Limits-to-arbitrage, investment frictions, and the asset growth anomaly

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喻清言

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Introduction

Background and Motivation

- Research has shown that companies invest more or grow their total assets more earn lower subsequent risk-adjusted returns.
- Two explanations proposed for asset growth anomaly: the mispricing hypothesis with limits-to-arbitrage and the q-theory with investment frictions
- Intend to explain the asset growth anomaly and compare the two explanations through empirical evaluation.

Introduction

Literature

- Mispricing with limits-to-arbitrage

Andrei Shleifer, Robert W. Vishny(1997): mispricing caused by arbitrage limitation may lead to anomaly

Sheridan Titman, K. C. John Wei and Feixue Xie(2009): the asset growth anomaly is stronger for firms with higher cash flows and lower debt ratios, etc.

Introduction

Literature

- Q-theory with investment frictions

Dongmei Li and Lu Zhang(2010): Q-theory predicts that investment frictions steepen the relation between expected returns and firm investment, but only weak evidence from proxies
Corelation between arbitrage limitation and investment frictions

Introduction

Contribution

- Comprehensively examine the power of two explanations, test whether one subsumes or dominates the other, also examine the joint effects

- Take more proxies into consideration

Research Design

Hypothesis

- H1: The negative relation between asset growth and subsequent stock returns is stronger for firms that are difficult to arbitrage.

- H2: The negative relation between asset growth and subsequent stock returns is stronger for firms with high investment frictions.

Research Design

Hypothesis

- H3: Controlling for the level of investment frictions, the negative relation between asset growth and subsequent stock returns is stronger for firms that are difficult to arbitrage.

- H4: Controlling for the level of limits-to-arbitrage, the negative relation between asset growth and subsequent stock returns is more significant for firms with high investment frictions.

Research Design

Variables and Proxies

- Measures of limit-to-arbitrage

IVOL: idiosyncratic volatility

COV: analyst coverage

DISP: dispersion in analysts' earning forecast — information uncertainty

CVOL: cash flow volatility

INSTn: shareholder sophistication

PRICE: share price

BIDASK: bid-ask spread

INSTh: institutional ownership — transaction cost

ILLIQ: illiquidity

DVOL: dollar trading volume

Research Design

Variables and Proxies

- Measures of investment frictions

AGE: firm age

ASSET: book value of total asset

PAYOUT: payout ratio rating

RATING: credit rating

Research Design

Data

- From Compustat, CRSP, IBES and CDA
- Cover annual firm characteristics 1970-2009 and monthly stock return 1971.7-2009.12

- Exclude financial companies and firms at early age

- Remove firms with less than $10million in sales

Results

Model and Regressions

$$R_{i,t} = c_{0,j} + c_{1,j} \ln(1 + TAG_{i,t-1}) + b_j \, Controls^{j}_{i,t-1} + \varepsilon^{j}_{i,t-1}$$

- R is the monthly raw return
- TAG is the asset growth rate
- Three sets of controls:

j = 1, no control variables

j = 2, {ln SIZE, ln BM, ln PRET}

j = 3, {ln SIZE, ln BM, ln PRET, IVOL, NS, NSlag}

Results

Model and Regressions

Limits-to-arbitrage	$c_{1,1}(OLS)$	$c_{1,2}(OLS)$
Low (Low *IVOL*)	−0.325	−0.025
Medium	**−1.235**	**−1.005**
High (High *IVOL*)	**−1.637**	**−1.358**
High–Low	**−1.312**	**−1.333**
t(High–Low)	[−5.33]	[−5.59]
Low (High *COV*)	**−0.673**	**−0.576**
Medium	**−1.013**	**−0.832**
High (Low *COV*)	**−1.572**	**−1.390**
High–Low	**−0.899**	**−0.815**
t(High–Low)	[−2.85]	[−2.98]
Low (Low *DISP*)	**−1.010**	**−0.904**
Medium	**−0.996**	**−0.838**
High (High *DISP*)	**−1.451**	**−1.163**
High–Low	−0.442	−0.259
(High–Low)	[−1.73]	[−1.14]
Low (Low *CVOL*)	**−1.215**	**−0.800**
Medium	**−1.264**	**−1.027**
High (High *CVOL*)	**−1.431**	**−1.193**
High–Low	−0.217	−0.393
t(High–Low)	[−0.84]	[−1.36]
Low (High $INST_N$)	**−0.951**	**−0.819**
Medium	**−1.351**	**−1.125**
High (Low $INST_N$)	**−1.633**	**−1.270**
High–Low	**−0.681**	−0.452
t(High–Low)	[−2.46]	[−1.91]
Low (High *PRICE*)	**−0.642**	**−0.539**
Medium	**−1.446**	**−1.193**
High (Low *PRICE*)	**−1.446**	**−1.261**
High–Low	**−0.804**	**−0.722**
t(High–Low)	[−2.61]	[−2.60]

Results

Model and Regressions

Low (Low *BIDASK*)	−0.642	**−0.644**
Medium	**−1.166**	**−0.988**
High (High *BIDASK*)	**−1.786**	**−1.595**
High–Low	**−1.144**	−0.952
t(High–Low)	[−2.09]	[−1.92]
Low (High $INST_H$)	**−0.968**	**−0.806**
Medium	**−1.270**	**−1.024**
High (Low $INST_H$)	**−1.646**	**−1.293**
High–Low	**−0.678**	**−0.487**
t(High–Low)	[−2.56]	[−2.01]

Low (Low *ILLIQ*)	**−1.212**	**−0.934**
Medium	**−1.325**	**−0.992**
High (High *ILLIQ*)	**−1.467**	**−1.407**
High–Low	−0.254	−0.473
t(High–Low)	[−0.73]	[−1.56]
Low (High *DVOL*)	**−1.387**	**−1.091**
Medium	**−1.185**	**−1.018**
High (Low *DVOL*)	**−1.300**	**−1.120**
High–Low	0.087	−0.028
t(High–Low)	[0.26]	[−0.10]

The slope of asset growth is negative and has a significantly higher magnitude in the High limits-to-arbitrage subsample

Results

Model and Regressions

Investment frictions	$c_{1,1}(OLS)$	$c_{1,2}(OLS)$
Low (High *AGE*)	**−0.670**	**−0.394**
Medium	**−1.212**	**−0.961**
High (Low *AGE*)	**−1.563**	**−1.266**
High–Low	**−0.893**	**−0.871**
t(High–Low)	[−3.47]	[−3.66]
Low (High *ASSET*)	**−1.051**	**−0.682**
Medium	**−1.150**	**−0.985**
High (Low *ASSET*)	**−1.600**	**−1.312**
High–Low	−0.549	**−0.630**
t(High–Low)	[−1.89]	[−2.23]
Low (High *PAYOUT*)	**−1.195**	**−1.013**
Medium	**−1.420**	**−1.139**
High (Low *PAYOUT*)	**−1.357**	**−1.070**
High–Low	−0.162	−0.057
t(High–Low)	[−0.59]	[−0.24]
Low (*RATING*=Yes)	−0.458	−0.189
High (*RATING*=No)	**−1.047**	**−1.212**
High–Low	**−1.015**	**−1.023**
t(High–Low)	[−3.54]	[−2.97]

The slope of asset growth is negative and has a significantly higher magnitude in the High investment frictions subsample

Results

Model and Regressions

- The joint effects of limits-to-arbitrage and investment frictions

To examine H3, construct the intersection of the three-by-three sorted sub-groups for each set of combinations:

	Differences in	Low *AGE*		Low *ASSET*	
IVOL	$c_{1,1}(OLS)$	**−1.549**	[−3.84]	**−2.917**	[−3.64]
	$c_{1,2}(OLS)$	**−1.444**	[−3.48]	**−2.427**	[−2.82]
	$c_{1,3}(OLS)$	**−1.275**	[−2.89]	**−3.113**	[−2.33]
	$c_{1,1}(WLS)$	−0.706	[−1.20]	**−2.786**	[−3.15]
	$c_{1,2}(WLS)$	**−1.344**	[−2.31]	**−2.356**	[−2.57]
	$c_{1,3}(WLS)$	**−1.607**	[−2.15]	**−2.893**	[−2.64]
COV	$c_{1,1}(OLS)$	−0.867	[−1.77]	−0.718	[−0.88]
	$c_{1,2}(OLS)$	−0.486	[−1.02]	−1.344	[−1.38]
	$c_{1,3}(OLS)$	−0.032	[−0.06]	−0.582	[−0.43]
	$c_{1,1}(WLS)$	−0.463	[−0.82]	−0.372	[−0.37]
	$c_{1,2}(WLS)$	0.152	[0.29]	−1.099	[−1.10]
	$c_{1,3}(WLS)$	0.230	[0.42]	−0.777	[−0.58]
DISP	$c_{1,1}(OLS)$	−0.353	[−0.94]	−0.355	[−1.07]
	$c_{1,2}(OLS)$	−0.186	[−0.52]	−0.190	[−0.60]
	$c_{1,3}(OLS)$	−0.250	[−0.60]	−0.080	[−0.23]
	$c_{1,1}(WLS)$	**−1.189**	[−1.97]	−0.075	[−0.16]
	$c_{1,2}(WLS)$	−0.613	[−1.08]	0.270	[0.62]
	$c_{1,3}(WLS)$	−0.578	[−1.04]	0.519	[1.16]

Results

Conclusions

- The negative asset growth-return relation is stronger when limits-to-arbitrage(or investment frictions) are more severe, even after controlling for the other.

- The two explanations appear to complement each other in explaining the asset growth anomaly.

THANKS!