Exploring Size Effect in China's A-Share Market

Siping Wang, 经 56, 2015012527
Kai Xiao, 经 53, 2015012453
Haotian Xu, 材 54, 2015012006

ABSTRACT: The aim of this paper is to explore the size effect in China's A-share Market. One-dimensional sort and double sort are adopted to determine the existence of the size effect. By Fama-Macbeth regression, we explore whether adding size factor increase the explanatory power of the traditional CAPM model. Our finding is that the size effect does exist in China and size factor is significant in the Fama-Macbeth regression. Recommended investment strategies based on the size effect are also discussed in this paper.

Keywords: Size Effect, China's A-Share Market, Double Sort

1. Introduction

The size effect has been proposed since 1981 and has strongly influenced investment thoughts and theories. Banz (1981) finds that market equity adds to the explanation of the cross-section of average returns provided by market βs, and he documents a strong negative relation between average return and firm size. Chan and Chen (1991) argues that it is differences in structural characteristics that lead firms of different sizes to react differently to the same economic news, and size is a systematic risk factor. Fama and French (1992) finds that size and book-to-market equity capture the cross-sectional variation in average stock returns in American stock markets for the 1963-1990 period, while market β loses its significance when controlling for size.

The size effect is important because size might be a new systematic risk factor which is not captured by the asset-pricing model of Sharpe (1964), Linter (1965), and Black (1972). If so, the size effect shows a potential opportunity for excess returns by investing in the size factor. Therefore, the size factor is widely explored across the world stock market.

The aim of this paper is to explore the size effect in China's A-Share market. Data from A-Share market for 2005 to 2018 are used to determine: (a) whether the size effect exits in China, (b) potential investment strategies of exploiting the size effect and its back test performance if the size effect does exist in China. Part 2 introduces the selected data in our research and the method adopted to estimate market β. Part 3 shows empirical results of our one-dimensional sort, double sort and Fama-Macbeth regression. Part 4 discusses potential investment strategies and their back test results. Part 5 concludes the paper and provide some further discussion.

2. Data and Method

2.1 Selected Data and Basic Statistics

In this research, we use the stock information from China's A-share market. The data base covers 3,631 stocks on China's market, and the test period is from January 2005 to June 2018. The stock data used consists of three parts: (a) basic information, including stock code and date of trading, (b) market data, including close price, trading volume, turnover and illiquidity (measured by monthly stock price shock, which is the absolute value of monthly return divided by monthly trading volume), and (c) financial data from balance sheets, income statements and cash flow statements.

Figure 1 to Figure 3 summarizes some basic statistics of stocks listed on China's A-Share Market. As shown in Figure 1, the monthly average size peaked at the end of 2007 and suffered great loss in the 2008 financial crisis. Figure 2 reveals that the density of small cap stocks is high on A-Share Market. That means, many of the listed firms are small cap companies, but the skewness decreases since 2006 and stay relatively stable since 2008.

Figure 1: Monthly Average Size of Stocks on China's A-Share Market

Figure 2: Monthly Skewness of Size of Stocks on China's A-Share Market

Figure 3: Monthly Kurtosis of Size of Stocks on China's A-Share Market

Liu, Stambaugh and Yuan (2018) excluded the smallest 30% of firms in their research on China's stock market. They argued that these excluded companies are the ones valued significantly as potential shells in reverse mergers that circumvent tight IPO constraints. However, as we will show, excluding the microcap firms does not significantly influence our results. Therefore, in the following parts of this paper, we go on with the whole sample set.

2.2 β Estimates

Most tests used portfolios in Fama-Macbeth (FM) regressions because estimates of market βs are more precise for portfolios. However, Fama and French (1992) introduced a new way to estimate market βs for individual stocks so that we can use individual stocks in the Fama-Macbeth asset-pricing test. They first estimated βs for portfolios and then assigned the βs of the portfolio to the stocks in the portfolio. We follow their approach in this paper.

Note that the test period is for January 2005 to June 2018, and on the other hand, 24 to 60 monthly returns are needed to estimate pre-ranking βs of each individual stock, so we construct portfolios from 2007 to 2018.

To be specific, during the period from 2007 to 2018, in June of each year, all the stocks in our dataset are sorted by their market capitalization and then divided into ten portfolios based on the decile breakpoints for size. Fama and French (1992) mentioned that size and βs of size portfolios are highly correlated in America, which is -0.988, which means that asset-pricing tests lack power to separate the effect of size from β in average returns. Therefore, to allow for variation in β that is unrelated to size, we then subdivide each size decile into ten portfolios based on the pre-ranking βs of each individual stock. The pre-ranking βs are estimated on 30 monthly returns of individual stocks before July of year t.

After assigning individual stocks to the size-β portfolios in June, we calculate the equal-weighted monthly returns on the portfolios for the next 12 months. After doing this, we get post-ranking monthly returns from July 2007 to June 2018 on 100 portfolios formed on size and pre-ranking βs. We then estimate the βs of each portfolio using the post-ranking monthly returns (132 months in total). β is estimated as the sum of the slopes in the regression of the return on a portfolio on the current and prior month's market return so that we can adjust for nonsynchronous trading, which is more obvious in small stocks.

In the end, we allocate the post-ranking βs of each size-β portfolio to individual stocks in the portfolio. These are the βs that will be used in the FM regression for individual stocks.

It is noteworthy that, in our dataset, the correlation between size and the βs of size portfolios is 0.206, which means that it might be safe to just use size to construct portfolio. However, to make our results comparable to previous studies, we still follow Fama and French (1992) to construct size-β portfolios and estimate market βs.

3. Empirical Results

3.1 One-Dimensional Sort

In order to explore the effect of size on average returns intuitively, we conduct one-dimensional sort. Table 1 shows the post-ranking properties for July 2005 to June 2018 for portfolios formed from one-dimensional sorts of stocks on size. The portfolios are formed at the end of June each year. All stocks on A-share market are sorted by size (ME, market capitalization) to determine the decile breakpoints for size, and the each individual stock is allocated to 10 size portfolios based on the breakpoints. Group 1 stands for the portfolio of stocks with the smallest ME, and Group 10 stands for the portfolio of stocks with the highest ME.

The 10 size portfolios are reconstructed in June each year. After portfolio construction, we compute time series averages of various properties for each portfolio. Rt_EW stands for time series averages of equal-weighted returns, while Rt_VW stands for time series averages of value-weighted returns. ME stands for size (market capitalization). BM stands for book-to-market ratio. R_1 is the portfolio return in January, while R_12 is the portfolio return in December. Mon_Illiq is a measure of illiquidity, which is the absolute value of monthly returns divided by monthly trading volume.

Table 1 shows clear negative relation between average returns and size. As size increases, both the equal-weighted returns and the value-weighted returns decrease, which is evidence for the existence of size effect. The equal-weighted return difference between Group 1 and Group 10 is as large as 1.99%. It should be noted that although Group 1 enjoys relatively higher average returns, its Mon_Illiq is as high as 2.37. This is reasonable because smaller capitalization firms attract less attention from analysts and these firms have lower capacity for outside investment, so these stocks have lower liquidity.

Another interesting phenomenon is the existence of January effect. As shown in table 1, the average return difference between small size portfolio and big size portfolio is larger in January compared to the annual average return difference. For example, the January return difference between Group 1 and Group 10 is 3.06%, much higher than the annual return difference 1.99%. One explanation for January effect is that fund managers will sell out stocks with poor performance in December of each year in order to polish their annual report, and they will buy these stocks back in January of next year, pulling up the stock price and the return in January.

Table 1: Properties of Portfolios Formed on One-Dimensional Sort

	Rt_EW	Rt_VW	Log_ME	Log_BM	R_1	R_12	Mon_Illiq
Group 1 (Small)	3.48%	3.34%	11.72	-1.20	8.71%	0.65%	2.37
Group 2	2.88%	2.88%	12.07	-1.05	8.90%	1.58%	0.79
Group 3	2.48%	2.48%	12.30	-1.01	8.20%	1.42%	0.37
Group 4	2.53%	2.52%	12.50	-0.99	7.82%	1.09%	0.33
Group 5	2.25%	2.25%	12.70	-0.99	7.60%	1.47%	0.29
Group 6	2.19%	2.19%	12.92	-1.02	7.54%	1.52%	0.25
Group 7	1.93%	1.94%	13.16	-1.02	6.56%	1.41%	0.23
Group 8	1.85%	1.86%	13.48	-1.04	6.56%	1.41%	0.15
Group 9	1.78%	1.79%	13.96	-1.02	5.65%	1.38%	0.13
Group 10 (Large)	1.49%	1.30%	15.82	-0.92	3.67%	0.64%	0.07

3.2 CAPM Alpha and Market β

Table 2 shows the estimated alpha and market β using CAPM model. We use the same one-dimensional sort approach mentioned above, and then regress the equal-weighted monthly returns on the market return minus risk free rate during the period of July 2005 to June 2018. The groups are reconstructed every year. Panel A uses total market capitalization to set the decile breakpoints, while Panel B uses circulation market value. We can find that using either type of market capitalization to measure size produces similar results. Market β is the coefficient of market return minus risk free rate. The t-value of each estimated coefficient is shown in the brackets below.

We can see that as firm size becomes larger, the estimated alpha becomes smaller no matter we use total or circulation market value to divide the stocks into groups. This significant result also indicates that size effect does exist and it is not captured by the CAPM model. Therefore, size may be another systematic risk which is independent with market β.

Table 2: CAPM Alpha and Market β

	Small	2	3	4	5	6	7	8	9	Large	Large - Small
Panel A：Total market capitalization											
Alpha	0.0176***	0.0123***	0.0115***	0.0100**	0.0091**	0.0087**	0.0077**	0.0086**	0.0074***	0.0066***	-0.011**
	(3.71)	(2.74)	(2.68)	(2.37)	(2.22)	(2.17)	(2.13)	(2.50)	(2.61)	(3.46)	(-2.29)
Market β	1.0200***	1.0638***	1.0587***	1.0676***	1.0922***	1.0908***	1.0810***	1.0943***	1.0970***	1.0103***	-0.0097
	(18.06)	(19.97)	(20.68)	(21.25)	(22.44)	(22.84)	(25.03)	(26.81)	(32.54)	(44.55)	(-0.17)
Panel B: Circulation market value											
Alpha	0.0157***	0.0123***	0.0126***	0.0102**	0.0101**	0.0083**	0.0089**	0.0076**	0.007**	0.0066***	-0.009**
	(3.51)	(2.68)	(2.92)	(2.37)	(2.49)	(2.19)	(2.39)	(2.33)	(2.34)	(3.42)	(-2.12)
Market β	0.9948***	1.0913***	1.0414***	1.0641***	1.0757***	1.0881***	1.1026***	1.1069***	1.0985***	1.0137***	0.0189
	(18.76)	(20.03)	(20.23)	(20.73)	(22.33)	(24.07)	(24.89)	(28.43)	(31.05)	(44.03)	(0.37)

*** indicates significant at 1% level ** indicates significant at 5% level * indicates significant at 10% leve

3.3 Double Sort

In order to separate size from β effects in average returns, a double sort approach is conducted based on β and size. Table 3 shows the results of portfolio construction by double sort. The detailed process of portfolio construction has been discussed in Data and Method part. The only difference is that, this time we first construct β portfolios and then subdivide each β decile into ten portfolios based on the size of each stock to control for β. The aim of doing so is to explore the size effect on average returns controlling for β. We allocate the stocks to each β-size portfolio in June of year t and calculate the equal-weighted monthly returns on the portfolios for the next 12 months. The data shown in Table 3 is the average monthly return of the totally 132 months of each β-size portfolio. The column 'Large - Small' shows the difference between the largest size decile and the smallest size decile in average monthly return. The t-value of each estimated coefficient is shown in the brackets below.

From Table 3, we can easily find that in each β group, average monthly return is negatively correlated with size, which means that when controlling for market β, we get lower return when the firm size becomes larger. The 'Large - Small' column also shows that stocks of small firms enjoy consistently and significantly higher return than stocks of large firms. This conclusion is in line with the size effect. Besides, in each size decile, we cannot detect the positive relation between β and return as predicted by the asset-pricing model of Sharpe (1964), Lintner (1965), and Black (1972), which means that β may have little power in explaining stock return. It is also worth noticing that most of the average monthly returns cannot be separated from zero for firms in size decile bigger than 5. This phenomenon indicates that size premium fades away quickly as firm size grows.

Table 3: Control β and construct portfolio by double sort

	Small	2	3	4	5	6	7	8	9	Large	Large - Small
Control: β	Average monthly returns (in percent)										
Low-β	4.7256***	2.3744**	1.6191	1.5799	1.5247	1.2162	1.0953	1.2514	0.7997	0.7547	-3.971***
	(3.985)	(2.399)	(1.621)	(1.578)	(1.591)	(1.301)	(1.242)	(1.489)	(0.978)	(1.106)	(-3.759)
2	2.6832***	2.0831**	1.4825*	1.4204	1.7917**	1.267	1.2539	1.2927	0.7743	0.592	-2.0912***
	(2.781)	(2.000)	(1.644)	(1.528)	(2.130)	(1.413)	(1.533)	(1.507)	(1.011)	(0.840)	(-2.929)
3	2.9168***	1.8194*	1.8319**	1.8732**	1.1769	1.7477*	1.1708	1.1409	0.7301	0.5489	-2.3678***
	(2.907)	(1.908)	(2.009)	(2.109)	(1.231)	(1.914)	(1.435)	(1.371)	(0.906)	(0.748)	(-3.357)
4	2.6264***	2.0621**	1.8728**	1.5676*	1.4358	1.202	0.9846	0.6297	0.6462	0.8049	-1.8215***
	(2.662)	(2.164)	(2.077)	(1.660)	(1.637)	(1.271)	(1.111)	(0.744)	(0.770)	(1.008)	(-2.72)
5	2.249**	2.2088**	2.0249**	1.4621	1.5833*	1.6475*	0.8712	0.8013	0.7422	0.4667	-1.7823***
	(2.260)	(2.266)	(2.092)	(1.583)	(1.703)	(1.736)	(0.967)	(0.999)	(0.858)	(0.550)	(-2.577)
6	2.799***	2.0106**	1.2592	1.5002	1.2958	1.2031	0.9153	0.8399	0.3782	0.5055	-2.2936***
	(2.973)	(2.142)	(1.425)	(1.575)	(1.426)	(1.399)	(1.015)	(0.941)	(0.440)	(0.620)	(-3.486)
7	2.2532**	2.0673**	1.6032*	1.7346*	1.2848	1.4151	0.9199	0.9768	0.6804	0.4124	-1.8408***
	(2.275)	(2.154)	(1.709)	(1.881)	(1.391)	(1.553)	(1.001)	(1.074)	(0.796)	(0.508)	(-2.680)
8	2.4035**	2.0226**	1.6605*	2.1303*	1.3555	1.3281	0.4867	0.6583	0.4358	0.4344	-1.9691***
	(2.45)	(2.235)	(1.743)	(1.953)	(1.407)	(1.405)	(0.528)	(0.726)	(0.519)	(0.481)	(-3.103)
9	2.5842**	2.0928**	1.9287*	1.6735*	1.427	0.8559	1.0901	0.8544	0.8248	0.3591	-2.2251***
	(2.514)	(2.053)	(1.922)	(1.711)	(1.568)	(0.909)	(1.159)	(0.904)	(0.900)	(0.375)	(-2.909)
High-β	2.2577**	1.641*	1.4873	1.3118	1.2714	1.0287	0.785	0.4763	0.5943	0.3549	-1.9028**
	(2.269)	(1.678)	(1.524)	(1.327)	(1.267)	(1.038)	(0.819)	(0.499)	(0.595)	(0.356)	(-2.339)
Average Over β	2.8541***	2.1094**	1.6792*	1.6323*	1.4195	1.2855	0.9504	0.8868	0.7141	0.5258	-2.3283***
	(3.077)	(2.243)	(1.851)	(1.765)	(1.574)	(1.444)	(1.096)	(1.042)	(0.869)	(0.667)	(-3.857)

*** indicates significant at 1% level ** indicates significant at 5% level * indicates significant at 10% level

3.4 Fama-Macbeth Regression

Table 4 shows the time-series averages of the slopes from the month-by-month Fama-Macbeth regressions of the cross-section of stock returns on size, β, and other variables including book to market ratio, earnings to price ratio, turnover rate and return of the previous month. ln(ME) represents the logarithmic value of firm's total market capitalization which measures the size of the firm. BM represents the book to market ratio. Ball (1978) argues that the earnings to price ratio is a catch-all for omitted risk factors in expected returns. If current earnings proxy for expected future earnings, high-risk stocks with high expected returns will have low prices relative to their earnings. However, this argument only makes sense for firms with positive earnings. When current earnings are negative, EP ratio is not a proxy for expected returns. Thus, the slope for EP ratio in the FM regressions should only base on positive values. Therefore, E(+)/P represents the earnings to price ratio when earnings are positive and is equal to 0 when earnings are negative. EP dummy is a dummy variable. It equals to 1 when earnings are negative and equals to 0 when earnings are positive. Last-month return represents the monthly return of the previous month. Turnover represents the monthly turnover rate. The t-value of each estimated coefficient is listed in the brackets below.

On average, there are 2124 stocks in the monthly regressions, which makes the results more convincing than just using portfolios in the regression. To avoid giving extreme observations heavy weight in the regressions, the smallest and largest 0.5% of the observations on E(+)/P and BM are set equal to the 0.005 and 0.995 quantile.

From Table 4, we can find that size factor does help to explain the cross-sectional stock return with a t-value of -6.58 after controlling for several variables. This indicates that the size effect, which is, the stocks of smaller firms enjoy higher return, do exist in China. It is also in consistent with our previous observation in Table 3. However, in contradiction with CAPM model, our results show that β has no significant effect in explaining cross sectional stock return, which is in line with the result of Fama and French (1992).

Table 4: Fama-Macbeth Regression Results

Constant	β	ln(ME)	BM	E(+)/P	EP dummy	Last-month return	Turnover
0.1656***	-0.0132	-0.0101***	0.0049	0.1783***	-0.0018	-0.0022	-0.0002***
(6.039)	(-1.36)	(-6.58)	(0.78)	(3.59)	(-0.90)	(-0.31)	(-5.77)

*** indicates significant at 1% level

** indicates significant at 5% level

* indicates significant at 10% level

4. Application: Investment Strategy Based on Size Effect

4.1 Basic Investment Strategy

The results to here are easily summarized: size effect does exist on China's A-share market, which means smaller-size stocks enjoy higher returns. Based on this fact, we can exploit the size factor to gain excess returns.

The recommended investment strategy based on size effect would be: sort the stocks of China's A-share market on size (ME), assign individual stocks to different groups based on the ME breakpoints, buy the small-size groups and sell the large-size groups.

There are two important notices. Firstly, a zero-net-investment approach should be adopted. That's to say, the total amount of money used to buy small cap stocks should be equal to the total amount of money used to sell large cap stocks, so the net investment is zero. The aim of doing so is to hedge market β so that we can only investment on size and avoid bearing other systematic risks besides size. Secondly, as shown in table 1, the smallest-size group (Group 1) has poor liquidity, which is not favorable for investors, especially for institutional investors who require reasonable liquidity. Therefore, when constructing the investment strategy, we exclude the smallest 10% stocks.

4.2 Back Test

The investment strategy mentioned above is tested with the historical data of China's A-share market from January 2005 to June 2018. At the beginning of each month, all of the A-share stocks are sorted on size and divided into 10 groups, with group 1 the smallest-size stocks and group 10 the largest-size stocks. As mentioned in 4.1, we exclude the smallest 10% stocks, which is Group 1, and only consider the investment in Group 2 to Group 10. The investment portfolio is adjusted at the beginning of each month.

The basic strategy is to buy small cap and sell large cap. However, this strategy can take different forms, such as (1) buy Group 2 and sell Group 10, and (2) buy Group 2 while sell Group 9, and so on. In the following part, we show the results of back test on different investment strategies and prove that the best strategy is to buy Group 2 and sell Group 10.

Table 5 shows the time series average returns of different investment strategy forms in the back test. The left column stands for the stock group bought in and the row stands for the stock group sold out. For example, (+2, -3) stands for buying Group 2 and selling Group 3. As shown in table 5, buying Group 2 and selling Group 3 produces the highest average monthly return, which is 1.77%. This is consistent with the fact that monthly returns are negatively related with size.

Table 5: Average Monthly Returns of Different Investment Strategy Forms

	-3	-4	-5	-6	-7	-8	-9	-10
+2	0.59%	0.94%	1.02%	1.19%	1.53%	1.40%	1.64%	1.77%
+3		0.35%	0.43%	0.60%	0.94%	0.81%	1.05%	1.18%
+4			0.09%	0.25%	0.59%	0.46%	0.71%	0.83%
+5				0.16%	0.51%	0.37%	0.62%	0.74%
+6					0.34%	0.21%	0.45%	0.58%
+7						-0.13%	0.11%	0.24%
+8							0.24%	0.37%
+9								0.13%

Table 6 shows the average alphas of different strategies. Alpha is calculated using the CAPM model. Similar to table 5, buying Group 2 and selling Group 10 produces the most favorable outcomes. The alpha of this strategy is 1.47%.

Table 6: Average Alphas of Different Investment Strategy Forms

	-3	-4	-5	-6	-7	-8	-9	-10
+2	0.34%	0.70%	0.76%	0.92%	1.26%	1.13%	1.36%	1.47%
+3		0.15%	0.21%	0.37%	0.71%	0.58%	0.81%	0.92%
+4			-0.16%	0.00%	0.35%	0.22%	0.44%	0.56%
+5				-0.05%	0.29%	0.16%	0.39%	0.50%
+6					0.13%	0.00%	0.23%	0.34%
+7						-0.34%	-0.12%	-0.01%
+8							0.02%	0.13%
+9								-0.10%

However, the strategy buying Group 2 and selling Group 10 have some drawbacks. As shown in table 7, the annualized Sharpe ratio of this strategy is 76.02%, which is acceptable but not the highest. Table 8 shows the maximum drawdowns of different strategy. The max drawdown of buying Group 2 and selling Group 10 is -35.43%, which is nearly the highest among all the strategies. This means a possibility of large loss.

Table 7: Average Annualized Sharpe Ratios of Different Investment Strategy Forms

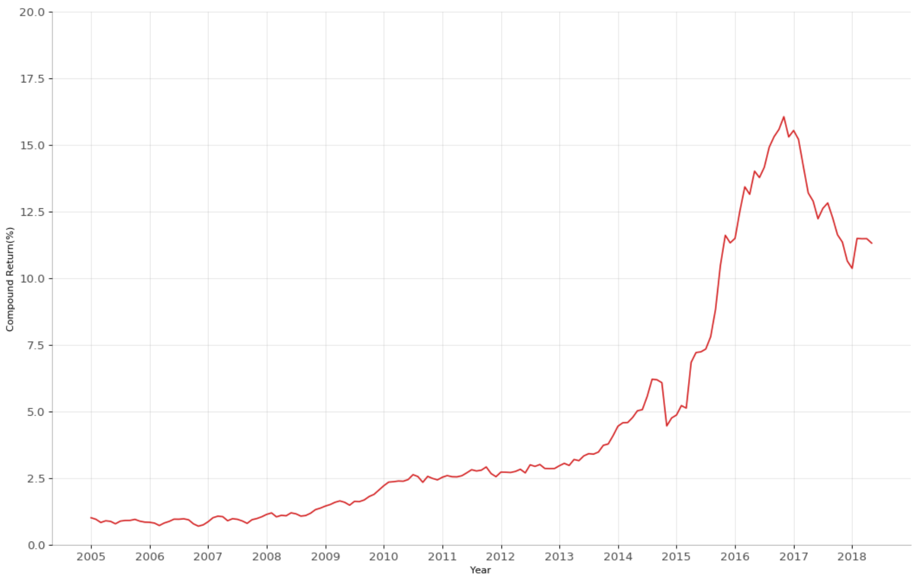
	-3	-4	-5	-6	-7	-8	-9	-10
+2	85.32%	126.60%	122.69%	120.08%	142.74%	107.78%	100.88%	76.02%
+3		30.09%	38.75%	58.06%	89.46%	64.58%	76.19%	68.06%
+4			-27.53%	6.98%	57.68%	30.95%	53.57%	56.31%
+5				-10.72%	51.39%	24.70%	50.06%	57.68%
+6					29.52%	0.17%	36.83%	45.50%
+7						-76.53%	-17.13%	4.16%
+8							7.30%	27.63%
+9								-19.03%

Table 8: Maximum Drawdowns of Different Investment Strategy Forms

	-3	-4	-5	-6	-7	-8	-9	-10
+2	-9.63%	-10.29%	-10.74%	-19.60%	-18.15%	-24.17%	-25.82%	-35.43%
+3		-7.99%	-8.05%	-12.03%	-13.78%	-19.44%	-26.02%	-35.59%
+4			-13.45%	-14.91%	-10.36%	-17.04%	-25.25%	-35.22%
+5				-14.33%	-10.58%	-17.15%	-23.18%	-34.64%
+6					-19.66%	-11.67%	-21.49%	-32.45%
+7						-28.23%	-17.59%	-32.27%
+8							-20.08%	-29.65%
+9								-21.27%

In short, we compare average returns, alphas, Sharpe ratios and maximum drawdowns of different investment strategies used in the back test. The strategy of buying Group 2 and selling Group 10 produces the highest average return and the highest alpha, but this strategy is at the cost of a high maximum drawdowns. Figure 4 shows the cumulative returns for this strategy.

Figure 4: The Cumulative Returns of Buying Group 2 and Selling Group 10



4.3 Discussion: Possible Improvements

Our recommended investment strategies, buying Group 2 and selling Group 10, provides fairly satisfying outcomes of high average returns and high alpha. However, this strategy is very crude and some further improvements are undoubtedly needed.

Firstly, as mentioned above, the Sharpe ratio is just at the medium level compared to other strategies.

Secondly, as the maximum drawdown is so high, a stop-loss strategy is still needed. We tried several stop-loss strategies, one of which is to assess the monthly returns of individual stocks included in our investment portfolio at the end of each month, and kick away the long-position stocks whose returns are lower than a benchmark and the short-position stocks whose returns are higher than a benchmark. However, these stop-loss strategies do not influence our back test results significantly.

Thirdly, the current investment strategy does not consider the January Effect. As mentioned above, small cap stocks perform even better in January. An investment strategy exploiting the January Effect needs to be explored.

5. Conclusion

The main conclusion of this paper is that the size effect does exist in China's A-Share market. In the one-dimensional sort, we see the trend intuitively: portfolios of smaller-size stocks have higher average returns. In the double sort, our result also supports the size effect: controlling for market β, average returns decrease with size within each market β group. This shows that in China's A-Share market, size is a systematic risk factor, and it captures risks which market β fails to capture. This conclusion is further approved by Fama-Macbeth regression: size factor does significantly add explanatory power to the traditional CAPM model, and market β loses its significance. All above approve that the stock data of China's A-Share market are consistent with the findings of Fama and French (1992).

Several potential investment strategies based on the size effect are also discussed in this paper. The basic strategy is to buy small-cap stocks and sell large-cap stocks. By comparing the performance of back test, buying Group 2 and selling Group 10 produces the highest average returns and alphas, but its medium Sharpe ratio and high maximum drawdowns should also be taken into consideration. In short, although good performance is approved in the back test, the investment strategies brought in this paper are somewhat crude and further improvements are still needed.

It should be noted that although there is indeed size effect in China's A-Share Market, we still need to figure out whether size stands for a systematic factor or behavioral bias. If the asset is rationally priced in China, then the relation between size and average return proxies for a more fundamental relation between expected returns and economic risk factors. If the size effect in China comes from irrational asset-pricing, then its rationale and application will be different. This is a potential field for further research.

References

[1] Eugene F. Fama and Kenneth R. French, The Cross-Section of Expected Stock Returns, Journal of Finance, Vol. XLVII, NO.2, 1992, 427-465
[2] Banz and Rolf W., The relationship between return and market value of common stocks, Journal of Financial Economics 9, 1981, 3-18
[3] K.C. Chan and Nai-Fu Chen, Structural and Return Characteristics of Small and Large Firms, Journal of Finance, Vol. XLVI, NO.4, 1991,1467-1484