China's Bilateral Currency Swap Agreement: Strategic Move to Foster Political and Financial Hegemony

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8 October 2019

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ABSTRACT

The global financial crisis of 2008 nearly put a halt to China's export-led and current account surpluses trajectory, in 2007 China's current account surplus fell from 10% of GDP to about 2% in 2013. This necessitates the internationalization of the Chinese Renminbi to boost trade, investment and hedge against foreign currency risk through bilateral currency swap. In bilateral currency swap, on the trade date, counter parties exchange notional amounts in two different currencies. For instance, one party receives 30 million British pounds while the other receives 3.3 million Chinese Renminbi. This implies a GBP/RMB exchange rate of 1.1, and at the end of the deal they swap again using the same exchange rate. Evidently, the currency bilateral swap agreements signed by the People's Bank of China and some Central Banks in advanced, emerging markets and developing economies is reinforcing the trend of Renminbi internationalization in global trade. Our empirical results show that Furthermore, the relative trade shares and exports intensity depicts a large positive swing especially for the swap provider, further suggesting that swap line's primal motive perhaps resolves around the provider country's self-interest, even though the benefits are substantially symbiotic for the recipient and provider country.

Keywords: Bilateral Currency Swap Line, Financial Development China, Trade Flows, and Renminbi Internationalization.

1. Introduction

Over the last two decades, the Chinese authorities commenced an extensive process to liberalize and internationalize Renminbi particularly under premier Zhu Rongji since 1993. The Chinese authorities are committed to achieving full convertibility of Yuan (Renminbi) by the end of the century. Before this period, the Chinese economy had been operating under a tight capital control since the formation of the People's Republic of China (PRC) in 1949 (Cheung et al., 2017; Ito, 2011; Vallee, 2012; Yu, 2012; Chen and Cheung, 2012; and Park, 2010). However, the liberalization and financial market reform initiated in the 1980s set the center stage for the rapid expansion of the Chinese economy. In the year 1994, deliberate and conscious efforts were implemented to lessen capital account restrictions in a piecemeal fashion and eventually established current account convertibility in 1996 (see Gao and Yu, 2009). The Asian financial crisis 1997-8 put a temporary halt to this objective. The Asian economic upheavals of 1997-8has made the Chinese authorities to relax its initial target of ensuring full convertibility by the close of the century. The global financial crisis of 2008 causes a decline in the overall trade financing due to US dollar shortage. In effect, this culminated to a massive decline in Chinese exports, and further exposed the unreliability of the existing international monetary system. The situation necessitates a move to safeguard against future reoccurrence, largely due to high reliance of the Chinese economy on international trade.

Consequently, as reported in Campenella, (2014) RMB internationalization is now at the apex of the economic policy of China enshrined in the codified 12th five-year plan (for the period 2011-2015). The plan implementation of the plan is through the meticulous and strategic engagements of powerful economic and financial institutions of the Chinese economy: The People's Bank of China (PBOC), the Ministry of Commerce, and the Ministry of Finance. Similarly, the plan is designed to enhance the cross-border use of RMB and subsequent liberalization of its capital account. In recent years, we have witnessed a passionate commitment by the Chinese government to liberalize its capital account through gradual expansion of the Renminbi (RMB) for settlement of global trade, development of a robust offshore Renminbi environment. In the bid to facilitate this goal, firms domicile outside China can open Renminbi (RMB) accounts in mainland China (Shanghai and four cities in Guangdong province) or Hong Kong (He, 2012; Cui, 2013a; Cui, 2013b; and Germain, and Schwartz, 2017). Since 2009 this pilot scheme was in operation for RMB trade settlement – the scheme is the first legal framework undertaken by the authorities to use RMB for current account transactions. To strengthen the internationalization process, the People's Bank of China (PBOC) declared its plan to develop and convert Shanghai into a global financial hub. In addition, new offshore clearing centers were extended in Singapore, Malaysia, and Europe.

Furthermore, negotiations to strike more offshore deals in several other countries, like Canada, Australia, and the United States, are ongoing (Cheung et al., 2017).

Contemporarily, the Chinese economy is an excellent specimen of export-powered growth, through learning by doing, reversing its status quo from autarkic fashion to opening up to foreign know how, and buffered by a complex and well tracked industrial policy.[1] China marked two decades of growth from (1980-2000), a quantum leap of transformation from autarkic and drudgery agricultural economy to a more sophisticated industrial sector and rising service sector in one generation (see Song and Zilibotti, 2009). In the period under scrutiny, China has recorded rapid growth in international trade, current account/GDP surpluses since the 2000s, and this is consistent with massive reserve hoarding and sterilization of expanding its trade surpluses and inflow of financial investment (Aizenman and Lee, 2008). Arguably, (Aizenman, Jinjazak, and Zheng, 2015) stressed that these policies deliberately pursued by the Chinese authorities intend to delay and slow the real appreciation associated its rapid growth success. The Asian region had seen the proliferation and build-up of FX reserves unprecedentedly since after the Asian financial crisis of 1997-1998. The Asia's reserve swelled from US$202 billion in 1990 to US$3371 billion in 2008, and the growth continues to gallop at 20% per year. It is important to note that China's contribution to this buildup accounted for than 50% of the realized growth of 1990-2008. In seeking to understand the extraordinary growth of Asia's FX reserves in the post-Asian financial crisis. Aizenman et al. 2011 opined that the Asian's crisis had a devastating impact socially and economically in the region. Even though five countries – Indonesia, Korea, Malaysia, Philippines, and Thailand bore the weight of the shock, but the psychological impact of the crisis spread to the whole region. On the precise cause of the crisis, a considerable deal of controversy clouds discussion of academics and policy circle.

However, the consensus was that of a shortage of international liquidity. Broadly speaking, the move to accumulate massive reserves and bilateral currency swapping highlights the precautionary self-insurance against the occurrence of another crisis. Aizenman et al. (2011), assess the prospective rise and impact of the aftermath of the 2008 global financial crisis that had seen the proliferation of the currency swap agreements between major central banks like the US Federal Reserve, PBOC, ECB, some Asian economies, and later rest of world. They show that currency swaps constitute one dimension of complimenting international reserves for effective insurance against unexpected shocks. Additionally, US Federal Reserve and ECB swap line served somewhat as a substitute to the foreign reserve accumulation for some emerging markets. Consequently, this piece of work seeks to explain the motive of PBOC's currency swaps from mercantilist export promotion as a way of intensifying the continuous Chinese economy's export-led drive towards growth.

[1]Learning via experimental approach greatly help China to poster its rapid productivity growth.

Using the gravity model, we intend to show the empirical evidence of trade creation via ex-post analysis of the trade flows. Methodologically, the theory consistent structural gravity model is an essential tool in our research kits to unbundle our goal. Regarding the sample, we drew sample 27 countries that were into China's currency swap line for empirical analysis. Similarly, our analysis relies on a panel approach which accounts for country-pair fixed effects solely to circumvent the embedded endogeneity in trade policy analysis, and phase-in effects of the bilateral currency swap agreement, which has important implication for future significance of swaps on trade.

The outcome of our empirical findings reveals an apparently large impact of bilateral currency swaps on trade flows. Succinctly, on average, the estimates suggest that bilateral currency swap increases counterparts trade more than three times. An important caveat we hold is that currency swap might be different from other forms of international trade agreements, such as the currency unions, currency peg, and dollarization, and indeed they have a different impact on trade.

2. China's Bilateral Currency Swap Agreement: Rationale and Strategy

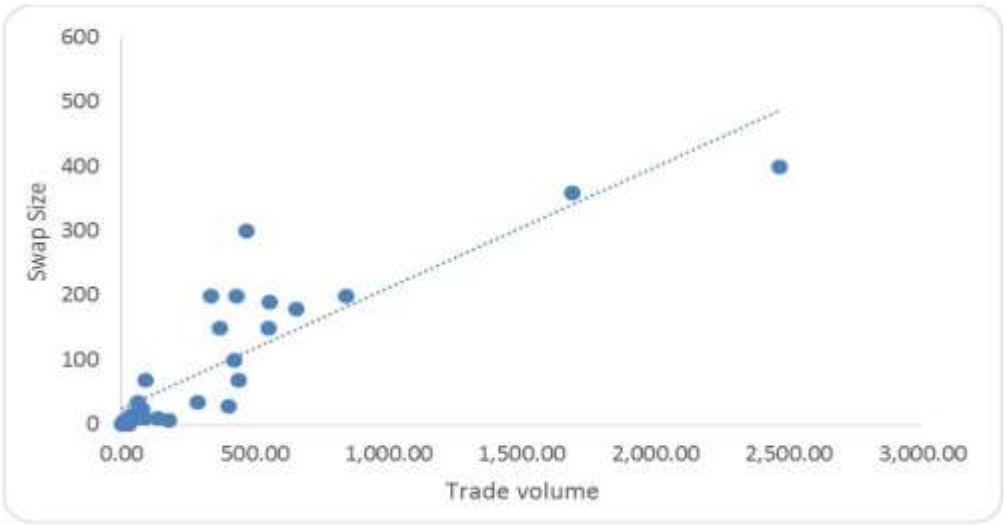
The extension of offshore Renminbi (RMB) is a strategic move towards promoting RMB as global investment currency for capital investment. The people's currency is now an asset class with a broad network of market participants that utilize it as an investment currency. The International Monetary Fund (IMF) on November 30, 2015 approved the inclusion of Renminbi in its Special Drawing Rights (SDR) baskets of currencies; this is another turning point for RMB to turn around with the elite global currencies, including the US dollar, British Pound, Euro and the Japanese Yen. Although, the quest for the internationalization agenda still has a long way to go, however, the recognition of RMB as part of the SDR basket is indeed a watershed and a milestone for the internationalization objective (see David, 2016).
Gao and Yu (2009), and Subramanian and Kessler, (2012) maintained that before the active internationalization of RMB move, the Chinese government mildly started the liberalization of its currency and capital markets, due to concerns from its major trading partners. The people's currency has a history of the pegged exchange rate, for example from 1994 to 2005, Renminbi was pegged RMB 8.28 to US dollar one. In the second quarter of 2005, the Chinese authorities-initiated policies that gradually aided the basing of RMB value subject to a daily trading band and basket of currencies, though rigidly controlled around the range of +/- 0.3%. Moreover, the Chinese authorities imposed tight capital controls. The relatively flexible exchange rate policy has made the RMB to appreciate by 21% from July 2005 to July 2008. During the 2008 global financial crisis, the People's Bank of China retained a peg policy to the USD from July 2008 through 2010, and in 2012, the trading band was increased to 1% and

later 2% in 2014. However, RMB suddenly started witnessing two-way volatility in 2014.[2] The People's Bank of China (PBOC) declared a surprising devaluation in August 2015, which depreciate the value of RMB by 3% against the US dollar overnight. Since then RMB has depreciated continuously against the USD, which may also have to do with Federal Reserve raising its rate, to strengthen the US dollar relative to other currencies (Love and Chen, 2015; and Campenella, 2014).

Renminbi (RMB) internationalization is receiving attention on commencement comparable to some of the China's initiatives such as the Asian infrastructure investment bank (AIIB) and the one Belt, and one Road initiative scheme. The government actively engage in the efforts to internationalize its currency (RMB). Although the Chinese capital account is, still relatively closed, non-resident investors cannot have access to RMB in international markets (Lin and Cheung, 2016; Gao and Yu, 2009; Park, 2010; Yu, 2012; and Chen and Cheung, 2011). Therefore, the alternative way to increase and encourage the international trade flow is through the swap line agreements even without opening of the capital account. The main aim of the currency swap agreement is to solve the problem of illiquidity in the time of downturn. For instance, taking the remote example of Asian financial crisis, after the crisis many Asian countries, including China, embraced a currency swap agreement under the canopy of the Chiang Mai Initiative (CMI). It follows that the United States entered a currency swap with several countries (such as Switzerland, Korea, Brazil, Mexico, and Singapore) to mainly provide liquidity in the form of US dollar to these countries. Most of the swaps are denominated in US dollars while others are in the local currencies (Liao and McDowell, 2015; Aizenman et al. 2011; Bowles and Wong, 2013; Cohen, 2012; Mcguire and Peter, 2012). Going beyond the Asian regional cooperation, the currency swap line of China continuously raises to approximately 30 countries since 2008 (see Table 1). Besides, In addition, the broader purpose is to facilitate bilateral trade and investment.

[2]The trading band was increased to 0.5% in 2007.

Figure 1: Correlation Between Trade Volume and Swap Size (in billion RMB)



Source: People's Bank of China's News Release.

Bilateral swap agreements (BSAs) is not an entirely a new phenomenon. For example, in the aftermath of the global financial crisis, the Association of the South East Asian Nations plus the three largest East Asian economies – Japan, South Korea, and China signed the Chiang Mai Initiative (CMI) to guide against the future occurrence of liquidity shortage (see Aizenman et al. 2011).[3] The Chiang Mai Initiative is a regional network of bilateral swap agreements (BSAs) among its members affected by the Asian crisis by varying degree. In comparison, US Federal Reserve move to enter into the bilateral swap agreements displayed a preference for considering developed countries as BSA partners following the 2008-09 financial fallout. Mainly central banks of developed countries accounted for 10 out of the 14 temporary BSA counterparts. After that, in October 2013, some of the temporary BSAs were converted into standing arrangements with five developed countries, namely the Bank of England, the Bank of Japan, the European Central Bank, Swiss National Bank, and Bank of Canada (Detais, 2016 and Goldberg and Kenney, 2010). These countries possess a high degree of financial openness with less history of sovereign default; this is important for the US Federal Reserve to minimize credit risks. Unlike the Federal Reserve, the PBOC's include many developing countries as BSA partners. Among the more than 30 useful BSAs, only six are with central banks of developed economies. No clear-cut evidence suggests that the decision of PBOC is not under the influence of geopolitical or institutional factors; somewhat

[3] The CMI initiative was link to IMF program, after its multilateralization and then converted into a single agreement in 2008. Furthermore, the CMI size now worth $240 billion in 2014 compared to the initial $120 billion. In comparison, bilateral currency swap agreements of China signed after the 2008 global financial crisis is denominated in RMB, while the CMI initiative are denominated in USD.

in the quest for internationalization, the selection of China's swap line agreement is as open as possible. For instance, several countries with default history are a signatory to China's swap line, like Argentina. Even though, these countries may be keen to establish such kind of financial arrangements solely to improve their standing and guide against external shocks. Similarly, for such countries, Renminbi swap line is in their economic interest if China has fewer concerns over their sovereign default history (see Aizenman, 2011). Figure 3 shows the relative importance of its swap partners as a significant exports destination since 1970s.

3. Currency Swap, Trade and Exchange Rate Volatility

The existence of swap lines as a hedging facility is one way of reducing the exchange rate uncertainty on international trade. Theoretical studies long established the expected impact of exchange rate volatility on international trade (see Allayannis, 2001). The effect might negatively assert influence on trade depending on some factors such as the structure of production such as the small number of firms, risk preferences, presence or absence of forward contract markets or currency swap options, and degree of economic integration (see Auboin and Ruta, 2013; Kawai, 1986; Broll and Wessel, 2011; Wong, 2003). Goswami et al. (2004) theoretically show that high economic exposure determines firm's preference to currency swaps. The economic exposure is positive if the foreign currency denominated cash inflows negatively correlate with foreign exchange rates. Their theory suggests that currency swaps help global firms to achieve long-term financing and financial risk management goals. Theoretically, most studies underpinned the idea that an increase in exchange rate volatility leads to a decrease in international trade. For example, if economic agents are risk averse, a higher volatility of exchange rate increases uncertainty, and hence raises the cost of conducting international trade (see Doganlar, 2002; Ethier, 1973; and Clark, 1973; Barkoulas, et al., 2002). McKenzie (1999) show that uncertainty will be greater in the absence of an adequate hedging instrument, indicating that the existence of a well-functioning forward market might lower exchange rate volatility downwards. The pioneering work of Ethier (1973) further supported the assertion that with perfect forward markets, and no other sources of uncertainty rather than exchange rate, the volume of trade is uninfluenced by exchange rate volatility. Moreover, Viane and Vries (1992) also reexamined the impact of rising volatility of the exchange rate on trade volume; their findings slightly contrast Ethier (1973). Showing that even when a forward market exists, the spot exchange rate volatility indirectly affects the volume of trade via its effect on the forward rate. In addition, they show that with an increase in the volatility of the exchange rate, the imports and exports might be different. It follows that in equilibrium forward rate is determinedby the total supply and demand for the forward currency. As a result, exports lose (benefit), and imports benefit (lose) when trade balance sign become positive (negative). Broll and Eckwert (1999) explored the theoretical likelihood of a positive association between exchange rate volatility and exports. The intuition behind

this possibility is because an increase in exchange rate volatility open options to export to the world markets, implying that firms that are more flexible can react to these changes and reallocate their exports destinations. Wei (1999) investigate the hedging hypothesis, i.e., an empirical puzzle in international finance, based on the notion that identifying the large and negative effect of exchange rate on trade is difficult due to the availability of forward and swap options. In testing the validity using data of over 1000 country pairs, the results show that there is no evidence in the data to support the validity of the hedging hypothesis. Moreover, country pairs with large trade potential, still, exchange rate volatility deters goods trade largely than that typically claim and documented in the literature. Wong (2003) show that hedging theorem holds if firms always find it optimal to export entire their output in the foreign markets. However, if firms are flexible by ex-post allocating their exports between the domestic and the international markets, and guide against foreign exchange risk exposure, implicitly using real hedging instrument introduces a convex component into the firm's foreign exchange exposure. Adam-Muller (2000) examines the optimal production, hedging and export allocation of a risk averse international firms that exports to different foreign markets with different currencies and multiple exchange rate risks. In the first scenario, that only one forward market for a single currency exist. In this case, the export allocation to different markets is separable from the firm's preference and the joint distribution of the exchange rates. In the second scenario, where hedging instruments and forward markets for each currency exist. In this case, production and exports allocation are separable. As result hedging with forward contracts, depend on risk premium and the joint distribution of the exchange rates. Brollet al. (2015) examine the behavior of competitive exporting firms that exports to two foreign countries in a state of multiple sources of exchange rate uncertainty. Showing that since firms cross hedge their exchange rate exposure if there is an only one forward market between the domestic currency and foreign country's currency. Therefore, firms optimally export to both foreign countries and the decision of firm's production is independent of the firm risk attitude and the underlying exchange rate uncertainty. Further, the showing that the firms' optimal forward position depends on whether the two random exchange rates correlate in the sense of expectation dependence.

Furthermore, the empirical literature revealed clear-cut evidence between exchange rate volatility and trade. Baum and Caglayan (2010) investigate the effect of exchange rate uncertainty, and international trade flows from the period of 1980-1998 for a broad set of industrial economies. Their results show the absence of a significant relationship between exchange rate uncertainty and trade volume. They argued that the openness of capital market in the emerging countries tend to reduce the effect of exchange rate volatility on international trade as compared to the impact in the developing counterparts. Grier and Smallwood (2007) show relatively a modest evidence of negative impact of the exchange rate volatility on

multilateral exports within the subsample of some developing countries and find little significant effects for some developed countries. Tenrenyo (2007) applies the gravity equation to analyze 87 developed and less developed countries in a panel data framework; the study does not find evidence pointing a significant link between exchange rate volatility on trade. Arize et al. (2008) find a negative and statistically significant long-run relationship in eight Latin American countries. Grier and Smallwood (2013) find evidence that real exchange rate uncertainty negatively affects trade for many less developed countries. The revealed evidence depicts unexpected impulse response of the real exchange rate on the growth of exports. Nevertheless, the empirical results also indicate asymmetric positive shocks that generate substantial negative response while unexpected depreciations produce a relatively smaller positive response. Caglayan and Demir (2013) also find a significantly negative of exchange rate uncertainty on trade flows in emerging markets. Furthermore, the results show that the direction of trade matters under the condition of exchange rate uncertainty, especially the direction of south-south or south-north trade. Asteriou et al. (2016) tested four empirical models for the impact of exchange rate volatility on export and import demand for the MINT countries. The empirical findings show that in the short run for Mexico and Indonesia, volatility affects exports and imports demand, except for Turkey, where the magnitude of the volatility has a small effect on export or import demand. In the case of Nigeria, the results indicate a unidirectional causality from export demand to volatility. Yang and Yu (2016) explore the effects of exchange rate variation on bilateral trade in exchange rate regime and with a vehicle currency. The findings suggested that appreciation of the import country's currency against the vehicle currency expectedly promotes imports and that the volatility of the import country's currency against the vehicle currency depresses the expected level of imports. Nevertheless, the effect on export country's currency is ambiguous.

The paper seeks to explain the ex-post behavior of China's Renminbi trade policy and the pattern of world trade, an essential novelty in this piece of work is to investigate the effect of currency swap on trade empirically. The literature of international trade provides a scanty evidence in this area. Therefore, our empirical investigation provides more elaborate discussion on currency swap and trade which will be of interest and relevance to the world. There are two novelties to this study. First, we take a line variant of the previous studies, and the foremost objective is to investigate empirically trade creation and trade diversion effect of the RMB-based trade policy-the bilateral currency swap agreements (BSAs) on bilateral trade. The study examines the positive impact on the counterparties to the agreement (trade creation) and the adverse effect on non-partner countries (trade diversion). Using the gravity model, we intend to show the empirical evidence of trade creation via ex-post analysis of the trade flows. Methodologically, the theory consistent structural gravity model is an essential tool in our research kits to unbundle our goal. Regarding the sample, we drew sample 27 countries that

were into China's currency swap line for empirical analysis. Similarly, our analysis relies on a panel approach which accounts for country-pair fixed effects solely to circumvent the embedded endogeneity in trade policy analysis, and phase-in effects of the bilateral currency swap agreement, which has important implication for future significance of swaps on trade.

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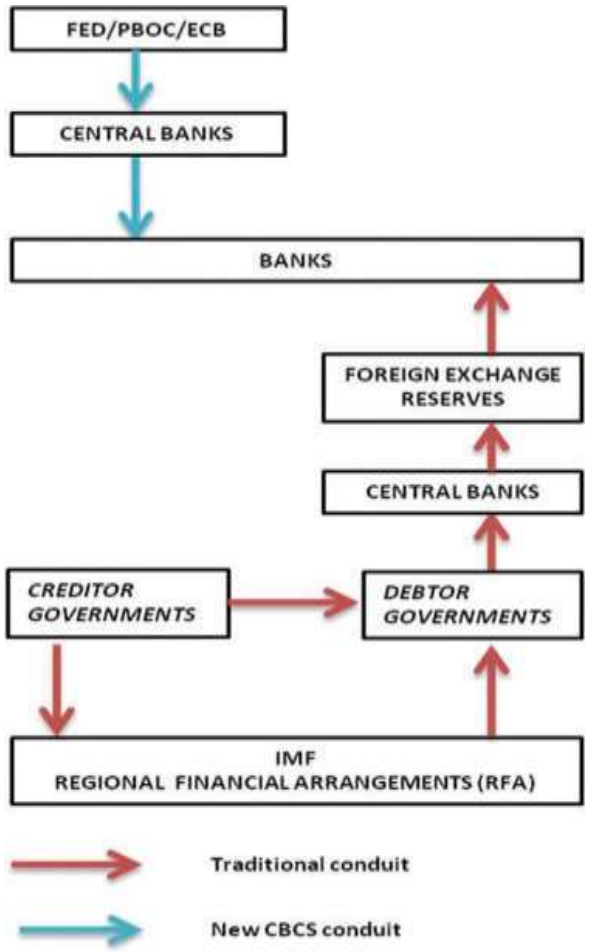
3.1 Currency Swap Mechanism

Currency swaps evolved from back to back loans. In a back to back loan, two parties in different countries make loans to one another, of equal value, each denominated in the currency of the lender and each maturing on the same date. The two loans are covered by separate agreements. The initial loan will be transacted at the spot rate, the interest payments and principal repayment would be carried out at formal rates (Detais, 2016; Sivaprakasam, and Mathew, 1996; and Close, (2001).Khurshed(2012) illustrated that Currency swap can be viewed as foreign exchange agreement between two parties to exchange principal and interest payments of a loan in one currency for equivalent aspect of an equal in net present value loan in another currency. This sort of arrangements is motivated by comparative advantage. Generally, currency swap that involves the exchange of principal and in one currency for the same in another currency is a foreign exchange transaction that is not required by law to be shown on the balance sheet. Similarly, since the exchange payments take place in two different currencies, the prevailing spot rate is benchmark to calculate interest payment and the principal. Significantly, the swap agreement is a customized instrument of international finance used to hedge against exchange rate and interest rate risk which is particularly important for firms and countries whose major source revenue heavily relies on international trade.

Historically, currency swap was originally utilized in the 1970s to evade foreign exchange control in the UK. During that period, the United Kingdom firms had to pay a premium to borrow is US dollars. In the exertion to skirt this, UK Companies firms set up back to back loan agreements with US firms who desire to borrow pound sterling. Nevertheless, currency swap arrangements date back to 1981 when IBM and World Bank entered into swap arrangement. Thereafter, currency swap has become a vital international financial instrument for management of debt and interest rate risk management. The market for swap agreement was developed and largely dominated by major investment and commercial banks, that

actively, market their product and servicesto corporate, institutional, and government clients. Contemporarily, swaps are among the most heavily traded international financial instruments (contracts) in the world. For instance, the total amount of outstanding and interest rate swap exceeds $426.7 trillion as of 2009, according to international swap and derivative association.

Figure 1: International Liquidity Swap Scheme



Source: Adopted from Detais (2016).

Significantly, currency swap has two major uses, firstly, it enables the parties to secure a cheaper debt (i.e. to borrow at best available rates irrespective of currency and swapping debt in the desired currency via back to back loans). Secondly, swaps are effective mechanisms for hedging against exchange rate exposure and fluctuation. Moreover, currency swaps are cost effective ways to transform risk exposures and alter future cash flows of firms. Similarly, comparative advantage is the fundamental motivation for wide area swap – covered foreign currency borrowing like the central bank bilateral currency of route of China and United States that covered many countries with large volumes swap – covered borrowing. Suppose the borrowing cost differ across markets, issuers as firms or central banks are likely to ameliorate their overall financing cost initiating swaps agreement in a manner in each party

signatories to the swap financial contract has an incentive or comparative advantage using the funds and proceeds.[4]

The swap agreement had seen a remarkable comeback, especially, in the 2000s when trading currency swaps increased for many world de facto currencies. In the heart of the global financial crisis of 2008, currency swap transactions were utilized by the United States' Federal Reserve and central bank of developed and emerging countries. Where both parties exchange domestic currencies at the prevailing market exchange rate and reverse the swap at the same exchange rate, predetermined at a future date. Essentially, the liquidity swap was aimed at providing liquidity in U.S. dollars to foreign markets. It is important to note that the central banks' liquidity swap and the plain vanilla currency swap are structurally the same. While plain vanilla currency swap is driven mainly by comparative advantage, the central bank liquidity swaps are emergency loans of U.S dollars to overseas markets. In contrast, the Peoples' Banks of China (PBOCs') motive is a multi-dimensional one, to serve both the aim of trade and investment promotion in addition to Renminbi internationalization framework which was a policy move to integrate the Chinese economy into the global monetary system.

4. The Data and Empirical Structural Gravity Equation

The application of Gravity model to bilateral interactions among the pair of countries, predicts trade between two economies as directly proportional to the product of their sizes and inversely proportional to the trade frictions between them. Early applications of this model resort to physical science analogy of the Newtonian Law of Gravitation without formal economic foundations (see Tinbergen, 1962; Linnnemann, 1966; Aitken, 1973; and Sapir, 1981). In 1979, the formal theoretical economic foundations of gravity emanated, under the assumptions that place of origin differentiates goods as in Armington (1969) and that consumers preferences are homothetic, identical across countries, and approximated by a CES utility function. Anderson (1979) formally derives the fundamental foundation of economic gravity rooted in economic theory. Since then several studies surfaced (see Baier and Bergstrand, 2001; Eaton and Kortum, 2002) and later Anderson and van Wincoop (2003) refine and popularize the idea in Anderson (1979). One notable attribute common to all these models is the explicit role for price levels or some form multilateral resistance term, for example, Balwin and Taglioni (2007) argued that ignoring the multilateral resistance term is

[4]For example, comparative advantage exists in financial market if similar risk is priced differently in different market, in this situation central banks and firms stand to gain from currency swapping. The benefit of swap more generally helps countries regulate their exposure to exchange rate uncertainty and interest rate risk.

tantamount to committing a gold medal mistake in the estimation of the gravity equation.[5] The framework of theoretical structural gravity system suggests the following;

$$X_{ij,t} = \frac{Y_i E_j}{Y}\left(\frac{\tau_{ij}}{\Pi_i P_j}\right)^{1-\sigma} \quad (1)$$

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{\tau_{ij}}{P_j}\right)^{1-\sigma}\frac{E_j}{Y} \;\; and \;\; P_j^{1-\sigma} = \sum_i \left(\frac{\tau_{ij}}{\Pi_i}\right)^{1-\sigma}\frac{Y_i}{Y} \quad (2)$$

Equation (1) is the representation of the theoretical gravity system that derives trade flows between pair of countries, conveniently we can decompose the size term, $Y_i E_j / Y$, and the trade cost term, $\left(\tau_{ij}/\left(\Pi_i P_j\right)\right)^{1-\sigma}$ Here the interpretation of the size term, $Y_i E_j / Y$, denote the hypothetical level of frictionless trade between a pair of countries i and j without trade costs. Mechanically, setting the bilateral frictions to equality (τ_{ij}=1), and re-deriving the gravity model, will intuitively, imply a frictionless world where consumers face the same price for a few goods regardless of their physical location. Similarly, the expenditure share on goods from a country will be equal to the share of production trace to source destination country in the global economy (say $X_{ij}/E_{ij} = Y_I/Y$). In effect, the economics size term carries a very useful information in relation to country size and bilateral trade flows. For example, large producers will naturally export more almost all destinations; richest and biggest markets also import more from almost all sources; also, trade flows between i and j will be larger if the pair countries are similar in size. Similarly, the trade cost term, $\left(\tau_{ij}/\left(\Pi_i P_j\right)\right)^{1-\sigma}$ captures the effect of trade costs that is the driving force of the realized and frictionless trade between a pair country. The literature divides the trade cost term into three components. First, the bilateral trade between a pair of country i and j, τ_{ij}, which is typically denoted by various historical, geographical variables. For example, bilateral distance, common border, language, colonizer, countriesever in colonial relationship and landlocked countries and trade policy variables regional trade agreement, (RTAs) between country pairs say i and j are the gravity controls in the literature. Secondly, the structural terms P_j, denotes the inward multilateral resistance term, which represents importer j's ease access of market. Thirdly, Π_i, indicates the outward multilateral resistance term that measures the exporter I's ease of market access.

[5]An important departure from the analogy of Newtonian gravity model is the multilateral resistance terms (MTR), which captures general equilibrium forces in a structural gravity system. Anderson and van Wincoop (2003) show that the more a country is resistant to trade with a given country, the more it shall trade with others, including itself and this captures the general equilibrium effect.

Primarily, the multilateral resistance term are vehicles that translate into the initial analysis of partial equilibrium effects of trade policy at the bilateral level to measure the country specific effects on consumer and producer prices. The initial effects of trade costs on trade flows account for the direct effect, while the taking into the trade cost changes into prices, incomes and expenditure is capture using the general equilibrium (Head and Mayer 2014 and Yotov et al., 2016). The structural gravity is multiplicative in nature, therefore, log-linearizing equation (1) with error term expansion we obtain the estimating equation thus:

$$\ln X_{ij,t} = \ln E_{j,t} + Y_{i,t} - \ln Y_t + (1-\sigma)\ln\tau_{ij,t} - (1-\sigma)\ln P_{j,t} - (1-\sigma)\ln\Pi_{i,t} + \epsilon_{ij,t} \quad (3)$$

This specification (4) is core to our analysis of central bank bilateral currency swap agreement, trade flows and various determinants of bilateral trade. $X_{ij,t,}$indicates the bilateral trade between country i and j at time t. Which depends positively on $E_{j,t}$and $Y_{i,t}$i.e., the importer expenditure and exporter income, and negatively on distance as a form of trade cost.The proxy of trade cost in the standard structural gravity system is$(1-\sigma)\ln\tau_{ij,t}$, it incorporates all manner of a series of observables that approximate bilateral trade cost. Interchangeably, we replace $(1-\sigma)\ln\tau_{ij,t}$ with $\ln\Gamma'_{ij,t}$as a measure of all sort of trade cost (a vector of control variables that represent the trade costs) in equation (5), these geographical and historical variables such as common border, language, colonial ties, countries that are an island, landlocked, and prevalence of regional agreements. While $\lambda'_{ij,t}$ (a dummy variable, 0/1 for swap status) which captures the central bank bilateral currency swap between China and members signatory to the agreement. From equation (4) $\ln P_{j,t}$and $\ln\Pi_{I,t}$ are unobservable, to obtain theoretically consistent estimates $\pi_{I,t}$ and $\chi_{j,t}$ captures exporter-time and importer-time fixed effects, which account for the outward and the inward multilateral resistance term, as well as other unobservable exporter-time and importer-time country specific attributes that influences trade. Constant term is not included in the presence of fixed effects.

$$\ln(X_{ij,t}) = \pi_{i,t} + \chi_{j,t} + \rho_1 \ln Y_i + \rho_2 \ln E_j + \rho_3 \ln\Gamma'_{ij,t} + \rho_4 \lambda'_{ij,t} + \epsilon_{ij,t} \quad (4)$$

$$\ln(X_{ij,t}) = \pi_{i,t} + \chi_{j,t} + \mu_{ij} + \rho_1 \ln Y_i + \rho_2 \ln E_j + \rho_3 \ln\Gamma'_{ij,t} + \rho_4 \lambda'_{ij,t} + \epsilon_{ij,t} \quad (5)$$

While μ_{ij}, in equation (5) captures the unobserved country-pair fixed effects, i.e., it controls bilateral country-pair unobserved heterogeneity and time-invariant unobservable trade-related factors that influence trade. Of relevance to note, all the time-invariant regressor lumped into the pair-specific fixed effects, absorbing all sort of similarities that are constant over time among the trading partners.

Table 2: Poisson Pseudo Maximum Likelihood (PPML) Intuitive Gravity Estimates

	PPML [1]	PPML [2]	PPML [3]	PPML [4]
Exp Income	0.806***	0.857***	0.854***	0.829***
	(0.0241)	(0.0198)	(0.0174)	(0.0163)
Imp Expenditure	0.813***	0.859***	0.857***	0.840***
	(0.0273)	(0.0234)	(0.0217)	(0.0208)
Distance		-0.834***	-0.873***	-0.740***
		(0.0443)	(0.0345)	(0.0300)
Border		0.590***	0.428***	0.411***
		(0.173)	(0.118)	(0.105)
Colony		0.590***	0.182	0.231**
		(0.0782)	(0.117)	(0.102)
Island		0.537***	0.516***	0.549***
		(0.0776)	(0.0779)	(0.0748)
Landlocked			-0.348***	-0.334***
			(0.0609)	(0.0611)
Common language			0.623***	0.596***
			(0.106)	(0.0926)
Common nation			0.0629	-0.0100
			(0.483)	(0.500)
Regional				0.484***
				(0.0487)
Currency swap				0.649**
				(0.271)
TD_Swap				0.216
				(0.201)
Observations	635,137	635,137	635,137	635,137
R-squared	0.522	0.593	0.671	0.726

In addition, this makes our regression to rely on time series variation, and it compares the pair observations of each country before and after swap line accession to determine the $\lambda'_{ij,t}$coefficient. In both equation (5) and (6), $\lambda'_{ij,t}$, captures intra-$\lambda'_{ij,t}$ trade creation. The inclusion of fixed effects specification and country-pair fixed effects represent a theory consistent structural gravity formulation to account for unobserved heterogeneity (see Baier and Bergstrand, 2007; Feenstra, 2004; Anderson and Yotov, 2011; Olivero and Yotov, 2012).

In the context of estimating average treatment effects of swap agreement on trade across swap member countries, the specification is in line with Baier and Bergstrand (2007) to yield unbiased coefficient estimates.[6]For robust estimation, we also consider the following PPML regression:

$$X_{ij,t} = \exp[\pi_{i,t} + \chi_{j,t} + \mu_{ij} + \beta_1 \ln Y_i + \beta_2 \ln E_j + \rho_1 \ln \Gamma'_{ij,t} + \rho_2 \lambda'_{ij,t}] + \epsilon_{ij,t} \quad (6)$$

The preceded models applied OLS estimator in log linear form. Econometric theory suggests that pooled or cross section regression satisfy the classical assumptions. Hence, OLS is unbiased, consistent and efficient estimator. However, as discussed in Santos Silva and Tenreyro (2006) standard log linearization is inappropriate and infeasible. First, the dependent variable can be 0.

Second, even if all the observations of the dependent variable are strictly positive, the expected value of the log-linearized error will overall the depend on the covariates and therefore OLS will be inconsistent (Santos Silva and Tenreyro, 2006, p.644). Similarly, the error terms are heteroskedastic and therefore its variance depends on the exponential function of the independent variable. Therefore, the pattern of heteroscedasticity, makes all the higher moments of the conditional distribution of the error term to affect the consistency of the estimator. In a nutshell, log linearization process drives the inconsistent estimates because of the correlation of the error term with explanatory variables.

Our alternative econometric specification that investigates trade diversion effect of RMB currency swap agreement of China follows Ghosh and Yamarik (2004), Dai, et al. (2014), Baier and Bergstrand (2007) that seek to identify the impact of FTAs on trade flows which generally based on gravity model. The approach fits the recent development in the application of empirical gravity to account for multilateral resistant term which had proven efficiency in the prediction of trade flows. The framework is given by:

$$X_{ij,t} = \exp\left[\pi_{i,t} + \chi_{j,t} + \mu_{ij} + \rho_1 \lambda'^{\text{in}}_{ij,t} + \rho_2 \lambda'^{\text{out}}_{ij,t}\right] + \epsilon_{ij,t} \quad (7)$$

Here, $\ln(X_{ij,t})$, is the bilateral trade between partners *i* and *j* at time *t.* $\pi_{i,t}$,is a s et of timevarying exporter (destination) fixed effects. They also control for all unobservable inward multilateral resistances including all total expenditure in line with structural model of Anderson and van Wincoop (2003). In similar vein, $\chi_{j,t}$,indicates all set of time varying

[6]Essentially, the omission of this control will make the $\lambda'_{ij,t}$coefficient to have upwards bias because they tend to pick up trade creation that is unrelated to $\lambda'_{ij,t}$ simply due to unobservable factors. Therefore, the introduction of country-pair fixed effects absorbs all the non-time varying variables that are likely to bias our coefficient of interest.

exporter (source) fixed effects, which also account for outward multilateral resistances and total shipments form the structural gravity model . Consequently, μ_{ij}, represent a set country-pair fixed effects that follow Baier and Bergstrand (2007), are utilized to address endogeneity of bilateral currency swap. While $\ln Y_i$, $\ln E_j$, and $\ln \Gamma'_{ij,t}$ captures the economic sizes and all trade cost related variables conventional considered within the intuitive gravity structure. To robustly confirm our empirical investigation on trade diversion and trade-creation effects we adopt both the intuitive and structural economic gravity as in specification (7) and (8) using the PPML estimator.

$$X_{ij,t} = \exp[\pi_{i,t} + \chi_{j,t} + \mu_{ij} + \rho_1 \lambda'^{in}_{ij,t} + \rho_2 \lambda'^{out}_{ij,t}] + \epsilon_{ij,t} \quad (8)$$

We include two set of zero-one dummy variables to depict whether two trading partners are join the RMB swap agreement in year *t*, $\lambda'^{in}_{ij,t}$, or whether only one trading partner has joined, $CSWAP^{outimp}_{ij,t}$. These dummies allow us to isolate three effects swaps may exert on the level of trade flows.[7] In effect, a positive coefficient on both $\lambda'^{in}_{ij,t}$, and $\lambda'^{out}_{ij,t}$ captures trade creation among the swap recipients, while trade diversion is suggestive of negative coefficient in $\lambda'^{out}_{ij,t}$. Table B8in the appendix reports the results of the intuitive gravity equation without country-pair fixed effects, this is to allow us to compare the alternative variation inspecification 13 to gauge the robustness of the findings. The coefficients of the intuitive gravity relatively have the expected signs as shown in Table 6 in the appendix. Equation (13) is used following the recommendation Santos Silva and Tenreyro (2006), we estimate an alternative model using Poisson Pseudo Maximum-likelihood (PPML) estimator to account for the pattern of heteroskedasticity imbedded in trade data.

The gravity equation provides an avenue for revealed evidence of trade diversion through an ex-post analysis of trade flow. Our empirical results confirm that RMB bilateral currency swap network is trade-creating, without evidence of trade diversion. Specifically, we find that

[7]See Anderson (2001) for in depth review of the theoretical foundation of economic gravity. Our analysis follows the literature of FTAs for our empirical investigation of bilateral currency configured as a form of trade policy (Frankel 1997; Magee, 2003; Baier and Bergstrand, 2002, 2004; and Baier and Bargstrand, 20007). Recently, Baier and Bergstrand (2007) utilize a gravity set up with fixed effects and successfully account for the endogeneity of FTAs. They showed that on the average, FTAs doubles member countries trade with phase-in effect of ten years. Similarly, Anderson and Yotov (2011) use structural gravity model to estimate terms of trade and efficiency gains form FTAs in the world. The central objective of this paper is to obtain trade diversion and trade-creation effects of a newly emerging trade agreement (RMB bilateral currency swap route of China) within the same similar framework.

RMB bilateral currency swap network rarely divert the trade signatories to the swap agreement away from the non-member countries. Specification 13 in Table 7 maintains that bilateral currency swap have significant effects on trade creation, this is evidenced by the positive signs of both Currency Swap and TD_Bcswap with magnitude of [exp(1.775)-1] = 4.9 and [exp(1.804)-1] = 5.07 respectively.[8]

Table 2: Structural Gravity: Trade Effects of Chinas' Bilateral Currency Swap

	PPML	**PPML**	**PPML**	**PPML**	**PPML**
Currency Swap	1.974***	1.681***	1.681***	1.823***	1.775***
	(0.201)	(0.203)	(0.203)	(0.101)	(0.118)
TD_Swap	1.968***	1.697***	1.697***	1.805***	1.804***
	(0.0531)	(0.0542)	(0.0542)	(0.0781)	(0.0781)
Swap_{t-4}					0.256***
					(0.0954)
Observations	731,826	731,826	730,063	730,063	730,063
R-squared	0.687	0.690	0.6541	0.711	0.685

Santos Silva and Tenreyro (2006) applied Poisson Pseudo Maximum Likelihood estimator to estimate gravity model; they show that the PPML estimator performs reasonably well even in the presence of high proportion of zero.[9] Estimating the empirical gravity in multiplicative is the convenient way to deal with the significant amount of zeros, instead of logarithmic form. Similarly, heteroscedasticity is another major concern in dealing with trade data. The problem is importantbecausein the presence of heteroscedasticity and Jensen's inequality as pointed by Silva and Tenreyro (2006), the gravity model estimates of the effects of trade policy and trade costs are likely to be biased and inconsistent with OLS estimator in logarithmic form.

For example, the mean of $ln\epsilon_{ij,t}$depends on a higher moment of $ln\epsilon_{ij,t}$, therefore, including its variance is important. Suppose $ln\epsilon_{ij,t}$ is heteroskedastic, and in practice this possibility might be prevalent. Then the expected mean of the error term depends on one or more covariates due to inclusion of variance term. Therefore, this tends to violate the first assumption of OLS which is suggestive of the fact that the estimator may be biased and inconsistent. More so, this kind of heteroskedasticity is not address simply by applying a covariance matrix estimator, because it affects the parameter estimates in addition to standard

[8]Swap captures trade-creation while Td_Swap denotes the variables represent trade diversion.

[9]Silva and Tenrenyro (2006) depicts the multiplicative gravity expressed as an exponential function of the gravity equation, which provides a nonlinear least square estimator (NLS).

errors. Our investigation of currency swap on trade applied structural gravity using both OLS and PPML in order to gauge between the two alternative approaches.

The benchmark model is as follows, we estimate the gravity model and discusses the estimation results via pooled OLS and Poisson Pseudo likelihood (PPML) followed by alternative variations of the benchmark model. We further proceed to discuss estimates related to the theoretical (structural) gravity model à la Anderson and Van wincoop (2003) model. It is relevant to note that the significant variance between the two approaches is the way estimates rely on many controls using econometric panel techniques to account for the multilateral resistance term (price indices). Given that, the price indices derived from the theoretical model are not observable. We discussed these two sets of techniques in equation (6), i.e., the fixed effects and the first difference estimation. Subsequently, we address an important issue of concern especially in the estimation of gravity model for applied trade policy research, namely, the possibility that some our explanatory variables may be endogenous in equation (6)

5. Conclusion

Chen et al. (2009) evaluate RMB internationalization process as part of the broader desire to reform and regenerate the international monetary system to represent a more diverse and interconnected global economy. In addition, the study reports that the use of RMB in trade financing has rapidly increase in recent years. In the same vein, another concern that leads to China's combined efforts to promote the cross-border use of RMB relates to the overall move to improve its financial liberalization program. In effect, to reduce China's reliance on the US-centric global financial system. Therefore, the RMB internationalization is to support the international monetary system reform. For example, the pace at which dollar accumulation expose many countries running surpluses in the current account, and by implication stand the risk of sudden dollar shortage. Internationalization of RMB in the subsequent years ahead is an alternative solution to this form of currency risk. In a way, this could help the move towards rebalancing the international monetary system that relies on few de facto currencies (Detais, 2016; and Eichengreen, 2011; and Chen and Cheung, 2009; Gao and Yu, 2009) argued that challenges still lie ahead for RMB; crucially the question is whether Chinese authorities will sequentially alter the status quo by ensuring more flexibility of the RMB exchange ratesandfull liberalization of the financial markets among factors others is key for RMB internationalization and becoming entirely part of the international monetary system reform. Nevertheless, along with the desire to fulfil the objective of international monetary reform several reasons account for the RMB internationalization. For example, Cheung et al. (2011) stressed that RMB's status does not match China's positioning in the world economy,

as the second-largest economy. Among other reasons mainly advanced in the literature, including the following:

RMB internationalization will help in the reduction of currency risk for both the exporter and importer so that the acceptance of RMB as trade settlement currency would promote international trade and investment, which is beneficial for both China and its global trading partners.

Similarly, RMB internationalization will reduce high exposure to dollar exchange rate volatility, given China's position as the holder of foreign exchange rate reserves and the lion share of the stockpile reserve is in US dollar (the dominant international reserve currency). Therefore, China's US dollar accumulation will likely reduce downward or reverse as RMB gains acceptance for global trade and investment.

Furthermore, Cheung et al. (2011), Ruan (2013), Yu (2012) and Ito (2011) emphasized arguments far from globalizing RMB as a store of value nor efforts build up a network of a financial hub in East Asia and beyond. They extend that the move is part of China's strategy to rebalance the lingering skewed international balance sheet - namely large and rapidly increasing exposure to foreign exchange rate risk. Stressing that the exposure derives from the combination of China's openness to direct investment from the rest of the world, current account surpluses, and lack of RMB internationalization. Furthermore, China like many advanced economies, at present it has a short position in its currency and a long position in other reserve currencies especially the US dollar (this accounts for inward direct investment and inward portfolio equity as RMB liabilities). Comparing China with Japan, the former now has a sizeable second source of its net foreign currency, with the persistently sizeable current account surpluses for a decade. The flows had cumulated into a stock known as the net international investment position, which is the difference between the nation's external assets and its liabilities. The continuous surpluses in China's current account had built up and positioned the Chinese economy as a net creditor nation. Cheung et al. (2011) added that the Chinese economy is converging with that of Japan at 40-50 percent GDP. In comparison, Japan's massive reserves position racked up over a generation, while China's standing witnessed a swift swing in a decade, moving from a net debtor of some 10% of GDP to a net creditor of 37% in 2009. Besides, in the case of China, the rest of the world's equity position and net investment in foreign currency, which is the sum of China's long position in foreign currency. In 2009, the amount approximated to 60 percent of China's GDP. The government absorbs the risk in the form of foreign exchange reserves financed by RMB liabilities (including reserves and Central Bank bills. The same authors argued that with RMB internationalization if some of China's claims to the rest of the world become RMB denominated, in turn, this would reduce the long foreign currency position of China when it claims on the rest of the world are denominated in RMB. Again, using Japan as an example,

Cheung et al. (2011) further maintained that the international use of creditor country's currency could allow the rest of the world to share the creditor country's currency risk. Significantly, modest internationalization of Japanese Yen permitted the rest of the world to share the foreign exchange exposure as the world uses yen denominate both assets and liabilities. Moreover, the claim of Japan to the rest of the world equivalent to the modest amount of 2% of its GDP. Considerably, the Chinese economy in its short lifespan as a strong creditor nation has piled up substantial foreign exchange exposure like that of Japan (see Cheung et al. 2011, p. 47). However, in Japan case, most Japanese companies, like pension funds, and mutual funds received and held a stock of securities denominated in Yen, doubling its official reserve. Which is equivalent to one-third of the GDP, which is around 11.6 percent, denominated in Japanese Yen. In comparison, the net international assets as a share of its GDP are still small relative to that of Japan. However, it overall long position in foreign exchange is as large as that of Japanese economy or even more significant. The long position is attributable to a more significant share of GDP in foreign holdings of equities in China due to the massive amount of foreign direct investment (FDI) inflows for almost two decades and lack of RMB internationalization. Therefore, the potential strategy seen to curb this challenge is RMB internationalization, mainly to ensure denomination of most of China's external claims in RMB. The combination of these entire factors made the Chinese authorities to put a proactive strategy in place to ensure RMB internationalization.[10] Cheung et al. (2011) refer this policy as "renminbization of China's claim to the rest of the world." The People's Bank of China (PBOC) sets to achieve the full convertibility of its currency through triple steps. First, RMB as a global trade currency, where business outside China are acquaintedwith using RMB for its payments and receipts of goods and services traded. Second, RMB as a global investment currency has the main objective is to ensure that RMB is freely investible, i.e., investors can be able to move their RMB-based holdings across the border, and global firms may require the conversion of their earning in RMB into other currencies. Thirdly, RMB as a global reserve currency, with the increasing importance of China as economic leader in the arena of international trade, the government is determined to match its currency with its position (Li, 2013; Lai and Zhou, 2012 Kamps, 2006; and Eichengreen, 2011)

[10]Additionally, another key factor resides in the objective of international system rebalancing; available evidence reveals that at least 30 world's central banks hold a portion of their reserves in RMB. Relatively, this is an indication of some level of acceptance of the RMB by number of Central Banks in the world, suggesting that RMB is effectively on the path of becoming a de facto reserve currency, although challenges such as inconvertibility and capital controls among other still lingers a head.

References

Adam-Muller, A. (2000). Exports and Hedging Exchange Rate Risks: The Multi Country Case. (International Trade). Journal of Futures Markets, 20(9), 843.

Aghion, P., Howitt, P., Mayer-Foulkes, D. (2005). The Effect of Financial Development on Convergence: Theory and Evidence. *Quarterly Journal Economics,* 120 (1), 173–222.

Agnosteva, Delina E., James E. Anderson, and Yoto V. Yotov. (2014). Intra-National Trade Costs: Measurement and Aggregation. NBER Working Paper No. 19872.

Aitken, Norman D., (1973). The effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis. American Economic Review 5, 881–892.

Aizenman J., YothinJinjarak, &Donghyun P. (2011). International Reserves and Swap Lines: Substitutes or Compliments? International Review of Economics and Finance, 20(5), 5-18.

Aizenman, J., & Lee, J. (2008). Financial versus monetary mercantilism: Long-run View of Large International Reserves Hoarding. The World Economy, 31(5), 593.

Aizenman, J., YothinJinjarak, &Huanhuan Zheng (2017). Chinese Outwards Mercantilism – The Art and Practice of Bundling, NBER, WP, 21089.

Aizenman, Joshua and Gurnain Kaur Pasricha. (2010). Selective Swap Arrangements and the Global Financial Crisis: Analysis and Interpretation. International Review of Economics & Finance, 19(3), 353-65.

Allayannis G, Ihrig J, Weston JP. (2001). Exchange-Rate Hedging: Financial Versus Operational Strategies. American Economic Review Papers Proc 91:391–395

Anderson, J. E., & Van Wincoop, E. (2003). Gravity with Gravitas: A Solution to the Border Puzzle. American Economic Review, 93(1), 170–192.

Anderson, J.E., and Yotov. Yotov. (2011). Terms of Trade and Global Efficiency Effects of Free Trade Agreements, 1990-2002. NBER Working Paper No. 17003.

Anderson, James E., (1979). A Theoretical Foundation for the Gravity Equation. American Economic Review 69 (1), 106–116.

Antras, P. & Caballero, R. J. (2009). Trade and Capital Flows: A Financial FrictionsPerspective. *Journal of Political Economy*, 117(4):701-744.

Anwar, Y. (2014). Pakistan's Currency Swap Agreement with China. Enterprise, 20(10), 11.

Arcand, Jean-Louis, Enrico Berkes, and Ugo Panizza. (2011).Too Much Finance?, VoxEU.org, 7 April.

Arize, A. C., Osang, T., &Slottje, D. J. (2008). Exchange-rate volatility in Latin America and Its Impact on Foreign Trade. International Review of Economics and Finance, 17(1), 33-44.

Armington, P. S. (I969) "A Theory of Demand for Products Distinguished by Place of Production", IMF Staff Papers, 16(1)159-177.

Auboin, M., &Ruta, M. (2013). The Relationship between Exchange Rates and InternationalTrade: A literature review. Cambridge: Cambridge University Press.

Baier, S. L., &Bergstrand, J. H. (2004). Economic Determinants of Free Trade Agreements. Journal of International Economics, 64(1), 29–64.

Baier, S. L., & Bergstrand, J. H. (2007). Do Free Trade Agreements Actually Increase Members' International Trade? Journal of International Economics, 71(1), 72–95.

Baier, S. L., Bergstrand, J. H., & Vidal, E. (2007). Free Trade Agreements in The Americas: Are the Trade Effects Larger Than Anticipated? World Economy, 30(9), 1347-1377.

Baier, Scott L., Bergstrand, Jeffrey H. (2001). The Growth of World Trade: Tariffs, Transport Costs, and Income Similarity. Journal of International Economics 53 (1), 1–27.

Baldwin, R. (2006). The euro's trade effects. IDEAS Working Paper Series from RePEc,

Baldwin, R., & Taglioni, D. (2006). Gravity for Dummies and Dummies for Gravity Equations. NBER Working Paper 12516, Cambridge, MA.

Baltagi, B.H., Demetriades, P.O., Law, S.K., (2009). Financial Development and Openness: Evidence from Panel Data. *Journal of Development Economics*. 89 (2), 285–296.

Bank for International Settlements. September (2013). Triennial Central Bank Survey of Foreign Exchange Turnover in April 2013: Preliminary Global Results. Monetary and Economic Department.

Bank of Korea. (2012). Introduction of Korea-China Currency Swap-Financed Trade Settlement Facility. Ministry of Strategy and Finance, the Bank of Korea.

Barkoulas, J.T., Baum, C.F., Caglayan, M. (2002). Exchange rate effects on the volume and variability of trade flows. Journal International Money. Finance 21 (4), 481–496.

Barro, R., and S. Tenreyro. (2007). Economic Effects of Currency Unions. Economic Inquiry 45 (1): 1–23.

Beck, T. (2002). Financial Development and International Trade: Is There a Link? *Journal. International. Economics*. 57 (1), 107–131.

Beck, T. and Levine, R. (2004). Stock Markets, Banks, and Growth: Panel Evidence, Journal of Banking and Finance,28, 423–42.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2010). Financial Institutions and Markets Across Countries and Over Time: The Updated Financial Development and Structure database. *The World Bank Economic Review, 24*(1), 77-92

Beck, T., Levine, R., Loayza, N. (2000). Finance and the Sources of Growth. *Journal Financial Economics* 58 (1), 261–300.

Becker, B. & Greenberg, D. (2007). Financial Development, Fixed Costs and Inter-national Trade. *Working Paper*, Harvard Business School.

Bencivenga, Valerie R., Bruce, D. Smith. (1991). Financial Intermediation and EndogenousGrowth, *Review Economic Studies* 58 (2), 195–209.

Blackburn, K., Bose, N., Capasso, S. (2005). Financial Development, Financing Choice andEconomic Growth. *Review of Development Economics,* 9 (2), 135–149.

Blackburn, K., Hung, V.T.Y. (1998). A Theory of Growth, Financial Development and Trade,*Economica*, 65 (257), 107–124.

Bowles, P., & Wang, B. (2013). Renminbi Internationalization: A Journey to Where?Development and Change, 44(6), 1363-1385.

Braun, M., Raddatz, C.E. (2005). Trade Liberalization and the Politics of Financial Development. *World Bank Working Paper* 3517.

Broll U, Wahl JE, Wessel C. (2011). Export, Exchange Rate Risk and Hedging: The Duopoly Case. German Economic Review 12:490–502

Broll, U., &Eckwert, B. (1999). Exchange Rate Volatility and International Trade. Southern Economic Journal, 66(1), 178-185.

Broll, U., Welzel, P., & Wong, K. (2015). Futures Hedging with Basis Risk and Expectation Dependence. International Review of Economics, 62(3), 213-221.

Bun, M. J., and F. J. Klaassen. (2007). The Euro Effect on Trade is Not as Large as Commonly Thought. Oxford Bulletin of Economics and Statistics 69 (4): 473–496.31

Caglayan, M., & Di, J. (2010). Does Real Exchange Rate Volatility Affect Sectoral Trade Flows? Southern Economic Journal, 77(2), 313-335.

Caglayan, M., Dahi, O., & Demir, F. (2013). Trade Flows, Exchange Rate Uncertainty, and Financial Depth: Evidence from 28 Emerging Countries. Southern Economic Journal.

Campanella, Miriam. (2014). The Internationalization of the Renminbi and the rise of a Multipolar Currency System, ECIPE Working paper, No.01/2014

Campbell, D. L. (2013). Estimating the Impact of Currency Unions on Trade: Solving the Glick and Rose Puzzle. The World Economy.

Cavallo, Eduardo, and Carlos Scartascini (2012). Interest Groups and Government Capabilities Matter for Financial Development, VoxEU.org.

Chen, H., W. Peng and C. Shu. (2009). Renminbi as an International Currency: Potential and Policy Considerations, Working Paper, 18/2009 (Hong Kong: Hong Kong Institute for Monetary Research).

Chen, Xiaoli and Yin-Wong Cheung. (2011). Renminbi Going Global. China & World Economy, 19(2), 1-18.

Cheung, Y.- W., Chow, K Kand Qin. F. (2017). The RMB Exchange Rate: The Past Present and the Future, World Scientific Publishing Co. Pte Ltd., ISBN 9789814675499.

Cheung, Y.-W., G. Ma and R. N. McCauley. (2011). 'Renminbising China's Foreign Assets.' Pacific Economic Review no. 16: 1–17.

Chey, H. (2012). Theories of International Currencies and the Future of the World Monetary Order1. International Studies Review, 14(1), 51-77.

Cihák M., Demirgüç-Kunt A., Feyen E. and Levine R. (2012). (Eds.), Benchmarking Financial Systems Around the World. *Washington, D.C., the World Bank*.

Cihák M., Demirgüç-Kunt A., Feyen E. and Levine R. (2013). Benchmarking Financial Systems around the World,*NBER Working Paper* 18946, National Bureau of Economic Research.

Clark, P.B. (1973). Uncertainty, Exchange Risk, and the Level of International Trade. Western Economic Journal 6, 302–313.

Cohen, Benjamin J. (2012). The Yuan Tomorrow? Evaluating China's Currency Internationalization Strategy. New Political Economy 17(3):361–371.

Cui, Y. (2013a). The Internationalization of the RMB: Where does the RMB Currently Stand in the Process of Internationalization. Asian - Pacific Economic Literature, 27(2), 68-85.

Cui, Y. (2013b). How is the RMB Exchange Rate Misaligned? A Recent Application of Behavioral Equilibrium Exchange Rate (BEER) to China. Journal of East Asian Economic Integration, 17(3), 281-310.

Dai, M., Yotov, Y. V., &Zylkin, T. (2014). On the Trade-Diversion Effects of Free Trade Agreements. Economics Letters, 122(2), 321-325.

Darrat, A.F., Elkhal, K., McCallum, B. (2006). Finance and macroeconomic Performance. Some Evidence for Emerging Markets. *Emerging Market Finance and Trade* 42 (3), 5–28.

David M. (2016). Renminbi SDR Inclusion Boost to Liquidity, focus: Renminbi Swap Network, OMFIF Bulletin.

Demetriades, P., Andrianova, S. (2004). Finance and Growth: What We Know and What We Need to Know. In: Goodhart, C. (Ed.), Financial Development and Economic Growth: Explaining the Links. *Palgrave Macmillan, Basingstoke*, pp. 38–65.

Demirgüç-Kunt, A., Levine, R. (2009). Finance and inequality: Theory and Evidence. *Policy Research Working Paper Series No.* 4967. The World Bank, Washington DC.

Destais, C. (2016). Central Bank Currency Swaps and the International Monetary system. Emerging Markets Finance & Trade, 52(10), 2253-2266.

Do, Q.-T., Levchenko, A.A. (2004). Trade and Financial Development. *World Bank Working Paper* 3347.

Doganlar, M. (2002). Estimating the Impact of Exchange Rate Volatility on Exports: Evidence from Asian Countries. Applied Economics Letters, 9(13), 859-863.

Ductor, L., Grechyna, D. (2015). Financial Development, Real Sector, and Economic Growth. *International Review Economics of Finance.* 37 (3), 393–405.

Eaton, Jonathan, Kortum, Samuel (2002). Technology, Geography, and Trade.Econometrica70 (5), 1741–1779.

Egger, Peter, and Sergey Nigai. (2015). Structural Gravity with Dummies Only. CEPR Discussion Paper No. DP10427.

Eichengreen, B. (2011b). 'The Renminbi as an International Currency', Journal of Policy Modeling, 33, 5, 723–30.

Eichengreen, Barry. (2011a). Exorbitant Privilege: The Rise and fall of the Dollar and the Future of the International Monetary System. Oxford: Oxford University Press.

Eichengreen, Barry. (2014). International Currencies Past, Present and Future: Two Views from Economic History.

Eicher, T. S., Henn, C., & Papageorgiou, C. (2012). Trade Creation and Diversion Revisited: Accounting for Model Uncertainty and Natural Trading Partner Effects. Journal of Applied Econometrics, 27(2), 296-321.

Esposito, P. (2017). Trade Creation, Trade Diversion, and Imbalances in the EMU DOI:

Ethier, W. (1973). International Trade and the Forward Exchange Market. American Economics Review. 63,494-503.

Feenstra, R. C. (2004). Advanced International Trade: Theory and evidence. Princeton: Princeton University Press.

Frankel, J. A. (1997). Regional Trading Blocs. Washington: Institute for International Economics.

Fung, M.K. (2009). Financial Development and Economic Growth: Convergence or Divergence? *Journal International Money Finance,* 28 (1), 56–67.

Gao, H. and Yu, Y. (2009). Internationalization of the Renminbi, Paper Presented at the Bank for International Settlements/Bank of Korea seminar, Currency Internationalization:

Lessons from theGlobal Financial Crisis and Prospects for the Futurein Asia and the Pacific, Seoul, Korea, 19–20 March.

Germain, R., & Schwartz, H. (2017). The Political Economy of Currency Internationalization: The Case of the RMB. Review of International Studies, 43(4), 765-787.

Ghosh, S., &Yamarik, S. (2004). Are Regional Trading Arrangements Trade Creating? An Application of Extreme Bounds Analysis. Journal of International Economics, 63(2), 369–395.

Glick, R., & Rose, A. K. (2016). Currency Unions and Trade: A Post-EMU Reassessment. European Economic Review, 87, 78-91.

Glick, R., and A. Rose. (2002). Does a Currency Union Affect Trade? The Time-series evidence. European Economic Review 6 (6): 1125–1151.

Goldberg L. S., Kennedy C. &Miu J. (2010.) "Central Bank Dollar Swap Lines and Overseas Dollar Funding Costs", NBER Working Paper, No 15763, February.

Goldberg, L. and C. Tille (2008). Vehicle Currency Use in International Trade, Journal of International Economics, 76, 2, 177–92.

Goswami, G., Nam, J., &Shrikhande, M. M. (2004). Why do Global Firms Use Currency Swaps? Theory and Evidence. Journal of Multinational Financial Management, 14(4), 315-334.

Greenwood, J., Jovanovic, B. (1990). Financial Development, Growth, and the Distribution ofIncome. *Journal Political Economy,* 98 (5), 1076–1107.

Grier, K. B., & Smallwood, A. D. (2013). Exchange Rate Shocks and Trade: A Multivariate GARCH-M Approach. Journal of International Money and Finance, 37, 282-305.

Guariglia, A., Poncet, S. (2008). Could Financial Distortions be no Impediment to Economic Growth After All? Evidence from China.*Journal Comparative Economics.* 36 (4), 633–657.

Havránek, T. (2010). Rose Effect and the Euro: Is the Magic Gone? Review of World Economics 146 (2): 241–261.

He, D. (2012). Renminbi Internationalization: A Primer, Hong Kong Institute for Monetary Research, Hong Kong.

Head, Keith, & Thierry Mayer. (2014). Gravity Equations: Workhorse, Toolkit, and Cookbook. Chapter 3 in the Handbook of International Economics Vol. 4, eds. Gita Gopinath, Elhanan Helpman, and Kenneth S. Rogoff, Elsevier Ltd., Oxford.

Hondroyiannis, G., Lolos, S. and Papapetrou, E. (2005). Financial Markets and Economic Growth in Greece, 1986–1999, *Journal of International Financial Markets, Institutions and Money*, 15, 173–88.

Huang, Y. & Temple, J. (2005). Does External Trade Promote Financial Development? *Working Paper* 5150, CEPR Discussion Paper.

Ito, T. (2011). The Internationalization of the RMB: Opportunities and Pitfalls, Maurice R. Greenberg CenterforGeo-economic Studies and International Institutions and Global Governance Program, Council on Foreign Relations.

Ju, J. & Wei, S. (2011). When is Quality of Financial System a Source of Comparative Advantage? *Journal of International Economics,* 84(2):178-187.

Kamps, A. (2006). The Euro as Invoicing Currency in International Trade, Working Paper 0665 (Frankfurt: European Central Bank).

Kawai M, Zilcha I. (1986) International Trade with Forward-Futures Markets under Exchange Rate and Price Uncertainty. Journal International Economics 20:83–98

Kenen, P. (2009). Currency Internationalization: An Overview, BIS Papers No. 61. Klein, M. W. (2005). Dollarization and Trade. Journal of International Money and Finance 24 (6): 935–943.

Kiendrebeogo, Y. (2012). The Effects of Financial Development on Trade Performance and the Role of Institutions. *IDEAS Working Paper Series from RePEc,*

Kim, D., Lin, S. C., & Suen, Y. (2010). Are Financial Development and Trade Openness Complements or Substitutes? *Southern Economic Journal, 76*(3), 827-845.

King, R. G. and Levine, R. (1993). Finance and Growth: SchumpeterMight be Right, *Quarterly Journal of Economics,* 108,717–37.

Klein, M. W. (2005). Capital Account Liberalization, Institutional Quality and Economic Growth: Theory and Evidence. *Working Paper* 11112, NBER.

Klein, M. W., and J. C. Shambaugh. (2006). Fixed Exchange Rates and Trade. Journal of international Economics 70 (2): 359–383.

Krugman, P. (1984). The International Role of the Dollar: Theory and Prospect, in J. Bilson and R. Marston (eds.), Exchange Rate Theory and Practice (Chicago, IL: University of Chicago Press), 261–78.

Kwon, E. (2015). China's Monetary Power: Internationalization of the Renminbi.Pacific Focus, 30(1), 78-102.

Lai, E. L., & Yu, X. (2015). Invoicing Currency in International Trade: An Empirical Investigation and Some Implications for the Renminbi.The World Economy, 38(1), 193-229.

Lai, E. L.-C. and J. Zhou. (2012). The Emergence of a Major Invoicing Currency, Working Paper (Hong Kong: Hong Kong University of Science and Technology).

Lane, P. R., &Shambaugh, J. C. (2010). Financial Exchange Rates and International Currency Exposures. The AmericanEconomic Review, 100(1), 518-540.

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal Economic Literature.* 35 (2), 688–726.

Levine, R. (2003). More on Finance and Growth: More Finance More Growth? *Federal. Reserve Bank of St. Louis Review.* 85 (4), 31–46.

Levine, R. (2004). Finance and Growth: Theory and Evidence. *NBER WorkingPaper*No: 10766

Levine, R. and Zervos, S. (1998). Stock Markets, Banks,and Economic Growth, *American Economic Review*, 88,537–58.

Li, B. (2013), The Prospect of Renminbi Pricing in Cross-Border Trade, China Finance, 2013, 23, 47–48.

Liao, S., & McDowell, D. (2015). Redback Rising: China's Bilateral Swap Agreements and Renminbi Internationalization. International Studies Quarterly, 59(3), 401-422.

Lin, Z., Zhan, W., & Cheung, Y. (2016). China's Bilateral Currency Swap Lines. China &World Economy, 24(6), 19-42.

Linnemann, Hans, (1966). An Econometric Study of International Trade Flows. North-Holland, Amsterdam.

Loayza, Norman V., and Romain Ranciere. (2006). Financial Development, Financial Fragility, and Growth. *Journal ofMoney, Credit and Banking,* 38:1051-76.

Love H and Chen C. (2015). Chinese Renminbi Internationalization: Guide to Present Developments, international services, Pnc.com/Go China.

Lucia O. (2016). Internationalization of the Chinese Currency: Towards a Multipolar International Monetary System? rocnik.

Magee, C. S. (2003). Endogenous Preferential Trade Agreements: An Empirical Analysis. Contributions to Economic Analysis & Policy, 2(1).

Magee, C. S. P. (2008). New Measures of Trade Creation and Trade Diversion. Journal of International Economics, 75(2), 349-362.

Manova, K. (2006). Credit Constraints, Heterogeneous Firms, and International Trade.*Working Paper*, Harvard University.

Matsuyama, K. (2005). Credit Market Imperfection and Patterns of International Tradeand Capital Flows. *Journal of the European Economic Association*, 3(2-3):714-723.

Matsuyama, K., N. Kiyotaki and A. Matsui (1993). Toward a Theory of International Currency', Review of Economic Studies, 60, 2, 283–307.

McCauley Robert. (2011). Renminbi Internationalization and China's Financial Development. Bank for International Settlements.

Mcguire, P., & Von Peter, G. (2012). The dollar shortage in global banking and the international policy response. International Finance, 15(2), 155-178.

McKenzie,M.D. (1999). The Impact of Exchange Rate Volatility on International Trade Flows. Journal. Economic. Survey. 13/1, 71–106.

Menyah, K., Nazlioglu, S., &Wolde-Rufael, Y. (2014). Financial Development, Trade Openness and Economic Growth in African Countries: New insights from a Panel Causality Approach. *Economic Modelling, 37*, 386-394.

Mishkin, F.S. (2009). Globalization and Financial Development. *Journal of Development. Economics*. 89 (2), 164–169.

Mohammed Ahmed, Abdullahi (2019). “Central Bank Bilateral Currency Swap and Trade Flows: An Implication for Chinese Renminbi Internationalization" , *Munich Personal RePEc Archive*

Mohammed Ahmed, Abdullahi (2019). “Financial Development and Central Bank Bilateral Currency Swaps: Is there Trade Effect? ”, *Munich Personal RePEc Archive*

Niroomand, F., Hajilee, M., & Al Nasser, O. (2014). Financial Market Development and Trade Openness: Evidence from Emerging Economies. *Applied Economics, 46*(13), 1490.

Nitsch, V. (2005). Currency union entries and trade. 2005/9. DiskussionsbeiträgeDesFachbereichsWirtschaftswissenschaft der FreienUniversität Berlin.

Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2009). Financial Instability, Reserves, and Central Bank Swap Lines in the Panic of 2008.The American Economic Review, 99(2), 480-486.

Olivero, María Pía, and YotoYotov. (2012). Dynamic Gravity: Endogenous Country Size and Asset Accumulation. Canadian Journal of Economics, 45(1): 64–92.

Park, Y. (2010). RMB Internationalization and its Implications for Financial and Monetary Cooperation in East Asia, China & World Economy, 18(2):1–21.

Rajan, R.G., Zingales, L. (2003). The Great Reversals: The Politics of Financial Development in the Twentieth Century. *Journal. Financial Economics*69 (1), 5–50.

Rey, H. (2001). International Trade and Currency Exchange, Review of Economic Studies, 68, 2,443–64.

Rose, A. (2001). Currency Unions and Trade: The Effect is large. Economic Policy, (33), 449-461.

Rose, A. K., & Spiegel, M. M. (2012). Dollar Illiquidity and Central Bank Swap Arrangements during the Global Financial Crisis. Journal of International Economics, 88(2), 326-340.

Roubini, Nouriel. (2009). The Almighty Renminbi? The New York Times, May 13. Available at http://www.nytimes.com/2009/05/14/opinion/14Roubini.html?_r = 0

Rousseau, P. and Wachtel, P. (2000). Equity Markets and Growth:Cross Country Evidence on Timing and Outcomes, *Journal ofBanking and Finance*, 24, 1933–57.

Ruan V. (2013). "People's Bank of China in Swap Deal with European Central Bank", South China Morning Post, Friday, 11 October.

Sapir, Andre. (1981). Trade Benefits underthe EEC Generalized System of Preferences. European Economic Review 15,339–355.

Silva, J., &Tenreyro, S. (2006). The Log of Gravity. Review of Economics and Statistics, 88(4), 641-658.

Song, Z., StoresLetten, K., &Zilibotti, F. (2009). Growing Like China. IDEAS Working Paper Series from RePEc.

Subramanian, A. and Kessler, M. (2012). The Renminbi Bloc is Here: Asia Down, rest of the World to go? Peterson Institute for International Economics (PIIE) Working Papers No. 12–19.

Svaleryd, H. & Vlachos, J. (2005). Financial Markets, the Pattern of Industrial Specialization and Comparative Advantage: Evidence from OECD Countries. *EuropeanEconomic Review*, 49(1):113-144.

Svirydzenka, K. (2016). Introducing A New Broad-basedIndex of Financial Development, *IMF Working paper*, WP/16/5

Tenreyro, S. (2007). On the Trade Impact of Nominal Exchange Rate Volatility, Journal of Development Economics, 82(2), 485-508.

Thom, R., and B. Walsh. (2002). The Effect of a Currency Union on Trade: Lessons from the Irish Experience. European Economic Review 46 (6): 1111–1123.

Tinbergen, Jan. (1962). Shaping the World Economy. The Twentieth Century Fund, New York.

Trefler, Daniel. (1993). Trade liberalization and the theory of Endogenous Protection: An Econometric Study of U.S. import policy. Journal of Political Economy 101 (1), 138–160.

Vallee, S. (2012). The Internationalization Path of the Renminbi, Bruegel Working Paper No. 2012/05.

Viaene, J., & de Vries, C. G. (1992). International Trade and Exchange Rate Volatility. European Economic Review, 36(6), 1311-1321.

Viner, J., (1950). The Customs Union Issue. Carnegie Endowment for International Peace, New York.

Wei, S. (1999). Currency Hedging and Goods Trade. European Economic Review, 43(7), 1371-1394.

Wilson, W. T. (2015). Washington, China, and the Rise of the Renminbi: Are the Dollar's Days as the Global Reserve Currency Numbered? The Heritage Foundation, Special Report, No. 171.

Wong, K. P. (2003). Export Flexibility and Currency Hedging. International Economic Review, 44(4), 1295-1312.

Wooldridge, J. M. (2003). Introductory Econometrics: A Modern Approach (2nd Ed.). Cincinnati, OH: Southwestern College Publishing.

Wooldridge, Jeffrey M. (2002). Econometric Analysis of Cross-Section and Panel Data. MIT Press, Cambridge, MA.

World Bank (2012). Global Financial Development Report 2013: Rethinking the Role of the State in Finance, *World Bank, Washington DC.*

Yang, J., & Han, L. (2013). Optimal Size of Currency Swap between Central Banks: Evidence from China.Applied Economics Letters, 20(3), 203-207.

Yotov. V. Yoto, & Roberto, P, Jose-Antonio M, & Mario Larch. (2016). An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model, World Trade Organization.

Yu, Y. (2012). Revisiting the Internationalization of the Yuan, ADBI Working Paper Series No. 366.

Table 3: Pooled OLS Gravity Estimates

	[Column 1]	[Column 2]	[Column 3]
Exp Income	1.119***	1.088***	0.959***
	(0.00639)	(0.00614)	(0.00500)
Imp Expenditure	0.835***	0.893***	0.959***
	(0.00651)	(0.00626)	(0.00499)
Distance	-1.203***	-1.166***	-1.192***
	(0.0185)	(0.0179)	(0.0150)
Border	0.766***	0.634***	0.723***
	(0.0810)	(0.0798)	(0.0737)
Colony	1.656***	1.668***	1.547***
	(0.0966)	(0.0916)	(0.0838)
Island	0.331***	0.352***	0.349***
	(0.0303)	(0.0291)	(0.0239)
Landlocked	-0.691***	-0.643***	-0.707***
	(0.0280)	(0.0274)	(0.0222)
Common language	0.716***	0.763***	0.775***
	(0.0359)	(0.0350)	(0.0288)
Common nation	-0.0506	0.0737	0.272***
	(0.177)	(0.106)	(0.0822)
RTA	0.490***	0.469***	0.433***
	(0.0351)	(0.0349)	(0.0296)
Currency Swap	0.247	0.440***	0.531***
	(0.196)	(0.152)	(0.172)
Observations	635,137	657,835	853,918
R-squared	0.548	0.561	0.606

Table 4: Structural Gravity Estimate (Sample 1990 – 2017)

	Pair Fixed Effects	Bilateral Fixed Effects	Pair Fixed Effects	PPML	PPML
Currency swap	0.740***	1.229**	3.078***	0.740**	0.676***
	(0.0969)	(0.612)	(0.269)	(0.0969)	(0.116)
Observations	22,980	22,984	22,984	22,980	22,980
R-squared	0.671	0.619	0.643	0.611	0.622

Table 5: Robustness Check: Structural Gravity Estimates

	Time Fixed Effects	Bilateral Fixed Effects	Pair Fixed Effects	PPML Pair Fixed Effects	PPML Pair Fixed Effects
Currency Swap	1.258***	0.986***	0.986***	1.286***	1.223***
	(0.196)	(0.196)	(0.196)	(0.0751)	(0.0876)
$\text{Currency Swap}_{t-4}$					0.337***
Observations	444,290	444,290	442,584	442,584	442,584
R-squared	0.587	0.653	0.653	0.676	0.664