How Internationalization of the renminbi Contributes to Growing Spillovers from China to the Association of Southeast Asian Nations (ASEAN) Economies

by

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An honors thesis submitted in partial fulfillment

of the requirements for the degree of

Bachelor of Science

Business Honors Program

NYU Shanghai

May 2017

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Abstract

In the recent years, China's economic power has become a key driver of the global growth and stimulated the growth of its trading partners, especially ASEAN countries. In December 2015, RMB was approved by International Monetary Fund (IMF) to be included in the Special Drawing Rights (SDR) currency reserve, representing the further integration of the Chinese economy into the global financial system. The paper examines the spillover from China to ASEAN-6 (Singapore, Malaysia, Thailand, Indonesia, the Philippine and Vietnam) in both trade and financial channels based on two stages model from Forbes and Chinn (2004). The results from the paper suggest that the spillover from China to Southeast Asian economies is on the rise after internationalization of the renminbi and is going to be comparable to the level of Japan although the influence of the United Status is still unquestionable The spillover from China to Southeast Asian economies is transmitted through both the trade channel and the financial channel, and the impact of the trade channel is more evident. In the country level, the estimated sensitivities of Vietnam and Indonesia to China are relative high although Indonesia and Vietnam don't present high trade and financial linkages compared to other ASEAN-6 countries. It suggests that countries with relatively low income and the less diversified composition of export to and import are more likely to be impacted by the change in China's growth. And countries with large tourism sectors such as Thailand and Singapore benefit from the transition of China from investment to consumption.

Acknowledgements

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I. Introduction

Over the past few years, the ascent of China's economic power has become progressively evident and turned out to be a key contributor to the global development. China's sustained strong economic growth in recent years not only pushed China to the position of the world's second largest economy, but also stimulated the growth of its trading partners (Arslanalp, Liao, Piao and Seneviratne, 2016). The economic influence of China on its regional countries is undoubted. In particular, China has already become the most important and the largest trading partner for most countries in the Association of Southeast Asian Nations (ASEAN) in both goods and services (Miller, 2015). Although China's importance in the real economy contributes significantly to Chinese regional influence on Southeast Asian economies, its direct financial spillovers have played minor role since direct financial links between China and ASEAN countries except for Singapore are very limited (Arslanalp, Liao, Piao and Seneviratne, 2016) Under these circumstances, the Chinese government determined to internalize the renminbi to promote the status of its currency. Two main approaches have been executed since 2009: the renminbi settlement in cross-border trade and investment, and the construction of offshore renminbi markets. Furthermore, other strategies capable of accelerating currency internationalization such as signing currency swap agreements of People's Bank of China (PBoC) with other central banks and reforming foreign exchange rate regime have been evolved rapidly and intensively (Zhang, 2015).

As internationalization of the renminbi has been making rapid progress, the impact of renminbi on the regional markets should be rising. Some countries in ASEAN, Singapore, Malaysia, Thailand, Indonesia, the Philippines, and Vietnam (The term "ASEAN-6" is

used to refer these six countries in the following context.) have, on average, fairly open capital markets, and thus the spillovers from China to these economies might get more evident. Moreover, after the implementation of internationalization of renminbi, the spillovers from China to countries have become more significant through both trade linkages and financial linkages. Overall, this paper aims to examine the spillover from China to ASEAN-6 in both trade and financial channels, and to what extent internationalization of renminbi contributes to this spillover. The rest of the paper is organized as follows.

- Section II presents literature review on the spillovers of China and the influence of the renminbi

- Section III describes the process of internalization of the renminbi and particular implementation of related polices made with ASEAN-6 countries.

- Section IV suggests examines the links between ASEAN-6 and China in terms of the performance of exports and investment and presents the facts of co-movement of Chinese and ASEAN-6's markets

- Section V conducts an empirical analysis using two stages regression to quantify the magnitude of the spillovers from China to each ASEAN-6 country and assesses the influence of internationalization of the renminbi behind them.

- Section VI presents hypothesis and results based on the empirical analysis

- Section VII concludes and conducts implication for policies for both China and Southeast Asian countries.

II. Literature Review

The issue of spillovers from China to Asian and global markets has drawn broad attention in the past few years. Particularly, a series of working paper from International Monetary Fund (IMF) and other research have covered it from different perspectives. Duval, Cheng, Oh, Saraf and Seneviratne (2014) quantifying the spillover in the view of Business Cycle Synchronization (BSC) suggest that growth spillovers from China to Asia are significant and sizeable, in particular, larger in economies that are more dependent on final demand from China in value-added terms. Specifically, they find that a one percentage increase in the growth of Chinese economy is predicated to raise GDP growth in Asian economies with median sizes by over 0.3 percentage after one year, compared to 0.15 percentage increase in non-Asian economies with same sizes at the same time. Arslanalp, Liao, Piao and Seneviratne (2016) find that China's influence on the regional market has been rising significantly, particularly after the 2008 global financial crisis, although the influence of the United States on global markets is still dominant. And the role of financial linkages in driving spillovers has been growing.

Furthermore, much prior research considers China's undergoing transition from a model driven by investment to a model increasingly motivated by consumption and services and its impact on regional markets. Ahuja and Nabar (2012) studying the issue of spillovers in the light of investment, find that one percentage point decrease in investment in China is estimated to reduce 0.1 percentag in global growth, five times larger than in 2002. Notably, countries that play a role of commodity exporters with relatively less diversified economies, such as countries in Southeast Asia, are more vulnerable to an investment slowdown in China. Hong, Hee, Lee, Liao and Seneviratne (2016) using value-added

trade data from 60 countries find that spillovers from China's transition are more negative on Asian countries and commodity exporters than others. That suggests, Asia will suffer a larger loss than other areas from China's rebalancing, and so will commodity-exporting emerging markets.

Arslanalp, Liao, Piao and Seneviratne (2016) suggest that China' financial spillovers could rise further through the ongoing internationalization of the renminbi and the liberalization of capital account, which is supported by prior works that indicate the growing influence of renminbi after the implementation of a managed float regime in July 2005. Shu (2007) tracking Asian currencies find that the importance of US dollar has declined since the 2005 renminbi exchange rate reform. Mattoo, Mishra and Subramanian (2012) find that 10 percent depreciation in the renminbi exchange rate averagely decreases exports from developing countries by approximately 1.5-2 percent and vice versa. Subramanian and Kessler (2012) find that in East Asia, 7 currencies out of 10 co-move more closely with the renminbi than with the dollar. Henning (2012) examines the exchange rate regimes of East Asian countries since July 2005 and finds that economic strategies of East Asian countries to stablize the exchange rate heavily depend on export performance and financial linkages, and the rise of Chinese economic power. Shu, He and Cheng (2014) manifest the increasing influence of the renminbi in the Asia-Pacific region by studying the roles of onshore and offshore markets in impact of the currencies. Additionally, the fact that the procedure of internationalization of the renminbi is developed rapidly and extensively has been indicated by Chen and Peng (2010), Gao (2010), Dai (2015) and Yao and Pang(2015). And Prasad and Ye (2011) point out that

although China is actively promoting the internationalization of the renminbi to propel capital account convertibility, the status of U.S. dollar is unlikely to be replaced soon.

III. Internationalization of the renminbi

A. Overview of the Process of Internationalization of the renminbi

In order to change the fact that the international status of the renminbi lagged behind that of China in terms of economic size, and reduce the reliance on the USD as dominate currency in international investment and trade Chinese government has begun to actively internationalize the renminbi to promote wider national use of the renminbi since early 2009 by mainly two approaches: the renminbi settlement in cross-border trade and investment, and the construction of offshore renminbi markets (Zhang, 2015) (Dai, 2015) (Yao and Pang, 2015). In December 2015, renminbi was approved by International Monetary Fund (IMF) to be included in the basket of currencies that composes the Special Drawing Rights (SDR) currency reserve, joining the US Dollar, Euro, British Pound and Japanese Yen. This decision took effect on 1st October, representing the milestone of the renminbi Internationalization since 2009 and the integration of the Chinese economy into the global financial system.

B. Timeline of Internationalization of the renminbi

- 2009 June: Chinese government implemented a pilot project of renminbi cross-border trade settlement that renminbi can be used to settle trade payments for the first time in Shanghai and four major cities (Dongguan, Guangzhou, Shenzhen and

Zhuhai) of Guangdong province with Hong Kong, Macau, and ASEAN countries.

- 2010 June: Cross-border trade settlement scheme expanded to 20 provinces and cities.

- 2010 August: PBoC allowed Yuan clearing banks and other overseas eligible financial institutions to trade directly in mainland interbank market.

- 2011 January: PBoC announced pilot scheme for mainland companies to settle overseas direct investments in Yuan.

- 2011 August: Overseas firms were allowed to use Yuan instead of USD to settle foreign direct investment in China in Beijing.

- 2011 December: renminbi qualified foreign institutional investor (RQFII) scheme was launched.

- 2013 September: Shanghai Free-Trade Zone approved by the State Council on 22 August 2013, the first free-trade zone in Mainland China, was officially launched on 29 September 2013, which would make freer convertibility of Yuan.

- 2014 November: Hong Kong scrapped 20,000 Yuan daily conversion to boost liquidity and tie up stock markets between Hong Kong and Shanghai ahead of a new cross-border equity trading scheme.

- 2015 October: PBoC launched the first phase of the Cross-Border Inter-Bank Payments System that offers clearing and settlement services for certain foreign banks in cross-border RMB payments such as to trade in mainland bond market.

On the respect of offshore markets, Hong Kong emerged first as a major offshore renminbi center because of its financial sophistication and special geography where renminbi deposits were allowed in 2004, renminbi-dominated bonds were firstly issued in

2007, dim sum bond market were established in June 2009, and renminbi-related business were approved to conduct after July 2010 (Zhang, 2015) (Miller, 2015).

C. Internationalization of renminbi with ASEAN countries

In fact, before the official announcement of internationalization of the renminbi, China had already allowed import and export in renminbi between Yunnan province and ASEAN countries in December 2008 (Zhang, 2015). This shows that China values the prospect for bilateral partnership with ASEAN in the long term through deeper integration in terms of economies. Since 2009, China has signed currency swap agreements with numerous countries of over 3 trillion Yuan. Particularly, Malaysia was the first country of ASEAN signed the agreements with China of 180 billion Yuan on February 2009. Later, PBoC signed renminbi bilateral swap agreements with Indonesia, Singapore, and Thailand of 100 billion, 300 billion and 70 billion in 2009, 2010 and 2011 respectively. Moreover, the Renminbi Qualified Foreign Institutional Investor (RQFII) pilot program was established in Hong Kong in 2011 and extend to three of ASEAN countries: Singapore (22 October 2013 & 17 November 2015), Malaysia (23 November 2015) and Thailand (17 December 2015) (Figure 1). Since 2013, renminbi offshore clearing banks have also been established in Singapore, Thailand and Malaysia (Table 1). Overall, Singapore, Malaysia and Thailand stand out from ASEAN having closer partnerships with China.

**Figure 1: renminbi Bilarteral Swap Agreement and
RQRII Program with ASEAN countries**

Unit: billion (RMB)

- ■ RMB Bilateral Swap Agreement
- ■ RQFII Program Licenses and Quotas
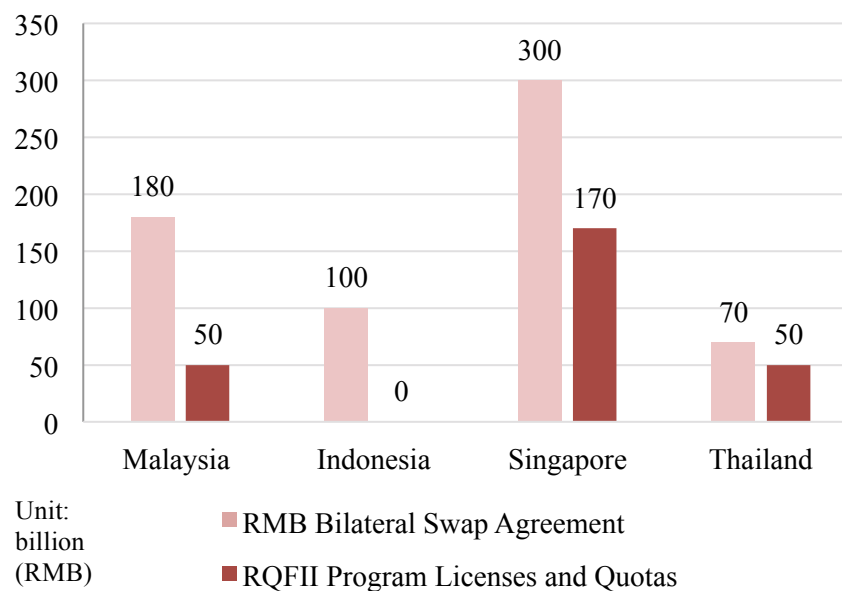
Table 1: renminbi Offshore Clearing Bank

Appointed Date	Country	Clearing Bank
8 February 2013	Sinapore	ICBC, Singapore branch
6 January 2015	Thailand	ICBC, Bangkok
6 January 2015	Malaysia	BoC, Malaysia

Note: ICBC =Industrial and Commercial Bank of China; BoC= Bank of China
Source: Wikipedia

IV. ASEAN-6 Exposures to China and Co-movement of Chinese and Asian markets

Variation of the asset price in China's stock market could be transmitted to the regional financial markets through many channels, including international trade, price effects on commodity, financial flows and even general market sentiment (Arslanalp, Liao, Piao and Seneviratne, 2016). This paper only considers two major channels through which China's development can affect the ASEAN-6 countries: trade and financial markets. As

mentioned before, trade might be the most important channel as China is a critical trading partner for these six economies not only in goods, but also in services such as tourism. The negative prospect of China's economy tends to decrease the domestic consumption and manufacture production, and thus lower exports from ASEAN-6 that export goods and services to China as the intermediary or final destination. Accordingly, the sales and earnings of related industry in ASEAN-6 will be lower, and thus the stock market valuation will be weakened.

Meanwhile, the financial channel can also play an important role in spillovers for all the ASEAN-6 countries, especially after internationalization of the renminbi. But direct financial links between China and the ASEAN-5 economies (ASEAN-6 except for Singapore) are still limited in the term of foreign direct investment (FDI) and financial claims, compared to trade linkages.

A. Trade Channel

China is an important trading partner for Southeast Asian countries and values its partnership with them. The ASEAN–China Free Trade Area (ACFTA) under which the average tariff rate on Chinese goods exported to ASEAN dropped to 0.6% from 12.8% was approved in 2002 and came into effect in 2010, becoming the world's largest free trade area covering 1.9 billion people and third-largest with the respect of nominal GDP after the EU and North American Free Trade Agreement (NAFTA) (Miller, 2015). But the performance of exports varies with different ASEAN countries. Based on the data from 2000 to 2015, ASEAN-6 countries' exposures to China through the trade channel are significant but not dominate compared to other economies such as the United Sates

and Japan. In 2015, their exports to China ranged from approximately 9% to 14% of their total exports. It should be noted that except for fluctuating ratio of exports of Vietnam, all other ASEAN countries' exposures China as a ratio to total exports surged from 3%-4% to 11%-13% in the past 15 years. In the contrast, their exports as a ratio of total exports to Japan, EU and the USA have decreased (Figure 2).

Figure 2: ASEAN-6: Composition of Exports by Trading Partner, 2000-2015 (in percent)

The Philippines
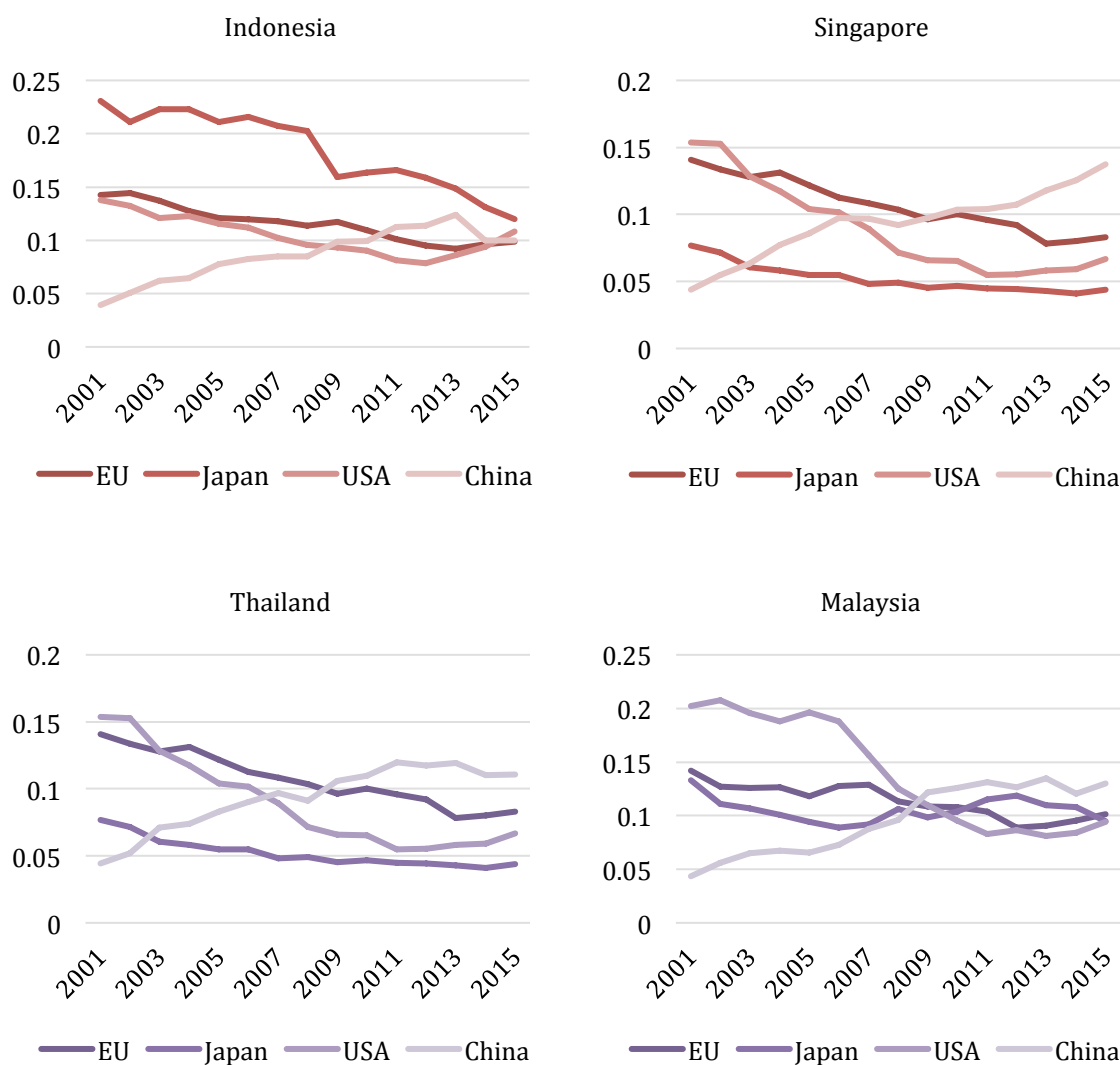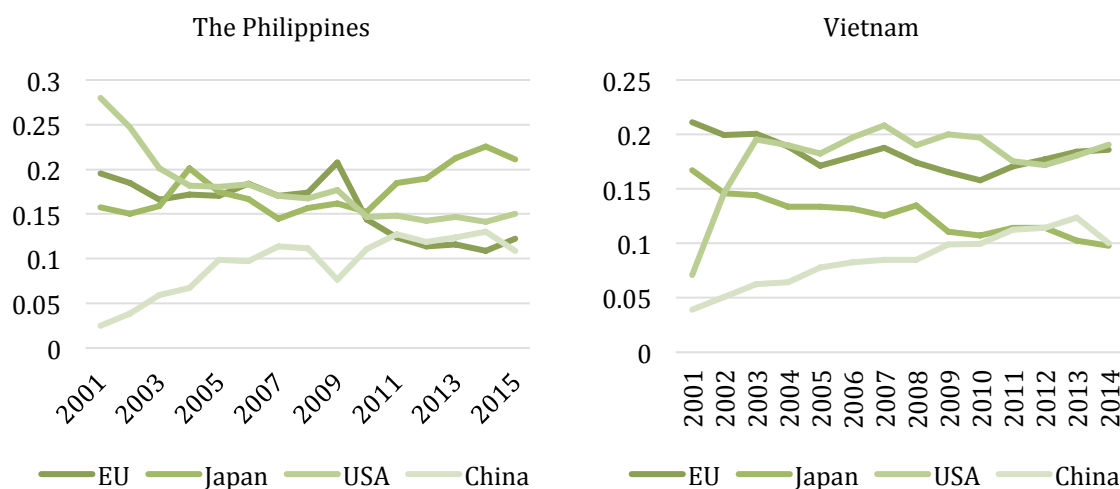
Vietnam

Source: IMF, and the author calculates.
Note: Data of Vietnam in the year of 2015 is absent.

In addition to the increasing ratio of exports to China, the composition of trade is changing from goods to more services. Due to China's transition from investment to consumption, its services imports have been growing in the last five years. (Dizioli, Guajardo, Klyuev, Mano and Raissi, 2016) Moreover, in current years the number of China's outbound tourists surged, reaching 122 million in 2016 increasing by 4.3% compared to the year of 2015 (117 million) and by 14% compared to the year of 2014 (107 million). China has remained the world's largest number of outbound tourists for consecutive years and more than half of service payments were accounted for by foreign travel. Due to ease visa, low cost, geographical proximity and other convenient factors, Southeast Asia has become the most popular designation for Chinese tourists (Figure 3). Thus, countries with large tourism sectors such as Thailand and Singapore should benefit from this transition. Thailand stands out as the country where sector has grown the most since 2010 and continue benefiting from the growing number of Chinese tourists.

Figure 3: Popular Outbound Destinations for Chinese Tourists in 2016

Top 10 Destinations Where Chinese Tourists

1. Thailand
2. Japan
3. South Korea
4. USA
5. Maldives
6. Indonesia
7. Singapore
8. Australia
9. Italy
10. Malaysia

Figure 3-1
(Countries from AEASN are marked in red.)

Top 20 Most Popular Destinations by Chinese Tourists

1. Thailand	11. Cambodia
2. South Korea	12. Russia
3. Japan	13. Australia
4. Indonesia	14. Mauritius
5. Singapore	15. Italy
6. USA	16. the UAE
7. Malaysia	17. Sri Lanka
8. Maldives	18. UK
9. Vietnam	19. Egypt
10. the Philippines	20. Germany

Figure 3-2

Top 10 Dark Horse Outbound Destinations

■ growth rate

Destination	growth rate
Canada	22%
UK	43%
Thailand	45%
Singapore	48%
Japan	53%
Sri Lanka	72%
the UAE	78%
India	81%
the Philippines	124%
Vietnam	166%

Source: China Tourism Academy (CTA)   Figure 3-3

B. Financial Channel

As mentioned before, except for Singapore, residents of ASEAN-6 have limited direct financial exposure to China. The ratio of China's investment to ASEAN-6 GDP is less than 1percent in all ASEAN-6 countries. In the contrast, bilateral linkages between China and Singapore via foreign direct investment are large (Ahuja and Nabar, 2012) Additionally, the variation in China's stock market is likely to affect the global financial environment and thus in turn impact the local financial markets of ASEAN-6. (Dizioli, Guajardo, Klyuev, Mano and Raissi, 2016) This kind of spillovers can be supported by the correlation between spikes in the VIX and the crash in China's stock market both in June 2015 and at the beginning of the year of 2016 (Figure 4).

Figure 4: 5-year Chicago Board Options Exchange SPX Volatility Index (VIX) and Shanghai Stock Exchange Composite Index (SSE)
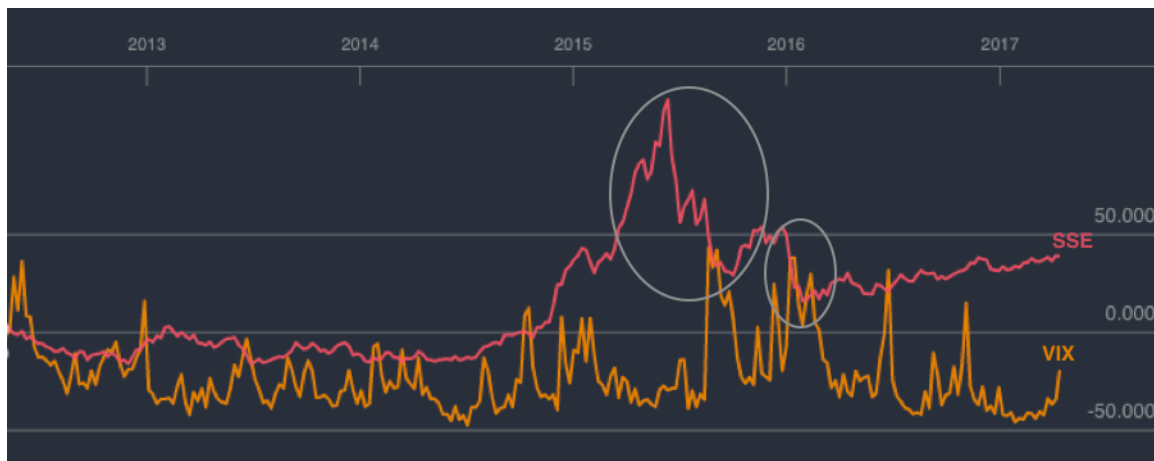
Source: Bloomberg

C. Facts of Co-movement of Chinese and ASEAN-6 Markets

In general, co-movement of Chinese and ASEAN-6 market has become more evident over time while the importance of US Dollars has declined. Chan (2007) tracking Asian

currencies in the currency basket from 1999 to 2007 suggests that although US dollar has continued to its dominant position, having a weight of 0.8–0.9 in more than half of the currencies, its influence has declined since the renminbi exchange rate reform in 2005. Subramanian and Kessler (2012) study on 10 East Asian currencies and find that the on average, the value of the co-movement coefficient associated with the RMB is around 60 percent greater than that for the US Dollars, which means currencies in East Asia averagely co-move more closely with the RMB than with the US Dollars. Henning (2012) identifies a general rising trend for the renminbi weights in the exchange rate regimes of eight East Asian currencies since July 2005 and finds that Malaysia, Singapore, Thailand and the Philippines have formed a loose but effective "renminbi bloc" with China. Dizioli, Guajardo, Klyuev, Mano and Raissi (2016) find that among the Asian countries, Singapore and Thailand have the relatively higher equity return correlation with China in the post global financial crisis period. Shu, He and Chen (2016) presents evidence of the renminbi's growing influence in the Asia-Pacific region. In they empirical analysis, they find that the renminbi has a significant impact on all the seven Asian economies they study (MYR, PHP, KRW, INR, SGD, THB and IDR[1]) in the panel analyses at the country level. The renminbi has the biggest impact on the Malaysia ringgit (0.41), followed by the Philippine peso (0.35) and has the most modest impact on the Indonesian rupiah (0.07).

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[1] MYR: Malaysia Ringgit; PHP: Philippine Peso; KRW: South Korean Won; INR: Indian Rupee; SGD: Singapore Dollars; THB: Thai Baht and IDR: Indonesia Rupiah

V. Empirical Analysis

Financial spillovers are defined as the transmission of a shock in China to asset prices in other countries, based on IMF research. The shocks can be categorized from "real shocks (news about growth prospects)" or "pure financial shocks (news about a change in the exchange rate regime)" or "a mixture of both" (Arslanalp, Liao, Piao and Seneviratne, 2016). In this part, this paper will evaluate the magnitude of the financial spillovers from China to ASEAN-6 in both trade and financial channels in the equity market referring the two stages regression model from Forbes and Chinn (2004) that estimates a factor model in which country's market returns are predicted by global, sectoral and cross-country factors, namely returns in large financial markets and by country-specific effects. Simplifying the Forbes and Chinn's model without considering the specific country factors, this paper selects China, Japan, the United States and Europe Union as comparably central economies to represent the cross-country factors, the world interest rate and volatility index to represent the change in global factors. At the first stage, we are trying to 1) estimate the sensitivity of stock market returns in ASEAN-6 countries to those in central countries (China, the United States, Japan and Euro Area) respectively in the panel analysis.

- **First Stage Regression**

$$r_{i,t} \ = \ \alpha_i + \beta_{c,t} r_{c,t} \ + \gamma R_t \ + \theta C_t \ + \varepsilon_{i,t} \quad (1.1)$$

$r_{i,t}$: Country i (ASEAN-6)'s stock market returns on week t from August 4th 2000 to November 25th 2016[2]

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[2] The Ho Chi Ming City Stock Exchange was established in 2000 and August 4th 2000 was its first trading date. STI (Singapore Stock Market Index) for Singapore; SET 50 (Stock Exchange of Thailand 50) for Thailand; JCI (Jakarta Stock Exchange Composite Index) for Indonesia; FBMKLCI (The FTSE Bursa Malaysia KLCI) for Malaysia; PSEi (Philippine Stock Exchange Index) for the Philippines, VN(Vietnam Ho Chi Minh Stock Index) for Vietnam

$r_{c,t}$:   Central country c's stock market returns on week t from August 4th 2000 to November 25th 2016[3]

R_t : World interest rate on week t[4]

C_t : Risk aversion risk on week t[5]

$\varepsilon_{i,t}$: Normally distribution error term

2) In the first stage, we are also trying to compare the degree of the sensitivity of stock market returns in ASEAN-6 countries as a whole pre and post the implementation of the internationalization of renminbi. So we use the panel data with fixed effects to conduct the regression for 2001-2008 and 2009-2016 respectively.

3) In the second stage, we will use the estimated beta as a dependent variable to decompose it in terms of trade and financial linkages. But firstly we have to adjust the first stage regression by adding interaction terms involving time dummy variables to get the more observations for the second stage regression.

The adjusted first stage regression is expressed as follows:

$$r_{i,t} = \alpha_i + \beta_{0c,t} r_{c,t} + \beta_{1c,t} r_{c,t} * year_{2001} + \ldots + \beta_{16c,t} r_{c,t} * year_{2016} +$$
$$\gamma R_t + \theta C_t + \varepsilon_{i,t} \quad (1.2)^6$$

$year_k$: Dummy variables year k, k=2001, 2002….2016. So we have 16 years included in the model.

$\beta_{kc,t}$: The coefficient for the dummy regressors where k =1, 2….16

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[3] SSE (Shanghai Stock Exchange Composite Index) for China; S&P 500 (The Standard & Poor's 500) for the United States; Nikkei 225 for Japan; E300 (FTSEurofirst 300 Index) for EU.

[4] The world interest rate is calculated by Bloomberg based on the volume.

[5] The CBOE Volatility Index is used to measure the global risk aversion.

[6] Other repressors, R_t C_t $\varepsilon_{i,t}$ keep the same as those in the formula 1.1

Then we use the beta for each year (dummy variables) and panel data model to conduct the second stage regression.

- **Second Stage Regression**

$$\beta_{c,t} = \alpha_i + \beta_1 T_{c,i} + \beta_2 F_{c,i} + \varepsilon_{i,t} \ \ (1.3)$$

$T_{c,i,t}$: Direct trade linkages between country i (ASEAN-6) and China on year t[7]

$F_{c,i,t}$: Direct financial linkages between country i (ASEAN-6) and China on year t[8]

$\varepsilon_{i,t}$: Normally distribution error term

VI. Hypothesis and Results

Hypothesis 1: *Spillovers from China in stock markets are more evident to ASEAN countries that have tighter linkages with China in trade and investment.*

The results of the first regression (1.1) show that among six Southeast Asian countries, the coefficient for China varies from 0.09 to 0.16 on the country level (Figure 5). The sensitivities of the stock market returns in Indonesia (0.157) and Vietnam (0.16) to China are relatively high, followed by Singapore (0.129) and the Philippines (0.109). The results conflict with the hypothesis 1, but can be well explained based on the prior research. Although the bilateral trade and financial linkages between China and Vietnam are pretty low and those between China and Indonesia are not very high compared to other ASEAN-6 countries such as Singapore and Thailand (Salidjanova and Koch-Weser, 2015), the natural resource oriented exports and the electrical products oriented imports as well as their low income increase their financial markets' dependence on China's market. This explanation is supported by Ahuja and Nabar (2012)'s research that

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[7] The trade linkage is measured by the ratio of ASEAN-6's exports to China to its total exports over 2003-2012
[8] The financial linkage is measured by the ratio of ASEAN-6's inward FDI from China to its total inward FDI over 2003-2012

countries that play a role of commodity exporters with relatively less diversified economies, are more vulnerable to change in China's growth.

Moreover, for all countries, the spillovers from China are lower than those from the United States. The most obvious example with the largest difference between the coefficient for China and the coefficient for the United States is Singapore: the coefficient for China is 0.129, higher than that associated with Thailand, the Philippines and Malaysia; but the stock markets in Singapore was much affected by the United States. It can be explained by the tighter linkages of Singapore in both trade and investment with the United States.

Figure 5: the Estimated Sensitivity of ASEAN-6 Countries to Central Economies

Central Economies	**ASEAN-6 Countries**						Observations
	Singapore	Thailand	Indonesia	Malaysia	the Philippines	Vietnam	
China	0.129***	0.106***	0.157***	0.0980***	0.109***	0.160***	789
United States	0.682***	0.475***	0.405***	0.210***	0.321***	0.207**	789
Euro Area	0.643***	0.458***	0.434***	0.236***	0.343***	0.170**	789
Japan	0.457***	0.402***	0.365***	0.178***	0.305***	0.168***	789

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note ..Only the factors for illustrative purposes are shown in the form.
Note: The regressions are made separately for different central economies; namely, the four central economies are not repressors in the same equation at the same time to avoid the collinearity problem.
Source: Author estimates.

Hypothesis 2: *Spillovers from China in stock markets to Southeast Asian countries are on the rise, particularly after the implementation of internationalization of the renminbi, but is not comparable to the level of the United States.*

The results of the first-stage regression with panel data in the two time period analysis suggest that, the correlation between ASEAN-6's and China's stock market surged from 0.09 to 0.159 after the implementation of Internationalization of renminbi (IOR), indicating the spillovers from China have increased after internationalizing the renminbi (Figure 6).   But compared to the spillovers from the United States in the post-IOR period (0.414), the coefficient for China is still far lower. However, the coefficient associated with stock markets in Japan has declined in the post-IOR years, partially due to the global financial crisis (Arslanalp, Liao, Piao and Seneviratne, 2016). Thus, the spillovers from China to ASEAN-6 counties have increased since the internationalization of the renminbi and could be comparable to the level of Japan, but the dominant spillovers from the United States is still undoubted.

Figure 6: ASEAN-6 Stock Market Sensitivity to Central Economies
(estimated beta coefficient)
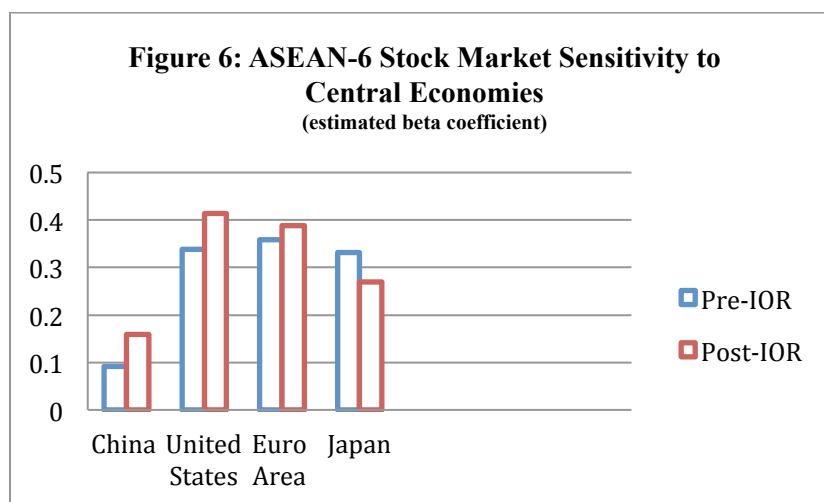
Note: IOR= Internationalization of renminbi; Pre-IOR= 2000-2008; Post-IOR= 2009-2016
Source: Author estimates.

3: Internationalization of the RMB influences the co-movement of Southeast Asian economies with China in both trade and financial linkages, but the financial linkages.

The results of the second-stage regression point that the trade exposure is the main transmission channel for spillovers from China to Southeast Asian stock markets. In general, we find that ASEAN-6's trade linkages with China are a statistically significant determinant of spillovers in the full sample. The coefficient associated with the trade linkage is 1.761 while that for the financial linkage is only 0.114. Separately, we conduct estimations only for the pre-IOR period (2003-2008) and the post-IOR period (2009-2012) and find that both channels have become more evident after the implementation of internationalization of renminbi. The contribution of the trade linkage in the post-IOR period is 2.5 times higher than in the pre-IOR period while the contribution of the financial linkage has increased by 37% after the internationalization of the renminbi. That means the relative contribution in explaining the variation in stock market spillovers from China have not changed and the trade channel has played more dominant role in spillovers (Figure 7).

Figure 7: Linkages between China and ASEAN-6
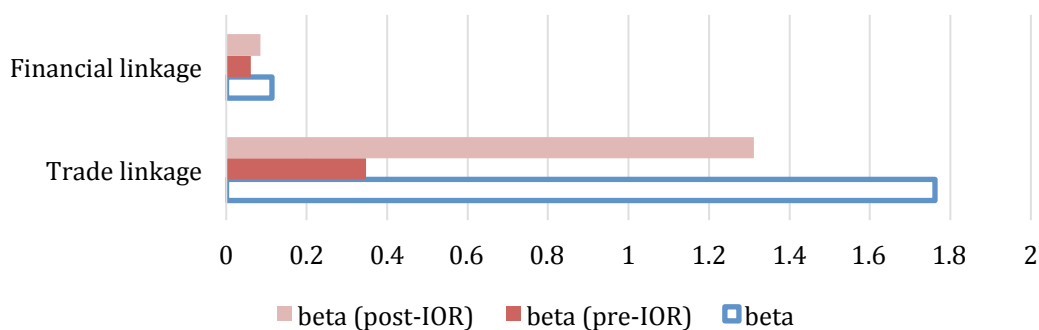
VII. **Conclusion and Implication**

Overall, financial spillovers from China to Southeast Asian economies are on the rise after internationalization of the renminbi. Although the influence of the United Status on the Southeast Asian financial markets is still unquestionable, spillovers form China to Southeast Asian economies is going to be comparable to the level of Japan after actively internationalizing of renminbi. The spillovers from China to Southeast Asian economies are transmitted through both trade channel and financial channel, and the impact of the trade channel is more evident. Although the currency liberalizing such as renminbi cross-border trade settlement and construction of offshore markets has strengthened the direct financial linkages between China and ASEAN, especially Singapore, Malaysia and Thailand, the main transmission channel appears to be trade linkages, whose contribution to spillovers have been more significant after internationalization of the renminbi. This can be explained by the transition the China is undergoing. Singapore, Malaysia and Thailand are countries with large services sector and benefit from the overseas payment and China's rebalancing from investment to consumption. Moreover, though Indonesia and Vietnam don't present high trade and financial linkages compared to other ASEAN-6 countries, their stock markets are more likely to be impacted by China's financial market because of their relatively low income, the less diversified composition of their export to and import from China and resource-seeking investment from China.

Internationalization of renminbi brings opportunities and challenges for both China and Southeast Asian countries. For China, given its increasing impact on the regional market, keeping the direction of its policy clearly to lead an effective prediction of China's economy will still be very important. Moreover, the implementation of Internationalization of renminbi has not significantly strengthened the financial linkages

with direct investment between China and ASEAN countries since the China's investment is basically source-seeking and China is now taking a transition from investment to consumption and finding service-oriented investment. In this case, for Southeast Asian countries, diversifying sources of exports, such as promoting the growth of the services sector could help these countries such as Indonesia and Vietnam to reduce dependence on exports. Additionally, due to the transition of China and convenience of overseas payment benefited from Internationalization of renminbi and online payment system, China's imports of services, particularly in tourism, are rising. Countries such as Thailand are benefiting from this trend and revolution. Thus, marketing the tourist attractions for Chinese tourists and facilitating the payment with Alipay and WeChat Pay, the mainstream online payment tools in China, might benefit other Southeast Asian countries from this trend.

VIII. Appendix

VARIABLES	Growthrate	Growthrate	Growthrate	Growthrate	Growthrate	Growthrate	Growthrate	Growthrate	Growthrate
SSEgrowth	0.0910***	0.0910***	0.159***						
	(0.02)	(0.02)	(0.02)						
VIXgrowth	0.0404***	0.0404***	0.0754***	0.0265***	0.00	0.0274***	0.01	0.0387***	0.0229***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)
IR	0.00342*	0.00342*	(0.00)	0.00	0.00334*	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SP500growth				0.338***	0.414***				
				(0.04)	(0.03)				
E300growth						0.358***	0.388***		
						(0.03)	(0.02)		
Nikkeigrwoth								0.332***	0.271***
								(0.02)	(0.02)
Constant	0.00279***	0.00279***	0.00249***	0.00236***	0.00155***	0.00250***	0.00205***	0.00243***	0.00221***
	0.00	0.00	(0.00)	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00
Observations	2388.00	2388.00	2346.00	2346.00	2388.00	2346.00	2388.00	2346.00	2388.00
Number of i	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	beta	beta	beta
tradelinkage	1.312*	0.35	1.761***
	(0.68)	(0.91)	(0.48)
financialsq	0.08	0.06	0.11
	(0.07)	(0.60)	(0.11)
Constant	0.09	0.129*	0.02
	(0.08)	(0.08)	(0.05)
Observations	24.00	36.00	60.00
Number of country	6.00	6.00	6.00

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	STIgrowth	STIgrowth	SETI50growth	SETI50growth	JCIgrwoth	JCIgrwoth	BMKLCIgrowt	BMKLCIgrowt	PESigrwoth	PESigrwoth	VNgrowth	VNgrowth	VVgrowth	Growthrate
SSEgrowth	0.129***		0.106***		0.157***		0.0980***		0.109***		0.160***		0.160***	0.160***
	(0.02)		(0.03)		(0.03)		(0.02)		(0.03)		(0.04)		(0.04)	(0.04)
IR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
VIXgrowth	0.0667***	0.0278***	0.0709***	0.0176*	0.0213**	0.0363***	0.0195***	0.0278***	0.0209***	0.0197**	0.0554***	0.0304***	0.0254**	0.0352***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SP500growth	0.682***		0.475***		0.405***		0.210***		0.321***		0.207**			
	(0.04)		(0.06)		(0.06)		(0.04)		(0.06)		(0.09)			
E300growth	0.643***		0.458***		0.434***		0.236***		0.343***		0.170**			
	(0.03)		(0.05)		(0.05)		(0.03)		(0.05)		(0.07)			
Nikkeigrwoth	0.457***		0.402***		0.365***		0.178***		0.305***		0.168***			
	(0.03)		(0.04)		(0.04)		(0.02)		(0.03)		(0.05)			
Constant	0.00	0.00294***	0.00211*	0.00249**	0.00	0.00242**	0.00110*	0.00126*	0.00109*	0.00272***	0.00223**	0.00242**	0.00345**	0.00350**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observation	789.00	789.00	789.00	789.00	789.00	789.00	789.00	789.00	789.00	789.00	789.00	789.00	789.00	789.00
R-squared	0.39	0.13	0.18	0.20	0.23	0.12	0.14	0.17	0.19	0.11	0.14	0.15	0.03	0.04

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source	SS	df	MS		Number of obs	=	4,734
					F(34, 4699)	=	20.00
Model	.603767128	34	.017757857		Prob > F	=	0.0000
Residual	4.17120195	4,699	.000887679		R-squared	=	0.1264
					Adj R-squared	=	0.1201
Total	4.77496908	4,733	.001008867		Root MSE	=	.02979

Growthrate	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
VIXgrowth	.0536153	.0029732	18.03	0.000	.0477866	.0594441
_Iyear_1	-.0011251	.0034816	-0.32	0.747	-.0079507	.0057005
_Iyear_2	-.0026573	.0034418	-0.77	0.440	-.0094049	.0040902
_Iyear_3	.0040991	.0034533	1.19	0.235	-.0026711	.0108693
_Iyear_4	.0037793	.003499	1.08	0.280	-.0030803	.0106389
_Iyear_5	.0007401	.0034606	0.21	0.831	-.0060443	.0075245
_Iyear_6	.0026614	.0035707	0.75	0.456	-.0043389	.0096616
_Iyear_7	.0028657	.0034978	0.82	0.413	-.0039917	.009723
_Iyear_8	-.0109338	.0034776	-3.14	0.002	-.0177514	-.0041161
_Iyear_9	.0060276	.0034576	1.74	0.081	-.000751	.0128062
_Iyear_10	.003349	.0034057	0.98	0.325	-.0033278	.0100257
_Iyear_11	-.0012867	.0034468	-0.37	0.709	-.008044	.0054706
_Iyear_12	.0019969	.0034216	0.58	0.560	-.0047109	.0087047
_Iyear_13	-.0012631	.0034227	-0.37	0.712	-.0079731	.005447
_Iyear_14	.0010709	.0034576	0.31	0.757	-.0057077	.0078494
_Iyear_15	-.0022537	.0034145	-0.66	0.509	-.0089476	.0044403
_Iyear_16	.0003653	.0034706	0.11	0.916	-.0064387	.0071693
SSEgrowth	.6698126	.1245228	5.38	0.000	.4256895	.9139357
_IyeaXSSEg_1	-.5878729	.1491591	-3.94	0.000	-.8802947	-.2954512
_IyeaXSSEg_2	-.6890518	.133881	-5.15	0.000	-.9515213	-.4265823
_IyeaXSSEg_3	-.4412813	.1416824	-3.11	0.002	-.7190452	-.1635173
_IyeaXSSEg_4	-.5824417	.1393183	-4.18	0.000	-.8555708	-.3093126
_IyeaXSSEg_5	-.6377726	.1374558	-4.64	0.000	-.9072504	-.3682947
_IyeaXSSEg_6	-.4733873	.1338598	-3.54	0.000	-.7358152	-.2109593
_IyeaXSSEg_7	-.4966345	.131585	-3.77	0.000	-.7546028	-.2386662
_IyeaXSSEg_8	-.5203389	.1280233	-4.06	0.000	-.7713246	-.2693532
_IyeaXSSEg_9	-.5032674	.1318579	-3.82	0.000	-.7617708	-.2447641
_IyeaXSSEg_10	-.5883722	.1363756	-4.31	0.000	-.8557323	-.3210121
_IyeaXSSEg_11	-.4987379	.1441297	-3.46	0.001	-.7812998	-.216176
_IyeaXSSEg_12	-.4042315	.1450755	-2.79	0.005	-.6886475	-.1198155
_IyeaXSSEg_13	-.5980987	.1433715	-4.17	0.000	-.8791741	-.3170233
_IyeaXSSEg_14	-.6838204	.1414766	-4.83	0.000	-.9611808	-.4064599
_IyeaXSSEg_15	-.7031032	.1288318	-5.46	0.000	-.955674	-.4505325
_IyeaXSSEg_16	-.6166016	.1381873	-4.46	0.000	-.8875136	-.3456896
_cons	.0020791	.0029579	0.70	0.482	-.0037197	.0078779

Model	.992857127	37	.026833976	Prob > F	=	0.0000
Residual	3.78211195	4,696	.00080539	R-squared	=	0.2079
				Adj R-squared	=	0.2017
Total	4.77496908	4,733	.001008867	Root MSE	=	.02838

Growthrate	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
SP500growth	.0301061	.0351943	0.86	0.392	-.0388913	.0991035
E300growth	.2087439	.0301918	6.91	0.000	.1495539	.2679339
Nikkeigrwoth	.208084	.0172994	12.03	0.000	.1741691	.2419988
VIXgrowth	.00646	.0040572	1.59	0.111	-.0014941	.0144141
_Iyear_1	-.0006291	.0033184	-0.19	0.850	-.0071347	.0058764
_Iyear_2	-.0021968	.0032838	-0.67	0.504	-.0086347	.0042411
_Iyear_3	.0015688	.0032957	0.48	0.634	-.0048924	.00803
_Iyear_4	.0013613	.0033366	0.41	0.683	-.0051799	.0079026
_Iyear_5	-.0030635	.003302	-0.93	0.354	-.009537	.00341
_Iyear_6	.0003558	.003404	0.10	0.917	-.0063176	.0070293
_Iyear_7	.0008784	.0033367	0.26	0.792	-.0056632	.00742
_Iyear_8	-.009436	.0033202	-2.84	0.005	-.0159451	-.0029269
_Iyear_9	.0036935	.0032974	1.12	0.263	-.0027711	.010158
_Iyear_10	.0009783	.0032485	0.30	0.763	-.0053904	.007347
_Iyear_11	-.002718	.0032892	-0.83	0.409	-.0091663	.0037303
_Iyear_12	-.0010148	.0032641	-0.31	0.756	-.007414	.0053845
_Iyear_13	-.0051376	.0032723	-1.57	0.116	-.011553	.0012777
_Iyear_14	-.0014086	.0033003	-0.43	0.670	-.0078788	.0050615
_Iyear_15	-.0052054	.0032563	-1.60	0.110	-.0115893	.0011784
_Iyear_16	-.001405	.0033123	-0.42	0.671	-.0078986	.0050886
SSEgrowth	.7019965	.1187054	5.91	0.000	.4692781	.9347148
_IyeaXSSEg_1	-.5851611	.1422748	-4.11	0.000	-.8640864	-.3062358
_IyeaXSSEg_2	-.788902	.1276226	-6.18	0.000	-1.039102	-.5387018
_IyeaXSSEg_3	-.4835377	.1352322	-3.58	0.000	-.7486563	-.2184192
_IyeaXSSEg_4	-.62505	.1327748	-4.71	0.000	-.885351	-.3647489
_IyeaXSSEg_5	-.6958465	.13108	-5.31	0.000	-.9528248	-.4388682
_IyeaXSSEg_6	-.5366203	.1276247	-4.20	0.000	-.7868247	-.2864159
_IyeaXSSEg_7	-.5490516	.1254622	-4.38	0.000	-.7950163	-.3030868
_IyeaXSSEg_8	-.575776	.1221415	-4.71	0.000	-.8152306	-.3363214
_IyeaXSSEg_9	-.5972558	.1257456	-4.75	0.000	-.8437761	-.3507355
_IyeaXSSEg_10	-.666412	.1300296	-5.13	0.000	-.9213309	-.411493
_IyeaXSSEg_11	-.6025078	.1377201	-4.37	0.000	-.8725037	-.3325118
_IyeaXSSEg_12	-.5433543	.1383822	-3.93	0.000	-.8146483	-.2720603
_IyeaXSSEg_13	-.6585634	.1367287	-4.82	0.000	-.9266158	-.390511
_IyeaXSSEg_14	-.7638575	.1348483	-5.66	0.000	-1.028223	-.4994915
_IyeaXSSEg_15	-.7094653	.1227489	-5.78	0.000	-.9501108	-.4688198
_IyeaXSSEg_16	-.6824406	.1317702	-5.18	0.000	-.9407721	-.4241091
_cons	.0033563	.0028197	1.19	0.234	-.0021716	.0088843

IX. Bibliography

"An Evolutionary Time Line of China's Yuan." South China Morning Post. June 26, 2016. Accessed Feb 09, 2017.

Ahuja, Ashvin, and Malhar Nabar. "Investment-Led Growth in China: Global Spillovers." IMF Working Papers 12, no. 267 (2012): 1. doi:10.5089/9781475556414.001.

Arslanalp, Serkan, Wei Liao, Shi Piao, and Dulani Seneviratne. "China's Growing Influence on Asian Financial Markets." IMF Working Papers 16.173 (2016): 1.

Chinese Outbound Tourism Statistics in 2016: 122 Million Chinese Tourists Make Outbound Trips, Spend $109.8 Billion--Focus On--World Travel Online. Accessed May 10, 2017. http://news.travel168.net/20170203/43145.html.

Chen, Hongyi, and Wensheng Peng. "The Potential of the Renminbi as an International Currency." Currency Internationalization: Global Experiences and Implications for the Renminbi, 2010, 115-38. doi:10.1057/9780230245785_5.

Dai Dahua " Analysis of the renminbi's Chance to be Included in the SDR"April, 2015.

Dizioli, Allan, Guajardo, Jaime, Klyuev, Vladimir, Mano, Rui and Raissi, Mehdi. " Spillovers from China's Growth Slowdown and Rebalancing to the ASEAN-5 Economies." IMF Working Papers 16.170 (2016): 1.

Duval, Romain, Kevin Cheng, Kum Hwa Oh, Richa Saraf, and Dulani Seneviratne. "Trade Integration and Business Cycle Synchronization: A Reappraisal with Focus on Asia." IMF Working Papers 14, no. 52 (2014): 1. doi:10.5089/9781475522464.001.

Forbes, Kristin, and Chinn, Menzie. 2004. "A Decomposition of Global Linkages in Financial Markets Over Time." The Review of Economics and Statistics, MIT Press, vol. 86(3), pages 705-722, 09.

Gao, Haihong. "Internationalization of the Renminbi and Its Implications for Monetary Policy."Currency Internationalization: Global Experiences and Implications for the Renminbi, 2010, 209-20. doi:10.1057/9780230245785_9.

Gagnon, Joseph E. and Kent Troutman "Internationalization of the Renminbi: The Role of Trade Settlement" May, 2014

Hong, Gee Hee, Jaewoo Lee, Wei Liao, and Dulani Seneviratne. "China and Asia in Global Trade Slowdown." IMF Working Papers 16, no. 105 (2016): 1. doi:10.5089/9781484368565.001.

Miller, Meredith. "China's Relations with Southeast Asia." May 13, 2015.

Prasad, E and L Ye "The renminbi's role in global monetary system", in R Glick and M Spiegel (eds), Asia's role in the post-crisis global economy, conference proceedings of the Federal Reserve Bank of San Francisco Asia Economic Policy Conference, 29–30 November 2011.

"Press Release No. 15/540." Press Release: IMF's Executive Board Completes Review of SDR Basket, Includes Chinese Renminbi. Accessed Feb 09, 2017.

Subramanian, Arvind, Prachi Mishra, and Aaditya Mattoo. "Spillover Effects of Exchange Rates: A Study of the Renminbi." IMF Working Papers 12, no. 88 (2012): 1. doi:10.5089/9781475502626.001.

Shu, Chang, Dong He, and Xiaoqiang Cheng. "One Currency, Two Markets: The Renminbi's Growing Influence in Asia-Pacific." SSRN Electronic Journal. doi:10.2139/ssrn.2438641.

Shu, Chang. "Impact of the Renminbi Exchange Rate on Asian Currencies." Currency Internationalization: Global Experiences and Implications for the Renminbi, 2010, 221-35. doi:10.1057/9780230245785_10.

Subramanian, Arvind, and Martin Kessler. "The Renminbi Bloc Is Here: Asia Down, Rest of the World to Go?" SSRN Electronic Journal, 2012. doi:10.2139/ssrn.2298011.

Yao, Aidan and Jason Pang "renminbi: assessing the chance and impact of SDR inclusion" Nov 2015

Zhang, Ming. "Internationalization of the Renminbi." Reform of the International Monetary System and Internationalization of the Renminbi (2015): 225. http://www.imf.org/en/News/Articles/2015/09/14/01/49/pr15540.