effect of liquidity on the interaction of macroeconomic conditions and investment decisions using a sample of 47,615 acquisitions by public and private acquirers from 36 countries between 1997 and 2014. We focus on acquisitions because they are large, observable investments, over which firms have substantial discretion. Therefore, if liquidity affects investment, it is more likely to be observed doing so for acquisitions than for capital investments. We estimate the likelihood that a firm makes an acquisition as a function of both its own financial position and overall macroeconomic conditions. The international sample provides us with variation in economic conditions that allows us to identify the way that firms' liquidity affects their investment decisions in differing economic conditions.

Similar to Harford (1999), we find that firms with higher cash holdings are more likely to make acquisitions in our much larger and non-overlapping sample. This finding could mean that cash relieves financial constraints and allows firms to invest efficiently, or it could mean that cash leads firms to overinvest and to make value-reducing acquisitions. If firms are choosing liquidity to trade off the costs and benefits of incremental liquidity, this positive relation between cash holdings and acquisitions could reflect both effects. During bad times, we expect higher liquidity to lessen the impact of credit rationing and, consequently, lower the impact of poor economic conditions in firms' investments, while in normal times, we expect higher liquidity to lead to overinvestment.

We analyze the relation between cash holdings and the propensity to make acquisitions over different macroeconomic conditions. Since down cycles cannot

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[2]See Passov (2003) and Graham and Harvey (2001), for practitioners' viewpoints, and Erel, Julio, Kim, and Weisbach (2012) for empirical evidence on how firms' capital raising varies over the business cycle.

be perfectly predicted and have a large impact on the firm's ability to raise capital, they are an exogenous factor that identifies the impact of liquidity. We estimate the extent to which macroeconomic conditions affect the likelihood of making an acquisition, as well as the extent to which the impact of macroeconomic conditions on acquisitions is affected by firms' cash positions. If the purpose of holding cash is to provide liquidity in times when the cost of external finance is high, then we would expect that firms with large cash holdings would be less affected by macroeconomic shocks than firms with less liquid balance sheets.

The results suggest that macroeconomic conditions positively affect the likelihood of making an acquisition. This finding is consistent with the common observation that merger waves tend to be procyclical (Harford (2005)). However, the results also suggest that the impact of macroeconomic conditions on firms' acquisition behavior is smaller when firms have larger cash positions. The fact that cash holdings reduce procyclicality suggests that part of the explanation for the cyclicality of merger waves comes from a financing channel. Since it is harder to raise external sources of capital when the economy is not doing well, firms neglect some potential value-increasing acquisitions (and other investments) during economic downturns. Holding cash mitigates this effect and enables firms to make valuable investments during poor times. However, incremental cash comes at the cost of potentially making financing too easy when macroeconomic conditions are strong, which can lead to poor quality acquisitions.

We evaluate the extent to which this result occurs because of the endogeneity of cash and the fact that macroeconomic cycles are partially predictable. We estimate a model predicting macroeconomic conditions and reestimate our equation predicting acquisitiveness using the unexpected component of gross domestic product (GDP) growth in a particular country, our measure of macroeconomic conditions. The results are similar to those using the level of GDP growth. In addition, we follow Fresard (2010) and instrument for cash holdings using 2 lags of cash holdings as well as the tangibility of the firms' assets, with similar results to those described previously.

The view that firms choose liquidity to trade off the agency costs coming from excess liquidity with the benefit of ensuring the ability to invest even in bad times also has predictions about the quality of investments over the business cycle. It suggests that firms will be more prone to overinvest when they have high cash balances, and that more cash will lead to lower quality acquisitions, especially during bull markets. In addition, if firms are credit-rationed during poor financial times, incremental cash will help to alleviate these constraints. If managers would undertake only the most valuable investments in the absence of cash, then additional cash would allow them to take some positive net present value (NPV) investments that the firm could not finance otherwise. These additional investments, while creating value, are nonetheless worse than the investments that the firm would have taken without the cash on hand. Thus, the incremental effect of cash on investment quality is negative, irrespective of business cycles, despite the fact that the cash enables firms to finance positive NPV investments.

To evaluate this idea, we rely on the market reaction to the announcement of the acquisition, which measures the market's expectation of the value added to the acquiring firm from the deal. For our sample, market reactions tend to be slightly

positive, with a mean of 0.77% and a median of 0.29%. In the cross section, we find that acquirers' announcement returns are, on average, negatively related to acquirers' cash holdings. These negative returns are consistent with the argument that, when acquirers have more cash, the acquisitions they make tend to be worse.

In addition, acquisition announcement returns are negatively related to macroeconomic conditions. Combined with the result that there is a lower probability of a firm making an acquisition in worse macroeconomic conditions, this pattern suggests that financing constraints force firms to be relatively selective during bad economic times, undertaking fewer but higher quality deals. During normal times, firms undertake relatively more deals, but potentially lower quality ones, since they are able to raise capital to finance any deal more easily. Overall, the results support the idea that firms view incremental liquidity as insurance against poor states of the world. Higher liquidity allows them to make better investments in bad states, but the cost is that they will make worse ones in good states, on average.

The paper combines the ideas in several disparate literatures in corporate finance, including work on the precautionary demand for corporate liquidity, on the effect of free cash flow on firms' investments, and on the impact of macroeconomic conditions on the cost of raising external financing. The literature on the precautionary demand for cash dates to Keynes (1936), who originally proposed that firms can hold cash as a hedge against potential future financial constraints. Opler, Pinkowitz, Stulz, and Williamson (1999) were the first to examine this idea empirically, and they started a literature that generally concludes that the precautionary motive is an important determinant of firms' liquidity management decisions.[3]

This paper contributes to the literature by documenting directly that cash helps enable firms to finance investments during poor macroeconomic times when liquidity is likely to be scarce. While most of the literature on liquidity examines it from an ex ante sense by studying the factors that affect firms' choices of liquidity, our paper extends the analysis by looking ex post at the way that firms' liquidity choices actually affect their investment decisions at times when it is needed.

Jensen (1986) and Stulz (1990) introduced the notion that liquidity can have a dark side and that too much liquidity can lead firms to take value-reducing investments. A number of papers have documented that firms with unusually large cash holdings take a number of poor investments, especially acquisitions.[4] This paper supports the notion that cash can contribute to poor acquisitions in good economic times, since it is relatively easy to raise capital and retained cash becomes superfluous. When economic conditions are strong, firms can more easily raise capital than when economic conditions are weak, so the cash firms have saved historically

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[3]See Almeida, Campello, and Weisbach (2004), Bates, Kahle, and Stulz (2009), Lins, Servaes, and Tufano (2010), Campello, Giambona, Graham, and Harvey (2011), Hoberg, Phillips, and Prabhala (2014), Morellec, Nikolov, and Zucchi (2014), and Lin, Schmid, and Weisbach (2018). Dittmar, Mahrt-Smith, and Servaes (2003) and Kalcheva and Lins (2007) focus on international issues related to cash management. Almeida, Campello, Cunha, and Weisbach (2014) provide a survey of this literature.

[4]See Lehn and Poulsen (1989), Lang, Stulz, and Walkling (1991), Blanchard, Lopez-de-Silanes, and Shleifer (1994), Harford (1999), Richardson (2006), and Cunha (2015).

becomes superfluous and can be used for value-reducing investments such as poor acquisitions.

Finally, emerging literature has documented that firms' capital raising decisions differ substantially over the business cycle (see Korajczyk and Levy (2003), Erel et al. (2012), Kahle and Stulz (2013), and Covas and Den Haan (2013)). This literature finds that, during booms, even poorly rated firms are able to raise capital through equity or debt issues. However, during poor macroeconomic times, raising capital appears to be much more expensive. During downturns, equity issues are rare and bond issues are restricted to the highest quality issuers. Our paper suggests that, because of the high costs of external finance during poor times, firms hold cash to be able to make investments during these poor times without having to raise external financing.

II.   Sample

A.   Data Sources

Our sample of firms is taken from the OSIRIS database, which provides financial information on publicly traded and major unlisted companies.[5] We require firms to report at least 1 year of financial information during the fiscal years of 1997 and 2014. We exclude financial firms (primary U.S. Standard Industrial Classification (SIC) codes 6000–6999), as well as firm-years for which the firm has less than 10 employees or total assets less than $1 million USD. OSIRIS's coverage of firm-level financial information varies widely by country. We restrict our sample to countries with at least 20 firms in every fiscal year to ensure a comprehensive set of firms in each country in our analysis. These sample selection criteria limit our sample to 36 countries.

To identify acquisitions made by the sample firms, we rely on the Zephyr database on worldwide mergers and acquisition transactions.[6] We include all mergers and acquisitions announced between Jan. 1, 1997 and Dec. 31, 2014 and completed as of Dec. 31, 2014. We focus on acquisitions of majority interests in which the acquirer owns less than 50% of the target shares prior to the deal but more than 50% subsequent to the deal. We additionally exclude buyouts, privatizations, reverse mergers, restructurings, and exits from private equity deals. Finally, we merge the acquisition transactions information in Zephyr to the firm-year panel data of OSIRIS.

To evaluate the impact of liquidity on firms' decisions to make acquisitions, we wish to estimate the likelihood that a given firm makes an acquisition in a particular year. Our goal is to construct as large a sample of potential acquirers as possible but only to include firms that realistically could make an acquisition.

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[5]The OSIRIS database mainly includes public companies over the world, but major private companies are included in the database if they are subsidiaries of public companies, they have issued a public bond, or they keep reporting financial information after delisting. Thirty-four percent of firms in our sample are private firms with average total assets of $1,230 million USD. Our main results are not qualitatively different when we exclude private firms in our sample.

[6]We rely on Zephyr instead of the Securities Data Company database because our 2 databases— OSIRIS and Zephyr—are provided by the same data provider, Bureau van Dijk, reducing any errors that could potentially come from the data merging process.

For this reason, we include all firms into our sample that, according to the Zephyr database, make at least 1 acquisition in our sample period.[7]

One limitation of the Zephyr database is that, for about 45% of deals, deal values are not reported. We neither drop these deals nor impose a size criterion for our acquisitions to avoid oversampling larger deals (see the discussion by Netter, Stegemoller, and Wintoki (2011)). We rather focus our filters on firms' decisions on whether to make at least 1 acquisition in a particular year, regardless of the acquisition's size.[8] When we pool firms across countries and years, the final sample contains 132,257 firm years, in which 47,615 acquisitions are made.

We organize the sample in 2 ways, depending on the type of the analysis for which it will be used. First, when estimating the likelihood of acquisitions, we use the firm-year panel data that include 132,257 observations of 12,660 firms in 36 countries from 1997 to 2014. Second, in the analysis of acquirers' cumulative abnormal returns (CARs) around announcement dates, we organize the sample at the individual deal level. For this second test, we use stock return data from *Datastream* and estimate the acquiring firm's CAR from day -1 to day $+1$ (CAR $[-1,+1]$) relative to the acquisition announcement date. Abnormal returns are calculated from the market model estimated from day -260 to day -100 relative to the announcement date with at least 60 days of returns available. When a firm makes multiple acquisition announcements in a short period, we take the first acquisition transaction and drop any other transactions that are announced within 30 days. We additionally include the acquiring firm's return from day -210 to day -10 in the regression as a control. We end up using a sample of 33,717 acquisition transactions in 36 countries with cumulative abnormal announcement returns available.

We use annual GDP growth in constant 2015 U.S. dollars obtained from the World Bank to measure country-level macroeconomic conditions. We construct indicator variables for high (low) GDP growth years when we evaluate whether the effect of cash holdings changes across macroeconomic cycles. Because countries have different distributions of GDP growth, to identify abnormal levels of GDP growth rates, we first normalize the GDP growth for each country by subtracting the mean and scaling by the standard deviation. For an observation of GDP growth for a particular country and year, the mean and standard deviation that are used for normalization are estimated from time-series GDP growth rates over the previous 20 years ending 2 years before the event time (i.e., from $t-23$ to year $t-3$). HIGH_GDP_GROWTH (LOW_GDP_GROWTH) is defined as the years when the normalized GDP growth rate is in the top (bottom) 20th percentile of the normalized GDP growth distribution of 648 country-year observations. We also use UNEXPECTED_GDP_GROWTH in a subset of regressions to address the possibility that firms adjust their cash holdings based on their expectations of economy-wide growth. UNEXPECTED_GDP_GROWTH is measured as the residuals from a model predicting future macroeconomic conditions, using a

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[7]Thirty-three percent of firms are dropped from the sample because they do not make any acquisitions during our sample period.

[8]We repeat our main tests using only acquisitions for which we know the valuation, imposing minimum deal size criteria of $1 million and $10 million. The results are similar to those we report.

specification suggested by Barro (2000). These estimates are presented in Table A1.

Our main measure for corporate liquidity is cash, scaled by the book value of total assets, which has been the literature's standard measure of corporate liquidity since Opler et al. (1999). The literature has likely focused on this measure of liquidity for two reasons. First, cash normalized by assets is straightforward to measure.[9] Second, there are theoretical reasons why cash is the preferred way of managing liquidity. Lines of credit and debt capacity can disappear during poor financial conditions when they are most needed, effectively being used to fund overinvestments in good times rather than efficient investments in poor times (see Acharya, Almeida, and Campello (2007) or Almeida et al. (2014)).

As firm-level control variables, we use firm size, profitability, and sales growth, all of which are taken from OSIRIS. At the deal level, we construct indicator variables for public targets, cross-border deals, and related-industry deals from Zephyr. To minimize the effect of outliers, we winsorize cash, profitability, and sales growth variables, and trim CARs.[10] Detailed definitions for all variables are provided in the Appendix.

B.   Sample Description

Table 1 summarizes the distribution of our sample of firms and acquisition transactions. Panel A presents the way in which the sample changes over the sample period. It begins in 1997 with 4,002 firms in 17 countries. The sample increases to 36 countries and more than 8,000 firms for most of the sample period. The "acquisition rate," which is the fraction of sample firms making at least 1 acquisition, varies from 16.0% to 30.8%, with an average of 24% per year. In addition, the last column shows the mean for 1-year lagged GDP growth rates of 36 countries by fiscal year. There is a substantial year-to-year variation in average GDP growth rates over time, from a high of 4.8% in 2007 to a low of −0.7% following the financial crisis in 2010.

Panel B of Table 1 breaks down the sample by country. Countries range in size from Columbia, with an average of 7 firms per year, to the United States, with over 2,600 firms per year. The acquisition rate varies substantially across countries as well, from a low of Hong Kong, with an acquisition rate of 11.5%, to a high of Netherlands, in which firms make acquisitions in 35.5% of years. The large difference in acquisition rates could reflect a number of factors, including legal or cultural obstacles to acquisitions or differences in reporting requirements, across countries that affect the likelihood that we can observe a given acquisition so that it makes it into our sample. Regardless of the reason why they occur, these differences strongly suggest that it is important to control for country-specific factors in any equations of acquisition rates.

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[9]However, its name is somewhat misleading because for most firms their "cash" holdings actually are an aggregation of a number of different securities, some of which are risky. See Duchin, Gilbert, Harford, and Hrdlicka (2017) for more discussion and a characterization of the "cash" portfolios of typical public firms.

[10]Cash is winsorized at the top and bottom 1% of the distribution. After examining the outliers, profitability is winsorized at the top 1% and bottom 5%, and sales growth at the top 5% and bottom 1%. Because of the extreme outliers, CARs are trimmed at the top and bottom 1% of the distribution.

TABLE 1

Sample of Acquisitions in 36 Countries (1997–2014)

Table 1 displays statistics on sample firms in 36 countries from 1997 to 2014, with at least 1 year of financial data available in OSIRIS. The sample includes firms that make at least 1 acquisition during the fiscal years 1997–2014 reported by the Zephyr database. Financial firms and firms with total assets less than 1 million U.S. dollars are excluded. Panel A presents the distribution of sample firms tabulated by fiscal year. The acquisition rate is calculated as the percentage of firms that make at least 1 acquisition during the fiscal year. We calculate mean of GDP growth each year for 36 countries, and the GDP growth rate is lagged by 1 year. Panel B presents the distribution of sample firms tabulated by acquirer country. Mean number of firms by year and mean annual acquisition rate are calculated as annual averages over the sample period by each country. For each country, we calculate mean and standard deviation (Std) of GDP growth rates and mean of the ratio of cash to total assets during 1996–2013.

Panel A. Sample of Acquisitions by Year

Year	Total No. of Countries	Total No. of Firms	Acquisition Rate	Mean GDP Growth
1997	17	4,002	16.0%	2.9%
1998	22	4,829	19.5%	3.9%
1999	23	5,422	20.4%	3.5%
2000	29	6,777	30.8%	4.1%
2001	31	7,351	26.2%	4.5%
2002	33	7,669	23.7%	2.2%
2003	35	8,078	22.6%	2.8%
2004	36	8,344	26.8%	3.0%
2005	36	8,515	27.3%	4.5%
2006	36	8,825	27.2%	3.9%
2007	36	8,863	27.6%	4.8%
2008	36	8,766	22.4%	4.2%
2009	36	8,660	18.6%	1.5%
2010	36	8,476	21.1%	−0.7%
2011	36	8,249	22.2%	4.0%
2012	35	7,903	21.2%	3.3%
2013	35	7,728	22.4%	2.2%
2014	33	3,800	29.0%	2.4%
Total	36	12,660	23.8%	3.2%

Panel B. Sample of Acquisitions by Acquirer Country

Country	Sample Period	Mean No. of Firms by Year	Mean Annual Acquisition Rate	Total No. of Acquisitions	Mean GDP Growth	Std. GDP Growth	Mean Cash/Total Assets
Australia	1998–2014	312.8	23.6%	1,956	3.3%	0.8%	0.123
Austria	1997–2014	40.9	21.5%	220	1.9%	1.5%	0.114
Belgium	1997–2014	68.1	26.5%	528	1.8%	1.5%	0.080
Brazil	2002–2014	82.4	20.1%	306	3.5%	2.1%	0.070
Canada	1998–2014	453.8	23.4%	2,600	2.6%	1.6%	0.119
Chile	2003–2013	33.1	14.8%	67	4.6%	2.4%	0.042
China	2003–2014	283.5	12.2%	521	10.2%	1.9%	0.185
Colombia	2002–2014	7.0	18.4%	21	4.3%	1.8%	0.043
Denmark	1997–2014	61.2	21.6%	315	1.4%	1.9%	0.083
Finland	1997–2014	81.4	31.8%	904	2.4%	3.4%	0.079
France	1997–2014	314.1	28.0%	2,368	1.6%	1.5%	0.083
Germany	1997–2014	286.3	22.0%	1,620	1.3%	2.1%	0.128
Greece	1997–2011	42.9	14.8%	139	2.4%	3.4%	0.071
Hong Kong	2000–2014	31.7	11.5%	63	4.1%	2.7%	0.152
India	2000–2014	253.2	15.7%	724	7.0%	2.1%	0.084
Indonesia	2001–2013	17.4	15.8%	35	5.3%	0.8%	0.140
Ireland	1997–2014	45.6	33.5%	556	4.5%	4.2%	0.139
Israel	1998–2014	65.2	15.2%	199	3.6%	2.2%	0.179
Italy	1997–2014	79.7	21.0%	373	0.5%	2.1%	0.087
Japan	2000–2014	557.3	13.6%	1,262	1.0%	1.8%	0.154
Luxembourg	1998–2014	13.0	22.1%	67	3.6%	3.3%	0.110
Malaysia	2000–2014	314.6	16.7%	1,080	5.2%	1.4%	0.119
Mexico	2000–2014	37.9	17.7%	156	2.1%	2.7%	0.065
Netherlands	1997–2014	107.7	35.5%	1,303	2.0%	2.2%	0.108
New Zealand	2000–2014	41.2	24.3%	167	2.7%	1.4%	0.071
Norway	1997–2014	72.6	25.7%	450	2.2%	1.7%	0.137
Peru	2004–2014	12.0	17.7%	25	6.2%	2.3%	0.073
Philippines	1999–2014	16.4	13.3%	46	4.5%	2.2%	0.111
Singapore	1998–2014	152.4	12.1%	436	5.6%	3.1%	0.171
South Africa	1997–2014	68.6	16.5%	262	3.1%	1.4%	0.124
South Korea	2001–2014	106.1	13.0%	227	4.4%	2.1%	0.062
Spain	1997–2014	64.2	23.1%	358	2.1%	2.7%	0.050
Sweden	1997–2014	165.6	29.5%	1,465	2.4%	2.5%	0.102
Switzerland	1997–2014	117.2	25.0%	804	1.9%	1.5%	0.136
United Kingdom	1997–2014	731.3	31.6%	6,843	2.1%	1.6%	0.130
United States of America	1997–2014	2644.8	25.5%	19,149	2.4%	1.7%	0.128
Total	1997–2014	7,347.6	23.8%	47,615	3.2%	2.8%	0.108

In addition, there is substantial variation in economic growth rates across countries. China has the largest average growth rate, with an average of 10.2%, while Italy has the smallest, with a growth rate of 0.5%. Even within countries, GDP growth rates change over time at different rates, with the standard deviation of GDP growth equal to 0.8% in Australia and 4.2% in Ireland.

In Panel A of Table 2, we provide statistics on the distribution of GDP growth variables. GDP growth rates range from −8.3% to 15.2%, with the median of 3.1%. Panel B of Table 2 summarizes the characteristics of the acquirers in our sample. Since our focus is on the factors that lead to acquisitions, we compare the characteristics of firms in acquisition years to those in non-acquisition years. These comparisons between acquisition years and non-acquisition years include both cross-sectional differences in the likelihoods that different firms will make

TABLE 2

Summary Statistics on Macroeconomic Conditions and Acquirer Characteristics

Table 2 presents summary statistics for macroeconomic condition variables and the accounting variables of the acquirers in the sample. Panel A presents the statistics for GDP_GROWTH and UNEXPECTED_GDP_GROWTH from country-year observations of 36 countries. UNEXPECTED_GDP_GROWTH is defined as the residual from the regressions of GDP_GROWTH on a list of macroeconomic variables. The estimations for the GDP growth are reported in Table A1. The table shows the minimum, maximum, and percentile values of the macroeconomic condition variables, and the bottom 2 rows present the percentage of the number of country-year observations with negative values and means of macroeconomic variables for the bottom and top 20% of the distributions. In Panel B, the sample includes firm-year observations from OSIRIS of the firms that make at least 1 acquisition between 1997 and 2014. Firm-year observations are categorized into non-acquisition years and acquisition years. TOTAL_ASSETS are in million U.S. dollars. We normalize the GDP growth by subtracting the mean and scaling by the standard deviation calculated from the previous 20 years of GDP growth data of each country. LOW_GDP_GROWTH (HIGH_GDP_GROWTH) is an indicator variable for the years when the normalized GDP growth is in the bottom (top) 20% of the country-year distribution. Firm-level variables and GDP growth variables are lagged by 1 year. Variable definitions are provided in the Appendix. We assess the differences in means using the mean difference test and medians using the Wilcoxon rank-sum test. *** indicates significance at the 1% level. + denotes cases where 2 samples have the same medians.

Panel A. Macroeconomic Conditions

	Percentile Values					
	Min.	P25	Median	Mean	P75	Max.
GDP_GROWTH	−0.0827	0.0164	0.0307	0.0316	0.0474	0.1524
UNEXPECTED_GDP_GROWTH	−0.0906	−0.0068	0.0051	0.0028	0.0168	0.0933

	Subgroup				
	<0			Low (Bottom 20%)	High (Top 20%)
	% Country-Year Obs.	Mean		Mean	Mean
GDP_GROWTH	9.5%	−0.0231		−0.0043	0.0565
UNEXPECTED_GDP_GROWTH	38.7%	−0.0185		−0.0390	0.0301

Panel B. Acquirer Characteristics

	Total			Non-Acquisition Year		Acquisition Year	
	Mean	Median	Std. Dev.	Mean	Median	Mean	Median
TOTAL_ASSETS	3,386.68	295.84	16,092.05	2,986.46	262.74	4,669.04***	425.79***
CASH	0.1234	0.0743	0.1397	0.1227	0.0740	0.1257***	0.0756***
PROFITABILITY	0.0947	0.1045	0.1246	0.0896	0.0999	0.1112***	0.1184***
SALES_GROWTH	0.1573	0.0890	0.3568	0.1444	0.0810	0.1989***	0.1149***
INVESTMENT_GRADE	0.0908	0.0000	0.2873	0.0780	0.0000	0.1319***	0.0000+
SPECULATIVE_GRADE	0.0703	0.0000	0.2556	0.0673	0.0000	0.0798***	0.0000+
UNRATED	0.8389	1.0000	0.3676	0.8547	1.0000	0.7883***	1.0000+
GDP_GROWTH	0.0280	0.0267	0.0271	0.0283	0.0267	0.0268***	0.0267+
NORMALIZED_GDP_GROWTH	−0.3408	−0.1654	1.2008	−0.3523	−0.1784	−0.3039***	−0.1553***
LOW_GDP_GROWTH	0.2073	0.0000	0.4054	0.2145	0.0000	0.1841***	0.0000+
HIGH_GDP_GROWTH	0.1240	0.0000	0.3296	0.1221	0.0000	0.1302***	0.0000+
UNEXPECTED_GDP_GROWTH	0.0017	0.0044	0.0194	0.0013	0.0039	0.0028***	0.0046***
No. of obs.		132,257			100,798		31,459

acquisitions and differences over time in the likelihood of a particular firm doing an acquisition.

Panel B of Table 2 indicates that there are stark differences between acquirers and non-acquirers. Acquirers have about 50% larger total book assets. In addition, acquirers tend to be more profitable and have higher sales growth. However, the differences in cash holdings, while statistically significant, are small. In addition, there is no noticeable difference in GDP growth rates between acquirers' and non-acquirers' countries. This pattern could reflect the fact that some firms in developed countries, such as the United States and the United Kingdom, which compose 45% of the sample firms, have relatively low GDP growth rates but a large number of acquisitions. To account for the different level and volatility of GDP growth rates by country, we compare the difference in normalized GDP growth rates between acquirers and non-acquirers. We find that acquisitions tend to occur when the GDP growth, normalized by the historical mean and standard deviation, is higher than usual and when unexpected GDP growth is high.

III.   Estimating the Effects of Liquidity and Macroeconomic Conditions on Acquisition Likelihoods

A.   Specification

Using this sample of firms and acquisitions, we estimate the likelihood that a firm makes an acquisition in a particular year. Because we include interaction terms in some specifications and there are well-known problems interpreting interacted coefficients in probit or logit specifications (Ai and Norton (2003)), we estimate the equation using a linear probability model. As our independent variable, we use our measure of corporate liquidity, a firm's cash holdings normalized by its assets.

An important consideration in designing an empirical specification to understand acquisition decisions is the substantial cross-firm differences in both firms' propensities to hold cash and their likelihood to make acquisitions. As documented in Panel B of Table 1, firms' cash holdings vary noticeably across countries, as do the fraction of firms that make acquisitions. There are a number of reasons for why such cross-country variation could exist, including tax, regulatory, and cultural factors. In addition to cross-country factors, there are firm-specific factors that affect firms' cash holdings (see Opler et al. (1999)). Because of the importance of firm and country-specific factors that affect both cash holdings and acquisitiveness, we include firm-specific fixed effects into the specification. Consequently, our results should be interpreted as estimates of the effect of additional cash on a particular firm's acquisition decisions, rather than on cross-firm differences.[11]

We also wish to control for other factors that potentially affect the likelihood that firms make acquisitions. Larger firms generally have better access to capital and more synergies with potential targets, both of which make it more likely to make acquisitions. For this reason, we include ln(ASSET) and

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[11]Our main results hold when we use alternative specifications that include country and industry fixed effects rather than firm fixed effects.

$\ln(\text{ASSET})^2$ into the specification. In addition, more profitable firms and ones that have been growing recently are more likely to make deals, so we also include PROFITABILITY and SALES_GROWTH in the equation. Finally, in a number of specifications, we include measures of 1-year lagged macroeconomic conditions in the acquirer's home country; when these variables are not included, we add year fixed effects to the equation to control for any potential omitted factors that vary over time.

B.   Estimates of Factors Affecting Acquisitiveness

1.   The Effect of Cash

We present estimates for the effect of additional cash on acquisition likelihoods in column 1 of Table 3. The statistically significant coefficient of 0.276 on CASH means that the likelihood of an acquisition increases with additional cash. Since the standard deviation of cash holdings is 0.14 (Table 2), this equation implies that a 1-standard-deviation increase in cash holdings leads to about a 3.86-percentage-point increase in the likelihood of an acquisition. Given the average acquisition rate of 24%, this increase corresponds to about a 16% increase in the acquisition rate.

This finding replicates a well-known result from Harford (1999), who estimates similar equations on large U.S. corporations between 1977 and 1993. Our sample period begins in 1997, after Harford's ends, is from 36 countries, and contains smaller as well as private acquirers. Our sample, therefore, is both non-overlapping and very different in makeup from Harford's. The fact that cash holdings predict acquisition likelihoods in such different samples suggests that the pattern is robust and reflects the way that additional cash is associated with higher acquisition rates for all types of firms.

The causal interpretation of this finding is that having more cash allows firms to make more acquisitions. If financial conditions are strong, this effect could lead to a free cash flow problem and provide capital for managers to undertake acquisitions that shareholders would prefer them not to undertake. If financial markets are weak and it is costly for firms to raise capital, managers can use cash on the balance sheet to finance valuable investments at times when accessing external capital markets would be difficult.

2.   Macroeconomic Conditions

A potential approach to identify the effect of cash on acquisitions comes from the insight that, while the quantity of cash that firms hold is under their control, the value of their cash holdings is not. As Keynes (1936) originally noted, if financial markets allowed firms to transact costlessly at assets' fundamental values, then there would be no reason for firms to hold cash. When macroeconomic conditions are strong, financial markets tend to work well. In good times, therefore, cash becomes less important since financial markets approach Keynes' benchmark in which transaction costs are negligible. However, when the economy is weak, it becomes harder to raise capital externally through financial markets and

TABLE 3

Effect of Cash on the Probability that a Firm Acquires
During the Fiscal Year by Macroeconomic Conditions

Table 3 presents estimates from equations of the likelihood that a firm acquires during the fiscal year. The estimation is from the OLS regression, where the dependent variable is the indicator for making at least 1 acquisition during the fiscal year. All firm-level controls and macroeconomic variables are lagged by 1 year. GDP_GROWTH is included in columns 1 and 2, LOW_GDP_GROWTH and HIGH_GDP_GROWTH in columns 3 and 4, and UNEXPECTED_GDP_GROWTH in columns 5 and 6. LOW_GDP_GROWTH (HIGH_GDP_GROWTH) is an indicator variable for the years when the normalized GDP growth is in the bottom (top) 20% of the country-year distribution. We normalize the GDP growth by subtracting the mean and scaling by the standard deviation calculated from the previous 20 years of GDP growth data of each country. UNEXPECTED_GDP_GROWTH is defined as the residual from the regressions of GDP_GROWTH on a list of macroeconomic variables. The estimations for the GDP growth are reported in Table A1. Columns 2, 4, and 6 include the interaction terms of cash holding with GDP growth variables. Definitions and sources of other variables are provided in the Appendix. All regressions include firm fixed effects. Standard errors are corrected for clustering of observations at the firm level, and associated t-statistics are in parentheses. *** indicates significance at the 1% level.

	Dependent Variable: D(ACQUIRE)					
	1	2	3	4	5	6
CASH	0.276***	0.327***	0.275***	0.263***	0.275***	0.281***
	(18.78)	(17.48)	(18.78)	(16.59)	(18.75)	(19.12)
GDP_GROWTH	0.338***	0.559***				
	(5.64)	(7.23)				
CASH × GDP_GROWTH		−1.694***				
		(−4.42)				
LOW_GDP_GROWTH			−0.022***	−0.034***		
			(−7.28)	(−8.36)		
CASH × LOW_GDP_GROWTH				0.097***		
				(4.24)		
HIGH_GDP_GROWTH			0.027***	0.031***		
			(6.28)	(5.45)		
CASH × HIGH_GDP_GROWTH				−0.035		
				(−1.11)		
UNEXPECTED_GDP_GROWTH					0.415***	0.665***
					(6.66)	(7.79)
CASH × UNEXPECTED_GDP_GROWTH						−1.933***
						(−4.15)
ln(ASSET)	0.033***	0.033***	0.035***	0.034***	0.033***	0.033***
	(5.73)	(5.61)	(5.97)	(5.82)	(5.71)	(5.62)
ln(ASSET)^2	−0.002***	−0.002***	−0.002***	−0.002***	−0.002***	−0.002***
	(−3.04)	(−2.87)	(−3.06)	(−2.89)	(−3.13)	(−3.01)
PROFITABILITY	0.284***	0.283***	0.281***	0.281***	0.284***	0.283***
	(17.50)	(17.44)	(17.32)	(17.32)	(17.47)	(17.44)
SALES_GROWTH	0.029***	0.029***	0.027***	0.028***	0.029***	0.029***
	(7.10)	(7.19)	(6.84)	(6.91)	(7.09)	(7.14)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	132,257	132,257	132,257	132,257	132,257	132,257
Adj. R^2	0.104	0.104	0.104	0.105	0.104	0.104

transaction costs tend to be higher.[12] Consequently, cash becomes more valuable in bad economic times than in good times. We use this idea to identify the effect of firms' cash holdings on their acquisition decisions.

To estimate the direct impact of macroeconomic conditions on acquisition activity, we include the GDP growth in the acquirer's country in the equation reported in column 1 of Table 3. Because of the international nature of the sample, there is substantially more variation in this variable than there would be if the data were only from 1 country since macroeconomic conditions are not perfectly

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[12]See Erel et al. (2012) for evidence about the way in which firms' capital raising varies over the business cycle. Related literature has argued that cash is more valuable for constrained firms than for unconstrained ones (see Denis (2011) and the references therein).

correlated across countries. The estimates indicate that GDP growth positively affects the likelihood that a firm makes an acquisition in a particular year even after controlling for a firm's cash holdings. The coefficient on GDP growth of 0.338 implies that a 1-standard-deviation increase in GDP_GROWTH (0.027) leads to about a 1-percentage-point increase in the likelihood a potential acquirer makes an acquisition, which is equivalent to about a 4% increase in the acquisition rate. This finding is consistent with the prior literature documenting the procyclicality of acquisitions (Harford (2005), Netter et al. (2011)).

3. Interactions of Cash and Macroeconomic Conditions

We next analyze the interaction of macroeconomic conditions with the effect of cash holdings on acquisitions. Under the causal interpretation, we expect cash holdings to have a larger effect on acquisition likelihoods during poor times than during normal times since cash holdings will serve to mitigate the impact of financial constraints. Econometrically, in the equation estimating acquisition likelihoods, we expect to observe a negative effect on the interaction between macroeconomic conditions and cash holdings. If incremental cash increases the likelihood of a firm making an acquisition, the extent to which it does should vary countercyclically.

In column 2 of Table 3, we present estimates in which we add GDP_GROWTH interacted with CASH to the prior specification. The estimated coefficient on this variable is −1.694, which is statistically significantly different from zero. This negative coefficient suggests that the effect of cash on acquisitions is countercyclical. Cash holdings appear to affect acquisition likelihoods more when the economy is doing poorly, consistent with the notion that its value is higher when the economy is doing poorly and the cost of accessing external capital markets is high.

As an alternative specification, we measure macroeconomic conditions using the indicator variables HIGH_GDP_GROWTH and LOW_GDP_GROWTH, which indicate whether the GDP is substantially higher or lower than its historical average. The estimated coefficient on HIGH_GDP_GROWTH (LOW_GDP_GROWTH) in column 3 of Table 3 implies that, in unusually good (bad) periods of growth, the annual likelihood of an acquisition increases (decreases) by 2.7 (2.2) percentage points. In column 4 of Table 3, we include interactions of each HIGH_GDP_GROWTH (LOW_GDP_GROWTH) indicator variable with firms' cash holdings. Similar to the results in column 2 using GDP growth, cash appears to affect acquisitions more during periods of extreme low growth.[13] The effect of cash during economic downturns is economically sizeable: a 1-standard-deviation increase in cash holdings increases the acquisition rate by 5.7% more during the periods with LOW_GDP_GROWTH. While these periods contain fewer acquisitions, the effect of cash holdings mitigates this effect, presumably by allowing firms to make acquisitions that they could not have financed if they had to access external capital markets.

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[13]One-standard-deviation increase in cash holdings (0.14) reduces the adverse effect of the low GDP growth period on the acquisition rate by 40% (0.097 × 0.14/0.034), which is statistically significant at the 1% level. However, it reduces the impact of the high-growth period by only 16% (0.035 × 0.14/0.031), which is not statistically significant.

C.   Endogeneity of Acquiring Firms' Cash Holdings

A possible alternative interpretation of the results is that the observed relation between cash and acquisitions reflects firms accumulating cash when their managers think it is likely that future acquisitions will occur. In other words, acquisitions could occur following cash accumulation not because the acquiring firms' cash affects their financing policies, but because the cash is accumulated to pay for acquisitions that are likely to occur in the near future. Cash holdings could change because of expectations about future demand for capital to finance acquisitions and could result from either economy-wide or firm-specific factors. Since macroeconomic conditions are partially predictable, firms will adjust their cash holdings based on their expectation of future macroeconomic conditions. In addition, managers will adjust their firms' cash holdings based on their expectations of their firms' investment opportunities. Each of these channels could lead to a spurious relation between firms' cash and their investments.

1.   Unanticipated Macroeconomic Growth

We address the possibility that firms adjust their cash holdings based on their expectations of economy-wide growth by estimating a model predicting future macroeconomic conditions. We use a specification suggested by Barro (2000) and present these estimates in Table A1. We use the residuals of this regression as a measure of unexpected GDP growth and examine the way cash mitigates the effect of unexpected macroeconomic conditions.

In column 5 of Table 3, we include UNEXPECTED_GDP_GROWTH in the equation predicting the likelihood of an acquisition. The coefficient on UNEXPECTED_GDP_GROWTH of 0.415 is statistically significantly different from zero. The economic magnitudes of these coefficients are similar to those in column 1, which use GDP_GROWTH: a 1-standard-deviation of unexpected GDP growth increases the acquisition rate by 0.8 percentage points, which is equivalent to a 3.4% increase. In column 6 of Table 3, we also include the interaction of UNEXPECTED_GDP_GROWTH with CASH. The estimated coefficient on UNEXPECTED_GDP_GROWTH is 0.665 and on the interaction term is −1.933, not statistically or meaningfully different from the coefficient of −1.694 on GDP_GROWTH in column 2 of Table 3. These results suggest that the results from the prior equations do not occur because of firms altering their cash holdings depending on their expectations of macroeconomic conditions.

2.   Instrumental Variables Estimates

If the factors affecting firms' investment opportunities are a function of firm-specific rather than macroeconomic factors, it is impossible for an outsider to gauge managers' expectations of future investments. Consequently, one cannot tell if a correlation between cash holdings and firms' investments is causal or a result of firms changing both cash and investments as a function of investment opportunities. However, if deviations in cash from historical levels reflect expectations about future investments, then Fresard (2010) argues that lagged cash levels would be a valid instrument for cash today. Lagged cash levels presumably reflect the amount of cash a firm holds in normal times but not information about

investment opportunities today. We follow Fresard and use 2 lags of cash and the firm's asset tangibility, which is likely to affect a firm's ability to raise debt, as instruments for cash.

Table 4 presents instrumental variables estimates of the equations predicting acquisitiveness. The first-stage equation (predicting cash levels) is in column 4. Both lags of cash and the level of asset tangibility are statistically significantly related to current cash levels. The other columns of the table replicate the specifications from columns 2, 4, and 6 from Table 3, except that they instrument for cash. In each column, the coefficients are similar to the corresponding

TABLE 4

Instrumental Variable Estimation for the Effect of Cash on the Probability that a Firm Acquires During the Fiscal Year by Macroeconomic Conditions

Table 4 presents estimates from equations of the likelihood that a firm acquires during the fiscal year. The estimation is from the instrumental variable (IV) regression, where the dependent variable is the indicator for making at least 1 acquisition during the fiscal year. Cash holdings are instrumented by their 2 lagged values (Cash $(t-1)$, Cash $(t-2)$) and asset tangibility (Asset Tangibility (t)). The regressions include the interaction terms of cash holdings with GDP_GROWTH in column 1, LOW_GDP_GROWTH and HIGH_GDP_GROWTH in column 2, and UNEXPECTED_GDP_GROWTH in column 3. All firm-level controls and macroeconomic variables are lagged by 1 year. Definitions and sources of other variables are provided in the Appendix. Column 4 reports the coefficients of the first-stage estimation of cash on 3 instrumental variables and firm-level controls. All regressions include firm fixed effects, and the first-stage regressions include firm and year fixed effects. Standard errors are corrected for clustering of observations at the firm level and associated t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	IV Estimation				First-Stage Estimation
					Dependent Variable: CASH (t)
	Dependent Variable: D(ACQUIRE)				
	1	2	3		4
$\widehat{\text{CASH}}$	0.435***	0.351***	0.367***	CASH $(t-1)$	0.349***
	(12.11)	(10.81)	(11.57)		(52.61)
GDP_GROWTH	0.646***			CASH $(t-2)$	0.010*
	(7.17)				(2.08)
$\widehat{\text{CASH}} \times$ GDP_GROWTH	−2.279***			ASSET_TANGIBILITY (t)	−0.235***
	(−4.17)				(−7.11)
LOW_GDP_GROWTH		−0.035***		ln(ASSET)	−0.025***
		(−7.84)			(−9.54)
$\widehat{\text{CASH}} \times$ LOW_GDP_GROWTH		0.119***		ln(ASSET)^2	0.000
		(4.10)			(1.63)
HIGH_GDP_GROWTH		0.039***		PROFITABILITY	0.074***
		(5.79)			(13.14)
$\widehat{\text{CASH}} \times$ HIGH_GDP_GROWTH		−0.095**		SALES_GROWTH	−0.008***
		(−2.10)			(−6.48)
UNEXPECTED_GDP_GROWTH			0.760***		
			(7.92)		
$\widehat{\text{CASH}} \times$ UNEXPECTED_GDP_GROWTH			−2.633***		
			(−4.40)		
ln(ASSET)	0.031***	0.032***	0.031***		
	(4.73)	(4.87)	(4.71)		
ln(ASSET)^2	−0.002***	−0.002***	−0.002***		
	(−3.02)	(−3.02)	(−3.15)		
PROFITABILITY	0.297***	0.296***	0.298***		
	(17.74)	(17.67)	(17.77)		
SALES_GROWTH	0.025***	0.024***	0.024***		
	(5.97)	(5.79)	(5.92)		
Firm FE	Yes	Yes	Yes	Firm FE	Yes
Year FE	No	No	No	Year FE	Yes
No. of obs.	122,373	122,373	122,373	No. of obs.	122,373
R^2	0.00865	0.00947	0.00879	F-stat.	1,555.29***
Hansen J-stat.	910.3	880.8	900.9		
p-value	0.000	0.000	0.003		

ordinary least squares (OLS) estimates. Therefore, it appears that endogeneity of cash holdings is not an important consideration in the relation between cash holdings, macroeconomic conditions, and a firm's propensity to make acquisitions.

IV.   Interpreting the Patterns of Corporate Liquidity over the Business Cycle

A.   The Method of Payment

The results presented in Tables 3 and 4 suggest that holding liquidity can play a role in facilitating acquisitions and presumably other investments during poor financial times. In particular, the finding that higher cash levels mitigate the cyclicality of acquisition likelihoods suggests that firms use incremental cash to pay for incremental acquisitions. An implication of this interpretation is that higher cash holdings should affect the likelihood of cash-financed acquisitions in poor financial times but should not affect the likelihood of stock-financed acquisitions. To test this hypothesis, we estimate multinomial logit equations, in which the dependent variable varies depending on whether the firm makes an acquisition using cash to finance it, makes an acquisition using stock to pay for it, or does not make an acquisition at all in a given year.[14] We present these estimates in Table 5.

The estimates indicate that cash-financed acquisitions are strongly procyclical, while the likelihood of stock-financed acquisitions does not vary with the business cycle. This finding holds in each specification, using GDP growth itself as a measure of macroeconomic conditions (columns 1 and 2), the dummy variables indicating whether GDP growth was high or low (columns 3 and 4), and our estimate of unexpected GDP growth (columns 5 and 6). Moreover, the effect of cash holdings clearly depends on the method of payment. Cash holdings tend to mitigate the cyclicality of cash-financed acquisitions and have no effect on the impact of macroeconomic conditions on the likelihood of stock-financed acquisitions.

B.   The Cost of Financing

Presumably, the reason why cash holdings mitigate the effect of macroeconomic conditions on acquisition likelihoods is because of the impact of macroeconomic conditions on the cost of financing the acquisitions. If interest rates increase during poor macroeconomic times, then the cost of financing increases, leading firms to be less likely to make acquisitions. However, if firms can avoid raising external capital by financing deals through their cash holdings, then acquisition policies should be less affected by macroeconomic conditions.

This argument is predicated on the assumption that borrowing rates do, in fact, vary with macroeconomic conditions. To evaluate this assumption, we estimate equations predicting bank lending rates as a function of GDP growth for the

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[14]If a firm makes multiple acquisitions in a year using both methods of payment, we consider this firm-year to be in the "stock" category. The results are similar if we classify these observations in the "cash" category. 1.8% of firm-year observations are categorized as stock-financed acquisitions, while 22% of firm-year observations are classified as cash-financed acquisitions.

TABLE 5

Effect of Cash on Acquisition Payment by Macroeconomic Conditions—Multinomial Logit

Table 5 presents estimates from equations of the probability that a firm makes different types of acquisitions during the fiscal year. The estimation is from the multinomial logit regression, in which the dependent variable includes the indicator of the year when a firm makes at least 1 acquisition with equity payment (EQUITY_ACQ), makes acquisitions with purely cash payment (CASH_ACQ), or does not make any acquisitions (base outcome) during the fiscal year. Estimates for the choice of making an equity acquisition are reported in columns 1, 3, and 5, and those for the choice of making a cash acquisition are reported in columns 2, 4, and 6. Definitions and sources of other variables are provided in the Appendix. All regressions include firm fixed effects. Standard errors are corrected for clustering of observations at the firm level, and associated t-statistics are in parentheses. ** and *** indicate significance at the 5% and 1% levels, respectively.

|	Dependent Variable:					
	EQUITY_ ACQ	CASH_ ACQ	EQUITY_ ACQ	CASH_ ACQ	EQUITY_ ACQ	CASH_ ACQ
	1	2	3	4	5	6
CASH	0.982*** (5.21)	0.876*** (10.03)	0.907*** (5.82)	0.725*** (10.51)	0.989*** (7.44)	0.823*** (13.40)
GDP_GROWTH	0.102 (0.08)	2.180*** (4.93)				
CASH × GDP_GROWTH	0.718 (0.16)	−2.721 (−1.32)				
LOW_GDP_GROWTH			0.046 (0.63)	−0.210*** (−8.97)		
CASH × LOW_GDP_GROWTH			0.216 (0.69)	0.460*** (3.71)		
HIGH_GDP_GROWTH			0.177** (2.01)	0.123*** (4.23)		
CASH × HIGH_GDP_GROWTH			0.402 (1.18)	−0.064 (−0.41)		
UNEXPECTED_GDP_GROWTH					−0.110 (−0.07)	3.582*** (6.96)
CASH × UNEXPECTED_GDP_GROWTH					3.796 (0.57)	−9.366*** (−3.48)
ln(ASSET)	−0.170*** (−4.28)	0.126*** (6.22)	−0.172*** (−4.33)	0.126*** (6.21)	−0.170*** (−4.28)	0.126*** (6.18)
ln(ASSET)^2	0.008** (2.34)	0.001 (0.31)	0.008** (2.40)	0.001 (0.33)	0.008** (2.33)	0.001 (0.32)
PROFITABILITY	−1.270*** (−7.22)	1.389*** (19.98)	−1.273*** (−7.25)	1.375*** (19.78)	−1.269*** (−7.23)	1.386*** (19.94)
SALES_GROWTH	0.679*** (12.77)	0.410*** (19.57)	0.673*** (12.76)	0.403*** (19.35)	0.677*** (12.76)	0.409*** (19.58)
No. of obs.	132,257	132,257	132,257	132,257	132,257	132,257
Pseudo-R^2	0.0420	0.0420	0.0427	0.0427	0.0421	0.0421

sample of the countries in which our sample is based.[15] Estimates of these equations are presented in Table A2. In each specification, GDP growth (or unexpected GDP growth) is negatively related to bank lending rates.

The effect is illustrated in Figure 1, which plots the relation between GDP growth and bank lending rates for 35 countries in our sample and the United States. For each country, consistent with the estimates presented in Table A2, the 2 variables are negatively related to one another. This pattern is consistent with the notion that, during poor macroeconomic times, cash holdings can facilitate acquisition financing so that firms do not have to raise external financing when rates are high.

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[15]The dependent variable is the bank rate for short- and medium-term financing to the private sector provided by the International Monetary Fund (IMF). The sample covers 35 countries (all our sample countries except Norway) for the period 1997–2014.

FIGURE 1

Cost of Financing and Macroeconomic Conditions

Figure 1 plots the changes in GDP growth and interest rates in 35 countries for the period 1970–2014. Norway is excluded because of the availability of lending rate information. Graph A plots the average GDP growth and lending rates across 35 countries, and Graph B plots the case of the United States. Lending rate is measured by the bank rate for short- and medium-term financing to the private sector, which is provided by the IMF. GDP growth is in constant 2015 U.S. dollars and obtained from the World Bank.

Graph A. GDP Growth and Borrowing Cost in 35 Countries

Graph B. GDP Growth and Borrowing Cost in the United States
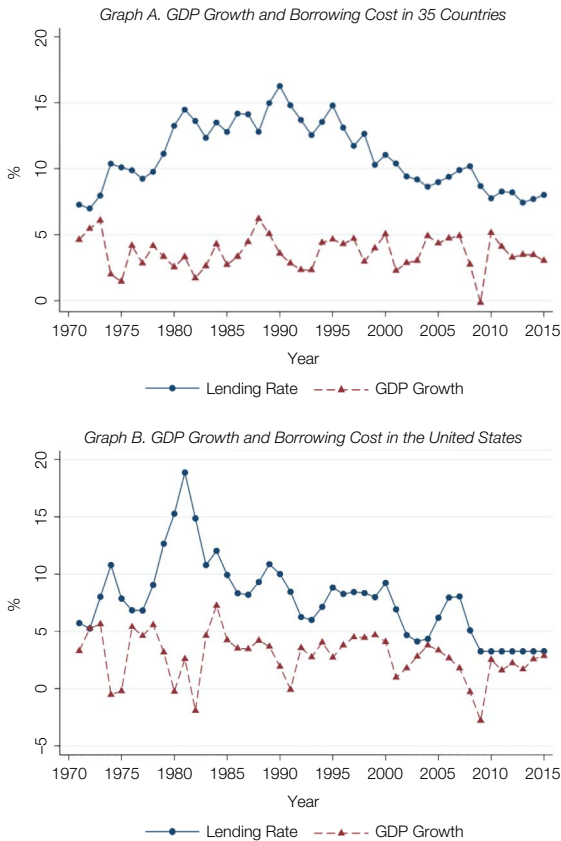
C.   Constrained versus Unconstrained Firms

The argument that the value of cash varies over the business cycle depends on the idea that macroeconomic conditions affect firms' abilities to access capital markets. However, the impact of macroeconomic conditions on firms' access to capital varies substantially across firms. For example, Erel et al. (2012) find that poorly rated firms decrease capital raising substantially during market downturns, but highly rated firms actually increase capital raising during these periods. Therefore, we expect cash to have a larger impact on the acquisition decisions of lower-rated or non-rated firms during market downturns than on those of highly rated firms.

In Table 6, we reestimate the equations from Table 3 on the subsamples of investment grade public firms, on public firms with either a speculative rating or no

TABLE 6

Effect of Cash on the Probability that a Firm Acquires During the Fiscal Year by Macroeconomic Conditions by Subsample

Table 6 presents estimates from equations of the probability that a firm acquires during the fiscal year by subsamples. The estimation is from the OLS regression, where the dependent variable is the indicator for making at least 1 acquisition during the fiscal year. The sample is divided into investment grade public firms in columns 1–3 and speculative grade public firms or public firms without a credit rating in columns 4–6. In columns 7–9, the sample of private firms is used. The specifications are the same as in columns 2, 4, and 6 in Table 3. All firm-level controls and macroeconomic variables are lagged by 1 year. Definitions and sources of other variables are provided in the Appendix. All regressions include firm fixed effects. The coefficients on the control variables, including $\ln(ASSET)$, $\ln(ASSET)^2$, PROFITABILITY, and SALES_GROWTH, are not reported for brevity. Standard errors are corrected for clustering of observations at the firm level, and associated t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: D(ACQUIRE)								
Sample:	Public Firms: Investment Grade			Public Firms: Speculative Grade and Unrated			Private Firms		
	1	2	3	4	5	6	7	8	9
CASH	0.234*	0.386***	0.271**	0.301***	0.236***	0.260***	0.424***	0.319***	0.342***
	(1.74)	(2.84)	(2.17)	(13.89)	(12.60)	(14.92)	(10.12)	(10.45)	(11.93)
GDP_GROWTH	0.004			0.536***			0.866***		
	(0.01)			(6.14)			(4.47)		
CASH × GDP_GROWTH	1.581			−1.463***			−3.195***		
	(0.49)			(−3.50)			(−3.07)		
LOW_GDP_GROWTH		0.014			−0.036***			−0.046***	
		(0.91)			(−7.53)			(−5.23)	
CASH × LOW_GDP_GROWTH		−0.256*			0.111***			0.118**	
		(−1.66)			(4.18)			(2.39)	
HIGH_GDP_GROWTH		0.095***			0.016**			0.054***	
		(3.80)			(2.35)			(4.58)	
CASH × HIGH_GDP_GROWTH		−0.693***			−0.009			−0.042	
		(−2.59)			(−0.23)			(−0.70)	
UNEXPECTED_GDP_GROWTH			0.194			0.663***			0.872***
			(0.50)			(6.80)			(4.21)
CASH × UNEXPECTED_GDP_GROWTH			0.625			−1.948***			−2.463**
			(0.16)			(−3.77)			(−2.13)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	10,450	10,450	10,450	86,601	86,601	86,601	35,206	35,206	35,206
Adj. R^2	0.189	0.190	0.189	0.0998	0.100	0.0999	0.0639	0.0656	0.0638

rating, and on private firms.[16] The results suggest that, while more cash affects all firms' acquisition likelihoods similarly, the impact of macroeconomic conditions is different among the 3 groups. In the estimates in columns 1–3 using investment grade public firms, the effect of GDP growth on the likelihood of making an acquisition varies across specifications, with it being small and insignificant using GDP growth or unexpected GDP growth. However, using the indicator variable specification in column 2, the high GDP growth indicator variable significantly increases acquisition likelihoods. In addition, the interaction of the high GDP growth indicator and cash is negative and significant.[17]

In contrast, in the estimates using the subsamples of speculative and unrated public firms and private firms, GDP growth and unexpected GDP growth are strongly positively related to the likelihood of an acquisition. For these firms, which are likely to be relatively financially constrained, the effect of GDP growth and unexpected GDP growth on the likelihood of an acquisition is mitigated to some extent if the firm has more cash. The coefficient on the interaction term between GDP growth and cash holdings is negative and statistically significant at the 1% level. The clear interpretation of this finding is that, when the economic conditions are poor, public firms without an investment grade rating and private firms have a difficult time raising capital so they are unlikely to make acquisitions. However, if these firms have more cash, then their acquisition decisions become less sensitive to macroeconomic conditions since they can finance acquisitions through their cash holdings during downturns.

In columns 5 and 8, we present estimates of the specification using the indicator variables to indicate particularly high and low GDP growth rates for these 2 subsamples. Higher cash lowers the macroeconomic effect during unusually bad periods for growth since the coefficients on the interaction of CASH with LOW_GDP_GROWTH are positive and statistically significant. In contrast, the coefficients on the interaction of CASH with HIGH_GDP_GROWTH are insignificant. These findings support the interpretation of our main results, in which firms with limited access to capital markets are less likely to make acquisitions during poor macroeconomic conditions because of a lack of access to external financial markets. However, holding more cash can mitigate this effect and provide financing for firms to make potentially valuable acquisitions regardless of the financial conditions they face.

V.   Quality of Acquisitions

The causal interpretation of the results presented above is that additional cash eases financing constraints and allows firms to make value-increasing investments. The ability to make value-increasing investments is particularly important when macroeconomic conditions are poor and financial markets are relatively costly to access. However, when times are good and firms can raise capital

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[16]Ratings are taken from *S&P Issuer Ratings* as of the time of the potential acquisition. We obtain these ratings from Capital IQ.

[17]The results in column 2 are somewhat puzzling, with the interactions between cash and both the high-growth and low-growth indicator variables each decreasing acquisition likelihoods.

easily in the financial markets, excess cash becomes superfluous and could even be harmful by exacerbating free cash flow problems.

The results we have presented so far concern the way in which the quantity of acquisitions varies with firms' cash holdings and business cycles. The view that cash holdings can affect firms' investments by relaxing financing constraints also has predictions for the quality of acquisitions we observe. If firms are capital rationed during periods of poor macroeconomic conditions, then we expect them to undertake only the highest quality acquisitions and ignore some positive NPV ones. Therefore, during poor periods of macroeconomic conditions, while we expect there to be fewer deals, the ones that do occur should be of higher quality than those observed in better economic times. If firms are not capital constrained during poor macroeconomic conditions, additional cash allows firms to undertake some of the deals that would have been otherwise forsaken, which are likely to have positive NPV but less valuable than the ones that would be taken with the capital constraints. Consequently, we expect to observe that, under poor macroeconomic conditions, higher cash holdings will be associated with lower quality acquisitions.

Similarly, in normal times, we expect that firms will be able to finance relatively more, if not all, valuable acquisitions. However, the increased access to finance in good times potentially will lead firms to overinvest and to undertake poor quality acquisitions in addition to good ones. Therefore, we expect acquisitions made during normal economic times to be lower quality than average. More cash potentially exacerbates this problem since it allows firms to make acquisitions without having to raise external capital.

A.   Announcement Return Variation across Cash Holdings and Macroeconomic Conditions

Measuring the success of acquisitions is difficult to do ex post, since target firms are integrated into acquirers and one cannot separately identify the change in the performance of the acquired firm. For this reason, it has become standard at least since Jensen and Ruback (1983) to measure an acquisition's performance by the acquirer's abnormal stock movements around the time of the announcement of the deal. The average CAR around the time of the acquisition is about 0.77%, regardless of whether we measure the returns in the 3 days around the announcement or the 5 days around the announcement. This small positive announcement return is similar to that reported by other studies that use samples similar to ours.[18] The positive acquirer's CAR reflects the fact that the majority of our CAR sample is the acquisition of private targets (93%) and acquirer CARs for acquisitions of private targets tend to be positive (see Fuller, Netter, and Stegemoller (2002)).

To evaluate the extent to which cash holdings and macroeconomic factors affect announcement day abnormal returns, we estimate equations predicting these abnormal returns. In addition to CASH and the variables indicating the macroeconomic conditions, we include a number of variables that also potentially affect announcement returns. In particular, our equation contains the following:

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[18]See Table 6 of Betton, Eckbo, and Thorburn (2008) for a summary of the announcement day abnormal returns found by a number of merger studies.

ln(ASSET); ln(ASSET)^2; PROFITABILITY; SALES_GROWTH; the indicator variables indicating whether the deal was for a public target, cross border, or related industry; and the return for the period prior to the deal (from trading day -210 to day -10 relative to the announcement day). In addition, we include country, industry, and year fixed effects in the specification.[19]

In column 1 of Table 7, we present estimates of the way that acquirer CARs vary with the acquiring firm's cash holdings, using GDP_GROWTH as our measure of macroeconomic conditions. The estimated coefficient on cash holdings is negative and statistically significantly different from zero. The coefficient of -0.809 implies that a 1-standard-deviation increase in acquirer's cash decreases a CAR by 0.11 percentage points, which is equivalent to a 14% decrease at the sample mean. Like the earlier finding on the relation between cash holdings and the likelihood of an acquisition, this finding replicates a similar finding in Harford (1999) on a much larger and non-overlapping sample. The estimated coefficient on GDP growth is also negative and statistically significantly different from zero. In columns 3 and 5, we replace GDP_GROWTH with the other measures of macroeconomic conditions used previously, with similar results.

The finding that cash is negatively related to announcement abnormal returns is consistent with both effects of liquidity. During normal times, cash lowers returns by facilitating negative NPV acquisitions and making the free cash flow problem worse. However, in bad times, it lowers the financing constraints firms face, enabling them to take more positive NPV, but less valuable, acquisitions. The results on GDP growth are consistent with this interpretation, which suggests that, regardless of the incremental effect of cash, the abnormal returns tend to be higher in worse markets because, during poor macroeconomic conditions, firms only make the most profitable acquisitions.

An additional potential implication of this argument is that the incremental effect of cash on acquisitions' quality should be greater during recessions than during boom times. During recessions, a capital-rationed firm potentially cannot undertake very valuable investments. And during boom times, incremental acquisitions occurring because of extra cash would be only marginal (i.e., somewhat worse than the very best acquisitions a capital-rationed firm would make). This argument implies that the effect of an additional dollar of cash on acquisition quality should be higher in recessions than in boom times. In other words, we conjecture that cash holdings provide valuable liquidity that enables firms to make acquisitions during poor macroeconomic times but do so at the cost of providing too much liquidity during good times. Therefore, one would expect that the quality of the marginal acquisition undertaken because of higher cash holdings during good times would be lower than the quality of the marginal acquisition undertaken because of high cash holdings during bad times.

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[19]Previous studies document that the relative size of the target firms would affect the acquisition announcements effects (e.g., Asquith, Bruner, and Mullins (1983), Travlos (1987), and Moeller, Schlingemann, and Stulz (2004)). When we additionally control for the relative transaction value to acquirer's total assets in the regressions, we find the consistent results. Since in these equations about 45% of the deals are dropped because of the missing transaction values, we do not include the relative target size as a control in our main regressions. Results are available from the authors.

TABLE 7

Effect of Cash on 3-Day CAR around the Acquisition Announcement Date

Table 7 presents estimates from equations of the acquirer firm's announcement returns. The estimation is from the OLS regression, where the dependent variable is the acquiring firm's CARs from day −1 to day +1 relative to the acquisition announcement date. Abnormal returns are calculated from the market model estimated from day −260 to day −100 relative to the announcement date (no less than 60 days). GDP_GROWTH is included in columns 1 and 2, LOW_GDP_GROWTH and HIGH_GDP_GROWTH in columns 3 and 4, and UNEXPECTED_GDP_GROWTH in columns 5 and 6. LOW_GDP_GROWTH (HIGH_GDP_GROWTH) is an indicator variable for the years when the normalized GDP growth is in the bottom (top) 20% of the country-year distribution. We normalize the GDP growth by subtracting the mean and scaling by the standard deviation calculated from the previous 20 years of GDP growth data of each country. UNEXPECTED_GDP_GROWTH is defined as the residual from the regressions of GDP growth on a list of macroeconomic variables. The estimations for the GDP growth are reported in Table A1. Columns 2, 4, and 6 include the interaction terms of cash holding with GDP growth variables. Accounting variables are based on the acquirers' information. Definitions and sources of other variables are provided in the Appendix. All regressions include acquirer country, year, and industry fixed effects. Standard errors are corrected for clustering of observations at the acquirer firm level, and associated t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

	Dependent Variable: ACQUIRER_CAR[−1,+1]					
	1	2	3	4	5	6
CASH	−0.809**	−0.510	−0.810**	−0.442	−0.809**	−0.805**
	(−2.54)	(−1.18)	(−2.54)	(−1.19)	(−2.54)	(−2.52)
GDP_GROWTH	−6.218**	−4.859				
	(−2.16)	(−1.53)				
CASH × GDP_GROWTH		−11.017				
		(−0.97)				
LOW_GDP_GROWTH			0.306***	0.431***		
			(2.78)	(3.23)		
CASH × LOW_GDP_GROWTH				−1.016		
				(−1.43)		
HIGH_GDP_GROWTH			0.254**	0.411***		
			(2.10)	(2.71)		
CASH × HIGH_GDP_GROWTH				−1.421		
				(−1.49)		
UNEXPECTED_GDP_GROWTH					−6.087**	−5.921*
					(−2.04)	(−1.70)
CASH × UNEXPECTED_GDP_GROWTH						−1.345
						(−0.09)
ln(ASSET)	−0.652***	−0.651***	−0.652***	−0.645***	−0.651***	−0.651***
	(−7.58)	(−7.57)	(−7.58)	(−7.50)	(−7.57)	(−7.57)
ln(ASSET)^2	0.025***	0.025***	0.025***	0.025***	0.025***	0.025***
	(4.42)	(4.42)	(4.43)	(4.35)	(4.42)	(4.42)
PROFITABILITY	0.679*	0.681*	0.675*	0.663*	0.677*	0.677*
	(1.75)	(1.75)	(1.74)	(1.71)	(1.74)	(1.74)
SALES_GROWTH	−0.002	0.001	−0.004	0.003	−0.003	−0.002
	(−0.01)	(0.01)	(−0.04)	(0.02)	(−0.02)	(−0.02)
PUBLIC_TARGET	−0.769***	−0.770***	−0.765***	−0.768***	−0.769***	−0.769***
	(−5.27)	(−5.28)	(−5.24)	(−5.26)	(−5.27)	(−5.27)
CROSS_BORDER	0.116*	0.116*	0.120*	0.118*	0.116*	0.116*
	(1.72)	(1.72)	(1.78)	(1.75)	(1.73)	(1.73)
SAME_INDUSTRY	0.170***	0.171***	0.171***	0.170***	0.171***	0.171***
	(2.67)	(2.68)	(2.67)	(2.66)	(2.67)	(2.67)
RETURN[−210, −10]	−0.672***	−0.673***	−0.673***	−0.667***	−0.673***	−0.673***
	(−6.44)	(−6.45)	(−6.45)	(−6.38)	(−6.45)	(−6.45)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	33,717	33,717	33,717	33,717	33,717	33,717
Adj. R^2	0.0190	0.0190	0.0191	0.0193	0.0190	0.0189

To evaluate this implication, we include an interaction term between the acquirer's cash and GDP growth in the equation and present the estimates in columns 2, 4, and 6 of Table 7. The coefficient estimate on the interaction term between CASH and GDP_GROWTH is negative in each specification. However, the estimated coefficient is not statistically significantly different from zero. In addition, its inclusion reduces the coefficient estimates and statistical significance of the coefficients on acquirer cash and GDP growth.

B.   Acquisition Announcement Date Returns across Countries

Throughout this paper, we have developed the idea that the effect of cash holdings on investment depends on external financing conditions. Thus, it is likely to be particularly relevant in countries with less developed capital markets. In these countries, firms are less likely to be able to raise external capital in all circumstances and the impact of economic downturns on capital raising is likely to be relatively severe. Consequently, the role of cash in relieving constraints is potentially more important in countries with less developed capital markets, so that the valuation consequences on the deals that do get consummated are likely to be greater in these countries.

To examine the effect of capital market development on the importance of cash holdings in ensuring corporate liquidity, we reestimate the equations reported in Table 7 across subsamples in which the importance of cash holdings in financing investments is likely to be differentially important. In particular, we sort the countries by GDP per capita and the ratio of bank credit to GDP. A country is defined as HIGH_GDP (LOW_GDP) in a specific year if its real GDP per capita is in the top tercile (bottom 2 terciles) among the 36 countries over the period from 1996 to 2013. A country is defined as HIGH_BANK_CREDIT (LOW_BANK_CREDIT) in a specific year if its ratio of private credit to GDP is in the top tercile (bottom 2 terciles) among the 36 countries over the period from 1996 to 2013.

Table 8 presents the results of the regression for these subsamples. The striking observation from Table 8 is the negative and mostly significant coefficients on the interaction between cash holdings and the GDP growth variables for the LOW_GDP and LOW_BANK_CREDIT countries. In contrast, the coefficients are positive (but not significant) for the HIGH_GDP and HIGH_BANK_CREDIT countries. This negative coefficient implies that, when macroeconomic conditions are poor, firms with more cash are able to take value-increasing acquisitions in these countries. Holding cash enables firms in countries with less developed capital markets to avoid having to rely on these capital markets in poor economic times to make valuable investments.[20]

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[20]As an additional test in Table A3, we also examine the agency hypothesis, which posits that cash exacerbates free-cash-flow problems and leads to overinvestment in acquisitions. We find the consistent evidence that acquisitions by firms with high cash holdings have lower announcement returns during the period with high GDP growth, especially in countries with weak governance.

TABLE 8

Effect of Cash on 3-Day CAR around the Acquisition Announcement Date by Region

Table 8 presents estimates from equations of the acquirer firm's announcement returns. The estimation is from the OLS regression, where the dependent variable is the acquiring firm's CARs from day −1 to day +1 relative to the acquisition announcement date. Abnormal returns are calculated from the market model estimated from day −260 to day −100 relative to the announcement date (no less than 60 days). The sample is divided into acquisitions by firms from high GDP countries in columns 1–3 and those from low GDP countries in columns 4–6. A country is defined as HIGH_GDP (LOW_GDP) in a specific year if its real GDP per capita is in the top tercile (the bottom 2 terciles) among 36 countries over the period 1996–2013. The sample is divided into firms from countries with high bank credit in columns 7–9 and those from countries with low bank credit in columns 10–12. A country is defined as HIGH_BANK_CREDIT (LOW_BANK_CREDIT) in a specific year if its ratio of private credit to GDP is in the top tercile (the bottom 2 terciles) among 36 countries over the period 1996–2013. The specifications are the same as in columns 2, 4, and 6 in Table 7. Coefficients on the control variables, including ln(ASSET), ln(ASSET)^2, PROFITABILITY, SALES_GROWTH, PUBLIC_TARGET, CROSS_BORDER, SAME_INDUSTRY, and RETURN[−210,−10], are not reported for brevity. Accounting variables are based on the acquirers' information. Definitions and sources of other variables are provided in the Appendix. All regressions include country, year, and industry fixed effects. Standard errors are corrected for clustering of observations at the acquirer firm level, and associated t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ACQUIRER_CAR[−1,+1]											
Sample:	HIGH_GDP			LOW_GDP			HIGH_BANK_CREDIT			LOW_BANK_CREDIT		
	1	2	3	4	5	6	7	8	9	10	11	12
CASH	−1.111**	−0.277	−0.583	0.590	−0.743	−0.916	−0.884*	−0.562	−0.906**	0.690	−0.132	−0.442
	(−2.22)	(−0.60)	(−1.48)	(0.63)	(−1.14)	(−1.56)	(−1.73)	(−1.28)	(−2.39)	(0.83)	(−0.18)	(−0.72)
GDP_GROWTH	−5.545			0.223			−8.419*			2.316		
	(−1.17)			(0.04)			(−1.81)			(0.45)		
CASH × GDP_GROWTH	26.510			−47.786***			0.571			−40.659**		
	(1.55)			(−2.72)			(0.04)			(−2.29)		
LOW_GDP_GROWTH		0.380**			0.485*			0.546***			0.201	
		(2.21)			(1.77)			(3.03)			(0.81)	
CASH × LOW_GDP_GROWTH		−1.278			−0.642			−1.237			0.107	
		(−1.60)			(−0.40)			(−1.52)			(0.08)	
HIGH_GDP_GROWTH		0.143			0.557***			0.304			0.573***	
		(0.51)			(2.60)			(1.26)			(2.62)	
CASH × HIGH_GDP_GROWTH		0.354			−2.065*			−0.570			−2.871**	
		(0.21)			(−1.68)			(−0.44)			(−2.12)	
UNEXPECTED_GDP_GROWTH			−5.806			3.302			−10.580**			4.075
			(−1.21)			(0.56)			(−2.06)			(0.73)
CASH × UNEXPECTED_GDP_GROWTH			22.394			−57.776*			19.736			−51.322**
			(1.20)			(−1.96)			(1.02)			(−1.98)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	21,450	21,450	21,450	12,265	12,265	12,265	24,121	24,121	24,121	9,594	9,594	9,594
Adj. R^2	0.0221	0.0222	0.0221	0.0154	0.0154	0.0151	0.0194	0.0196	0.0195	0.0186	0.0188	0.0185

VI.   Summary and Discussion

When financial managers make decisions about the liquidity of their balance sheets, an important factor they consider is the possibility of shocks to their firms' cost of raising external capital that could affect future investment decisions. Higher liquidity, which usually comes in the form of cash holdings, increases the ability of firms to invest without having to raise capital from the external capital markets. However, it comes at the cost of exacerbating agency problems, potentially leading to overinvestment. Since an important source of shocks to financial markets is changes in macroeconomic conditions, an important role of corporate liquidity is to enable firms to invest efficiently at different parts of the business cycle. This paper provides evidence on the impact of liquidity management decisions by measuring the way that firms' investments respond to macroeconomic shocks as a function of the quantity of cash that they have on their balance sheets.

Using a sample of 12,660 firms from 36 countries between 1997 and 2014, we estimate the likelihood that our sample firms make at least 1 acquisition in a particular year. Consistent with the notion that mergers tend to follow procyclical waves, we find that the likelihood of an acquisition increases with the GDP growth in the country where a firm is located. However, as firms' cash holdings increase, this effect becomes smaller, suggesting that higher cash holdings mitigate the effect of business cycles on firms' acquisitiveness. Larger cash holdings appear to enable firms to make valuable acquisitions when they are available, even if there is a recession that increases the cost of external finance. This effect does not appear to occur because of the endogeneity of cash holdings. This relation between cash holdings, acquisitions, and macroeconomic conditions is driven by cash-financed rather than stock-financed acquisitions, and is largest in public firms with speculative or no rating and private firms for which capital market downturns have the largest impact on the cost of external financing.

We also consider the way that the abnormal returns on the announcements of these acquisitions vary with both cash holdings and macroeconomic conditions. Our estimates indicate that abnormal returns are negatively related to the country's GDP growth, so they are higher during market downturns than when the economy is doing well. This result is consistent with the view that, when times are good, firms can raise capital and potentially overinvest. However, when times are bad, capital is rationed so the only deals that get done are the most profitable ones. In addition, more cash is associated with lower abnormal returns, suggesting that a more liquid balance sheet eases capital rationing during bad times but worsens free cash flow problems during good times. Overall, the abnormal return results are consistent with the estimates of the equations predicting acquisition likelihoods; they suggest that cash holdings provide valuable liquidity that enables firms to make acquisitions during poor macroeconomic conditions but do so at the cost of providing too much liquidity during good conditions.

The results in this paper have implications for our understanding of both corporate liquidity and the determinants of mergers and acquisitions. Much of the prior literature on liquidity focuses on the level of cash holdings, which serve as a hedge against potential financial shocks. This literature generally takes an ex ante

perspective on liquidity management in that it considers the way firms choose their liquidity prior to any potential shocks. We extend this literature by using an ex post approach in which we examine the way in which liquidity affects firms once the shocks have occurred. Subsequent to shocks to firms' financial conditions, differences in cash positions have a meaningful impact on firms' abilities to invest.

Firms decide to hold cash to ensure that they can invest efficiently, even at times when the cost of accessing external financial markets is extremely high. We provide evidence suggesting that liquidity does have this effect, as firms with higher liquidity appear to be less affected by market downturns in their investment decisions. The cost of doing so is that cash can facilitate unprofitable acquisitions during other times.

A number of questions remain. While we focus our analysis on acquisitions, it is not clear whether cash holdings affect other types of investments during market downturns. Do other forms of liquidity, such as lines of credit, affect investments over the business cycle in the same manner as cash holdings? Can we identify if firms, on average, have the optimal level of cash, or if it is too high or too low in most firms? Finally, for a typical firm, does incremental cash add or destroy value? The 2008 Financial Crisis has stimulated research into some of these questions (see, e.g., Duchin, Ozbas, and Sensoy (2010), Campello et al. (2011), and Campello, Giambona, Graham, and Harvey (2012)). Nonetheless, there is much more to be done and the answers to these and other related questions would be excellent topics for future research.

Appendix. Variable Definitions

Firm-Level Variables

D(ACQUIRE):   Indicator variable equal to 1 if a firm announces at least 1 acquisition during the fiscal year.

CASH: Cash and cash equivalent/Total Assets (OSIRIS item 13050/13077).

ln(ASSET):   Log of total assets in U.S. dollars (OSIRIS item 13077).

PROFITABILITY: EBITDA/Total Assets (OSIRIS item 13018/13077).

SALES_GROWTH: [Net sales(t) − Net sales$(t-1)$]/Net sales$(t-1)$ (OSIRIS item 13002).

ASSET_TANGIBILITY: [Accounts Receivable + Net Inventories + Net Property, Plant, and Equipment]/Total Assets (OSIRIS item $(20040+20010+13068)/13077$).

INVESTMENT_GRADE: A firm that has a Standard & Poor's (S&P) investment grade issuer rating (AAA, AA+, AA, or AA−). *Source:* Capital IQ.

SPECULATIVE_GRADE: A firm that has an S&P speculative grade issuer rating (A+, A, A−, BBB+, BBB, BBB−). *Source:* Capital IQ.

UNRATED: A firm that does not have any public bond rating.

Macroeconomic Variables (Source: World Bank)

GDP_GROWTH: Annual percentage growth rate of GDP in constant 2015 U.S. dollars.

NORMALIZED_GDP_GROWTH: GDP growth rate normalized by subtracting the mean and scaling by the standard deviation. For each GDP growth rate of year t, the mean and standard deviation are estimated from time-series GDP growth rates of the country over the previous 20 years with 2-year gap (i.e., from year $t-23$ to year $t-3$).

LOW_GDP_GROWTH (HIGH_GDP_GROWTH):   Indicator variable equal to 1 for the years when normalized GDP growth is below the bottom (top) 20% of the normalized GDP growth distribution of country-year observations.

UNEXPECTED_GDP_GROWTH: The residuals from the estimations predicting GDP_GROWTH. The estimation is from the OLS regressions, using the country-year panel data of 36 countries, where the dependent variable is real GDP_GROWTH and the independent variables include log of GDP per capita (in constant 2010 U.S. dollars), log of GDP per capita squared, inflation rate, ratio of government consumption to GDP, growth rate in the ratio of export to import prices, and log of fertility rate with country fixed effects. The estimation results are reported in Table A1.

HIGH_GDP (LOW_GDP):   Country-year observations where real GDP per capita in U.S. dollars is in the top tercile (the bottom 2 terciles) in the sample of 36 countries over the period 1996–2013.

HIGH_BANK_CREDIT (LOW_BANK_CREDIT):   Country-year observations where the ratio of domestic credit to private sector to GDP is in the top tercile (the bottom 2 terciles) in the sample of 36 countries over the period 1996–2013.

Deal-Level Variables

ACQUIRER_CAR[−1,+1]:   Cumulative abnormal return from day −1 to day +1 relative to the acquisition announcement date. Abnormal returns are calculated from the market model estimated from day −260 to day −100 relative to the announcement date with at least 60 days of returns available. *Source:* Datastream, Zephyr.

PUBLIC_TARGET: Indicator variable denoting the acquisition of public target. *Source:* Zephyr.

CROSS_BORDER: Indicator variable equal to 1 if the target and acquiring firms are from different countries. *Source:* Zephyr.

SAME_INDUSTRY: Indicator variable equal to 1 if the target is in the same industry as the acquiring firm, based on the first 2 digits of the primary U.S. SIC codes. *Source:* Zephyr.

RETURN[−210,−10]:   Cumulative returns from day −210 to day −10 of acquiring firm relative to the acquisition announcement date. *Source:* Datastream.

TABLE A1

Estimation of Unexpected GDP Growth

Table A1 presents the estimates for predicting GDP_GROWTH to calculate UNEXPECTED_GDP_GROWTH used in our main regressions. The sample includes a country-year panel of 36 countries covering the period 1972–2014. The estimates are from OLS regressions, where the dependent variable is real GDP_GROWTH. The regressions include log of GDP per capita (in constant 2010 U.S. dollars), log of GDP per capita squared, inflation rate, ratio of government consumption to GDP, growth rate in the ratio of export to import prices, and log of fertility rate. All independent variables are lagged by year. All variables are obtained from the World Bank. The regression includes country fixed effects. UNEXPECTED_GDP_GROWTH is defined as the residual from the regression predicting the GDP_GROWTH below. Robust t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

	Dependent Variable: GDP_GROWTH
ln(GDP_PER_CAPITA)	0.048**
	(2.18)
ln(GDP_PER_CAPITA)^2	−0.004***
	(−3.24)
INFLATION_RATE	−0.001*
	(−1.66)
GOVERNMENT_CONSUMPTION/GDP	−0.193***
	(−4.40)
TERM_TRADE_GROWTH	0.061***
	(4.01)
ln(FERTILITY_RATE)	−0.016**
	(−2.38)
Country FE	Yes
No. of obs.	1,449
Adj. R^2	0.290

TABLE A2

GDP Growth and Cost of Borrowing

Table A2 presents the correlation between cost of borrowing and macroeconomic conditions. The estimates are from OLS regressions, where the dependent variable is lending rate. The sample is a country-year panel of 35 countries (all countries in our sample except Norway) from the period 1997–2014. The regressions include contemporaneous or lagged GDP_GROWTH in columns 1–3 and UNEXPECTED_GDP_GROWTH in columns 4–6. LENDING_RATE is the bank rate for the short- and medium-term financing to the private sector and obtained from the IMF. All regressions include country and year fixed effects. Robust t-statistics are reported in parentheses. ** and *** indicate significance at the 5% and 1% levels, respectively.

	Dependent Variable: LENDING_RATE (t)					
	1	2	3	4	5	6
GDP_GROWTH (t)	−0.357***		−0.337***			
	(−3.73)		(−3.54)			
GDP_GROWTH ($t-1$)		−0.166**	−0.107			
		(−2.15)	(−1.45)			
UNEXPECTED_GDP_GROWTH (t)				−0.276***		−0.270***
				(−2.81)		(−2.76)
UNEXPECTED_GDP_GROWTH ($t-1$)					−0.080	−0.048
					(−0.96)	(−0.61)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	507	507	507	507	507	507
Adj. R^2	0.885	0.881	0.885	0.883	0.880	0.883

TABLE A3

Effect of Cash on 3-Day CAR around the Acquisition Announcement Date by Country-Level Governance

Table A3 presents estimates from equations of the acquirer firm's announcement returns. The estimation is from the OLS regression, where the dependent variable is the acquiring firm's CARs from day −1 to day +1 relative to the acquisition announcement date. Abnormal returns are calculated from the market model estimated from day −260 to day −100 relative to the announcement date (no less than 60 days). The sample is divided into acquisitions by firms from strong governance countries in columns 1–3 and those from weak governance countries in columns 4–6. A country is defined as STRONG_GOVERNANCE (WEAK_GOVERNANCE) in a specific year if its anti-self-dealing index, developed by Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008), is in the top tercile (the bottom 2 terciles) among 36 countries over the period 1996–2013. The sample is divided into firms from countries with low corruption in columns 7–9 and those from countries with high corruption in columns 10–12. A country is defined as LOW_CORRUPTION (HIGH_CORRUPTION) in a specific year if its control of corruption index, obtained from the Worldwide Governance Indicators, is in the bottom tercile (the top 2 terciles) among 36 countries over the period 1996–2013. The specifications are the same as in columns 2, 4, and 6 in Table 7. Coefficients on the control variables, including acquirer ln(ASSET), ln(ASSET)^2, PROFITABILITY, SALES_GROWTH, PUBLIC_TARGET, CROSS_BORDER, SAME_INDUSTRY, and RETURN[−210,−10], are not reported for brevity. Definitions and sources of other variables are provided in the Appendix. All regressions include country, year, and industry fixed effects. Standard errors are corrected for clustering of observations at the acquirer firm level, and associated t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ACQUIRER_CAR[−1,+1]											
Sample:	STRONG_GOVERNANCE			WEAK_GOVERNANCE			LOW_CORRUPTION			HIGH_CORRUPTION		
	1	2	3	4	5	6	7	8	9	10	11	12
CASH	−1.114**	−0.720*	−0.760**	0.949	0.389	0.475	−0.587	−0.213	−0.342	−2.985**	−0.910	−1.538
	(−2.39)	(−1.71)	(−1.96)	(0.88)	(0.33)	(0.48)	(−0.89)	(−0.33)	(−0.59)	(−2.19)	(−0.72)	(−1.40)
GDP_GROWTH	−16.786***			14.509**			0.018			−10.976		
	(−3.18)			(2.16)			(0.00)			(−1.51)		
CASH × GDP_GROWTH	15.947			−49.233*			11.933			23.877		
	(1.23)			(−1.72)			(0.66)			(1.16)		
LOW_GDP_GROWTH		0.781***			−0.407			0.013			0.391	
		(3.63)			(−1.24)			(0.05)			(0.72)	
CASH × LOW_GDP_GROWTH		−0.451			3.393			−0.638			2.255	
		(−0.55)			(1.42)			(−0.43)			(0.80)	
HIGH_GDP_GROWTH		0.005			0.683***			0.425*			0.773*	
		(0.01)			(2.94)			(1.74)			(1.71)	
CASH × HIGH_GDP_GROWTH		0.277			−2.585*			−0.789			−5.625***	
		(0.15)			(−1.73)			(−0.51)			(−2.83)	
UNEXPECTED_GDP_GROWTH			−11.762**			14.700**			2.919			2.924
			(−2.03)			(2.00)			(0.54)			(0.36)
CASH × UNEXPECTED_GDP_GROWTH			−7.578			−69.369*			−3.597			−79.234*
			(−0.38)			(−1.92)			(−0.14)			(−1.94)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	21,089	21,089	21,089	4,291	4,291	4,291	10,818	10,818	10,818	2,071	2,071	2,071
Adj. R^2	0.0199	0.0199	0.0197	0.0183	0.0198	0.0183	0.0288	0.0289	0.0288	0.0220	0.0254	0.0224

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