Foreign Exchange Rate Exposure of Chinese Firms in the New Exchange Rate Regime

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Abstract

The purpose of this paper is to investigate the foreign exchange rate exposure of Chinese firms under the managed floating system after China announced this regime switch on 21st July 2005. The sample includes over 1,400 Chinese listed firms on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) for the period of 22nd July 2005 – 18th October 2006. In addition to the analysis of the foreign exchange exposure at the firm level, we shed some light on the cross-sectional distributions of exchange rate exposures of Chinese firms by industries, ownership structures and firm characteristics.

JEL Classifications: C32, G14, G15

Keywords: China, Exchange Risk Exposure, Renminbi

1. Introduction

It has been nearly 1.5 years since China reformed her exchange rate regime on July 21, 2005, by moving into a managed floating exchange rate regime based on market supply and demand with reference to a basket of currencies. The exchange rate of the Renminbi (RMB) against the U.S. dollar was adjusted to 8.11 yuan per US dollar at the announcement day and it would no longer be pegged to the U.S. dollar. The change from a highly stable exchange rate regime to a managed floating regime was associated with an increase in exchange rate variability. RMB has been appreciated over 5% during the past fifteen months since the announcement released on 21st July 2005. This regime swift motivates us to study the time-varying relationship between exchange rate and stock price at the individual firm level in the Chinese equity markets. It also provides us with a good event window to undertake this analysis as the de facto fixed RMB exchange rate between 1994 and 2005 made it an impossible mission.

Unlike what happened in China, the adoption of floating exchange rate by many countries after 1970s led to exchange rate volatility. As recent international financial events have demonstrated an exchange rate crisis could be induced in some emerging markets that adopted the floating exchange rate regime recently and it can expand quickly into a broader financial and economic crisis. The rapid expansion of exchange crises reflects the importance of the exchange rate to firm profitability and its stock value. Exchange rate volatility affects firms' value through many ways. First, it affects directly those firms with financial assets and debts denominated in foreign currencies and those with foreign operational cash flows. Moreover, it influences the value of firms with no foreign currency revenues through its impact on domestic macroeconomic conditions. Therefore, a relatively wide range of firms could be exposed to the movements in foreign exchange rates, regardless of their direct transactional and operational exposure.

As a major source of macroeconomic uncertainty affecting firms, the exchange rate volatility and the impact of foreign currency exposure on the firm value have been studied extensively in a large number of theoretical models for several decades. (Shapiro, 1975; Hodder, 1982; Adler and Dumas, 1984). More recently, Bodnar, Dumas and Marston (2002) develop a duopoly model of an exporting firm and to explain simultaneously the behaviour of the prices of goods and the profits for a firm that competes with a local firm in a foreign market. BDM models define a structural relation between a firm's pass-through decision and its resulting exchange rate exposure and provide a framework for determining if estimates of exposure are sensible. Allayannis and Ihrig (2001) develop a theoretical model that identifies three channels of exposure. These channels are a positive effect through the competitive structure of the destination markets, a positive effect through the interaction of the competitive structure of the export market and a negative effect through the interaction of the competitive structure of the imported input market and the share of production that is imported.

A number of empirical studies have also emerged in the past two decades. Seminal studies include Booth and Rotenberg (1990) and Jorion (1990). Booth and Rotenberg (1990) analyze the relationship between the foreign currency exposure and the Canadian dollar/US dollar exchange rate using a sample of Canadian firms. Several empirical studies examine the sensitivity of US firms to changes in exchange rate. Jorion (1990) investigates the sensitivity of US multinationals to changes in a trade weighted index and provides weak evidence of exchange rate exposure. Other studies however report that neither U.S. multinationals nor the largest U.S. exporters are significantly affected by contemporaneous exchange rate movements (see, e.g. Amihud, 1994; Bodnar and Gentry, 1993; Bartov and Bodnar, 1994). One possible explanation for these ambiguous results is the fact that corporations make extensive use of foreign currency derivatives that may have reduced the ability of these

studies to identify a significant contemporaneous correlation between stock returns and exchange rate fluctuations. Bartov and Bodnar (1994) attribute the failure of previous studies to provide strong support for the exchange rate exposure to sample selection procedures and investors' errors in estimating the relationship between contemporaneous exchange rate movements and the changes in firm performance.

The empirical studies on other countries show ambiguous picture. The Japanese stock market has been explored by He and Ng (1998). In a sample of 171 Japanese multinationals they found that about 25 percent of their stock returns experienced ecnomically significant positive exposure effects for the period 1979 to 1993. They also checked the determinants of foreign currency exposure. Highly leveraged firms or firms with low liquidity are likely to have smaller exposures. Foreign exposure is found to increase with firm size.

Dominguez and Tesar (2003) find a statistically significant and robust level of exposure in their eight-country sample. Those eight industrialized and emerging markets are Chile, France, Germany, Italy, Japan, Netherland, Thailand and UK. They also find that the exposure is more prevalent in small sized firms than in large and medium sized firms and in firms engaged in international activities, although which firms are affected by movements in the exchange rate and the direction of exposure depends on the specific exchange rate. Muller and Verschoor (2006a, 2006b) study 817 European firms quoted in a European stock market and 3,634 Asian firms listed in Hong Kong, Indonesia, South Korea, Malaysia, Philippines, Singapore and Thailand during the period between 1988 and 2002 and report that more than 42 percent of European firms and 61 percent of Asian firms are significantly affected by foreign currency fluctuations in the long-term.

The Australian stock market is analysed in Loudon (1993), Khoo (1994) and Iorio and Faff (2000). Both Loudon (1993) and Khoo (1994) failed to establish a robust sensitive relationship between the stock returns and changes in the exchange rate. The results are consistent with those reported weak evidence of exchange rate exposure in the US equities market. However, Iorio and Faff (2000) analysed the foreign exchange exposure of the Australian equities market using an augmented market model and found stronger evidence of exposure based on daily data. In a more recent study, Nguyen and Faff (2003) achieve a degree of success in providing empirical evidence in support of the hypothesis that the use of foreign currency derivatives reduces short-term exchange rate exposure of Australian companies.

As far as we know, no study has yet touched the foreign exchange exposure issue in the Chinese equity market. The recent change from a highly stable exchange rate regime to a managed floating regime and the resulting volatile currency movements could be an important source of macroeconomic uncertainty for Chinese public listed firms with foreign trade or financial relationships to the rest of the world. Empirical studies demonstrate that the rise in the volatility of exchange rates – and the subsequent increase in uncertainty and risk - has significant consequences on trade flows.[1] We expect that the increased exchange rate variability in the new managed floating regime altered the trade terms between China and her trading partners. The lesson we have got from the recent financial crises is that currency crisis has led an increase in the observed volatility of financial markets and capital flows around the world. This motivation has led academics and investors to re-evaluate the impact of (increased) exchange rate fluctuations on stock markets.[2]

[1] Rahmatsyah, Rajaguru and Siregar (2002) provide an extensive discussion of this literature.

[2] For example, see Bartov et al. (1996), Chen and So (2002), Chang (2002), Bin, Blenman and Chen (2004).

The contribution of this paper is as follows. First, we explore the time-varying relationship between the RMB exchange rate and the Chinese stock return at the individual firm level. The empirical analysis investigates whether the enhanced uncertainty about the exchange rate of RMB resulted into an increased stock return variability. We expect an increase of the stock return variability under the new managed floating regime. Using a sample of 1,493 public listed firms, 831 in Shanghai A-share market, 54 in Shanghai B-share market, 553 in Shenzhen A-share market, and 55 in Shenzhen B-share market, we find evidence for the significant foreign currency exposure effects for the managed floating period, which is from 22 July 2005 to 18 October 2006. Second, we examine the following three questions concerning the effects of unexpected exchange rate movements: (i) is the exposure to exchange rate movements uniform across industries in China?; (ii) does ownership structure matter to the exchange rate exposure of Chinese firms? (iii) do firm characteristics matter to the exchange rate exposure of Chinese firms?

The remainder of the paper is organized as follows. Section 2 illustrates the institutional background on the three classes of shares in the China's stock markets and ownership structure of the listed companies. Section 3 describes data and the methodology used in this study. It also provides summary statistics of the data. Section 4 reports and discusses the empirical results. Section 5 offers some concluding remarks.

2. Institutional background

China's equity markets have attracted investors' attention because of that country's fast development and potential opportunities. China's recent remarkable aggregate economic growth rates, averaging 9% since 1990, have been accompanied by similar growth in its

equity markets. However, China's stock markets are unusual in comparison with others in the world due to the complicated share classes and ownership structure.

2.1 Background of A- , B- and H-shares

A-shares and B-shares are two classes of common shares issued by Chinese firms and listed in both Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE).[3] In the early years of A-shares being traded on both markets, China's government intended to insulate the A-share prices from the influence of foreign capital while meeting the demand of foreign exchange for local firms. Therefore the government established the B-share market especially for foreign investors in February 1992. The trading activity and liquidity of B-shares had been much lower than that of A-shares until the restriction on B-share market was removed in February 2001. China Securities Regulatory Commission (CSRC) introduced the Qualified Foreign Institutional Investor (QFII) in 2002 and QFIIs are allowed to invest the A-shares within a certain quota. A-shares are domestic shares priced in RMB in both SHSE and SZSE. B-shares in the SHSE are denominated in the U.S. dollar while the B-shares in the SZSE are priced in the Hong Kong dollar. Chinese investors have been permitted to trade B-shares in either the U.S. dollar in the SHSE or the Hong Kong dollar in the SZSE since the China Securities Regulatory Commission (CSRC) removed the restriction in February 2001.

One additional class of common shares is H-share. A limited number of the listed companies issue H-shares to Hong Kong investors and H-shares are traded on the Hong Kong Stock Exchange (HKSE) subject to the Hong Kong listing rules. Although the three classes of shares are entitled to exactly the same voting and dividend rights and obligations, they follow the different accounting standards. The annual reports for A-shareholders follow the Chinese

[3] The Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) began operations at 19 December 1990 and 3 July 1991, respectively.

GAAP while the companies issuing B-shares or H-shares are also required to prepare another set of reports based on International Accounting Standards (IASs) for B-shareholders and H-shareholders. They had been traded at significantly different prices with a substantial price discount for B- and H-shares before 2000. (Zhang and Zhao, 2003)

2.2 Background of ownership structure

Chinese listed firms have a rather complicated ownership structure in which the shares are classified into state-owned shares, legal-person shares, and tradable shares. All shares carry the same voting rights but the first two categories are not traded in the equity markets. Tradable shares are accounting for about one-third of total shares in issue and are divided into A-shares, B-shares and shares listed in the overseas market. State-owned shares are normally held by government agencies or wholly state-owned enterprises (SOEs). The wholly state-owned enterprises are the firms in which the state totally controls. Normally SOEs are owned by the central, provincial, district, or county government. Legal-person shares are further broken down into domestic legal-person shares, foreign legal-person shares and other legal-person shares. Both state-owned shares and legal-person shares were not tradable before 2005. Chinese government has recently allowed some companies to convert their nontradable shares through the state and institutions to become tradable shares, hoping to unify the fragmented Chinese market and have one type of shares that are gradable. In August 2005, The CSRC encouraged all nontradable shares in listed companies on the stock exchanges to change into tradable shares.[4] The reforms allow the Chinese government to reduce its shareholdings to facilitate further privatization.

[4] See Financial Times, August 22, 2005.

3. Data and Methodology

3.1 Data and summary statistics

We use daily stock returns for 1493 Chinese firms traded on the Shenzhen Stock Exchange (SZSE) and the Shanghai Stock Exchange (SHSE) over the period of July 2005 to October 2006. Returns data were obtained from Datastream and CSMAR database.[5] CSMAR is also used to determine the firm's share classes, industry classification, and the ownership structure. The middle exchange rate for the Chinese currency, Renminbi (RMB), against the U.S. dollar published by the People's Bank of China (PBC) was obtained from the State Administration of Foreign Exchange (SAFE).

[Insert Table 1 Here]

Table 1 shows the industry sub-samples in both SZSE and SHSE. The summary statistics of foreign exchange and market index movement are also reported in Table 1. CSMAR database categorizes the Chinese listed firms into six main industries. They are finance, utilities, properties, conglomerate, industrials, and commerce. 26 firms were not specified the industry out of 1,378 firms with the ownership structure data available. Overall the individual firm stock returns and the SHSE and SZSE stock indexes illustrate a persistent upward trend through the sample period. The China's stock market performed much better than the average of the rest of the world while the exchange of Renminbi displayed a strong appreciating pattern.

[Insert Table 2 Here]

[5] Datastream is an online database distributed by Datastream International and is updated daily. CSMAR is a database of financial data and marketing data of China's capital market, which was developed by GTA information technology according to the international standards of database.

Table 2 reports some statistics of the ownership structure in the China's stock market. The vast majority of the Chinese listed firms have 25% - 75% shares which are not tradable. And most of the firms' negotiable shares are A-shares. According to the number of A shareholders / Total number of negotiable A shares and the number of B shareholders / Total number of negotiable B shares, the A-share market in China is dominated by small or individual investors while the large or institutional investors play a major roll in the B-share market.

3.2 Mothodology

The firm-specific exchange rate sensitivity, called *firm-specific exposure*, is defined as the effect of exchange rate changes on the value of a firm in excess of the global market's reaction to foreign exchange rate movements. Following Jorion (1990) and other, it is empirically estimated by the following model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \theta_t + \varepsilon_{it} \qquad (1)$$

where R_{it} designates the total return of firm i in period t, R_{mt} is the local stock market return – the Shanghai and Shenzhen Stock Exchange return – in period t, β_i is firm i's return sensitivity to market fluctuations, θ_t is the movement in the bilateral U.S. dollar / Chinese Renminbi exchange rate[6], γ_i is firm i's exposure to the exchange rate index independent of the effect these currency movements have on the overall market[7], and ε_{it} denotes the white noise error term. Hence γ_i describes the sensitivity of stock returns to unanticipated changes in exchange rates. Since the bilateral exchange rate has been defined as units of Chinese

[6] The exchange rate is defined as the price of one U.S. dollar in units of Chinese Renminbi. An appreciation (depreciation) of the Renminbi will, thus, produce a negative (positive) value for X_t.

[7] A zero exposure doesn't imply, thus, that the firm is not affected by currency movements. It rather means that the firm value reacts to exchange rate movements to the same degree as the market portfolio.

Renminbi per U.S. dollar, an appreciation of the Chinese Renminbi makes exporting goods more expensive in terms of U.S. dollars, and this may lead to a fall in foreign demand and foreign sales revenue. On the other hand, the importing firm will benefit from an appreciation of the Chinese Renminbi, as its imports become cheaper in terms Chinese Renminbi. Thus, the γ_i coefficient should be negative for net-exporters and positive for net-importers.[8] Similarly, Chinese multinationals with net exposed foreign denominated liabilities will gain with a strengthening Chinese currency, while firms with net exposed foreign denominated assets lose.

The implicit assumption made in the above-mentioned model (1) is the hypothesis of constant variance. This assumption is often rejected for common financial weekly time series - like exchange rate and stock return series.[9] As the presence of heteroskedasticity invalidates the test statistics of the ordinary least squares regression, we test whether the residuals ε_{it} exhibit time-varying heteroskedasticity. We use the test Engle derived from the Lagrange multiplier principle to check the validity of the null hypothesis that the error terms of Eq. (1) ε_{it} present no heteroskedasticity. If we do not reject the null hypothesis, we perform an ordinary least squares regression. Otherwise we add a GARCH(1,1) process[10] to the initial augmented market model to incorporate conditional variance into the system (Bollerslev, Chou and Kroner, 1992). Thus, the regression model becomes:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \theta_t + \varepsilon_{it}$$

$$\varepsilon_{i,t} = \mu_{i,t} * (h_{i,t})^{1/2}$$

$$h_{i,t} = \delta_i + \tau_i \varepsilon^2_{i,t-1} + \nu_i h_{i,t-1} \qquad (2)$$

[8] Note that the sign of the exchange rate exposure coefficient becomes less distinct for a company that imports as well as exports. See, for example Adler and Dumas (1984) and He and Ng (1998) for their suggestion that the sensitivity of the firm value to exchange rate fluctuations depends on the elasticity of the firm's demand for foreign goods relative to the elasticity of the foreign market's demand for the firm's goods.

[9] See, for example Bollerslev, Chow and Kroner (1992), and Nieuwland, Verschoor and Wolf (1994).

[10] The choice of a GARCH(1,1) specification is supported by many empirical studies which show that the GARCH(1,1) specification is valuable for modeling the variance generating process of financial time series.

where $h_{i,t}$ denotes the conditional variance of the residuals; δ_i, τ_i *and* ν_i are unknown parameters[11]; and $\mu_{i,t}$ represents the white noise error term.

4. Empirical Results

The empirical findings of this study are reported in the following tables. Table 3 shows the foreign exchange exposure of all firms in the SHSE and SZSE based on Eq. (1) during the entire study period. For the entire sample during the first 15 months in the new exchange rate regime, the average exposure coefficient is -4.2539 in the SHSE and -5.0305 in the SZSE. Nearly half of the firms in the SZSE, 47.43% or 277 of 584 firms, experience statistically significant exposure to the foreign exchange movement, while 39.22% of 877 firms in the SHSE show the same pattern. The sign of foreign exchange exposure is negative indicating adverse impact of foreign exchange rate on firm value.

[Insert Table 3 & 4 Here]

In terms of the foreign exchange exposure of A- and B-shares in the SHSE and SZSE, more B-shares than A-shares experience statistically significant exposure, 62.96% versus 37.67% in the SHSE and 69.09% versus 45.18% in the SZSE. There are two main reasons for such a high proportion of B-shares exposed to the foreign exchange movement. Firstly, B-shares are denominated in the foreign currencies. B-shares in the SHSE are denominated in the US dollar and B-shares in the SZSE are denominated in the Hong Kong dollar. Secondly, B-shares are invested in mainly by the foreign investors or local residents with foreign currencies, while the A-shares are invested by the local residents in the Chinese Renminbi.

[11] The parameters are estimated by maximum-likelihood and generated using the Berndt et al. (1974) algorithm.

5. Conclusions

This paper examines the exposure of more than 1,400 Chinese firms traded on the SHSE and SZSE under the recent floating exchange rate regime. Our results identify a consistent relation between contemporaneous stock returns and unanticipated Renminbi fluctuations. The relation appears to be stronger for the B-shares in both SHSE and SZSE.

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Table 1: Daily average stock price returns and foreign exchange rate changes during the July 2005 – October 2006 period

Industry（code）	*N*	*Mean*	*S.D.*	*Min*	*Max*
Panel A: All Firms					
Finance (1)	11	0.002412	0.02481	-0.32158	0.219084
Utilities (2)	95	0.001847	0.027476	-0.33984	0.096543
Properties (3)	48	0.001907	0.024391	-0.31502	0.097371
Conglomerates (4)	247	0.0029	0.027481	-0.26905	0.096747
Industrials (5)	888	0.002508	0.030035	-0.33813	0.096631
Commerce (6)	106	0.00292	0.025561	-0.25512	0.095871
Not specified (0)	26	0.002152	0.02575	-0.21493	0.09541
Total	1,421	0.002388	0.026501	-0.33984	0.219084
Panel B: Shanghai Stock Exchange					
Finance (1)	8	0.002489	0.026678	-0.32158	0.219084
Utilities (2)	61	0.001763	0.0253	-0.29609	0.09544
Properties (3)	25	0.001893	0.021719	-0.20673	0.097371
Conglomerates (4)	171	0.00375	0.028258	-0.26905	0.096672
Industrials (5)	501	0.001786	0.029304	-0.33813	0.096445
Commerce (6)	64	0.003004	0.026412	-0.25512	0.095473
Not specified (0)	4	0.001967	0.025803	-0.10724	0.082644
Total	834	0.002379	0.026211	-0.33813	0.219084
Panel C: Shenzhen Stock Exchange					
Finance (1)	3	0.002308	0.022094	-0.10486	0.095935
Utilities (2)	34	0.00196	0.030154	-0.33984	0.096543
Properties (3)	23	0.002092	0.027556	-0.31502	0.097202
Conglomerates (4)	76	0.001768	0.026389	-0.26362	0.096747
Industrials (5)	387	0.00347	0.030979	-0.16378	0.096631
Commerce (6)	42	0.002806	0.024401	-0.18655	0.095871
Not specified (0)	22	0.002398	0.025697	-0.21493	0.09541
Total	587	0.002415	0.026753	-0.33984	0.097202
Panel D: Foreign exchange rate and market indexes					
MSCI world		0.000509	0.005634	-0.01823	0.020724
SHSE A		0.001724	0.012042	-0.05509	0.041951
SHSE B		0.002306	0.018242	-0.08619	0.092132
SZSE A		0.001955	0.013191	-0.06057	0.043565
SZSE B		0.001491	0.016169	-0.05872	0.077251
Exchange Rate ($\times 10^{-4}$)		-0.08276	0.508138	-1.53965	2.543017

Table 2: The ownership structure statistics

Panel A: share outstanding			
		Number	Percentage
Number of non-negotiable shares / Total number of shares	0 - 25%	12	0.87%
	25% - 50%	228	16.55%
	50% - 75%	1059	76.85%
	75% - 100%	79	5.73%
Number of negotiable A shares / Total number of negotiable shares	0 - 25%	43	3.12%
	25% - 50%	51	3.70%
	50% - 75%	25	1.81%
	75% - 100%	1259	91.36%

	Mean	S.D.	Min	Max
Panel B: Number of shareholders				
Number of shareholders / Total number of shares ($\times 10^{-4}$)	0.138478	0.115283	0	2.329348
Number of shareholders / Total number of negotiable shares ($\times 10^{-4}$)	0.138511	0.115459	0	2.334786
Number of A shareholders / Total number of negotiable A shares ($\times 10^{-4}$)	0.38606	0.30253	0	5.905453
Number of B shareholders / Total number of negotiable B shares ($\times 10^{-4}$)	0.004383	0.02521	0	0.234083
Panel C: Largest shareholders				
Year-end shareholdings of ten largest shareholders / Total year-end shareholdings	0.04944	0.06653	0	0.589711
Year-end shareholdings of three largest shareholders / Total year-end shareholdings	0.031138	0.056337	0	0.586426

Table 3: Chinese Foreign exchange risk exposure

This table reports cross-sectional summary statistics of the parameters estimated by the following regression model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \theta_t + \varepsilon_{it} \quad (1)$$

where R_{it} designates the total return of firm i in period t, R_{mt} the orthogonalized local stock market return in period t, β_i firm i's return sensitivity to market fluctuations, θ_t the movement in the bilateral US$ / RMB exchange rate, γ_i firm i's exposure to the exchange rate and ε_{it} the white noise error term.

If, for firm i, the homoscedasticity of the returns is rejected, the previous model is extended to:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \theta_t + \varepsilon_{it}$$
$$with \quad \varepsilon_{i,t} = \mu_{i,t} * (h_{i,t})^{1/2} \quad h_{i,t} = \delta_i + \tau_i \varepsilon^2_{i,t-1} + \nu_i h_{i,t-1} \quad (2)$$

where $h_{i,t}$ denotes the conditional variance of the residuals; δ_i, τ_i *and* ν_i unknown parameters; and $\mu_{i,t}$ represents the white noise error term.

		mean	median	Q_1	Q_3	*N**	*N*
Shanghai Stock Exchange							
constant	α	0.0009 0.0000	0.0008 0.0001	0.0002	0.0017		
market index	β	1.0977 0.0093	1.1123 0.0117	0.9261	1.2773		
US$/RMB exchange rate	γ	-4.2539 0.1280	-4.2748 0.1604	-6.5696	-1.8069	*344* *39.22%*	*877*
constant	δ	0.0004 0.0000	0.0003 0.0000	0.0002	0.0005		
arch	τ	0.3469 0.0348	0.2021 0.0436	0.0777	0.3344		
garch	ν	0.1658 0.0189	0.1825 0.0237	0.0118	0.3532		
Shenzhen Stock Exchange							
constant	α	0.0008 0.0001	0.0008 0.0001	0.0000	0.0017		
market index	β	1.0473 0.0117	1.0739 0.0147	0.8956	1.2288		
US$/RMB exchange rate	γ	-5.0305 0.1714	-4.9725 0.2148	-7.3663	-2.3641	*277* *47.43%*	*584*
constant	δ	0.0004 0.0000	0.0003 0.0000	0.0002	0.0004		
arch	τ	0.3212 0.0289	0.2001 0.0362	0.1101	0.3446		
garch	ν	0.2105 0.0174	0.2299 0.0218	0.0497	0.3363		

The numbers are summary statistics of the cross-sectional distribution of the ordinary least squares parameter estimates of Eq. (1), respectively the maximum likelihood (using the Berndt, Hall, Hall and Hausman (1974) algorithm) parameter estimates of Eq. (2). Q_1 and Q_3 represent the first and third quartiles of the distribution, respectively. N* is the number of firms with a documented significant exchange rate exposure at the 5% level at least. N is size of the total sample.

Table 4: Foreign exchange risk exposure: Comparison between A- and B-Shares

This table reports cross-sectional summary statistics of the parameters estimated by the following model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \theta_t + \varepsilon_{it} \quad (1)$$

where R_{it} designates the total return of firm i in period t, R_{mt} the orthogonalized local stock market return in period t, β_i firm i's return sensitivity to market fluctuations, θ_t the movement in the bilateral US$ / RMB exchange rate, γ_i firm i's exposure to the exchange rate and ε_{it} the white noise error term.

If, for firm i, the homoscedasticity of the returns is rejected, the previous model is extended to:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \theta_t + \varepsilon_{it}$$
$$with \quad \varepsilon_{i,t} = \mu_{i,t} * (h_{i,t})^{1/2} \quad h_{i,t} = \delta_i + \tau_i \varepsilon^2_{i,t-1} + \nu_i h_{i,t-1} \quad (2)$$

where $h_{i,t}$ denotes the conditional variance of the residuals; δ_i, τ_i *and* ν_i unknown parameters; and $\mu_{i,t}$ represents the white noise error term.

		A-Shares			B-Shares		
		mean	median	*N**	mean	median	*N**
Shanghai Stock Exchange							
constant	α	0.0009	0.0008		0.0012	0.0013	
		0.0000	0.0001		0.0001	0.0002	
market index	β	1.1037	1.1180		1.0059	1.0335	
		0.0098	0.0122		0.0266	0.0333	
US$/RMB exchange rate	γ	-4.1801	-4.1421	*310 / 823*	-5.3777	-5.0478	*34 / 54*
		0.1344	0.1685	*37.67%*	0.3169	0.3971	*62.96%*
constant	δ	0.0004	0.0003		0.0003	0.0002	
		0.0000	0.0000		0.0000	0.0000	
arch	τ	0.3471	0.1918		0.3396	0.2800	
		0.0358	0.0449		0.0967	0.1212	
garch	ν	0.1675	0.2076		0.1102	0.1014	
		0.0193	0.0242		0.0896	0.1123	
Shenzhen Stock Exchange							
constant	α	0.0008	0.0007		0.0010	0.0010	
		0.0001	0.0001		0.0001	0.0002	
market index	β	1.0581	1.0909		0.9432	0.9734	
		0.0126	0.0158		0.0251	0.0315	
US$/RMB exchange rate	γ	-5.0608	-4.9413	*239 / 529*	-4.7395	-5.2622	*38 / 55*
		0.1849	0.2318	*45.18%*	0.3888	0.4873	*69.09%*
constant	δ	0.0004	0.0003		0.0003	0.0002	
		0.0000	0.0000		0.0000	0.0000	
arch	τ	0.3247	0.1939		0.2915	0.2703	
		0.0320	0.0401		0.0370	0.0463	
garch	ν	0.2119	0.2299		0.1986	0.2366	
		0.0191	0.0239		0.0308	0.0385	

The numbers are summary statistics of the cross-sectional distribution of the ordinary least squares parameter estimates of Eq. (1), respectively the maximum likelihood (using the Berndt, Hall, Hall and Hausman (1974) algorithm) parameter estimates of Eq. (2). Q_1 and Q_3 represent the first and third quartiles of the distribution, respectively. N* is the number of firms with a documented significant exchange rate exposure at the 5% level at least. N is size of the total sample.