

Liquidity Management and Corporate Investment During a Financial Crisis

Murillo Campello
*University of Illinois
& NBER*

Erasmus Giambona
University of Amsterdam

John R. Graham
*Duke University
& NBER*

Cam R. Harvey
*Duke University
& NBER*

How Does Liquidity Affect *Real* Firm Behavior?

Understanding financing–investment interactions is central to corporate research

In particular, understanding whether capital market frictions force firms to make suboptimal decisions related to savings, investment

Literature has difficulties dealing with how corporate investment is affected by internal liquidity and access to external liquidity
[Micro: Fazzari, Hubbard, and Petersen (1988); Macro: Bernanke and Gertler (1988)]

The global credit crisis of 2008-9 provides an opportunity to study the effects of credit imperfections on corporate policies:

- “Unprecedented, unanticipated” credit squeeze
- It is a “clean” supply-side credit shock (“banks in mortgage markets”) that suddenly makes immediate liquidity crucial for investment

How Does Liquidity Affect *Real* Firm Behavior?

Not all crises are born equal...

The current crisis has a feature that has lead to much debate:

Firms' access to and use of lines of credit

- Some look at bank lending stats and argue for smaller role for policy: Chari, Christiano, and Kehoe (2008)
- Others look at those stats, see hike in pre-committed lines of credit: Ivashina and Scharfstein (2008)
- Others “worry” about who is using those lines: Campello, Graham, and Harvey (2009)

Is this surprising?!

In theory:

- LCs are designed as insurance policy [Holmstrom and Tirole (1998)]
- They may “hang over” from the better times [Thakor (1995)]

Empirically, we know little about LCs in general, *much less* about their role shaping firm liquidity (and investment) in contractions

Lack of data is an enormous limitation

This Paper

*We use a research approach that can shed light on these topics...
...credit shortage, liquidity management (incl. LCs), real firm
behavior, and more...as the crisis unfolds*

We survey 800 CFOs in N.A., Europe, Asia (over 30 countries) in two subsequent rounds in early 2009

Using this empirical research design :

- We ask financial managers about firm financial management
 - We get “quantitative” data (which we cross-check) as well as “qualitative” (hard-to-get) info that motivates decisions
- We obtain unique, detailed data on LCs: quantities, access, drawdown activity, prices, terms (maturity, collateral)
 - Data for both private and public firms, in the U.S. and abroad
 - For both before and during the crisis period

This Paper

- We study firms' choices between *internal sources of liquidity* (cash flows, cash stocks) *vs.* "options" on *external liquidity* (LCs) during the current crisis
- We also gather unique data on companies' *pro forma* plans (investment, employment, and R&D spending)
 - *Ex-ante* data (uncontaminated by *ex-post* events)
- Finally, we examine firms' decisions on *real expenditures*, to see whether/how these decisions are affected by liq. management in the current crisis

What We Don't Know

A number of “gaps” in understanding of important issues...

- 1) We don't know how firms manage liquidity in crises periods
- 2) We know very little about the role of LCs in liquidity management in general, *much less* during a crisis
 - Who uses LCs? What for? Esp. during a crisis? What determines the terms of LCs (size, maturity, collateral)? How are LCs priced (fees, int. markups)?
- 3) We don't know how firms substitute b/w internal and external sources of immediate liquidity
- 4) We don't know if liquidity management in a time of crisis has implications for firm *real-side* decisions

The evidence we present will touch on each of these subjects

Data: Survey Methodology

- Survey instrument
 - Ongoing, short surveys conducted by *CFO* magazine
 - Send CFOs approx. 11,000 E-mail invitations to visit a website
 - Response rate of about 4-7% in U.S. [[Table 1](#)]
 - Unique data:
 - Non-archival, anonymous (off-the-record, unspoken info)
 - *Ex-ante* data (uncontaminated by *ex-post* events)
 - Decision-maker planning (helps pin causality in firm policy)
 - Usual caveats:
 - Personal biases
 - Question interpretation (but followed-up with mini-surveys)
 - Less variables than desirable (# of questions *vs.* response rate)
 - Only 1 cross-section: Can't deal with heterogeneity via panel methods (but questions w/ "lags" allows for variables in *changes, instruments*)

Data: Survey Methodology

- Central variables
 - Demographics:
 - Size (small/large) based on sales and number of employees
 - Location (country, U.S. regions)
 - Industry (10 categories)
 - Ownership (private/public)
 - Credit Ratings (investment/non-investment)
 - Financial ratio variables:
 - Cash Holdings/Assets (2009, 2008)
 - LCs/Assets (2009, 2008)
 - Cash Flow/Assets (2008)
 - Drawdowns/LCs (2009)
 - Comm. Fees, Markups, Maturity, Collateral (2009, 2008)
 - Growth Prospects (range of 0 to 100)
 - Financial Constraints (range of 0 to 100)
 - Pro-forma spending plans (% change over 12 months):
 - Capital, R&D, Employment
 - Other: E.g., whether the firm has been denied a LC

Data: Survey Methodology

- Summary statistics: [Table 2](#) , [Table 3](#)
- Benchmarking the data
 - Compared to other recent LC papers:
 - Detail information on LC drawdowns, terms, prices, access/denial
 - Unique data on private U.S. and Int'l firms
 - Data from crisis
 - Other survey papers [Campello et al. (2009), Lins et al. (2008)] look at LCs. But have only qualitative/categorical data, the latter does not cover the crisis
 - Comparing to Compustat (public, non-financial): [Table 4](#)
 - Survey sample has more firms above \$1B sales, positive cash flows
 - Less firms with investment-grade ratings
 - Similar dividend payout ratio and cash stocks

LCs and Internal Funds: Descriptives

- Descriptives:

Data on LCs, Cash Holdings, Drawdowns before *vs.* during crisis

- Overall: Slight decline in the availability of LCs during the crisis
- Cross-section:
 - Firms that are small, private, non-invest. grade, financially const., and unprofitable (“constrained firms”) have larger LCs than “unconstrained firms” *before and during* crisis: [Table 5 – Panel A](#)
- Proportion of firms w/ LCs is smaller among “constrained firms”
- “Constrained firms” have more difficulty initiating/renewing LCs, and draw down more: [Table 5 – Panel C](#)
- Evidence similar for European firms, less clear-cut for Asian firms: [Table 6 – Panel A Europe](#) ; [Asia](#)

LCs and Internal Funds: Univariate

- Correlations: [Table 7](#)
 - LCs and Cash Holdings are *negatively* correlated.
This “substitution effect” is *stronger during the crisis*
 - Drawdowns negatively related with Cash Holdings
 - LCs and Cash Holdings correlated over time (instruments)

LCs and Internal Funds: Multivariate

- Regressions:

We study whether/how Cash Flows, Cash Holdings, and their “interplay” affect LCs

- Model

$$LC / Assets = \beta_1 CashFlow + \beta_2 CashHold + \beta_3 (CashFlow \times CashHold) + \beta_4 Controls$$

- Relative to Sufi (2009) we have:

- Private (bank-dependent) firms, to whom LCs *matter the most*
- Crisis data: when liquidity *matters the most*
- European/Asian firms: to *corroborate results*
- Our model allows to characterize *subtle, non-linear effects* on internal-external liquidity substitution effects

$$LC / (LC + Cash) = \beta_1 CashFlow + \beta_2 Controls$$

LCs and Internal Funds: Multivariate

- Findings:
 - Cash Flows have a direct positive effect on LCs, *but* firms w/ high internal liquidity will rely *less* on LCs ($\beta(\text{Cash Flows} \times \text{Cash Holdings}) < 0$): [Table 9 – Panel A](#)
 - For a firm with no Cash, a 1-IQR change in Cash Flows (=0.12) leads LCs to increase by 4% (cf. Sufi (2009))
 - *But*, at 9th decile of Cash (=0.30) the same Cash Flows change leads LCs to increase by *insignificant* amount: [Figure 1 – Panel A](#)
 - Similarly, at the 9th decile of Cash Flows (=0.25) a 1-IQR change in Cash (=0.14) leads LCs to *decrease* by 3%: [Figure 1 – Panel B](#)
- We find similar evidence for Europe and Asia: [Table 10](#)

The Pricing of Lines of Credit

- This “substitution effect” between Cash and LCs suggests a *cost-wedge* between internal and external funds...*Cost of LCs?*
- Follow-up survey in 2009Q2 gathers data on commitment fees, markups, maturity, and collateral use
- Overall: [Table 12](#)
 - Commitment fees *doubled* in crisis in the U.S. Smaller hikes in E & A
 - Bp markups on LIBOR/Prime increases in all 3 continents
 - Maturity falls by 3 months (down from 30 months)
- Cross-sectional:
 - Markups increase *more sharply* for “constrained firms” (up to 140bps)
[Table 13 – Panel A](#)
 - Maturity *drop more* for “unconstrained” firms; but avgs were higher for them: [Table 13 – Panel B](#)

Liquidity and Real Firm Decisions

- Do interactions between internal and external liquidity affect *real-side decisions*?
- We examine how Cash Holdings, Lines of Credit, their interaction affect *ex-ante* plans on Investment, Employment and R&D spending over the next 12 months
- The model (via IV estimations):

$$Investment = \beta_1 CashHold + \beta_2 LC + \beta_3 (CashHold \times LC) + \beta_4 Controls$$

Liquidity and Real Firm Decisions

- Findings: [Table 15](#)
 - Bottom line: LCs have a *moderating* effect on Investment-Savings
 - For firms w/ little LCs, Cash and Investment “compete” for funds: When LC=0 firms, increases in Cash are associated w/ deep Investment cuts: 1-IQR in Cash leads to -5.4% in Investment
 - As LCs increase, Cash is associated w/ increases in Investment: At the 9th decile of LCs (=0.50), a 1-IQR change in Cash (=0.10) leads Investment to grow by 3.2%! [Figure 2 – Panel A](#)
 - Even stronger results for actual Drawdowns
 - LCs seem to “free up” internal funds for investments in the crisis, when the avg firm is cutting investment by 15%!
- Similar evidence for European firms, but generally weak results for Asian firms: [Table 18](#)

Conclusion

- We try to learn about links between financial markets and firm decisions *in the current crisis* by asking CFO about these links
- We survey 800 CFOs in 31 countries and ask questions about:
 - Their firms' liq. management (cash and LCs) before and in the crisis
 - Their firms' *pro forma* plans (investment, employment, etc.)
- Our results suggest that the crisis has a large impact on how firms manage liquidity and investment, but unequally across firms
- Our paper isolates these differences, which is important for policy
- One takeaway: LCs *seem to* play a key role in financing investment
- Using a timely survey instrument we learn a lot about the crisis
- Researchers should more often use “evidence from the field” to check theories and empirics

Table 1: Survey Invitations and Response Rates (U.S.)

Characteristics	Category	Number of Invitations	Number of Responses	Response Rate (%)
Size (Sales)	Small (< \$1 Billion)	7,165	405	5.7%
	Large (>= \$1 Billion)	3,335	138	4.1%
Industry	Retail/Wholesale	1,166	77	6.6%
	Manufacturing	2,471	132	5.3%
	Mining	504	26	5.2%
	Transportation	563	29	5.2%
	Communication	406	10	2.5%
	Software/Biotech	511	27	5.3%
	Services	764	48	6.3%
	Healthcare	807	40	5.0%
	Banking/Finance/Insurance	2,359	71	3.0%
	Other	1,451	73	6.8%



Table 2: Descriptive Statistics

Variables	Descriptive Statistics					Obs.
	Mean	St. Dev.	25th Pct.	50th Pct.	75th Pct.	
Planned Investments	-14.727	43.112	-30.000	-10.000	0.000	345
Planned R&D	-5.763	30.970	-10.000	0.000	0.000	311
Planned Employment	-5.709	33.016	-15.000	-5.000	0.000	341
Cash Holdings (Current)	12.217	15.738	2.000	5.500	16.000	334
Cash Holdings (Last Year)	12.562	15.215	2.000	9.000	18.000	323
LCs (Current)	23.852	20.954	10.000	20.000	33.000	287
LCs (Last Year)	23.995	21.265	9.000	18.000	33.000	282
Investment Growth Prospects	63.169	24.595	50.000	70.000	80.000	393
Cash Flow	8.977	17.065	3.000	8.000	15.000	338
Large	0.222	0.416	0.000	0.000	0.000	397
Investment Grade	0.181	0.386	0.000	0.000	0.000	397
Public Firm	0.219	0.414	0.000	0.000	0.000	397
Drawdowns	38.469	36.896	0.000	30.000	75.000	245
Access to Credit	51.000	30.863	25.000	50.000	80.000	378



Table 3: Lines of Credit and Cash Holdings

Industry	Proportion of Firms w/ LC	Avg. LC/A During Crisis	Avg. LC/A Before Crisis	Avg. Cash/A During Crisis	Avg. Cash/A Before Crisis
Retail/Wholesale	0.833	28.347	30.276	8.000	9.000
Manufacturing	0.873	24.423	22.415	8.646	8.260
Mining	0.783	17.500	16.813	21.938	18.838
Transportation	0.920	21.100	20.685	4.250	5.650
Communication	0.600	28.400	29.000	10.740	10.940
Software/Biotech	0.538	17.077	16.769	15.615	15.167
Services	0.784	25.711	27.811	11.633	12.059
Healthcare	0.520	24.136	29.045	16.250	16.917



Table 4: Survey and Compustat Samples as of 2009Q1

Firm Types	Survey Sample		Compustat Sample	
	Obs. (N)	Freq. (%)	Obs. (N)	Freq. (%)
Small	41	47%	3,647	68%
Large	46	53%	1,698	32%
Non-Investment Grade	54	62%	997	52%
Investment Grade	33	38%	907	48%
Non-Dividend Payer	46	53%	2,667	55%
Dividend Payer	41	47%	2,173	45%
Negative Cash Flow	11	16%	1,152	23%
Positive Cash Flow	58	84%	3,875	77%
	Mean	Median	Mean	Median
Cash Holdings	0.146	0.071	0.178	0.078



Table 5 – Panel A: Lines of Credit

Panel A: Lines of Credit	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	24.654	25.123	-0.469
Large	21.445	20.306	1.139
Diff. Small – Large	3.208	4.817	
Private	25.840	25.774	0.066
Public	15.909	16.655	-0.745
Diff. Private – Public	9.931***	9.119***	
Non-Investment Grade	25.280	25.354	-0.074
Investment Grade	18.089	18.259	-0.170
Diff. Non-Inv. – Inv. Grade	7.191**	7.095**	
Constrained Credit	29.124	31.334	-2.210*
Unconstrained Credit	20.400	19.760	0.640
Diff. Constrained – Unconstrained	8.724**	11.574***	
Negative Cash Flow	29.250	30.400	-1.150
Positive Cash Flow	23.241	23.125	0.116
Diff. Negative – Positive Cash Flow	6.009*	7.275**	



Table 5 – Panel B: Cash Holdings

Panel B: Cash Holdings	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	12.989	13.265	-0.276
Large	9.399	9.823	-0.424
Diff. Small – Large	3.590	3.442	
Private	11.655	11.772	-0.117
Public	14.733	15.821	-1.087
Diff. Private – Public	-3.079	-4.049***	
Non-Investment Grade	12.018	12.161	-0.143
Investment Grade	13.340	14.391	-1.052
Diff. Non-Inv. – Inv. Grade	-1.322	-2.230	
Constrained Credit	9.252	12.020	-2.768***
Unconstrained Credit	14.379	13.332	1.047
Diff. Constrained – Unconstrained	-5.127**	-1.312	
Negative Cash Flow	8.984	12.366	-3.381***
Positive Cash Flow	13.016	12.543	0.473
Diff. Negative – Positive Cash Flow	-4.031*	-0.177	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 5 – Panel C: Proportions and Averages

Panel C: Firm Proportions and Averages	Proportion of Firms w/ LCs > 0	Proportion of Firms w/ Difficulty in Renewing LCs	Proportion of Firms w/ Drawdowns > 0	Average Drawdowns (% Tot. Assets)
Small	0.746	0.207	0.692	42.633
Large	0.915	0.216	0.581	27.258
Diff. Small – Large	-0.169***	-0.009	0.112	15.375***
Private	0.797	0.229	0.686	41.719
Public	0.731	0.138	0.565	25.587
Diff. Private – Public	0.066	0.091*	0.121	16.132***
Non-Investment Grade	0.776	0.225	0.683	42.444
Investment Grade	0.815	0.139	0.571	20.786
Diff. Non-Inv. – Inv. Grade	-0.039	0.086	0.111	21.659***
Constrained Credit	0.676	0.414	0.782	53.855
Unconstrained Credit	0.833	0.031	0.525	25.443
Diff. Constrained – Unconstrained	-0.157***	0.384***	0.257***	28.412***
Negative Cash Flow	0.625	0.424	0.829	63.600
Positive Cash Flow	0.831	0.158	0.609	33.552
Diff. Negative – Positive Cash Flow	-0.206***	0.266***	0.219**	30.048***

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 6 – Panel A: Lines of Credit - Europe

Panel A: Lines of Credit Europe	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	28.221	27.652	0.570
Large	23.405	24.351	-0.946
Diff. Small – Large	4.816	3.300	
Private	29.914	29.444	0.470
Public	21.100	21.775	-0.675
Diff. Private – Public	8.814	7.669*	
Non-Investment Grade	28.929	29.857	-0.929
Investment Grade	21.321	19.273	2.048
Diff. Non-Inv. – Inv. Grade	7.607	10.584**	
Constrained Credit	31.857	30.762	1.095
Unconstrained Credit	26.773	28.682	-1.909
Diff. Constrained – Unconstrained	5.084	2.080	
Negative Cash Flow	17.350	18.700	-1.350
Positive Cash Flow	27.257	27.171	0.087
Diff. Negative – Positive Cash Flow	-9.907	-8.471	



Table 6 – Panel A: Lines of Credit - Asia

Asia	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	32.562	31.457	1.105
Large	39.000	31.235	7.765*
Diff. Small – Large	-6.438	0.222	
Private	34.330	33.443	0.886
Public	31.206	26.206	5.000**
Diff. Private – Public	3.124	7.237	
Non-Investment Grade	32.648	31.011	1.637
Investment Grade	35.839	32.645	3.194
Diff. Non-Inv. – Inv. Grade	-3.190	-1.634	
Constrained Credit	32.667	31.944	0.722
Unconstrained Credit	32.951	31.155	1.796
Diff. Constrained – Unconstrained	-0.285	0.789	
Negative Cash Flow	32.125	31.250	0.875
Positive Cash Flow	33.221	31.558	1.663
Diff. Negative – Positive Cash Flow	-1.096	-0.308	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 6 – Panel B: Proportions and Averages - Europe

Panel B: Firm Proportions and Averages				
Europe	Proportion of Firms w/ LCs > 0	Proportion of Firms w/ Difficulty in Renewing LCs	Proportion of Firms w/ Drawdowns > 0	Average Drawdowns (% Tot. Assets)
Small	0.592	0.111	0.857	53.179
Large	0.824	0.193	0.767	30.400
Diff. Small – Large	-0.232***	-0.082	0.090	22.779***
Private	0.670	0.120	0.836	48.036
Public	0.648	0.160	0.806	40.258
Diff. Private – Public	0.022	-0.040	0.030	7.778
Non-Investment Grade	0.659	0.122	0.847	49.220
Investment Grade	0.667	0.173	0.778	36.519
Diff. Non-Inv. – Inv. Grade	-0.008	-0.051	0.070	12.702*
Constrained Credit	0.512	0.295	0.952	68.571
Unconstrained Credit	0.619	0.044	0.778	39.833
Diff. Constrained – Unconstrained	-0.107	0.251***	0.175*	28.738***
Negative Cash Flow	0.600	0.188	0.889	63.556
Positive Cash Flow	0.650	0.131	0.833	44.136
Diff. Negative – Positive Cash Flow	-0.050	0.057	0.056	19.419*



Table 6 – Panel B: Proportions and Averages - Asia

Asia	Proportion of Firms w/ LCs > 0	Proportion of Firms w/ Difficulty in Renewing LCs	Proportion of Firms w/ Drawdowns > 0	Average Drawdowns (% Tot. Assets)
Small	0.698	0.145	0.825	51.613
Large	0.815	0.143	0.786	39.214
Diff. Small – Large	-0.117	0.002	0.039	12.398
Private	0.734	0.138	0.794	46.088
Public	0.672	0.157	0.885	59.385
Diff. Private – Public	0.062	-0.019	-0.090	-13.296*
Non-Investment Grade	0.683	0.154	0.803	46.986
Investment Grade	0.818	0.109	0.870	58.348
Diff. Non-Inv. – Inv. Grade	-0.135*	0.046	-0.067	-11.362
Constrained Credit	0.952	0.318	0.933	65.333
Unconstrained Credit	0.683	0.125	0.808	47.410
Diff. Constrained – Unconstrained	0.270***	0.193**	0.126	17.923*
Negative Cash Flow	0.471	0.222	1.000	47.143
Positive Cash Flow	0.754	0.152	0.831	52.091
Diff. Negative – Positive Cash Flow	-0.283**	0.070	0.169	-4.948

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 7: Correlations

	LCs During Crisis	LCs Before Crisis	Cash During Crisis	Cash Before Crisis	Drawdowns During Crisis
LCs During Crisis	1.000				
LCs Before Crisis	0.926***	1.000			
Cash Holdings During Crisis	-0.106*	-0.090	1.000		
Cash Holdings Before Crisis	-0.042	-0.022	0.863***	1.000	
Drawdowns During Crisis	0.241***	0.249***	-0.332***	-0.239***	1.000

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 8: Drawdowns vs. External Finance During the Crisis

	Constrained Category	Unconstrained Category	Difference Constrained – Unconstrained
By Size	0.244	0.097	0.147*
By Ownership	0.253	0.035	0.218**
By Ratings	0.237	0.071	0.166*
By Access to Credit	0.305	0.070	0.234***
By Cash Flow	0.512	0.180	0.333**

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 9 – Panel A: Substitution between CFs, Cash and LCs

Panel A: Lines of Credit	Dep. Var.: LC / (LC + Cash) (Sufi (2009) Specification)		Dep. Var.: LC / Assets (Public and Private Firms)		
	Public Firms (1)	Private Firms (2)	(3)	(4)	(5)
Cash Flow	0.471*** (2.64)	0.060 (0.31)	0.226** (1.97)	0.240* (1.92)	0.325** (2.20)
Cash Holdings				-0.192** (-2.33)	-0.161** (-2.43)
Cash Flow×Cash Holdings					-0.424** (-2.33)
Large	0.108 (1.20)	0.191** (2.37)	0.080** (2.47)	0.076** (2.45)	0.075** (2.45)
Public Firm			-0.089** (-2.50)	-0.056* (-1.85)	-0.061** (-2.04)
Investment Grade	0.026 (0.25)	-0.195** (-2.31)	-0.053 (-1.09)	-0.079** (-2.12)	-0.077** (-2.10)
Unconstrained Credit	0.093 (1.34)	-0.013*** (-2.58)	-0.022 (-1.46)	-0.015 (-0.80)	-0.016 (-0.84)
Inv. Growth Prospects	-0.210 (-0.77)	-0.121** (-2.11)	-0.035 (-1.04)	-0.014 (-0.40)	-0.024 (-0.63)
Obs.	54	226	309	282	282
Adj.-R ²	0.092	0.056	0.087	0.112	0.120



Table 9 – Panel B: Substitution between CFs, Cash and DDs

Panel B: Drawdowns	Dep. Var.: Unused LC / (Unused LC + Cash) (Sufi (2009) Specification)		Dep. Var.: Drawdowns / Assets (Public and Private Firms)		
	Public Firms (1)	Private Firms (2)	(3)	(4)	(5)
Cash Flow	0.129*** (5.29)	0.096 (0.93)	-0.643*** (-4.35)	-0.496*** (-3.51)	-0.571*** (-2.57)
Cash Holdings				-0.763*** (-5.28)	-0.847*** (-3.77)
Cash Flow×Cash Holdings					0.644 (0.65)
Large	-0.009 (-0.58)	0.042 (0.75)	-0.117** (-2.41)	-0.112*** (-2.72)	-0.110*** (-2.67)
Public Firm			-0.047 (-0.95)	-0.048 (-1.18)	-0.045 (-1.08)
Investment Grade	0.031 (0.96)	0.002 (0.05)	-0.093*** (-3.37)	-0.069 (-1.15)	-0.070 (-1.14)
Unconstrained Credit	-0.003 (-0.11)	0.022 (0.81)	-0.068** (-2.31)	-0.086** (-2.29)	-0.085** (-2.26)
Inv. Growth Prospects	-0.045 (-0.88)	0.097 (1.38)	-0.098 (-0.51)	-0.140 (-0.66)	-0.139 (-0.66)
Obs.	37	149	208	189	189
Adj.-R ²	0.055	0.023	0.161	0.249	0.250

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 10 – Substitution between CFs, Cash, LCs and DDs: Europe and Asia

	Dep. Var.: LC / Assets (Public and Private Firms)		Dep. Var.: Drawdowns / Assets (Public and Private Firms)	
	Europe (1)	Asia (2)	Europe (3)	Asia (4)
Cash Flow	0.206*** (2.59)	0.499*** (3.73)	-0.344*** (-2.63)	-0.971*** (-2.83)
Cash Holdings	-0.426*** (-7.74)	0.067 (0.37)	-0.610*** (-5.03)	-0.779*** (-5.04)
Cash Flow×Cash Holdings	-0.061 (-0.51)	-0.965* (-1.66)	-0.809 (-0.27)	2.592** (2.23)
Large	0.079*** (3.26)	0.107* (1.92)	-0.139 (-0.91)	-0.051 (-0.98)
Public Firm	-0.147*** (-3.50)	-0.079*** (-4.78)	-0.032 (-0.26)	0.132 (1.30)
Investment Grade	-0.047 (-1.14)	0.088* (1.90)	-0.150 (-1.51)	0.097** (2.13)
Unconstrained Credit	-0.003 (-0.08)	-0.053* (-1.77)	-0.052 (-0.54)	-0.165* (-1.84)
Inv. Growth Prospects	0.061 (1.34)	0.048 (0.70)	-0.087 (-0.61)	0.073 (0.44)
Obs.	117	132	67	73
Adj.-R ²	0.193	0.089	0.297	0.260

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.



Table 11 – Difficulty to Initiate/Renew a Line of Credit - Probit

	(1)	(2)	(3)
Cash Flow	-0.009* (-1.79)	-0.007 (-1.17)	-0.018** (-2.32)
Cash Holdings		-0.014* (-1.69)	-0.025** (-2.14)
Cash Flow×Cash Holdings			0.001** (2.19)
Large	0.165 (0.61)	-0.021 (-0.08)	0.021 (0.07)
Public Firm	-0.668* (-1.71)	-0.334 (-0.89)	-0.360 (-0.94)
Investment Grade	-0.101 (-0.36)	-0.046 (-0.19)	-0.008 (-0.04)
Unconstrained Credit	-0.800*** (-8.22)	-1.03*** (-9.46)	-1.056*** (-8.85)
Inv. Growth Prospects	-0.007** (-2.04)	-0.009** (-2.32)	-0.008** (-2.04)
Obs.	318	286	286
Pseudo-R ²	0.116	0.154	0.168

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 12 – LC Terms Before and During the Crisis

Panel A: U.S.	During Crisis (1)	Before Crisis (2)	Difference During – Before the Crisis (3)
Basis Point Commitment Fee	26.408	12.668	13.740***
Basis Point Markup on LIBOR/Prime Rate	182.610	124.144	58.467***
LC Maturity (in months)	27.559	30.133	-2.574***
Panel B: Europe			
Basis Point Commitment Fee	22.556	20.772	1.784
Basis Point Markup on LIBOR/Prime Rate	111.302	87.886	23.415*
LC Maturity (in months)	26.850	30.500	-3.650**
Panel C: Asia			
Basis Point Commitment Fee	12.509	8.854	3.655*
Basis Point Markup on LIBOR/Prime Rate	193.459	124.501	68.958***
LC Maturity (in months)	25.273	27.740	-2.468*

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 13 – Panel A – Lines of Credit Markups

Panel A: Basis Point Markup on LIBOR/Prime Rate	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	189.473	127.511	61.962***
Large	152.300	109.272	43.028**
Diff. Small – Large	37.173	18.239	
Private	188.724	124.340	64.385***
Public	158.155	123.360	34.794*
Diff. Private – Public	30.569	0.980	
Non-Investment Grade	182.375	119.179	63.196***
Investment Grade	184.074	155.037	29.037
Diff. Non-Inv. – Inv. Grade	-1.699	-35.858	
Constrained Credit	328.808	191.366	137.442***
Unconstrained Credit	141.252	105.127	36.125***
Diff. Constrained – Unconstrained	187.556***	86.239***	
Negative Cash Flow	213.145	117.936	95.210***
Positive Cash Flow	184.127	128.424	55.702***
Diff. Negative – Positive Cash Flow	29.018	-10.488	



Table 13 – Panel B – Lines of Credit Maturity

Panel B: LC Maturity (in months)	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	25.093	26.780	-1.687
Large	37.289	43.368	-6.079***
Diff. Small – Large	-12.196***	-16.588***	
Private	24.967	26.424	-1.457
Public	38.135	45.270	-7.135***
Diff. Private – Public	-13.168***	-18.846***	
Non-Investment Grade	25.857	29.050	-3.193***
Investment Grade	37.704	36.593	1.111
Diff. Non-Inv. – Inv. Grade	-11.847***	-7.543*	
Constrained Credit	22.488	28.326	-5.837***
Unconstrained Credit	29.062	30.669	-1.607
Diff. Constrained – Unconstrained	-6.574*	-2.343	
Negative Cash Flow	20.536	23.000	-2.464
Positive Cash Flow	28.822	31.212	-2.390**
Diff. Negative – Positive Cash Flow	-8.286*	-8.212**	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 14 – Panel A – Commitment Fee and Internal Liquidity - Logit

Panel A: Logit Model	Public Firms	Private Firms	Public and Private Firms			
	(1)	(2)	(3)	(4)	(5)	(6)
Cash Flow				-0.019 (-1.22)	-0.022* (-1.66)	-0.015 (-0.69)
Cash Holdings					-0.025** (-2.51)	-0.022* (-1.68)
Cash Flow×Cash Holdings						0.000 (-0.44)
Large	1.265 (1.37)	1.645*** (3.56)	1.406*** (3.08)	1.255*** (3.02)	1.272*** (3.17)	1.261*** (3.06)
Public Firm			-1.001* (-1.66)	-0.923* (-1.90)	-0.985** (-2.08)	-0.967** (-2.01)
Investment Grade	1.922 (1.28)	-0.187 (-0.22)	0.118 (0.15)	0.254 (0.36)	0.071 (0.09)	0.080 (0.10)
Unconstrained Credit	-2.150 (-1.23)	-0.124 (-0.61)	-0.325 (-1.13)	-0.319 (-1.57)	-0.236 (-1.20)	-0.221 (-1.01)
Size of LCs	0.034*** (3.62)	0.000 (0.02)	0.000 (0.05)	-0.001 (-0.14)	-0.008 (-0.94)	-0.009 (-0.94)
Inv. Growth Prospects	-0.090*** (-3.45)	0.005 (0.69)	-0.005 (-0.88)	-0.005 (-0.86)	-0.006 (-0.94)	-0.007 (-1.08)
LC Collateral Dummy (Yes=1)	0.680 (0.64)	0.481 (1.55)	0.580** (2.30)	0.483** (2.02)	0.438* (1.75)	0.429* (1.70)
LC Maturity (in Months)	0.024 (0.66)	0.051*** (4.22)	0.045*** (4.08)	0.046*** (3.72)	0.045*** (3.61)	0.044*** (3.42)
Obs.	36	141	177	165	160	160
Pseudo-R ²	0.393	0.142	0.129	0.138	0.156	0.157

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.



Table 14 – Panel B – Commitment Fee and Internal Liquidity - OLS

Panel B: OLS Model	Public Firms		Private Firms			
	(1)	(2)	(3)	(4)	(5)	(6)
Cash Flow				-0.009 (-1.20)	-0.010** (-2.05)	-0.020*** (-4.98)
Cash Holdings					-0.014** (-2.27)	-0.015*** (-3.07)
Cash Flow×Cash Holdings						0.058*** (6.08)
Large	-0.011* (-1.72)	-0.001 (-0.41)	-0.004** (-2.50)	-0.003** (-2.33)	-0.002* (-1.95)	-0.003** (-2.50)
Public Firm			-0.004* (-1.90)	-0.002 (-0.94)	-0.002 (-1.07)	-0.003 (-1.11)
Investment Grade	0.000 (-0.36)	0.015*** (3.03)	0.011*** (3.33)	0.005*** (3.04)	0.005*** (3.63)	0.005*** (3.11)
Unconstrained Credit	-0.017*** (-4.43)	-0.016*** (-4.27)	-0.015*** (-5.45)	-0.010*** (-6.77)	-0.010*** (-5.97)	-0.010*** (-6.29)
Size of LCs	-0.015** (-2.23)	0.002 (0.51)	0.003 (0.95)	0.003 (1.58)	0.002 (1.18)	0.002 (1.27)
Inv. Growth Prospects	-0.001 (-0.19)	-0.016*** (-6.58)	-0.015*** (-4.81)	-0.010*** (-4.56)	-0.010*** (-5.82)	-0.009*** (-6.64)
LC Collateral Dummy (Yes=1)	-0.007*** (-3.01)	0.002 (0.52)	0.000 (0.06)	0.001 (-0.23)	0.002 (-0.12)	0.003 (-0.25)
LC Maturity (in Months)	0.000** (2.24)	0.000*** (-3.09)	0.000*** (-3.80)	0.000** (-2.30)	0.000** (-2.25)	0.000* (-1.87)
Obs.	21	74	95	90	92	90
R ²	0.649	0.433	0.384	0.343	0.369	0.393

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 15 – Cash Holdings, Lines of Credit and Investment

	Planned Investment		Planned R&D		Planned Employment	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)
Cash Holdings	-0.136 (-0.52)	-0.565** (-2.14)	-0.003 (-0.02)	-0.484* (-1.93)	-0.552** (-2.12)	-0.170 (-0.51)
LCs	-0.203*** (-3.43)	-0.332*** (-3.00)	-0.114 (-1.01)	-0.219*** (-2.58)	-0.009 (-0.14)	-0.125* (-1.73)
Cash Holdings×LCs	1.127* (1.78)	1.814** (2.53)	0.539 (1.19)	1.569*** (2.75)	2.665 (1.55)	1.438 (0.76)
Large	0.023 (0.62)	0.018 (0.54)	0.019 (0.85)	0.021 (0.88)	0.026 (1.50)	0.027 (1.54)
Public Firm	-0.061 (-1.54)	-0.049 (-1.26)	-0.112 (-1.23)	-0.110 (-1.21)	-0.017 (-0.95)	-0.030* (-1.94)
Investment Grade	0.028 (0.84)	0.031 (0.97)	0.109 (1.09)	0.120 (1.17)	0.011 (0.58)	-0.008 (-0.42)
Unconstrained Credit	0.081*** (2.57)	0.084*** (2.74)	0.047* (1.73)	0.052* (1.94)	0.030*** (3.96)	0.024** (1.99)
Obs.	215	208	208	203	220	213
Adj.-R ²	0.033	0.016	0.037	0.022	0.142	0.071
Diagnostic Statistics						
Hansen's <i>J</i> -Stat. (<i>p</i> -val.)		0.618		0.760		0.233
First-Stage <i>F</i> -test (lowest <i>p</i> -val)		0.000		0.000		0.000

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.



Table 16 – Cash Holdings, Drawdowns and Investment

	Planned Investment	Planned R&D	Planned Employment
Cash Holdings	-0.352* (-1.74)	-0.216** (-2.05)	-0.026 (-0.10)
Drawdowns	-0.142*** (-4.49)	-0.099*** (-3.23)	-0.077*** (-3.2)
Cash Holdings×Drawdowns	1.416*** (3.01)	0.869*** (2.83)	0.190 (0.46)
Large	0.014 (0.34)	0.032*** (3.35)	0.012 (0.35)
Public Firm	-0.027 (-0.78)	-0.008 (-0.43)	-0.044** (-2.36)
Investment Grade	0.034 (0.66)	-0.023 (-0.53)	0.004 (0.28)
Unconstrained Credit	0.123*** (3.72)	0.044*** (2.99)	0.019 (0.83)
Obs.	176	172	181
Adj.-R ²	0.070	0.057	0.022

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.



Table 17 – Cash Holdings, Lines of Credit and Investment by Inv. Prospects

	Below Median Inv. Prospects		Above Median Inv. Prospects	
	OLS (1)	IV (2)	OLS (3)	IV (4)
Cash Holdings	0.200 (0.52)	-0.272 (-0.83)	-0.708** (-2.45)	-0.790 (-1.64)
LCs	0.157 (1.26)	-0.102 (-0.49)	-0.561*** (-3.90)	-0.461 (-1.55)
Cash Holdings×LCs	-0.423 (-0.46)	0.428 (0.48)	3.380*** (6.76)	3.499*** (2.58)
Large	0.028 (0.58)	0.030 (0.63)	0.039 (0.75)	0.041 (1.00)
Public Firm	0.004 (0.05)	-0.017 (-0.22)	-0.067 (-1.58)	-0.053 (-1.17)
Investment Grade	-0.041 (-0.45)	-0.028 (-0.33)	0.016 (0.24)	0.011 (0.18)
Unconstrained Credit	-0.020 (-0.35)	-0.037 (-0.66)	0.107*** (3.80)	0.117*** (6.07)
Obs.	102	100	111	106
Adj.-R ²	0.015	0.000	0.095	0.087
Diagnostic Statistics				
Hansen's <i>J</i> -Stat. (<i>p</i> -val.)		0.934		0.368
First-Stage <i>F</i> -test (lowest <i>p</i> -val)		0.000		0.000

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.



Table 18 – Cash Holdings, Lines of Credit and Investment: Europe and Asia

	Europe		Asia	
	OLS (1)	IV (2)	OLS (3)	IV (4)
Cash Holdings	-0.088 (-0.20)	-0.287 (-1.31)	0.286 (0.58)	1.209** (2.49)
LCs	-0.666*** (-3.97)	-0.875*** (-2.73)	-0.204 (-0.84)	0.061 (0.31)
Cash Holdings×LCs	1.462*** (3.80)	1.626*** (5.54)	0.324 (0.48)	-0.844 (-1.42)
Large	-0.279 (-1.57)	-0.311* (-1.78)	0.099 (1.19)	0.111* (1.92)
Public Firm	0.107 (1.40)	0.136*** (2.59)	0.060 (0.48)	0.002 (0.02)
Investment Grade	0.043 (0.25)	-0.081 (-0.48)	0.075 (0.60)	0.112 (0.95)
Unconstrained Credit	0.163 (0.93)	0.260* (1.78)	-0.157 (-0.58)	-0.342 (-1.55)
Obs.	64	62	74	72
Adj.-R ²	0.172	0.132	0.117	0.022
Diagnostic Statistics				
Hansen's <i>J</i> -Stat. (<i>p</i> -val.)		0.160		0.514
First-Stage <i>F</i> -test (lowest <i>p</i> -val)		0.000		0.000

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.



Figure 1 – Economic Effect of Internal Liquidity on Lines of Credit

Panel A - Sensitivity of Lines of Credit to 1 IQR Change in Cash Flows at Different Levels of Cash Holdings

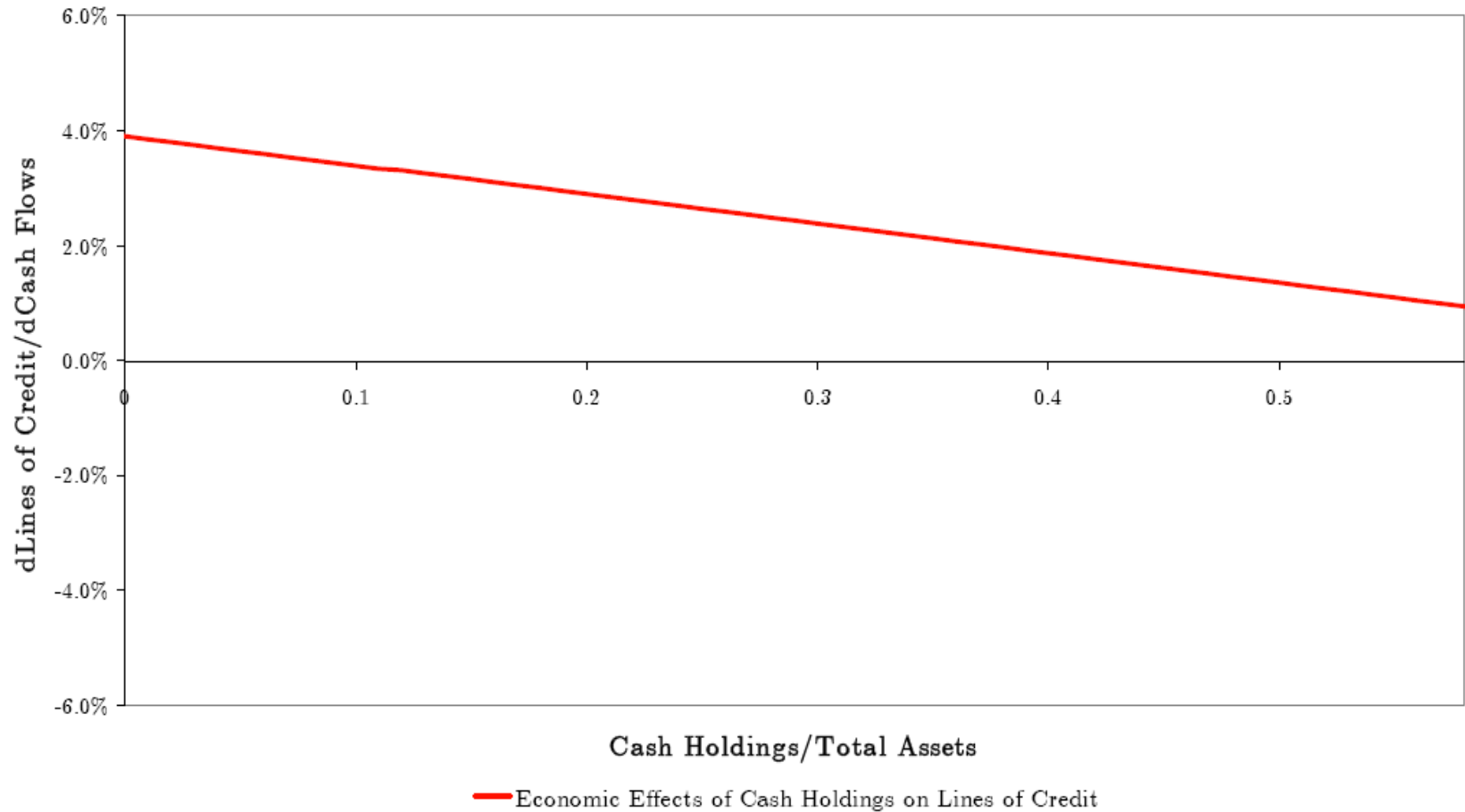


Figure 1 – Economic Effect of Internal Liquidity on Lines of Credit

Panel B - Sensitivity of Lines of Credit to 1 IQR Change in Cash Holdings at Different Levels of Cash Flows

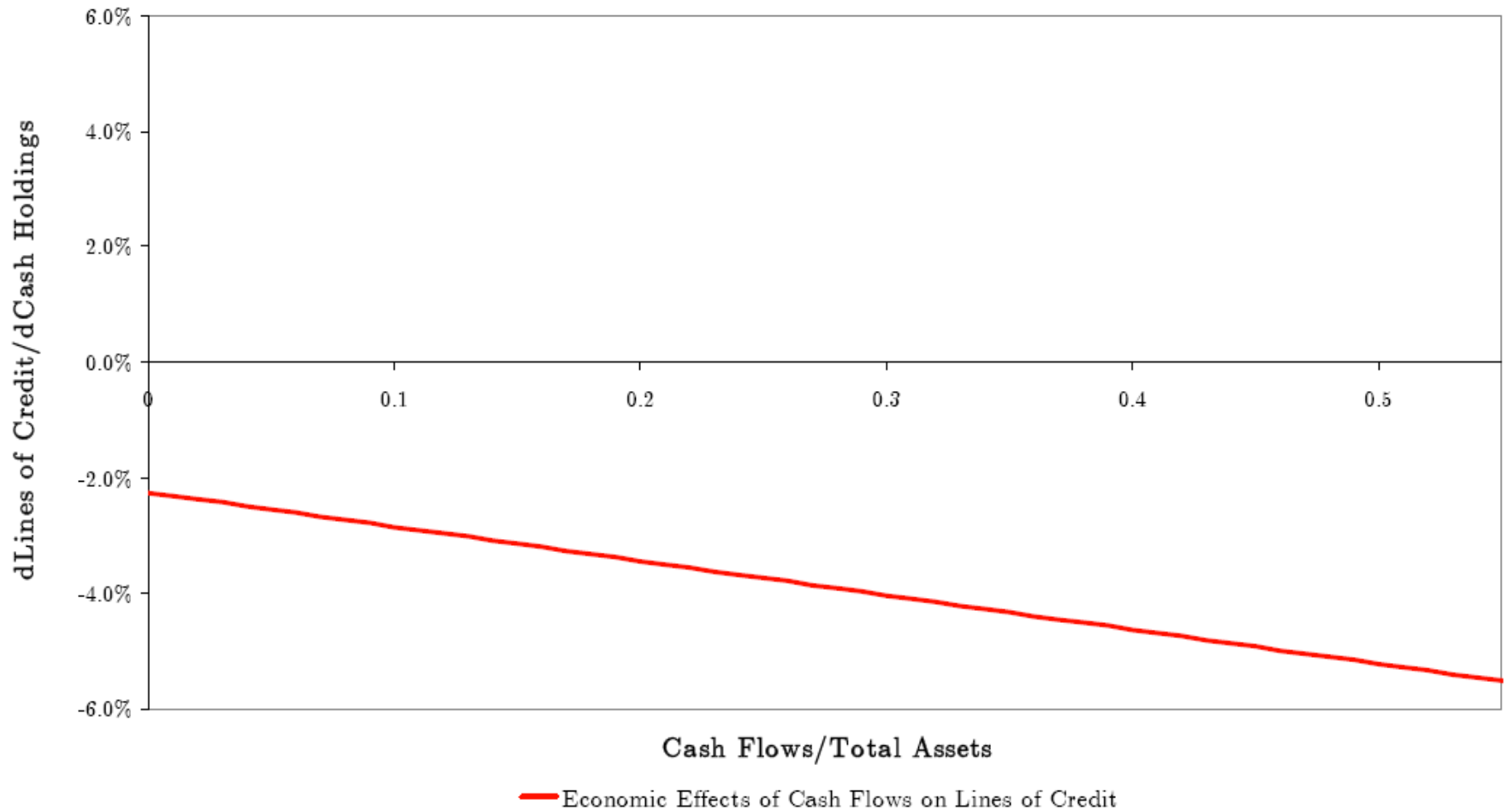


Figure 2 – Economic Effect of Liquidity on Investment

Panel A - Sensitivity of Investment to 1 IQR Change in Cash Holdings at Different Levels of LCs

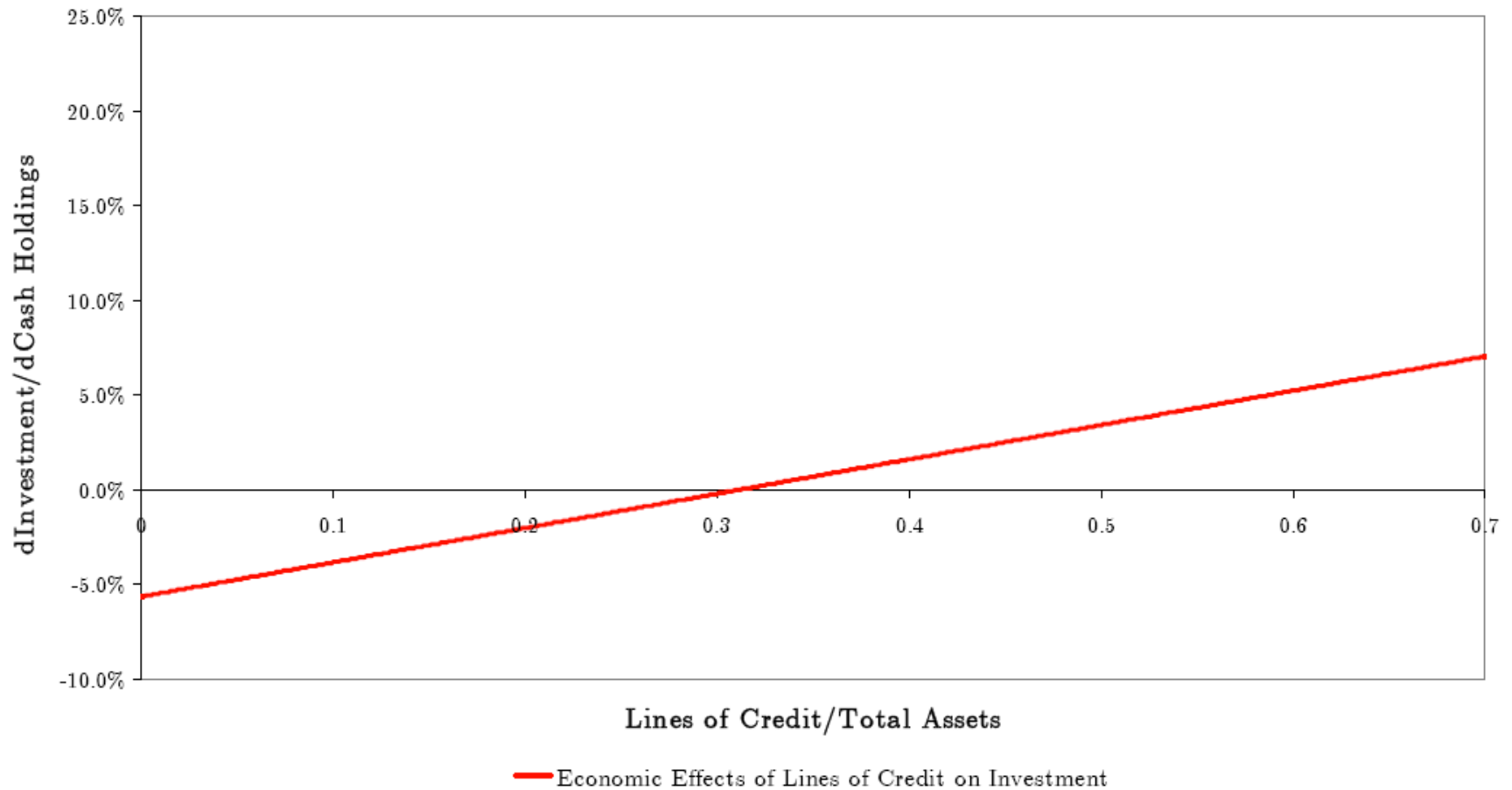


Figure 2 – Economic Effect of Liquidity on Investment

Panel B - Sensitivity of Investment to 1 IQR Change in Lines of Credit at Different Levels of Cash Holdings

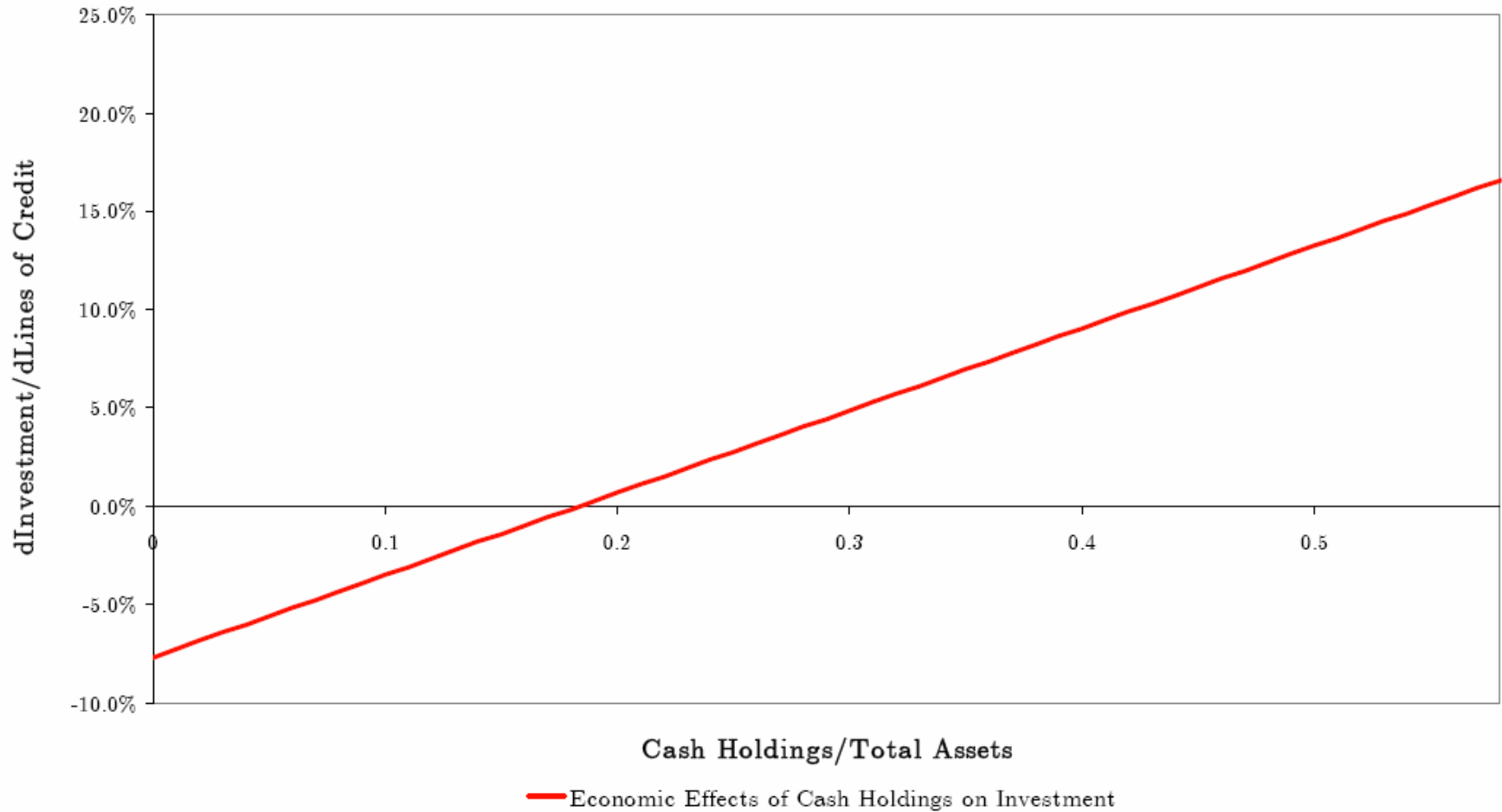


Figure 3 – Economic Effect of Liquidity on Investment by Growth Prospects

