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ARE COMMON STOCKS A GOOD HEDGE AGAINST INFLATION : EVIDENCE FROM CHINA AND INDIA

Miss Wang Fang

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เฟย หวัง: การใช้หุ้นสามัญป้องกันความความเสี่ยงต่อภาวะเงินเฟ้อ กรณีศึกษาจากจีนและอินเดีย (ARE COMMON STOCKS A GOOD HEDGE AGAINT INFLATION :EVIDENCES FROM INDIA AND CHINA) อ. ที่ปรึกษาวิทยานิพนธ์หลัก: รศ.ดร. สันติ ถิรพัฒน์, 77 หน้า.

วิทยานิพนธ์ฉบับนี้ทำการศึกษาเชิงประจักษ์เรื่องความสัมพันธ์ของราคาหุ้นสามัญกับราคาสินค้าของประเทศจีนและประเทศอินเดียในระดับประเทศและระดับอุตสาหกรรม ซึ่งจากการศึกษาพบว่ามีความสัมพันธ์เชิงลบในระยะสั้นระหว่างผลตอบแทนตามจริงของหุ้นสามัญกับเงินเฟ้อในประเทศอินเดีย ซึ่งสมมติฐานตัวแทนของฟามา(Fama's proxy hypothesis)ไม่สามารถอธิบายได้ ในขณะที่ความสัมพันธ์อิสระของหุ้นสามัญกับเงินเฟ้อในประเทศจีนสอดคล้องกับสมมติฐานของฟิชเชอร์(Fisher) นอกจากนี้ยังได้ทำการศึกษาเกี่ยวกับความสัมพันธ์ระยะยาวของหุ้นสามัญกับเงินเฟ้อโดยใช้ขอบข่ายของสมมติฐานข้อโต้แย้งทางภาษีของฟิชเชอร์(Tax-argument Fisher hypothesis) คู่ของหุ้นสามัญกับราคาสินค้าส่วนใหญ่จะมีความสัมพันธ์ร่วมกันยกเว้น 2คู่จาก 31คู่ ความยืดหยุ่นของราคาหุ้นสามัญต่อราคาสินค้ามีความสัมพันธ์อย่างมีนัยสำคัญมากกว่าหนึ่งทุกคู่ยกเว้นอยู่ 3คู่ การค้นพบนี้มีความแตกต่างอย่างมากกับผลการค้นคว้าส่วนใหญ่ในปัจจุบัน ซึ่งกล่าวว่าความยืดหยุ่นของราคานั้นต่ำกว่าหนึ่งหรือแม้กระทั่งไม่มีความสัมพันธ์ในระยะยาวกันเลย ดูเหมือนว่าในทางทฤษฎีจะมีเหตุมีผลอยู่บ้างเนื่องจากผลตอบแทนของหุ้นสามัญที่เป็นตัวเงิน จะต้องมากกว่าอัตราเงินเฟ้อ เพื่อเป็นการชดเชยภาษีให้ผู้ลงทุน นอกจากนี้ในการการทดสอบตามช่วงเวลา (Time path test)ยังเสริมด้วยว่าความสัมพันธ์ของหุ้นสามัญกับเงินเฟ้อในประเทศอินเดียเปลี่ยนแปลงจากลบเป็นบวกตามระยะเวลา ในขณะที่ราคาหุ้นสามัญในประเทศจีนตอบสนองเชิงบวกอย่างคงที่ต่อผลกระทบฉับพลันในดัชนีราคาผู้บริโภค การพบส่วนประกอบของเงินเฟ้อนั้นยังสนับสนุนการค้นพบที่ได้กล่าวมาข้างต้น ดังนั้นแม้ว่าจะมีความแตกต่างของช่วงเวลาในแต่ละประเทศ, การแบ่งส่วนตลาด, และอุตสาหกรรม การลงทุนในกลุ่มหุ้นสามัญถือว่าเป็นการป้องกันความเสี่ยงต่อภาวะเงินเฟ้อในระยะยาวทั้งในประเทศจีนและประเทศอินเดียได้เป็นอย่างดี

ภาควิชา การธนาคารและการเงิน ลายมือชื่อนิสิต.....Wang Fay.....
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FANG WANG: ARE COMMON STOCKS A GOOD HEDGE AGAINST INFLATION : EVIDENCES FROM INDIA AND CHINA. THESIS PRINCIPAL ADVISOR: ASSOC. PROF. SUNTI TIRAPAT, Ph. D., 77pp

This thesis provides empirical evidences on the relations of stock prices and goods prices of China and India in country level and industry level. We find negative short run relation between real stock returns and inflation in India where Fama's proxy hypothesis couldn't explain it; while independent stock-inflation relation in China, consistent with Fisher's hypothesis. Moreover, we extend the investigation to long run relation of stock-inflation using a framework of tax-augmented Fisher hypothesis. Most pairs of stock and goods prices are cointegrated except 2 pairs in 31 pairs. The elasticity of stock prices to goods prices are significantly above unity in all pairs but 3. These findings, though in sharp contrast to most existing findings that report price elasticity of below unity or even no long run relation, appearing theoretically more plausible because nominal stock returns must exceed the inflation rate to compensate tax-paying investors. The time path test reinforce that India stock-inflation relation adjust from negative to positive over time, whereas China stock prices persists positive response to the corresponding shocks in consumer price indexes. The findings of inflation components also enhance the above findings. Hence, even though the time span is varying across countries, market segmentations and industries, stock portfolios are a reasonably good hedge against inflation in the long run in China and India.

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CHAPTER I

Introduction

1.1 Background and Problem Review

Are common stocks a good hedge against inflation during inflationary time periods? This is an issue because viewed from the vantage point of the generalized Fisher H0, equity stocks, representing claims against underlying real assets, may serve as a hedge against inflation. Following this line of reasoning, investors would engage in a form of arbitrage, selling financial assets in exchange for real assets when expected inflation is pronounced. Central to this particular form of Fisher's effect, linking stock prices to corresponding changes in inflation is the proposition that stock prices in nominal terms fully reflect expected inflation, in other words, the statistical relationship between the movements of these two variables can be found not negatively correlated. Moreover, in the real world, asset holders are obligated to pay tax on their income. Hence, for the investors to be fully compensated for inflation, the nominal stock return should include both expected inflation and taxes, which is Fisher's tax-augmented hypothesis. Fisher's tax-augmented hypothesis anticipates positive stock-inflation relation.

Empirical evidence on the issue of whether the Fisher hypothesis holds in stock markets is far from conclusive. The variation of results is related to country effects, sample periods, time horizons, and model specification. Most of the studies regarding the U. S. market presented negative relations between common stock returns and inflation; however the results from emerging markets are more mixed and varied than developed markets [i.e. Khill and Lee (2000), Spyrou (2004)]. Since negative empirical evidence generally conflicts to Fisher's theories, several explanations (i.e., Fama's proxy hypothesis 1983) have been provided from macroeconomic views to

explain the negative relationship between stock return and inflation. Whereas, increasing evidence shows that negative relations between common stock returns and inflation are due to short horizon followed by positive relations in long horizon. [i.e., Khazali and Chong (2004)]. Under the cointegration framework, Luintel and Paudyal (2006) claims that Common stocks are a hedge against inflation in both country level and industry level in U.K. market. The goods price elasticity is significantly above unity in all but two cases.

Even though a lot of empirical evidence about stock-inflation relation is provided, there is no prior research or study providing empirical evidence in China and India in the sample from 1990s till now. This paper provides further evidence on literature research by investigating whether common stock returns are a hedge against inflation in China and India in short run and long run across country level and industry level.

Since the beginning of 1990s, China and India economies' rapid developments are the main power for global economic growth and the experiencing low inflation rate. Additionally, the rapid growth in economy increasingly and directly attracts investment capital pouring into stock markets in China and India. General price levels are remaining a source of concern to foreign investors. It is necessary for foreign investors to know the behavior of common stock returns hedging against inflation.

This paper also provides further evidence on the long-run stock-inflation relation under a co-integration framework in emerging markets. Firstly, though commodity price elasticity of stock prices is likely to be heterogeneous across industry groups in U.K market as reported by Luintel and Paudyal (2006), there is no empirical evidence from emerging markets using industry-level stock indexes yet. This paper bridges this gap in the literature by testing whether the behavior of common stocks hedges against inflation across industries. Secondly, there is special market segmentation in China

stock market: separating all stocks to A-share and B&H-share markets. It is attractive to study the difference of A-share's and B&H-share's hedging relation with inflation. Finally, though the sample period is not very long in this paper which is about 14 years, it is still necessary to investigate whether economic structural breaks lead to non-stable long run relation in China and India. The structural breaks such as financial crisis in Asian countries 1997, the global stock market bubble in 2000, oil shocks in 1999 and 2005, may induce structural shifts in many economic relations, including the Fisher relation in stock markets. Hence, an important question would be whether stock prices and goods prices exhibit a stable long-run relation as no prior studies done. We test for structural breaks in the cointegrating relation between stock and goods price indexes and control for such breaks where identified.

1.2 Statement of Problem / Research Questions

Are common stock returns at country level and industry level a good hedge against inflation in China and India in short-run and long-run?

1.3 Objective of the Study

1. To provide empirical evidence on that relationships of common stock returns and inflation in China and India in the short-run and long-run, and the effects of structural breaks in both short-run and long-run relations.

2. To provide empirical evidence on that whether hedging relation between common stocks and inflation are heterogeneous across industries and market segmentations.

3. To provide empirical evidence on the examination of different stock-inflation relations in China and India from developed markets by analyzing monetary policy and real activities roles in inflation.

4. To provide time path test (dynamic relations) for relations of stock prices and goods prices.

1.4 Contribution

This thesis intentionally provides empirical evidence on the hedging relationship between common stocks and inflation in China and India. There has never been a study which has studied these two countries using data from 1994-2007 when there was the rapid growth in economy but low inflation rate. This thesis will provide further evidence concerning stocks and inflation relation. Firstly, this paper investigates stock-inflation relations under Fisher's tax-augmented H0 which is an extension of generalized Fisher's H0, where there is no research provided for emerging markets yet. Secondly, even though it is acknowledged that the commodity price elasticity of stock prices is likely to be heterogeneous across industry groups (Luintel and Paudya 2006) in U. K. market, no study examines the short-run as well as long-run relation between stock prices and goods prices in industry-level stock indexes and market segmentation level under cointegrating framework in emerging markets. This paper bridges this gap in the literature by testing whether the common stocks in various groups offer a hedge against inflation and how varying cross groups. Thirdly, the paper provides stability test to examine whether structural breaks cause instable short run and long run relations in China and India. Fourthly, it analyze increasingly effective monetary policy and real activities' impact on stock-inflation relations in the long run for China and India markets, which shed light on how macroeconomic factors impact stock markets.

In addition, this paper provides better understanding of the dynamics of monetary policies and inflation impacts to stock markets and government, benefiting government to make monetary policies according to critical movement in markets.

Investors could adjust investment portfolios depending on conclusions of this paper. i.e., overall stock index or industry level, A-share or B&H-share, and better understanding on dynamic macroeconomic shocks' (i.e. monetary policies, real activities) impacts on inflation and stock markets.

1.5 Organization of the Paper

The remainder of this paper is organized as follows: Chapter II discusses findings regarding short run and long run stock return and inflation relations and analysis on negative inflation-stock return relation in previous studies. Chapter III describes the data sources, hypotheses and methodologies. Chapter IV will discuss the results from our empirical analysis. A summary is found in the Chapter V.

CHAPTER II

Literature Review

This chapter reviews research studies on inflation-stock return relations and is divided into 3 sections. Section 2.1 discusses the empirical evidence from developed countries. Section 2.2 discusses empirical findings and analysis on negative relation in emerging markets. Section 2.3, includes researches that have been done in China and India. The last section illustrates the summary of this chapter.

2.1 Empirical evidences from developed countries

Negative relation between stock returns and inflation are well documented in developed countries: At country level: Bodi (1976) is the first one to investigate relationship between common stock returns and inflation under Fisher's hypothesis, and he found negative relation (non-hedging relation). After that, the non-hedging relations between common stock returns and inflation are generally found in many markets, especially developed countries. Fama and Schwert (1977), Jaffe and Mandelker (1976), Nelson (1976) investigated common stock return and inflation relationship at the same time periods in U. S. market, but all provide negative relationships. Gultekin (1983) also didn't find reliable positive relations in 26 countries including U. S. and U. K by traditional regression methodology. Later, Khil and Lee (2000) observe that 10 pacific-rim countries exhibit negative correlation between real stock returns and inflation except Malaysia. One of the arguments for negative relations is that real activities disturbances drive a negative stock return-inflation relation, while monetary disturbances yield a positive relation, which is consistent with Hess and Lee (1999).

At industry level: Boudoukh and Richardson (1993) and Frennberg and Hansson (1993) considered longer-horizon returns (up to 5 years) using traditional regression

model, they found that longer horizons stocks are good hedges against both expected and unexpected inflation. For Swedish data set used by Frennberg and Hansson the Fisher relation holds even at short horizons (as short as one month). Wei, Boudoukh, Richardson and Whitelaw (1994) report that common stock returns are not a hedge against inflation at industry level in short-run in U. S. market and hedging relation were heterogeneous. Fama's proxy hypothesis could explain negative relation except non-cyclical industries.

Several explanations are proposed to explain the spurious negative relations. The first paper is Fama's proxy hypothesis which is proposed by Fama (1981, 1983). That is the relationship between stock returns and inflation is due to the combination of the inflation-real activity and the real activity-stock returns relationships. Proposition A is that there is a negative association between inflation and real economic activity; proposition B is that there is a positive association between real activity and stock returns. In other words, higher level of inflation may proxy a drop in the money demand induced by a lower growth in real activity, which simultaneously implies a drop in expected future profits and thus a drop in stock prices. The negative stock return-inflation relationship is commonly referred to as the "proxy effect". Fama obtains this hypothesis based on a money demand function assuming largely invariant money supply with respect to real shocks. Geske and Roll (1983) emphasize a counter-cyclical monetary response that reinforces the negative real activity-inflation relation. In an attempt to explain both the post-war negative correlation and the pre-war positive relation between stock returns and inflation, Kaul (1987, 1990) argues that the stock-return-inflation relation depends on the equilibrium in the monetary sector: a counter-cyclical monetary response is responsible for a negative correlation, while a pro-cyclical monetary response leads to a neutral or positive correlation

between stock returns and inflation (see also Boudoukh et al., 1994). Park and Ratti (2000) extend Kaul (1987, 1990) research by arguing that variation in monetary policy is partly endogenous and can be explained by movements in economic and financial variables. And they provide an alternative hypothesis named “anticipated hypothesis” to the proxy hypothesis: that is higher inflation leads to expectations of tighter monetary policy, the expectation in turn lowers the stock market.

However, there are increasing positive relations between stock returns and inflation evidence reported in developed countries in recent years, which claim that positive relations are related to some Characteristics. For a short sample period covering the post-war years, Firth (1979) and Gultekin (1983) find that the relationship between nominal stock returns and inflation in the United Kingdom is reliably positive, a finding consistent with the generalized Fisher hypothesis. From methodology aspect: under traditional regression methodology, Anari and Kolari (2001) report negative correlations between stock prices and inflation in the short run that are followed by positive correlations in the long run. Crosby (2000) shows that the negative relations due to short-run time period, and is also dependent on the time period considered. Under cointegration framework, Osamah and Chong (2004) show conving positive cointegration relations between stock returns and inflation in 9 pacific-basin countries, where there were also negative relations in the short-run and followed by positive relations in the long-run. Luintel and Paudyal (2006) claim that Common stocks are a hedge against inflation in both country level and industry level in U.K. market. The goods price elasticity is significantly above unity in all but two cases.

The negative and positive relations are related to some factors, such as countires, time periods, methodology, which is far from conclusive.

2.2 Empirical evidences from emerging markets

After the 1990s, there were more papers investigated in emerging markets since emerging markets have started to play more important roles in the global economy and data become more available. The relations between common stock returns and inflation from emerging markets are more various than developed countries and explanations derived from developed countries only partly explain negative relations in emerging markets. Adrangi, Chatrath and Sanvicente (2000) investigate in Brazil and find both negative short-run relation and long-run relation. Fama's proxy hypothesis could only explain the negative long-run relation. On the other hand, Choudhry (2001) reports positive short-run inflation-stock returns relation in 4 Latin-American high inflation countries. Spyrou (2001) shows negative relations in a small and emerging economy of Greece (high growth and high inflation), and reports the reason is that the negative correlation is mainly due to the less correlation between inflation and monetary fluctuations, consistent with findings of Hess and Lee (1999).Khil and Lee (2000). However, Spyrou (2004) investigated in ten important emerging markets and reports that the relations between common stock returns and inflation are varying in ten important emerging markets. The varying results may be due to the significant role of money supply and the positive relationship between consumer prices and output, which is contrary to Fama's proxy hypothesis condition 1.

2.3 Researches in China and India:

Chatrath, Ramchander and Song (1997) provide negative inflation-stock returns empirical evidence in India market, which was short run relation from 1984 to 1992 and Fama's proxy hypothesis could only explain part of the negative relation. The negative association between real stock returns and inflation is found to persist

despite controlling for the inflation-real activity relationship. Chatrath, Ramchander and Song (1997) did not provide further research about negative relation such as analysis on role of monetary policy factor.

Working paper Zhou (1999) reports negative short-run inflation-stock returns empirical evidence in China's market in country level from 1993 to 1998. And the relation between stock return and inflation became positive after controlling real activity, which is consistent with Fama's proxy hypothesis. Another one is related to hedging characteristics of the Chinese real estate market. Chu and Sing (2004) found that the Chinese real estate market are not a hedge against inflation in four main cities and there is no significant long-run inflation-stock returns relation, which quite differ from other mature markets' hedging relation.

Increasing number of papers has investigated the special market segmentation in China stock market from different aspects. Some previous paper found heterogeneous performance of A-share and B&H-share. For instance, Xu (2001) reports that the trading volume and volatility of B shares behave differently from A share on Shanghai stock exchange. Seiler, Harrison, Vliet and Yeung (2005) found that A-share's returns are higher than B-share's.

With the increased opening of the country, the monetary policy become more impacted on Chinese and Indian inflation and real activity since last decades, which are stated by Kojima, Nakamura and Ohyama (2005) of Chinese market and Mohan (2006) of India market.

2.4 Summary

Since the heterogeneous evidences from developed markets and emerging markets, it is interesting to investigate industry level short-run and long-run inflation-stock return relations at both country level, industry level and market segmentation in

China and India. Furthermore, the structural breaks impacts on short run and long run relations. Finally, this paper analyzes the dynamic stock-inflation relations from short run to long run, and the increasingly impacts of monetary policy and real activities effects in inflation.

CHAPTER III

Data and Methodology

3.1 Scope and Data[1]

3.1.1 Scope of the study

The sample contains monthly goods prices data, stock prices data, monetary policy data and real activities data in China and India from 1994 - 2007.

3.1.2 Data

The data used in this study are obtained from the DataStream database. All stock indexes include dividends. The sample covers January 1994 to August 2007, yielding 164 monthly observations. The consumer price index (CPI) is used to measure goods prices in China, while whole sale price index (WPI) is used in India. The criterion of industry classification is based on the Industry Classification Benchmark (ICB) developed by FTSE and Dow Jones Index. The disaggregated index including 10 industry indexes: basic materials (BAM), consumer goods (CONG), consumer services (CONS), financials (FIN), Health care (HEA), industrials (IND), Oil&Gas (OIL), technology (TEC), telecom (TEL), utilities (UTI). Finally, industrial production index is the proxy for real activity, and M2 is the proxy for money supply in China and India markets. The sample period is from 1994,1 to 2007,6, monthly data. The selecting standards of proxy are consistent with Khill and Lee (2000) and Spyrou (2004).

Figure I show the log levels of the WPI and India market aggregated index, CPI and B&H market aggregated index. Figure II shows the monthly (unannualized) stock returns of the market aggregated indexes, and Figure III shows the monthly

[1] All data mentioned in this paper are collected from datastream.

inflation rate of WPI and CPI. Figure II and III reveals that the log levels of all series are trending and appear nonstationary, whereas their logarithmic first differences appear stationary. The plots of India suggest one important shift in the stock indexes during the sample period, which occurred in June 2006, where the stock market index dropped by 27%, as well as +47% in September 1994 of China A-share in the stock indexes, 33% in July 1998 of China B&H share. Such jumps may induce structural breaks in the long run relation. One of the objectives of this paper is to address this issue. Figure I suggest that overall stock market plot higher than goods prices in both China and India, indicateing a positive real return rate on stocks. The formal conclusions of all stock indexes are reported in results section.

3.2 Research Hypotheses

To conduct the empirical objective, the following hypotheses will be empirically examined: the common stock returns should be a hedge against inflation according to Fisher's tax augmented hypothesis.

Hypothesis 1: Common stock returns are a hedge against inflation in the short run at country level and industry level.

Even though there are well documented short-run negative relationships in more developed markets, the rapidly growing stock markets and relatively stable inflation in India and China may exhibit positive relations in the short-run. Examination on this hypothesis would reveal whether hedging relationships between common stock returns and inflation in China and India differ from developed countries.

Hypothesis 2: Common stock returns are not a good hedge against inflation in the long run at both country level and industry level in China and India.

Many studies investigated in developed countries report positive long-run relationship between stock returns and inflation, and China and India economies experienced high growth rate in stock market and low inflation rate at the sample period. Hence, it is reasonable to expect that common stocks are a hedge against inflation in the long run.

Hypothesis 3: The long-run relations of inflation-stock returns exhibit time-varying characteristics.

3.3 Methodology

This study investigates the precise performances on predicting issuer ratings change of static and hazard rate models and standard of rating agency S&P when it assigned ratings.

3.3.1 Methodologies for short-run relations:

3.3.1.1 The Correlation between stock returns and inflation rates

They are examined to indicate positive or negative relationships firstly.

3.3.1.2 Short run relationship

The short run relation of real stock return and inflation can be expressed as:

$$SR_{i,t} - INF_{i,t} = a_1 + a_2 INF_{i,t} + \omega_i D_{i,t} * INF_{i,t} + \varepsilon_t$$

(1)[2]

Where, $SR_{i,t}$ are calculated as ($SR_{i,t} = \ln(SP_{i,t} / SP_{i,t-1})$, i =stock index of India and China, CPI and WPI; inflation rate $INF_{i,t}$ is as ($INF_{i,t} = \ln(INFI_{i,t} / INFI_{i,t-1})$, ϑ_t is the regression error terms. The coefficient a_2 captures the sensitivity of stock returns to inflation rate. The structural shifts dummy variable $D_{i,t}$ [3] which takes value

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[2] A standard approach to examine the relationship between stock market returns and inflation (i.e., Bodie (1976) and liu, Hsueh and Graham (1996)).

[3] During the last 15 years (our sample period), the world economy has witnessed major economic events such as the financial crisis in Asian countries in 1997, global stock market bubble in 2000, oil shocks in 1999 and 2004,

of one and zero, is included in equations (2a) and (2b) to captures the effects of possible structural changes in the economics under study. The dummy variable takes on values of one if the monthly stock return ($\ln(SP_{i,t} / SP_{i,t-1})$ is higher than 30% or lower than -30%, otherwise is zero, consistent with Luintel and Paudyal (2006).[4] $a_2 = 0$ in equation (1) will be consistent with the Fisherian hypothesis, that is real stock returns are a perfect hedge against inflation.[5]

Hypothesis 1: Common stock returns are a hedge against inflation in the short run at country level, industry level and market segmentation level, in equation. (1).

$H_0: \ a_2 = 0$

$H_1: \ a_2 \neq 0$

If there is a negative relationship between the real stock returns and inflation, it might because of the proxy of real activities as Fama (1983) suggested. Relationships expressed as Proposition A and B[6] are tested separately by estimating the following set of equations:

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which may have induced structural shifts in many economic relations, including the Fisher relation in stock markets. We test of structural shifts in the short run relation between stock returns and inflation, and control for such breaks where identified.

4 Structural dummies are defined as follows. India: 2006:6-2006:7 for market overall index; 2006:6-2006:7 for basic materials; 1999:12-2000:1, 2000:4-2000:5, 2006:6-2006:7 for consumer services; 1994:3-1994:4 for financials; 2006:6 for industrials; 1996:10-1996:11, 2000:3, 2004:1, 2006: 6 for oil&gas; 1997:8, 1998:4-5, 1999:2, 1999:10, 2000:1-2000:8, 2001:4, 2001:10-2001:12 for technology; 2000:4, 2001:3 for telecom; 1994:2, 2004:1, 2004:6 for utilities. China A-share: 1994:5-1994:8, 1996:12-1997:2 for Market overall indexes; 1994:7-1994:10, 1996:12-1997:2 for basic materials; 1994:8-1994:11, 1997:3-1997:5, 1999:5-1999:7 for industrials, 1994:8-1994:10, 1996:12-1997:9 for consumer goods; 1996:4-1997:2 for health care; 1994:6-1995:4, 1997:3-1997:5 for consumer services; 1994:8-1994:11, 1999:5-1999:7, 2000:2-2000:4, 2003:10-2003:12, 2006:11-2007:1 for telecom; 1994:6-1994:10, 1996:12-1997:2, 1999:6-1999:7 for utilities; 1996:5-1996:7, 1997:4-1997:6, 1999:6-1999:7 for financials; 1998:1-1998:3 for technology. China B&H share: 1998:7 for market overall index; 1997:7-1997:9, 1997:12-1998:1, 1998:7-1998:9, 1999:5, 2000:7-2000:9, 2001:3, 2001:8-2001:9, 2004:4-2004:6 for basic materials; 1996:12-1997:1, 1998:8, 1999:6, 2001:2-2001:8 for consumer services; 1999:6-1999:7 for consumer services; 1996:12-1997:1, 1997:5 for financials; 1998:1-1998:2, 1997:12-1998:1, 1999:5-1999:7, 2001:4, 2001:8 for industrials; 1997:7-1997:8, 1997:12-1998:1, 1998:8-1998:10, 1999:5, 2006:5-2006:6 for oil&gas; 1998:7-1998:8, 1999:7-1999:8 for technology; 1996:12-1997:1, 1997:12-1998:1, 1998:7-1998:8, 1999:2-1999:3 for utilities.

5 As Graham (1996), Luintel and Paudya (2006) argued, although this equation does not distinguish between expected and unexpected components of inflation, none the less, it yields the same qualitative evidence.

6 Fama's proxy hypothesis: Proposition A is that there is a negative association between inflation and real economic activity; proposition B is that there is a positive association between real activity and stock returns.

$$INF_{i,t} = \alpha_3 + \sum_{j=-k}^{k} \tau_i GIP_{i,t+1} + \varepsilon_t \quad (2a)$$

$$SR_{i,t} - INF_{i,t} = a_4 + \sum_{j=-k}^{k} \beta_i GIP_{i,t+1} + \xi_{t,3} \quad (2b)$$

Combined test: $SR_{i,t} - INF_{i,t} = a_5 + a_6\varepsilon_t + \sum_{j=-k}^{k} \beta_j GIP_{t+1} + \rho_i D_{i,t} + \xi_4 \quad (3)$

$$\varepsilon_t = INF_{i,t} - a_3 - \sum_{j=-k}^{k} \tau_i GIP_{i,t+1}$$

Where industrial production: $GIP_{i,t} = \ln(GIP_{i,t} / GIP_{i,t-1})$. The leads and lags of GIP are included as explanatory variables due to the absence of prior evidence that inflation and real returns lead the economic activity. $\tau < 0$, $\beta > 0$ are consistent with proposition A and B. The further implication of Fama's hypothesis is that real stock returns should be a hedge against inflation after control for impacts of real activities, which use purged inflation rate instead of inflation. The purged inflation is estimated residual (ε_t) from equation (2a). The finding of $a_6 = 0$ in equation (3) would support the proxy hypothesis. The dummy variable D is defined as before.

3.3.1.3 Short run relation and structural breaks

During the last 15 years (our sample period), the world economy has witnessed major economic events such as the financial crisis in Asian countries, global stock market bubble in 2000, China joined WTO in 2002. These events may have induced structural shifts in many economic relations, including the Fisher relation in stock markets. We test of structural shifts in the short run relation between stock returns and inflation, and control for such breaks where identified. The structural shifts dummy variable $D_{i,t}$ which takes value of one and zero, is included in equations (2a) and (2b) to captures the effects of possible structural changes in the economics under study. The dummy variable takes on values of one if the monthly stock return ($\ln(SP_{i,t} / SP_{i,t-1})$ is higher than 30% or lower than -30%, otherwise is zero, whereas the criteria is consistent with Luintel and Paudyal (2006).[7]

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[7] Structural dummies are defined as follows. India: 2006:6-2006:7 for market overall index; 2006:6-2006:7 for basic materials; 1999:12-2000:1, 2000:4-2000:5, 2006:6-2006:7 for consumer services;

$$SR_{i,t} - INF_{i,t} = a_7 + a_8 INF_{i,t} + \omega_i D_{i,t} * INF_{i,t} + \varepsilon_t \quad (4)$$

In equation (4), would suggest real stock returns are a hedge against inflation

3.3.2 Methodologies of long-run relations

The long run relation between stock price indexes and goods prices is expressed (in logarithmic form) as:

$$\ln SP_{i,t} = c_1 + c_2 \ln INFI_{i,t} \quad (6)$$

A unit coefficient (c_2=1) would imply that common stocks are a hedge against inflation in the long run in a perfect market. However, the income from stocks is subject to taxes; hence, the long run return rate on common stocks should exceed the inflation rate at least by the tax rate. Therefore, the size of the coefficients (c_2) should be exceed one.

We apply Johasen's (1992, 1995) multivariate method to estimate the long relation (i.e., . Under this approach, a system of n endogenous variables can be reparameterized into a vector error correction model:

$$\Delta X_t = \mu + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} \ldots + \Gamma_{k-1} \Delta X_{t-k-1} + \Pi X_{t-k} + \varphi D_t + \varepsilon_t \quad (7)$$

Where X_t and ε_t are (n × 1) vectors; Π and Γ_i are (n × n) matrix of parameter and gives the number of co-integrating vectors, which are long run relations among Xs; D_t are deterministic components, such as seasonal and impulse dummies; μ is a constant term; k is the lag lengths; and μ_t is a vector of normally and independently distributed error terms. In the long run relation of stock prices and goods prices

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1994:3-1994:4 for financials; 2006:6 for industrials; 1996:10-1996:11, 2000:3, 2004:1, 2006: 6 for oil&gas; 1997:8, 1998:4-5, 1999:2, 1999:10, 2000:1-2000:8, 2001:4, 2001:10-2001:12 for technology; 2000:4, 2001:3 for telecom; 1994:2, 2004:1, 2004:6 for utilities. China A-share: 1994:5-1994:8, 1996:12-1997:2 for Market overall indexes; 1994:7-1994:10, 1996:12-1997:2 for basic materials; 1994:8-1994:11, 1997:3-1997:5, 1999:5-1999:7 for industrials, 1994:8-1994:10, 1996:12-1997:9 for consumer goods; 1996:4-1997:2 for health care; 1994:6-1995:4, 1997:3-1997:5 for consumer services; 1994:8-1994:11, 1999:5-1999:7, 2000:2-2000:4, 2003:10-2003:12, 2006:11-2007:1 for telecom; 1994:6-1994:10, 1996:12-1997:2, 1999:6-1999:7 for utilities; 1996:5-1996:7, 1997:4-1997:6, 1999:6-1999:7 for financials; 1998:1-1998:3 for technology. China B&H share: 1998:7 for market overall index; 1997:7-1997:9, 1997:12-1998:1, 1998:7-1998:9, 1999:5, 2000:7-2000:9, 2001:3, 2001:8-2001:9, 2004:4-2004:6 for basic materials; 1996:12-1997:1, 1998:8, 1999:6, 2001:2-2001:8 for consumer services; 1999:6-1999:7 for consumer services; 1996:12-1997:1, 1997:5 for financials; 1998:1-1998:2, 1997:12-1998:1, 1999:5-1999:7, 2001:4, 2001:8 for industrials; 1997:7-1997:8, 1997:12-1998:1, 1998:8-1998:10, 1999:5, 2006:5-2006:6 for oil&gas; 1998:7-1998:8, 1999:7-1999:8 for technology; 1996:12-1997:1, 1997:12-1998:1, 1998:7-1998:8, 1999:2-1999:3 for utilities.

system, $X_t = [SP_t, INFI_t]$ is a 2×1 vector, and Π and Γ_i are (2 × 2) matrix of parameter coefficient matrices. A cointegrated system implies that $\Pi = c_1 c_2^{'}$ is reduced rank. In the components of inflation system: $X_t = [INFI_t, MS_t, IP_t]$ is a 3×1 vector, and Π and Γ_i are (3 × 3) matrix of parameter coefficient matrices.

Hypothesis 2: Common stock returns are a good hedge against inflation in the long run at both country level and industry level in China and India. Under Fisher's tax-augmented hypothesis, the elasticity is greater than 1 (unity) means that common stock returns are a hedge against inflation after paying out tax.

$H_0: c_2^{coun(ind)} \geq 1$

$H_1: c_2^{coun(ind)} < 1$

After investigation of long run relation between stock prices and goods prices, it is necessary to examine components of inflation in order to analyze on different and similar determinants from developed countries, as consistent by Adrangi,Chatrath and Sanvicente (2000). As well as suggested by Adrangi, Chatrath and Shank (1999) it may be prudent to re-examine the proxy effect in the framework of a long-run relationship before denying its validity. There are two sources of inflation: from money supply and real activity. Previous studies stated that inflation primarily from monetary shocks may lead to positive inflation-stock returns relations.

Firstly, the long run relation among goods price and real activity, monetary policy is examined:

$$\Delta \ln INFI_{i,t} = \sum_{k=1}^{n-1} j_k \Delta \ln INFI_{i,t-k} + \sum_{k=1}^{n-1} l_k \Delta \ln IP_{i,t-k} + \sum_{k=1}^{n-1} m_k \Delta \ln MS_{i,t} + e(\ln INFI_{i,t-1} - d_1 - d_2 \ln IP_{i,t-1} - d_3 \ln MS_{i,t-1}) \quad (8)$$

Where IP is the industrial production, MS is the money supply, $\sum$ term represents the short-run relation between inflation and real activity and money supply, the error correction term e represents the speed of adjustment of inflation to changes in real activity and money supply variables, and the $e(\ln INFI_{i,t} - d_1 - d_2 \ln IP_{i,t})$ term represents the long run relationship between inflation and real activity and money supply, which can be expressed as:

$$\ln INFI_{i,t} = d_1 + d_2 \ln IP_{i,t} + d_3 \ln MS_{i,t} \quad (9)$$

Secondly, as to examine components of inflation, this paper re-estimates the cointegrating relation (13) imposing the over-identifying restrictions: $d_2 = 0$ implies that real activity is not the main source of inflation; $d_3 = 0$ implies that monetary policy is not the main source of inflation. The log-likelihood ratio statistic for testing the restriction is statistically significant, which suggests that the restrictions are rejected at the 1%, 5% or 10% level.

3.3.2.1 Long run relation and structural breaks

As discussed in short run section, the structural shifts may induce instable long run relations. The dummy variables are defined as before. We insert the dummy variable into VEC model as exogenous variable in order to involve structural shifts in long run relation of stock prices and goods prices, which is the equation (9).

3.3.3 Time path tests

Finally, we explore the time path test, which is how stock prices react to shocks in goods prices. For this purpose, Impulse response functions trace the effect of a one standard deviation shock to one of the innovations on current and future values of the endogenous variables. In other words, a shock to the j-variable directly affects the j-variable, and is also transmitted to all of the endogenous variables through the dynamic structure of the vector error correction model (VECM) of Johansen (1991). More specifically, for instance the relation of stock prices-goods prices relation, a change in the error term in Equation. (7) will immediately change the value of current stock prices, and it also impacts all future values of the stock prices differential and changes in goods price. The impulse response functions shed light on the dynamics of the variables included in the VECM system as a result of a shock to either one of these variables.

The impulse response function is computed by artificially imposing a one standard deviation shock to one variable and by measuring the response of each variable in the system. The time path of the response between stock prices and the unpredicted movement in goods prices can be tested by utilizing long-term information that may be contained in stock prices and goods prices. The pattern of dynamic responses of each of the pair of variables to innovations in a particular variable using the simulated responses of the estimated VECM system is then estimated. Time test is a robustness test of hypothesis 1 and 2.

Hypothesis 3: The long-run relations of stock prices-goods prices exhibit time-varying characteristics.

CHAPTER IV

Results

This section is separated into four main findings: 1) the short-run relation between common stocks and inflation in both country level and industry level; and 2) the long-run relationship between common stocks and inflation in both country level and industry level; moreover 3) further analysis on structural breaks impacts on short-run、long-run relations, and the components of inflation finally 4) the dynamic relations of common stocks and goods prices from short run to long run.

The descriptive statistics on the time-series includes the aggregated and disaggregated stock indexes of China and India, and the correlation of stock returns with the rates of inflation, which are shown in Table 1. One can see that in the first column which shows stock indexes returns, in aggregated level: China A-share stock indexes provided higher mean return than India stock indexes and China B-share. All mean returns are much lower than other empirical findings of Spyrou (2004)'s finding, that is the highest mean monthly return from 1989-2000 is produced by the Argentinean index and the lowest from the Korean index. However, the stock market returns are much higher than inflation rate in China and India, implying positive stock return-inflation relation. The standard deviation results in column 2 reported that: China A-share stock index also produces the highest one, the second is China B-share stock index and the third is India market stock index, which implies that China stock price indexes perform more volatile than India stock price indexes, consistent with the argument that higher returns along with higher risks. All time series' skewness and kurtosis description are provided in column 3 and 4 of Panel A, B, C. We can see that most of China stock indexes are right tilt; however, 70% of India stock indexes are

left tilt, which may due to China's stock market grew faster than India's market in 2000s.

Panel D provides the correlations between rates of stock return and rates of inflation for China and India market. All Indian stock indexes are negative correlated with inflation; in contrast, all Chinese stock indexes are positive correlated with inflation. The correlation's absolute numerical values of all China indexes are lower than India market. The casual correlation results may imply that there are positive short run relation among china stock returns and inflation rate but may not be significant, while negative relation of stock returns and inflation in India. China and India may provide interesting evidences in demonstrations and explanations of the suspicious negative inflation-stock return relation as documented in many previous researches.

4.1 Short-run relations

4.1.1 Stock returns and inflation

Table 2 shows that: in India market: the coefficients are negative and statistically significant in at least 5% confidence level for all aggregated stock index and disaggregated stock indexes; one exception is that of consumer services industry is statistically significant at 10% level. The generally negative coefficients are consistent with the negative correlation results in table 1. The empirical finding in our sample period is also consistent with Chatrath, Ramchander and Song (1996) whose sample period is from 1984-1992, implying that even though after the economic revolution in 1991 when economic grew faster and experienced lower inflation compared than before 1990s, the Indian stock returns are still not a hedge against inflation in the short run. In contrast, Panel B and Panel C of table 2 shows that coefficients of are generally statistically insignificant in China market, indicating

that real stock returns are independent from inflation in China in the short-run. The insignificant results are consistent with correlation results in table 1, as well as with Sprou (2004). It could be concluded that the common stocks are a hedge against inflation in both aggregated and disaggregated stock indexes in China market, consistent with Fisher's effect. However, Fisher's tax-augment may not be supported in the short run.

The average R2 is less than 10% in both China and India regressions, which implies that the explanatory power of the typical individual regression is not impressive. Obviously, there are either a large component of noises and/or other influences on monthly stock returns except inflation. However, the empirical results of India and China are consistent with previous empirical studies: Sprou (2001); Sprou (2004); Chatrath, Ramchander and Song (1996); Adrangi, Chatrath and Sanvicente (2000).

Because of suspicious negative stock-inflation relations in India, we try to apply Fama's proxy hypothesis to explain the suspicious negative empirical findings.

Proposition A: Inflation versus Real Activity: Panel A of Table 3 reports that coefficients of contemporaneous growth rate of industry production ( ) are negative and statistically significant in both (1) (2) estimations at 1% and 10% significant level respectively, associating with Proxy hypothesis proposition A, along with Adrangi, Chatrath and Sanvicente (2000) and Chatrath, Ramchander and Song (1996). Proposition B: Stock Returns versus Real Activity: Empirical findings summarized in panel B report varying relation among stock returns and industrial production variables. Coefficients of contemporaneous are positive and statistically significant in 8 regressions: market overall indexes, consumer goods, consumer

services, financials, health care, industrials, technology, and telecoms industries. However, for the remaining 3 industries, the coefficients are not statistically significant positive. The above findings do not quite consistent with Proposition B of Fama's proxy hypothesis for all Indian stock indexes. Therefore, the proxy hypothesis may not explain the negative relations in India based on our data, consistent with Adrangi, Chatrath and Sanvicente (2000) and Chatrath, Ramchander and Song (1996).

Empirical findings of India are not quite consistent with two propositions of Fama's proxy hypothesis, further implication of Fama's proxy hypothesis - combined tests is investigated. Table 4 Combined test show that, statistically significant negative coefficients of error indicate that there are still strong negative stock-purged inflation relationship in most Indian stock prices, contracting to Fama's proxy hypothesis which suggests that there should be positive coefficients of error variable after controlling for real activities impacts on inflation. But the uniformly negative relations are consistent with consistent with Adrangi, Chatrath and Sanvicente (2000) and Chatrath, Ramchander and Song (1996).

4.1.2 Structural breaks and short run relation

Short run relations with structural breaks

The empirical finding shows that there are still significant negative relations between all real stock returns and inflation in at least 10% level in India. Results of table 5 are similar to results in table 2. The structural break's effect are not significant in China and India. It could be concluded that the short run relation in China and India are stable.

4.2 Long run relations

We apply VEC (vector error correction) to investigate long run relation. Before investigation of long run relation, unit root test are important. Unit root test results presented in table 6 shows that most time series are non-stationary in I(0) level in India and China but all the time series are stationary in first difference I(1), thus there should be cointegration relations among time series in China and India.

4.2.1 Co-integration test results

To estimate the vector autoregressive (VAR) models, indentifying lag lengh of VAR is very important. We identify the lag lengths following Sims's (1980) likelihood ratio (LR) tests and multivariate Akaike information criterion (AIC). Under the LR and AIC tests, we begin with a maximum lag length (- max) of 20 and sequentially test down, deleting one VAR lag at a time until the deleted lags are jointly significant. Information criteria normally chooses a shorter lag length, which is not always sufficient to flush serial correlation from the VAR residuals. It is important to render VAR residuals uncorrelated (Johansen 1992). To solve this problem, we restrict the AIC search between - max = 20 and - min = 5, consistent with Luintel, Paudyal (2006).The VAR lengths specified by LR tests and AIC tests are reported in Table 8. It is evident that the selection of VAR length is not uniform. The LR tests identify VAR lengths ranging from 6-20 for India market, 13-20 for China A-share market, 13-16 for China B-share market; whereas the AIC identifies VAR lengths of 8-20 for India market, 13-15 for China A-share market, 11-17 for China B-share market. Given these two different findings from LR and AIC tests, we get the adopted lag length by estimate VAR models for each pair of and ranging from minimum lag lengths (as determined by the LR and AIC) to the maximum lag length and choose the

one that shows no serial correlation in the VAR residuals. The precise VAR lengths we adopted are reported in the last column of Table 7.

After specified the unit root of each time serie and lag length of each pair time series, the next step is do the cointegration test. Table 8 shows trace tests for the cointegration ranks. India cointegration test is taken under the assumption that there is intercept (no linear trend) in data, because cointegrating relation persistent mostly under this assumption in India. Trace statistics bigger than critical value implies reject null hypothesis, otherwise accept the null hypothesis. This paper require that there is one cointegrated relation in each pair of stock prices and goods prices, table 8 indicates that the trace statistic of all time series pair are bigger than 20.262 and lower than 9.165 critical values at 5% level, which implies that all pairs of time series are cointegrated in India. China cointegraion test is taken under the assumption that allow for linear deterministic trend in data. After compared the trace statistics in panel B with 5% critical value, it reveals that most pairs of China A-share stock index and CPI are cointegrated except telecom industry . While financial, health caresand industrials pairs of China A-share could not accept the null of that there is at most one cointegration at 5% significant level, hence there might be no cointegration among these 3 pair time series, especially in industrials pair. Panel C results show all pair of time series reject the null of no cointegration and accept the null of at most one cointegration. Hence, there is one cointegration among each pair of China B&H share stock prices and goods prices series. Hence, the empirical evidence of table 8 could be concluded that most pairs of stock time series are cointegrated with WPI/CPI in China and India.

4.2.2 Long run relations

By examining equation (10), the estimates on long-run relations between stock prices and the goods prices of China and India are shown in table 9. There are above unity long run relations in all cases except technology and utilities industry of China A-share. This finding is in sharp contrast to the existing results, which mostly suggest below-unity elasticity. A notable exception is Luintel, Paudyal (2006) Khazali and Pyun (2004), and Anari, Kolari (2001), who report above-unity elasticity. Our results appear to be consistent with theirs. The finding of commodity price above-unity elasticity is consistent with the tax-augmented Fisher hypothesis discussed earlier. In addition, empirical findings of China stock markets differ from evidences in Real estate markets where real estate markets are not a hedge against inflation in the short run and there is no long run relationship.

It should be noted that the estimated Fisher coefficients (c2) are in the range of 17.041 (technology) to 37.461 (oil & gas) with a mean of 27.257 and all are significant in 1% confidence level in China B-share market. The elasticity of B-share stock indexes to goods prices is much higher than unity. However, the significantly large coefficients are consistent with evidence from some emerging markets, for instance, Adrangi, Chatrath and Sanvicente (2000) where the elasticity of stock prices to goods prices is 56.73 in Brazil. Moreover, Panel A and Panel B show that coefficients of India and China A-share markets are much lower than China B-share's, and the significance level is generally lower than B-share. The elasticities ( ) of India varying from 1.668 (market aggregated index) to 6.648 (technology) with a mean of 3.667, and the elasticities ( ) of China A-share is ranging from 0.625 (utilities) to 14.514 (financials) with a mean of 8.053. That might because the divergence of stock

prices and good prices were not fully adjusted over a relatively short sample period in China A-share and India.

In table 9, the estimates of the speed of adjustment coefficients (e) lie between -0.0007 to -0.037 for Indian indexes, which means that it takes a long time for stock prices to return to their long-run relation following an unexpected movement in goods prices. These results support the impulse response function findings in section.

4.2.3 Structural breaks and the long run relation:

The results of stock-inflation relation involving structural breaks reported in table 10 provides similar results as table 9 in China and India market. The structural breaks could not improve the insignificant elasticity of stock prices and goods prices in India and China A-share markets. Hence, the long run relations are stable in China are stable in China.

4.2.4 Components of inflation

Table 11 show that there are one cointegrating relation among goods prices, money supply and industrial production in China and India. The long run relation among goods prices, real activities and money supply is: . As we can see from the regression, the goods prices are positive associated with both real activities and money supply in India, contrarying to Fama's proxy hypothesis. A sequential test is examined by involving restrictions that the money variable and the real activity variable are equal to zero, in order to examine whether these variables enter the cointegrating vector or not. Table 11 shows that India market reject the restriction of [ ] at 1% confidence level, while accept the restriction of [ ]. Therefore inflation is primarily generated by monetary policy shocks but not real activity shocks in India. That is why Fama's proxy Hypothesis could not explain negative short run relation in

India. This finding is consistent with the results in Panel A of table 3, where lagged and leading IP are independent from goods price in India.

The long run relation among goods prices, real activities and monetary policy is: in China market. There are positive association among goods prices, real activities and monetary policies in China, which is both contrary to Fama's proxy hypothesis and anticipated hypothesis. The sequential results indicate that inflation is generated by both monetary policy shocks and real activities shocks in China. This result differ from developed market findings, however it is consistent with empirical evidence from some emerging markets: Chile, Mexico, Thailand, Malaysia, Brazil and Philippines (Sprou (2004)), where inflation is related to both monetary policy and real activity shocks, and that is one reason that there are both positive short-run and long run relation in China market.

4.3 Time path test of the relation between stock prices and goods prices

Figure IV shows that an unexpected movement in the goods price index influences the stock price index over time, investigated by impulse response function.

For India market: Figure IV results show that after a transitory period of a negative shock to stock prices, the impulse response function for all stock indexes of India would return to zero line and would later become positive in the long run. The shortest adjusted period from negative to positive relation is oil & gas industries (10 months). Technology industry takes the longest time (47 months) to adjust from negative relation to positive long run relation, which might attributed to that the sector has the highest mean return but most volatile sectors during our sample period, where mean return is 0.029 and the standard deviation is 0.138 as shown in Table 1 Panel A. This positive long run effect of inflation on stock prices is consistent with the

previously cited research by Jaff and Mandelker as well as Khazali and Pyun (2004), where all relations of stock prices and goods prices adjust from negative short relation into positive long run relation in 24 months in 10 pacific-basin countries.

For China B-share market: As the graphs shown from figure 2, there are positive short run and long run relations in all the 24 holding periods. There is no adjustment from short run to long run. This is consistent with positive short run relation that we found in table 2, as well as strong above unity long run relation in table 6. Hence, it could be concluded that China B-share stock indexes are a good hedge against inflation all the time, which is consistent with Crosby (1999), where Australia stock prices are a hedge against inflation in both short run and long run.

However for China-A share market: the graphs are much more waving than India and China B-share. The relation between stock price index and consumer prices are adjusted along the holding period. As see from the impulse response graph in panel B of figure IV, there are still positive long run relations for all the stock indexes of China A-share. However, the periods are generally not as long as findings from China B&H share. One reason might because the positive relation of A-share is not as significant as B-share's, as showed in table 10. The average positive long run holding period is about 15 months. The shortest positive relation period is 5 months of health care industry, which might due to a loss of 25% from 2001 to 2006. The longest positive relation period is 24 months of basic materials industry. Therefore, the time span of each pair of time series is heterogeneous in China.

Table 13 shows the response of stock price indexes (illustrated in figure IV) to a one standard deviation positive shock in the goods prices and their corresponding *t*-values. The *t*-values are derived based on an analytical method for estimating variances of impulse functions suggested by Hamiton (1994, P336). The *t*-values

measure if a given positive or negative response is statistically significant. As the table reports, the initial response are negative and become positive and statistically significant in the long run.

Our findings are consistent with the Fisher tax-augmented effect wherein it takes a longer period of time for inflation to be fully reflected in stock prices for India stock indexes. These results indicate that previous evidence of an inverted short-run, and a positive long-run relation between stock returns and inflation can be reconciled by evidence from India. It stands to reason that investors can reasonably expect stocks to be a good inflation hedge over a long holding period in India and China, but the holding period is varying across industries. We conclude that stock prices in India and China, like those in other Pacific-Basin countries, U.S. and Europe, appear to reflect a long-term memory associated with inflation shocks that make stock portfolios a reasonably good hedge against inflation in the long run.

CHAPTER V

Conclusion and Areas for Future Research

5.1 Conclusion

We examined whether stock investments hedge against inflation. The investigation was conducted by the aggregated market index and 10 industry sectors monthly time series spanning 14 years from India and China. Our empirical analysis is based on the tax-augmented Fisher hypothesis. We find negative short run stock-inflation relation in India, consistent with previous study; whereas independent stock-inflation relation in China. Fama's proxy hypothesis could not explain negative stock-inflation relation in India. Moreover there are statistically significant cointegrating relations between stock and good price indexes in both aggregate and disaggregate (industry) data except 2 groups. Of the 26 industry groups examined, 24 show positive goods price elasticity above unity and the remaining shows elasticity below unity. The overall market index also shows goods price elasticity above unity. These findings of above unity elasticity are consistent with the tax-augmented version of the Fisher hypothesis; that is, the return on stocks must exceed the inflation rate to compensate for the loss in the real wealth of tax-paying investors. We also find considerable heterogeneity in the point estimates of the goods price elasticity across industry groups, suggesting that the long-run real return varies across industries. The time span test also suggest that hedging time span are heterogeneous across industries when adjust from short run to long run. In some cases, we identify significant structural shifts in the cointegrating relation. This indicates that economics shocks might impact long relation between stock prices and goods prices. However, accounting for these structural shifts doesn't improve the precision of the results, which means relations are stable.

5.2 Areas for futures research

Like all other researches, this thesis also has a limitation. This thesis is subjected to the time constraint and the availability of the stock prices and goods prices data. With the more rapidly development of economy in China and India, the goods price indexes also rise faster than last decades in 2007. When more updated data are publicly available, revising these hypotheses could reveal some new information, or it could confirm some of these research findings.

Another interesting issue from this thesis is that inflation doesn't impact on stock returns too much in China and India, the R2 is not very large. This could be caused by some elements of noises or some unknown factors. Further investigation may reveal additional factors except real activities that could better explain the inflation-stock return relation

Moreover, future research can be carried out by improving the empirical model to further analyze stock returns and inflation relation to other areas.

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APPENDIX

- **Fisher's tax-augmented hypothesis**

Fisher (1930) suggests that the market interest rate (R) reflects the expected real interest rate (r^e) and the expected inflation rate (π^e). In a frictionless economy this can be expressed as:

$$(1+R) = (1+r^e)(1+\pi^e) \quad (1)$$

If common stocks provide a fully hedge against inflation, the application of this hypothesis in a perfect market should be a one-to-one relation between the inflation rate and stock returns. However, in the real world, asset holders are obligated to pay tax on their income (regular income as well as capital gains). Hence, for the investors to be fully compensation for inflation, the nominal stock return should include both expected inflation and taxes. Denoting T as tax rate, the equation (1) could be written as:

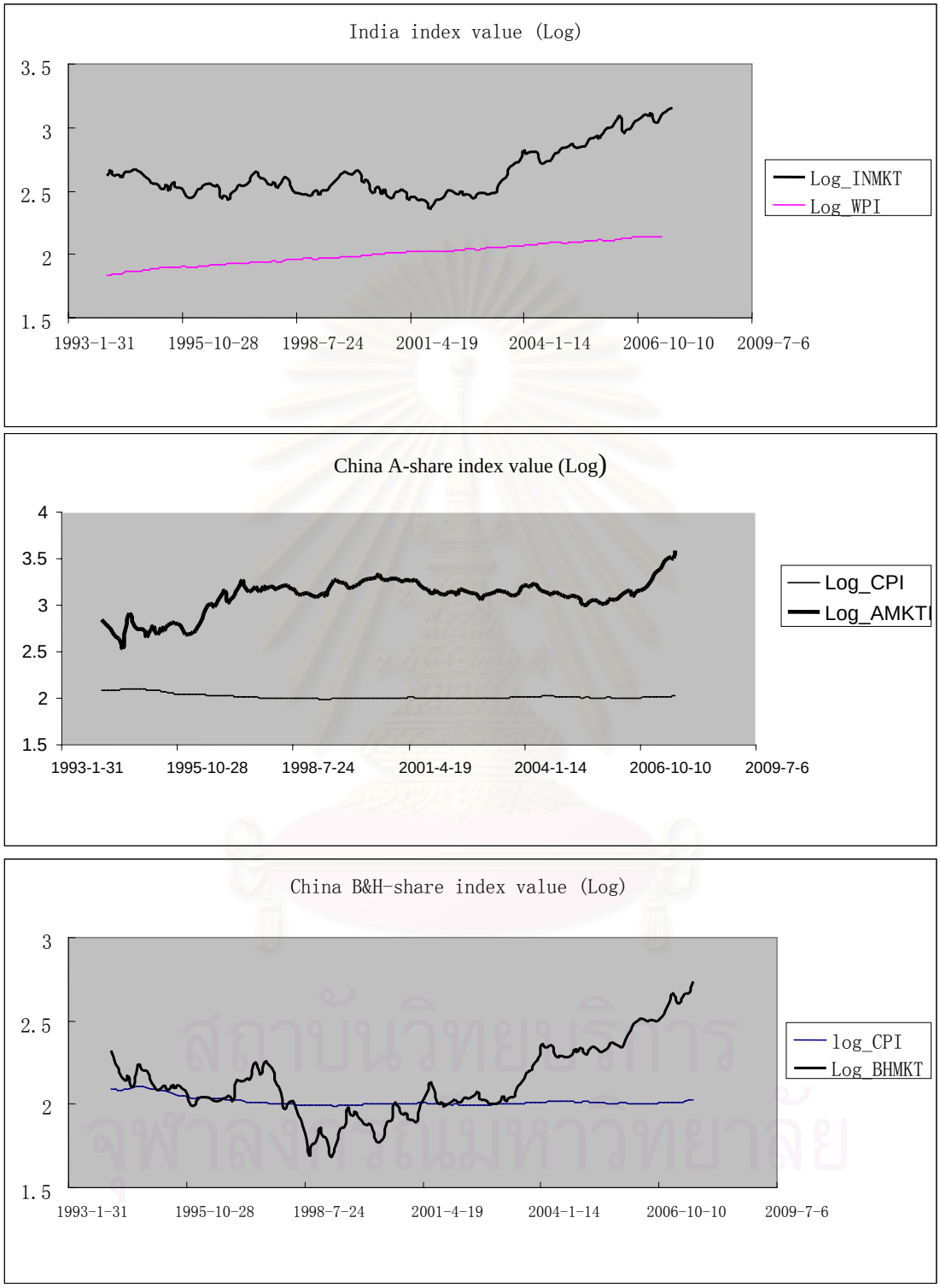
$$R = \frac{(1+r^e)(1+\pi^e)-1}{(1-T)} \quad (2)$$

Given T > 0, equation (2) implies that the common stocks' nominal return rate should be higher than the inflation rate. The effective tax rate in China is positive; therefore, the return rate on stocks must exceed the inflation rate to fully protect investors form inflation. According to [Lee, Xiao (2004)], capital gain is tax free for individual investors in China, whereas cash dividend is taxable on a 20% tax rate. For institutional investors, capital gain and cash dividend are considered as taxable income indifferently. The average tax burden income tax rates on domestic companies are proximately 25%. According to [M.Govinda Rao (2000)], the personal income taxes were drastically reduced to 10, 20 and 30 percent since tax reform in 1991. The corporate income taxes on both domestic and foreign companies are 35% and 48% respectively from 1991. However, there are a number of "zero-tax" companies, to ensure minimum tax payments by them, a minimum alternative Tax was introduced in 1997-1998. In light of these findings, it appears that an average implicit tax rate of 15% to 25% in China and 20% in India over 1994-2007 may not be an unreasonable estimates[8]. Thus, we anticipate positive short-run relation and above-unity price elasticity under the cointegration methodology.

8 Estimates of average implicit rates of taxes on combined equity income (capital gains and dividend) are not available, and their estimation is beyond the scope of this article.

TABLES

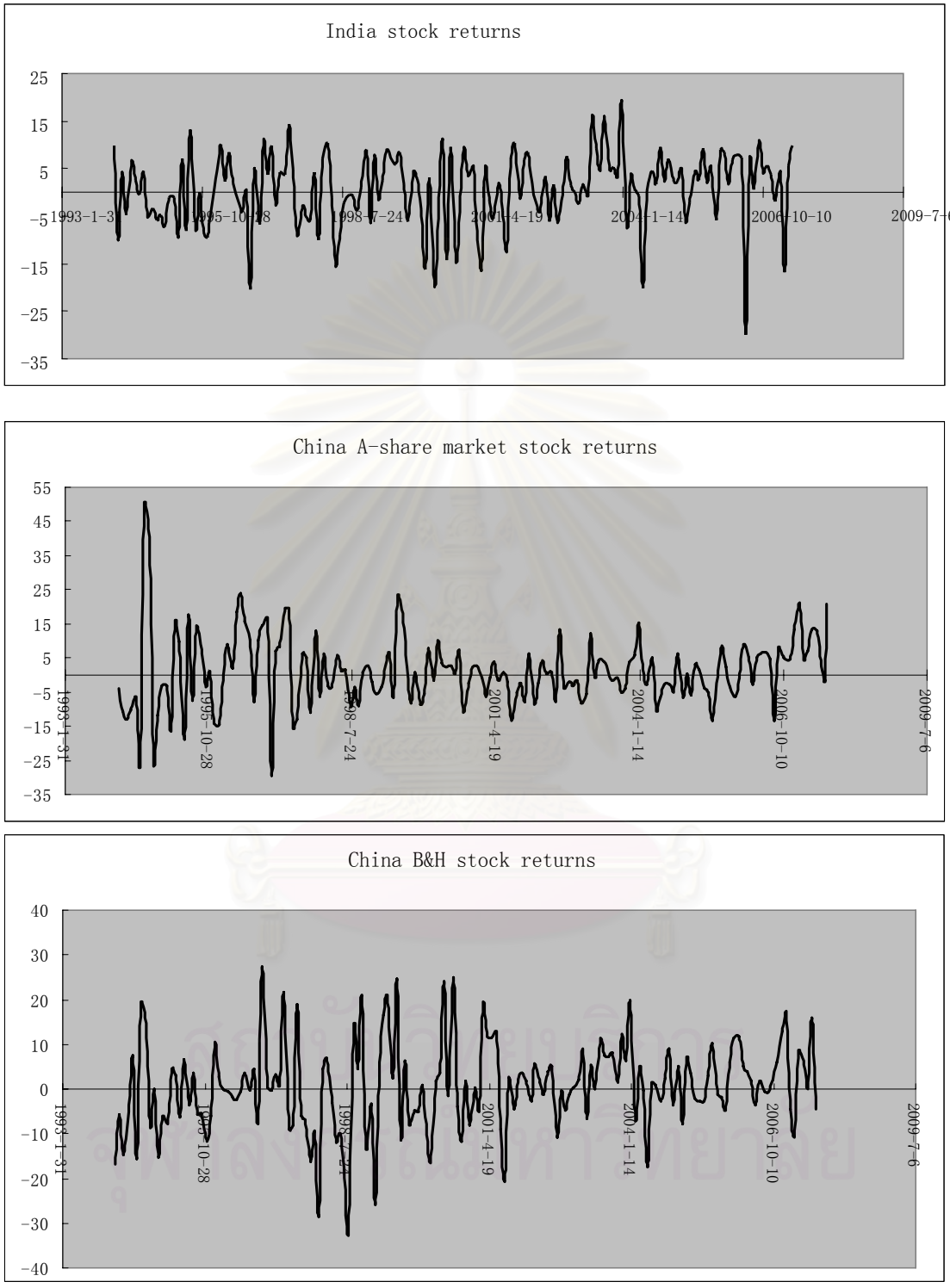
Figure I. Market aggregated index (INMKT, AMKT, BHMKT) and goods prices (WPI, CPI)



Note: Time is calendar time.

Figure II. Monthly Stock Returns (Market Overall stock Index) in Percentages.

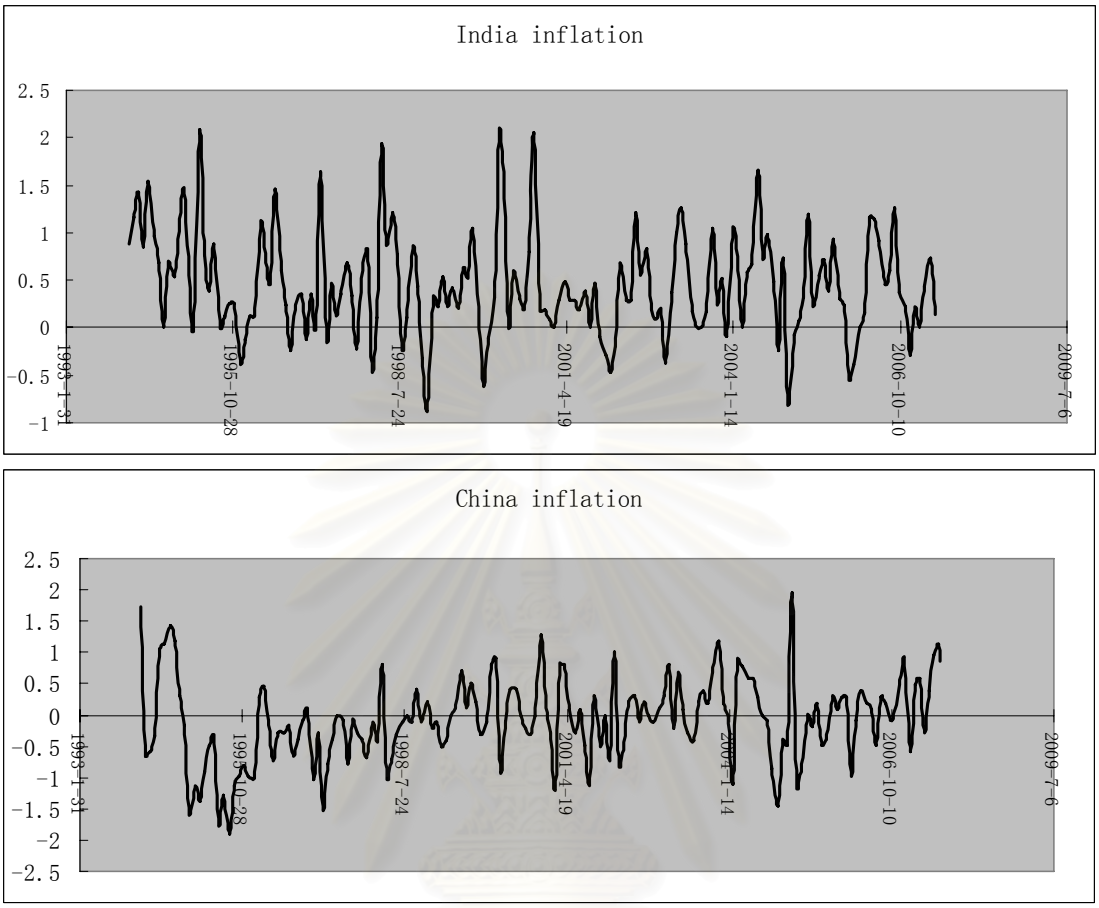
$R=\ln (R_{i,t}/R_{i,\,t-1})$



Note: Time is calendar time.

Figure III: Monthly Inflation Rate (WPI and CPI) in Percentages.

$R=\ln (R_{i,t}/R_{i,t-1})$



Note: Time is calendar time

Table 1: Descriptive Statistics

This table represents the summary statistics of aggregated and disaggregated indexes in China and India during January 1994 to August 2007. The summary statistics reported in Panel A are Indian stock indexes and goods prices, in Panel B and C are China A-share and B-share respectively. Panel D reports the correlation between stock returns and inflation in China and India. MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil gas, TEC = technology, TEL = telecom, UTI = utilities, CPI = consumer price index, WPI = wholesale price index.

Panel A: India

	Mean monthly equity market return	Standard deviation	Skewness	Kurtosis-3
MKT	0.007	0.078	-0.789	4.177
BMA	0.011	0.086	-0.440	3.881
CONG	0.010	0.084	-0.768	4.429
CONS	0.009	0.113	-0.491	4.445
FIN	0.010	0.097	-0.932	4.569
HEA	0.007	0.071	-0.598	4.042
IND	0.010	0.102	-0.716	3.729
OIL	0.004	0.106	-0.348	5.308
TEC	0.029	0.138	0.375	4.780
TEL	0.006	0.104	-0.446	3.569
UTI	0.008	0.105	-0.164	4.222
WPI	0.004	0.005	0.591	3.545

Panel B: China A-share

	Mean monthly equity market return	Standard deviation	Skewness	Kurtosis-3
Panel B: China A-share				
MKT	0.011	0.105	0.703	5.934
BMA	0.010	0.110	0.659	6.347
CONG	0.006	0.112	0.284	5.049
CONS	0.014	0.118	1.460	8.730
FIN	0.014	0.131	1.730	8.718
HEA	0.010	0.112	0.872	8.787
IND	0.010	0.129	1.094	6.961
OIL	0.012	0.089	0.571	3.731
TEC	0.011	0.105	0.894	4.249
TEL	0.004	0.129	0.683	4.718
UTI	0.011	0.113	0.644	6.121
CPI	0.001	0.007	0.039	3.219

Table 1 - continued
Panel C: China B&H-share

	Mean monthly equity market return	Standard deviation	Skewness	Kurtosis-3
MKT	0.006	0.101	-0.017	3.722
BMA	0.009	0.131	-0.044	4.151
CONG	0.006	0.130	1.491	11.265
CONS	0.003	0.101	-0.160	3.824
FIN	0.008	0.117	0.655	4.045
IND	0.008	0.131	0.109	3.568
OIL	0.010	0.125	-0.092	4.467
TEC	0.008	0.126	0.246	6.123
UTI	0.013	0.113	-0.322	4.686

Panel D: Correlation between Stock returns and Inflation rate, Monthly data

	India (WPI)	China A-share (CPI)	China B-share (CPI)
MKT	-0.204	0.092	0.135
BMA	-0.174	0.136	0.153
CONG	-0.235	0.09	0.155
CONS	-0.093	0.07	0.125
FIN	-0.261	0.012	0.09
HEA	-0.198	0.049	
IND	-0.219	0.051	0.189
OIL	-0.122	0.155	0.043
TEC	-0.028	0.083	
TEL	-0.208	0.0421	0.113
UTI	-0.117	0.059	0.065

Table 2: Short-run Relationship between Real Stock returns and Inflation

The table shows the regressions that real stock returns are regressed on inflation rate. MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. DW=Durbin Watson statistic. The estimate model is: $SR_{i,t} - INF_{i,t} = a_1 + a_2 INF_{i,t} + \vartheta_t$. $SR_{i,t}$ is the returns on the equity indexes $SP_{i,t}$: $(SR_{i,t} = \ln(SP_{i,t} / SP_{i,t-1})$, i =Aggregated market index, industrial indexes in India and China; $INF_{i,t}$ is the inflation rate: $(INF_{i,t} = \ln(INFI_{i,t} / INFI_{i,t-1})$, i = China, India respectively; The number in the parentheses is t-statistics.

Panel A: India

	Estimate coefficients			
	α_1	α_2	R^2	DW
1994 M1 - 2007 M8				
MKT	0.019***	-3.885**	0.073	2.106
	(2.542)	(-3.530)		
BMA	0.023***	-3.724***	0.054	2.065
	(2.632)	(-3.032)		
CONG	0.026***	-4.569***	0.087	1.938
	(3.128)	(-3.884)		
CONS	0.018	-2.902*	0.020	1.646
	(1.547)	(-1.790)		
FIN	0.029***	-5.585***	0.098	2.180
	(3.005)	(-4.135)		
HEA	0.019***	-3.553***	0.073	2.058
	(2.653)	(-3.539)		
IND	0.027***	-5.041***	0.073	1.903
	(2.672)	(-3.519)		
OIL	0.014	-3.354**	0.03	1.985
	(1.329)	(-2.21)		
TEC	0.034	-1.699**	0.005	1.546
	(2.389)	(-0.856)		
TEL	0.023**	-4.953***	0.066	1.763
	(2.233)	(-3.353)		
UTI	0.018	-3.235**	0.028	2.132
	(1.649)	(-2.151)		

Table 2 - continued

Panel B: China A-share

	Estimate coefficients			
	α_1	α_2	R^2	DW
1994 M1 - 2007 M8				
MKT	0.012	0.425	0.001	1.807
	(1.423)	(0.351)		
BMA	0.012	1.188	0.006	1.787
	(1.377)	(0.944)		
CONG	0.007	0.474	0.001	2.010
	(0.789)	(0.368)		
CONS	0.015*	0.205	0.000	1.723
	(1.657)	(0.151)		
FIN	0.014	-0.767	0.002	1.576
	(1.351)	(-0.505)		
HEA	0.011	-0.155	0.000	2.001
	(1.218)	(-0.111)		
IND	0.011	-0.024	0.000	1.733
	(1.094)	(-0.015)		
OIL	0.011	1.406	0.008	1.908
	(1.246)	(0.956)		
TEC	0.011	0.506	0.001	2.079
	(1.094)	(0.305)		
TEL	0.004	-0.203	0.000	2.078
	(0.414)	(-0.136)		
UTI	0.012	-0.026	0.000	1.846
	(1.325)	(-0.020)		

Table 2 - Continued

Panel C: China B&H share

	Estimate coefficients			
	α_1	α_2	R^2	DW
1994 M1 - 2007 M8				
MKT	0.007	0.999	0.005	1.850
	(0.899)	(0.862)		
BMA	0.011	1.929	0.010	1.882
	(1.073)	(1.290)		
CONG	0.008	1.949	0.011	1.926
	(0.774)	(1.312)		
CONS	0.004	0.866	0.003	1.926
	(0.552)	(0.744)		
FIN	0.009	0.536	0.001	1.760
	(0.996)	(0.398)		
IND	0.011	2.618*	0.019	1.791
	(1.036)	(1.764)		
OIL	0.010	-0.168	0.000	1.676
	(1.013)	(-0.106)		
TEC	0.009	1.423	0.004	1.877
	(0.784)	(0.759)		
UTI	0.014	0.204	0.000	2.060
	(1.484)	(0.132)		

***: significant in 1% level
**: significant in 5% level
*: significant in 10% level

Table 3: Fama proxy hypothesis (India)

Panel A: Inflation and Real Activities

The table shows regressions of real inflation rates are regressed on the lagged, contemporaneous and leading levels of the growth in industrial productions. The data are from DataStream for the period 1994-2007. MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. DW=Durbin Watson statistic. The estimated model is: $INF_{i,t} = \alpha_3 + \sum_{j=-k}^{k} \tau_i GIP_{i,t+1} + \varepsilon_t$: $INF_{i,t}$ is the inflation rate: $(INF_{i,t} = \ln(INFI_{i,t} / INFI_{i,t-1})$, GINIP is the growth rate of Indian industrial production. $GIP_{i,t} = \ln(GIP_{i,t} / GIP_{i,t-1})$. (1) regressions are regressed on 6 lagged, contemporaneous and leading levels of GIP, (2) regressions are regressed on 12 lagged, contemporaneous and leading levels of GIP. The number in the parentheses is t-statistics.

	Variable	c	GINIPt-12	GINIPt-9	GINIPt-6	GINIPt-3	GINIPt	GINIPt+3	GINIPt+6	GINIPt+9	GINIPt+12	R2	DW
WPI	(1)	0.004***			0.013	0.002	-0.04***	0.000	-0.003			0.132	1.514
		(10.046)			(0.701)	(0.258)	(-4.446)	(-0.019)	(-0.165)				
	(2)	0.004***	0.019	0.036	0.008	0.003	-0.04*	-0.033	0.000	0.000	-0.022	0.179	1.612
		(9.057)	(0.846)	(1.513)	(0.362)	(0.125)	(-1.651)	(-1.399)	(-0.019)	(-0.005)	(-1.004)		

***: significant in 1% level
**: significant in 5% level
*: significant in 10% level

Table 3 - Continued

Panel B: Stock Returns and Real Activity in India

The table shows regressions of real stock returns are regressed on the lagged, contemporaneous and leading levels of the growth in industrial productions. The data are from DataStream for the period 1994-2007. MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. DW=Durbin Watson statistic. The estimated model is: $SR_{i,t} - INF_{i,t} = a_4 + \sum_{j=-k}^{k} \beta_i GIP_{i,t+1} + \xi_{t,3}$. $INF_{i,t}$ is the inflation rate: $(INF_{i,t} = \ln(INFI_{i,t} / INFI_{i,t-1}) \cdot SR_{i,t}$ are the returns on the equity indexes $(SR_{i,t} = \ln(SP_{i,t} / SP_{i,t-1})$. GINIP is the growth rate of Indian industrial production. $GIP_{i,t} = \ln(GIP_{i,t} / GIP_{i,t-1})$. (1) regressions are regressed on 6 lagged, contemporaneous and leading levels of GIP, (2) regressions are regressed on 12 lagged, contemporaneous and leading levels of GIP. The number in the parentheses is t-statistics.

	Variable	c	GINIPt-12	GINIPt-9	GINIPt-6	GINIPt-3	GINIPt	GINIPt+3	GINIPt+6	GINIPt+9	GINIPt+12	R2	DW
MKT	(1)	0.002			-0.071	-0.164	0.202*	-0.092	0.150			0.03	1.970
		(0.35)			(-0.252)	(-1.187)	(1.48)	(-0.68)	(0.56)				
	(2)	0.004	0.147	-0.418*	0.159	0.174	0.201	0.294	-0.033	-0.242	-0.112	0.045	1.953
		(0.533)	0.446	(-1.176)	(0.497)	(0.545)	(0.558)	(0.841)	(-0.107)	(-0.766)	(-0.345)		
BMA	(1)	0.007			-0.181	-0.104	0.144	-0.235*	0.245			0.030	2.013
		(0.986)			(-0.572)	(-0.677)	(0.944)	(-1.548)	(0.826)				
	(2)	0.009	0.042	-0.323	0.067	0.535*	0.299	0.088	0.012	-0.513*	-0.210	0.048	1.814
		(1.156)	(0.117)	(-0.829)	(0.192)	(1.531)	(0.760)	(0.229)	(0.034)	(-1.485)	(-0.593)		
CONG	(1)	0.006			-0.014	-0.223*	0.269*	-0.101	0.122			0.042	1.828
		(0.793)			(-0.046)	(-1.490)	(1.812)	(-0.691)	(0.425)				
	(2)	0.007	0.407	-0.460	0.206	0.243	-0.021	0.299	-0.051	-0.385	-0.024	0.075	1.745
		(0.867)	(1.133)	(-1.185)	(0.592)	(0.696)	(-0.054)	(0.784)	(-0.149)	(-1.117)	(-0.068)		
CONS	(1)	0.000			0.120	0.042	0.283*	0.314*	-0.093			0.033	1.505
		(-0.002)			(0.295)	(0.214)	(1.439)	(1.612)	(-0.244)				
	(2)	0.001	-0.249	0.168	0.609	0.728*	0.702*	0.201	-0.560	-0.601	-0.229	0.064	1.405
		(0.090)	(-0.511)	(0.319)	(1.291)	(1.543)	(1.319)	(0.389)	(-1.217)	(-1.288)	(-0.479)		
FIN	(1)	0.003			-0.016	0.076	0.389**	-0.242*	0.168			0.065	1.980
		(0.354)			(-0.050)	(0.483)	(2.490)	(-1.568)	(0.556)				
	(2)	0.005	-0.191	-0.541*	0.247	0.530	0.739*	0.169	0.020	-0.452	-0.160	0.124	2.110
		(0.623)	(-0.509)	(-1.333)	(0.679)	(1.454)	(1.797)	(0.423)	(0.055)	(-1.253)	(-0.431)		

HEA	(1)	0.003			-0.143	-0.188*	0.191*	-0.005	0.084			0.035	1.840
		(0.551)			(-0.561)	(-1.515)	(1.547)	(-0.043)	(0.354)				
	(2)	0.006	0.104	-0.407	0.155	-0.133	0.027	0.364*	-0.204	0.027	0.105	0.050	1.875
		(0.974)	(0.357)	(-1.295)	(0.550)	(-0.473)	(0.085)	(1.178)	(-0.741)	(0.096)	(0.367)		
IND	(1)	0.005			0.209	-0.308*	0.361**	-0.125	-0.082			0.051	1.701
		(0.515)			(0.570)	(-1.727)	(2.035)	(-0.710)	(-0.240)				
	(2)	0.005	0.358	-0.357	0.515*	-0.080	0.136	0.229	-0.337	-0.144	-0.031	0.069	1.669
		(0.556)	(0.826)	(-0.762)	(1.227)	(-0.189)	(0.286)	(0.498)	(-0.823)	(-0.347)	(-0.072)		
OIL	(1)	-0.001			0.095	-0.271*	0.040	-0.011	0.109			0.022	1.928
		(-0.140)			(0.244)	(-1.430)	(0.210)	(-0.057)	(0.300)				
	(2)	0.002	0.068	-0.57*	0.257	-0.042	0.288	0.529*	0.007	-0.100	-0.315	0.032	1.905
		(0.158)	(0.147)	(-1.136)	(0.571)	(-0.094)	(0.566)	(1.072)	(0.017)	(-0.224)	(-0.690)		
TEC	(1)	0.022*			0.248	0.119	0.435*	-0.143	-0.129			0.027	1.544
		(1.781)			(0.489)	(0.481)	(1.766)	(-0.586)	(-0.271)				
	(2)	0.021*	0.348	0.210	0.618	0.678	0.524	-0.346	-0.434	-0.515	-0.389	0.0439	1.5173
		(1.634)	(0.554)	(0.309)	(1.013)	(1.111)	(0.762)	(-0.519)	(-0.730)	(-0.854)	(-0.628)		
TEL	(1)	0.001			0.121	-0.078	0.428**	-0.078	-0.260			0.045	1.720
		(0.075)			(0.323)	(-0.427)	(2.353)	(-0.434)	(-0.739)				
	(2)	0.003	-0.058	-0.520	0.518	0.394	0.942*	0.407	-0.639	-0.393	-0.488	0.082	1.705
		(0.276)	(-0.129)	(-1.074)	(1.193)	(0.908)	(1.923)	(0.856)	(-1.509)	(-0.916)	(-1.107)		
UTI	(1)	0.003			-0.058	0.124	0.100	-0.073	0.048			0.007	2.110
		(0.324)			(-0.159)	(0.702)	(0.568)	(-0.419)	(0.141)				
	(2)	0.003	0.927**	-0.888**	0.267	0.972**	-0.226	0.735*	-0.232	-0.747*	-0.464	0.126	1.927
		(0.330)	(2.247)	(-1.993)	(0.668)	(2.429)	(-0.501)	(1.677)	(-0.595)	(-1.889)	(-1.143)		

***: significant in 1% level
**: significant in 5% level
*: significant in 10% level

Table 4: Combined test of Fama's Proxy Hypothesis

The table shows regressions of real stock returns are regressed on error term, the lagged, contemporaneous and leading levels of the growth in industrial productions. The data are from DataStream for the period 1994-2007. MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. DW=Durbin Watson statistic. The estimated model is $SR_{i,t} - INF_{i,t} = a_5 + a_6\varepsilon_t + \sum_{j=-k}^{k}\beta_j GIP_{i,t+1} + \xi_{t,4}$. $INF_{i,t}$ is the inflation rate: $(INF_{i,t} = \ln(INFI_{i,t} / INFI_{i,t-1})$. $SR_{i,t}$ are the returns on the equity indexes $(SR_{i,t} = \ln(SP_{i,t} / SP_{i,t-1})$. GIP is the growth rate of Indian industrial production. $GIP_{i,t} = \ln(GIP_{i,t} / GIP_{i,t-1})$. ε_t represents the level of inflation that is purged of the inflation of real activity: $\varepsilon_t = INF_{i,t} - a_3 - \sum_{j=-k}^{k}\tau_i GIP_{i,t+1}$. The regressions are regressed on 12 lagged, contemporaneous and leading levels of GIP. The number in the parentheses is t-statistics.

Variable	c	Error	GINIPt-12	GINIPt-9	GINIPt-6	GINIPt-3	GINIPt	GINIPt+3	GINIPt+6	GINIPt+9	GINIPt+12	R2	DW
MKT	0.004	-3.763***	0.147	-0.418	0.159	0.174	0.201	0.294	-0.033	-0.242	-0.112	0.105	1.951
	(0.548)	(-2.900)	(0.458)	(-1.210)	(0.511)	(0.561)	(0.574)	(0.866)	(-0.110)	(-0.789)	(-0.355)		
BMA	0.009	-3.560**	0.042	-0.323	0.067	0.535*	0.299	0.088	0.012	-0.513	-0.210	0.093	1.766
	(1.179)	(-2.488)	(0.119)	(-0.846)	(0.196)	(1.562)	(0.775)	(0.234)	(0.035)	(-1.515)	(-0.605)		
CONG	0.007	-4.824***	0.407	-0.460	0.206	0.243	-0.021	0.299	-0.051	-0.385	-0.024	0.156	1.699
	(0.903)	(-3.452)	(1.181)	(-1.235)	(0.617)	(0.725)	(-0.056)	(0.818)	(-0.155)	(-1.164)	(-0.071)		
CONS	0.001	-2.795*	-0.249	0.168	0.609	0.728*	0.702	0.201	-0.560	-0.601	-0.229	0.079	1.412
	(0.090)	(-1.423)	(-0.513)	(0.320)	(1.297)	(1.549)	(1.325)	(0.391)	(-1.222)	(-1.294)	(-0.481)		
FIN	0.005	-5.117***	-0.191	-0.541	0.247	0.530	0.739	0.169	0.020	-0.452	-0.160	0.203	2.056
	(0.651)	(-3.506)	(-0.532)	(-1.391)	(0.708)	(1.518)	(1.876)	(0.441)	(0.058)	(-1.308)	(-0.450)		
HEA	0.006	-3.534***	0.104	-0.407	0.155	-0.133	0.027	0.364	-0.204	0.027	0.105	0.118	1.882
	(1.006)	(-3.100)	(0.369)	(-1.339)	(0.568)	(-0.488)	(0.088)	(1.217)	(-0.766)	(0.100)	(0.379)		
IND	0.005	-4.757***	0.358	-0.357	0.515	-0.080	0.136	0.229	-0.337	-0.144	-0.031	0.124	1.670
	(0.570)	(-2.781)	(0.848)	(-0.782)	(1.259)	(-0.194)	(0.294)	(0.512)	(-0.845)	(-0.356)	(-0.074)		
OIL	0.002	-4.042**	0.068	-0.570	0.257	-0.042	0.288	0.529	0.007	-0.100	-0.315	0.067	1.909
	(0.161)	(-2.179)	(0.149)	(-1.152)	(0.580)	(-0.095)	(0.575)	(1.088)	(0.017)	(-0.227)	(-0.700)		
TEC	0.021	-0.592	0.348	0.210	0.618	0.678	0.524	-0.346	-0.434	-0.515	-0.389	0.044	1.514
	(1.628)	(-0.231)	(0.552)	(0.307)	(1.009)	(1.107)	(0.759)	(-0.517)	(-0.728)	(-0.851)	(-0.625)		
TEL	0.003	-3.135*	-0.058	-0.520	0.518	0.394	0.942**	0.407	-0.639	-0.393	-0.488	0.103	1.663
	(0.279)	(-1.741)	(-0.130)	(-1.083)	(1.203)	(0.915)	(1.938)	(0.863)	(-1.521)	(-0.923)	(-1.116)		
UTI	0.003	-2.866*	0.927**	-0.888**	0.267	0.972**	-0.226	0.735*	-0.232	-0.747*	-0.464	0.146	1.953
	(0.333)	(-1.727)	(2.265)	(-2.009)	(0.673)	(2.448)	(-0.505)	(1.690)	(-0.600)	(-1.904)	(-1.152)		

***: significant in 1% level; **: significant in 5% level; *: significant in 10% level

Table 5: Short-run Relation and Structural Break

The table shows the regressions that real stock returns are regressed on inflation rate and structural dummy variables. MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. DW=Durbin Watson statistic. The estimate model is: $SR_{i,t} - INF_{i,t} = a_6 + a_7 INF_{i,t} + \omega_i D_{i,t} * INF_{i,t} + \varepsilon_t$. $SR_{i,t}$ is the returns on the equity indexes $SP_{i,t}$: $(SR_{i,t} = \ln(SP_{i,t} / SP_{i,t-1})$, i =Aggregated market index, industrial indexes in India and China; $INF_{i,t}$ is the inflation rate: $(INF_{i,t} = \ln(INFI_{i,t} / INFI_{i,t-1})$,i = China, India respectively; D=1 if SR is higher than 30% or lower than 30%, otherwise D=0. The number in the parentheses is t-statistics.

Panel A: India

	α_6	α_7	Dummy	R^2	DW
1994 M1 - 2007 M8					
MKT	0.02***	-3.605***	-0.298***	0.160	2.013
	(2.742)	(-3.421)	(-4.025)		
BMA	0.023***	-3.4***	-0.343***	0.149	1.843
	(2.849)	(-2.903)	(-4.172)		
CONG					
CONS	0.02*	-2.771*	-0.137**	0.046	1.646
	(1.731)	(-1.726)	(-2.092)		
FIN	0.029***	-5.015***	-0.39***	0.193	1.986
	(3.156)	(-3.893)	(-4.314)		
HEA					
IND	0.028***	-4.755***	-0.303***	0.126	1.849
	(2.806)	(-3.400)	(-3.092)		
OIL	0.016	-2.607*	-0.184***	0.101	1.961
	(1.498)	(-1.760)	(-3.510)		
TEC	0.026*	-2.688	0.142**	0.082	1.759
	(1.932)	(-1.391)	(3.642)		
TEL	0.025***	-4.383***	-0.303***	0.166	1.954
	(2.479)	(-3.116)	(-4.327)		
UTI	0.017*	-3.886**	0.142**	0.060	2.163
	(1.693)	(-2.574)	(2.313)		

***: significant in 1% level
**: significant in 5% level
*: significant in 10% level

Table 5 - continued

Panel B: China A-share

	Estimate coefficients				
	α_6	α_7	Dummy	R^2	DW
1994 M1 - 2007 M8					
MKT	0.005	-1.181	0.435***	0.199	1.682
	(0.691)	(-1.057)	(6.299)		
BMA	0.008	0.727	0.19***	0.060	1.839
	(0.942)	(0.587)	(3.035)		
CONG	0.004	0.295	0.149**	0.033	2.019
	(0.464)	(0.231)	(2.310)		
CONS	0.006	-0.657	0.486***	0.310	1.902
	(0.734)	(-0.580)	(8.475)		
FIN	0.001	0.010	0.367***	0.279	1.903
	(0.125)	(0.008)	(7.838)		
HEA	0.008	0.232	0.189***	0.055	2.027
	(0.880)	(0.170)	(2.953)		
IND	0.001	-1.513	0.303***	0.160	1.928
	(0.056)	(-1.059)	(5.502)		
OIL					
TEC	0.004	1.008	0.366***	0.199	1.858
	(0.495)	(0.674)	(5.398)		
TEL	-0.003	-0.880	0.272***	0.106	2.054
	(-0.303)	(-0.619)	(4.348)		
UTI	0.009	-0.178	0.153**	0.033	1.835
	(1.000)	(-0.138)	(2.349)		

Panel C: China B&H share

	Estimate coefficients				
	α_6	α_7	Dummy	R^2	DW
1994 M1 - 2007 M8					
MKT	0.009	1.033	-0.326	0.069	1.864
	(1.187)	(0.919)	(-3.335)		
BMA	0.012	1.936	-0.012	0.011	1.883
	(1.102)	(1.291)	(-0.263)		
CONG	0.000	1.445	0.215***	0.109	2.002
	(-0.046)	(1.018)	(4.204)		
CONS	0.002	0.553	0.298***	0.056	1.847
	(0.298)	(0.485)	(2.997)		
FIN	0.004	0.613	0.418***	0.158	1.701
	(0.481)	(0.494)	(5.454)		
IND	0.009	2.554*	0.062	0.026	1.827
	(0.832)	(1.720)	(1.051)		
OIL	0.007	-0.235	0.072***	0.013	1.692
	(0.716)	(-0.149)	(1.393)		
TEL	0.005	1.313	0.145**	0.034	1.872
	(0.481)	(0.708)	(1.995)		
UTI	0.019**	0.255	-0.19***	0.076	2.069
	(2.085)	(0.171)	(-3.421)		

***: significant in 1% level, **: significant in 5% level, *: significant in 10% level

Table 6: Augmented Dickey-Fuller and Kwiatkowski, Phillips, Schmidt, and Shin Tests.

ADF = argumented Dickey-Fuller (1979); KPSS = Kwiatatkowski, Phillips, Schmidt, and Shin (1992); MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. The ADF and KPSS tests are conducted by setting a lag length (k) of 20 and testing down as explained in the text. However, the results are robust to any lag length of 0 to 20. For the ADF tests, τ_μ denotes the only constant term in the estimating equation, whereas τ_τ denotes both the constant term and a linear trend. Similarly, η_μ denotes only the constant term, whereas η_τ denotes both the constant term and a linear trend in the KPSS model.

Critical values:

	$ADF\tau_\mu$	$ADF\tau_\mu$	$KPSS\eta_\mu$	$KPSS\eta_\tau$
1%	-3.43	-3.93	0.739	0.216
5%	-2.86	-3.41	0.463	0.146

Panel A: India

	Log levels				First differences			
	$ADF\tau_\mu$	$ADF\tau_\mu$	$KPSS\eta_\mu$	$KPSS\eta_\tau$	$ADF\tau_\mu$	$ADF\tau_\mu$	$KPSS\eta_\mu$	$KPSS\eta_\tau$
MKT	1.152	-1.369	1.201***	0.358***	-13.004***	-13.471***	0.575	0.026
BMA	-0.126	-0.903	0.777***	0.318***	-6.968***	-7.029***	0.181	0.09
CONG	-1.767	-2.295	0.665***	0.126*	-10.646***	-10.614***	0.049	0.049
CONS	0.545	-1.412	1.034***	0.370***	-14.055***	-14.557***	0.513	0.033
FIN	-0.671	-2.305	1.305***	0.091	-13.060***	-13.061***	0.079	0.064
HEA	0.262	-0.501	0.455*	0.248***	-11.858***	-12.025***	0.414	0.124
IND	0.453	-1.120	0.889***	0.339***	-13.222***	-13.586***	0.449	0.039
OIL	-0.84	-1.600	0.607**	0.354	-12.648***	-12.810***	0.259	0.047
TEC	-1.418	-1.278	1.271***	0.254***	-10.059***	-10.093***	0.211	0.096
TEL	0.019	-0.552	0.301***	0.250***	-11.386***	-11.686***	0.475	0.108
UTI	-0.013	-1.134	0.732***	0.362***	-14.353***	-14.789***	0.432	0.057
WPI	-1.469	-4.877	1.567***	0.119*	-9.520***	-9.595***	0.218	0.092

Panel B: China A-share

	Log levels				First differences			
	$ADF\tau_\mu$	$ADF\tau_\mu$	$KPSS\eta_\mu$	$KPSS\eta_\tau$	$ADF\tau_\mu$	$ADF\tau_\mu$	$KPSS\eta_\mu$	$KPSS\eta_\tau$
MKT	-0.361	-1.334	0.740***	0.158***	-11.159***	-11.214***	0.182	0.118
BMA	-1.467	-1.492	0.145	0.148**	-12.649***	-12.690***	0.173	0.117
CONG	-0.876	-1.546	0.774***	0.205**	-10.933***	-10.915***	0.135	0.128
CONS	-0.707	-1.459	0.758***	0.245***	-11.392***	-11.385***	0.136	0.129
FIN	-1.408	-1.700	0.578**	0.247***	-10.188***	-10.156***	0.114	0.119
HEA	-1.346	-1.434	0.290***	0.246***	-12.260***	-12.222***	0.160	0.167
IND	-1.564	-1.533	0.320*	0.321***	-11.155***	-11.126***	0.255	0.179
OIL	0.999	-0.527	0.749***	0.152**	-9.823***	-10.069***	0.415	0.11
TEC	-1.622	-1.711	0.201	0.159**	-11.275***	-11.228***	0.154	0.156
TEL	-1.715	-1.796	0.367*	0.324***	-13.094***	-13.064***	0.140	0.107
UTI	-0.756	-1.594	0.932***	0.289***	-11.700***	-11.679***	0.106	0.114
CPI	-2.584	-0.631	0.720***	0.327***	-8.968***	-9.692***	0.57	0.066

Table 6 – continued

Panel C: China B-share

	Log levels				First differences			
	$ADF\tau_\mu$	$ADF\tau_\mu$	$KPSS\eta_\mu$	$KPSS\eta_\tau$	$ADF\tau_\mu$	$ADF\tau_\mu$	$KPSS\eta_\mu$	$KPSS\eta_\tau$
MKT	-0.044	-1.701	0.799***	0.36***	-11.728***	-12.008***	0.545	0.033
BMA	0.067	-1.638	0.907***	0.342***	-11.786***	-12.012***	0.439	0.026
CONG	-0.633	-2.685	1.045***	0.172***	-12.165***	-12.277***	0.301	0.075
CONS	-0.760	-1.823	0.608**	0.35***	-7.156***	-12.324***	0.446	0.034
FIN	-0.437	-2.161	1.039***	0.137**	-11.518***	-11.545***	0.186	0.047
HEA								
IND	-0.117	-2.258	1.043***	0.246***	-11.173***	-11.356***	0.394	0.074
OIL	-0.426	-1.340	0.686**	0.316***	-10.334***	-10.367***	0.224	0.051
TEC	-2.125	-2.713	0.846***	0.07	-10.708***	-10.668***	0.039	0.037
TEL								
UTI	-1.078	-2.349	1.19***	0.1	-12.259***	-12.221***	0.053	0.051
CPI	-2.584	-0.631	0.721**	0.328***	-8.968***	-9.692***	0.571	0.067

***: significant in 1% level
**: significant in 5% level
*: significant in 10% level

Table 7: Likelihood Ratio (LR) Statistics and Akanke Information Criterion (AIC) for Vector Auto regression (VAR) Lengths Specification.

MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. A VAR length of 20 is specified as the most general model. LR test statistics and AIC is computed by sequentially reducing one VAR length at a time. $\left|\sum\right|$ is the determinant of the variance-covariance matrix of the residuals and N is the total number of parameters estimated in all equations. For example, if each equation in an n variable VAR has p lags and an intercept, then $N = n^2p+n$; each of the regressors has np lagged regressors and an intercept. Sims's (1980) LR test is given by $LR = (T-c)(\log\left|\sum_R\right| - \log\left|\sum_U\right|) \sim \chi^2(R)$.

2. Adopted lag lengths as discussed in the text.

	$LR:(T-c)(\log\left\|\sum_R\right\| - l\log\left\|\sum_U\right\|)$	$AIC: T\log\left\|\sum\right\| + 2N$	lags adopted
Panel A: India			
MKT	6	6	8
BMA	6	6	11
CONG	13	6	8
CONS	6	6	17
FIN	20	5	10
HEA	6	6	20
IND	6	6	6
OIL	9	6	8
TEC	13	13	13
TEL	6	6	8
UTI	6	6	8
Panel B: China A-share			
MKT	13	13	13
BMA	15	15	14
CONG	13	13	13
CONS	19	13	13
FIN	13	13	13
HEA	18	13	13
IND	19	13	14
OIL	15	15	20
TEC	20	13	20
TEL	13	13	14
UTI	13	13	13
Panel C: China B-share			
MKT	13	11	13
BMA	13	11	13
CONG	13	13	13
CONS	13	11	13
FIN	13	11	13
HEA			
IND	13	11	13
OIL	13	12	6
TEC	16	17	5
TEL			
UTI	13	11	13

Table 8: Cointegration Test

MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. The null is defined in the first column: none cointegration, at most 1 cointegration. The critical value of trace statistics is reported at the last column. Cointegration test of India is examined under assumption of no linear trend in data, and for China is examined under assumption of there is linear trend in data. The trace statistic bigger than 5% critical value means rejection of null at 5% confindence level, otherwise accept the null. The adopted vector autoregression lengths are reported in the last column of Table 10.

No. of conintegration vectors	Trace statistic											
	MKT	BMA	CONG	CONS	FIN	HEA	IND	OIL	TEC	TEL	UTI	5% critical value
Panel A: India												
None	37.839	34.412	30.435	21.199	24.698	24.888	30.135	39.865	30.876	28.976	30.711	20.262
At most 1	8.571	8.624	4.250	3.984	6.084	5.881	3.641	6.928	4.665	3.676	6.293	9.165
Panel B: China A-share												
No. of conintegration vectors	Trace statistic											
	MKT	BMA	CONG	CONS	FIN	HEA	IND	OIL	TEC	TEL	UTI	5% critical value
None	20.589	25.601	35.399	27.231	24.488	17.728	23.108	15.603	19.751		46.518	15.495
At most 1	2.691	2.361	4.15	2.354	7.418	4.952	9.155	0.033	0.521		5.15	3.841
Panel C: China B-share												
No. of conintegration vectors	Trace statistic											
	MKT	BMA	CONG	CONS	FIN	HEA	IND	OIL	TEC	TEL	UTI	5% critical value
None	19.975	23.383	24.577	20.298	21.844		21.439	14.856	18.475		25.591	15.495
At most 1	0.035	0.072	1.069	0.128	0.579		0.573	0.056	0.717		0.45	3.841

Table 9: Long run Relations between Stock Prices and Goods Prices

Note: MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. DW=Durbin Watson statistic. The estimated model is: $\ln SP_t = c_1 + c_2 \ln INFI_t$, where SP_t is stock prices indexes in India and China, *INFI* is goods prices indexes. c_2 is the elasticity of stock prices with respect to goods prices. The number in the brackets is t-statistics.

Panel A: India

	C_1	C_2	e
MKT	-3.792	1.668*	-0.014
		[-1.85]	
BMA	-29.474	7.029***	-0.022
		[-3.224]	
CONG	-15.997	3.432	-0.004
		[-1.233]	
CONS	3.204	2.021	-0.016
		[-1]	
FIN	-15	4.125***	-0.008
		[-2.387]	
HEA	- 0.857	2.146***	-0.019
		[-3.142]	
IND	-10.272	2.177	-0.004
		[-0.67]	
OIL	-6.447	1.935*	-0.006
		[-1.72]	
TEC	-16.827	6.648*	-0.037
		[-1.628]	
TEL	-22.574	4.540	-0.0007
		[-1.284]	
UTI	-17.31	4.049**	-0.0002
		[-1.656]	

Panel B: China A-share

	C_1	C_2	e
MKT	-18.285	5.5***	-0.068
		[-2.406]	
BMA	-39.812	9.926***	-0.060
		[-3.184]	
CONG	-49.206	11.558***	-0.041
		[-3.367]	
CONS	- 3.058	1.948***	-0.093
		[-1.17]	
FIN	- 60.063	14.514***	-0.034
		[-2.444]	
HEA	-5.6	2.379	-0.052
		[-0.382]	
IND			
OIL	-44.015	10.543***	-0.062
		[-3.157]	
TEC	6.508	- 0.269	-0.120
		[0.048]	
TEL			
UTI	2.540	0.625	-0.130
		[-0.424]	

Panel C: China B-share

	C_1	C_2	e
MKT	-137.772	30.805***	-0.003
		[-4.249]	
BMA	-156.319	34.824***	-0.007
		[-4.669]	
CONG	-102.679	23.216***	-0.017
		[-4.05]	
CONS	-102.824	23.26***	-0.003
		[-4.528]	
FIN	-73.369	17.128***	-0.023
		[-3.604]	
HEA			
IND	-130.953	29.317***	-0.003
		[-4.154]	
OIL	-168.607	37.461***	-0.011
		[-3.734]	
TEC	-73.404	17.041***	-0.033
		[-3.902]	
TEL			
UTI	-143.461	32.262***	-0.031
		[-4.523]	

Table 10: Long Run Relation with Structural Breaks

Panel A: Structural breaks and Cointegration test

MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. The null is defined in the first column: none cointegration, at most 1 cointegration. The critical value of trace statistics is reported at the last column. Cointegration test of India is examined under assumption of no linear trend in data, and for China is examined under assumption of there is linear trend in data. Dummy variables are involved as exogenous variable in cointegration tests, where D=1 if SR is higher than 30% or lower than 30%, otherwise D=0. The trace statistic bigger than 5% critical value means rejection of null at 5% confidence level, otherwise accept the null. The adopted vector autoregression lengths are reported in the last column of Table 10.

No. of cointegration vectors	Trace statistic					5% critical value
	CONS	OIL	TEC	TEL	UTI	
India						
None *	23.095	38.486	37.142	21.549	31.92	20.262
At most 1	3.611	6.938	5.104	2.483	6.323	9.165

No. of cointegration vectors	Trace statistic					5% critical value
	MKT	BMA	FIN	HEA	UTI	
China A-Share						
None	20.589	23.944	26.556	17.418	48.927	15.495
At most 1	2.691	0.076	3.777	2.456	3.585	3.841

No. of cointegration vectors	Trace statistic											5% critical value
	MKT	BMA	CONG	CONS	FIN	HEA	IND	OIL	TEC	TEL	UTI	
China B&H-share												
None	19.249	23.944	24.375	19.709	21.859		21.155	15.136	17.331		27.949	15.495
At most one	0.113	0.077	0.096	0.05	0.288		0.324	0.029	0.285		0.585	3.841

Table 10 - continued

Panel B: Structural Breaks and VEC model

MKT = aggregated stock price index, BMA = basic material, CONG = consumer goods, CONS = consumer services, Fin = financials, HEA = health care, IND = industrials, OIL = oil&gas, TEC = technology, TEL = telecom, UTI = utilities. DW=Durbin Watson statistic. The estimated model is: $\ln SP_t = c_1 + c_2 \ln INFI_t$, where SP_t is stock prices indexes in India and China, $INFI$ is goods prices indexes. c_2 is the elasticity of stock prices with respect to goods prices. Dummy variables are involved as exogenous variable in cointegration tests, where D=1 if SR is higher than 30% or lower than 30%, otherwise D=0. The number in the brackets is t-statistics.

India

	C_1	C_2	e
CONS	-4.378	2.387	-0.009
		[-0.765]	
OIL	5.981	1.801*	0.010
		[-1.487]	
TEC	21.681	7.28***	-0.061
		[-7.343]	
TEL	-56.668	7.401	-0.001
		[0.711]	
UTI	15.982	3.844*	0.005
		[-1.75]	

China A-share

	C_1	C_2	e
BMA	-21.906	6.017***	-0.054
		[-2.406]	
FIN	-222.958	49.684***	-0.011
		[-3.669]	
HEA	18.278	-2.787	-0.075
		[0.554]	
UTI	5.71	-0.06	-0.134
		[0.043]	

China B-share

	C_1	C_2	e
MKT	-140.119	31.312***	-0.001
		[-4.153]	
BMA	-169.49	37.668***	-0.002
		[-4.708]	
CONG	-117.717	26.463***	-0.016
		[-4.206]	
CONS	-96.493	21.893***	-0.006
		[-4.409]	
FIN	-77.753	18.075***	-0.019
		[-3.68]	
HEA			
IND	-133.417	29.849***	-0.003
		[-4.14]	
OIL	-170.467	37.863***	-0.010
		[-3.761]	
TEC	-75.852	17.571***	-0.081
		[-3.889]	
TEL			
UTI	-138.338	31.153***	-0.038
		[-4.698]	

Table 11: Relations among goods prices, real activities and monetary policy

ln(IP)=ln(Industrial production); ln(MS)=ln(money supply); ln(CPI)=ln(consumer price index), ln(WPI)=ln(wholesale price index). The Lag length is 12 for China and India. The cointegration test and VEC model is examined under assumption of no linear trend in the data for both China and India. The trace statistic bigger than 5% critical value means rejection of null at 5% confidence level, otherwise accept the null. The long run estimated model in panel B is: $\ln(INFI) = d_1 + d_2 \ln(IP) + d_3 \ln(MS)$. χ^2 is Chi-square distributed. The number in parentheses is t-statistics. The number in brackets is p-values.

Panel A: Cointegrations of Inflation, Money supply and Industrial production

		India	China	
Null	Alternative	statistic	statistic	0.05 Critical Value
r=0	r≥1	52.068	48.827	35.193
r≤1	r≥2	15.015	15.765	20.262
r≤2	r=3	2.221	1.784	9.165

Note: Trace test indicates 1 cointegrating eq (s) at the 0.05 level

Panel B: VEC model:

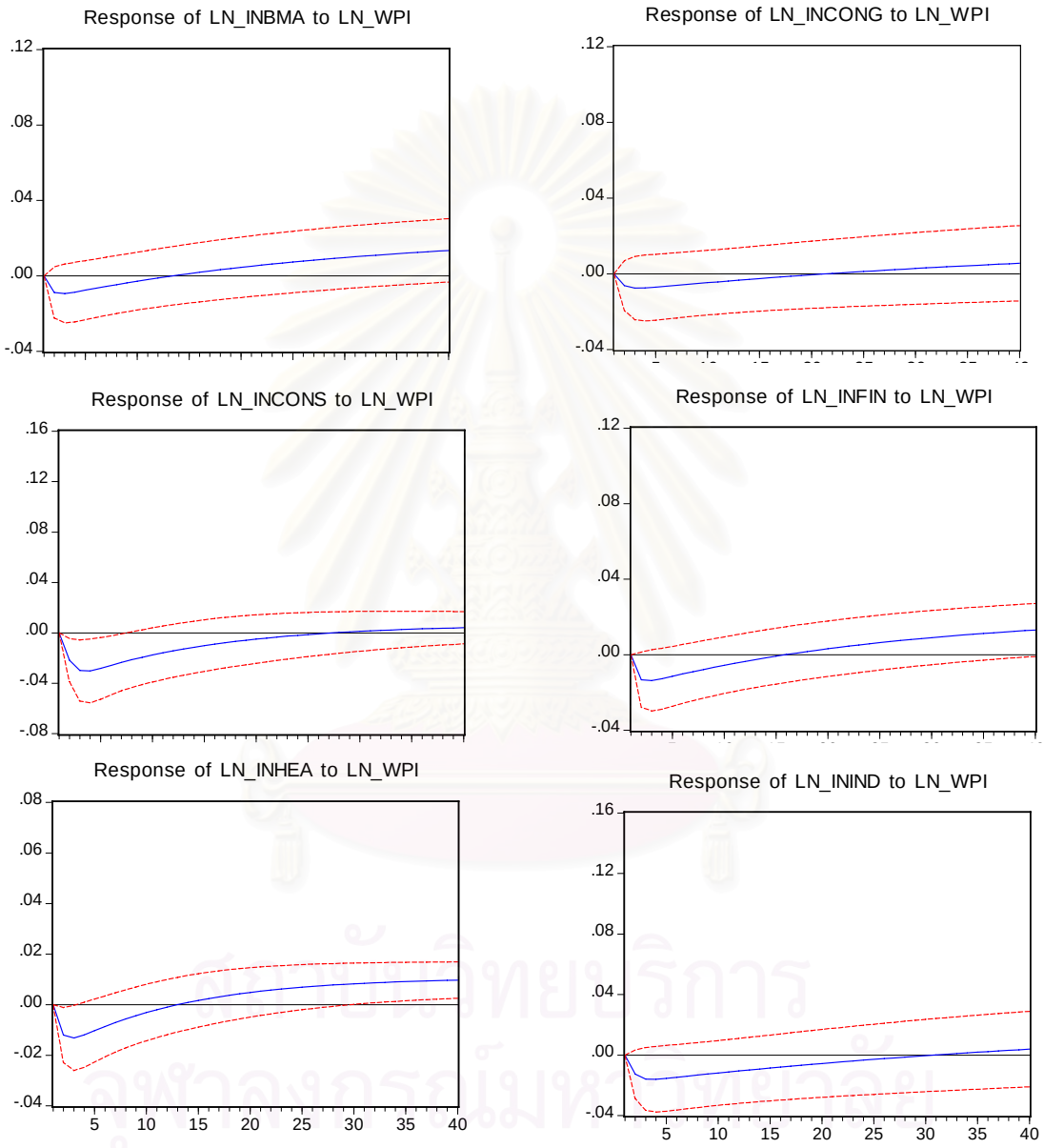
	d2	d3	LR tests of restrictions
ln(WPI)	0.8***	29.3***	ln(money supply)=0, χ^2 = 12.917 [0.000]
	(-11.039)	(-3.89)	ln(industrial production)=0, χ^2 = 2.067 [0.15]
ln(CPI)	0.57***	4.967***	ln(money supply)=0, χ^2 = 6.354 [0.01]
	(-4.638)	(-2.939)	ln(industrial production)=0, χ^2 = 11.132 [0.000]

***: significant in 1% level
**: significant in 5% level
*: significant in 10% level

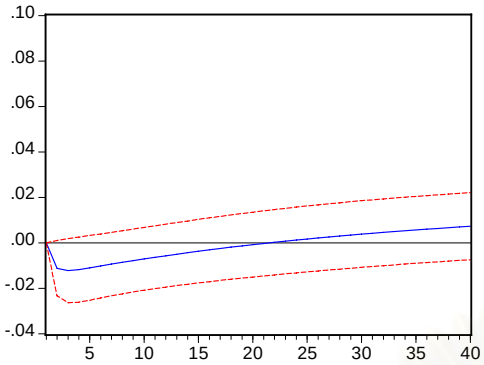
Figure IV: Graphs of impulse response function illustrating the response of stock price indexes to a one standard deviation shock in the goods prices.

Forecast horizon is months.

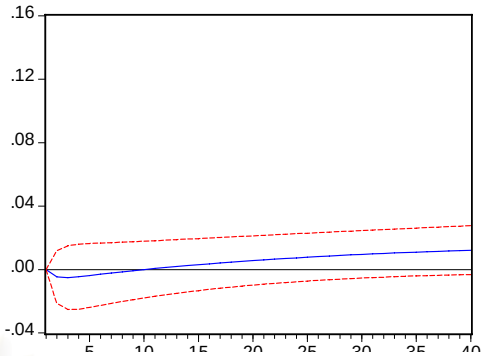
Panel A: India



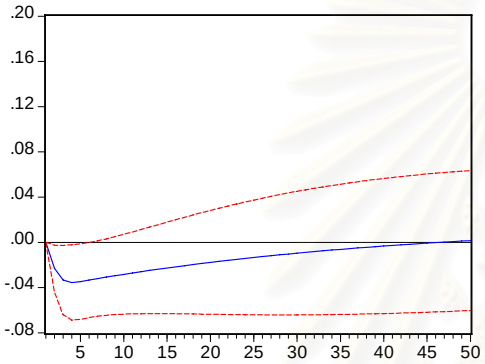
Response of LN_INMKT to LN_WPI



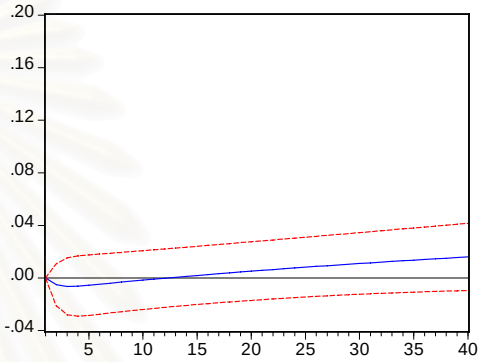
Response of LN_INOIL to LN_WPI



Response of LN_INTEC to LN_WPI



Response of LN_INTEL to LN_WPI



Response of LN_INUTI to LN_WPI

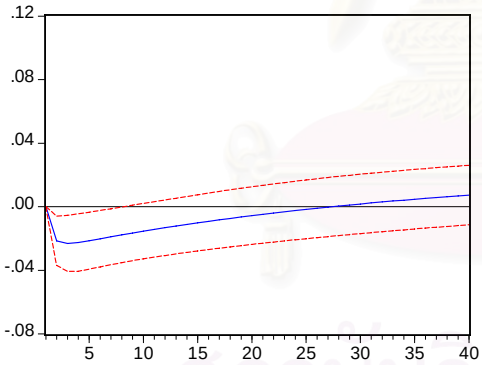
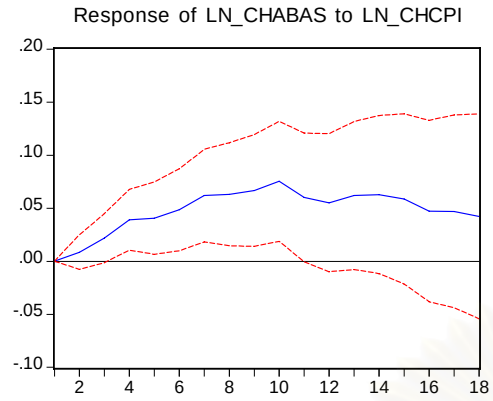
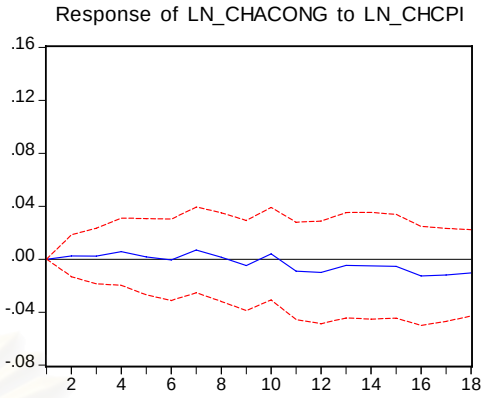
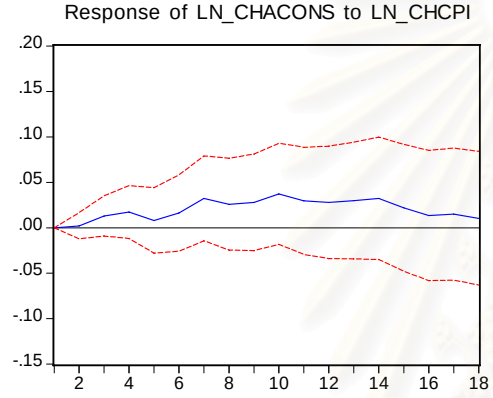
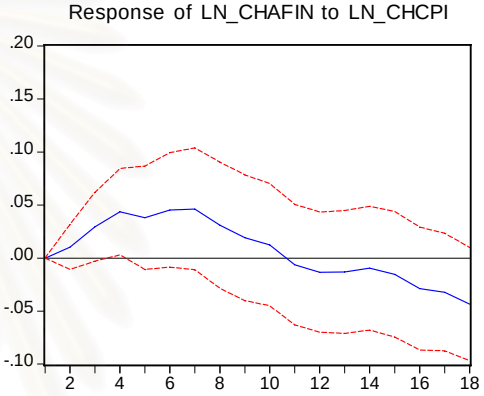


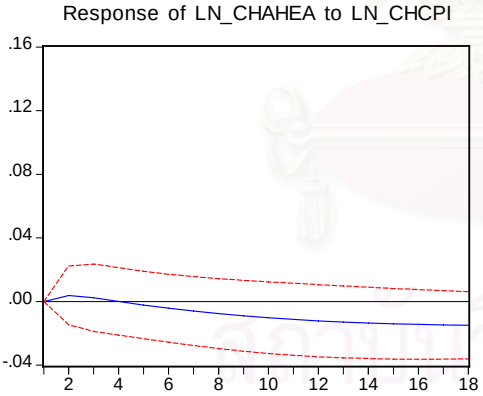
Figure IV - Continued
Panel B: China A-share

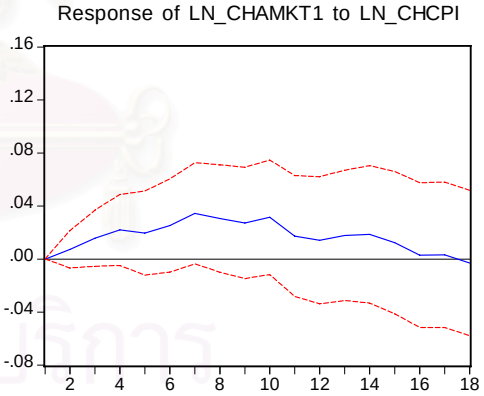




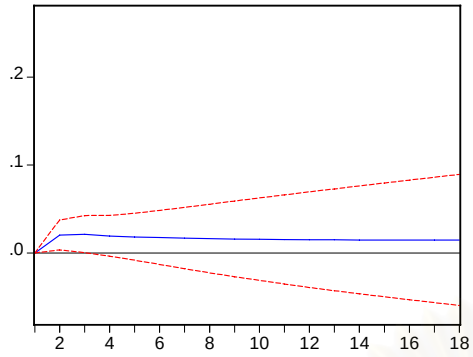




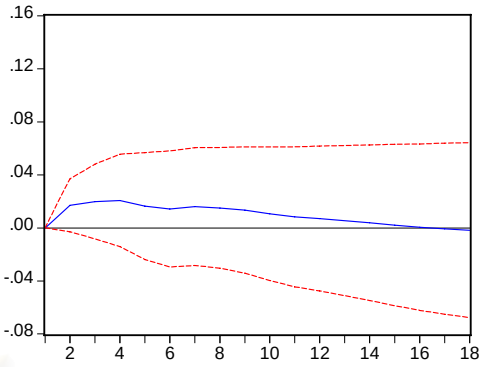




Response of LN_CHAOIL to LN_CHCPI



Response of LN_CHATEC to LN_CHCPI



Response of LN_CHAUTI to LN_CHCPI

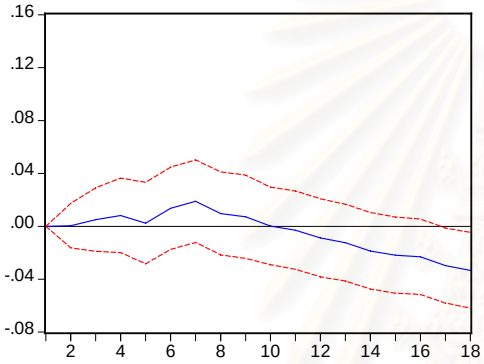
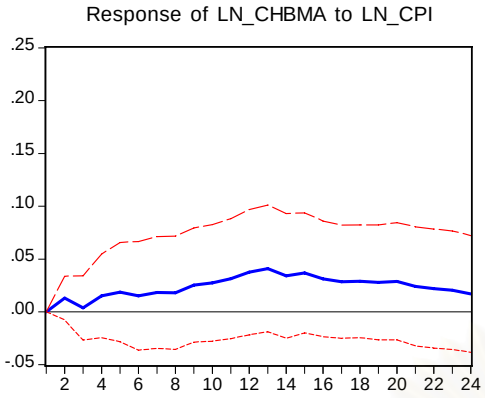
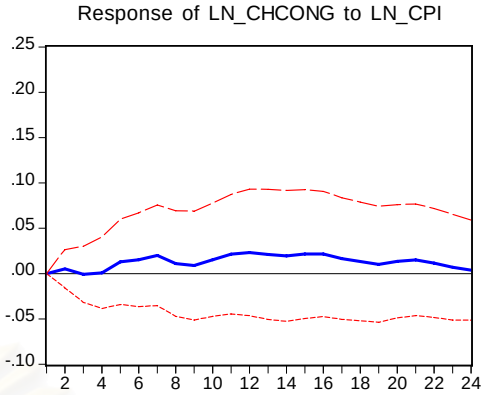
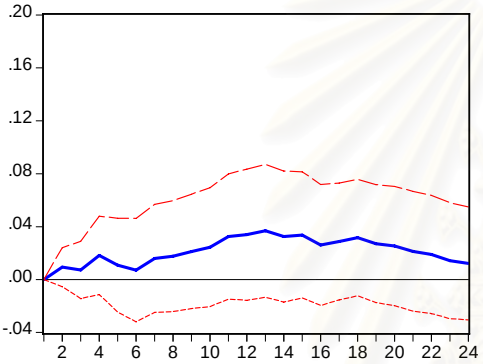


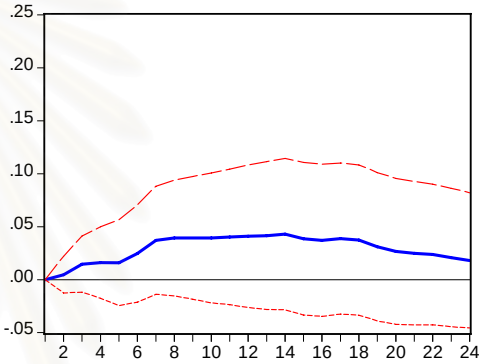
Figure IV - Continued

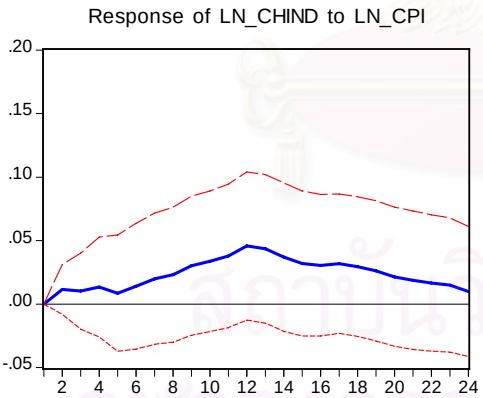
Panel C: China B&H Share

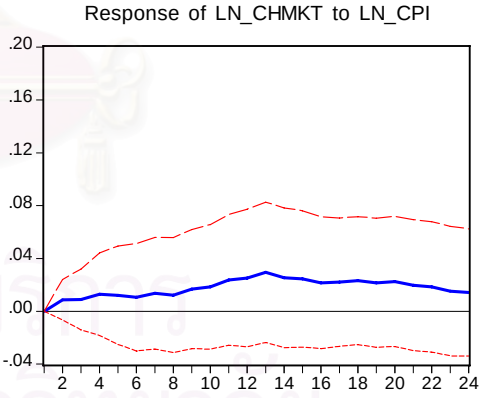




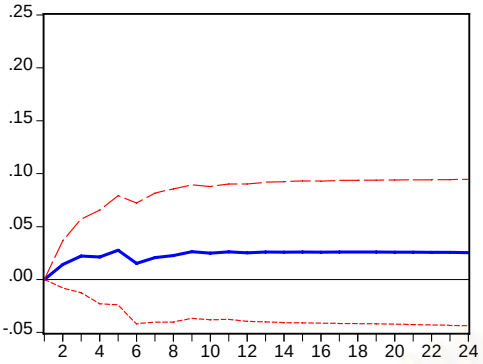








Response of LN_CHOIL to LN_CPI



Response of LN_CHTEC to LN_CPI

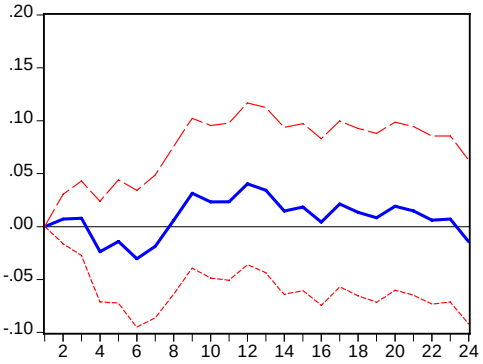


Table 12: Impulse Response Function and Their t-values

The number in parentheses is t-statistics.

Panel A: India

Forecast Horizon month	MKT	BMA	CONG	CONS	FIN	HEA	IND	OIL	TEC	TEL	UTI
1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	-0.011126	-0.00881	-0.006223	-0.02165	-0.013241	-0.012009	-0.012616	-0.004653	-0.023017	-0.005205	-0.021448
	(0.00608)	(0.00677)	(0.00659)	(0.00854)	(0.00733)	(0.00544)	(0.00801)	(0.00830)	(0.01029)	(0.00809)	(0.00773)
3	-0.012217	-0.009344	-0.007552	-0.029837	-0.013609	-0.013156	-0.01582	-0.005088	-0.033398	-0.006463	-0.023061
	(0.00705)	(0.00781)	(0.00834)	(0.01213)	(0.00810)	(0.00645)	(0.01037)	(0.01005)	(0.01533)	(0.01085)	(0.00883)
4	-0.01176	-0.008578	-0.00748	-0.030184	-0.012673	-0.011907	-0.015985	-0.004528	-0.035471	-0.006195	-0.022517
	(0.00717)	(0.00790)	(0.00869)	(0.01267)	(0.00806)	(0.00644)	(0.01086)	(0.01025)	(0.01663)	(0.01146)	(0.00902)
5	-0.01098	-0.007573	-0.007073	-0.028127	-0.011426	-0.010243	-0.015422	-0.003757	-0.034693	-0.005514	-0.021358
	(0.00712)	(0.00783)	(0.00871)	(0.01222)	(0.00792)	(0.00622)	(0.01088)	(0.01007)	(0.01666)	(0.01151)	(0.00897)
6	-0.010154	-0.006552	-0.006593	-0.025703	-0.010167	-0.008595	-0.014709	-0.00296	-0.033322	-0.004741	-0.020111
	(0.00704)	(0.00776)	(0.00866)	(0.01169)	(0.00779)	(0.00601)	(0.01083)	(0.00982)	(0.01657)	(0.01144)	(0.00888)
7	-0.00934	-0.005559	-0.006104	-0.023405	-0.008945	-0.007052	-0.013974	-0.00218	-0.031948	-0.003957	-0.018873
	(0.00698)	(0.00770)	(0.00861)	(0.01130)	(0.00768)	(0.00585)	(0.01077)	(0.00958)	(0.01665)	(0.01136)	(0.00881)
8	-0.008548	-0.004599	-0.005621	-0.021287	-0.00777	-0.005624	-0.013246	-0.001426	-0.030648	-0.003181	-0.017665
	(0.00694)	(0.00768)	(0.00857)	(0.01104)	(0.00760)	(0.00574)	(0.01072)	(0.00934)	(0.01689)	(0.01129)	(0.00875)
9	-0.007781	-0.003675	-0.005146	-0.019326	-0.006641	-0.004307	-0.012531	-0.0007	-0.029403	-0.002417	-0.01649
	(0.00692)	(0.00766)	(0.00855)	(0.01085)	(0.00754)	(0.00565)	(0.01070)	(0.00913)	(0.01723)	(0.01123)	(0.00872)
10	-0.007037	-0.002785	-0.004681	-0.017504	-0.005558	-0.003094	-0.011829	-1.44E-06	-0.028195	-0.001665	-0.015348
	(0.00691)	(0.00767)	(0.00854)	(0.01072)	(0.00749)	(0.00558)	(0.01070)	(0.00894)	(0.01764)	(0.01118)	(0.00871)
11	-0.006316	-0.001927	-0.004226	-0.015807	-0.004517	-0.001976	-0.011141	0.000671	-0.027019	-0.000926	-0.01424
	(0.00691)	(0.00769)	(0.00854)	(0.01061)	(0.00746)	(0.00552)	(0.01071)	(0.00876)	(0.01810)	(0.01114)	(0.00872)
12	-0.005618	-0.0011	-0.003781	-0.014227	-0.003518	-0.000946	-0.010467	0.001318	-0.025873	-0.000199	-0.013162
	(0.00692)	(0.00771)	(0.00855)	(0.01052)	(0.00743)	(0.00546)	(0.01073)	(0.00860)	(0.01860)	(0.01111)	(0.00874)
13	-0.004942	-0.000302	-0.003344	-0.012754	-0.002559	1.77E-06	-0.009805	0.001940	-0.024754	0.000516	-0.012116
	(0.00694)	(0.00774)	(0.00857)	(0.01042)	(0.00741)	(0.00540)	(0.01076)	(0.00845)	(0.01913)	(0.01109)	(0.00877)
14	-0.004286	0.000466	-0.002917	-0.011383	-0.001637	0.000875	-0.009157	0.002539	-0.023663	0.001219	-0.011099
	(0.00696)	(0.00778)	(0.00860)	(0.01033)	(0.00740)	(0.00534)	(0.01081)	(0.00832)	(0.01967)	(0.01108)	(0.00880)
15	-0.003651	0.001208	-0.002499	-0.010105	-0.000752	0.001679	-0.008521	0.003116	-0.0226	0.001910	-0.010111
	(0.00698)	(0.00782)	(0.00863)	(0.01023)	(0.00739)	(0.00527)	(0.01086)	(0.00820)	(0.02023)	(0.01107)	(0.00884)

16	-0.003035	0.001923	-0.002089	-0.008916	9.79E-05	0.002419	-0.007897	0.003670	-0.021563	0.002589	-0.009151
	(0.00701)	(0.00786)	(0.00867)	(0.01012)	(0.00738)	(0.00520)	(0.01092)	(0.00809)	(0.02078)	(0.01108)	(0.00888)
17	-0.002438	0.002613	-0.001688	-0.007808	0.000915	0.003101	-0.007286	0.004204	-0.020552	0.003258	-0.008218
	(0.00704)	(0.00789)	(0.00871)	(0.01001)	(0.00737)	(0.00513)	(0.01099)	(0.00800)	(0.02133)	(0.01108)	(0.00893)
18	-0.001859	0.003278	-0.001295	-0.006777	0.001700	0.003728	-0.006686	0.004718	-0.019566	0.003915	-0.007312
	(0.00707)	(0.00793)	(0.00876)	(0.00988)	(0.00736)	(0.00505)	(0.01106)	(0.00791)	(0.02188)	(0.01110)	(0.00897)
19	-0.001298	0.003921	-0.000911	-0.005817	0.002454	0.004305	-0.006098	0.005213	-0.018605	0.004562	-0.006431
	(0.00710)	(0.00797)	(0.00882)	(0.00974)	(0.00736)	(0.00497)	(0.01113)	(0.00783)	(0.02242)	(0.01112)	(0.00902)
20	-0.000754	0.004542	-0.000535	-0.004924	0.003179	0.004836	-0.005522	0.005689	-0.017668	0.005198	-0.005575
	(0.00713)	(0.00801)	(0.00887)	(0.00960)	(0.00735)	(0.00489)	(0.01120)	(0.00777)	(0.02295)	(0.01115)	(0.00906)
21	-0.000226	0.005141	-0.000166	-0.004093	0.003876	0.005324	-0.004957	0.006147	-0.016754	0.005824	-0.004743
	(0.00716)	(0.00804)	(0.00893)	(0.00944)	(0.00733)	(0.00480)	(0.01128)	(0.00771)	(0.02346)	(0.01118)	(0.00911)
22	0.000286	0.005720	0.000195	-0.003319	0.004547	0.005773	-0.004403	0.006588	-0.015864	0.006439	-0.003934
	(0.00719)	(0.00807)	(0.00898)	(0.00928)	(0.00732)	(0.00472)	(0.01136)	(0.00766)	(0.02396)	(0.01122)	(0.00914)
23	0.000783	0.006280	0.000548	-0.0026	0.005191	0.006186	-0.003859	0.007012	-0.014996	0.007045	-0.003148
	(0.00721)	(0.00810)	(0.00904)	(0.00912)	(0.00731)	(0.00463)	(0.01143)	(0.00761)	(0.02444)	(0.01126)	(0.00918)
24	0.001265	0.006821	0.000895	-0.00193	0.005811	0.006565	-0.003326	0.007421	-0.014151	0.007641	-0.002384
	(0.00723)	(0.00813)	(0.00910)	(0.00895)	(0.00729)	(0.00454)	(0.01151)	(0.00757)	(0.02490)	(0.01131)	(0.00921)
25	0.001733	0.007344	0.001233	-0.001308	0.006407	0.006914	-0.002803	0.007814	-0.013327	0.008227	-0.001641
	(0.00725)	(0.00816)	(0.00916)	(0.00877)	(0.00727)	(0.00446)	(0.01159)	(0.00754)	(0.02535)	(0.01137)	(0.00924)
26	0.002187	0.007850	0.001565	-0.00073	0.006981	0.007234	-0.00229	0.008193	-0.012523	0.008804	-0.000919
	(0.00727)	(0.00818)	(0.00922)	(0.00860)	(0.00726)	(0.00438)	(0.01166)	(0.00752)	(0.02578)	(0.01143)	(0.00927)
27	0.002628	0.008340	0.001890	-0.000192	0.007533	0.007528	-0.001788	0.008558	-0.011741	0.009372	-0.000216
	(0.00729)	(0.00820)	(0.00928)	(0.00842)	(0.00724)	(0.00430)	(0.01174)	(0.00750)	(0.02619)	(0.01149)	(0.00929)
28	0.003056	0.008814	0.002208	0.000308	0.008064	0.007798	-0.001295	0.008909	-0.010978	0.009931	0.000467
	(0.00730)	(0.00822)	(0.00934)	(0.00825)	(0.00722)	(0.00423)	(0.01181)	(0.00749)	(0.02657)	(0.01156)	(0.00931)
29	0.003472	0.009273	0.002520	0.000772	0.008575	0.008046	-0.000811	0.009248	-0.010235	0.010481	0.001131
	(0.00732)	(0.00824)	(0.00940)	(0.00807)	(0.00720)	(0.00415)	(0.01188)	(0.00748)	(0.02695)	(0.01164)	(0.00933)
30	0.003875	0.009717	0.002825	0.001203	0.009068	0.008273	-0.000337	0.009573	-0.009511	0.011022	0.001777
	(0.00733)	(0.00826)	(0.00946)	(0.00790)	(0.00718)	(0.00409)	(0.01194)	(0.00748)	(0.02730)	(0.01172)	(0.00934)
31	0.004267	0.010148	0.003124	0.001603	0.009542	0.008481	0.000129	0.009887	-0.008806	0.011555	0.002405
	(0.00734)	(0.00827)	(0.00951)	(0.00773)	(0.00716)	(0.00402)	(0.01201)	(0.00748)	(0.02763)	(0.01180)	(0.00935)
32	0.004648	0.010565	0.003417	0.001974	0.009999	0.008672	0.000585	0.010189	-0.008119	0.012080	0.003016
	(0.00734)	(0.00829)	(0.00957)	(0.00756)	(0.00714)	(0.00396)	(0.01207)	(0.00749)	(0.02795)	(0.01189)	(0.00936)
33	0.005018	0.010970	0.003703	0.002319	0.010439	0.008846	0.001032	0.010480	-0.00745	0.012596	0.003611
	(0.00735)	(0.00830)	(0.00962)	(0.00740)	(0.00712)	(0.00390)	(0.01213)	(0.00751)	(0.02824)	(0.01199)	(0.00937)

34	0.005378	0.011363	0.003984	0.002638	0.010863	0.009006	0.001471	0.010761	-0.006798	0.013105	0. 004190
	(0.00736)	(0.00831)	(0.00967)	(0.00724)	(0.00710)	(0.00385)	(0.01219)	(0.00752)	(0.02852)	(0.01209)	(0.00937)
35	0.005728	0.011744	0.004259	0.002934	0.011272	0.009152	0.001902	0.011031	-0.006164	0.013605	0.004752
	(0.00736)	(0.00833)	(0.00973)	(0.00709)	(0.00708)	(0.00380)	(0.01225)	(0.00754)	(0.02879)	(0.01220)	(0.00937)
36	0.006068	0.012114	0.004528	0.003208	0.011666	0.009285	0.002324	0.011291	-0.005546	0.014098	0.005300
	(0.00736)	(0.00834)	(0.00978)	(0.00694)	(0.00706)	(0.00376)	(0.01230)	(0.00757)	(0.02903)	(0.01231)	(0.00937)
37	0.006399	0.012473	0.004791	0.003462	0.012046	0.009407	0.002739	0.011542	-0.004944	0.014584	0.005833
	(0.00737)	(0.00835)	(0.00982)	(0.00680)	(0.00705)	(0.00372)	(0.01235)	(0.00760)	(0.02926)	(0.01243)	(0.00937)
38	0.006720	0.012822	0.005049	0.003697	0.012413	0.009518	0.003145	0.011783	-0.004358	0.015062	0.006352
	(0.00737)	(0.00837)	(0.00987)	(0.00666)	(0.00703)	(0.00368)	(0.01240)	(0.00763)	(0.02947)	(0.01255)	(0.00936)
39	0.007033	0.013162	0.005302	0.003915	0.012767	0.009619	0.003544	0.012016	-0.003788	0.015533	0.006857
	(0.00737)	(0.00838)	(0.00992)	(0.00653)	(0.00702)	(0.00364)	(0.01245)	(0.00767)	(0.02967)	(0.01268)	(0.00936)
40	0.007338	0.013492	0.005550	0.004115	0.013109	0.009711	0.003935	0.012241	-0.003232	0.015997	0.007349
	(0.00737)	(0.00840)	(0.00996)	(0.00641)	(0.00701)	(0.00361)	(0.01250)	(0.00770)	(0.02986)	(0.01281)	(0.00935)
41									-0.002692		
									(0.03002)		
42									-0.002166		
									(0.03018)		
43									-0.001654		
									(0.03032)		
44									-0.001155		
									(0.03044)		
45									-0.000671		
									(0.03056)		
46									-0.000199		
									(0.03066)		
47									0.000260		
									(0.03075)		
48									0.000706		
									(0.03083)		
49									0.001140		
									(0.03090)		
50									0.001562		
									(0.03095)		

Table 12 - Continued
Panel B: China A-share

Forecast Horizon month	MKT	BMA	CONG	CONS	FIN	HEA	OIL	TEC	UTI
1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	0.007332	0.008467	0.002604	0.002217	0.010340	0.003892	0.023696	0.000501	0.002523
	(0.00707)	(0.00811)	(0.00786)	(0.00721)	(0.01055)	(0.00919)	(0.01196)	(0.01118)	(0.00777)
3	0.015699	0.021807	0.002380	0.013021	0.029437	0.002407	0.027044	-0.007	0.011385
	(0.01059)	(0.01154)	(0.01050)	(0.01104)	(0.01619)	(0.01058)	(0.01826)	(0.01598)	(0.01130)
4	0.021971	0.039156	0.005676	0.017277	0.043650	7.84E-05	0.028886	-0.008	0.019649
	(0.01341)	(0.01432)	(0.01264)	(0.01458)	(0.02029)	(0.01060)	(0.02122)	(0.01950)	(0.01430)
5	0.019601	0.040588	0.001831	0.008090	0.037989	-0.002	0.021604	-0.009	0.019914
	(0.01584)	(0.01705)	(0.01441)	(0.01798)	(0.02436)	(0.01059)	(0.02569)	(0.02231)	(0.01686)
6	0.025393	0.048602	0.000	0.016233	0.045343	-0.004	0.010754	-0.006	0.034750
	(0.01757)	(0.01934)	(0.01534)	(0.02098)	(0.02698)	(0.01068)	(0.02876)	(0.02367)	(0.01870)
7	0.034506	0.061917	0.007076	0.032337	0.046219	-0.006	0.031075	0.011604	0.043910
	(0.01911)	(0.02183)	(0.01619)	(0.02332)	(0.02871)	(0.01082)	(0.03206)	(0.02458)	(0.02054)
8	0.030589	0.063027	0.001588	0.025893	0.030857	-0.008	0.018827	0.010574	0.035877
	(0.02024)	(0.02432)	(0.01673)	(0.02523)	(0.02969)	(0.01099)	(0.03583)	(0.02531)	(0.02168)
9	0.027254	0.066646	-0.005	0.027936	0.019083	-0.009	0.007306	-0.001	0.031511
	(0.02098)	(0.02633)	(0.01699)	(0.02654)	(0.02963)	(0.01113)	(0.03921)	(0.02620)	(0.02199)
10	0.031541	0.075320	0.004193	0.037362	0.012469	-0.010	0.012858	0.002393	0.028049
	(0.02160)	(0.02824)	(0.01746)	(0.02778)	(0.02882)	(0.01124)	(0.04380)	(0.02743)	(0.02193)
11	0.017359	0.060093	-0.009	0.029554	-0.006	-0.011	0.008056	-0.013	0.015036
	(0.02281)	(0.03038)	(0.01838)	(0.02949)	(0.02841)	(0.01131)	(0.04935)	(0.02882)	(0.02235)
12	0.014132	0.055152	-0.010	0.028005	-0.013	-0.012	0.011977	0.000861	0.012571
	(0.02394)	(0.03251)	(0.01937)	(0.03089)	(0.02832)	(0.01133)	(0.05404)	(0.02967)	(0.02272)
13	0.017849	0.061904	-0.005	0.029846	-0.013	-0.013	0.026758	-0.001	0.016357
	(0.02458)	(0.03489)	(0.01989)	(0.03205)	(0.02895)	(0.01129)	(0.05964)	(0.03054)	(0.02253)
14	0.018651	0.062761	-0.005	0.032316	-0.010	-0.013	0.020169	-0.012	0.014823

	(0.02589)	(0.03728)	(0.02012)	(0.03366)	(0.02918)	(0.01122)	(0.06585)	(0.03108)	(0.02311)
15	0.012352	0.058792	-0.005	0.021991	-0.015	-0.014	0.013506	-0.017	0.006580
	(0.02680)	(0.04010)	(0.01960)	(0.03487)	(0.02957)	(0.01110)	(0.07200)	(0.03125)	(0.02343)
16	0.003009	0.047300	-0.013	0.013473	-0.029	-0.014	0.012607	-0.020	-0.002
	(0.02731)	(0.04273)	(0.01868)	(0.03582)	(0.02894)	(0.01094)	(0.07776)	(0.03169)	(0.02354)
17	0.003209	0.046934	-0.012	0.015036	-0.032	-0.015	0.009512	-0.004	-0.003
	(0.02743)	(0.04542)	(0.01757)	(0.03632)	(0.02776)	(0.01075)	(0.08278)	(0.03175)	(0.02345)
18	-0.003	0.042201	-0.010	0.010443	-0.043	-0.015	0.014581	5.22E-06	-0.014
	(0.02745)	(0.04830)	(0.01629)	(0.03679)	(0.02668)	(0.01054)	(0.08950)	(0.03170)	(0.02323)

Table 12 - Continued
Panel C: China B&H - Share

Forecast Horizon month	MKT	BMA	CONG	CONS	FIN	IND	OIL	TEC	UTI
1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	0.008733	0.013027	0.005370	0.009368	0.004697	0.011562	0.014108	0.007084	0.006599
	(0.00771)	(0.01035)	(0.01059)	(0.00734)	(0.00862)	(0.00976)	(0.01117)	(0.01178)	(0.00899)
3	0.008909	0.003721	-0.000845	0.007213	0.014714	0.010221	0.022194	0.007892	4.31E-05
	(0.01152)	(0.01517)	(0.01544)	(0.01082)	(0.01326)	(0.01501)	(0.01738)	(0.01763)	(0.01288)
4	0.012871	0.015173	0.000917	0.018325	0.016196	0.013436	0.021241	-0.023674	0.004746
	(0.01560)	(0.01981)	(0.01968)	(0.01482)	(0.01686)	(0.01967)	(0.02213)	(0.02376)	(0.01676)
5	0.012054	0.018652	0.012956	0.010870	0.016044	0.008595	0.027532	-0.013987	0.008654
	(0.01862)	(0.02348)	(0.02348)	(0.01776)	(0.02029)	(0.02293)	(0.02577)	(0.02913)	(0.01934)
6	0.010658	0.015160	0.015251	0.007172	0.024739	0.014088	0.015195	-0.030376	0.013826
	(0.02033)	(0.02576)	(0.02586)	(0.01953)	(0.02296)	(0.02477)	(0.02855)	(0.03230)	(0.02049)
7	0.013650	0.018331	0.020187	0.016039	0.037243	0.020014	0.020704	-0.018629	0.019868
	(0.02115)	(0.02654)	(0.02774)	(0.02041)	(0.02550)	(0.02580)	(0.03047)	(0.03379)	(0.02098)
8	0.012197	0.018084	0.011079	0.017666	0.039321	0.023151	0.022608	0.005859	0.027075
	(0.02176)	(0.02679)	(0.02911)	(0.02093)	(0.02738)	(0.02652)	(0.03144)	(0.03493)	(0.02232)
9	0.016775	0.025387	0.008850	0.021260	0.039444	0.030260	0.026303	0.031448	0.033256
	(0.02257)	(0.02702)	(0.03000)	(0.02157)	(0.02900)	(0.02740)	(0.03152)	(0.03541)	(0.02384)
10	0.018488	0.027437	0.015293	0.024461	0.039376	0.033673	0.024874	0.023320	0.037846
	(0.02359)	(0.02756)	(0.03122)	(0.02249)	(0.03064)	(0.02768)	(0.03147)	(0.03603)	(0.02591)
11	0.023735	0.031418	0.021520	0.032559	0.040322	0.037986	0.026219	0.023528	0.055816
	(0.02475)	(0.02844)	(0.03293)	(0.02366)	(0.03200)	(0.02825)	(0.03198)	(0.03712)	(0.02809)
12	0.025092	0.037520	0.023382	0.033933	0.040987	0.045757	0.025315	0.040381	0.054682
	(0.02606)	(0.02967)	(0.03495)	(0.02478)	(0.03361)	(0.02916)	(0.03243)	(0.03817)	(0.02985)
13	0.029496	0.041086	0.021186	0.036839	0.041642	0.043483	0.025923	0.034406	0.065976
	(0.02658)	(0.03001)	(0.03587)	(0.02506)	(0.03485)	(0.02924)	(0.03297)	(0.03899)	(0.03169)
14	0.025362	0.034083	0.019517	0.032507	0.043035	0.036970	0.025772	0.014676	0.060109

	(0.02646)	(0.02952)	(0.03611)	(0.02475)	(0.03575)	(0.02922)	(0.03329)	(0.03941)	(0.03223)
15	0.024533	0.036776	0.021609	0.033742	0.038629	0.032043	0.026039	0.018331	0.067301
	(0.02581)	(0.02840)	(0.03550)	(0.02385)	(0.03604)	(0.02855)	(0.03349)	(0.03942)	(0.03269)
16	0.021525	0.031194	0.021633	0.026188	0.037129	0.030594	0.025786	0.004309	0.065630
	(0.02495)	(0.02742)	(0.03449)	(0.02287)	(0.03588)	(0.02785)	(0.03361)	(0.03940)	(0.03317)
17	0.022016	0.028481	0.016567	0.028747	0.038789	0.031846	0.025967	0.021349	0.069019
	(0.02429)	(0.02674)	(0.03353)	(0.02207)	(0.03565)	(0.02741)	(0.03374)	(0.03918)	(0.03412)
18	0.023161	0.028953	0.013476	0.031691	0.037403	0.029534	0.025920	0.013571	0.069006
	(0.02420)	(0.02674)	(0.03271)	(0.02200)	(0.03546)	(0.02751)	(0.03384)	(0.03951)	(0.03554)
19	0.021555	0.027937	0.010203	0.027190	0.030994	0.026192	0.025924	0.008176	0.069231
	(0.02443)	(0.02720)	(0.03200)	(0.02228)	(0.03505)	(0.02761)	(0.03395)	(0.03984)	(0.03711)
20	0.022570	0.028938	0.013614	0.025351	0.026721	0.021514	0.025792	0.019214	0.067253
	(0.02466)	(0.02773)	(0.03121)	(0.02253)	(0.03444)	(0.02739)	(0.03407)	(0.03967)	(0.03819)
21	0.019764	0.024199	0.015099	0.021347	0.024936	0.018812	0.025719	0.014800	0.063979
	(0.02484)	(0.02822)	(0.03076)	(0.02264)	(0.03389)	(0.02727)	(0.03420)	(0.03983)	(0.03903)
22	0.018437	0.022033	0.011744	0.018974	0.023755	0.016649	0.025603	0.006004	0.063679
	(0.02470)	(0.02817)	(0.03007)	(0.02232)	(0.03322)	(0.02687)	(0.03434)	(0.03967)	(0.03932)
23	0.015289	0.020450	0.006984	0.014212	0.020890	0.015000	0.025528	0.007150	0.053185
	(0.02453)	(0.02808)	(0.02911)	(0.02194)	(0.03265)	(0.02642)	(0.03447)	(0.03921)	(0.03954)
24	0.014219	0.016985	0.003863	0.012205	0.018200	0.009956	0.025430	-0.014411	0.055094
	(0.02404)	(0.02764)	(0.02764)	(0.02134)	(0.03190)	(0.02564)	(0.03460)	(0.03875)	(0.03983)

BIOGRAPHY

Miss. Fang Wang was born in Hubei, China in January 1, 1984. She graduated secondary school from Hubei Tianmen middle school in 1999. Her bachelor degree of Business Administration was got from faculty of business school, Yunnan Normal University in June 2006, and majoring in finance. She joined the Master of Science in Finance program, Chulalongkorn University in June 2006.