The Relationship between the Exchange Rate and American Depositary Receipt (ADR) Returns: In case of Chinese ADRs

MFIN Program

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by

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A research project submitted in partial fulfillment of the

requirements for the degree of Master of Finance

Saint Mary's University

Written for MFIN6669 under the direction of

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Date: September 10, 2013

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Acknowledgements

I wish to express my sincere gratitude to Dr. Colin Dodds for all his assistance, support and guidance. Deepest gratitude is also due to Dr. Francis Boabang without whose knowledge and assistance this study would not have been successful. Not forgetting to my best friends and colleagues who always have been there.

I wish to express my love and gratitude to my beloved families for their understanding and endless love through the duration of my studies.

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September 6, 2013

Abstract

American Depositary Receipts (ADRs) as the representative of foreign stocks listed on the U.S. stock exchanges require more risk exposures than domestic stocks. This paper investigates the exchange risk effect on ADR returns in the case of Chinese ADRs. The general consensus has been that there is strong negative relationship between the ADR returns and the U.S. dollar value against the corresponding foreign currency. In this paper, it provides an empirical analysis of the relationship between Chinese ADR returns and the exchange rate of the U.S dollar per Chinese yuan. Using daily data over the 2008-2013 period, it generates an insignificant relationship between exchange rate change and ADR returns, meaning that the exchange rate is not a powerful indicator of the performance of Chinese ADRs.

CHAPTER 1: INRODUCTION

1.1 Overview

Global investment is way for investors to spread risk and improve return on investment. With the increasing integration of the world financial markets, increasingly investors are willing to invest abroad. American Depositary Receipts （ADRs) provide a way for the American investor to invest in a foreign company by purchasing the stock in the domestic stock market.

An ADR is a financial instrument that represents the securities of an overseas company that trades in the American stock market. Investors can realize global investment without considering the transaction fees and foreign regulations. Although ADRs are traded and pay dividends in U.S. dollars, there are still some impacts from the economy and political factors in the foreign countries.

1.2 Purpose of study

The general idea about the relationship between exchange rates and performance of the ADR is ambiguous. However, this paper will provide empirical analysis to prove the insignificant relationship between the Chinese ADR returns and exchange rates movement.

1.3 Background

JP. Morgan issued the first ADR for the investment in the stock of British company Selfridges in 1927. It created a more convenient and less costly way to invest globally by saving on the transaction cost and regulation fees. ADRs represent the right to foreign shares, which have been deposited in the Custodian banks in the foreign company's home country. The American depositary bank such as JP. Morgan and the Bank of New York issue the ADRs. The price of ADR will be adjusted for the movement of price in the underlying foreign stock market. An American individual benefits from ADR investment by direct investment with the same broker they originally have. They are not constrained by the laws and regulations used in international direct investment. Some institutional investors who have limitations on investing in foreign markets can though purchasing ADR to avoid these restrictions. They are traded on the stock market like the normal domestic stocks. Therefore, the obvious advantage of holding an ADR compared to a foreign direct investment is that they trade in US dollars.

The foreign firms though ADRs can get the chance to be traded and listed on the American stock exchange which can promote their brand recognition in the U.S. market. They can use this method to raise funds from the world largest capital market, without the tedious processes of direct listing, so it is a lower cost way to

finance in U.S. market. In the case of the foreign firms that have American branches, the U.S. dollar collected from the U.S. stock market can be directly injected into the U.S. branches' operation.

In the current stock market, ADRs have become a significant component in the global diversified portfolio. According to the release information from the Bank of New York, the BNY Mellon Classic ADR Index in 2012 had an excess return of 2% when compared to the Standard & Poor's 500 Index in the U.S stock market. In the specific region like China and Europe, the ADR Indexes were up 25% and 20% respectively from last year (2012).

1.4 Need for Study

Because the ADR can directly trade in U.S. dollars, currency risk is minimized for U.S. investors, although the underlying value of the ADRs is reflection of country specific issues such as in China. This paper will explore the relationship between the foreign exchange rate risk and ADR performance in order to guide the risk control of potential ADR investors.

1.5 Statement of Problem

Although investors have an awareness of global influences, the complex relationship is not easy to define. The performance of ADR could be the reflection of the foreign political environment, the stage of foreign economic cycle, and interest rate fluctuations. If we can assume other factors maintain the same, the relation between the foreign exchange rate and return of ADR is still not straight forward. For example, the drop in the value of the U.S. dollar will lead to increases in the prices of Chinese imported products in the American market. The Chinese exporting company will thus lose some price advantages in their export markets. The lower earnings from the exports will lower the share price of the company in the home stock market. This will finally transfer to the American stock exchange causing a drop in the price of the ADR. In other words, the ADR returns seem positively related to the US dollar value.

However, Mueller et al (2006) claim that ADR prices have to be adjusted by the exchange rate in order to avoid the appearance of arbitrage opportunities. That implies a negative relationship between ADR returns and U.S. dollar value. When the ADR underlying foreign stock remains the same, a higher U.S. dollar value generates a lower price in the ADR. Analyzing the relationship between the five years of ADR historical returns and the fluctuation of foreign exchange rate will

answer the question “is there still a significant relationship between them after these inverse effects?”

The paper is organized as follows. Chapter 2 will provide a detailed literature review and Chapter 3 will discuss the data set and methodology used. Chapter 4 provides the empirical results, and the final part (Chapter 5) will be a summary and some considerations for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 The risk factors in ADR in case of Arbitrage Principle

There is an increased interest toward the ADR risk factors. In the Gramming et al (2005)'s paper, they mentioned that ADR's issued by the predetermined fixed multiple, the movement of the ADR is adjusted by the exchange rate. Although ADRs are traded and paid dividends in U.S. dollars, the arbitrage opportunity will arise when the foreign exchange rate fluctuate. Liang et al (1996) have mentioned in their study that the ADR can be converted into underlying foreign shares. If the U.S investor covert their ADR to the underlying foreign stocks before the U.S dollar deprecation, they can get more ADR returns after they covert back to U.S dollars.

The similar idea come from Kato et al (1991) and Wahab and Khandwala (1992) also confirmed that the arbitrage opportunities will generate profits to ADRs after deducting the transaction costs. The multi-factors effects in the ADR pricing were also considered in the Jiang (1998) and Kim et al (2000)'s work. They believe the ADR return determined by the three aspects: U.S. market returns, local market return, exchange rate change.

2.2 The study of the existence of exchange rate risk in ADRs

Gramming et al (2004) have using the high-frequency intra-day data of three German firms that trade on the XETRA and NYSE to estimate how international stock prices are adjusted by exchange rates. They also explore that exchange rates play an independent role in the ADR pricing. This implies that the ADR investor bears more risk from the change in exchange rate than the home- market investor. By considering this fact, ADR investors need to know their exchange rate exposures before taking ADR's into their investment portfolios.

In their study, they divided the foreign exchange rate risk to ADR return into two components. One is the exchange risk influence to the market. Because ADRs trade in the U.S. stock exchanges, the exchange rate risk will bring the impact to the ADR though the market. Another one is the incremental influence of exchange rate risk in ADR by considering its own features.

In the Liang et al (1996)'s study over 1976 to 1990 period, they conclude that exchange rate risk is existed in the ADR returns, and part of exchange rate risk is priced in the market. However, the incremental part is not being priced. That means, the ADR investors are exposed to more exchange rate risk than others.

Jiang (1998) made a similar inference. He compared the excess return per unit of risk of various portfolios to examine the performance of ADR portfolios. He found that the ADR outperformed the local market indices. The multi-factor asset pricing model which includes the return of the US market index, the return of foreign market index and the currency return were used to prove their hypothesis. He examined 113 ADRs from eight countries during the sample period January 1980 to September 1994 to find the result that all the three factors are important in ADR pricing. This is opposite to some other studies that suggest the ADR returns are significantly related to the U.S. stock market. He also contended that there is an exchange rate change impact to ADR returns.

There is an extensive literature that has studied the transmission of foreign stock market's influence to U.S stock movements. ADRs as foreign stocks trading in the U.S. equity market provide a unique channel for the studies to investigate the dynamics of the market place. In the study of Kim et al (2000), they determined the efficiency between markets for ADRs and their underlying foreign shares by using both a vector autoregressive (VAR) model with a cointegration constraint and seemingly-unrelated regression (SUR) approach. Though their empirical study, they concluded that the exchange rate is very important in the ADR returns. Kim et al (2000) examined the daily data of Australian, Japanese, British, Dutch, Swedish

firms to estimate the relationship between the ADR return and underlying stocks in the sample period of January 4, 1988 to December 31, 1991. They find the underlying stocks have greater influence to ADR returns than other factors. The exchange rate and U.S. market impact in their study display an independent role in the ADR returns. In additional, they find ADRs tend to overact to the U.S. market index. Inversely, the ADR tends to underreact to the change of underlying foreign stocks and exchange rate.

2.3 The literature about the positive relationship between ADR return and U.S. dollar value change

In the article written by Byrne (2004) titled "Weak Dollar Bedevils ADRs", he claims there is an important consideration about the downside risk in the strategy of buying the ADR when U.S. dollar value is depreciating. Contrary to some thoughts, he states that the strong U.S. dollar value will bring the positive effect to ADR returns. For example, in the case of Siemens, the raw material purchased from the U.S. will be more expensive when the dollar value goes up. So the ADR price will be negatively influenced by the appreciation in the dollar. In addition, he explains that when the dollar weakens, the export company will lose the price advantage in the U.S. market. Lower exports will transfer to the unfavorable revenue and final transfer to the price of the ADR.

2.4 The literature about the negative relationship between ADR returns and U.S. dollar value change

In addition, Bae et al (2008) divide the exchange rate risk in three ways: economic exposure, translation exposure, transaction exposure. In their study, they investigate the economic exposure and translation exposure of exchange rate through Australia, France, Japan and the U.K.. Moreover, they found the ADR returns in the four countries are significantly negatively related to the U.S dollar value, meaning that the U.S. dollar depreciation will bring benefit to the ADR returns.

Bin et al (2002) generates a similar result that the increase of dollar value against the corresponding currency creates a negative return on the ADR of the foreign share. They use the event-study methodologies and a multifactor pricing model during the major currency crises in 1990s to examine the performance of ADRs in the ADR-originating countries. The major events include the 1997 financial flu in Asia, the U.K. pound exit from the European Exchange Rate Mechanism (ERM) in 1992. They find that there is a negative effect of a currency crisis on ADR return in their results, implying that they find the significant abnormal return in the ADRs caused by the currency crisis. Furthermore, they determined an increased tendency in the exchange rate exposure in this period, which brings more volatility in ADR returns.

2.5 The literature against the existence of relationship between ADR return and U.S. dollar value change

Contrary to much of the pervious literature, Mueller et al (2006) conclude that there is no significant relationship between ADR returns movement and change in the corresponding foreign exchange. Their research covered the daily data from Japanese, Swedish, British, and Euro ADR returns collected from the New York ADR Mellon Index and the corresponding exchange rate of the ADR's original countries in the period from 2002 to 2004.

CHAPTER 3: DATA AND METHODOLOGY

3.1 Model development Process

The recent financial world is integrated in various directions. The relationship between ADR returns and exchange rate need to be considered in multi angles. The development of the model in this paper is though adding important factors in the basic function. The expression of the linear relationship between the ADR and exchange rate can be expressed as the following equation:

$$\mathbf{ADRR_t} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1}\,\mathbf{EXR_t} + \boldsymbol{\varepsilon_t} \quad \textbf{(3.1)}$$

In the equation above, the $ADRR_t$ is ADRs prices expressed in U.S. dollars. EXR expresses the exchange rate of U.S. dollar per Chinese yuan. β_1 is the coefficient of EXR, which measures the linear relationship between the exchange rate and ADR price. If β_1 is positive and significant, it represents the appreciation in local currency against U.S. dollar value leads an increasing in ADR price.

If we use the regression model based on the Equation (3.1), the result seems misleading because the price of ADR also can be explained by other important factors. If the exchange rate risk is independent in its effect to ADR price, the influence of ADR needs to be isolated from other factors. In the Bae, et al (2008)'s

work, the price of ADRs underlying foreign stock is measured by the joint effect of local market conditions and the exchange rate. In Bae's study, the price of ADR's underlying foreign stock price can be displayed as the Equation (3.2) and Equation (3.3)

$$\mathbf{Price_{share} = f_1(local\ market\ comditions,\ economic\ exposure)} \qquad \mathbf{(3.2)}$$

$$\mathbf{UNDR_t = \alpha_0 + \alpha_1\ LMR + \alpha_2\ EXR + e_t} \qquad \mathbf{(3.3)}$$

Where the UNDR is Chinese ADRs' underlying Chinese stock prices in Chinese stock market, and LMR is U.S. stock market return. EXR is defined as same as previews equations. AS I mentioned before, the ADR price is based on the corresponding foreign share price multiplied by the fixed rate and adjusted by the exchange rate. If the world markets are perfectly integrated, the price of ADR= $Price_{share} \times EXR$. Any change in the exchange rate will cause the related change of ADR in the U.S. market. However, world financial markets are not perfectly integrated, because investors in ADRs are allowed to covert the shares to corresponding underlying shares subject to transaction costs, the ADRs are priced according to the arbitrage effect between the two markets. Therefore, the ADR investor may be exposed more risk in the exchange rate than the local share investors.

In much of the literatures, the ADR's exchange exposure is concluded in two-ways. The economic exposure of ADR means the exchange rate is influencing it though the foreign stock market. Another ADR exchange exposure is called translation exposure, meaning the ADR price has an exchange risk when the price translates from a local currency to the U.S. dollar.

In the study of Kim et al (2000) and Jiang (1998), they comment that the ADR price can be expressed in three factors as Equation (3.3). The influence from the price of underlying share price does not need to be explained again. The U.S. market effect in ADR pricing is related to the way the U.S. investor measure the systematic risk. The ADR is traded in the U.S. market, therefore, the market U.S. market condition is a really essential factor in previous empirical studies. See Equation (3.4) below

$$\mathbf{Price_{ADR} = f_2 (Price_{share} , U.S.\ market\ conditions, translation\ exposure)} \quad \mathbf{(3.4)}$$

Combining Equations 3.2 and 3.4, but replacing the underlying foreign share price with the ADR price then the ADR price can be explained by

$Price_{ADR} = f_2$ (local market conditions, U.S. market conditions, economic exposure, translation exposure) **(3.5)**

3.2 Hypotheses

The ADR has no abnormal returns from the exchange risk after controlling the exchange rate effect on the U.S stock market and local stock market.

3.3 Regression Model

Adopting the same regression as the Bae et al (2008) study, the **Model 1** (Equation 3.6) is used to examine the exchange rate effect on Chinese's ADR return in U.S. in the U.S. market is as follows:

$$\mathbf{ADRR_t = b_1 + b_0 LMR + b_2\ USMR_t + b_3\ EXRt + u_t}$$

(3.6)

Where the $ADRR_t$ is the realized return in Chinese ADRs. It is using the equal-weighted portfolio return of 12 Chinese stocks. LMR is defined as in Equation 3.3. USMR is the U.S. Market return that is the S&P 500 return in this study. EXR is the daily exchange rate expressed in U.S. dollar per local currency. The coefficient b_3 is measures the effect of exchange rates on ADR returns through both economic and translation exposure.

To isolate the local market condition from the effect of exchange rates, we adopt the same orthogonalization procedure as Bae et al (2008). We use an explanatory variable of EXR to build a regression model of LMR. LMR is then replaced by the regression residual (LMRO) in order to explain the effect to LMR price without the exchange rate effect.

To examine the relationship between ADR, underlying foreign stock and exchange rate, there also exists a relationship between exchange rates and local market conditions as I mentioned before. Model 2 can be expressed as Equation (3.7).

$$\mathbf{UNDR_t = \alpha_0 + \alpha_1 LMR_t + \alpha_2 EXR_t + e_t} \quad \textbf{(3.7)}$$

Where $UNDR_t$ represents the underlying Chinese stock price in Chinese stock market. EXR_t is as same as before.

Applying the same orthogonalization procedure, I replace LMR with the regression residual (LMRO). α_2 measures the relationship between the exchange and underlying Chinese stock price.

Theoretically, the market return is adjusted based on all the risk factors in the whole market. Therefore, if there is still a reward from the exchange risk after deducting the expected return from the ADR real return, that implies there is an independent risk from exchange rate risk. In other words, investors should require a higher return for ADR than the underlying stock return (after the price translates from local currency to U.S. dollar based on exchange rate). The equation used by Bae et al (2008) covers this “abnormal return” as follows:

$$\mathbf{AR_t = ADRR_t - （UNDR_t + EXR_t）}$$

(3.8)

Where AR_t is used to express the abnormal return of ADR after deducting the expected return of ADR from the real return of ADR. ADRR is the real stock return (in Chinese yuan) of ADR in the U.S. stock market. $UNDR_t$ is the underlying stock return. EXR is the change in exchange rate of U.S dollars per local currency.

3.4 Data

For the purpose of finding the relationship between ADR return change and exchange rate movement, the selection of ADR has some criteria. The Chinese ADRs traded in the OTC market are excluded. The selected Chinese ADRs all trade on the NYSE since those Chinese ADRs typically have bigger scale and greater

liquidity than those traded in other exchanges. Currently, there are 72 ADRs traded on the NYSE. After removing some not listed in the study period, 35 Chinese were on the list. Some of them are not listed in the Shanghai or Shenzhen exchanges (when on the Hongkong stock market). Excluding those Hongkong listed stocks and ADRs for which we do not have relevant information, this study will focus on 12 Chinese ADRs.

For these I collected from Bloomberg the daily prices in the period from September 7, 2008 to March 28, 2013. Table 3.1 provides a list of Chinese stocks included in this study. The 12 underlying Chinese daily stock prices contain 1182 data units and the exchange rate used in the model is the daily closing price of Chinese yuan per U.S. dollar which is also from Bloomberg. For the performance of the U.S. stock market, we use the S&P 500 index daily closing price to measure the U.S. market conditions. For situations in the Chinese stock market, I use the daily closing prices of the Shanghai stock exchange as a benchmark due to its major position in China.

Table 3.1:

Chinese ADR	Exchange in U.S.	Code in China	Exhange in China
China Petroleum & Chemical	NYSE	600028	Shanghai Exchange
China Life Insurance	NYSE	601628	Shanghai Exchange
Sinopec Shanghai Petrochemical	NYSE	600688	Shanghai Exchange
China Eastern Airlines	NYSE	600115	Shanghai Exchange
China Eastern Airlines	NYSE	601600	Shanghai Exchange
China Nepstar Chain Drugstore	NYSE	601808	Shanghai Exchange
China Southern Airlines	NYSE	600029	Shanghai Exchange
China Unicom	NYSE	600050	Shanghai Exchange
Guangshen Railway	NYSE	601333	Shanghai Exchange
Huaneng Power International	NYSE	600011	Shanghai Exchange
PetroChina	NYSE	601857	Shanghai Exchange
Yanzhou Coal Mining	NYSE	600188	Shanghai Exchange

CHAPTER 4: RESULTS

4.1 Dickey-Fuller test results

To test the time series data, I adopt the Dickey-Fuller test to examine the stationarity of all the variables in the model by using STATA. The results from the Dickey-Fuller test are displayed in the Tables 4.1 to Table 4.5.

Table 4.1:

```
. dfuller  exr

)ickey-Fuller test for unit root                  Number of obs   =      1175

                                 ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic          Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -35.552           -3.430            -2.860           -2.570
------------------------------------------------------------------------------
1acKinnon approximate p-value for Z(t) = 0.0000
```

Table 4.2:

```
. dfuller  lmr

Dickey-Fuller test for unit root                  Number of obs   =      1175

                                 ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic          Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -33.643           -3.430            -2.860           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Table 4.3:

```
Dickey-Fuller test for unit root                    Number of obs   =      1175

                                 ---------- Interpolated Dickey-Fuller ---------
                 Test            1% Critical       5% Critical      10% Critical
               Statistic            Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -38.370            -3.430            -2.860           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Table 4.4:

```
. dfuller usmr

Dickey-Fuller test for unit root                    Number of obs   =      1175

                                 ---------- Interpolated Dickey-Fuller ---------
                 Test            1% Critical       5% Critical      10% Critical
               Statistic            Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -38.008            -3.430            -2.860           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Table 4.5:

```
. dfuller aaar

Dickey-Fuller test for unit root                    Number of obs   =      1175

                                 ---------- Interpolated Dickey-Fuller ---------
                 Test            1% Critical       5% Critical      10% Critical
               Statistic            Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -32.282            -3.430            -2.860           -2.570
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

The P-values in the test results are all equal to 0, meaning all data of the variables are stationary.

Table 4.6

	UNDR	ADDR	USMR	EXR	LMR	AR	USMRO
Average	-0.0002	-0.0004	0.0002	-0.0001	0.0001	0.0002	-0.0001
Standard Diviation	0.0007	0.0002	0.0003		0.0003	0.0006	0.0003

To summarize the relevant variables, I find the average exchange rate change is very small during the period 2008 to 2013. The average underlying stock change and average corresponding ADR returns are also small in absolute values.

4.2 Regression Results

The following results were generated from regression **Model 1** and are reported in Table 4.7.

Table 4.7: Model 1

Source	SS	df	MS	Number of obs =	1176
				F(3, 1172) =	15.99
Model	.009616024	3	.003205341	Prob > F =	0.0000
Residual	.234904054	1172	.00020043	R-squared =	0.0393
				Adj R-squared =	0.0369
Total	.244520078	1175	.000208102	Root MSE =	.01416

addr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lmr	.1503491	.0244947	6.14	0.000	.1022909	.1984074
usmr	.0853634	.0248923	3.43	0.001	.0365249	.134202
exr	.3589452	.4177099	0.86	0.390	-.4605975	1.178488
_cons	-.0003832	.000414	-0.93	0.355	-.0011954	.000429

The regression results in Table 4.7 suggest that the exchange rate effect on the Chinese ADR return is insignificant at the 95% confidence level. Although the R squared in this model is relatively low, the F test represents that the Model 1 is significant as whole. For the consideration in the exchange rate effect on the independent variable LMR, I regress the same model with a controlled LMR (LMRO). The results determined by using orthogonalization procedure are displayed in Table 4.8.

Table 4.8: Model 1- Modified

Source	SS	df	MS	Number of obs =	1176
Model	.009616024	3	.003205341	F(3, 1172) =	15.99
Residual	.234904053	1172	.00020043	Prob > F =	0.0000
				R-squared =	0.0393
Total	.244520078	1175	.000208102	Adj R-squared =	0.0369
				Root MSE =	.01416

addr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lmro	.1503491	.0244947	6.14	0.000	.1022909	.1984074
usmr	.0853634	.0248923	3.43	0.001	.0365249	.134202
exr	.0314276	.4143514	0.08	0.940	-.7815257	.8443809
_cons	-.0003902	.000414	-0.94	0.346	-.0012023	.000422

After controlling the biased determinant in Model 1, the 0.94 P-value implies that the coefficient of EXR is insignificant in the 99 percent confidence level. The exchange rate change and Chinese ADR return have no significant linear relationship, suggesting that Chinese ADR returns are not dependent on the movement of the exchange rate between Chinese currency and U.S. dollar.

Table 4.9 presents the regression results based on **Model 2**.

Table 4.9: Model 2

Source	SS	df	MS	Number of obs =	1176
Model	.005599462	2	.002799731	F(2, 1173) =	4.29
Residual	.765516508	1173	.000652614	Prob > F =	0.0139
				R-squared =	0.0073
Total	.77111597	1175	.000656269	Adj R-squared =	0.0056
				Root MSE =	.02555

undr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lmr	-.1271058	.0441693	-2.88	0.004	-.2137654	-.0404462
exr	.1316751	.7534617	0.17	0.861	-1.346608	1.609958
_cons	-.000212	.0007469	-0.28	0.777	-.0016774	.0012535

There is also an insignificant P-Value of coefficient on exchange rate displayed in Table 4.9. That means the exchange rate effect on the price of ADR underlying Chinese stocks is insignificant.

Table 4.10: Model 2- Modified

Source	SS	df	MS		Number of obs =	1176
					F(2, 1173) =	4.29
Model	.005599462	2	.002799731		Prob > F =	0.0139
Residual	.765516508	1173	.000652614		R-squared =	0.0073
					Adj R-squared =	0.0056
Total	.77111597	1175	.000656269		Root MSE =	.02555

undr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lmro	-.1271058	.0441693	-2.88	0.004	-.2137654	-.0404462
exr	.4085599	.747293	0.55	0.585	-1.05762	1.87474
_cons	-.0002061	.0007469	-0.28	0.783	-.0016715	.0012593

By using the same controlled factor LMRO, the modified Model 2 results indicate an insignificant relationship between Chinese ADR underlying stock in China and exchange rate at the 99 percent confidence level. The adjusted Model 2 displays a 0.0139 P-value for the F test, meaning the model is significant at the 95 percent confidence level.

The AR calculation results based on Equation (3.8) are displayed in Table 4.6. The average change of Chinese ADR abnormal return is a very low absolute value

which is 0.02%, indicating that there is a little arbitrage opportunity between the Chinese ADR return and underlying stock after adjusting for the exchange rate. The reason could be the room for arbitrage tends to disappear after the transaction costs. Therefore, the return caused by the change of exchange rate could be fully accounted into the ADR and ADR underlying Chinese stock returns.

To summarize, with the data of Chinese ADRs from September 7, 2008 to March 28, 2013 they show an insignificant independent relationship between ADR return and exchange rate. The abnormal return is insignificant between the realized ADR price and expected ADR price. The change in exchange rates has no relationship with the movement of Chinese ADR returns.

CHAPTER 5: CONCLUSIONS

With the integration of the world economy, ADRs have preforming as an essential component of investment portfolios in U.S. the market. In this paper, we have provided empirical analysis on the relationship between Chinese ADR returns and exchange rates. Through the regression models and modified regression models, the results have shown that the change of exchange rate has no significant explanatory power to predict Chinese ADR returns.

The study starts from building the hypothesis of no abnormal returns from the exchange risk in ADRs investment. The empirical analysis includes the Dickey-Fuller test, simple regressions, and orthogonalization procedures.

In contrast to some previous studies that claimed a positive or negative relationship between ADRs returns and exchange rate changes, this paper concludes that there is little room for arbitrage opportunities in Chinese ADRs returns from the fluctuation of exchange rates. The reason for these results can be explained by the Market Efficient Hypothesis (EMH). The exchange risk has already been priced into the ADRs returns by the U.S. stock market. Another reasonable explanation for this result is that the negative and positive effects of exchange risk in ADR returns offset each other, and generate an insignificant relationship between ADR returns

and exchange rate change.

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