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Empirical Research of Asset Growth and Future Stock Returns Based on China Stock Market

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Abstract

Extensive research has been done on the return of predictive power of factors related to asset growth and capital investment. However, most of the research was based on U.S. market and generally has shown that growth in assets is negatively related to future stock return. In my paper, a research based on China stock market gives a different answer.

In this paper, first I conduced monthly Fama-MacBeth regressions by regressing monthly stock return on the asset growth-related measures and found that the asset growth related measures demonstrate the ability to predict future stock returns and the two-year total asset growth rates showing the greatest predictive power.

To further assess the return predictability of the two-year asset growth rates and also the profitability of the related trading strategies, I applied a commonly used rank portfolio test and measured the abnormal return for each portfolio of the Fama-French (1993) three –factor model.

In the end, conclusion can be reached that in China market, investors could potentially earn a monthly abnormal return of 0.74%, annualizing it gives an annualized abnormal return of 9.25%.

Key words: Predictive power; Asset growth; Capital investment; China stock market; Fama-MacBeth regressions; FF3 model

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INTRODUCTION

There is already researched extensively examining the return predictive power of factors related to asset growth and capital investment, with a focus on U.S. markets. Generally, the research has shown that growth in assets and investments is negatively related to future stock returns (Cooper, Gulen, & Schill, 2008).

The asset growth effect can be attributed to mispricing or systematic risks. On the one hand, the mispricing explanation is that investors overreact to past information about positive asset growth by extrapolating the past growth rate into future periods. Stock returns attenuate when investors are disappointed by the mean reversion of asset growth rates (Lakonishok, Shleifer, & Vishny, 1994; Li & Sullivan, 2011).

On the other hand, a growing literature argues that systematic risks may explain the asset growth effect. Berk, Green, and Naik (1999) provided an explanation that assumes that assets in place are naturally less risky than growth options. Companies are composed of a mix of growth options and assets in place (Berk, Green, & Naik, 1999). When a company exercises growth options and makes investments, this mix changes in a way that reduces the company's overall risk as growth options are replaced by assets in place. Thus, asset growth leads to reduced risks and, consequently, subsequent returns.

Another explanation is based on the *q*-theory framework of Tobin (1969) and Yoshikawa (1980). If the value of any investment project is equal to the discounted cash flows that it produces, then companies will invest when they expect higher future cash flows or lower discount rates. As long as investment levels are negatively related to future discount rates to some extent, we should expect a negative relationship between asset growth and future stock returns.

1. WHAT DO REFERENCES DO?

The reference extends previous research in U.S. markets to international markets. It shows that the negative relation between asset growth and stock returns also exists in international markets. What's more, it provides evidence that people have the potential to make profit by portfolio strategies.

1.1 Data Description

The reference obtained annual financial statement data from World scope and stock return data from the MSCI monthly stock return files for 1985 through 2009. It restricted the sample to all nonfinancial companies with available data. For exposition purposes, the reference focused analysis on those companies whose fiscal year's end on 31 December. What's more, it merged financial statement data available at the end of March with the subsequent 12 month stock returns, from April to the following March. So, it effectively assumed a three-month lag after the end of the fiscal year-la lag frequently used by practitioners to minimize the potential impact of look-ahead bias.

1.2 Measures Related to Asset Growth

The reference defines 7 measures: (a) one-year asset growth (CGS1), defined as Total asset_t/Total $\text{asset}_{t-1} - 1$; (b) two-year asset growth (CGS2), defined as Total assets $_t$/Total $\text{assets}_{t-2} - 1$; (c) investment-based factor (LSZ) defined as (Inventories – Inventories_{t-1} + Gross property, plant, and equipment – Gross property, plant, and equipment_{t-1})/Total assets_{t-1}; (d) "Xing measures": Capital expenditures_t/Capital $\text{expenditures}_{t-1;}$ (e) TWX measure: Capital expenditures_t/Average (Capital expenditures from $t-1$ to $t-3$) – 1; (f) PS measure: Capital expenditures_t/ Net property, plant, and $\text{equipment}_{t-1;}$ (g) AG measure: Capital expenditures_t/Capital $\text{expenditures}_{t-2} - 1$.

1.3 Major Content

Firstly, it wants to know whether the asset growth related method has predictive power. It conducted monthly Fama-MacBeth (1973) regressions by regressing monthly stock returns for the April-March period on the asset growth related measures, calculated with the accounting data for the prior fiscal year.

Fama–MacBeth Regressions:

$r_{t+1}=\alpha_{0,t}+\alpha_{1,t}\,\text{Asset growth}+\alpha_{2,t}\,\text{Size}_t+\alpha_{3,t}\,\text{BTM}_T+\varepsilon_{i,t+1}$.

The result shows that the two-year asset growth rates have the strongest return predictive power.

Secondly, many variables in the previous literature show predictive power for subsequent stock returns in the overall sample largely because of their predictive power among relatively small stocks. To further investigate the impact of size on the return predictive power of the asset growth related measures, it weighted each observation by its market capitalization in the Fama-MacBeth (1973) regression.

The results shows two-year asset growth rates still have the strongest return predictive power. Meanwhile, Asset growth anomaly is somewhat related to smaller companies but is not a small-company-based anomaly.

Thirdly, it wants to assess the profitability of related trading strategies. It applied a commonly used rank portfolio test by assigned companies within each country, in equal numbers, to quintile portfolios according to the magnitude of two-year asset growth rates constructed with the financial statement information from the prior fiscal year and calculated the equal –weighted returns for each quintile portfolio for each month in the subsequent April-March period.

The result shows that investors could potentially make profit for the quintile spread portfolio based on two-year asset growth rate. And the abnormal returns of quintile portfolios decrease monotonically with the portfolio increasing in two-year asset growth rates rank determined in the prior period.

2. EMPIRICAL RESEARCH

The author showed that asset growth has a negative relation with future stock return not only in American market, but also in developed market. Now, I want to copy the test in Chinese market to see the influence of asset growth in a developing country.

2.1 Data Description

I obtained annual financial statement data and stock return data through 2000 to 2012 from Wind. I restricted the sample to all nonfinancial companies with available data. I identified financial firms according to SEC industry code. I effectively assumed a three-month lag after the end of the fiscal year—a lag frequently used by practitioners to minimize the potential impact of look-ahead bias—from which I gathered the data items. I used one-year government bond as risk-free rate and CSI300 index as market performance. I used cross-sectional data instead of time series data. The structure is described as below:

Table 1
Number of Observation

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of observation	608	687	755	822	921	935	1001	1127	1204

2.2 Empirical Tests

I first conducted monthly Fama–MacBeth (1973) regressions by regressing monthly stock returns for the April–March period on the asset growth–related measures, calculated with the accounting data for the prior fiscal year. In the assay, the author came to the conclusion that in summary, I found that the asset growth related measures demonstrate the ability to predict future stock returns, with two-year total asset growth rates showing the greatest predictive power. To be consistent with the assay, I also used two year total asset growth rates as asset growth-related measure in order to make the conclusion comparable.

$$r_{t+1} = \alpha_{0,t} + \alpha_{1,t}\text{ Assetgrowth}_t + \alpha_{2,t}\text{Size}_t + \alpha_{0,t}\text{BTM}_t + \varepsilon_{i,t+1}.$$

The regression's dependent variables are the monthly returns of individual stocks in year t+1, or the first April–March period after the construction of the asset growth–related measures based on the prior-fiscal-year accounting data, for companies whose fiscal year end in December. The independent variables are normalized to be between 1 and 100, respectively. The reported coefficient estimates, which are in percentages, are the time-series means of the estimated parameters from monthly cross-sectional regressions. Robust Newey–West (1987) t-statistics are in parentheses.

$$r_{t+1}=\alpha_{0,t}+\alpha_{1,t}\text{CGS2}_t+\alpha_{2,t}\text{Size}_t+\alpha_{0,t}\text{BTM}_t+\varepsilon_{i,t+1}$$

-0.20^{***}	-0.62^{***}		
(-3.33)	(-9.23)		
-0.44^{***}	-0.01	-0.60^{***}	1.40^{***}
(-7.46)	(-0.11)	(-5.19)	(8.55)

The coefficient of two-year asset growth is -0.62 with t-statistic of -9.23, indicating that the asset growth having negative influence in stock return. However, when I add two other factors of size and book-to-market ratio, the coefficient of two-year asset growth is -0.01 with t-statistic of -0.11. The influence of CGS2 is not significant after considering size and book-to-market factors. I believe that size and book-to-market ratio may better predict the future return.

Now, I measured the return predictive power of two-year asset growth rates with abnormal returns of the quintile spread portfolio, or the portfolio representing the difference between the lowest- and highest-ranked quintile portfolios. The main purpose is to see whether the premium could make money.

To further assess the return predictability of two-year asset growth rates, as well as the profitability of the related trading strategies, I applied a commonly used rank portfolio test. Assuming a three-month lag after the end of the fiscal year, I then calculated the equal weighted returns for each quintile portfolio for each month in the subsequent April–March period. The author measured the abnormal return for each portfolio in the intercept of the Fama-French (1993) three-factor model. The dependent variables are the monthly returns of these portfolios in excess of the U.S. risk-free rate (the one-month U.S. Treasury bill rate). They measured the return predictive power of two-year asset growth rates with abnormal returns of the quintile spread portfolio, or the portfolio representing the difference between the lowest- and highest-ranked quintile portfolios.

I copied their portfolio using Chinese data. The dependent variables are the monthly excess return of 5 portfolios. I measured the return predictive power of two-year asset growth rates with abnormal returns of the quintile spread portfolio. The independent variables are market excess return, which means I assumed CAPM holds in the period.

Table 2
Quintile Portfolio Test Results for the Monthly Abnormal Returns in the First Year Following Portfolio Formation

	All countries	All countries (ex-U.S.)	Europe	Asia Pacific ex-Japan	China
1(low)	0.38***	0.48***	0.49***	0.54	-0.39***
	(4.85)	(3.18)	(2.80)	(1.36)	(-3.12)
2	0.35***	0.45***	0.44***	0.42	-0.73***
	(5.05)	(3.21)	(2.74)	(1.22)	(-7.44)
3	0.23***	0.30***	0.27*	0.42	-0.82***
	(3.62)	(2.10)	(1.70)	(1.30)	(-8.50)
4	0.01	0.08	0.07	0.26	-1.01***
	(0.21)	(0.56)	(0.42)	(0.79)	(-10.22)
5(high)	-0.44***	-0.41***	-0.35*	-0.20	-1.13***
	(-4.08)	(-2.10)	(-1.77)	(-0.57)	(-14.5)
1-5	0.82***	0.89***	0.84***	0.74***	0.74***
	(6.43)	(6.13)	(5.99)	(2.90)	(5.42)

This table presents quintile portfolio test results for the monthly abnormal returns in the first year following portfolio formation. The abnormal returns of quintile portfolios decrease monotonically with the portfolio rank determined in the prior period. The second-to-last cell in Column 1 shows that investors could potentially earn a monthly abnormal return of 0.82%, absent transaction costs (i.e., market impact, trading cost, and liquidity constraints), for the quintile spread portfolio based on two-year asset growth rates. Annualizing this monthly abnormal return $[(1 + \text{monthly})^{12} – 1]$ gives an annualized abnormal return of 10.30% before transaction costs. The t-statistic for the abnormal return on the quintile spread portfolio is 6.43 and indicates significance at the 1% level.

2.3 Significance of Research

In Chinese market, investors could potentially earn a monthly abnormal return of 0.74%, absent transaction costs, for the quintile spread portfolio based on two-year asset growth rates. Annualizing this monthly abnormal return gives an annualized abnormal return of 9.25%.

I may use the strategy to make money in Chinese market although it's a developing country. However, I didn't use three factor models in the regression, which may influence the result and due to the different accounting standard and market, the influence of measurements may also differ.

3. COMPARISONS BETWEEN CHINESE AND AMERICAN EMPIRICAL RESULTS

As I stated before, I got very different results using Chinese data compared to the research result of the paper I imitated. In fact, not only me, but many other Chinese studies have also found out that past asset growth has positive relationship with future stock return, which might indicate that Chinese stock market has its own distinctive characteristics compared to American markets.

3.1 Asset Growth Anomalies

According to the paper I based my study on, in developed markets, growth in assets and investments is negatively related to its future stock returns, this phenomena is against the classical efficient market theory, and researchers tried to explain this anomaly in many different ways, in this report I summarized some main stream explanatory theories.

a) Systematic risks theory

Companies' total assets are a combination of their assets in control and its growth opportunities. Growth opportunities behave like options, which are more risky compared to assets in control. So those stocks who enjoyed high growths in the past actually have turned a great part of its growth opportunities into assets, which greatly lower their total risks. And stocks with lower market risk are deemed to have lower returns. So this explains why high growth in the past could predict lower return.

b) Q-theory

If the value of any investment projects is equal to the discounted cash flows that it produces, then companies will invest when they expect higher future cash flows or lower discount rates (risks). So it is those companies who have lower risks are more willing to expand, and they should have lower future returns.

c) Financing timing

Managers refinance when stocks are overpriced, and those stocks would have lower returns in the future due to price adjustments. So those stocks that do SEOs always have lower returns.

3.2 Characteristics of Chinese Market

However, Chinese market has some very distinctive features, all of which contribute to the different results of our study.

a) Q-theory

Q-theory is not valid in China because our companies rely much on bank loans, and those SOEs who have good relationship with local government have much lower borrowing costs. So in fact, in China it is not your risks, but your network that decide your discount factor.

b) Financing timing

SECs have relatively sticky requirements for SEOs, only qualified companies can do SEOs. What's more important is that many major Chinese companies have one or two major stock-holders who occupied great shares of the company, and this kind of share structure can easily trigger transportation of benefits. So in China companies tends to raise funds from existing stock-holders when the stock price is undervalued.

c) Reform of the shareholder structure

Another important issue of Chinese stock market is that it has experienced several severe reforms in its relative short life-time. Among them, the shareholder structure reform is one the most important one. On September 4th, 2005, SEC published regulations toward non-tradable shares of listed companies. Thanks to the new regulation, SOEs' share prices surged afterwards, and many of them expand drastically. So I believe the issue effect twisted the research results of China.

4. FUTURE WORK

The topic of my study is relatively new in China, however this research subject would have significant empirical importance related to trade strategy or asset pricing. (refer part 2 for detailed trading strategy). So it's very important to further analyze this phenomenon in China. And I believe the following issues should be paid great attentions in future work:

a) Distinguish between SOEs and civilian-run enterprise:

As we all know, the economic environment and corporate control system of these two kinds of companies are very different, and they are subject to different financing cost and different rewarding system, so it would be very important to separate them from each other.

b) Distinguish between assets

Also I recommend researchers distinguish among different financing sources, for example retained earnings, bank loans or secondary offerings. Because different sources released various signals to the markets and could trigger different price variation.

c) Markets structure reformation

A young market as our stock market is, it has experienced several thorough reforms in its short life period, and these reformations might cause interferences for our studies. So for future researchers who are interested in this topic, I think separate the research period into 3 parts: 2001-2005, 2007-2012 and 2012-afterwards is very necessary.

The relationship between past asset growth and future stock returns has attracted closely attention by not only researchers, but those fund managers who tried to seek better trading strategy. However it is important to figure out different relationship in different markets and understand the underlying reasons. Only by this I could build reliable strategy based on our finding and efficiently adjust my strategy if future market conditions changes.

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