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To cite this article: Fan Zhang, Miaojie Yu, Jiantuo Yu & Yang Jin (2017) The Effect of RMB Internationalization on Belt and Road Initiative: Evidence from Bilateral Swap Agreements, *Emerging Markets Finance and Trade*, 53:12, 2845-2857, DOI: [10.1080/1540496X.2017.1382346](https://doi.org/10.1080/1540496X.2017.1382346)

To link to this article: <https://doi.org/10.1080/1540496X.2017.1382346>



Accepted author version posted online: 17 Oct 2017.  
Published online: 17 Oct 2017.



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# The Effect of RMB Internationalization on Belt and Road Initiative: Evidence from Bilateral Swap Agreements

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**ABSTRACT:** This article evaluates the implication of renminbi (RMB) internationalization on economic integration between China and its partners, especially for Belt and Road countries. We collected data for all bilateral swap agreements between 2000 and 2016, and empirically explored the role of bilateral swap agreements in the bilateral trade flows between China and its partner countries. We examined the effects in gravity equation and found a significant positive effect of swap agreements on trade. In our benchmark model, the negotiations of swap agreement would improve 30.4% of bilateral trade values between China and its partners. For Belt and Road countries, the effect is even stronger. This effect is both statistically and economically significant. It is also robust for alternative measure of swap agreements and alternative estimation method. We argue that RMB swap agreements are beneficial for the economic integration between China and Belt and Road countries through facilitating bilateral trade.

**KEY WORDS:** Belt and Road Initiative, RMB internationalization, swap agreements

The increase in China's role in the world economy in the past few decades has raised a heated discussion on the role of renminbi (RMB) in international transactions (Eichengreen and Lombardi 2017). Starting from around 2005, Chinese government has pursued a variety of initiatives designed to encourage wider use of RMB. These efforts sped up after the global financial crisis in 2008 and have made great progress since 2009. The progress peaked in 2015 and then slowed down in some aspects since 2016.

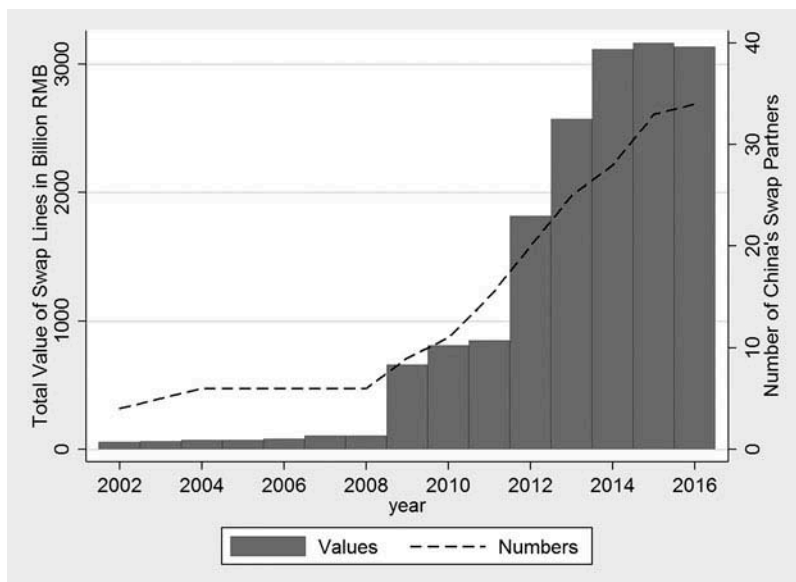
The progress of RMB internationalization could be categorized into four fields: RMB trade settlement, RMB denominated investment, RMB bond issuance, and RMB currency swaps and direct trading (Eichengreen and Kawai 2014). Specifically, the RMB settlement by Chinese banks for cross-border trade reached its peak value of RMB7.23 trillion in 2015 and then dropped to RMB5.23 trillion in 2016. The RMB cross-border direct investment settlement increased drastically in 2015 and slowed down in 2016. The value of 2016 hit RMB2.46 trillion, including RMB1.40 trillion of overseas direct investment and RMB1.06 trillion of foreign direct investment. Although the foreign direct investment kept on increasing, the overseas direct investment dropped significantly compared to its value of RMB1.58 trillion in 2015. However, the non-financial direct investment from Chinese investors in 7961 enterprises in 164 countries and regions amounted to RMB1130 billion in 2016, remaining a rapid growth. Meanwhile, RMB international bonds and bills issued in 2016 totaled RMB233.7 billion from 26 overseas issuers. The value is larger than the accumulated sum of previous years.<sup>1</sup>

Among these initiatives, the negotiation of bilateral swap agreements is one of the key means to secure RMB-denominated liquidity adequate to cover an open position. Through these agreements, partner countries are able to obtain the RMB needed by their respective domestic financial institutions and pass this on to the latter as needed. The assured provision of RMB liquidity should in turn allow foreign monetary authorities to authorize the banks they regulate to incur RMB exposures (Eichengreen 2015). Figure 1 shows the time trend of China's swap values and numbers of partner countries in the twenty-first century. The first swap signed by China is under Chiang Mai Initiative

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**Figure 1.** China's bilateral swap values and numbers.

**Note:** Data of swaps under CMI are from Bank of Japan. Data of other swaps are from People's Bank of China (2016). Swap agreements under CMI are mostly denoted in USD values. We use 8 RMB/\$ as exchange rate to estimate their RMB values.

(hereafter CMI) framework in 2002. As we can see, 2009 is a tipping point on the trend. Both values and numbers have experienced a drastic increase since 2009. The high speed growth kept until 2014 which slows down since 2015. The drop in the value in 2016 compared with 2015 is the consequence of stagnation in developing new swap agreements partners since June 2016 and the discontinuity after expiration of the original agreement with Brazil.<sup>2</sup> The slowdown of the bilateral swap agreements growth reflects the reversal in the trend of RMB internationalization.

By the end of 2008, all swap agreements signed by China are under the framework of CMI. Partner countries signed include Japan, South Korea, and four leading countries of the Association of Southeast Asian Nations (hereafter ASEAN)—Thailand, Malaysia, Philippines, and Indonesia. The CMI swap arrangement dates back to 1977 and China participated into the arrangement in 2002. The CMI swap arrangement is aimed at providing liquidity support among East Asian countries. Most of the swap lines were denoted in US dollar and local currencies. In particular, agreements between China and Thailand, Malaysia, and Indonesia is on swap of US dollar and Thai baht (THB), Malaysian ringgit (MYR), and Indonesian rupiah (IDR), respectively, not related to RMB. Besides, these swaps must supplement existing international financial facilities and specifically those of the International Monetary Fund (IMF) (Park and Wang 2005). These swap agreements, therefore, have nothing to do with RMB internationalization. By December 2008, the total value of China's swap lines is 16.5 billion USD, signed with six countries.

The first swap agreement beyond CMI framework signed by China is with South Korea in 2008 December and becomes valid from 2009 April. Since then, China has started to sign currency swap agreements with a much larger set of partner countries. By 2016 December, China has signed swap agreements with 35 different central banks. The total value of these agreements reached as high as 3.6 trillion yuan RMB (People's Bank of China, 2016). These agreements differ from those under CMI in several crucial ways. First and the most important, the values of the agreements are denoted directly in RMB and local currencies of partner countries. Thus the agreements rule out the role of US dollar as

an important symbol of RMB internationalization. Second, the magnitudes of these agreements are much larger than those under CMI. For example, the swap line under CMI between China and South Korea is 4 billion USD while that signed in 2009 beyond CMI is 180 billion RMB or 38 trillion Korean won (KRW). Based on exchange rates at that time, the line beyond CMI is six times larger than that under CMI. In 2011, the swap line beyond CMI between China and South Korea even doubled. Similar gaps in size also exist among China and Indonesia, Malaysia, and Philippines. Last but not the least, the country coverage of partners since 2009 is much larger than those under CMI. Besides East and South Asian countries, China's swap agreement partners since 2009 cover 35 economies are located in all continents except Antarctica.

Among the 35 economies, more than half belong to the Belt and Road Initiative (hereafter BRI) countries. The BRI is a short form for the Silk Road Economic Belt and the twenty-first Century Maritime Silk Road. First put forward by President Xi Jinping in 2013 and then written into the Chinese government report in 2015, the BRI is an international economic cooperation initiative, whose goal is to strengthen the economic integration of involved countries with China. Among the 68 BRI countries,<sup>3</sup> more than one-third have signed bilateral swap agreements with China. Figure 2 displays the spread of China's partner countries with swap agreements and BRI countries. There is a large overlap among these two group of countries. Therefore, BRI countries are China's important partners in the process of RMB internationalization.

While BRI countries constitute the main partners of RMB internationalization, a natural question is how RMB internationalization has helped foster the economic integration between China and BRI countries? Constrained by the availability of data, what this article focuses on is the effects on bilateral trade. More specifically, how do the negotiations of China's currency swap agreements affect the bilateral trade flows between China and its partner countries? Is the effect different for BRI countries compared to non-BRI countries? What implication is the effect for BRI and RMB internationalization?

These questions are important not only for the perspective of BRI blueprint, but also essential to answer where RMB internationalization would go. As we can see in Figure 1, the increasing trend of swap agreement values and numbers has slowed down since 2015. This slowdown is not only held for bilateral swap cooperation, but also held for other fields of RMB internationalization. The slowdown of progress of RMB internationalization is perhaps due to net capital outflows, RMB devaluations since exchange rate reform in 2015 August, and rapid declines in China's foreign exchange reserves.<sup>4</sup> Where and how RMB internationalization should go on turn to be a problem more urgent than ever. In

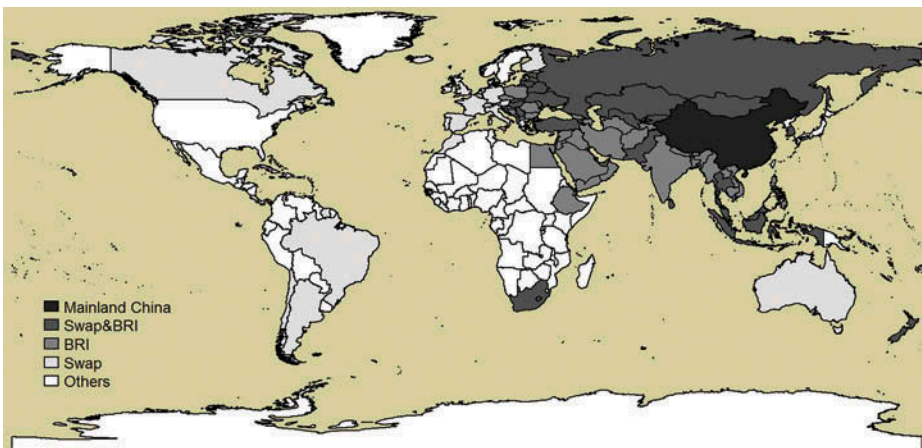


Figure 2. Locations of countries covered in BRI and China's swap partners.

Note: Euro area countries signed bilateral swap agreement with China in the name of European Central Bank.

this context, more research is needed to empirically evaluate the benefits and costs of RMB internationalization. Unfortunately, there are few empirical research in exploring how RMB internationalization has made on China and global economies.

This article attempted to fill the blank from the perspective of bilateral trade. We collected a comprehensive samples of bilateral swap relationship from 2000 to 2016 and empirically test its effects on bilateral trade values. We examined the effect in classical gravity equation and found a significant positive effect of swap agreements on trade. In our benchmark model, the negotiations of swap agreement would improve 30.4% of bilateral trade values between China and its partners. This effect is both statistically and economically significant. When tested using BRI countries subsample, the effect is even larger, reaching as high as 37.3%. The pro-trade effect of bilateral agreements is robust on alternative measure of swap agreement and alternative estimation method. We also discussed on potential mechanism on how the effect works and empirically test the role of exchange rate volatility. We found that while the reduction of exchange rate volatility helps explain the pro-trade effect in whole world sample, the mechanism might not be the whole story for explaining the effect in China and its partners. Our results revealed an essential part of benefits of RMB internationalization. On the background of new trend of RMB internationalization, our article provided empirical evidence recognizing the positive effects of past RMB internationalization progress.

The remainder of the article is organized as follows. Section II reviews previous literature on impact of RMB internationalization on the BRI countries and currency internationalization on economic integrations. Section III empirically tests the effects of bilateral swap agreements on trade. Section IV contains policy implications and concluding remarks.

## Literature Review

Opposing views on prospect of RMB internationalization have always existed since Chinese government began to pursue the goal. Optimists like Eichengreen (2014) believed RMB would be likely to share the international currency role with US dollar in the not-too-distant future. Pessimists like Frankel (2012) emphasized the role of financial depth in determining the status of international currency and tended to assume there could be a long way for the internationalization of RMB.

Despite theoretical arguments, Chinese government has been actively promoting offshore use of RMB since 2009. What do these efforts mean for China and other countries? Kenen (2011) and Gao and Yu (2011) made a comprehensive but qualitative analysis on the benefits and costs of currency internationalization. Both of them argued the primary benefits would be the reduction of exchange risk and potential pro-trade effects. Park (2010) and Park and Song (2011) argued that RMB internationalization would help deepen economic integration for East Asia. Papadavid (2016) believed RMB internationalization would bring further financial market volatility, but increase global trade and investment. Still, these arguments are more prospects than empirical conclusions. Unfortunately, all views of benefits and costs are supported with little empirical evidence. As Song (2011) commented, it was rather difficult to quantify the benefits and costs of internationalization, before the efforts put into practice.

One decade after the beginning of the RMB internationalization efforts, how would RMB internationalization affect China and its economic integration with related countries has been an empirical problem. Perhaps due to its fast progress and accessibility of detailed data, bilateral swap agreements have been one of the most discussed in empirical research. Empirical studies focus on the determinants of who is on the receiving end of the swap agreements with China (Garcia-Herrero and Xia 2015; Liao and McDowell 2015; Lin, Zhan, and Cheung 2016). They found that both political considerations and institutional characteristics could affect the decision to sign a swap line and the size of swap lines. However, to our knowledge, no empirical research has ever been done on evaluating the effects of swap agreements.

On the other hand, economic integration might also increase the need for use of international currency, and thus stimulate the currency internationalization. Chey, Kim, and Lee (2016) found

significant impacts on a state's interest in RMB use resulting from its institutional economic cooperation with China through a preferential trade agreement or a bilateral investment treaty. Among current economic integration initiatives related to China, the BRI is probably the most appealing one, involving a much larger group of countries than previous regional economic initiatives. Chen (2015) and Huang and Huang (2015) both viewed the BRI as an important opportunity for RMB internationalization. However, we found no empirical research focusing on the RMB internationalization on BRI countries. Although the conception of BRI was not proposed until 2013, more than half of China's bilateral swap agreements since 2009 have been negotiated with BRI countries. Therefore, it is possible to evaluate how RMB internationalization has affected the BRI countries and their connection with China. On potential influence, trade integration is probably the most directly related aspect (Aizenman 2015). This is exactly what this research attempts to examine.

### Impacts of RMB Swap Agreements on Bilateral Trade

This part is aimed to analyze the effects of bilateral currency swap agreements on bilateral trade flows. We explore the effects in three steps. First, we test the effects in a global sample covering all bilateral swap relationships between all country-pairs. Second, we focus on China's bilateral swap relationship, paying special attention to those signed since 2009. Third, we compare the results using non-BRI countries subsample and BRI countries subsample. We also make further analysis how a potential mechanism helps explain the effects.

We collected a comprehensive sample of bilateral swap agreements since 2000. Our samples of developed countries are based on Allen and Moessner (2010), Papadia (2013), and Steil and Walker (2017). We also check and update these sources using annual reports of central banks of USA, Japan, England, Swiss, European, and Canada. Since some swap agreements do not set up a specific swap line,<sup>5</sup> we could only build a dummy variable of whether swap agreements exist between certain pair countries in a certain year. Swap agreements under CMI are collected from related reports by Bank of Japan. Swap agreements with China beyond CMI are from the List of Bilateral Currency Swap between People's Bank of China and Other Central Banks or Monetary Authorities (as of June 2016). The data include information of negotiation date, value of swap lines both in RMB and partner's local currency, and valid term. We also checked related announcements and news on swaps from official website of People's Bank of China, and found no new swap agreements added from 2016 June to 2016 December.

Agreements in our samples could be categorized into three types: agreements under CMI and North American Free Trade Agreement (hereafter NFATA), agreements emerged after the financial crisis except China, and agreements signed between China and its partners. Before the global financial crisis, bilateral swap agreements only exist under CMI among ASEAN countries with China, South Korea, and Japan, and under NFATA framework among USA, Canada, and Mexico. These swap agreements remain valid during the whole sample period, except the one between China and Japan, which expires in 2013. In total there are 61 country-pairs ever with swap agreements under CMI and 3 in NFATA. What is worth mentioning is, before financial crisis, there are also temporary short-term swap agreements. For example, in 2001 the US Federal Reserve (Fed) signed temporary swap agreements with the European Central Bank, Bank of England, and Bank of Canada as a response to 9–11 shock. But the term is only one month. Since we focus on influences on bilateral trade flows, we exclude short-term agreements (less than one year) that probably make little sense on bilateral trade.

Since the end of 2007, as a response to global financial crisis, bilateral swap agreements sprung up mainly among developed countries. A network of swap agreement was built since 2009, whose core is the "Big Six": The Fed, the European Central Bank, Bank of England, Bank of Canada, Bank of Japan, and Bank of Switzerland. Involved countries also include Denmark, Sweden, Norway, Iceland, Latvia, Estonia, Hungary, Poland, New Zealand, Australia, Singapore, India, and Brazil. In total there are 39 country-pairs<sup>6</sup> ever with swap agreements in this category.

The third part is China's bilateral swap agreements since 2009. It covers a large set of both developed and developing countries, as described in Section I. There are 35 country-pairs in this category.

We define a dummy variable equal to 1 if and only if the pair of countries keep a swap agreement in the year.<sup>7</sup> For Euro countries, we define the variable as 1 if and only if the partner countries keep a swap agreement with the European Central Bank. For the swap lines signed with China, we have detailed values of swap lines of China and its partners. So we also construct the relative size of the agreement, or the ratio of domestic currency value of a country in its swap agreement with China to the current cash-in-circulation (M1) and M1 plus near money (M2) of the partner country as an alternative measure in our analysis using China subsamples. The data of M1 and M2 are from IMF's International Financial Statistics.

Drawing on Yu (2010) as reference and in line with the classic gravity equation model in international trade (Head and Mayer 2014), we base on benchmark analysis on ordinary linear regression (OLS) with countries' characteristics like GDP and GDP per capita as well as bilateral trade costs controlled. Our dependent variable is the value of bilateral trade flows. The data come from Direction of Trade Statistics (DoTS) provided by the IMF. We use the export free on board values denoted in USD as our measure of bilateral trade value. Our GDP and GDP per capita data come from World Development Indicators. Though we are able to expand swap variables to 2016, the GDP and GDP per capita of most countries have not been available when the article was written. So our regression sample period is limited from 2000 to 2015. We also control trade cost variables, including population weighted bilateral distance in kilometer and dummy for contiguity from CEPII distance dataset, as well as dummy for common official or primary language based on Head, Mayer, and Ries (2010). To avoid the bias brought by unobserved time effects, we also control year fixed effects in our regression.

Table 1 summarizes the basic statistics of main variables. We divide our sample into two periods, using 2008–2009, the financial crisis year, as breaking point. Paying special focus on China, we also independently list the summary statistics of subsamples with China as partner.

As is presented in Table 1, there is a sharp increase in number of swap agreements after financial crisis. Probability of any pair of countries with a swap agreement is only 0.8% during 2000 and 2008. By contrast, the probability between 2009 and 2015 is 2.0%. For China, the increase is even more drastic, changing from 2.5% before 2009 to 14.1% since 2009. Meanwhile, the increase of trade is 43% for the whole world in average and 156% for China in average.

**Table 1. Summary statistics.**

Sample	World				China			
	2000–2008		2009–2015		2000–2008		2009–2015	
Variables	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Trade Value	14.82	3.964	15.25	4.133	18.31	3.574	19.87	3.478
Swap dummy	0.008	0.088	0.020	0.141	0.025	0.157	0.159	0.366
Exporter's GDP	24.94	2.214	25.06	2.228	26.58	2.806	27.01	3.084
Importer's GDP	24.65	2.351	24.86	2.326	26.25	3.011	26.81	3.218
Exporter's GDP per capita	8.820	1.535	8.911	1.474	8.132	1.134	8.576	1.058
Importer's GDP per capita	8.657	1.572	8.792	1.502	8.123	1.162	8.564	1.070
Distance	8.593	0.831	8.613	0.820	9.012	0.525	9.014	0.525
Common border	0.027	0.161	0.025	0.156	0.085	0.279	0.086	0.280
Common language	0.165	0.371	0.163	0.369	0.023	0.151	0.023	0.150
Observations	161,858		136,130		3,087		2,444	

*Note:* Swap, common border and common language are dummy variables. Other non-dummy variables are log values.

**Table 2. Effects of swap agreement on bilateral trade flows.**

Sample Variables	World		China	
	2000–2008	2009–2015	2000–2008	2009–2015
Swap dummy	1.084*** (0.0697)	0.401*** (0.0502)	0.253 (0.228)	0.285*** (0.107)
Exporter's GDP	1.206*** (0.00339)	1.202*** (0.00376)	1.483*** (0.0179)	1.472*** (0.0183)
Importer's GDP	0.852*** (0.00321)	0.883*** (0.00362)	1.031*** (0.0170)	1.049*** (0.0176)
Exporter's GDP per capita	0.0913*** (0.00477)	0.167*** (0.00554)	-0.0960*** (0.0314)	-0.283*** (0.0349)
Importer's GDP per capita	0.0489*** (0.00468)	-0.0159*** (0.00545)	-0.167*** (0.0305)	-0.308*** (0.0345)
Distance	-1.323*** (0.00801)	-1.357*** (0.00916)	-0.481*** (0.0823)	-0.430*** (0.0822)
Common border	1.269*** (0.0408)	1.329*** (0.0479)	0.353** (0.147)	0.113 (0.147)
Common language	1.110*** (0.0169)	1.061*** (0.0192)	2.670*** (0.221)	1.898*** (0.238)
Constant	-26.36*** (0.122)	-26.71*** (0.139)	-41.78*** (1.110)	-39.17*** (1.159)
Year Fixed Effects	YES	YES	YES	YES
Observations	161,858	136,130	3,087	2,444
Adjusted R-squared	0.623	0.624	0.773	0.784

Note: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Our benchmark results are summarized in Table 2. The left two columns are regressions using the whole samples, while the right two columns using subsamples with China as partner of the trade. In our whole sample, negotiation of swap agreements has a positive significant effect on trade flows in both periods. The agreements before financial crisis improve bilateral trade flows as much as 108% compared those without swap agreements. The effect of that after crisis is more modest, but still improve as much as 40%. Both effects are statistically and economically significant.

For China, however, the effect of swap agreement on trade flows is not such high. Before financial crisis, the swap agreements between China and its partners, which are all under CMI, do not have significant effect on trade flows, although the coefficient is positive. After financial crisis, however, the effect of swap agreement, which are signed under the background of RMB internationalization, on trade flows is significant on 1% level. After controlling the influences of bilateral partners' GDP and trade costs, the negotiation of swap agreements is shown to improve trade flows by 28.5% in average compared to those not signed agreements. The coefficients of GDP and trade cost variables are consistent with classical gravity literature.

To further explore the effects of swap agreements aimed for RMB internationalization, we distinguish swap agreements since 2009 as under CMI and beyond CMI, and make similar OLS analysis. Columns 1 and 2 of Table 3 present the results. It shows that the swap agreements under CMI have no significant effect on trade flows. The coefficient is even negative. By contrast, the swap agreements beyond CMI, that is, signed at the background of RMB internationalization, have a positive effect on trade flows. The negotiation of the agreement would improve 30.4% of the trade flows on average. This further distinguishes the efforts of RMB internationalization from those before 2009. In latter analysis, we focus only on swaps beyond CMI when using China's subsample.



**Table 3. Effects of China's swap agreements since 2009 on trade flows.**

Variables	All with China				Non-BRI	BRI
	(1)	(2)	(3)	(4)	(5)	(6)
Swap Under CMI	-0.115 (0.320)					
Swap Beyond CMI		0.304*** (0.108)	0.299*** (0.108)	0.00118 (0.159)	0.131 (0.173)	0.373*** (0.121)
BRI			0.101 (0.0938)	0.0200 (0.0989)		
Swap Beyond CMI*BRI				0.510** (0.199)		
Controlled Variables	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	2,444	2,444	2,444	2,444	1,552	892
Adjusted R-squared	0.784	0.785	0.785	0.785	0.790	0.743

*Note:* Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Controlled variables are the same as those reported in Table 2.

Among the partner countries of agreements beyond CMI, more than half belong to BRI countries. It is natural to ask whether the effects of swap agreements are different for BRI and non-BRI countries. In Column 3, we present the results of considering the role of BRI countries by adding into a dummy variable equal to 1 if and only if the partner country belongs to BRI countries. After controlling fundamental variables, the BRI countries do not have significant difference on trade flows with non-BRI countries. This means BRI countries might not systematically be different from non-BRI countries in bilateral trade connections with China. However, when we further add the interaction term of the swap dummy and BRI dummy, as is presented in Column 4, we found that it is significantly positive while the left single dummies of BRI and Swap turn to be not significant. This implies that for non-BRI countries, the coefficient of swap dummy is not statistically different from zero. But for BRI countries, the negotiation of swap agreement would significantly improve bilateral trade flows. To further distinguish the BRI and non-BRI countries, we make similar OLS regression using separately the non-BRI countries subsample and the BRI countries subsample. The results are displayed in Columns 5 and 6 of Table 3. Though both the coefficient of swap dummy is positive, only that estimated from BRI subsample is significant at 1% level. It further verifies the conclusion we draw from Column 4: swap agreements beyond CMI with China only help improve the trade flows with BRI countries significantly. The effect is also economically significant: the negotiation of swap agreement would improve the BRI trade with China by 37.3% on average.

To further examine the robustness of the effects, we also do robustness check. Since our dataset contains information of value of each swap agreement in partners' local currency, we are able to construct the relative size of each agreement, using monetary aggregates of partner countries as reference countries. Columns 1 and 2 of Table 4 report the results using two relative measures using cash and checking deposits (M1) and M1 plus near money (M2). Both show positive effects significant at 1% level. On average, 1% increase in bilateral swap agreement magnitude relative to M1 leads to 3.16% increase in trade flows between China and the partner country. One percent increase in relative size of swap relative to M2 improves bilateral trade flows by 6.70%. These results are consistent with those presented in Tables 2 and 3.

The OLS results might be biased by unobserved variables related to our swap agreements. To deal with the possible problem of endogeneity, we use an index of the degree of bilateral strategic partner relations as an IV. We build this index showing strategic partnership (huobanguanxi) between a country and China (see the Appendix). The build-up of China's strategic partnership with other

**Table 4. Robustness checks.**

Variables	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	IV	IV	IV
Swap/M1 ratio	3.164*** (1.116)			3.740** (1.609)	
Swap/M2 ratio		6.700*** (1.384)			22.79*** (8.777)
Swap dummy			1.298** (0.529)		
Controlled variables	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES
Observations	2,430	2,390	2,444	2,440	2,390
Adjusted R-squared	0.785	0.783	0.777	0.742	0.770

*Note:* Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Controlled variables are the same as those reported in Table 2.

countries is mainly a political concern, without direct relation with bilateral trade values. However, Lin, Zhan, and Cheung (2016) has showed that China is more likely to sign bilateral swap agreements with higher swap lines with countries of better strategic partnership. Therefore, this index is a suitable instrument variable for swap dummy and relative size of the swap. We run regressions separately to swap dummy and relative size of swap agreements, respectively. The results, shown in columns 3, 4, and 5 of Table 4, support our conclusions drawn from OLS results. For swap dummy, the IV-estimated coefficient is much larger than that of OLS. Negotiation of swap agreement improve bilateral trade flows as much as 129.8% compared to those not signed. For relative size of swap measure using M1, the IV-estimated coefficient is a little larger than OLS coefficient. By contrast, relative size measure using M2 is much larger in IV regression. Both effects are statistically and economically significant.

So through what mechanism bilateral swap agreements affect bilateral trade values? One possible answer may lie in the reduction of bilateral exchange risk.<sup>8</sup> The mechanism relies on two hypotheses. First, bilateral exchange rates volatility has negative effects on bilateral trade flows. Second, swap agreements weaken the negative effects by bilateral exchange rate volatility. However, previous empirical evidence testing the first hypothesis is mixed, depending on methods, measures, and samples (Chit, Rizov, and Willenbockel 2010; Tang 2014; Tenreyro 2007). In the article, we check the hypothesis using our sample. We calculate standard deviations of change of monthly bilateral exchange rates for each pair of countries in each year as a measure of bilateral exchange rate volatility. Bilateral exchange rates are obtained from IMF's International Financial Statistics. We add volatility variables into our benchmark gravity equations, using both the whole world sample and the subsample with China since 2009. The results are listed in columns 1 and 3 in Table 5. For the world sample, after controlling fundamental characteristics, a higher bilateral exchange rates volatility leads to a lower bilateral trade flows. One percent increase in volatility leads 1.53% drop in trade flows. The effect is significant at 1% level. For subsample with China, the effect is also negative and the coefficient is even larger in absolute value. However, it is not significant even at 10% level.

Following the second hypothesis, we shall predict the negotiation of swap agreement would weaken the negative effect of volatility on bilateral trade flows. We therefore add interaction term of volatility and swap dummy. If the hypothesis holds, the coefficient of the interaction term should be positive: with swap dummy equal to 1, the net effect of volatility on trade flows should be more moderate than those with swap dummy equal to 0. Regression results are presented in columns 2 and 4 of Table 5. The coefficient estimated using the whole sample is exactly what the hypothesis predicts. With swap agreement, the net effect of volatility decreases from 1.635 into 0.508. Negotiation of swap

**Table 5. Potential mechanism tests.**

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	China	China	BRI	BRI
Volatility*Swap dummy		1.127** (0.443)		-5.932 (5.395)		0.385 (5.498)
Volatility	-1.528*** (0.124)	-1.635*** (0.129)	-2.413 (2.243)	-1.912 (2.486)	-6.874** (2.751)	-8.828*** (3.396)
Swap dummy		0.291*** (0.0510)		0.437*** (0.153)		0.481*** (0.163)
Controlled variables	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	126,755	126,755	2,320	2,320	858	858
Adjusted R-squared	0.634	0.634	0.780	0.781	0.754	0.758

*Note:* Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Controlled variables are the same as those reported in Table 2.

agreements significantly weakens the negative effect of exchange rate volatility on trade flows. For China subsample, however, the coefficient of the interaction term is not significant at 10% level, and it is negative.

Further we made similar test using only BRI subsamples with China. The results are listed in columns 5 and 6 of Table 5. The coefficient of volatility is negative and significant at 5% level, showing higher exchange rate risk do have negative effects on bilateral trade for China and its BRI partners. The coefficient becomes even more negative and significant when we further add the interaction term. However, the interaction term is not significant at 10% level, although it is positive as our second hypothesis predicts. This implies reduction of bilateral exchange rate risk might not be the whole story in explaining the pro-trade effects of bilateral swap agreements on China and its BRI partners. What the exact mechanism of China's swap agreements waits for further research and is beyond the scope of discussion of this article.

### Concluding Remarks

From the perspective of RMB internationalization, BRI countries show to be important partners for China. From the perspective of economic integration of BRI countries, RMB internationalization facilitates the process through improving bilateral trade. The overlap of China's swap partners with BRI countries supports the first argument and our research provides empirical evidence for the latter. To realize the goal of strong economic integration under BRI framework, the progress of bilateral currency cooperation has been showed to be a valid instrument.

But this research is only a tentative one, focusing on one aspect of RMB internationalization, the bilateral swap agreements, and on one aspect of effects, the bilateral trade flows. While the effects of bilateral swap agreements on bilateral trade is estimated to be significant, we shall be cautious to draw further conclusions based solely on these results about the process of RMB internationalization. The RMB internationalization is a comprehensive initiative, involving not only trade, but also investment, financial stability as well as economic growth. It is more than currency cooperation. We call for more research to be done to evaluate these aspects of RMB internationalization, before we could make further policy implications on where RMB internationalization should go. Even limited on the evaluation of bilateral swap agreements, how these agreements would influence the bilateral investment and financial stability remains an unanswered question. What this article shows is on trade flows, it plays a significant and beneficial role.

On the other hand, BRI is just the beginning. On 2017 May 14, a BRI summit conference named Belt and Road Forum for International Cooperation was held in Beijing, China. A blueprint was published including not only prospects on economic integration of related countries, but also willingness to cooperate on matters like culture, institutions, innovation as well as environment. How this unprecedented regional integration initiative would develop waits for the time to tell. But without doubt this initiative would call for and also provide a room for more research on economic growth, trade, and international finance.

## Acknowledgments

The authors thank Fei Tan, Fang Wang, and Jiajia Liu for their excellent research assistance. We also thank the anonymous referee for invaluable comments. All errors are ours.

## Funding

This article is based on a research project supported by China Development Research Foundation.

## Notes

1. The data on trade settlement and bond issuance are cited from Reports of Financial Statistics issued by People's Bank of China. The data on investment are from official website of Ministry of Commerce of China.

2. Another agreement expires without being renewed is with Uzbekistan, signed in 2011 and lasted for three years.

3. The coverage of BRI countries is not limited into the ancient Silk Road countries. In this article we adopt the definition of the official website of BRI ([www.yidaiyilu.gov.cn](http://www.yidaiyilu.gov.cn)). According to the list it provides on May 2017, the BRI countries include 11 ASEAN countries (Singapore, Malaysia, Indonesia, Myanmar, Thailand, Laos, Cambodia, Vietnam, Brunei, Philippines, and Timor-Leste), 15 Middle-East countries (Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, The United Arab Emirates, and Yemen), 7 South Asian countries (India, Pakistan, Bangladesh, Sri Lanka, Maldives, Nepal, and Bhutan), 9 Central Asian countries (Afghanistan, Armenia, Azerbaijan, Georgia, Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, and Kyrgyzstan), 21 Central and Eastern Europe countries (Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, and Ukraine), New Zealand, Ethiopia, South Africa, South Korea, and Mongolia.

4. We thank the anonymous referee for figuring this point out.

5. For example, swap agreements between the Fed and Central Bank of Japan, England, Canada, Swiss as well as European Central Bank do not set any upper lines since 2010.

6. This number regards Euro countries as one.

7. For those agreement signed at the end of year, we define the swap dummy to be 1 since the next year.

8. We thank the anonymous referee for figuring this out.

## References

- Aizenman, J. 2015 August. Internationalization of the RMB, capital market openness and financial reforms in China: RMB Internationalization. *Pacific Economic Review* 20(3):444–60. doi:10.1111/1468-0106.12116.
- Allen, W. A., and R. Moessner. 2016. Central bank co-operation and international liquidity in the financial crisis of 2008-9. BIS Working Papers, No. 310.
- Chen, Y. 2015. Belt and Road Initiative and RMB Internationalization. *China Finance* 19:40–42. In *Chinese*.
- Chey, H., G. Y. Kim, and D. H. Lee. 2016. Who are the first users of a newly-emerging international currency? A demand-side study of chinese renminbi internationalization. Bank of Korea Working Paper No.19. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2890352](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2890352).
- Chit, M. M., M. Rizov, and D. Willenbockel. 2010 February. Exchange rate volatility and exports: New empirical evidence from the emerging East Asian economies. *World Economy* 33(2):239–63. doi:10.1111/j.1467-9701.2009.01230.x.
- Eichengreen, B. 2014. International currencies past, present and future: Two views from economic history. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2580651](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2580651). doi:10.2139/ssrn.2580651
- Eichengreen, B. 2015 May. Sequencing RMB Internationalization. CIGI Papers No. 69.

- Eichengreen, B., and M. Kawai. 2014. Issues for renminbi internationalization: An overview. ADBI Working Paper Series No.454. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2382420](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2382420).
- Eichengreen, B., and D. Lombardi. 2017 January. RMBI or RMBR? Is the renminbi destined to become a global or regional currency? *Asian Economic Papers* 16(1):35–59. doi:10.1162/ASEP\_a\_00483.
- Frankel, J. 2012. Internationalization of the RMB and historical precedents. *Journal of Economic Integration* 27 (3):329–65. doi:10.11130/jei.2012.27.3.329.
- Gao, H., and Y. Yu. 2011. Internationalisation of the renminbi. *BIS Papers* 61:105–24.
- Garcia-Herrero, A., and L. Xia. 2015. RMB bilateral swap agreements: How China chooses its partners? *Asia-Pacific Journal of Accounting & Economics* 22.4:368–83. doi:10.1080/16081625.2014.960059.
- Head, K., and T. Mayer. 2014. Gravity equations: Workhorse, toolkit, and cookbook. *Handbook of International Economics* 4:131–95. doi:10.1016/B978-0-444-54314-1.00003-3.
- Head, K., T. Mayer, and J. Ries. 2010 May. The erosion of colonial trade linkages after independence. *Journal of International Economics* 81(1):1–14. doi:10.1016/j.jinteco.2010.01.002.
- Huang, W., and J. Huang. 2015. How does RMB go abroad under the strategy of belt and road?. *Academic Frontier* 5:30–39. In Chinese.
- Kenen, P. B. 2011. Currency Internationalization: An overview. *BIS Papers* 61:9–18.
- Liao, S., and D. McDowell. 2015 September. Redback rising: China's bilateral swap agreements and renminbi internationalization. *International Studies Quarterly* 59(3):401–22. doi:10.1111/isqu.12161.
- Lin, Z., W. Zhan, and Y. Cheung. 2016. China's bilateral currency swap lines. *China & World Economy* 24 (6):19–42. doi:10.1111/cwe.12179.
- Papadavid, P. 2016. China's Balancing Act. ODI Report. <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/10223.pdf>.
- Papadia, F. 2013. Central bank cooperation during the great recession. Bruegel Policy Contribution, No 8. <https://www.econstor.eu/handle/10419/106330>.
- Park, Y. C. 2010. RMB Internationalization and its implications for financial and monetary cooperation in East Asia. *China & World Economy* 18 (2):1–21. doi:10.1111/j.1749-124X.2010.01186.x.
- Park, Y. C., and C. Song. 2011. renminbi internationalization: prospects and implications for economic integration in East Asia. *Asian Economic Papers* 10 (3):42–72. doi:10.1162/ASEP\_a\_00100.
- Park, Y. C., and Y. Wang. 2005. The chuang mai initiative and beyond. *The World Economy* 28 (1):91–101. doi:10.1111/twec.2005.28.issue-1.
- People's Bank of China. 2016 June. List of bilateral currency swap between people's bank of china and other central banks or currency authorities. Accessed May 24, 2017. <http://www.pbc.gov.cn/huobizhengceersi/214481/214511/214541/2967384/index.html>
- Song, F. 2011. Comments on Haihong Gao and Yongding Yu's paper 'Internationalisation of the renminbi' and Hongyi Chen, Wensheng Peng and Chang Shu's paper 'The potential of the renminbi as an international currency'. *BIS Papers* 61:149–50.
- Steil, B., and D. Walker. the spread of central bank currency swaps since the financial crisis. Accessed May 24, 2017. <https://www.cfr.org/international-finance/central-bank-currency-swaps-since-financial-crisis/p36419#!>.
- Tang, H. C. 2014 February. exchange rate volatility and intra-asia trade: evidence by type of goods. *The World Economy* 37 (2):335–52. doi:10.1111/twec.12095.
- Tenreiro, S. 2007 March. On the trade impact of nominal exchange rate volatility. *Journal of Development Economics* 82 (2):485–508. doi:10.1016/j.jdeveco.2006.03.007.
- Yu, M. 2010 March. trade, democracy, and the gravity equation. *Journal of Development Economics* 91(2):289–300. doi:10.1016/j.jdeveco.2009.07.004.

**Appendix: Score of relationship between China and its strategic partners.**

<b>Description of partner relations</b>	<b>Countries</b>	<b>Score</b>
All-weather strategic partnership	Pakistan	5.5
Comprehensive strategic partnership-I	Russia	5.0
Comprehensive strategic partnership-II	Vietnam, Thailand, Burma, Cambodia, Laos	4.5
Comprehensive strategic partnership	U.K., Italy, Peru, Malaysia, Spain, Denmark, South Africa, Portugal, Indonesia, Mexico, Mongolia, Argentina, Venezuela, Brazil, France, Algeria, Belarus, Kazakhstan, Greece, Australia, New Zealand, Egypt, Saudi Arabia, Iran	4.0
All-dimensional strategic partnership	Germany	3.75
Strategic cooperative partnership	Korea, India, Sri Lanka, Afghanistan	3.5
Strategic partnership	Turkmenistan, Nigeria, Canada, Uzbekistan, Tajikistan, Kyrgyzstan, Ireland, Poland, Ukraine, Serbia, Angola, Chile, United Arab Emirates, Qatar, Ecuador, Costa Rica, Jordan, Sultan	3.0
All-dimensional cooperative partnership	Belgian, Singapore	2.5
Comprehensive cooperative partnership	Croatia, Nepal, Bangladesh, Romania, Holland, East Timor, Ethiopia, Tanzania, Congo (Brazzaville), Maldives, Bulgaria	2.0
Friendship cooperative partnership	Hungary, Senegal	1.75
Friendship partnership	Jamaica	1.5
Important cooperative partnership	Fiji	1.5
New cooperative partnership	Finland	1.0
Strategic reciprocal relationships	Japan	0

*Note:* The score rating is based on strategic partnership between China and other countries. The main considerations are political relations, which has impact on whether or not to sign a swap agreement.