China-Concept Factor and Stock Returns in Taiwan

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Abstract

This study investigates whether there is a “China-concept factor”, a common variation of stock returns, for firms that are listed in Taiwan stock markets and have real investments in China. We employ a methodology similar to that used by Lamont, Polk and Saa-Requejo (2001) in examining whether there is a financial-constraints factor. A sample of listed firms in Taiwan stock market for the period 1990-2004 are used to form portfolios of firms based on observable characteristics related to their real investments in China. We find that firms investing heavily in China have stock returns moving together over time, which suggests that firms investing in China are subject to common shocks. Firms investing heavily in China are found to exhibit higher average stock returns. Hence, there exists a China-concept factor for firms listed in Taiwan stock market and have real investments in China.

Keywords: China-concept, factor models, common variation

1. Introduction

There are a huge number of global fund managers paying attention to the security markets of the BRIC's: Brazil, Russia, India and China. These four countries are expected to experience the greatest economic expansion of the world in 50 years. Of the four countries, China has the closest relationship with Taiwan owing to long history of political relation and economic collaboration. Since the economic reform by Deng in 1990s, China has allured hundreds of billion dollars of funds from all over the world. Attracted by China's low costs of labor and land, tax benefits, and same language, Taiwanese firms were the first ones that invested in China. Taiwanese firms' real investments in China amount to more than 40 billion dollars according to Taiwan's official report by the end of 2004. This amount reaches 100 billion dollars according to some unofficial reports.

Since a great percentage of Taiwanese firms have made real investments in China, we call these firms "China-concept" firms. If these firms are listed firms in Taiwan stock markets, then, their stocks are called "China-concept" stocks. There is a saying by foreign institutional investors in Taiwan that in a few years Taiwan listed stocks will be all "China-concept" stocks, since no firms can survive without switching manufacturing to China. These "China-concept" stocks are benefited by increasing contribution of earnings from investments in China to their earnings per share, while suffer whenever there is turmoil on the political relationship between China and Taiwan.[1] It is interesting to examine whether the common variation of stock returns for these "China-concept" stocks exists.

We study this question by relating asset returns to observable firm characteristics. Specifically, we test whether firms that made physical investment in China share common variation in their stock returns. If physical investments in China are indeed an important determinant of the value of corporation, changes in investment level should be reflected in stock returns. On the contrary, if changes in investment level are solely a firm-specific, idiosyncratic phenomenon, then the China-Concept firms' returns have no reason to move together, controlling for other source of common variation among asset returns (such as the size or the book-to-market factors). Hence, our study could be closely related to factor models.

Since Sharpe (1964) presented the CAPM, academicians had questioned the

[1] China claims that Taiwan is a province of China, while Taiwan claims it is an independent country itself.

appropriateness of using only one factor, the market portfolio, to explain stocks' expected returns. Fama and French (1992, 1993)'s pioneering work firstly points out the joint effects of market β, size, **E/P**, leverage, and the book-to-market ratio on stock returns. The cross-sectional variation of expected returns could be explained by size (**ME**) and book-to-market (**BE/ME**). A three-factor asset-pricing model that includes a market factor as well as risk factors related to size and **BE/ME** seems better capture the cross-section of average returns on U.S. stocks. Jegadeesh and Titman (1993) proposed the "momentum strategy", that is, investors can earn abnormal returns via buying winner portfolios and selling loser portfolios. Recently, Lamont et. al. (2001) found the existence of a factor called the "financial constraints factor", in addition to the three factors found by Fama and French (1993), and the momentum factor. Our findings regarding to the China-concept factors share common interest with Lamont et. al. (2001) in a analogous way.

The remainder of this article is organized as follows. Section 2 briefly reviews several descriptive statistics about the intimate economic relationships between Taiwan and China, with special emphasis on why this issue is relevant. Section 3 discusses the relevant literature review. Our methodology is described in section 4. There we describe our sample and give our definition of China-concept firms. Our empirical results are presented in section 5. Section 6 concludes.

2. Cross-Strait relationship between China and Taiwan

Before the end of the last century, because of the sky-rocketing wages, escalating renting costs and overwhelming environmental protection campaigns, traditional industries in Taiwan have lost most of their competitive advantage on production costs and are forced to transfer their real investments oversea. Huang (2001) polled the members of the Taiwan Merchant Association and documented that main reasons for Taiwanese firms to invest in China are cheap labor costs, low land rental expenses, low corporate income taxes. China has successfully absorbed most of the new investment projects initiated by Taiwanese firms. One could see a significant increasing trend from Table 1.

Table 1

Taiwanese listed firms' investments in China approved by Taiwan's Industry Development & Investment Center Ministry of Economic Affairs. Unit: US $ (million)

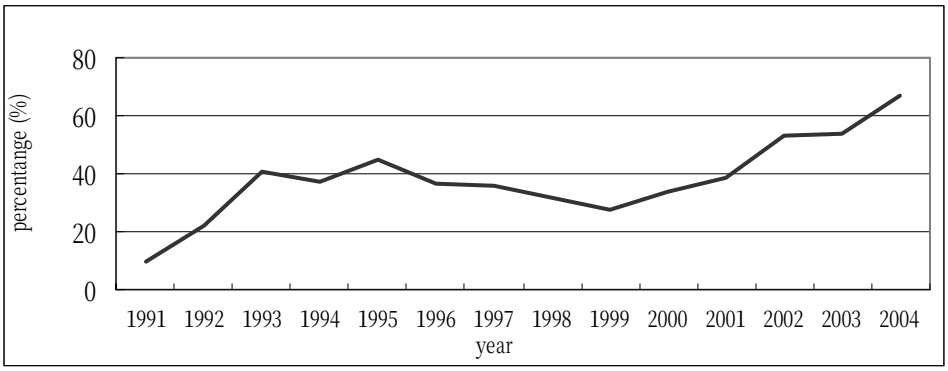
Year		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Number of Applications approved		69	78	94	166	116	134	247	340	505	578	497
Approved amount	Total approval	275	361	512	754	639	632	1,317	1,711	2,561	2,747	3,602
	Average approval	3.99	4.63	5.45	4.54	5.51	4.72	5.33	5.03	5.07	4.75	7.25
Approved amount that have been remitted to China	Total remittance	371	563	764	1273	732	902	2,040	2,306	2,928	2,593	2,083
	Average remittance	5.38	7.22	8.13	7.67	6.31	6.73	8.26	6.78	5.80	4.49	4.19

Data source: Industry Development & Investment Center Ministry of Economic Affairs of Taiwan

Table 1 shows that the number and amount of approved China investments by listed firms have increased tremendously over the period 1994-2004. The official record shows that the number of investment approvals increased from 69 in 1994 to 497 in 2004. The total investment amount approved by Taiwan's Ministry of Economic Affairs increases from $275 million in 1994 to $3,602 million in 2004. The amount of actual remittance of the approved investments also increased. From the perspective of overall investments abroad (Figure 1), China's share is increasing year by year since 1999, and up to 70.62% in 2004. China has undoubtedly become the most important region for Taiwanese firms to invest in and profit from.

Figure 1

Investments in China as a percentage of Taiwan's Total investments abroad



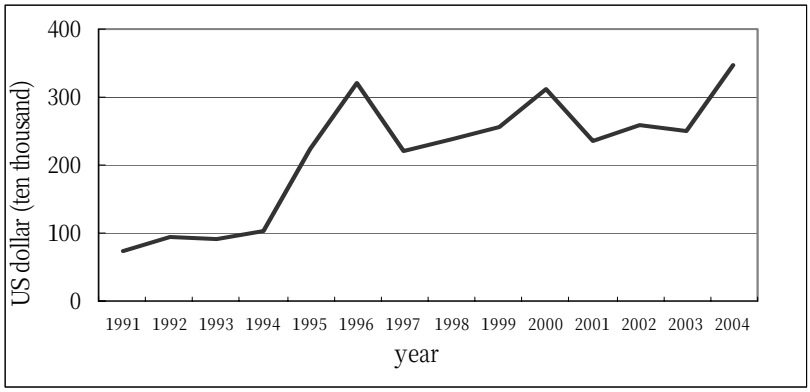
Data source: Industrial Development & Investment Center Ministry of Economic Affairs of Taiwan

Now turn to the investment scales. Figure 2 shows that the investment

scales in China jumped enormously from 1994 to 1996, with the exception in 1996 and 2000. The investment scale had experienced two reductions due to the Presidential Election in Taiwan, which aggravated the already malfunctioned relationship between Taiwan and China (Taiwan and China government are politically hostile since 1949). In the recent years, however, the growing tendency of the investment scale has recovered again.

Figure 2

The average investment scale, 1991-2004 Unit: US $ (ten thousand)



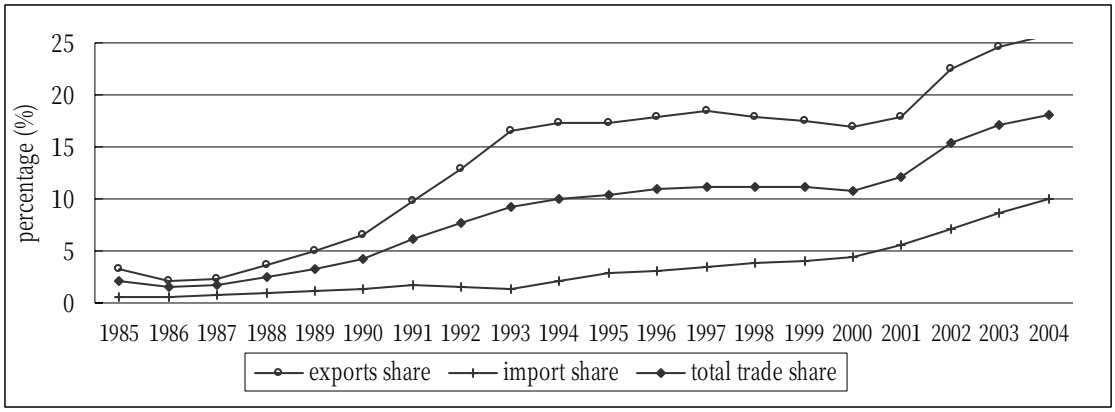
Data source: Industrial Development & Investment Center Ministry of Economic Affairs of Taiwan

The interdependence of trading between Taiwan and China has also risen, as indicated in Figure 3, Table 2 and Table 3 . Both Taiwan's exports share and imports share of trade with China relative to its overall foreign trade increases year by year. As of 2004, the exports share of cross-strait trade to total foreign trade has exceeded 25%. Total cross-strait trade increases more than 50%, from 17.9 billion in 2002 to 57.9 billion in 2004, as shown in Table 2. That suggests the interdependency of trading between Taiwan and China has risen significantly. Because the China market is so important to Taiwan, and the economic activities are intimately related between Taiwan and China, the term China-concept Stock[2] is therefore created and refers to companies investing in China while listed in Taiwan Stock Exchange.

[2] From a global view, the China Concept firms may also include the global companies that have large interests in the domestic markets or have many plants manufacturing exporting goods in China, such as firms in Hong Kong, Korea and U.S.A.

Figure 3

The Cross-Strait Trade as a percentage of Total Foreign Trade of Taiwan



Data source: Taiwan's Mainland Affairs council

Table 2

The Cross-Strait Trade between Taiwan and China, 1990-2004 **Unit: US $**

Year	Total Trade		Exports		Imports		Surplus / Deficit	
	Amount (million)	Growth Rate (%)	Amount (million)	Growth Rate (%)	Amount (million)	Growth Rate (%)	Amount (million)	Growth Rate (%)
1990	341	137	0		341	137	-341	137
1991	597	75	0	262	598	75	-597	75
1992	748	25	1	906	747	25	-746	25
1993	1,031	38	16	1,444	1,015	36	-999	34
1994	1,990	40	132	711	1,859	83	-1,727	73
1995	3,467	74	378	186	3,091	66	-2,714	57
1996	3,683	6	623	66	3,060	-1	-2,436	-10
1997	4,541	23	626	0	3,915	28	-3,288	35
1998	4,945	9	835	33	4,110	5	-3,275	0
1999	7,062	43	2,537	204	4,526	10	-1,989	-39
2000	10,440	48	4,217	66	6,223	37	-2,006	-1
2001	10,647	2	4,745	13	5,902	-5	-1,156	-42
2002	17,892	68	9,945	110	7,947	35	1,997	--
2003	32,377	81	21,417	115	10,960	38	10,457	423
2004	50,690	57	34,013	59	16,678	52	17,335	65

Data source: Bureau of Foreign Trade of Taiwan (http://cus93.trade.gov.tw/fsci/)

Table 3

The share of Cross-Strait Trade in Taiwan Total Foreign Trade, 1985-2004 (estimated by Mainland Affairs Council, ROC) Unit: Percentage (%)

Period	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Exports share*	3.21	2.04	2.28	3.7	5.03	6.54	9.84	12.95	16.47	17.22
Import share*	0.58	0.6	0.83	0.96	1.12	1.4	1.79	1.55	1.43	2.18
Total trade share*	2.17	1.49	1.71	2.47	3.31	4.23	6.2	7.6	9.32	10.02
Period	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Exports share*	17.4	17.87	18.39	17.94	17.52	16.87	17.86	22.56	24.52	25.83
Import share*	2.98	3.02	3.42	3.93	4.09	4.44	5.5	7.06	8.61	9.93
Total trade share*	10.46	10.95	11.15	11.13	11.12	10.84	12.1	15.39	17.07	18.03

* The denominators are Taiwan's trade volume to the world; the numerators are Taiwan's trade volume to Mainland China.

Data source: Mainland Affairs council of Taiwan (http://www.mac.gov.tw/index1.htm)

According Table 4, the overall profits generated from investments in China had been increasing since 1998. For the top 10% firms, the average profits are also increasing from 1,558 millions in 1998 to 37,808 millions in 2004. The profits increased sharply form 2002 to 2003, and remain over 30,000 million in recent two year, this is point out the profit from investment in China is more important and bigger.

Table 4

Profits Earned from Investment in China by Listed firms in Taiwan, 1998-2004

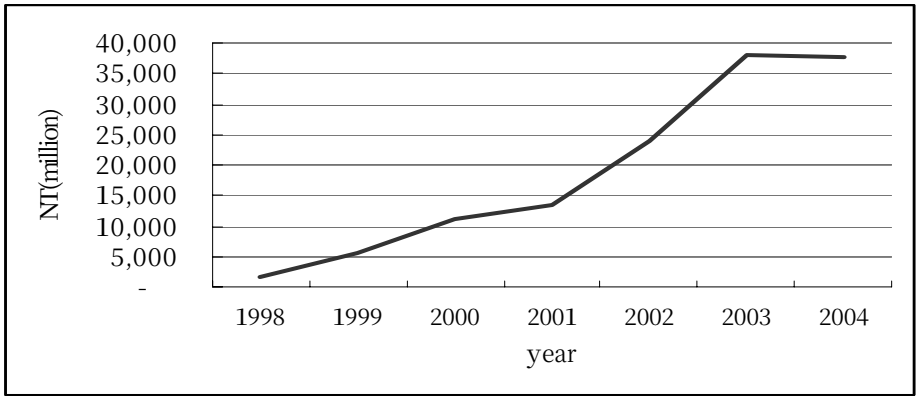
Unit: NT million

Investment income in China						
Years	No. of firms	Total profits	Average profits	Standard deviation	Average profits of top 10% firms	Average profits of bottom 10% firms
1998	163	1,558	9	122	224	-116
1999	272	5,569	20	123	263	-96
2000	480	11,252	23	131	277	-106
2001	562	13,438	22	195	333	-136
2002	763	23,830	31	264	389	-111
2003	826	37,949	45	403	521	-121
2004	832	37,808	45	376	534	-138

Data source: Taiwan Economic Journal (TEJ) data base

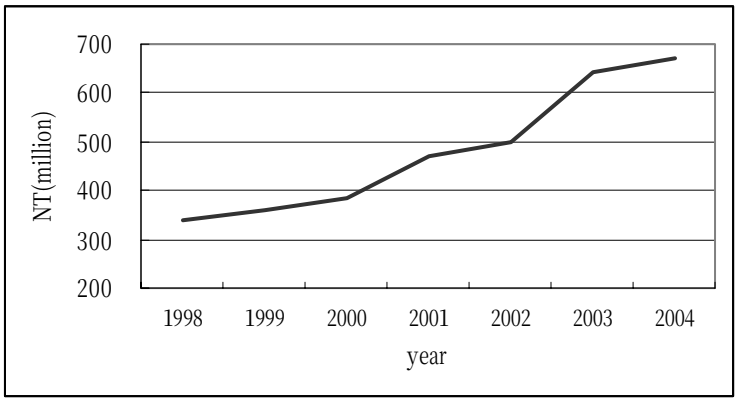
Figure 4

Total profits from investments in China by listed firms in Taiwan, 1998-2004



Data source: TEJ data base

Figure 5 The gap of the average profits from investments in China between top 10% and bottom 10% firms, 1998-2004



Data source: TEJ data base

Table 4 shows that average profits from investments in China has risen from 9 million to 45 million from 1998 to 2004. The average profit gap between the top 10% firms and the bottom 10% firms had also increased from 340 million in 1993 to 672 million in 2004. A rising trend can be detected in Figure 5, which means the gap between the most profitable firms and the least ones is getting larger in recent years. From the perspective of the contribution to EPS before tax, Table 5 indicates the average contribution to EPS before tax is from 0.047 in 1998 to 0.117 in 2004. The subsidiaries are becoming more important in terms of contribution of sales and earnings to their parent company than before. All these

evidence signifies the revenue generated from China plays a critical role for companies listed in Taiwan. A significant change in the structure of return-generating for the Taiwanese China-concept firms has occurred.

Table5

Contribution of profits from investments in China to EPS of listed firms in Taiwan , 1998 – 2004

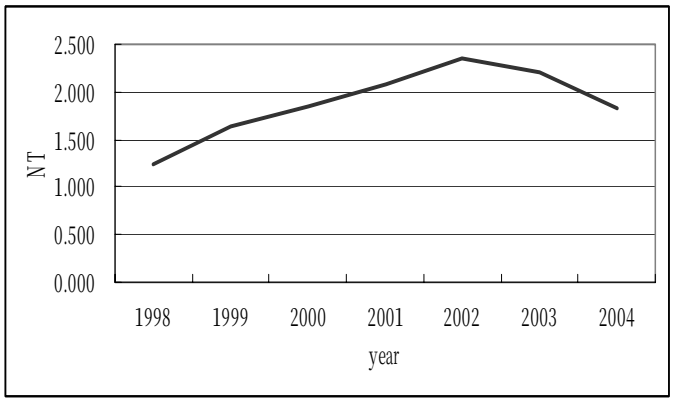
Unit: NT

The contribution to EPS before tax					
years	No. of firms	Average contribution to EPS(before tax)	Standard deviation	Average contribution to EPS of top 10% firms	Average contribution to EPS of bottom 10% firms
1998	157	0.047	0.471	0.848	-0.402
1999	263	0.102	0.570	1.255	-0.374
2000	481	0.136	0.629	1.411	-0.434
2001	562	0.044	0.958	1.135	-0.936
2002	763	0.113	0.806	1.685	-0.677
2003	826	0.126	0.716	1.590	-0.624
2004	832	0.117	0.579	1.336	-0.500

Data source: TEJ data base

Figure 6

The gap of the average contribution to EPS before tax between top 10% and bottom 10% firms



Data source: TEJ database

3. Relevant Literature Review

Most literatures regarding China-concept stocks come from Taiwan. Chang (1998) find that the higher the retained earnings to capital ratio, the higher the export ratio, or the longer the years of establishment, the higher the possibility a firm will invest in China. Nevertheless, the variations of stock returns measured by risk proxies are the same between China-concept stocks and non-China-concept stocks. Hsu (2000) indicates that Taiwanese firms' investments in China have better performance after they invested in China for more than five years. Lin (2001) investigates the relationships among China-concept Stock Index, Taiwan Weighted Stock Index, Taiwan Electronics Stock Index, Shanghai Synthesis Index, and American NASDAQ Stock Index, and finds a high correlation among China-concept Stock Index, Taiwan stock market, and American stock market. Yang (2001) examines the impact of investments in China on stock returns for Taiwanese listed firms. He finds that the announcements of Taiwanese listed firms' investments in China cause significant positive abnormal returns. Huang (2001) studies the Taiwanese firms that have invested in China and south-east Asia and find the investment horizon is one of the major causes for earning profits. He also indicates that listed firms with smaller size, higher debt ratio and higher profitability in Taiwan tend to have better performance oversea.

Another branch of literature studies the same issue from the perspective of corporate finance. Lo (2001) examines whether agency problems affect the stock returns of Taiwanese firms when they are permitted to invest in China. He finds that the abnormal stock returns of firms with lower insiders ownership are significantly larger than those with higher insiders ownership. Chen (2003) finds that the contribution of China-investments' profits to earnings before taxes is reflected in China-concept stocks' returns. To our best knowledge, none of the previous works deal with the China-concept issue from the viewpoint of a multi-factor model. To relate the China-concept factor to the stock returns of Taiwanese firms with real investments in China are the main themes in our study.

Since Sharpe (1964) presented the CAPM, academicians had questioned the appropriateness of using only one factor, the market portfolio, to explain stocks' expected returns. The market model has been used to detect the existence of abnormal returns of specific strategies. As the number of anomalies found increased, academicians began to search for adequate variables to explain the stock returns in addition to the market β factor.

Fama and French (1992, 1993)'s pioneering work firstly points out the joint

effects of market β, size, **E/P**, leverage, and the book-to-market ratio on stock returns. The cross-sectional variation of expected returns could be explained by size (**ME**) and book-to-market (**BE/ME**) in addition to market risk, providing a simple but powerful characterization of the cross-sectional average stock returns for the period of 1963-1990. This three-factor model seems to capture the cross-section variation of average returns of U.S. stocks.

Previous works on behavioral finance also pinpoint the relationship between investing behavior and stock returns. De Bondt and Thaler (1985, 1987), among others, focused on the reversal strategy and find strong tendencies for poorly performing stocks in one period to experience sizable reversals over the subsequent period, while the best-performing stocks in a given period tend to follow with poor performance in the following period. That is, the losers rebound and winners fade back, suggesting that the stock market may overreact to relevant news. In contrast, Jegadeesh and Titman (1993) proposed the "momentum strategy", that is, investors can earn abnormal returns via buying winner portfolios and selling loser portfolios. Rouwenhoust (1998) also adopted the momentum strategy to test if the abnormal returns could exist persistently for twelve European countries, and the results were affirmative.

Recently, Lamont et. al. (2001) found the existence of another factor called the "financial constraints factor" even in the existence of Fama and French's three factors and a momentum factor. They construct various zero-cost portfolios that are long on financially constrained firms and short on less constrained firms and draw several implications in asset pricing. First, these portfolios capture common variation in stock returns not captured by other sources of return comovements. Thus, the financial constraints factor is an identifiable independent common source of economic shocks to firm value. Second, the investigation of the role of financial constraints in asset pricing reveals that constrained firms earn lower returns than unconstrained firms, a result not explainable using existing asset pricing models. Our findings regarding the China-concept factor share common interest with Lamont et. al. (2001) in a analogous way.

4. Methodology

4.1 Sample

Our research sample includes firms that have real investment records in the Industrial Development & Investment Center Ministry of Economic Affairs of Taiwan. Once a Taiwanese listed firm is approved by the government to invest in China, it will automatically be regarded as a China-concept firm in the later years.

Table 6 shows the number of firms used in our sample for the period 1994-2003.

Table 6

Number of firms in our sample, 1994 -2003

Years	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
No. of firms	59	83	116	166	196	226	315	419	535	624

Data source: The Industrial Development & Investment Center Ministry of Economic Affairs of Taiwan.

Financial data of the Taiwanese listed firms are collected for the study from the Taiwan Economic Journal database (or TEJ hereafter) and the Industrial Development & Investment Center Ministry of Economic Affairs of Taiwan. Due to the data availability from the Industrial Development & Investment Center Ministry of Economic Affairs, our research period is confined to the period 1994-2004. Firms without complete data are excluded either.

4.2 Returns pattern for China-concept stocks

In order to investigate whether the listed firms with different level of investments in China have different stock returns and whether their stock returns have a pattern, we use a ratio to denote the degree of investments in China by Taiwanese firms. A firm's accumulative investments in China approved by the Taiwanese government divided by its total assets is used as a proxy for the China-concept ratio, which is called the CC ratio. The **CC** ratio is higher for firms that have invested heavily in China. This ratio is then used to sort firms into portfolios according to their extent of investments in China.

We also sort the sample into three portfolios according firms' size, ie, market value of equity.

In June of each year *t* during the study period 1993-2003, we form portfolios according to sample firms' size and CC ratio estimated using the financial data of year *t-1*. Similar to Lamont, Polk and Saa-Requejo (2001), we form portfolios based on independent sorts of the top third, middle third and bottom third of size and of CC.

Hence, we have nine groups of the combination of different level of size and CC ratio. We divide our sample firms into three size groups: small, medium and big. Then we break our sample firms into three **CC** groups based on the breakpoints for the bottom 33%, middle 34%, and top 33% of the sorted values of **CC** ratio. Each firm's **CC** ratio of the year *t* is calculated as the accumulative

investments in China at the end of year *t*-1 divided by its total assets at the end of year *t*-1. The bottom 33%, middle 34%, and top 33% of the are called "low-China-concept stock", "middle-China-concept stock", and "high-China-concept stock" respectively. The final portfolios are the nine combinations of the three **ME** and the three **CC** groups: low **CC** /small size (**LS**), low **CC** /medium size (**LM**), low **CC** / big size (**LB**), middle **CC**/ small size (**MS**), middle **CC**/ medium size (**MM**) , middle **CC** / big size (**MB**), high **CC**/ small size (**HS**), high **CC**/ medium size **(HM**), and high **CC** / big size (**HB**). After the nine portfolios are constructed, we calculate subsequent value weighted returns on the nine portfolios from July of year *t* to June of year *t+1* and reform the portfolios in June of *t+1*. We calculate the returns beginning in July of year *t* is to make sure that the relevant values to calculate size and CC ratios for year *t-1* are known.

To be included in the sample, a firm must have complete data, necessary for this study, in TEJ database for each year in study.

There are another three portfolios in our research: the first one is called the **HIGHCC**, which is simply the equal-weighted average of the three size-sorted portfolios in the top third of the **CC** sort. The second one is **LOWCC**, which is similarly the equal weighted average of the three size-sorted portfolios in the bottom third of the **CC** sort. The third one is **CCF**, representing the difference between the **HIGHCC** and **LOWCC**. Thus, **CCF** is **HIGHCC** minus **LOWCC**. **CCF** is a monthly time series of returns on a zero-cost factor-mimicking portfolio for China-concept Factor, which we shall be using for the rest of this article.

The size-stratification of **CCF** is similar to the procedure followed by Fama and French (1993) and Lamont et al (2001). By forcing the long and short portfolios (**HIGHCC** and **LOWCC**) to equally represent small, medium, and large firms, the procedure ensures that one class of firms does not dominate the **CCF** returns. By controlling for firm size, we ensure that the returns on the **CCF** portfolio are due to the different extent of investments in China, not the differences in size. Table 7 shows returns and characteristics for these nine portfolios.

4.3 Tests for common variation of China-concept stock returns

In order to investigate whether firms invested highly in China have returns that move together, controlling for other sources of common variation, such as the market factor, size factor, or industry factors, we use the returns on each of the

nine CC/size sorted portfolios (shown in Table 7) as dependent variables, and the return of our reference portfolio as independent variables, then run the regression. Our reference portfolios are similar to the ones by Lamont et al (2001). The first reference portfolio is proxy for the market factor, the second reference portfolio is a proxy for the size factor, and the third reference portfolio is the CCF portfolio.

The size and market factor proxies we constructed are based on the nine portfolios (**LS**, **MS**, **HS**, **LM**, **MM**, **HM**, **LB**, **MB**, **HB**). The proxy for the overall market consists of the portfolios of less investment in China medium-sized and large-sized firms: **BIG**=(**LM**+**LB**+**MM**+**MB**)/4. Our proxy for size consists of the less investment in China small-size firms: **SMALL**= (**LS**+**MS**)/2.

As indicated by Lamont et al (2001), simply using **BIG**, **SMALL**, and **CCF** in the regressions would result in spurious regression because the same return series would appear in both the dependent and independent variable. Hence, for each of the nine portfolios we modify the formation of three benchmark portfolios. The dependent variable is excluded from the construction of the right-hand-side independent variables. For example, in regressions where **LM** is the dependent variable, **BIG** is constructed excluding **LM** (so that **BIG** consists only of **LB**, **MM**, and **MB**). For convenient comparisons across different regressions, we make the definition of the **CCF** variable constant within size groups. Specifically, for a given size group we construct **CCF** using only those high-investment and less-investment portfolios that are not in the given size group. For example, in regressions where **LM** is the dependent variable, **CCF** is constructed excluding both high- and less-investment portfolios from the medium size group (so **CCF** in this regression is long on **HS** and **HB**, short on **LS** and **LB**, and excludes **HM** and **LM**). Table 8 will show the results of these nine regressions.

4.4 The covariance of China-concept stock returns after controlling industry factor

Now we would like to know if the co-variation we find is due to common industry shocks when conducting the investigation of whether firms invested highly in China have returns that move together. After controlling for industry, we construct an industry-matched measure of the high China-concept Factor. Like **CCF**, we construct **CCFIND** as a portfolio that is long on high investment in China firms and short on less investment in China firms that are in the same industry. First we break our sample firms into nine portfolios according size and **CC** ratio. Then in June of each year *t*, we rank portfolios by ranking our sample

firms each year by the size, and in December of each year *t-1*, we rank portfolios by ranking our sample firms by **CC** ratio. So the **HIGHCC** is the same in **CCF**. However, there is a different short portfolio: for each firm in the high investment in China groups (**HS**, **HM**, and **HB**), we find a firm in the same industry from the less investment group (**LS**, **LM**, **LB**, **MS**, **MM**, and **MB**), and form a matching group by sampling without replacement, so that each high investment in China firm has a less investment in China firm in the same industry. Thus, the high and low portfolios have an equal number of firms. After the matching group is defined, we then size-stratify the matching group into three size portfolios and construct CCFIND as the three high investments in China portfolios minus the three less investment in China portfolios. Similar to Table 8, **CCFIND**, **SMALL**, and **BIG** are constructed differently for each portfolio. Table 9 shows the co-variation tests.

4.5 Tests for the explaining power of China-concept factor by existing asset pricing models

We would like to know the characteristics for factor returns, and the investigation of whether the existing asset pricing models can explain China-concept factor.

We show summary statistics for the two measures of the China-concept factor. Then, we demonstrate statistics for three stock market factors used by Fama and French (1993). The three Fama-French factors are **RM-RF**, **HML**, and **SMB**. **RM** is the return on the value-weighted portfolio of the stock listed in Taiwan Stock Exchange, and **RF** is the return from the one-year deposit interest rates in Taiwan Bank. **HML** (high minus low) is the book-to-market factor, constructed by subtracting a low book-to-market portfolio return from a high book-to-market portfolio return. **SMB** (small minus big) is the size factor, constructed by subtracting a large firm portfolio return from a small firm portfolio return. The portfolio **SIZE** is a China-concept stratified portfolio that is constructed using the nine portfolios. **SIZE** is long on small firms and short on big firms: **SIZE**=(**LS**+**MS**+**HS**-**LB**-**MB**-**HB**)/3.

Moreover, we would like to know if the existing pricing equations can explain China-concept Factor, We regress the China-concept Factor on a set of other factor return. First we use the asset-pricing model of Sharpe (1964), Lintner (1965), and Black (1972), the **CAPM** model, it implies that expected returns on securities are a positive linear function of their market β and market β suffices to describe the cross-section of expected returns. Then, we use the Fama and French (1993) three-factor model, which are **RM-RF**, **HML**, and **SMB**.

5. Empirical Results

5.1 Firm characteristics

According to Chen (2000), firms have high retain earning to total asset, high export ratio, and long established periods, the probability of their investing in China is bigger, and Chen (2003) indicated that the investment income to un-taxed earning, the contribution to un-taxed EPS, and the investment income will react to China-concept Stocks return.

Table 7 shows returns and characteristics for these nine portfolios. For each size group, high CC groups have a higher average stock return that that of the low CC groups, and higher export-ratio firms tend to have greater extent of China-investments. The average stock return is increasing as the extent of

China-investments increases for the medium and large firm groups, but not for the small-cap group. For each CC group, average net income of the past ten years increases as size increases. That is not surprising. However, for each size group, we don't find consistent relationship between firms' average net income and CC ratio. Low CC firms tend to have more workers than high CC firms in each size group, indicating that those that invest heavily in China are labor-intensive firms and they have done a good job in shifting labor-intensive jobs to their plants in China and hence have lower number of workers in Taiwan. It is important to note that the CCF portfolio (long HIGCC and in the meantime short LOWCC portfolio) has an average monthly stock return of 0.7199% for the past ten years. For those China-concept firms, high investments in China may imply high risk and they deserve higher stock returns.

Table 7

Portfolio characteristics and returns, 1994-2004

Portfolios are formed yearly from July 1994 to July 2004. Data of approved investments in China is from the Industrial Development & Investment Center Ministry of Economic Affairs of Taiwan, and accounting information from TEJ data base. All of the nine portfolios are value-weighted. Each portfolio contains firms that are both in a given size category and in a given CC category. Low-cap, Mid-cap, and High-cap firms are firms that are in the bottom third, middle third, and top third in a given year, sorted on market capitalization. Similarly, Low, Middle, and High Investment are firms that are in the lowest, middle, and top third sorted by the CC ratio in a given year. Both the returns and the portfolio characteristics are value weighted. The sample mean of each portfolio is calculated as the average monthly return in excess of one-month time deposit rate in Taiwan Bank. Each firm's export ratio is calculated as the export amount divided by total sales, reported in percentage terms. Number of workers are the average number of employers. Age of company is how long the firm has existed.

	Monthly returns (excess)	Export Ratio	Number of Workers	Age of Company	Average Net Income
Low-cap firms (smaller)					
Low Investment (**LS**)	2.0948	7.95	193	9	31,325
Middle Investment (**MS**)	1.6565	13.46	209	9	18,991
High Investment (**HS**)	2.9528	17.74	172	8	36,459
Mid-cap firms (smaller)					
Low Investment (**LM**)	1.2011	17.62	535	24	117,239
Middle Investment (**MM**)	1.6224	24.82	478	21	82,716
High Investment (**HM**)	2.0456	31.36	407	20	131,150
High-cap firms (smaller)					
Low Investment (**LB**)	0.2010	8.25	959	12	450,897
Middle Investment (**MB**)	0.4946	9.55	421	10	253,632
High Investment (**HB**)	0.6583	11.85	491	10	321,866
Portfolios					
HIGHCC	1.8856	20.32	356	13	163,158
LOWCC	1.1656	33.81	1687	45	599,461
CCF	0.7199	(13.50)	(1331)	(32)	(436,303)

5.2 Testing for common variation and time-series properties

Table 8 shows the results of these nine regressions. We found 7 out of the 9 regression coefficients of the CCF variable are significant, after controlling for the size and market variables. For each of the size group, we found the regression coefficient of the CCF variable is greater for the high investment group than that of the less investment group. This finding is very similar to that by Lamont et al (2001) in that in each of the size group high KZ group has a greater regression coefficient of FC than that of the low KZ group. We also found that high-cap firms have high loadings on BIG, and small-cap firms have high loadings on SMALL. Within the small and medium cap group, the CCF loading increases as the extent of China-investments increases. However, in the high-cap group, the CCF loading does not have this pattern. We may conclude, that the findings in this table are quite similar to the findings in the counterpart of Lamont et al (2001).

Table 8

Covariance tests, 1994 to 2004

Results from regression analysis of the nine value weighted CC-size-sorted portfolios (LS, LM, LB, MS, MM, MB, HS, HM, HB). We regress excess returns on each portfolio on three reference portfolios. We construct our size and market factor proxies using the portfolios in table 7 as follow. Our proxy for the overall market is the return on a portfolio of less investment medium-sized and large firms, BIG=(LM+LB+MM+MB)/4, in excess of one month deposit interest rate in Taiwan bank. Our proxy for the size factor is the return on a portfolio of less-investment small firms, SMALL=(LS+MS)/2, in excess of one month deposit interest rates in Taiwan bank. CCF is the China-concept Factor. In each regression, we omit the portfolio that is the dependent variable from the construction of the portfolios that constitute the regression's independent variables. In the case of CCF, we also omit the matching portfolio on the short side. For convenience, table 8 reports the definition of the independent variables in each regression. t-statistics are in parentheses. * Denotes significance at the 0.1 level. **Denotes significance at the 0.05 level.

	Constant	BIG	SMALL	CCF	Adjusted R^2
Low-cap firms (smaller)					
Less Investment (**LS**)	0.4988	0.3805	0.4807	0.2055	0.7222
	1.0796	(4.4126)**	(6.4178)**	(2.1088)**	
Middle Investment (**MS**)	-0.2956	0.4970	0.5273	0.0248	0.7405
	-0.6022	(5.7684)**	(6.4226)**	(0.2388)	
High Investment (**HS**)	0.8499	0.4156	0.5752	0.4259	0.7137
	1.5559	(3.8317)**	(5.5626)**	(3.6860)**	
Mid-cap firms (smaller)					
Less Investment (**LM**)	-0.5611	0.5384	0.4757	0.0972	0.8040
	-1.3740	(7.2841)**	(6.9237)**	(1.7641)*	
Middle Investment (**MM**)	-0.5439	0.2916	0.7371	0.3096	0.8270
	-1.3556	(4.3212)**	(11.6512)**	(3.8414)**	
High Investment **(HM**)	-0.1311	0.5258	0.5410	0.4395	0.7782
	-0.2661	(5.3538)**	(5.9494)**	(4.3965)**	
High-cap firms (smaller)					
Less Investment (**LB**)	-0.4487	1.0947	-0.3515	-0.2204	0.6963
	-0.9834	(11.5677)**	(-3.7989)**	(-2.6324)**	
Middle Investment **(MB**)	-0.7247	1.1452	-0.2084	0.1120	0.6409
	-1.2199	(8.9598)**	(-1.7526)**	(1.0372)	
High Investment (**HB**)	-0.3935	1.1790	-0.2320	0.1003	0.8146
	-1.0049	(15.3278)**	(-3.2300)**	(1.4078)	

5.3 Testing for common variation and time-series properties after controlling industry factor

In Table 9, the loading on **CCIND** is almost the same in table 8. Again, in each size class, the loading on **CCIND** is higher in high investment in China portfolio than that in medium and less investment in China portfolios. Only in high-cap firms, there is a consistent loading pattern on **CCIND**— the more invested in China, the higher loading on **CCIND**. The significance is increasing—there are six of nine portfolios significant, meaning the significance is increasing comparing to the results before controlling industry. Nevertheless, the loading on **BIG** and **SMALL** is different from Table 8. The loading on **BIG** is higher on high-cap firms than low-cap and mid-cap firms; yet there is no obviously pattern on **BIG**. Furthermore, there is no consistency in loading on **SMALL**. The R^2 ranges from 0.5943 to 0.8528, it is wider than in Table 8. In conclusion, the results in Table 9 are similar to those in table 8: listed firms that have invested highly in China have stock returns that positively co-vary with the returns of other highly invested firms. We can reject the hypothesis that high investment in China firm returns do not co-vary with other high investment in China firms' returns, holding the variance of industry constant.

Table 9

Covariance tests after controlling industry, 1994 to 2004

The results of regression test after controlling industry Like CCF, CCFIND goes long on HIGHCC, but has a different short portfolio than CCF. The short portfolio consists of the firms from the less investment factor of firms that are in same industry, so each firm in high investment in China portfolio has a matching firm in less investment in China portfolio. After the matching firms are identified, we then size-stratify the matching group into three size portfolios and construct CCFIND as HIGHCC minus these three matching portfolios. * Denotes significance at the 0.1 level. ** Denotes significance at the 0.05 level.

	Constant	BIG	SMALL	CCFIND	adjusted R^2
Low-cap firms (smaller)					
Less Investment (LS)	1.2632	0.6502	0.2195	0.1637	0.5943
	(1.9663)*	(6.0244)**	(2.2112)**	1.5877	
Middle Investment (MS)	-0.4915	0.6671	0.1866	0.0859	0.6308
	-0.8164	(7.1414)**	(2.2111)**	0.8782	
High Investment (HS)	0.6744	0.7754	0.2138	0.1936	0.7715
	1.3638	(8.2793)**	(2.2538)**	(2.4047)**	
Mid-cap firms (smaller)					
Less Investment (LM)	1.3349	0.6331	0.4837	0.3416	0.6674
	(1.9391)*	(4.76593)**	(3.6749)**	(2.6731)**	
Middle Investment (MM)	-0.6131	0.4572	0.4984	0.0727	0.7625
	-1.2664	(5.4333)**	(5.6038)**	0.8372	
High Investment (HM)	0.4947	0.5688	0.5043	0.6423	0.7810
	0.91128	(5.3604)**	(4.6251)**	(6.3952)**	
High-cap firms (smaller)					
Less Investment (LB)	0.0323	0.7294	0.2699	0.1542	0.8528
	0.0750	(10.6426)**	(3.7743)**	(2.1948)**	
Middle Investment (MB)	-0.2012	0.9016	-0.1437	0.2118	0.7032
	-0.3882	(9.1533)**	-1.3243	(2.2842)**	
High Investment (HB)	-0.4784	0.6903	0.3892	0.5705	0.6695
	-0.6856	(5.2036)**	(2.8342)**	(4.4321)**	

5.4 The correlation between CCF (CCFIND) and other risk factors

Table 10 shows correlations among the returns on these zero cost stock portfolios. Examining the correlation of **SIZE** and **CCF** helps evaluate the correlation of the size and China-concept Factor. Because **SIZE** is constructed to

be neutral with respect to the China investment characteristic, the correlation of **SIZE** and **CCF** shows whether the size and China-concept are correlated. In our test, the **SIZE** and China-concept Factor are significantly negatively correlated; it means that part of the size factor in returns reflects something other than the characteristic of size in the underlying firms. However, the **SIZE** and **CCFIND** are negatively correlated in an insignificant way.

Table 10

Summary statistics for factor return, 1994 to 2004

Summary statistics of the returns on two versions of the CCF and CCFIND, the size-factor specific to our particular sample, and three other factors used in previous research. All data are monthly percent returns, from July 1994 to December 2004. The portfolio SIZE is a China-concept stratified portfolio. SIZE=(LS+MS+HS-LB-MB-HB)/3.

The following three factors come from Fama and French (1993). RM-RF, the market factor, is the return on a value-weighted portfolio of stocks listed in Taiwan stock exchange minus one-month deposit interest rate in Taiwan bank. HML is high minus low, which measures the book-to-market factor by subtracting returns from a portfolio of high book-to-market firm stocks from the returns from a portfolio of low book-to-market firm stocks. SMB is small minus big, which measures the size factor by subtracting returns from a portfolio of big firm stocks from the returns from a portfolio of small firm stocks. * Denotes significance at the 0.1 level.

Correlation matrix						
	CCF	CCFIND	RM-RF	HML	SMB	SIZE
CCF	1.0000	0.3547	0.1625	0.0042	-0.0355	-0.2911
CCFIND	0.3547	1.0000	-0.0251	-0.0397	-0.0119	-0.1277
RM-RF	0.1625	-0.0251	1.0000	0.0167	-0.0360	0.0059
HML	0.0042	-0.0397	0.0167	1.0000	0.5433	0.0679
SMB	-0.0355	-0.0119	-0.0360	0.5433	1.0000	0.6049
SIZE	(-0.2911)**	-0.1277	0.0059	0.0679	0.6049	1.0000
Statistics						
	CCF	CCFIND	RM-RF	HML	SMB	SIZE
Mean	0.7750	-0.5315	1.3292	0.8471	1.4482	0.2953
SD	4.5737	4.9912	8.7509	9.8427	7.3155	6.1543
Min	-8.6916	-35.6939	-17.8995	-47.7474	-25.0073	-30.1322
Max	20.1252	10.2964	28.3031	26.9777	24.0018	15.5701

5.5 The CCF and CCFIND returns and existing pricing model

Table 11 shows the **CAPM** and Fama-French three-factor model that regress the China-concept Factor on a set of other factor returns. First of all, we start by discussing the results for **CCF**. The first row shows how well the China-concept Factor can be explained by the **CAPM**. The market β is positively

significant of 0.0867 of China-concept Factor. Which means that high investments in China firms have higher β than less investment in China firms. The α is not significant from zero of the coefficient 0.6594; it does not reject the hypothesis that market factors correctly price the China-concept Factor. In spite of that there R^2 is just only 0.0264 — the R^2 in these regressions measures how much of the variation in the China-concept Factor can be explained using other systematic factors— it is too small and implied that the **CAPM** has little power to explain the China-concept Factor. Then, we discuss the result of Fama and French (1993) three-factor model. The coefficient of market β is the same as **CAPM**, yet the **BE/ME** and **SIZE** factors are both not significant, meaning the two factors have no power to explain the China-concept Factor. Again, α is not significant from zero, and R^2 is small.

Next, we discuss the results for **CCFIND**. The coefficient for β is -0.0146 for both **CAPM** and Fama-French model (1993), it is conflicted from the result of **CCF**, but because it is not significant, it can be ignored. In addition, the R^2 is smaller than **CCF**. Because the R^2 for the two factor in **CAPM** and Fama-French model are too small, and the risk factors are almost not significant. So we can conclude that the China-concept Factor cannot be sufficiently explained by existing asset pricing models.

Table 11

Pricing tests on China-concept factor

Results from asset-pricing tests of the two China-concept factors---CCF, CCFIND. The asset pricing models are the CAPM and the Fama and French (1993) three-factor model. The CAPM consists solely of the Fama-French market proxy, RM-RF, the market factor, is the return on a value-weighted portfolio of stocks listed in Taiwan stock exchange minus one month deposit interest rate in Taiwan bank. The Fama-French three-factor model adds the HML and SMB portfolios to the CAPM model. HML is high minus low, which measures the book-to-market factor by subtracting returns from a portfolio of high book-to-market firm stocks from the returns from a portfolio of low book-to-market firm stocks. SMB is small minus big, which measures the size factor by subtracting returns from a portfolio of big firm stocks from the returns from a portfolio of small firm stocks. All regressions use the full sample period, * Denotes significance at the 0.1 level.

	α	RM-RF	HML	SMB	R^2
CCF					
CAPM	0.6594	0.0867			0.0264
	1.5345	(1.7430)*			
Fama-French three factor model	0.6901	0.0857	0.0116	-0.0271	0.0277
	1.5603	(1.7049)*	0.2231	-0.3859	
CCFIND					
CAPM	-0.5120	-0.0146			0.0006
	-1.0778	-0.2653			
Fama-French three factor model	-0.5053	-0.0139	-0.0233	0.0083	0.0023
	-1.0335	-0.2500	-0.4047	0.1076	

5.6 Testing for common variation and time-series properties of extreme portfolio

According to Table 7 and Table 8, we understand that the small listed firms have higher stock returns. The size effect shows that the listed firms with smaller capital have higher stock returns. We would like to know if the relationship exists for the extreme portfolios (HS, LB) as well, and investors could earn higher return by this zero cost portfolios. We construct a portfolio **HSLB** which is consist of **HS** and **LB**: **HSLB**=**HS**-**LB**。

In table 12, in each size class, the loading on **HSLB** is higher for high investment in China portfolio than less investment in China portfolio. And in each size class, there is a consistent pattern in the loading on **HSLB**; the loading is highest for the high investment in China portfolio, and is lowest for the less

investment in China portfolio. There are only seven of nine portfolios significant (five are positive, four is negative). Then the coefficients on **BIG**, big firms have high loading on **BIG**, and all nine portfolios are positive and significant, and the coefficients on **SMALL** are high for low-cap firms, low for high-cap firms. The R^2 ranges from 0.6596 to 0.8342. The three risk proxies can highly explain the China-concept portfolios, because the R^2 is high for all the portfolios. But after controlling for the industry, the significance for **HSLB** is decreasing. The conclusion is different. The loading on **HSLBIND** is inconsistent for each cap-firm class.

In summary, Table 12 shows the same conclusion to Table 8: listed firms that have invested highly in China have higher stock returns, and the return positively co-varies with the returns of other highly invested firms. There is a China-concept Factor in Taiwan stock market. However, in Table 13 we could not find a similar result.

Table 12

Covariance tests, 1994 to 2004

Results from regression analysis of the nine value weighted CC-size-sorted portfolios (LS, LM, LB, MS, MM, MB, HS, HM, HB). We regress excess returns on each portfolio on three reference portfolios. We construct our size and market factor proxies using the portfolios in table 7 as follow. Our proxy for the overall market is the return on a portfolio of less investment medium-sized and large firms, BIG=(LM+LB+MM+MB)/4, in excess of one month deposit interest rate in Taiwan bank. Our proxy for the size factor is the return on a portfolio of less-investment small firms, SMALL=(LS+MS)/2, in excess of one month deposit interest rates in Taiwan bank. HSLB is the portfolio constructed by HS and LB, HSLB=HS-LB. In each regression, we omit the portfolio that is the dependent variable from the construction of the portfolios that constitute the regression's independent variables. For convenience, table 12 reports the definition of the independent variables in each regression. * Denotes significance at the 0.1 level. **Denotes significance at the 0.05 level.

	Constant	BIG	SMALL	HSLB	adjusted R^2
Low-cap firms (smaller)					
Less Investment (LS)	0.6990	0.4627	0.3951	0.1214	0.7234
	1.4907	(4.8280)**	(4.4461)**	(2.1827)*	
Middle Investment (MS)	-0.3369	0.6252	0.3529	0.2559	0.7894
	-0.7552	(7.7159)**	(4.4461)**	(5.2933)**	
High Investment (HS)	1.3216	1.0316	0.4440	0.5435	0.7105
	(2.4268)**	(4.8489)**	(3.7949)**	(3.6460)**	
Mid- cap firms					
Less Investment (LM)	-0.2011	0.6054	0.4056	0.0631	0.8064
	-0.4940	(7.2280)**	(4.8066)**	1.2711	
Middle Investment (MM)	-0.2737	0.5156	0.5054	0.2261	0.8342
	-0.6945	(6.5353)**	(6.3447)**	(4.5257)**	
High Investment (HM)	0.0913	0.8714	0.1747	0.3125	0.7931
	0.1914	(8.2646)**	1.6510	(5.4911)**	
High- cap firms (bigger)					
Less Investment (LB)	-0.0746	1.1439	-0.2222	-0.1940	0.6959
	-0.1624	(11.4948)**	(-2.2224)**	(-2.6751)**	
Middle Investment (MB)	0.0313	0.9963	-0.0180	-0.1844	0.6596
	0.0540	(7.2918)**	-0.1323	(-2.7420)**	
High Investment (HB)	0.1462	1.1387	-0.1796	-0.0556	0.8120
	0.3710	(13.0684)**	(-2.0539)*	-1.1814	

Table 13

Covariance tests after controlling industry, 1994 to 2004

The results of regression test after controlling industry Like HSLB, HSLBIND goes long on HS, but has a different short portfolio than HSLB. The short portfolio consists of the firms from the less investment factor of firms that are in same industry, so each firm in high investment in China portfolio has a matching firm in less investment in China portfolio. After the matching firms are identified, we then size-stratify the matching group into three size portfolios and construct HSLBIND as HS minus LB. * Denotes significance at the 0.1 level. ** Denotes significance at the 0.05 level.

	Constant	BIG	SMALL	HSLBIND	Adjusted R^2
Low-cap firms (smaller)					
Less Investment (LS)	1.2179	0.6226	0.2394	0.0121	0.5844
	1.8584	(5.7014)**	(2.3216)*	0.1137	
Middle Investment (MS)	-0.6059	0.6732	0.1951	0.1731	0.6381
	-1.0131	(7.3148)**	(2.3216)*	1.8221	
High Investment (HS)	0.5460	0.7182	0.2560	-0.0143	0.7547
	1.0836	(4.1370)**	(2.6433)**	-0.0904	
Mid- cap firms					
Less Investment (LM)	1.0110	0.8206	0.3130	0.3182	0.6698
	1.4625	(6.1765)**	(2.4205)*	(2.7725)**	
Middle Investment (MM)	-0.6328	0.4867	0.4751	0.0013	0.7545
	-1.2934	(5.8854)**	(5.5257)**	0.0162	
High Investment (HM)	0.0349	0.8458	0.2433	0.2762	0.7179
	0.0565	(7.2624)**	(2.0618)*	(2.7641)**	
High- cap firms (bigger)					
Less Investment (LB)	-0.0912	0.6821	0.2016	0.1127	0.8447
	-0.2362	(8.0617)**	(2.7357)**	1.5671	
Middle Investment (MB)	-0.1145	0.9181	-0.1723	-0.1239	0.6880
	-0.2198	(9.2183)**	-1.6298	-1.4765	
High Investment (HB)	-0.7380	0.8137	0.2385	0.0185	0.6089
	-0.9718	(5.6786)**	1.6425	0.1501	

6. Conclusions

We construct various zero-cost portfolios that are long on stocks with high-degree of investments in China and short on stocks with lower-degree of investments in China. We conclude the results as following: first, Taiwanese listed firms that invest heavily in China have higher stock returns than those firms that invest less heavily. One major reason is that the more Taiwanese firms invest in China the

more uncertainties with earnings and the safety of investments in China exist due to political tension across the Strait. Investors of China-concept stocks must be compensated according to their exposure to such risk. Secondly, portfolios of stocks with investments in China capture common variation in stock returns after the size factor is controlled. In every size class, portfolios with the heavier investments in China have the higher return. Hence, we conclude that there is a China-concept Factor, an identifiable independent common source of economic shocks to firm value. The evidence suggests that the degree of investments in China does affect firm value. Lastly, we investigate the China-concept factor in the asset pricing model. The results reveal that the existing asset pricing models have little power to explain the China-concept Factor. The conclusion is attractive because it provides an economically meaningful story that investor can earn greater returns from long heavy-investments-in-China portfolios and short less heavy-investments-in-China portfolios.

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