The rationale for Renminbi-denominated foreign reserves for African countries

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Abstract

International Monetary Fund ("**IMF**") member countries are required to hold foreign reserves denominated in reserve currencies and China has indicated its intention to obtain a reserve currency issuer status. Given increased Sino-Africa trade, African countries may consider strategically realigning their foreign reserves to assist China, in order to secure beneficial trade arrangements.

The purpose of this research was to evaluate the suitability of Renminbi-denominated foreign reserves for African countries, with a particular focus on Gross Domestic Product ("**GDP**") growth. Africa could improve the market depth and liquidity of the Renminbi and support its acceptance within the IMF. China may find this beneficial as it would not affect its foreign reserve valuations nor result in significant transactional costs.

The research assessed the comparability between the Renminbi and reserve currencies, China's capital account liberalisation and the impact of Sino-Africa trade on African GDP growth.

The Renminbi was somewhat comparable to other reserve currency issuers. However, the impact of Sino-Africa trade on African GDP growth was limited. African GDP growth was more significantly linked to debt and Foreign Direct Investment ("**FDI**"). Thus African countries may rather consider pursuing Renminbi-denominated debt or FDI in order to enhance their GDP growth and Sino-Africa relationships.

Keywords: .... Africa; China; Renminbi; Foreign Reserves; and Trade.

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Masters of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Student Name: Sanusha Chetty

Signature: _____

Date: 09 November 2015

Dedication

In loving memory of my grandmother, Mrs. Somaganthee Moodley. She was the heart of our family, an avid reader and a truly inspirational woman. I would not have achieved all that I have, if it were not for her guiding influence and love.

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Chapter 1 – Introduction to the Research Problem

In July 1944, the Bretton Woods system established the United States Dollar ("**USD**") as the global reserve currency and moved away from the gold-exchange standard. Over time, other reserve currencies such as the European Union Euro ("**EUR**"), Japanese Yen ("**YEN**") and British Pound Sterling ("**GBP**") were introduced to limit the dependency on the United States of America's ("**United States"**) balance of payments deficit (Austin, 2014).

As at September 2015, 188 countries were members of the International Monetary Fund ("**IMF**"). According to the IMF, member countries are required to maintain certain quotas or foreign reserves in the form of foreign currency securities, gold or international reserve assets designated as Special Drawing Rights ("**SDRs**").

An SDR is a potential claim on the freely usable currencies of IMF members and can be traded between members at any time for freely transferable currencies. SDR quotas are based on a member's relative position of within the global economy and change over time. As of September 2015, the IMF held c.USD285 billion in global SDR reserves (see **Figure 1**).

Figure 1: World SDR Allocations (Figures in USDbn)

Source: International Monetary Fund

The SDR is a quasi-currency that is derived from a basket of global reserve currencies according to predetermined basket weightings set by the IMF. Each underlying currency component represents a country or region with significant presence within the global economy. The SDRs were created to support a multi-currency based system with less reliance upon any single or significant trading currency.

An IMF member can exchange its SDR holdings at any time for the underlying reserve currencies. Each member can either earn or be charged interest if its SDR holdings are respectively above or below its allocated quota.

The SDR currency rate is predominantly determined by the USD, which over the last 15 years has averaged around 42% of the SDR's valuation (see **Figure 2**). In 2009, an amendment to the IMF SDR regulations required all IMF members to hold SDR allocations on an equitable basis. The last amendment to the underlying currency weightings was implemented in 2011 and the weightings were adjusted to 41.9% USD; 37.4% EUR, 11.3% GBP and 9.4% YEN respectively.

<u>Figure 2: Currency Weighting within the IMF SDR Basket (Figures in %)</u>

Source: International Monetary Fund

The Peoples Republic of China ("**China**") has indicated an intention to obtain a reserve currency issuer status. This is embedded within China's 12th Five-Year Development Plan, which outlines various objectives concerning the improvement of the RMB's technical status as a trading currency. Most notably, the execution of planned objectives coincided with the 2015 IMF review of the SDR currency basket.

Taylor (2013) proposed that global trade has realigned from North-South (between developed and emerging countries) to South-South (within emerging countries) and China is likely to be a key facilitator. Furthermore, China may be well positioned to adopt a reserve generation stance as opposed to its current reserve accumulation strategy. During the 2015 United Nations Sustainable Development Summit, China's President Xi Jinping pledged a further USD2 billion to support the South-South cooperation assistance fund (FOCAC, 2015).

According to the IMF, China currently represents more than 30% of total global reserves, excluding gold, and has recently adopted an internationalisation strategy for its currency, the Renminbi ("**RMB**"). As at September 2015, China's foreign reserves amounted to

USD3.557 trillion, with the majority of holdings within USD-denominated assets (c.USD1.4 trillion) and not SDRs (see **Figure 3**). Lizardo & Kelly (2014) suggest that China's usage of USD-denominated reserves is linked to its need for an undervalued currency to support an ever-growing trade surplus.

Figure 3: China and Reserve Currency Issuer SDR Holdings (Figures in USDbn)

Source: International Monetary Fund

Upon referring to the matter of including the RMB within the 2015 SDR basket, IMF Managing Director Christine Lagarde commented "*It's not a question of if, it's a question of when*" (Taplin & Sweeney, 2015).

In order to achieve a reserve currency designation, the IMF has highlighted China's need for a deeper global RMB utilisation, improved settlement infrastructure and finally IMF Board approval. As at September 2015, the United States, United Kingdom and Japan represented a combined 27% of total IMF voting rights, whereas China and Africa represented 3.651% and 5% respectively.

China's allocated voting rights do not reflect its reserve position held within the IMF (see **Figure 4**). The 2010 IMF quota and governance reform framework, which provides increased voting power to developing economies, has yet to be ratified within the IMF and awaits final approval by the United States. Thus, China will require additional support from other IMF members to fulfil the 75% voting requirement to achieve a reserve currency status.

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Figure 4: China and Africa as a Percentage of Total World Foreign Exchange Reserves (Figures in %)

Source: International Monetary Fund

Africa's foreign reserve accumulation has not shown significant growth, which may be reflective of its historic real GDP growth rate (see **Figure 5**). Foreign reserve requirements are typically increased by the IMF as countries increase their market share within global trade. Despite the muted growth in foreign reserves, African countries may utilise their associated IMF voting rights to obtain beneficial agreements with other IMF members.

Figure 5: Africa's Average Real GDP Growth Rate (Figures in %)

Source: International Monetary Fund

Most African countries have historically held less than their designated SDR allocations (see **Figure 6**). Over the last 15 years, 80% of African countries on average do not meet their allocated SDR quotas. Countries may either elect to incur an interest charge levied by the IMF on any unfulfilled quotas or seek external debt financing to fulfil these obligations. As such, IMF reserve requirements result in a redistribution of income from the developing to the developed world (Ocampo, 2008).

Figure 6: Africa's Net SDR Position (Figures in USDbn)

Source: International Monetary Fund

Despite reduced reserves relative to other IMF members, Africa's overall debt position has grown (see **Figure 7**). This is contrary to the emerging market trend of increasing foreign reserves and decreasing short term debt finance simultaneously, as well as the Guidotti-Greenspan-IMF rule of maintaining foreign reserves to at least meet short term debt obligations (Rodrik, 2006). African countries have not elected to fund their reserve shortfalls through the use of external debt funding.

Figure 7: Africa's Growing Debt Obligations (Figures in USDbn)

Source: African Development Bank

During the 2014 African Union summit, China's Premier Li Keqiang forecasted a growth in Sino-Africa trade to USD400 billion and direct investment to USD100 billion in Africa by 2020, far surpassing that of the United States and European counterparts (Keqiang, 2014). Africa's dependency on global commodity demand has been predominantly driven by the performance of the Chinese economy and its associated infrastructure needs (see **Figure 8**).

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China has also migrated its dealings with Africa towards a two-tiered bargaining model (Li, Newenham-Kahindi, Shapiro, & Chen, 2013). The Chinese government and multi-national corporates engage African trade on a mutual basis, firstly to lower entry barriers and secondly to enhance the bargaining power of Chinese firms. Thus African countries may need to consider alternative means to manage their trading relationships with China.

Figure 8: Africa as a Percentage of Total Chinese Net Exports (Figures in %)

Source: World Bank WITS Database

This research document will investigate the feasibility of linking China's RMB internationalisation strategy, growth in Sino-Africa trade and the associated impact on African GDP growth.

A review of the RMB's suitability as a reserve currency and the impact of Africa's trading relationship with China will be required. China may accelerate its RMB strategy through the use of African trading agreements and secure beneficial IMF voting to approve the RMB's reserve status. In return, African countries may request enhanced Sino-Africa trade volume, improved trading terms and/or lower transactional costs. However, the relationship between Sino-Africa trade and sustainable GDP growth requires further investigation.

In terms of business applicability, the research may provide insight into strategic risk management policies for African reserves. Any changes in foreign reserves may have a significant impact on the global currency and derivative markets.

Secondly, the research may propose alternative means for African countries to enhance Sino-Africa trade beyond focussing on trade terms and conditions. The research may also indicate whether African countries or China dictate the directional flow of Sino-Africa trade and hence a bias towards positional power.

Lastly, China may wish to circumvent a large USD devaluation given its exposure to the USD-denominated reserve assets. China may consider directly absorbing a large amount of Africa's USD-denominated reserves in return for RMB-denominated assets. This may indirectly promote the market depth of the RMB and limit the risk of excess USD-denominated assets being released into the global markets.

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Chapter 2 - Theory and Literature Review

This chapter presents a literature review on the relative importance of reserve currency issuers within the international monetary system, the ability of China to achieve a reserve currency issuer status and the peripheral benefits of foreign reserve management and Sino-Africa trade.

The International Monetary System's Bias towards Reserve Currency Issuers

According to the IMF, the objective of the international monetary system is to foster stable and high global growth, while supporting price and financial stability. The system comprises a set of official arrangements that regulate key dimensions of the global balance of payments, which include exchange arrangements and exchange rates; international payments and transfers relating to international transactions; international capital movements; and international reserves. Its purpose is to facilitate the exchange of goods, services and capital amongst countries.

Eichengreen (2013) described the international monetary system as the "glue that binds national economies". The system is currency-based in order to respond to global liquidity needs, as opposed to asset-based such as the previous gold standard. Global liquidity is facilitated by trading primary reserve currencies, which are inherently based on the currency's credit quality, confidence and trust to foster stability. However, the system is plagued by volatility, notable information asymmetry and clashes of global and national policy objectives (Subacchi, 2010).

Austin (2014) proposed that a new Bretton Woods system has evolved. Reserve accumulators peg their exchange rates to reserve currencies and freely purchased reserves to resist appreciation of their own currencies. As such, reserve accumulators benefitted from the system by setting low currency values in order to engineer large current account surpluses and strategic reserve purchases. The burden of global readjustment always fell upon the reserve currency issuer.

Such asymmetries fostered two main effects – quantity and price. Banchs & Mollejas (2010) argued that monetary system asymmetries were created by non-reserve currency issuers. Non-reserve currency issuers targeted a minimum amount of foreign reserves as their own domestic currencies were not globally liquid. The demand for non-reserve

currencies was not market driven but rather determined by domestic interest rate policies.

Secondly, Banchs & Mollejas (2010) proposed that non-reserve currency issuers had the option to accumulate local or foreign currency reserve holdings, essentially considering both interest and exchange rate policy implications for foreign reserve management (see **Figure 9**). Reserve currency issuers had more flexibility in reserve accumulation and were less constrained by global interest rate policy implications. Thus the endogenous theory of money was applicable whereby central banks, and not the markets, determined short term interest rates.

Figure 9: International Monetary Asymmetries and the Link between the Foreign Exchange Rate and the Short Term Interest Rate

Source: Banchs, A., & Mollejas, L. (2010) International Monetary Asymmetries and the Central Bank, Journal of Post Keynesian Economics.

Furthermore, Banchs & Mollejas (2010) discussed a hierarchy amongst reserve currency issuers whereby their influence was limited by the regional access of their currencies (see **Figure 10**). This in turn led to a global distinction in preference between reserve currencies for reserve assets. The ranking between reserve currency issuers was directly linked to the utilisation of the currency, similar to that of the SDR basket weighting allocations.

Figure 10: Rank Order between Reserve Issuers and Reserve Earners

Source: Banchs, A., & Mollejas, L. (2010) International Monetary Asymmetries and the Central Bank, Journal of Post Keynesian Economics.

The international monetary system could be viewed as a means to achieve and/or maintain sovereign power on a global basis. Cohen (2008) considered that significant entities could use the system to enhance their global power either through autonomy or influence.

China had demonstrated its autonomy with regards to a soft currency peg and is now focussed on influence through the RMB's internationalisation. If China obtained a reserve currency issuer status, the USD may experience some devaluation as investors could expect that China would relinquish a portion of its USD-denominated reserves in favour of RMB-denominated assets. China had already demonstrated a rebalancing within its global reserve portfolio during 2000 to 2007 (Sheng, 2013). However, Cohen (2008) proposed that reserve accumulation alone does not necessarily lead to enhancement of global power.

According to the IMF, a number of challenges exist prior to China achieving its internationalisation strategy:

- The availability and liquidity of the RMB within global currency and settlement markets required further enhancement (Raymaekers, 2011). This had a direct impact on RMB-denominated debt instruments as well as global access to China's stock exchange;
- China maintained a dual currency system (refer to **Appendix A** for additional detail). The RMB typically refers to both the onshore Yuan ("**CNY**") currency traded within China and the offshore currency ("**CNH**") traded through Hong Kong. However, global trades are typically executed through the offshore or CNH market and collectively settled through Hong Kong. In both markets,

China actively managed the supply of RMB and allowed some divergence between the CNY and CNH currency rates; and

- To date, the USD has remained the cornerstone of global market valuations and a trading currency of choice (Subacchi, 2010). Any currency trades that do not include the reserve currencies are indirectly settled through the USD. For example, a RMBZAR trade is settled in two components i.e. two separate currency transactions are executed as RMBUSD and then a USDZAR conversion. This intermediate conversion results in increased trade costs for non-reserve currency transactions. China may require a number of global partnerships to support increased direct RMB-denominated trade in order to reduce transactional costs.

The Influence of Reserve Currency Issuers

In order for a currency to be included within the SDR basket, it must receive a 70% to 85% approval by the IMF council, which is then ratified by the IMF Executive Board. Over 20% of the Board's directors are represented by reserve currency issuers. Thus a certain degree of IMF voting power is held within the reserve currency group.

Banchs & Mollejas (2010) highlighted that during times of global economic strain, reserve currency issuers tend to be more resilient to economic shocks as opposed to other countries. Non-reserve currency issuers were heavily reliant on monetary policy actions which may have proven ineffective or resulted in delayed interventions. In addition, non-reserve currency issuers were predominantly focussed on aggregating foreign reserves in order to manage their exchange rates. This was unlike reserve currency issuers who had inherent support for their currencies within the international monetary system. Despite the economic costs borne by non-reserve issuers, Banchs & Mollejas (2010) argued that such costs were well surpassed by the associated benefits of welfare and economic growth.

Reserve currency issuers were typically from developed countries due to their assessed stability, currency strength and portion of global trade (Bird, 2011). Reserve issuers benefitted from seigniorage, an increased ability to borrow in local currency and development of political power and influence. In addition, there were fundamental connections between international reserves and international adjustments; with causal relationships irrespective of direction.

Bird (2011) likened obtaining reserve currency status to that of Dutch disease, whereby a country may become less competitive with regards to its exchange rate management policies. Furthermore, reserve currency issuers may become complacent with considering their impact on non-reserve currency issuers' domestic policies. Reserve currencies did not retain their international status due to inherent intrinsic value, but rather their global usage. As such, non-reserve currency issuers found it difficult to emulate a similar status given the inertia required for reserve currency transactions.

Developing markets were less able to rely upon establishing reserve currency status and deferred to hoarding large foreign reserves to protect against economic shocks (Delatte & Fouquau, 2012). Although the rationale for holding a certain level of foreign reserves should be in response to competitive exchange rate management, the notable acceleration of reserves in recent years has been in response to fears of mounting market contagion and economic crisis. As developing countries adopted protectionist monetary policies, which promoted the usage of flexible exchange rates, the demand for international reserves considerably fell.

The indirect economic and soft power provided to reserve currency issuers came under significant disdain. Subacchi (2010) argued that the international monetary system was unduly biased towards reserve currency issuers and required substantial reforms which included trading arenas. In essence, all IMF members inherently supported reserve currency countries by maintaining demand for their currencies through the allocation of international reserves by the IMF. Reserve currency issuers possessed a first-mover advantage in terms of domestic policy and non-reserve currency issuers would thereafter adopted a reactionary stance.

According to Cardullo & Sage (2012), the SDR's larger weighting towards the USD as well as the currency market infrastructure supporting the USD has allowed the United States to play a larger role in global trade, be it direct or indirect, as well as access cheaper costs of debt given the larger supply of its funding currency. Furthermore, a single currency would almost always be predispositioned within the global economy due to the inherent monetary system network and operational externalities. The United States benefitted from lower reserve allocations and typically utilised gold reserves for its requirement. Thus there was no emphasis for the United States to necessarily support a move towards a more diverse multi-currency system.

Rouse, Boff, Sanderson, Cardullo, & Sage (2011) highlighted the operational complexity of establishing a multi-currency system infrastructure. Global cooperation amongst a

number of countries and standardised governance frameworks would need to be agreed and adhered to. However, this was impeded by the self-interest of various stakeholders.

The Impact of International Reserves for IMF Members

Although IMF member countries are required to accumulate international reserves, most members preferred to maintain such reserves in order to absorb economic shocks. According to Jie & Ouyang (2011), the amount of reserves held by countries only delayed the timing of a potential crisis if they were fundamentally at risk. Thus if a country's fundamentals were sufficiently dire, no amount of reserves could avoid a crisis occurring (Jie, 2007).

Gourinchas and Jeanne (2013) proposed that developing countries benefitted from the aggregation of international reserves in order to boost capital inflows. The empirical evidence under review suggested that capital flows were not attracted to countries with high productivity growth or investment opportunities but rather higher levels of national savings. Thus a developing country's growth strategy should include an allocation component which revolves around foreign denominated reserves. In addition, a portfolio management approach was adopted for foreign reserve optimisation and management (Jeanne & Rancière, 2011). Foreign reserves were managed on the expected volatility in use and fundamental health assessment of the reserve accumulator.

Countries have elected to follow either a mercantilist or precautionary approach to reserve management (Delatte & Fouquau, 2012). A mercantilist approach required central banks to aggregate reserves in order to protect their relative export competitiveness, whereas a precautionary approach focused on stability in balance of payments. China followed a mercantilist approach with regards to hoarding reserves. This in itself introduces a global imbalance within the monetary system. However, Delatte & Fouquau (2012) found no evidence of mercantilist approaches proving successful.

Developing countries were often disadvantaged by the sizeable amount of reserves placed in low yielding assets as compared to other non-reserve currencies (Jeanne, 2012). In most cases, developing countries funded their reserves by borrowing from the global debt markets. The cost of debt finance was typically higher than the yields generated on reserve assets. Thus an indirect tax was placed on IMF members in order to fulfil their reserve requirements, which directly benefitted reserve currency issuers.

Furthermore, Rodrik (2006) suggested that emerging countries have over-invested in reserve accumulation and not capital account management policies to reduce short term debt obligations. Their reserve accumulation strategies were seen as significant sunken costs for maintaining large short term debt refinancing obligations. This irrationality could be explained by the usage of notably cheaper short term debt as opposed to more expensive but far safer long term debt obligations.

China's Approach to Meeting Reserve Currency Fundamentals

The IMF awards a reserve currency status to a currency depending on its global trade market share and currency utilisation for global payments. A reserve currency requires the demonstration of market depth, liquidity and capital account liberalisation.

Market depth and liquidity could be fostered through the use of currency market infrastructure such as global banking systems, currency trading hubs or an agreed currency denomination for certain markets. The Society for Worldwide Interbank Financial Telecommunication ("**SWIFT**") proposed that China has pursued an RMB internationalisation strategy since 2002. China's strategy entailed a policy liberalisation approach with regards to its currency management, regional development through ASEAN countries and then internationalisation by allowing extensive trade and participation within its markets (Raymaekers, 2011).

In addition, the global infrastructure connections between the RMB interfaces to China, facilitated through the China National Advance Payment System, and SWIFT have already been entrenched (Raymaekers, 2011). Offshore RMB transactions were completed or cleared through designated RMB clearing banks (which promote intraday liquidity) or settlement institutions (who channel payments to an RMB agent bank). Settlement institutions were also involved with facilitating interbank and derivative markets which were solely dedicated to RMB-denominated transactions (de Meijer, 2012). The next phase of the RMB's internationalisation was expected to focus on RMB-denominated investments.

Capital account liberalisation is a far more challenging requirement given a country's vulnerability to external shocks. Global capital flows theoretically supported markets with enhanced liquidity and established financial systems. However, capital flows have traditionally supported countries with strong national saving cultures and longevity of accumulated international reserves (Gourinchas & Jeanne, 2013).

Prasad & Rajan (2008) suggested that the main benefits of capital account liberalisation for emerging markets were more indirect and linked to the establishment of institutions rather than increasing capital inflows. Despite the debate around the success of using foreign reserves to soften an economic crisis, central banks have pursued different utilisation strategies. Countries have recapitalised their domestic banks, financed infrastructure spending, stockpiled oil reserves, created sovereign wealth funds or expanded opportunities for further private investment.

China's Foreign Direct Investment ("**FDI**") flows remains less volatile than other reserve currency issuers (see **Figure 11**), despite improving investor access to domestic capital markets (see **Figure 12**).

Figure 11: Net Foreign Direct Investment Inflows (Figures in %GDP)
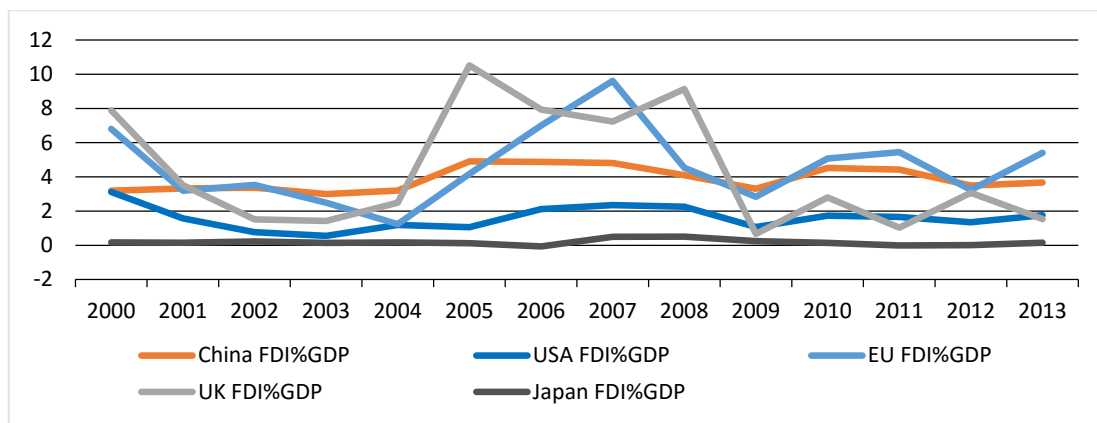
Source: Bloomberg

Figure 12: Domestic Market Capitalisation and Share Trading per Region
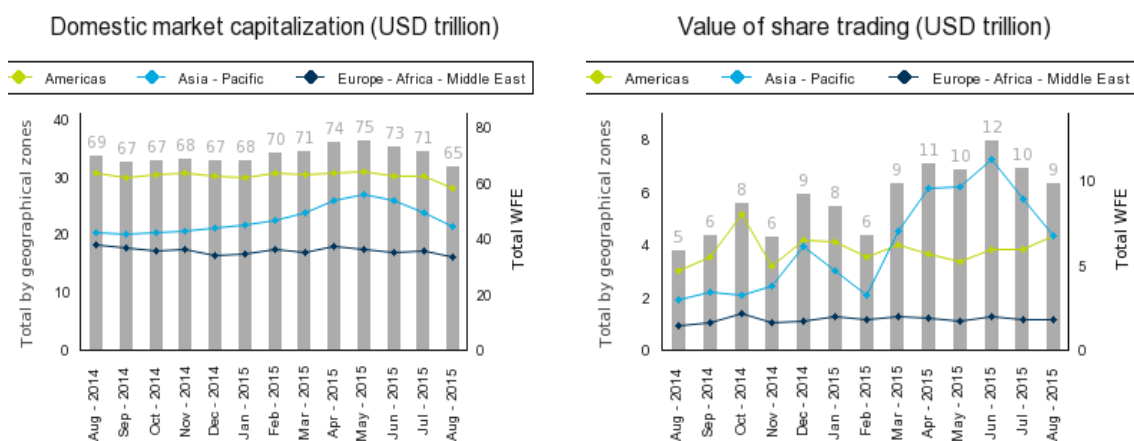
Source: World Federation of Exchanges, www.world-exchanges.org, 2015.

Reserve currency issuers often faced the Triffin Dilemma, which was developed by Robert Triffin in 1960. The theory proposed that as the global economy expands, the demand for reserve assets, and thus reserve currency issuer debt obligations, notably increases (Maes, 2013). Thus the supply of reserve currencies or liquidity within that currency could only be maintained if the country supported a perpetual current account deficit and simultaneously raised debt denominated in its currency (Taylor, 2013). This may be evidenced by global cross-border bank claims denominated in currencies (see **Figure 13**).

Figure 13: Reporting Bank Cross-Border Claims by Borrowing Currency (Figures in USDtrn)
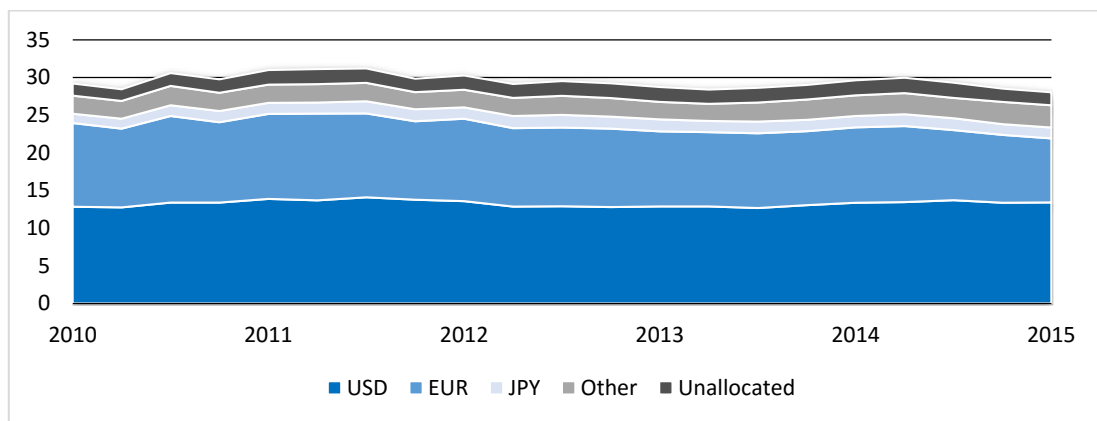
Source: Bank for International Settlements Quarterly Review 2015

Triffin argued that the reserve currency system would only be effective if global governments and central banks relinquished political, monetary and banking authorities to the United States in terms of the management and use of their reserves (Maes, 2013). Furthermore, relatively poor countries were viewed as indirectly financing the debt requirements of richer countries, through a structural interdependency (Dooley, Folkers-Landau, & Garber, 2004).

Thus reserve currency issuers were plagued by the conflict of maintaining a stable global trade presence and mounting debt obligations (see **Figure 14**), albeit at relatively low funding rates, to support their currency liquidity.

Figure 14: Total Country Debt (Figures in %GDP)
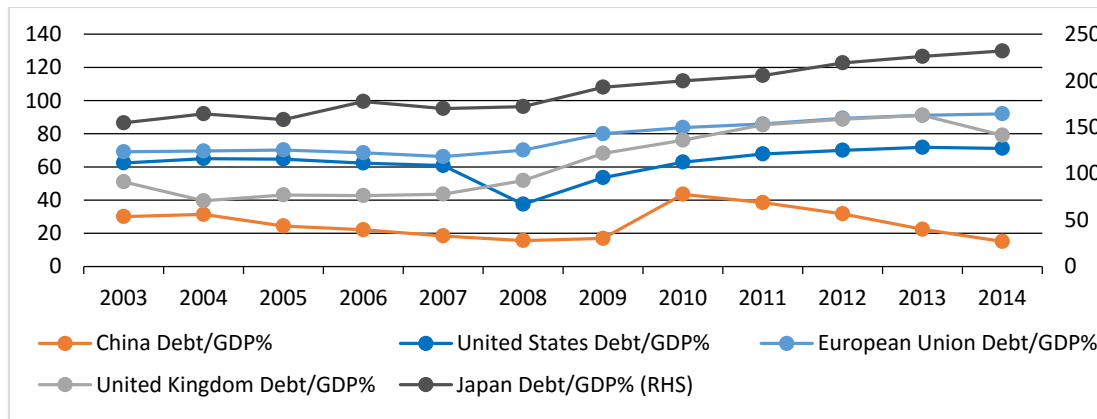
Source: Bloomberg

The assumption that a reserve currency issuer is fairly robust and of sound credit quality is flawed given the debt burden required for currency liquidity (Maes, 2013). If the global markets were ever to assume that a reserve currency issuer was under duress, they would quickly divest its debt instruments. This would potentially create currency instability and global financial contagion due to the market interdependencies between reserve currency issuers.

During the April 2015 IMF International Monetary and Finance Committee meeting in Washington D.C., Governor Zhou Xiaochuan highlighted China's internationalisation progress:

- The RMB has become convertible for foreign and outward direct investment;
- Registration-based trade credit and trade-related claims on non-residents have been established;
- Qualified Foreign Institutional Investors and Qualified Domestic Institutional Investors programmes have been introduced and improved;
- RMB cross-border financial investments and bilateral monetary co-operations have been established; and
- RMB clearing banks have been established in 14 countries or regions.

"*The capital account convertibility China is seeking to achieve is not based on the traditional concept of being fully or freely convertible....China will adopt a concept of managed convertibility*" – People's Bank of China ("**PBoC**") Governor Zhou Xiaochuan, IMF International Monetary and Finance Committee (2015).

China's Trade and Capital Account Surplus

China has maintained both a trade and capital account surplus (see **Figure 15-16**) due to its trading relationship with the United States and other global trade partners. Knight & Wang (2011) suggested that China had created both an expenditure and external imbalance. Its high investment and low consumption environment led to rapid capital accumulation and an imbalance between expenditure and production, which fostered a large capital account surplus.

Figure 15: China's Trade and Capital Account Surplus (Figures in %GDP)
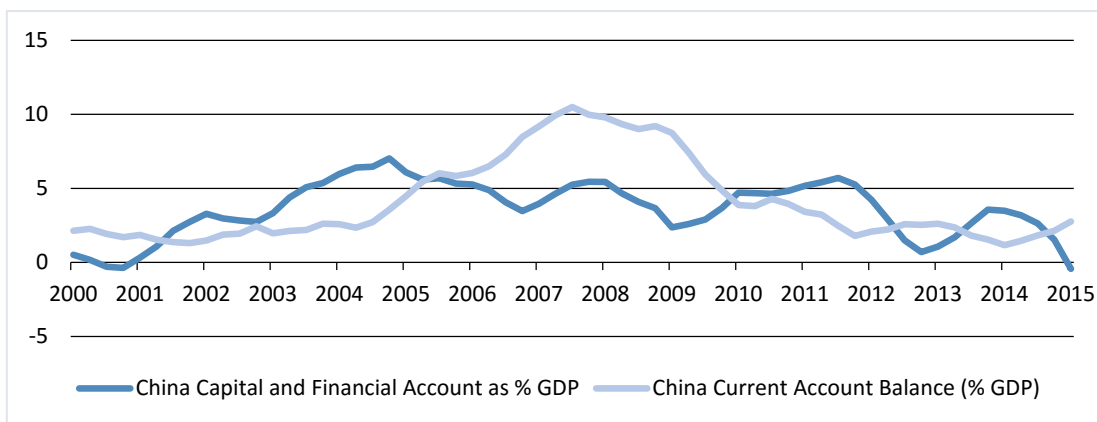
Source: Bloomberg

Figure 16: China's Current Account Components (Figures in USDmn)
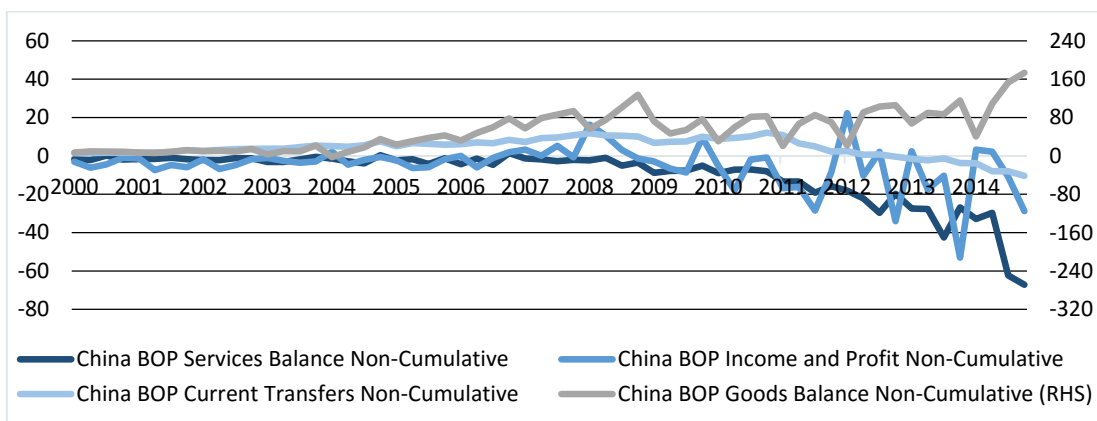
Source: Bloomberg

Alternatively, this dual account surplus could be seen as a balancing mechanism for global markets. China may have provided a valued counterbalance to other emerging markets by pursuing a reserve accumulation strategy in conjunction with the United States and thereby fulfilled a financial intermediary role (Willett & Chiu, 2012).

Any Chinese cross-border capital account transactions, RMB-denominated outward direct investments or outward FDI required government approval (Raymaekers, 2011). Thus China retained notably more oversight over any capital account movements, unlike reserve currency issuers.

The growth in global trade with China also led to a significant increase in RMB-denominated deposits held with various banks (see **Figure 17**). However, China was reluctant to appreciate the RMB due to its need for rapid export growth, concerns of social instability related to an economic slowdown and reduced national wealth due to a lower domestic valuation of its foreign reserves (Knight & Wang, 2011).

Figure 17: Growth in Offshore RMB Deposits per Reporting Zone (Figures in USDbn)
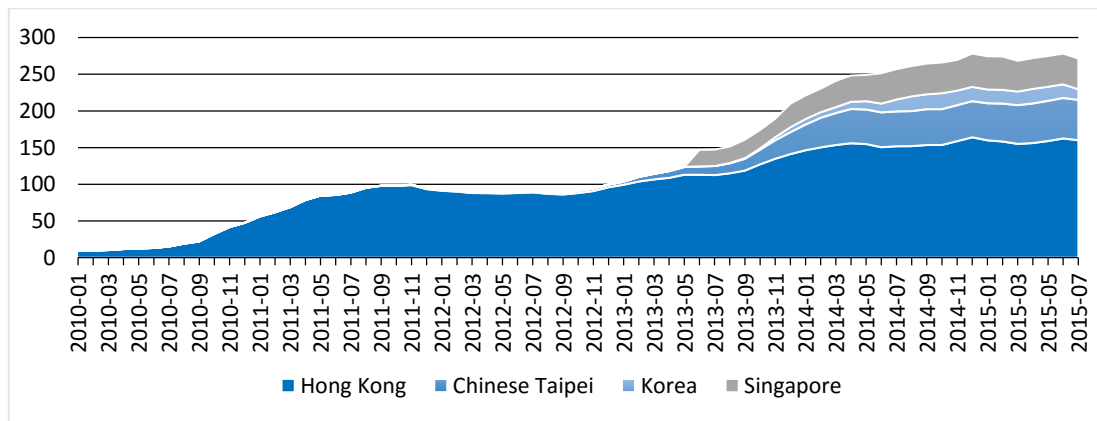
Source: Bank for International Settlements

Recent concerns about China's growth forecasts have resulted in notable capital outflows and pressure on China's balance of payments account (see **Figure 18**). Duan & Eccles (2014) suggested that China's growth was achieved at notable environmental and social cost. This was subsequently realigned towards a more sustainable approach in order to foster a more positive global sentiment towards China.

Figure 18: China's Capital Account Components (Figures in USDmn)
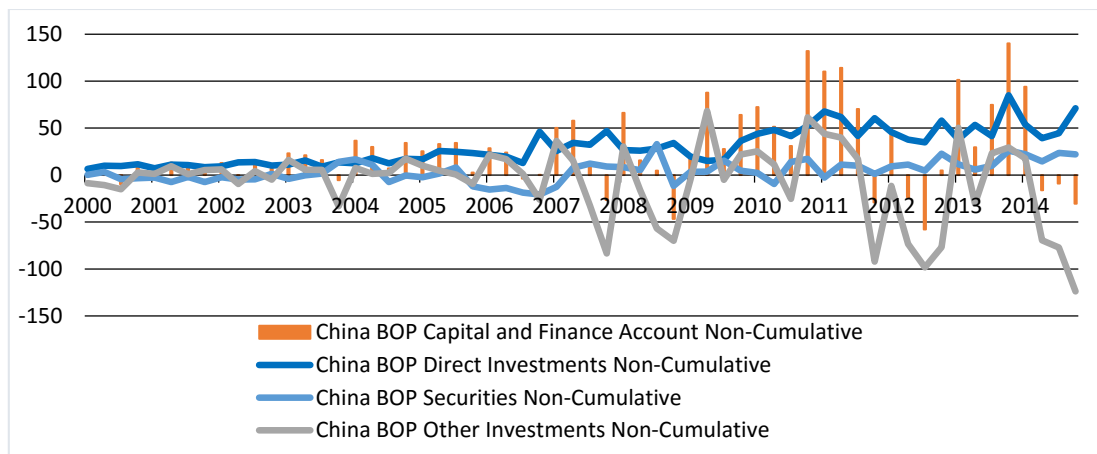
Source: Bloomberg

The Sustainability of Sino-Africa Trade

Cheung, de Haan, Qian, & Yu (2012) proposed that China's notable increase in outward investment towards Africa since early 2000 was a direct result of its 2002 "Going Global" or "Stepping Out" policy reform and could be traced back to the 1955 Asian-African conference held in Indonesia. In addition, China's notable investment was directed towards developing countries, which challenged global investment norms.

Despite global suspicion towards China's objectives, its outward investment within Africa could be attributed to a number of infrastructure developments and economic activity. Furthermore, Cheung et al. (2012) suggested a transition in relationship occurred between China and Africa from ideology and political references towards economic and developmental considerations. An African country's natural resources may have had a more significant impact on attracting Chinese FDI as opposed to its risk assessment.

China approached its political and economic relationship with Africa in terms of "surgical colonialism" (Mohan, 2013). The roles of the coloniser and colonised were blended in such a means that no dominion was enacted but rather a form of state-orchestrated market capitalism. China typically combined its overall ambitions in terms of aid, trade, FDI and an exported labour force when engaging with African trade. This so-called "Beijing Consensus" provided an alternative to traditional western ideologies with regards to trade with Africa.

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However, Fijalkowski (2011) proposed that the longevity of the Sino-Africa trade relationship was based on the growing cross-regional diplomacy. China and Africa evolved from a shared colonialism past towards a mutually beneficial partnership. Furthermore, China's commitment to fostering a longstanding relationship with Africa was embedded within its Africa Policy and pursuit for enhanced soft power on a global platform.

In contrast, Drummond & Li (2015) highlighted the pervasive nature of China's growth. For every one percentage decline in China's growth, a 0.1 percentage reduction in global growth was realised. In addition, there were only certain industries within African countries that benefited from prolonged Chinese growth – the impact was not broad based.

Despite Africa being more open to trade and investment as opposed to China, this alone had not positively nor significantly contributed to African growth (Anyanwu, 2014). Keenan (2009) suggested that China's unconditional approach to creating wealth within Africa had undesired effects such as poverty creation and human rights violations. He proposed that African countries needed to embed development policies to ensure the appropriate use of proceeds and that China should consider marrying political factors with market forces.

Furthermore, Vickers (2013) proposed that Africa did not possess the bargaining leverage required to negotiate beneficial agreements with China and remained fairly reactive to trade agreements. African countries needed to adopt judicious negotiating strategies and foster robust networks prior to engaging global trade agreements.

Lastly, Hanusch (2012) considered the reception of Africa towards engaging with China. The study found that African perceptions towards China was similar to that of other global powers and nuanced by economic and political considerations. African countries typically welcomed investment from China but were wary of the perceived lack of quality imports. Only select countries were sensitive to negative perceptions of Chinese engagements (Shinn, 2009). Overall, the Sino-Africa relationship continually shifted between Chinese priorities and African countries attempting to play a greater agency role.

The Suitability of RMB-denominated Reserves for Africa

China was lauded as an emergent creditor country which supported its power of autonomy with domestic policy decisions (Chin & Helleiner, 2008). As such, the country repositioned its growth strategy towards becoming the dominant global force by forming collective bargaining partnerships and slowly opening its economic policies.

Regional partnerships, such as that between China and the European Union, have attempted to reconfigure global precedents (Otero-Iglesias & Zhang, 2014). In addition, the RMB's internationalisation has been attributed as the second stage of rejuvenating China's economic momentum (Bibow, 2012).

Africa may benefit from strategic foreign reserve management and indirectly enhance its bargaining position for increased Chinese investment and trade flows with limited disruption to Western trade agreements. Garroway, Hacibedel, Reisen & Turkisch (2012) suggested that the RMB was significantly undervalued in terms of its stability and potential suitability for promoting a developing country's growth. Although a portfolio management approach to foreign reserves was warranted, the ability of African countries to execute robust and stringent financial efficiencies was limited or very costly (Gourinchas & Jeanne, 2013).

However, China may be constrained in promoting the use of African reserves for enhanced RMB market depth. China currently holds c.USD400 billion in foreign reserves and would prefer not to directly devalue the USD nor engage into a currency war with the United States (Austin, 2014).

Lizardo & Kelly (2014) suggested that China strategically maintained a significant holding of USD-denominated reserves in order to force desired trade surpluses. The inherent contradiction in China's preservation of national policies and opening of the economy led to a Triffin Dilemma, as evidenced with the United States (Jeanne, 2012). Additionally, China's domestic fiscal, monetary and exchange rate policies may require alignment to what was deemed globally appropriate, but not necessarily nationally optimal (Bird, 2011).

In addition, other challenges such as foreign exchange baskets, convertible capital accounts and an efficient financial system would need to be implemented to foster the RMB's adoption beyond currency depth (Lee, 2014).

However, evidence of improved RMB circulation and infrastructure was apparent within Africa:

- In September 2011, Nigeria approved the investment of ten percent of its foreign exchange reserves within RMB-denominated assets (Raymaekers, 2011);
- The Johannesburg branch of the Bank of China in South Africa was appointed as the first RMB clearing bank within Africa after the PBoC signed a memorandum of understanding with the country to cooperate on the supervision and clearing of RMB-denominated business to facilitate enhanced trade (Jeffreys, 2015); and
- Zambia has signed a memorandum of understanding to establish a second RMB clearing bank within Africa's border. The appointed clearing bank has yet to be appointed. Furthermore, the PBoC lauded Zambia's active approach towards promoting the use of the RMB in cross-border trade and investment (FOCAC, 2015).

In 2013, SWIFT reported that African countries require enhanced local settlement systems to reduce their transactional costs. As Africa invested within its financial market infrastructure, the introduction of RMB settlement hubs could be easily facilitated as the systems supported multi-currency trading (Chilosi, Dugauquier, Lambe, & Onizuka, 2013).

- With the exception of 2009, transaction flows executed by banks in Africa have shown a year-on-year growth of around 10%;
- In 2013, 40% of African payment flows were processed in the United States, despite only 9% of transactions being attributed to the United States and 22% being attributed to Asia-Pacific; and
- 50% of African commercial payments were denominated in USD and only 17% in EUR. This may also be due to the increasing market share of USD clearing banks; rising to 40% of global commercial transactions.

SWIFT further proposed that before the movement away from USD to RMB trading occurs, the importance of Sino-Africa trade corridors must be established as well as important regulatory frameworks, RMB convertibility and corporate demand.

Literature Review Summation

In conclusion, reserve currency issuers have exerted significant global influence or power within economic and political spheres. This has been obtained by embedding their currencies within the fundamental infrastructure of the international monetary system. As such, these countries have become far less reactive to competing nations' policies. The influence of reserve currency issuers can be ranked according to the permeability of their currencies, in terms of regional acceptance and global trade. However, reserve currency issuers are plagued with the requirement to adopt large debt obligations, which may lead to financial vulnerability during times of economic distress.

Reserve currency issuers retain significant control over whether other countries can receive a similar designation. China's aspirations of obtaining this designation requires notable support by other IMF member countries. In addition to favourable voting, countries may assist China by enhancing the utilisation of the RMB within global markets. The IMF will be predominantly focussed on China's ability to demonstrate an improvement in the RMB's currency fundamentals.

As evidenced, developing markets should adopt a strategic or capital management perspective to their accumulated foreign reserves. Africa may be strategically positioned to utilise its foreign reserves to enhance the benefits of Sino-Africa trade. This would further improve the South-South trade focus that has developed and lead to further buying power for African countries in terms of directional trade flows.

An analysis should be conducted to assess which African countries are in a position to benefit from strategic foreign reserve management, which includes the suitability of utilising RMB-denominated foreign reserves, and if Sino-Africa trade is a significant contributor to African GDP growth.

African countries may only consider utilising RMB-denominated reserves if the currency displayed similar fundamentals to that of reserve currency issuers. The suitability of the RMB as a reserve currency is dependent on the currency's market depth and liquidity as well as the degree to which China's capital account has been liberalised.

Countries are typically focused on enhancing GDP growth. The linkage between increased Sino-Africa trade and African GDP growth may identify whether pursuing strategic trade negotiations has any bearing on GDP growth performance. If not, alternative approaches to the RMB's internationalisation may need to be considered.

Chapter 3 – Research Hypotheses

This chapter outlines the research hypotheses that will be used to assess the RMB's suitability as a reserve currency for African countries and the impact of Sino-Africa trade on African GDP growth.

The RMB's Market Depth and Liquidity

The purpose of this study is to assess whether China's historic market turnover and average market turnover growth is statistically equivalent to that of reserve currency issuers. This may be used as a proxy to assess the RMB's state of market depth and liquidity as compared to reserve currency issuers.

Research Hypothesis 1 – Market Turnover

Null hypothesis H_0	The average market turnover of China (RMB_1) is equal to the average market turnover of a reserve currency issuer (SDR_1) $RMB_1 - SDR_1 = 0$
Alternative hypothesis H_A	The average market turnover of China (RMB_1) is not equal to the average market turnover of a reserve currency issuer (SDR_1) $RMB_1 - SDR_1 <> 0$

Research Hypothesis 2 – Market Turnover Growth

Null hypothesis H_0	The average yearly growth in market turnover of China (RMB_2) is equal to the average yearly growth in market turnover of a reserve currency issuer (SDR_2) $RMB_2 - SDR_2 = 0$
Alternative hypothesis H_A	The average yearly growth in market turnover of China (RMB_2) is not equal to the average yearly growth in market turnover of a reserve currency issuer (SDR_2) $RMB_2 - SDR_2 <> 0$

A single factor ANOVA regression was conducted according to a 95% confidence interval and 5% alpha. The ANOVA regression was used to assess the in-group relationship between the various regions. The test statistic for equality in means will be the F-value.

With regards to the data under review:

- All data was sourced from the World Bank databases from 1999 to 2013;
- No data transformations were required and there were no data omissions over the review period;
- Market turnover is defined as the total value of shares traded during the period divided by the average market capitalization;
- Regional market turnover from China, the United States, the United Kingdom, the European Union (excluding the United Kingdom) and Japan will be reviewed; and

The Null hypothesis H_0 will be rejected if the F-statistic is greater that the applicable F-test critical value as determined by the F-distribution (5% alpha).

The Chinese Capital Account Liberalisation

The purpose of this study is to assess whether China's currency volatility, FDI and bank borrowing display similar variability to that of reserve currency issuers. These factors are usually associated with increased capital account liberalisation. Any statistical significance in variability may infer that China possesses either a similar or different level of capital account liberalisation as compared to reserve currency issuers.

Research Hypothesis 3, 4 & 5 – Currency, FDI & Bank Borrowing

Null hypothesis H_0	The Chinese capital account is as liberalised as reserve currency issuers. Factors to be assessed: realised currency volatility (RMB_3), FDI (RMB_4) and bank borrowing (RMB_5) $RMB_3 - SDR_3 = 0$ $RMB_4 - SDR_4 = 0$ $RMB_5 - SDR_5 = 0$

Alternative hypothesis H_A	The Chinese capital account is not as liberalised as reserve currency issuers **$RMB_3 - SDR_3 <> 0$** **$RMB_4 - SDR_4 <> 0$** **$RMB_5 - SDR_5 <> 0$**

An F-test for variances was conducted according to a 95% confidence interval and 5% alpha. The F-test was used to assess the relationship in variability between various capital account factors. The test statistic under assessment will be the F-value.

With regards to the data under review:

- All data has been sourced from Bloomberg and the Bank for International Settlements;
- No data transformations were required and there were no data omissions over the review period;
- Currency data was sourced on a daily basis from 2006 to 2015 for China, the United States, the United Kingdom, the European Union (excluding the United Kingdom) and Japan;
- Yearly FDI data was sourced from 2000 to 2013 for China, the United States, the United Kingdom, the European Union (excluding the United Kingdom) and Japan;
- Quarterly cross-border bank claims in terms of borrower country was sourced from 2010 to 2015 for China, the United States, the United Kingdom, the European Union (France and Germany were used as data proxies) and Japan; and
- The Null hypothesis H_0 will be rejected if the F-statistic is greater that the applicable F-test critical value as determined by the F-distribution (5% alpha).

The Impact of Sino-Africa Trade

The purpose of this study is to assess the innate trade dependencies between African countries and China. In order to assess the relative strength of export and import relationships with GDP growth performance, other factors such as debt to GDP ratios, population wealth (real capita GDP growth rate), domestic inflation and donor FDI will also be considered.

Any statistical significance in exports to or imports from China may infer a directional trade relationship for each country.

Research Hypothesis 6 & 7 – Exports to & Imports from China

Null hypothesis H_0	African GDP growth is not significantly dependent on debt to GDP, population wealth (real capita GDP growth rate), domestic inflation, donor FDI, exports to China (RMB_6) or imports from China (RMB_7) $RMB_6 = 0$ $RMB_7 = 0$
Alternative hypothesis H_A	African GDP growth is significantly dependent on debt to GDP, population wealth (real capita GDP growth rate), domestic inflation, donor FDI, exports to China (RMB_6) or imports from China (RMB_7) $RMB_6 <> 0$ $RMB_7 <> 0$

A multiple factor ANOVA regression was conducted according to a 95% confidence interval and 5% alpha. The ANOVA regression was used to assess the factor relationships per country, with a particular focus on exports to and imports from China. The test statistics under review were the R-squared, the Student's t-statistic (population mean and variance per country are unknown and a two-sided test was applied) and the p-value.

With regards to the data under review:

- Data was sourced from the African Development Bank and World Bank WITS databases from 2000 to 2013;
- No data transformations were required for the period under review;

- Certain countries did not possess complete datasets over the review period. If a country had less than five data points or no data available, it was excluded from analysis;
- Factors beyond trade data with China were included as comparative independent variables; and
- The Null hypothesis H_0 will be rejected if the t-statistic is greater that the applicable t-test critical value as determined by the Student's t-distribution (5% alpha) or the p-value is less than 0.025 (two-sided test).

Research Hypothesis Summation

The research hypotheses will assess the relevant fundamentals of the RMB in relation to reserve currency issuers as well as the strength of the relationship between Sino-Africa trade and African GDP growth. The approach to evaluating these hypotheses is discussed within Chapter 4.

Chapter 4 - Research Methodology

The research methodology followed a realism, exploratory and induction approach based on quantitative secondary data analysis (Saunders & Lewis, 2012).

The realism approach related to a scientific query and was suited to the quantitative nature of the research. The methodology was driven by the requirement to assess time series numerical data with the intention of evaluating any evidence of statistically significant relationships.

The exploratory nature of the research highlighted the recency of the topic under review, being the RMB's internationalisation and linkage to Sino-Africa trade. Further research in this field would include a progressively narrower focus and investigations.

The research pursued an induction perspective whereby the development of theory would result from the analysis of collected data. The emphasis was on understanding the data within the research context under investigation.

Population

The research population included all IMF member countries that were active in global trade, possessed globally traded currencies and implemented some form of foreign reserve management. Only IMF member countries have been reviewed given that IMF membership requires the fulfilment of allocated foreign exchange reserve quotas.

Although non-member countries may elect to aggregate foreign reserves, their objectives and maintenance of such holdings may not be in line with IMF requirements, which are directly linked to the establishment of reserve currencies. Countries that are restricted from trading outside their borders would also be excluded from the considered population.

Sampling Method and Size

The sampling method was purposive in order to assess a select group of countries namely reserve currency issuers, China and African countries. Purposive sampling is a form of non-probability sampling whereby the researcher's judgement is used to determine the sample selected based on a predefined rationale (Saunders & Lewis, 2012).

The selected countries fell within the population or sample frame under review. In addition, homogenous groups were created within the sampling frame such as reserve currency issuers, non-reserve currency issuers and African countries.

The sample size included the aforementioned group of countries and the period under review was 1999 to 2015. In most cases sufficient data was available, no data trimming was required and any anomalous data was adequately captured (Siew & Yinglei, 2011).

Data reporting included daily, monthly or yearly frequencies, subject to available reporting precedents. The data collection followed a snowball approach and commenced with global reporting entities such as the IMF, the World Bank and progressed to select central banks or regional entities such as the African Development Bank. A snowball approach followed a non-probability sampling format whereby a data source was used to identify subsequent data sources of similar quality and depth (Saunders & Lewis, 2012).

Quantitative data was collected for the following variables:

- Historic foreign reserve balances, SDR allocations and holdings;
- Historic GDP growth, sovereign debt, population wealth, inflation, FDI, exchange rates and currency volatility;
- Historic regional market capitalisations, trade and investment flows; and
- Research cometary on the establishment of foreign reserve policies.

Additional data concerning qualitative aspects was collected subject to its relevance for specific hypotheses or to explain certain technical terms or concepts.

Unit of Analysis

The data was sourced in unit currency, percentage or description format. In terms of the currency data collected for China, all statistical assessments were performed on the onshore currency designated as CNY (see **Appendix A** for further details).

Data Collection

A literature review was conducted to identify the key aspects to be investigated in relation to the proposed hypotheses. The majority of literature was sourced from Business Source Premier (EBSCO host), included peer reviewed and cited journals and was published from 2000 onwards.

Data was gathered in secondary format and sourced from global institutions and business sources such as:

- The Bank of International Settlements – Data on international policy, financial flows, global trade settlement and emerging trends;
- The Society for Worldwide Interbank Financial Telecommunication – Data on global financial settlement flows and associated infrastructure;
- The International Monetary Fund and World Bank – Data on the international monetary system, global regulations, macroeconomic country statistics, foreign reserves and emerging trends etc.;
- The International Finance Corporation and African Development Bank – Data on African country performance, finance requirements, growth outlooks and economic trends;
- The Peoples Bank of China and African Central Banks - policies governing foreign reserves and historic accumulation in reserves; and
- Bloomberg – global financial market data.

The datasets included publicly available data without any restrictions in use or dissemination. Data files were typically sourced in CSV format which allowed for transformations and analysis.

In most circumstances, the datasets were collated from a single reporting source to ensure consistency in reporting guidelines, data frequency and consistency in the underlying sources of information. If similar data was present in more than one data source, preference was given to the data source with the highest international standing or ranking as well as the data source's relative completeness over the period under review.

The data was collected over a five to ten year period. In most cases, a higher data reporting frequency was preferred. The frequency of data allowed for more than 30 data points for be collected, a typical prerequisite for normalised data distributions (Wegner, 2012).

Data Analysis

The analysis followed a statistical approach to identify any variation or trends in datasets between countries. Depending of the nature of the underlying data, an appropriate statistical analysis (e.g. normalised or Student's t distribution) was applied. Statistical evaluations were based on acceptable confidence intervals (95%) and their associated levels of assessment error (5% alpha) (Wegner, 2012).

All statistical tests assumed that the data followed a normalised distribution. This normality assumption was applied to the data's assumed distribution in terms of shape, relative distance, symmetry and fatness of tails, that being the distribution's kurtosis (Lantz, 2014).

Single factor ANOVA regressions were used to evaluate in-group and out of group relationships between China and each of the reserve currency issuers. The test statistic under review was the F-statistic. The purpose of the analysis was to test the presence of a statistically significant relationship between the countries according to certain factors.

Multi-factor ANOVA regressions were used to evaluate the strength in relationship between the dependant variable (GDP growth) and independent variables for each country. The independent variables under review were: Debt to GDP ratios, population wealth (real capita GDP growth rate), domestic inflation, donor FDI, exports to and imports from China. The test statistic used for the assessment was the Student's t-statistic (degrees of freedom ranged from 13 to 14 depending on data availability) and

associated p-values. The purpose of the analysis was to test the strength in relationship between a country's GDP growth and the independent variables, with a particular focus on the contribution of exports to and imports from China.

Two factor F-Tests assessed the relationship in variability between data sets. The data that was reviewed included historic market turnover, market turnover growth, FDI and bank borrowing relationships between that of China as compared to each of the reserve currency issuers. The purpose of the analysis was to test the variance differential amongst countries.

The coefficient of determination or R-squared for each regression analysis measured the proportion of variation in the dependent variable that was explained by the independent variable (Wegner, 2012). An R-squared above 0.75 was deemed as a strong association between variables and that the regression explained a suitable amount of variation within the underlying data.

Research Assumptions

The research assumed that data collected from international agencies or country reporting platforms was correctly sourced from reporting the underlying entities and approved by these reporting entities for public dissemination. Any missing data was assumed to take on the previous reporting value for that period. If a country did not have sufficient data available for analysis, it was removed from the selection group for that specific assessment. The removal of countries with insufficient data limited the impact of government data bias and insufficient neutrality (Palmer, 2008). In addition, historical data was reported on a constant currency basis, typically being denominated in USD.

Datasets were typically assessed from a single data source. This approach limited the bias and contamination risk that could be realised from mixed datasets and reporting standards. The multi-factor ANOVA regression required data to be combined from both the World Bank WITS and African Development Bank databases.

With regards to a statistical assessment of the data, the normal probability or Student's t-distribution was applied to datasets with 13 data points or more. No data seasonality was experienced and the data did not require notable transformations in terms of underlying trends. In addition, no specific outliers were apparent nor required removal

from the dataset. The data was also assumed to follow a homoscedastic distribution and any heteroscedasticity was catered for within the ANOVA regression (Lantz, 2014).

Limitations of Methodology

In terms of the research scope, there was a predominant focus on Africa or topics linked to Sino-Africa relationships. As such, any derived conclusions may be limited in terms of their broader applicability beyond African countries. In addition, the focus on African countries as a collective may have been an oversimplification given the diversity of individual countries on an economic, political and cultural basis.

Secondly, the data assessments were heavily reliant on the quality of data received from and produced by global reporting bodies such as the IMF and World Bank. Direct data publications from African countries were not available in most circumstances or not produced in comparable format for statistical assessments.

The majority of literature was sourced from the Business Source Premier (EBSCO host) database given its depth of underlying sources. References cited within the research are published between 2000 and 2015, peer reviewed and sourced from academic journals. Journals with ten or more citations were given preference for this assessment.

The collation of journals was based on a snowball effect using topical searches or through the usage of core journals or contributing authors. In most cases, relevant literature was published by Asian or American journal houses or universities. Given the recency of the RMB internationalisation strategy, the subject was yet to be reviewed across a large collection of internationally recognised journals.

Industry and governmental reports were utilised in select cases to evidence operational or technical features of the research. Their usage within the literature review was limited. Specific commentary was used to highlight key events or referenced developmental plans linked to the RMB's internationalisation.

Secondary data assessments were exposed to lack of available data, reporting bias, reporting errors or incorrect data transformations. The data quality for this research was sufficient with most datasets being relatively complete and with limited errors. Data sourcing was limited to globally recognised sources and a certain level of quality was assumed for data capturing and confirmation. The data was not sourced directly from

African countries due to the lack of publication, inconsistency in reporting frequency and concerns around consistency in reporting conventions across various countries.

Currency markets were often affected by expectations on economic policy or endogenous events outside the control of the currency issuer. Thus conclusions drawn on currency data were potentially attributed to market perceptions and not direct trade agreements or actual circumstances.

Lastly, with regards to the statistical assessments that were performed, each assessment inherently contained a Type 1 error of rejecting the Null hypothesis when in fact it was true. The Type 1 error set for the assessments was 5%, resulting in a 95% level of confidence.

Research Methodology Summation

The research methodology discussed above was applied in terms of the approach to data collation and assessment under each research hypothesis. The results of each research hypothesis is discussed within Chapter 5.

Chapter 5 – Results

This chapter presents the results and descriptive statistics for each research hypothesis under investigation.

A Null hypothesis is rejected if the relevant test statistic is greater than the associated critical value for a given level of confidence. The highlighted content within the tables contained in Chapter 5 indicate that the Null hypothesis has been rejected.

An ANOVA regression R-squared above 0.75 would be classified as a strong predictor of the variation between the dependent and independent variable under review.

1. **<u>The RMB's Market Depth and Liquidity</u>**

For a detailed review of the statistical results for each hypothesis, refer to **Appendix B**. A single factor ANOVA assessed regional market turnover and yearly growth in market turnover between China and reserve currency issuers. F-tests were performed on each dataset to assess the equality of means.

Table 1 outlines the F-statistic and critical value for market turnover data over the review period for the sample group. Market turnover may be used as a proxy for market depth, as the larger the number of trades within a particular market, the more likely it is to be viewed as deep.

<u>Table 1: Research Hypothesis 1 - Market Turnover Results</u>

Regression	F-statistic	F-Critical	Result
Market Turnover	6.65162827	2.513040096	Reject the H_0: $RMB_1 - SDR_1 = 0$

Figure 19 is a visual representation of the historic market turnover per region from 2000 to 2012. In most cases, the United States displays the largest market turnover whilst China only displays a notable improvement in market turnover after 2006. Other reserve currency issuer market turnovers have been fairly stable or followed a similar trend to the United States.

Figure 19: Historic Market Turnover (Figures in %)
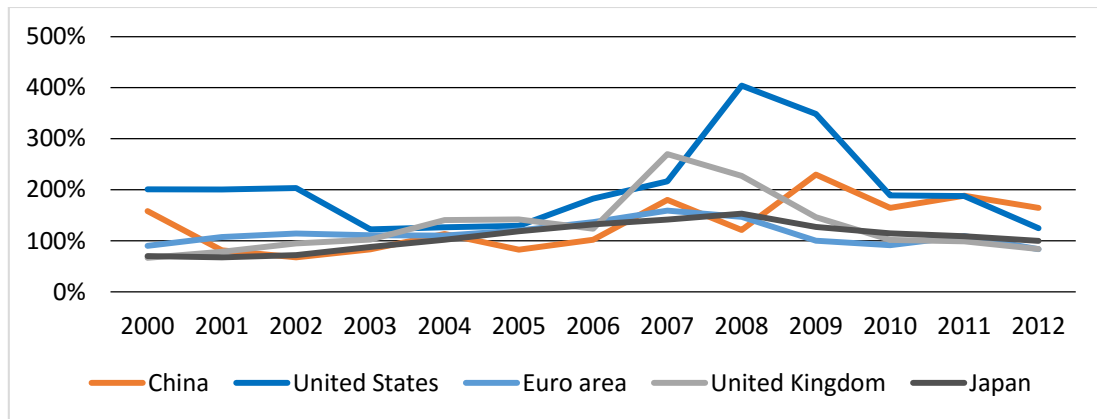
Source: World Bank

Table 2 outlines the F-statistic and critical value for the yearly growth in market turnover over the review period. Although the sample group does not display similar levels of market depth, they do display similar or different levels of market turnover growth. Market turnover growth provides some insight into a market's liquidity, which is the ease of entry and exit within a market. This would typically translate into a currency's liquidity.

Table 2: Research Hypothesis 2 - Market Turnover Growth Results

Regression	F-statistic	F-Critical	Result
Yearly Growth in Market Turnover	0.098262349	2.525215102	Do not reject the H_0: RMB_2 - SDR_2 = 0

Figure 20 is a visual representation of the yearly growth in market turnover per region from 2000 to 2012. In most cases, reserve currency issuers have realised fairly stable growth rates with some disruption over 2007 to 2009. China has experienced the most volatility in yearly turnover growth, which is indicative of its late introduction of market reform policies.

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Figure 20: Historic Yearly Market Turnover Growth (Figures in %)
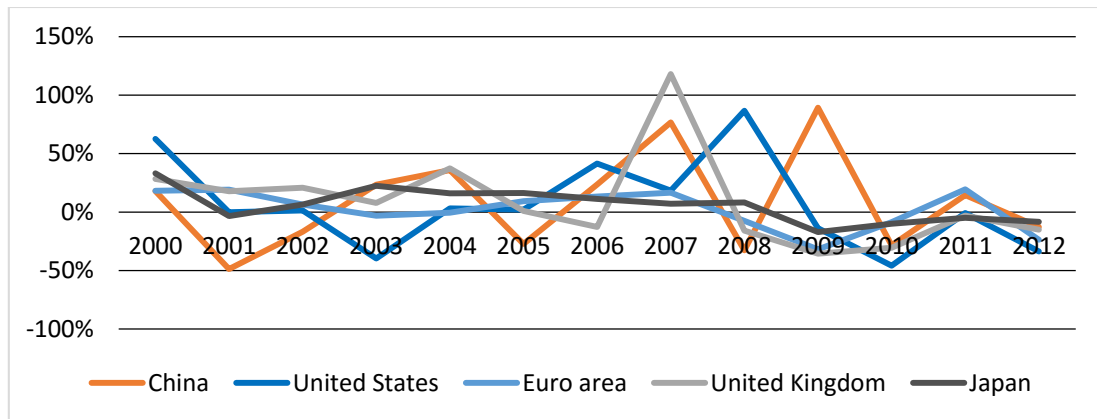
Source: World Bank

2. The Chinese Capital Account Liberalisation

For a detailed review of the statistical results for each hypothesis, refer to **Appendix C**. F-tests were performed on four currency pairs to assess the difference in sample variance between the CNY and reserve currencies (the USD, EUR, GBP and JPY), FDI and bank borrowing pairs.

Table 3 outlines the F-statistic and critical values for each regional currency pair. The USD and JPY indicate some equality in currency volatility similar to that of the CNY. This may be indicative of China's active strategy in terms of managing the RMB in close relation to the USD.

Table 3: Research Hypothesis 3 – Currency Pair Results

Currency pair	F-statistic	F-Critical	Result
CNYEUR-USDEUR	0.05648623	0.936287202	Do not reject the H_0: $RMB_3 - SDR_3 = 0$
USDCNY-USDEUR	96.00482394	1.068048348	Reject the H_0: $RMB_3 - SDR_3 = 0$
USDCNY-USDGBP	100.8082036	1.068048348	Reject the H_0: $RMB_3 - SDR_3 = 0$
USDCNY-USDJPY	0.001572967	0.936287202	Do not reject the H_0 : $RMB_2 - SDR_2 = 0$

Figure 21 is a visual representation of the historic currency volatility function as recorded by Bloomberg for spot currency rates over 2006 to 2015. Most of the reserve currency pairs trade within set volatility bands and display little divergence. This is also true for RMB currency pairs that were used for comparative purposes i.e. USDCNY and CNYEUR.

Figure 21: Historic Spot Foreign Exchange Volatility
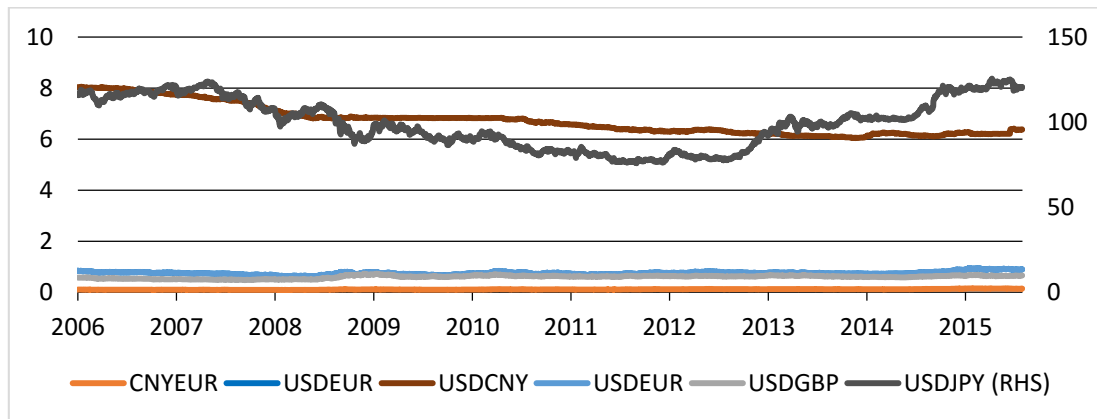
Source: Bloomberg

Table 4 outlines the F-statistic and critical values for each regional FDI pair. In all cases, the variance in FDI between China and reserve currency issuers could be seen as statistically equivalent. Thus foreign investors may view FDI opportunities within this group as somewhat similar, with no country attracting significantly more or less FDI than another.

Table 4: Research Hypothesis 4 – FDI Pair Results

FDI pair	F-statistic	F-Critical	Result
China – United States	1.4230659	2.686637112	Do not reject the H_0: $RMB_4 - SDR_4 = 0$
China – European Union	0.000546023	0.372212531	Do not reject the H_0: $RMB_4 - SDR_4 = 0$
China – United Kingdom	0.282713667	2.686637112	Do not reject the H_0: $RMB_4 - SDR_4 = 0$
China - Japan	7.30221E-12	2.686637112	Do not reject the H_0: $RMB_4 - SDR_4 = 0$

Figure 22 outlines the historic FDI as a percentage of GDP for each reserve currency issuer and China over the period from 2000 to 2013. Reserve currency issuers show a similar trend in FDI over time whereas China has shown a far more stable profile. This may be indicative of the relative market and investment openness of reserve currency issuer as compared to China.

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Figure 22: Historic China and Reserve Currency Issuer Inward FDI (Figures in %GDP)
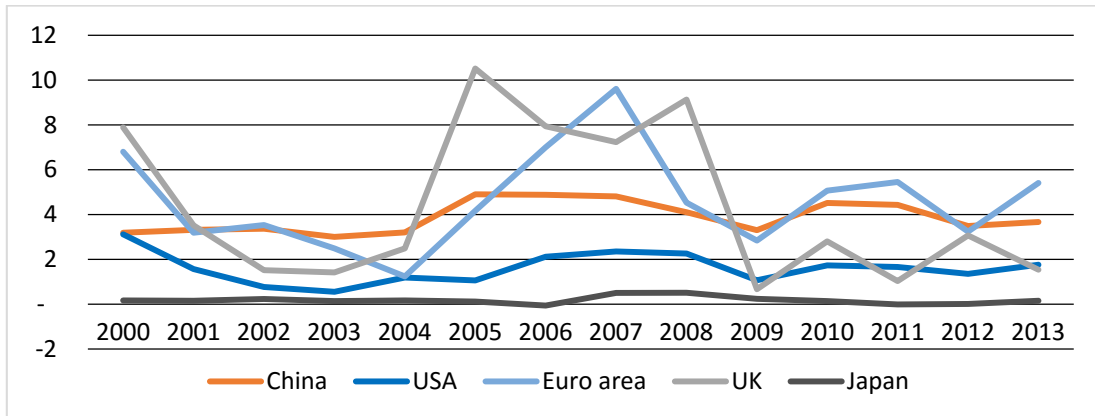
Source: Bloomberg, World Bank

Table 5 outlines the F-statistic and critical values for each regional pair based on the size of national reporting bank borrowings. Only China and the UK displayed a significant similarity in bank borrowing variance over time. It may be more likely that China's shadow banking system is not captured within these datasets and thus its bank borrowing statistics are not comparable to most reserve currency issuers.

Table 5: Research Hypothesis 5 – Bank Borrowings Results

Bank borrowing pair	F-statistic	F-Critical	Result
China – United States	3.017579112	2.124155213	Reject the H_0: $RMB_5 - SDR_5 = 0$
China – European Union	3.279764836	2.124155213	Reject the H_0: $RMB_5 - SDR_5 = 0$
China – United Kingdom	1.511659111	2.124155213	Do not reject the H_0: $RMB_5 - SDR_5 = 0$
China - Japan	7.390248046	2.124155213	Reject the H_0: $RMB_5 - SDR_5 = 0$

Figure 23 indicates the historic cross-border bank claims according to each bank's reporting region, whereas **Figure 24** indicates the historic cross-border bank claims according to trading currency. The United States represents the largest share of reporting bank cross-border claims as well as reporting currency for cross-border transactions.

Figure 23: Selected Reporting Bank Cross-Border Claims by Borrowing Country (Figures in USDtrn)
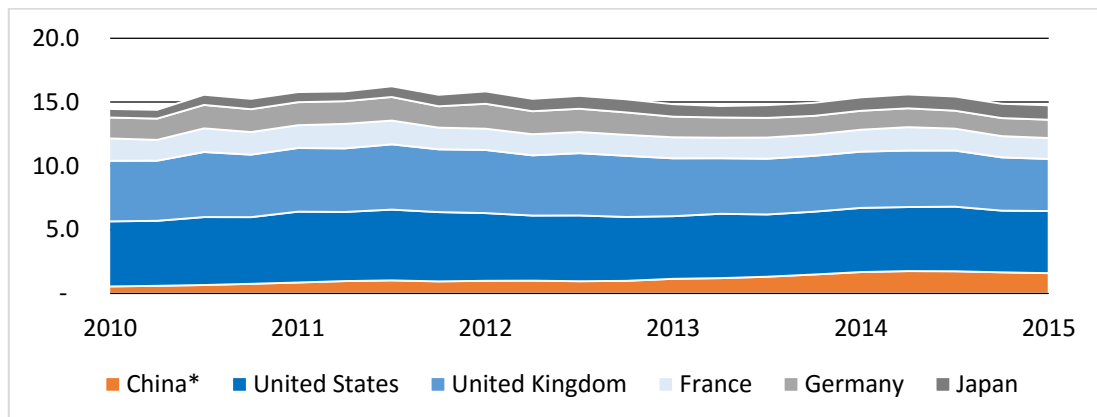
*Source: Bank for International Settlements Quarterly Review 2015. *Figures for China include the Hong Kong offshore reporting centre*

Figure 24: Selected Reporting Bank Cross-Border Claims by Currency (Figures in USDtrn)
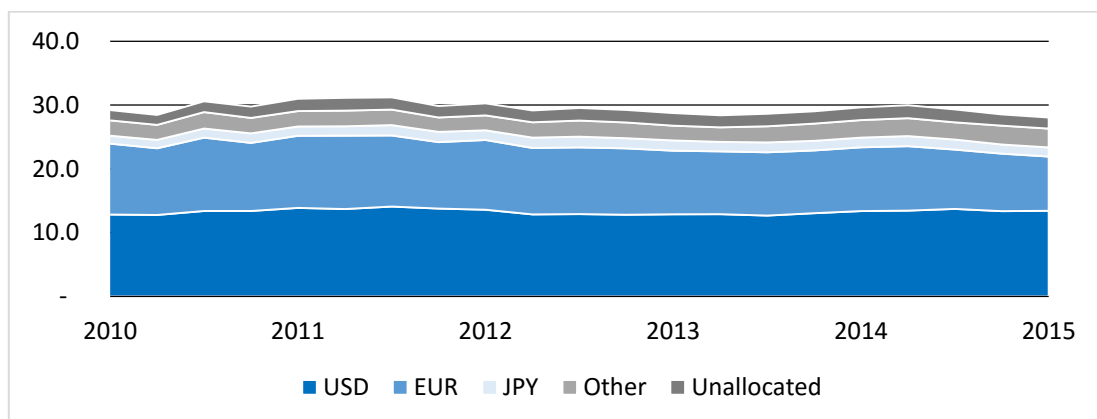
Source: Bank for International Settlements Quarterly Review 2015

3. The Impact of Sino-Africa Trade

For a detailed review of the statistical results for each hypothesis, refer to **Appendix D**. Of the 54 African countries under review, 17 countries (31%) neither disclosed trade data with China nor had more than five years of trade with China on record. These countries were excluded from review. A regression was performed for each of the remaining 37 countries to assess the significance of their exports to or imports from China in relation to their GDP performance.

Table 6 lists the countries that have been excluded from assessment due to insufficient data.

Table 6: Non-qualifying African Countries

African Countries with Insufficient Data		
Angola	Djibouti	Sao Tome & Principe
Cabo Verde	Equatorial Guinea	Sierra Leone
Chad	Eritrea	Somalia
Comoros	Guinea-Bissau	South Sudan
Republic of Congo	Liberia	Sudan
Democratic Republic of Congo	Libya	

Table 7 outlines the summarised ANOVA regression data for each country with sufficient data for analysis. The t-statistic and p-values indicate the statistical significance of exports to and imports from China in terms of their relationship to a country's GDP. A p-value that is less than 0.025 indicates that the Null hypothesis has been rejected.

The R-squared provides an indication of the model's forecasting ability with higher values being preferred. Only two country regressions (Botswana, Nigeria) generated R-squared figures of less than 0.75. The predictability of variation of these regressions would be viewed as moderately strong as the R-squared is between 0.50 and 0.75.

Table 7: Summarised ANOVA Results for Qualifying African Countries

Results of ANOVA Regressions for each qualifying African country (alpha = 0.05, two-sided test)					
Country	**ANOVA R-squared**	**Exports to China**		**Imports from China**	
		T-statistic	**P-value**	**T-statistic**	**P-value**
Algeria	0.989219905	4.722907888	0.002150247	7.163310756	0.000183218
Benin	0.929336662	-1.174223334	0.278701696	-0.338814637	0.744685794
Botswana	0.654542034	0.17706379	0.864472637	2.636262379	0.033605436
Burkina Faso	0.869467018	-0.407088414	0.696103395	1.645708274	0.143819697
Burundi	0.868993556	0.350449878	0.736309997	-0.586484783	0.575965885
Cameroon	0.839171368	0.362096506	0.727964329	-0.109104249	0.916181588
Central African Republic	0.946634524	-0.006706582	0.994836091	-0.714611563	0.497981476
Cote d'Ivoire	0.968839816	-2.138386801	0.069800387	0.486952967	0.641168754
Egypt	0.996256891	-0.770780865	0.466051353	8.496886568	6.19162E-05
Ethiopia	0.859583036	-0.116542395	0.910495827	0.682320547	0.516971183
Gabon	0.954463646	-0.426829171	0.682324297	-1.472093061	0.184474418
Gambia	0.91819123	-0.211905644	0.838218533	1.430676821	0.195608906
Ghana	0.992081838	-2.861822568	0.024274224	6.001953781	0.000541203
Guinea	0.972357024	-0.155479288	0.880832004	-0.749549669	0.477954488

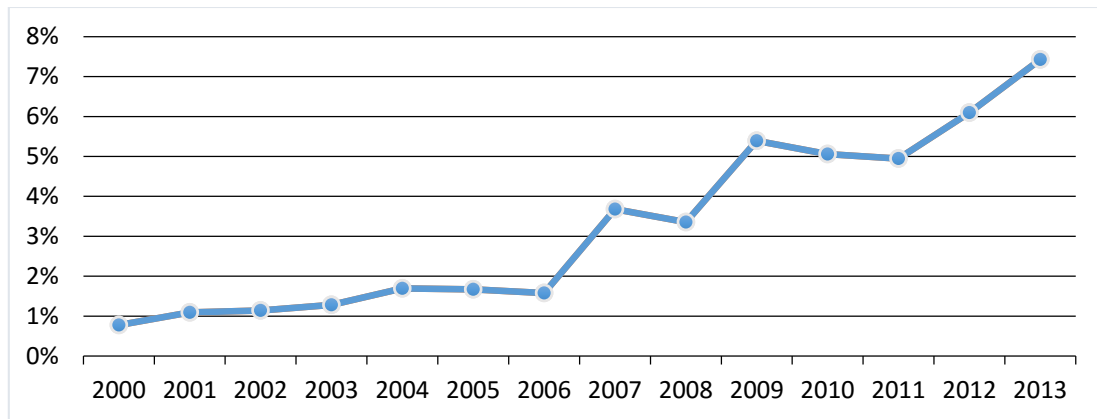| Country					
Kenya	0.807010281	-3.025989229	0.019223088	1.757234725	0.122294993
Lesotho	0.942172766	0.303867578	0.770062294	-0.411510885	0.693005543
Madagascar	0.98790661	8.388077064	6.72768E-05	0.815604148	0.441590894
Malawi	0.857857074	-1.18312607	0.275378928	1.796754343	0.115431428
Mali	0.862839816	-0.045110354	0.965279256	1.371146825	0.212667768
Mauritania	0.970301949	2.385238405	0.048507115	2.025147567	0.082501366
Mauritius	0.972476522	0.544831545	0.602786312	5.966100282	0.000560941
Morocco	0.771371131	-0.22565774	0.82791448	0.621099646	0.554212064
Mozambique	0.922908802	-0.47722676	0.647740536	-0.165473578	0.873248816
Namibia	0.982550329	1.230432903	0.258274844	1.315470052	0.229798914
Niger	0.982937039	7.23599515	0.000172001	-2.626092071	0.03410578
Nigeria	0.648326072	1.406938383	0.202259435	-0.312577118	0.763708147
Rwanda	0.939790697	0.105691691	0.91879195	2.700877451	0.030600151
Senegal	0.875141762	0.037911162	0.970817043	0.070751463	0.945574471
Seychelles	0.889424711	1.625839781	0.226392625	0.148010612	0.827364853
South Africa	0.979909299	0.77408342	0.464218049	4.162854367	0.004226668
Swaziland	0.91392177	-1.263240687	0.246949125	-0.711698807	0.499675594
Tanzania	0.996748126	-1.381459036	0.209621294	11.2495284	9.7961E-06
Togo	0.986986207	0.869275984	0.41350655	8.974915272	4.34383E-05
Tunisia	0.89686221	0.63102514	0.548066136	1.624560996	0.148284222
Uganda	0.990050787	7.736502068	0.000112811	-1.845329693	0.107501222
Zambia	0.979971332	1.387896172	0.207739262	1.121507118	0.299065304
Zimbabwe	0.925825223	-0.12307806	0.905504555	1.542265143	0.166914099

Table 8 provides a summary of the ANOVA results contained within **Table 7** that concern African exports to China. Only six countries displayed a statistically significant relationship between exports to China and GDP growth.

Table 8: Research Hypothesis 6 – African Exports to China Results

Statistical significance (alpha 5%)	Number of African countries
Reject the $H_0 : RMB_6 = 0$	6 (12%)
Statistically significant to not reject the $H_0 : RMB_6 = 0$	31 (57%)
Insufficient data for analysis	17 (31%)

Figure 25 displays the historic yearly growth in African exports to China over 2000 to 2015. On average, African exports to China have grown by 3.23% per year.

Figure 25: Historic Yearly Growth in African Exports to China (Figures in %)
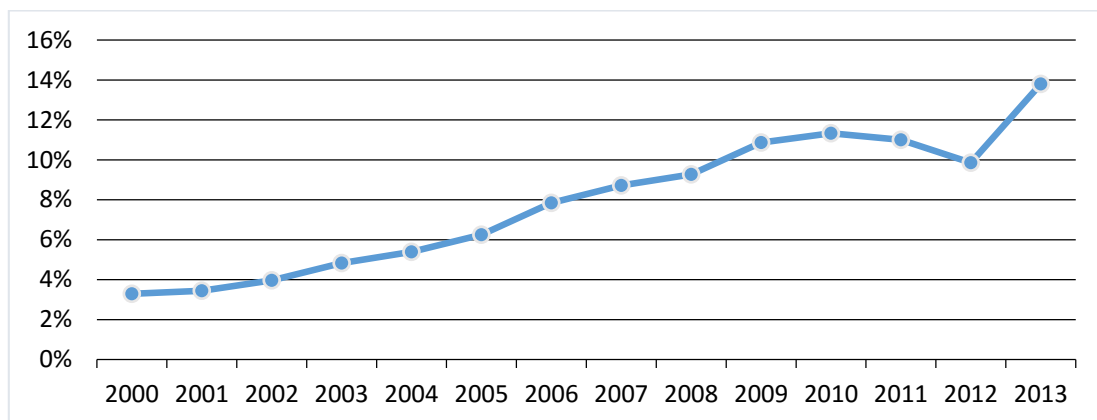

Source: World Bank

Table 9 provides a summary of the ANOVA results contained within **Table 7** that concern African imports to China. Only seven countries displayed a statistically significant relationship between imports from China and GDP growth.

Table 9: Research Hypothesis 7 – African Imports from China Results

Statistical significance (alpha 5%)	Number of African countries
Reject the H_0 : RMB_7 = 0	7 (13%)
Statistically significant to not reject the H_0 : RMB_7 = 0	30 (56%)
Insufficient data for analysis	17 (31%)

Figure 26 displays the historic yearly growth in African imports from China over 2000 to 2015. On average, African imports from China have grown by 7.85% per year.

Figure 26: Historic Yearly Growth in African Imports from China (Figures in %)

Source: World Bank

Table 10 provides a summary of the ANOVA results contained within **Table 7** for other variables under review. Besides increased leverage, FDI flows have also demonstrated a statistically significant relationship with GDP growth for certain countries.

Table 10: Other Independent Variables Results

Independent variable	Number of African countries		
	Reject H_0	Do not reject H_0	No data
Debt to GDP	15 (28%)	22 (41%)	17 (31%)
Population Wealth	3 (6%)	34 (63%)	
Inflation	2 (4%)	35 (65%)	
FDI	7 (13%)	30 (56%)	

Despite heightened levels of debt, African countries have elected not to meet their SDR allocations (see **Table 11**). Only 12 countries had more than five years of excess SDR holdings on record from 2000 to 2015.

Table 11: Number of Years of Excess SDRs Held by African Countries

Country	Number of years with excess SDRs: 2000-2015
Algeria	None
Angola	9.8
Benin	0.1
Botswana	15.4
Burkina Faso	None
Burundi	4.3
Cabo Verde	None
Cameroon	None
Central African Republic	None
Chad	None
Comoros	4.3
Congo	None
Cote d'Ivoire	0.1
Democratic Republic of Congo	None
Djibouti	None
Egypt	None
Equatorial Guinea	None
Eritrea	5.8
Ethiopia	None
Gabon	None
Gambia	None
Ghana	None

Guinea	1.3
Guinea-Bissau	None
Kenya	None
Lesotho	6.2
Liberia	6.1
Libya	15.4
Madagascar	None
Malawi	None
Mali	None
Mauritania	None
Mauritius	15.4
Morocco	2.2
Mozambique	9.9
Namibia	11.5
Niger	None
Nigeria	None
Rwanda	12.3
Sao Tome & Principe	None
Senegal	None
Seychelles	None
Sierra Leone	12.6
Somalia	None
South Africa	14.9
South Sudan	No data
Sudan	None
Swaziland	1.7
Tanzania	None
Togo	None
Tunisia	0.3
Uganda	None
Zambia	0.6
Zimbabwe	None

Figure 27 outlines the historic fulfilment of African countries in meeting their allocated IMF SDRs. African countries have typically elected to not fulfil their SDR quotas and incurred an interest charged on unfulfilled amounts levied by the IMF. This SDR position is not reflective of an African country's total foreign reserves, which may include other qualifying assets such as gold.

Figure 27: Historic African SDR Fulfilment
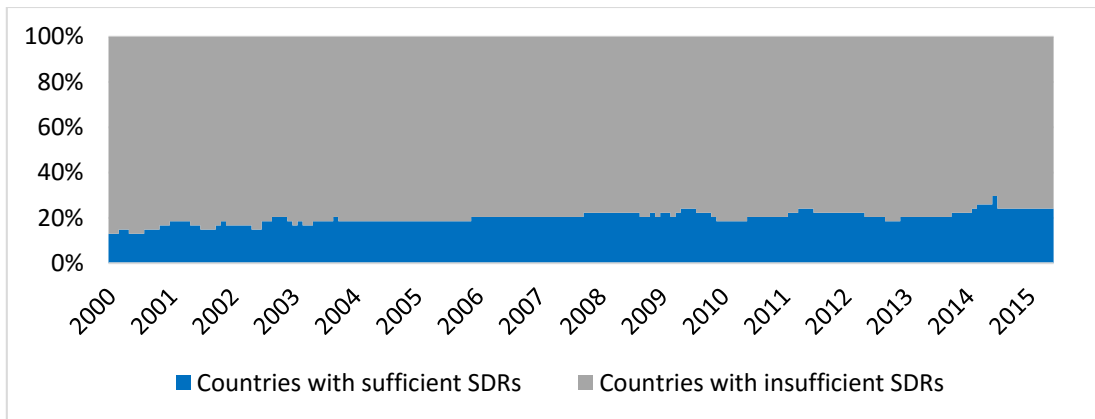
Source: International Monetary Fund. The above graph only reflects data for African IMF member countries

Figure 28 displays the historic growth in total African gross domestic savings from 2000 to 2014. The growth in gross domestic savings has deteriorated since 2008, with an average growth rate over the entire period of 12.1% annual growth.

Figure 28: Total African Gross Domestic Savings (Figures in USDbn and %)
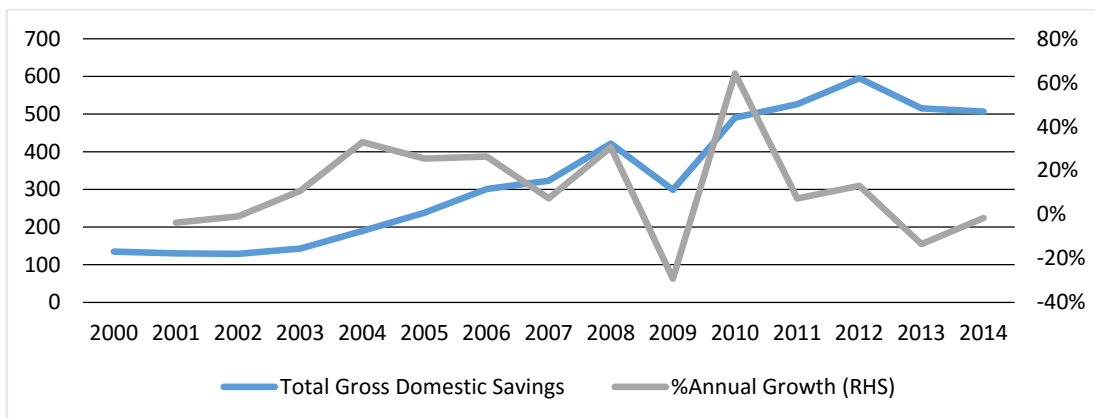
Source: African Development Bank

An analysis of the results displayed above is discussed within Chapter 6.

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Chapter 6 – Discussion of Results

This chapter discusses the results presented in Chapter 5 in line with the literature reviewed within Chapter 2. The aim of this is chapter to assess whether the results are in line with or contradict the theory presented within the literature review.

1. **The RMB's Market Depth and Liquidity**

Based on the results contained within **Appendix B**, there is statistically significant evidence to reject that China's market turnover is equal to that of reserve currency issuers and secondly, not to reject that equality in market turnover growth amongst the sample group.

The market turnover experienced by China could be attributed to the asymmetry within the international monetary system as highlighted by Subacchi (2010). The depth of information contained within developed markets facilitates increased trading activity. This is evident within **Figure 19**, whereby developed markets experience a correlation in terms of historic market turnover trend. Furthermore, Banchs & Mollejas' (2010) relative ranking of reserve currency issuers promotes heightened participation by domestic and international investors. The United States holds the highest ranking and experiences the largest market turnover.

The results within **Table 1** are aligned with the self-fulfilling nature of reserve currency issuers (Cardullo & Sage, 2012). These countries have deep and open financial markets as well as being entrenched within global trade by becoming generally accepted trading currencies or means of valuation. This is also in line with the Triffin dilemma, which necessitates an increased demand for reserve currency assets as these issuers participate in increased global trade activity (Maes, 2013).

Figure 20 highlights the historically closed nature of China's financial markets and the relatively late allowance of foreign investor participation. In 2009, the minimum ticket or trade amount allowed in Hong Kong was reduced and led to a significant increase in trading activity. Although this led to an improvement in liquidity, China did not attract larger foreign participation due to broader trading restrictions (Gerace & Smark, 2012).

China remains in conflict with pursuing global policies which support the opening of its markets, similar to that of reserve currency issuers, and national policies which dictate a certain level of limited interaction with global markets (Vermeiren & Dierckx, 2012). Bird (2011) suggested that China is realigning its policies towards global ambitions but in a staggered fashion. The staggered nature of policy implementation could be evidenced by the lack of market turnover activity as compared to reserve currency issuers who have already established relatively open markets. Similarly, Li (2007) supported the gradual introduction of the RMB's internationalisation alongside robust economic and financial reforms.

However, the growth in market turnover within China is improving. This is evidenced by specific policies to increase domestic and foreign investor activity within China's markets (Borio, Cohen, Domanski, Song Shin, & Turner, 2015). The majority of increased turnover activity within Chinese markets has been attributed to both domestic and foreign investors. The access of domestic investors to local markets has dramatically increased due to readily available debt finance. However, reduced regulations have fostered increased foreign trading activity.

Secondly, China's markets are predominantly traded by government affiliated agencies (Raymaekers, 2011). Thus market liquidity may be impacted by national policies which do not support the liquidation of government holdings. Despite the improvement in market turnover growth, SWIFT has indicated that China needs further enhancement in its settlement infrastructure to fully reflect the liquidity experienced by reserve currency issuers (Raymaekers, 2011).

Table 1 and **Table 2** reinforce the difficulty for non-reserve currency issuers to emulate reserve currency fundamentals as proposed by Delatte & Fouquau (2012). Certain reserve currency issuers do not possess a historic market turnover or growth in market turnover equal to that of the United States. Lee (2014) suggests that an RMB internationalisation alone will not suffice in achieving China's global ambitions. As such, China may prefer not to compete with the USD. As the RMB's usage within regional markets improves, China may prefer a second or third ranking reserve currency order (Banchs & Mollejas, 2010).

Despite China not having sufficient market turnover as compared to reserve currency issuers, it has shown an improvement to quickly replicate similar market turnover growth. If China continues with relaxing its market protection policies and supports increased investor participation, it is likely to replicate reserve currency issuer market turnover depth within the short term.

China may need to consider increasing its borrowing activities within global financial markets and expand its settlement infrastructure (see **Figure 29**). The use of dim sum bonds and other RMB-denominated debt products has been widely supported by China since 2009 (Cui, 2013). The increased circulation of RMB-denominated debt obligations would promote additional liquidity within the currency. Yin-Wong, Guonan, & McCauley (2011) suggested that borrowing from RMB-denominated markets would be very similar to USD-denominated markets due to China's exchange rate management policies.

Figure 29: China Debt to GDP (Figures in %)
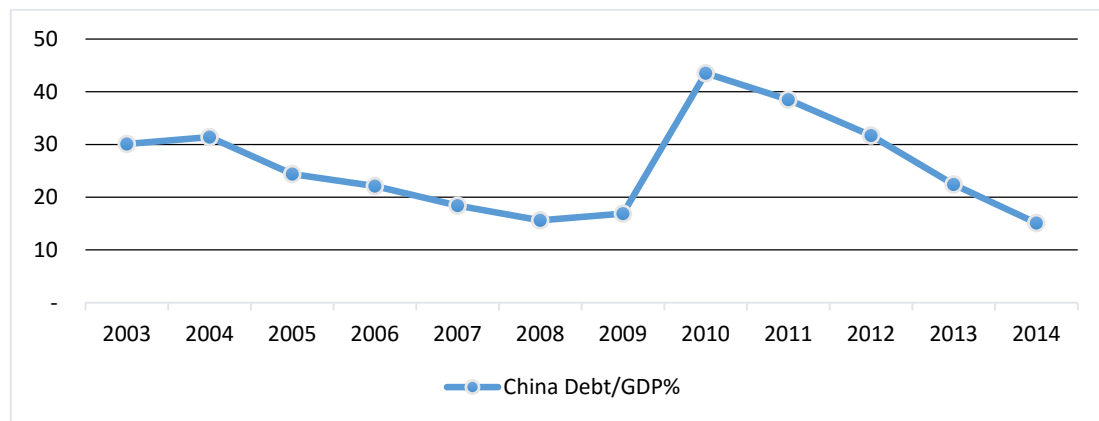
Source: Bloomberg

Answers to Hypotheses:

- The average market turnover of China (RMB_1) is **not equal to the average market turnover** of a reserve currency issuer (SDR_1); and
- The average yearly growth in market turnover of China (RMB_2) **is equal to the average yearly growth in market turnover** of a reserve currency issuer (SDR_2).

2. **The Chinese Capital Account Liberalisation**

Based on the results contained within **Appendix C**, there is no statistical difference in currency variance between the CNY, USD and JPY. Similarly, there is no statistically significant FDI variance between China and all of the reserve currency issuers. However, China, the United States, the Euro area and Japan displayed a statistically significant difference in variance with regards to bank borrowing.

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The extent of China's capital account liberalisation is impacted upon the requirement to preserve an undervalued currency in order to retain a trade surplus (Lizardo & Kelly, 2014). The results present a varied degree of capital account liberalisation in terms of currency volatility, FDI and bank borrowing as compared to the reserve currency issuers.

The similarity in currency variance between China and certain reserve currency issuers, outlined in **Table 3**, may be related to their close trading ties and government policies. China has managed its currency in order to maintain certain expenditure and external imbalances (Knight & Wang, 2011). As such, China's currency variance in relation to other currencies is due to policy implementation and less so with market dynamics.

Furthermore, China may be adverse to a notable devaluation in the RMB which may result in an economic slowdown and potential social unrest. Cheng & Liu (2013) proposed that China considered how to devalue the RMB and not whether the RMB required devaluation. Garroway et al. (2012) suggests that the RMB's stability within a market context is underestimated. In essence, China would prefer to circumvent a currency war with any of the reserve currency issuers, most notably the United States (Austin, 2014).

FDI flows may be more sensitive to individualised government policy and state of domestic markets (Bird, 2011). **Table 4** indicates that global investors consider China to be on par with reserve currency issuers in terms of FDI. China's emergence as a creditor country has resulted in a number of notable global partnerships being formed in order to attract FDI (Chin & Helleiner, 2008).

Figure 22 indicates that China has maintained a fairly stable proportion of FDI and more recently, attracting a higher proportion of FDI relative to most reserve currency issuers. Prime, Subrahmanyam, & Lin (2012) proposed that China's growth in FDI was due to a combination of the timing of economic reforms in addition to an increasing role within the East Asian region. This was further enhanced by government policies to promote business development within China. However, such policies were only introduced in the 1980's, much later than those of reserve currency issuers.

With regards to bank borrowing, **Figure 23** may be a demonstration of the Triffin Dilemma faced by reserve currency issuers, which requires a larger amount of debt obligations denominated in a particular currency and frequent access to the debt markets for those countries (Maes, 2013).

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Table 5 indicates that China does not display similar variance in bank borrowing as compared to most reserve currency issuers and would need to increase its circulation of debt instruments. China may consider utilising its influence within the BRICS and Asian Infrastructure Investment Bank to promote the usage of RMB-denominated debt products.

China also faces the challenge of managing a shadow banking system which is not captured within formal bank regulatory submissions (Chi, 2013). Thus the overall bank borrowing variance between China and reserve currency issuers may be more significant if the shadow banking system was adequately captured.

However, unlike developed markets, China's shadow banking system remains relatively unsophisticated (Sharma, 2014). This inherently limits the amount of debt that can be absorbed outside the traditional banking system.

Despite China's partial fulfilment of a liberalised capital account, this may lead to enhanced institutions within the country in addition to increased capital flows (Prasad & Rajan, 2008). In most of the results obtained, there was a statistically significant relationship between China and the United States. This reinforces the notion of China fulfilling a role as a financial counterbalance to the United States (Willett & Chiu, 2012).

Answers to Hypotheses:

- There is **no statistically significant difference in variance in realised currency volatility** (RMB_3) between China, the United States and Japan;
- There is **no statistically significant difference in variance in FDI** (RMB_4) between China and reserve currency issuers;
- There is a **statistically significant difference in variance in bank borrowing** (RMB_5) between China, the United States, the Euro area and Japan; and
- The **Chinese capital account is not as liberalised** as reserve currency issuers.

3. The Impact of Sino-Africa Trade

Based on the results contained within **Appendix D**, only six countries (12% of the sample) over the period from 2000 to 2013 displayed a statistically significant relationship between their GDP performance and exports to China. Only seven countries (13% of the sample) over the same period displayed a statistically significant relationship between their GDP performance and imports from China. Thus African GDP growth is not heavily dependent on exports to or imports from China, as less than 13% of African countries displayed a statistically significant relationship.

The lack of significance between Sino-Africa trade and African GDP growth may be due to the underlying nature of South-South global trade as proposed by Taylor (2013). The trading terms or use of proceeds from net exports may not have been utilised in a manner to directly promote GDP growth.

Table 8 and **Table 9** reinforce the proposal by Vickers (2013) that the benefits from increased trade have not translated into GDP growth. The bargaining power of African sovereigns remains insufficient with regards to Sino-Africa trade.

The concentration of significant relationships between Sino-Africa trade and African GDP growth may relate to a focussed trade strategy implemented by China. Drummond & Liu (2015) proposed that Sino-Africa trade was often limited in benefit and only led to enhancements within certain industries. The benefits of Sino-Africa trade were not evidenced on a national level.

With regards to the other independent variables outlined in **Table 10**, African GDP growth displayed statistically significant relationships with Debt to GDP and FDI.

As proposed by Okafor & Tyrowicz (2010), increasing levels of foreign debt within developing countries has resulted in increased GDP growth at the cost of reduced domestic savings as shown in **Figure 28**. **Table 11** reinforces the notion that African countries have increased borrowings to the jeopardy of inadequate foreign reserves. This contradicts the proposal that African countries should mobilise resources for higher domestic investment (Anyanwu, 2014).

Fincke & Greiner (2010) proposed that although developing countries assumed large debt obligations, empirical evidence has shown that rising debt levels can be supported on a sustainable basis irrespective of their economic positioning. Furthermore, Okafor & Tyrowicz (2010) highlight that countries who are prone to foreign debt exposures adopt

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an adverse view to capital formation and domestic savings, especially in the long run. As such, this may be evidenced by the stagnant or insufficient accumulation of foreign reserves within Africa, in conjunction with rising debt (see **Figure 30**).

**Figure 30: Total African External Debt (Figures in USDbn and %)**
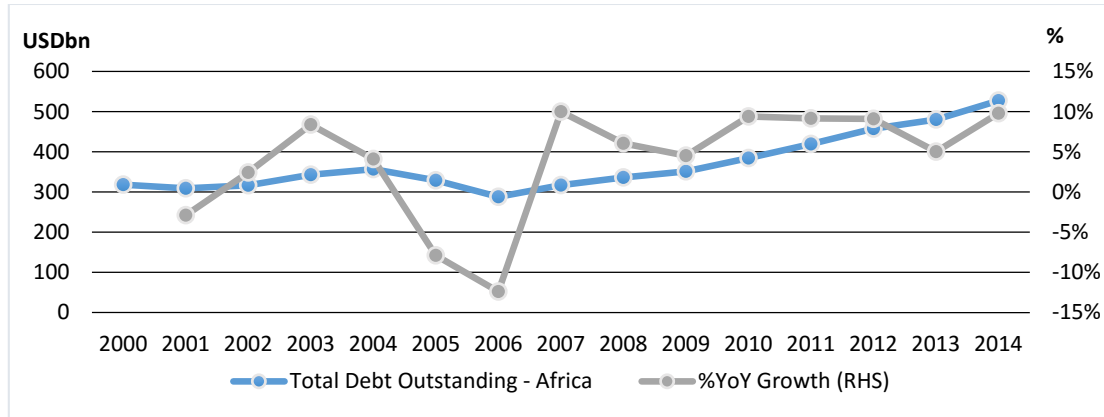
Source: African Development Bank

In contrast, certain African countries may have overinvested in foreign reserves without adequate policies for capital formation (Rodrik, 2006). Thus the impact of large investments within low yielding assets has not proven favourable given the increase of expensive debt taken on by African countries (Jeanne, 2012). The results have not evidenced whether African countries have deployed strategic portfolio optimisation techniques in managing their foreign reserves.

Table 10 confirms that China has adopted a bargaining model when engaging with African countries (Li, Newenham-Kahindi, Shapiro, & Chen, 2013). Chinese outward FDI was typically deployed in relation with sourcing strategic natural resources supply contracts. As such, the Chinese Government and corporates act as a collective to inject FDI within Africa, in return for specific resources. By 2010, China's outward FDI had become the fifth largest global source of FDI (Cui, 2013).

Despite the importance of FDI towards Africa's GDP growth, the yearly growth in FDI has dramatically reduced over the last decade (see **Figure 31**). The volatility in FDI growth may be due to the lack of or inconsistency in policies to promote inward African FDI (Adeleke, 2014).

Figure 31: Total Inward African FDI (Figures in USDbn and %)
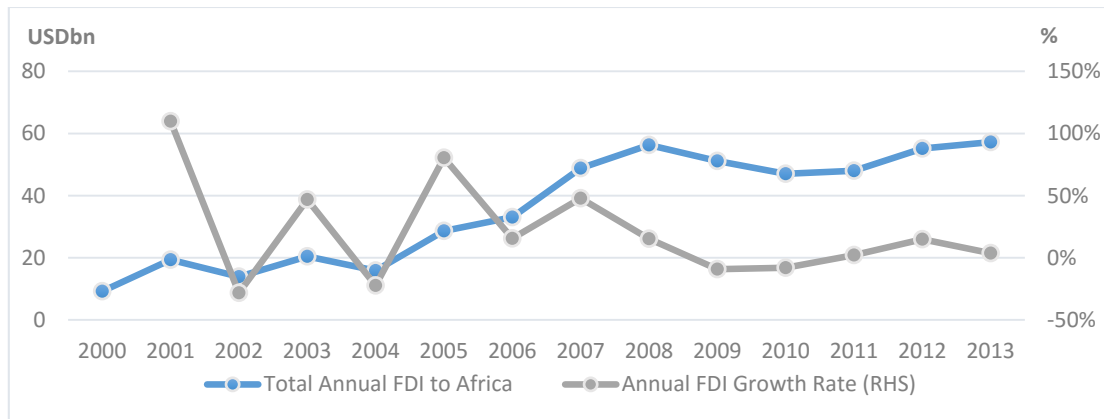
Solomon & Ruiz (2012) highlight that Africa remains the worst region to attract FDI despite offering amongst the highest return on investments. Furthermore, the combination of political risk and exchange rate uncertainty enhanced the risk aversion of potential FDI providers.

African countries have increased foreign reserves despite the reduction in FDI inflows. This is contradictory to the rationale for foreign reserves proposed by Gourinchas & Jeanne (2013). This may be an indication of the challenging economic conditions faced by African countries since the 2008 global financial crisis. Despite the requirement to hold larger reserves as a safety buffer for economic distress, the aggregation of reserves has not led to large capital inflows.

Population wealth and inflation were somewhat significant and in most cases negatively related to GDP growth. This has been evidenced in other developing countries whereby the trade has led to the widening of income inequality (Dizaji & Badri, 2014).

Answers to Hypotheses:

- There is a **statistically significant relationship** between African GDP growth and debt to GDP;
- There is **no statistically significant relationship** between African GDP growth and population wealth;
- There is **no statistically significant relationship** between African GDP growth and domestic inflation;
- There is **a statistically significant relationship** between African GDP growth **and** donor FDI;

- There is **a moderate statistically significant relationship** between African GDP growth and exports to China (RMB_6); and

- There is **a moderate statistically significant relationship** between African GDP growth and imports from China (RMB_7).

Chapter 7 – Conclusion

Principal Findings

A currency typically required enhanced market depth, liquidity and a liberalised capital account to be considered for a designation as a reserve currency.

China did not display comparable market depth but did replicate a growth in market liquidity comparable to that of reserve currency issuers. The inherent information asymmetry within the Chinese market also prohibits the true reflection of stock prices as compared to other reserve currency markets (Jiang, 2011). It may be expected that the depth and liquidity of the Chinese market will continue to improve as China expands the participation of domestic and foreign investor activity and considers divestment of non-core government holdings.

China's capital account evidenced different levels of liberalisation. The RMB displayed similar levels of variance to certain reserve currency issuers but not all. China's strategy to increase the amount of global RMB trading and settlement hubs may foster increased currency trades and access to the currency (Raymaekers, 2011). With regards to inward FDI, China's volatility in FDI flows was similar to that of reserve currency issuers. This may be the result of policies to enhance China's economic openness, industrial and economic development (Zheng, 2011).

However, China's variability in bank borrowing was the most divergent. This may highlight the developed nature of reserve currency issuer banking systems and access to finance. China's banking infrastructure is still under development and does not fully reflect the impact of the shadow banking system. In addition, China's culture of high investment and low consumption may limit the requirement for bank borrowings (Knight & Wang, 2011).

With regards to the impact of Sino-Africa trade, only a select group of African countries displayed a significant trading relationship with China. This may either be due to strategic trade agreements negotiated by China as it distinguishes between various suppliers or countries. Secondly, trade agreements only form one part of China's overarching strategy with regards to its African policy (Li, Newenham-Kahindi, Shapiro, & Chen, 2013).

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The data presented a statistically stronger relationship between African GDP growth, debt and FDI as opposed to Sino-Africa trade. This may be in alignment with China's holistic bargaining approach towards Africa.

Implications

Although the RMB partially fulfilled the IMF's reserve currency requirements, the RMB possessed sufficient levels of market liquidity in order to be considered for reserve asset holdings. Countries may consider utilising a portion of excess foreign reserves towards RMB-denominated assets until the RMB is formally recognised as a reserve currency.

However, African countries remain constrained in terms of reserves and do not have sufficient or excess reserves to secure favourable Sino-Africa trade terms. Secondly, there is limited statistical significance between increased Sino-Africa trade and African GDP growth to support the rationale for RMB-denominated foreign reserves.

African countries may be better placed in sourcing RMB-denominated debt or FDI arrangements with China or other parties. This may assist in increasing the RMB's circulation within global currency markets, align to China's bargaining approach to Africa and have a direct uplift on GDP growth, if funds are utilised appropriately.

Lastly, African countries may consider establishing trade bargaining groups in terms of Sino-Africa trade. Certain countries are more sensitive to exports to or imports from China. As a collective, these countries may be able to negotiate stronger trading conditions and more favourable outcomes, given a certain directional preference for Sino-Africa trade.

Limitations of the Research

In terms of the research scope, there was a predominant focus on Africa or topics linked to Sino-Africa relationships. As such, any derived conclusions may be limited in terms of their broader applicability beyond African countries. In addition, the focus on African countries as a collective may have been an oversimplification given the diversity of individual countries on an economic, political and cultural basis.

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Secondly, the data assessments were heavily reliant on the quality of data received from and produced by global reporting bodies such as the IMF and World Bank. Direct data publications from African countries were not available in most circumstances or not produced in comparable format for statistical assessments.

The majority of literature was sourced from the Business Source Premier (EBSCO host) database given its depth of underlying sources. References cited within the research are published between 2000 and 2015, peer reviewed and sourced from academic journals. Journals with ten or more citations were given preference for this assessment.

The collation of journals was based on a snowball effect using topical searches or through the usage of core journals or contributing authors. In most cases, relevant literature was published by Asian or American journal houses or universities. Given the recency of the RMB internationalisation strategy, the subject was yet to be reviewed across a large collection of internationally recognised journals.

Industry and governmental reports were utilised in select cases to evidence operational or technical features of the research. Their usage within the literature review was limited. Specific commentary was used to highlight key events or referenced developmental plans linked to the RMB's internationalisation.

Secondary data assessments were exposed to lack of available data, reporting bias, errors or incorrect data transformations. The data quality for this research was sufficient with most datasets being relatively complete and with limited errors. Data sourcing was limited to globally recognised sources and a certain level of quality was assumed for data capturing and confirmation. The data was not sourced directly from African countries due to the lack of publication, inconsistency in reporting frequency and concerns around consistency in reporting conventions across various countries.

Currency markets are often affected by expectations on economic policy or endogenous events outside the control of the currency issuer. Thus conclusions drawn on currency data were potentially attributed to market perceptions and not direct trade agreements or actual circumstances.

With regards to the statistical assessments that were performed, each assessment inherently contained a Type 1 error of rejecting the Null hypothesis when in fact it was true. The Type 1 error set for the assessments was 5%, resulting in a 95% level of confidence.

Lastly, the research has been based on a set period under review. If the RMB achieves reserve currency status in the near future, the research hypotheses would need to be re-evaluated as to whether a reserve currency status has had any impact on the research findings.

Suggestions for Future Research

In light of the research findings, the following investigations would be suggested for future research:

- An investigation as to whether a new reserve currency could be created without establishing market infrastructure and incurring large sunken costs. A country may consider utilising the existing infrastructure within the international monetary system and rather focus on negotiating beneficial trade or financial agreements. This may result in a faster and deeper utilisation of a currency given the multi-currency focus of existing market constructs;
- A study on the relative importance of factors underlying China's surgical colonialism approach to Africa. This may recommend further strategic approaches for African countries to consider when engaging in Sino-Africa trade or other engagements with China;
- A study to assess China's approach to RMB-denominated outward FDI and its impact on regional improvements; and
- A study on whether the one-way Sino-Africa trade relationships are determined by China or the relevant African country. This assessment will determine the extent of buyer or supplier power demonstrated by each trading counterparty, whether the relationship has evolved over time and if certain trade positions are more beneficial than others.

Conclusion

The research has identified that although the RMB partially fulfils the requirements of a reserve currency, only a select group of African countries can utilise the currency as part of their excess foreign reserves until the RMB is formally accepted by the IMF.

Secondly, the rationale for utilising RMB-denominated reserves to enhance Sino-Africa is insufficient. African countries should rather investigate the use of favourable RMB-denominated debt or FDI arrangements, which are statically significant contributors to African GDP growth.

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Appendices

Appendix A – China's Dual Currency System

The RMB is typically used to designate both the onshore and offshore currency markets despite a divergence in value between each market. The main difference between these markets is the extent to which China exerts certain influence.

According to the Bank for International Settlements, the onshore market remains constrained the People's Bank of China's intervention and stipulation of daily trading bands relative to the USD (Shu, He, & Cheng, 2014).

The People's Bank of China does not directly influence the offshore market and attempts to manage the market differential through the supply of RMB (Shu, He, & Cheng, 2014). Both markets have responded differently to the same economic data announcements as well as global factors. Despite the potential for arbitrage, the currency rates between the two markets converge within a predefined trading band.

Table 12: Onshore and Offshore RMB Market Comparison

Regional Market	Onshore CNY Market	Offshore CNH market
Products	Spot, forward, swap and options	
Market Participants	Central bank, domestic banks, finance companies (subsidiaries of large State-Owned Entities) and domestic subsidiaries of foreign banks	Exporters, importers, offshore financial institutions, hedge funds and Hong Kong residents
Price Formation Mechanism	Managed float	Free float
Central Bank Intervention	Yes	No
Trading Band	+/- 2%	No
Regulatory Authorities	PBoC	Hong Kong Monetary Authority

Source: Bank for International Settlements, Working Paper 446

Figure 32: Trading Differential between Offshore (USDCNH) and Onshore (USDCNY) Renminbi Exchange Rates (Figures in %)

Source: Bloomberg

69
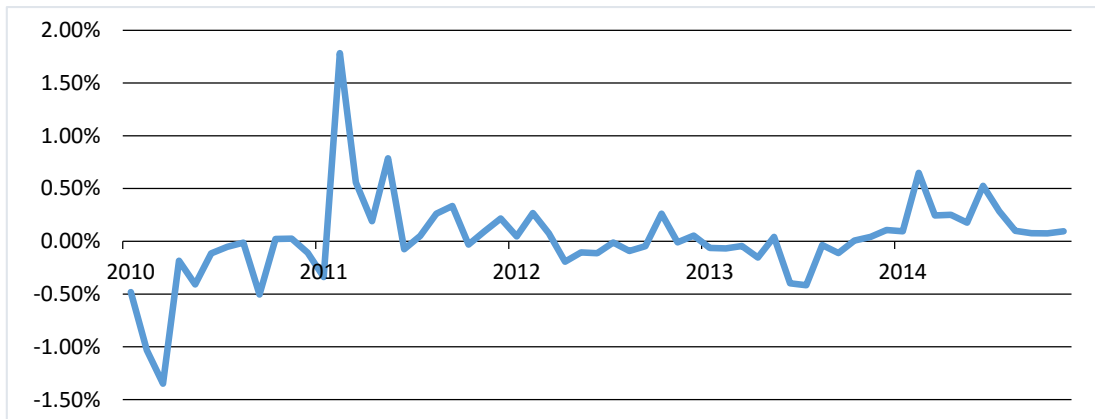
Appendix B – Research Hypothesis 1 & 2 Statistical Assessments

Single Factor ANOVA Based on Regional Market Turnover: 2000 to 2012

Anova: Single Factor
Market Turnover

SUMMARY

Groups	Count	Sum	Average	Variance
China	14	18.70461632	1.336044023	0.235916225
Euro area	14	15.56124051	1.11151718	0.055871073
United Kingdom	14	17.28537433	1.234669595	0.366189178
Japan	14	14.47984562	1.034274687	0.091985311
United States	14	27.59718863	1.971227759	0.710735554

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	7.772812586	4	1.943203146	6.65162827	0.00014988	2.51304
Within Groups	18.98906544	65	0.292139468			
Total	26.76187803	69				

Single Factor ANOVA Based on Yearly Growth of Regional Market Turnover: 2000 to 2012

Anova: Single Factor
Average Market Turnover Growth

SUMMARY

Groups	Count	Sum	Average	Variance
China	13	1.148516046	0.088347388	0.176463163
Euro area	13	0.272734155	0.02097955	0.027644133
United Kingdom	13	1.186282076	0.091252467	0.155606913
Japan	13	0.774148311	0.05954987	0.020390434
United States	13	0.822265655	0.063251204	0.149807029

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.041656292	4	0.010414073	0.098262349	0.98262075	2.525215
Within Groups	6.358940054	60	0.105982334			
Total	6.400596346	64				

F-test for Two Sample Variances per Currency Pair: CNY

F-Test Two-Sample for Variances

CNYEUR-USDEUR

	China	*United States*
Mean	0.11275876	0.753541016
Variance	0.000198984	0.003522702
Observations	2499	2499
df	2498	2498
F	0.05648623	
P(F<=f) one-tail	0	
F Critical one-tail	0.936287202	

F-Test Two-Sample for Variances

USDCNY - USDEUR

	China	*European Union*
Mean	6.737685434	0.753540976
Variance	0.338195273	0.00352269
Observations	2499	2499
df	2498	2498
F	96.00482394	
P(F<=f) one-tail	0	
F Critical one-tail	1.068048348	

F-Test Two-Sample for Variances

USDCNY-USDGBP

	China	*United Kingdom*
Mean	6.737685434	0.602257263
Variance	0.338195273	0.003354839
Observations	2499	2499
df	2498	2498
F	100.8082036	
P(F<=f) one-tail	0	
F Critical one-tail	1.068048348	

F-Test Two-Sample for Variances

USDCNY-USDJPY

	China	*Japan*
Mean	6.737685434	99.44946379
Variance	0.338195273	215.0046921
Observations	2499	2499
df	2498	2498
F	0.001572967	
P(F<=f) one-tail	0	
F Critical one-tail	0.936287202	

F-test for Two Sample Variances per FDI Pair

F-Test Two-Sample for Variances
China & United States

	China	United States
Mean	170839.2154	211523.9231
Variance	12147565991	8536193573
Observations	13	13
df	12	12
F	1.4230659	
P(F<=f) one-tail	0.275254327	
F Critical one-tail	2.686637112	

F-Test Two-Sample for Variances
China & European Union

	China	European Union
Mean	170839.2154	520637.3769
Variance	12147565991	96523833649
Observations	13	13
df	12	12
F	0.12585043	
P(F<=f) one-tail	0.000546023	
F Critical one-tail	0.372212531	

F-Test Two-Sample for Variances
China & United Kingdom

	China	United Kingdom
Mean	170839.2154	101762.8
Variance	12147565991	8649460792
Observations	13	13
df	12	12
F	1.404430436	
P(F<=f) one-tail	0.282713667	
F Critical one-tail	2.686637112	

F-Test Two-Sample for Variances
China & Japan

	China	Japan
Mean	170839.2154	8109.069231
Variance	12147565991	61382283.4
Observations	13	13
df	12	12
F	197.9001972	
P(F<=f) one-tail	7.30221E-12	
F Critical one-tail	2.686637112	

F-test for Two Sample Variances on Cross Border Bank Borrowing for China as Compared to the United States, European Union, United Kingdom and Japan

*Data for China includes the offshore clearing centre based in Hong Kong

F-Test Two-Sample for Variances

China & United States

	China*	United States
Mean	1.137538449	5.134431985
Variance	0.145729312	0.048293452
Observations	21	21
df	20	20
F	3.017579112	
P(F<=f) one-tail	0.008617619	
F Critical one-tail	2.124155213	

F-Test Two-Sample for Variances

China & European Union

	China*	EU
Mean	1.137538449	3.374329482
Variance	0.145729312	0.044432854
Observations	21	21
df	20	20
F	3.279764836	
P(F<=f) one-tail	0.005349925	
F Critical one-tail	2.124155213	

F-Test Two-Sample for Variances

China & United Kingdom

	China*	United Kingdom
Mean	1.137538449	4.662567068
Variance	0.145729312	0.096403555
Observations	21	21
df	20	20
F	1.511659111	
P(F<=f) one-tail	0.181592216	
F Critical one-tail	2.124155213	

F-Test Two-Sample for Variances

China & Japan

	China*	Japan
Mean	1.137538449	0.934230619
Variance	0.145729312	0.019719137
Observations	21	21
df	20	20
F	7.390248046	
P(F<=f) one-tail	1.91234E-05	
F Critical one-tail	2.124155213	

Appendix D – Research Hypothesis 6 & 7 Statistical Assessments

The following tables outline ANOVA regression results for each of the countries listed below.

ALGERIA

Regression Statistics	
Multiple R	0.994595347
R Square	0.989219905
Adjusted R Square	0.979979823
Standard Error	8123612471
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	4.23903E+22	7.06505E+21	107.0574855	1.58275E-06
Residual	7	4.61952E+20	6.59931E+19		
Total	13	4.28523E+22			

	Coefficients	Standard Error	t Stat	P-value
Intercept	25160329079	25241072846	0.996801096	0.352062798
Debt:GDP	26139799.68	420021915.7	0.062234371	0.952115921
Capita Growth rate	903273685.4	1898836340	0.475698546	0.648776206
Inflation	356453697.4	1455855446	0.244841408	0.813601648
FDI	-5.438785181	5.484463649	-0.991671297	0.354391487
Exports to China	1376.84132	291.524068	4.722907888	0.002150247
Imports from China	14613.05511	2039.986203	7.163310756	0.000183218

BENIN

Regression Statistics	
Multiple R	0.96402109
R Square	0.929336662
Adjusted R Square	0.868768086
Standard Error	722168243.6
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	4.80124E+19	8.00207E+18	15.34354488	0.001036815
Residual	7	3.65069E+18	5.21527E+17		
Total	13	5.16631E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	5468760228	1237216162	4.420214021	0.003080487
Debt:GDP	-49295461.92	23951165	-2.058165518	0.07857759
Capita Growth rate	-647207639	305759302.3	-2.116722645	0.072069437
Inflation	197061976.3	111973817	1.759893352	0.121821266
FDI	13.18967818	3.957597447	3.33274881	0.012543705
Exports to China	-10368.84688	8830.387352	-1.174223334	0.278701696
Imports from China	-1185.392308	3498.645504	-0.338814637	0.744685794

BOTSWANA

Regression Statistics	
Multiple R	0.809037721
R Square	0.654542034
Adjusted R Square	0.358435207

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	Standard Error	2631969315			
	Observations	14			

ANOVA

	df	SS	MS	F	Significance F
Regression	6	9.1876E+19	1.53127E+19	2.210492881	0.16149789
Residual	7	4.84908E+19	6.92726E+18		
Total	13	1.40367E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	16868166830	5073373539	3.324842277	0.012680473
Debt:GDP	-223285106.4	123546376.8	-1.807297892	0.113663657
Capita Growth rate	89329683.39	250976426.2	0.355928582	0.732379261
Inflation	-212927695.2	547352201.4	-0.389014047	0.708828357
FDI	-7.470154427	5.483925741	-1.362191025	0.215345201
Exports to China	2784.397289	15725.39081	0.17706379	0.864472637
Imports from China	16012.14637	6073.806046	2.636262379	0.033605436

BURKINA FASO

Regression Statistics	
Multiple R	0.932452153
R Square	0.869467018
Adjusted R Square	0.757581605
Standard Error	1642800792
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.25835E+20	2.09725E+19	7.771048931	0.008032772
Residual	7	1.88916E+19	2.69879E+18		
Total	13	1.44726E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	6040315653	2957079838	2.042662351	0.080396367
Debt:GDP	-75956777.2	53770813.76	-1.412602337	0.200654538
Capita Growth rate	404097228.5	236536222.4	1.708394699	0.131316072
Inflation	-13369746.22	159527999.6	-0.083808148	0.935555363
FDI	8.757230824	5.236731308	1.672270412	0.138390484
Exports to China	-9955.020703	24454.19805	-0.407088414	0.696103395
Imports from China	12256.8247	7447.750548	1.645708274	0.143819697

BURUNDI

Regression Statistics	
Multiple R	0.932198239
R Square	0.868993556
Adjusted R Square	0.756702318
Standard Error	303854036.7
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	4.28698E+18	7.14497E+17	7.738747681	0.008128588
Residual	7	6.46291E+17	9.23273E+16		
Total	13	4.93328E+18			

	Coefficients	Standard Error	t Stat	P-value
Intercept	2493869188	386818454.3	6.447130846	0.00035122
Debt:GDP	-11038989.22	2681247.506	-4.117109365	0.004475773
Capita Growth rate	7349442.617	65573302.62	0.1120798	0.913906409
Inflation	1750919.065	21547028.82	0.081260348	0.937509507
FDI	-0.075610071	38.09972515	-0.001984531	0.998471947

	Coefficients	Standard Error	t Stat	P-value
Exports to China	69248.29235	197598.2779	0.350449878	0.736309997
Imports from China	-3709.770455	6325.433435	-0.586484783	0.575965885

CAMEROON

Regression Statistics	
Multiple R	0.916062972
R Square	0.839171368
Adjusted R Square	0.701318255
Standard Error	3614649367
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	4.77219E+20	7.95365E+19	6.087431385	0.015819973
Residual	7	9.14598E+19	1.30657E+19		
Total	13	5.68679E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	23245708082	3885104255	5.983290681	0.000551379
Debt:GDP	-203948104.8	58138118.16	-3.507992885	0.009886054
Capita Growth rate	119072321.9	535164656.4	0.22249661	0.830279893
Inflation	-207906656.2	693213102.5	-0.299917378	0.772950499
FDI	4.651530918	4.704899037	0.988656904	0.355765431
Exports to China	3511.738472	9698.349504	0.362096506	0.727964329
Imports from China	-931.5021211	8537.725451	-0.109104249	0.916181588

CENTRAL AFRIQUE REPUBLIC

Regression Statistics	
Multiple R	0.97295145
R Square	0.946634524
Adjusted R Square	0.900892687
Standard Error	145449817.3
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	2.62692E+18	4.3782E+17	20.69515776	0.000399188
Residual	7	1.4809E+17	2.11556E+16		
Total	13	2.77501E+18			

	Coefficients	Standard Error	t Stat	P-value
Intercept	2093391160	196030728.3	10.67889294	1.38533E-05
Debt:GDP	-10561682.84	1932681.15	-5.464782869	0.000941068
Capita Growth rate	1752344.589	5808008.333	0.30171179	0.771638026
Inflation	-16315277.71	21592199.59	-0.755609804	0.47453624
FDI	6.282489296	3.006588795	2.089573841	0.075017214
Exports to China	-88.47734439	13192.61351	-0.006706582	0.994836091
Imports from China	-7048.750105	9863.750419	-0.714611563	0.497981476

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COTE D'IVOIRE

Regression Statistics	
Multiple R	0.98429661
R Square	0.968839816
Adjusted R Square	0.942131088
Standard Error	1596411821
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	5.54677E+20	9.24461E+19	36.27427672	6.29287E-05
Residual	7	1.78397E+19	2.54853E+18		
Total	13	5.72516E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	40906054990	4774855514	8.566972314	5.87195E-05
Debt:GDP	-176727671.4	20606584.32	-8.576271964	5.83096E-05
Capita Growth rate	-154680407	185099725	-0.835659842	0.430942407
Inflation	4474056.883	358293001.4	0.012487146	0.990385397
FDI	-4.788601389	9.345460346	-0.512398663	0.624139143
Exports to China	-39253.87793	18356.77152	-2.138386801	0.069800387
Imports from China	1585.087176	3255.113499	0.486952967	0.641168754

EGYPT

Regression Statistics	
Multiple R	0.998126691
R Square	0.996256891
Adjusted R Square	0.993048512
Standard Error	5678510456
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	6.00767E+22	1.00128E+22	310.5171903	3.94754E-08
Residual	7	2.25718E+20	3.22455E+19		
Total	13	6.03024E+22			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1.8878E+11	18744137908	10.07139879	2.04136E-05
Debt:GDP	-3001791445	503532589.5	-5.961464079	0.000563552
Capita Growth rate	-9196594674	2563010947	-3.588199529	0.008878441
Inflation	497314013.5	558987410.8	0.889669434	0.403181225
FDI	2.281373241	0.930344801	2.45218035	0.043966472
Exports to China	-9581.902854	12431.42285	-0.770780865	0.466051353
Imports from China	15837.23311	1863.886611	8.496886568	6.19162E-05

ETHIOPIA

Regression Statistics	
Multiple R	0.927137011
R Square	0.859583036
Adjusted R Square	0.739225639
Standard Error	6633434182
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.88557E+21	3.14262E+20	7.141921096	0.010195306
Residual	7	3.08017E+20	4.40024E+19		
Total	13	2.19359E+21			

	Coefficients	Standard Error	t Stat	P-value
Intercept	25013130385	12766094479	1.959340848	0.090907941
Debt:GDP	-358045769.7	130617074.8	-2.741186558	0.028868702
Capita Growth rate	-649203937.2	542203324	-1.197344075	0.270141052
Inflation	-152405522.3	165969800.4	-0.918272613	0.389020307
FDI	29.59246059	11.07849667	2.671162113	0.031945824
Exports to China	-5640.748766	48400.83088	-0.116542395	0.910495827
Imports from China	5690.480025	8339.892524	0.682320547	0.516971183

GABON

Regression Statistics	
Multiple R	0.976966553
R Square	0.954463646
Adjusted R Square	0.915432486
Standard Error	1528037188
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	3.42584E+20	5.70973E+19	24.45388847	0.000232011
Residual	7	1.63443E+19	2.3349E+18		
Total	13	3.58928E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	14685237401	3924324227	3.742106042	0.007242726
Debt:GDP	-159548025.6	72449946.66	-2.202182789	0.063526006
Capita Growth rate	75174121.21	391561039.2	0.191985703	0.853203991
Inflation	310499498.3	376028448.2	0.825734063	0.436189506
FDI	6.881657103	3.495063841	1.968964636	0.089627853
Exports to China	-877.3433419	2055.490586	-0.426829171	0.682324297
Imports from China	-30678.06115	20839.75664	-1.472093061	0.184474418

GAMBIA

Regression Statistics	
Multiple R	0.958222954
R Square	0.91819123
Adjusted R Square	0.848069426
Standard Error	72704892.72
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	4.15297E+17	6.92161E+16	13.094233	0.001699592
Residual	7	3.7002E+16	5.286E+15		
Total	13	4.52299E+17			

	Coefficients	Standard Error	t Stat	P-value
Intercept	998607156.7	115854203.6	8.619515956	5.64453E-05
Debt:GDP	-3919548.384	952313.883	-4.115815651	0.004483048
Capita Growth rate	-501556.6256	6168241.586	-0.08131274	0.937469318
Inflation	-2517815.344	5805760.468	-0.433675374	0.677575464
FDI	-1.342521166	1.930359578	-0.695477247	0.509178779
Exports to China	-3031.026895	14303.66286	-0.211905644	0.838218533
Imports from China	5700.209448	3984.27469	1.430676821	0.195608906

GHANA

Regression Statistics	
Multiple R	0.996033051
R Square	0.992081838
Adjusted R Square	0.985294842
Standard Error	1619412264
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	2.30004E+21	3.83341E+20	146.173924	5.39965E-07
Residual	7	1.83575E+19	2.6225E+18		
Total	13	2.3184E+21			

	Coefficients	Standard Error	t Stat	P-value
Intercept	13807091579	2453202560	5.628190597	0.000792273
Debt:GDP	-77398594.39	35366054.45	-2.188499554	0.064822198
Capita Growth rate	-1116807703	313544548.2	-3.561878878	0.009196284
Inflation	48812329.1	113516269.1	0.430002937	0.680120895
FDI	-1.747421447	1.160934596	-1.505185092	0.175993512
Exports to China	-25136.67786	8783.450849	-2.861822568	0.024274224
Imports from China	25183.16555	4195.827971	6.001953781	0.000541203

GUINEA

Regression Statistics	
Multiple R	0.986081652
R Square	0.972357024
Adjusted R Square	0.948663045
Standard Error	253318137.1
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.58005E+19	2.63342E+18	41.03814778	4.16126E-05
Residual	7	4.49191E+17	6.41701E+16		
Total	13	1.62497E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	6848450253	270319445.3	25.33465636	3.81165E-08
Debt:GDP	-35525251.9	3151775.236	-11.2715055	9.66932E-06
Capita Growth rate	-33442894.09	46720481.77	-0.715807989	0.497286697
Inflation	7669273.081	9243266.077	0.829714629	0.43407984
FDI	0.219321873	0.32375121	0.677439548	0.519881267
Exports to China	-2731.591581	17568.84549	-0.155479288	0.880832004
Imports from China	-2377.59612	3172.032781	-0.749549669	0.477954488

KENYA

Regression Statistics	
Multiple R	0.89833751
R Square	0.807010281
Adjusted R Square	0.641590522
Standard Error	8451939076
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	2.09101E+21	3.48501E+20	4.87856037	0.028271604
Residual	7	5.00047E+20	7.14353E+19		
Total	13	2.59105E+21			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1.04842E+11	34219362296	3.063829226	0.018224982
Debt:GDP	-2186432205	793674613.2	-2.754821899	0.028306474

Capita Growth rate	375844643.4	1284354223	0.292633167	0.778286479
Inflation	348428262.3	672854279.6	0.517836139	0.620531321
FDI	2.229397159	15.60287399	0.142883751	0.89040792
Exports to China	-1784099.874	589592.275	-3.025989229	0.019223088
Imports from China	24951.08273	14199.06081	1.757234725	0.122294993

LESOTHO

Regression Statistics	
Multiple R	0.970655843
R Square	0.942172766
Adjusted R Square	0.892606565
Standard Error	213932567.9
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	5.21975E+18	8.69959E+17	19.00837156	0.000524912
Residual	7	3.2037E+17	4.57671E+16		
Total	13	5.54012E+18			

	Coefficients	Standard Error	t Stat	P-value
Intercept	4074599126	445486902.5	9.146394884	3.84027E-05
Debt:GDP	-39332075.07	9123111.586	-4.311256604	0.003517679
Capita Growth rate	11231964.34	28118357.65	0.399453072	0.70146644
Inflation	38248114.92	59272429.16	0.645293528	0.539303819
FDI	-11.25289226	4.665827495	-2.411767745	0.046652716
Exports to China	35618.80017	117218.1658	0.303867578	0.770062294
Imports from China	-2282.094959	5545.64908	-0.411510885	0.693005543

MADAGASCAR

Regression Statistics	
Multiple R	0.993934913
R Square	0.98790661
Adjusted R Square	0.977540848
Standard Error	367916249.8
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	7.74041E+19	1.29007E+19	95.30476907	2.36187E-06
Residual	7	9.47537E+17	1.35362E+17		
Total	13	7.83516E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	5019077372	837816941.5	5.990661113	0.000547335
Debt:GDP	-4093732.972	7567225.836	-0.540982001	0.605299594
Capita Growth rate	-31207716.97	33707229.12	-0.925846407	0.385333373
Inflation	-72677570.66	29745851.17	-2.443284284	0.044543838
FDI	2.346736736	0.750852743	3.125428733	0.016716245
Exports to China	31136.53415	3711.999057	8.388077064	6.72768E-05
Imports from China	1207.17883	1480.103838	0.815604148	0.441590894

MALAWI

Regression Statistics	
Multiple R	0.926205741
R Square	0.857857074

	Adjusted R Square	0.73602028			
	Standard Error	922992059.2			
	Observations	14			

ANOVA

	df	SS	MS	F	Significance F
Regression	6	3.59901E+19	5.99836E+18	7.041034551	0.010608882
Residual	7	5.9634E+18	8.51914E+17		
Total	13	4.19536E+19			

	Coefficients	Standard Error	t Stat	P-value	
Intercept	5504006978	1215473099	4.528283664	0.002705249	
Debt:GDP	-22670439.47	7342333.168	-3.087634265	0.017625421	
Capita Growth rate	-267930005.5	129177517.3	-2.07412258	0.076748222	
Inflation	-62810840.72	44390807.17	-1.414951535	0.199992228	
FDI	3.253763721	5.915061025	0.550081175	0.599368253	
Exports to China	-72458.42424	61243.19808	-1.18312607	0.275378928	
Imports from China	27623.65675	15374.19784	1.796754343	0.115431428	

MALI

Regression Statistics	
Multiple R	0.928891714
R Square	0.862839816
Adjusted R Square	0.745273944
Standard Error	1511604305
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.00618E+20	1.67697E+19	7.339203127	0.009444501
Residual	7	1.59946E+19	2.28495E+18		
Total	13	1.16613E+20			

	Coefficients	Standard Error	t Stat	P-value	
Intercept	7280821371	1543245530	4.71786325	0.002162932	
Debt:GDP	-59568619.62	20418792.29	-2.917342944	0.022424715	
Capita Growth rate	-120642709.1	137270382.2	-0.878869186	0.408625715	
Inflation	-6658686.058	146174956	-0.045552851	0.96493894	
FDI	5.544155777	2.344147552	2.36510529	0.049964633	
Exports to China	-453.5626057	10054.51222	-0.045110354	0.965279256	
Imports from China	4761.637598	3472.740854	1.371146825	0.212667768	

MAURITANIA

Regression Statistics	
Multiple R	0.985039059
R Square	0.970301949
Adjusted R Square	0.944846476
Standard Error	361270449.5
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	2.98498E+19	4.97497E+18	38.11761678	5.33098E-05
Residual	7	9.13614E+17	1.30516E+17		
Total	13	3.07634E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1431403607	1297389069	1.103295566	0.306377617
Debt:GDP	-4173435.615	4466287.811	-0.934430514	0.381186328
Capita Growth rate	40318499.45	40492223.52	0.995709693	0.352557248
Inflation	124579597.9	71001289.58	1.754610355	0.12276434
FDI	-1.384594705	0.669074535	-2.069417729	0.077283156
Exports to China	2086.997558	874.9639254	2.385238405	0.048507115
Imports from China	16108.27475	7954.123939	2.025147567	0.082501366

MAURITIUS

Regression Statistics	
Multiple R	0.986142242
R Square	0.972476522
Adjusted R Square	0.948884969
Standard Error	581357156.5
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	8.35911E+19	1.39318E+19	41.22138641	4.09941E-05
Residual	7	2.36583E+18	3.37976E+17		
Total	13	8.59569E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	3882408406	1083289680	3.583906021	0.008929466
Debt:GDP	-56718810.6	36940768.13	-1.535398788	0.168562309
Capita Growth rate	157869202.7	116384847.5	1.356441204	0.217079799
Inflation	-18113032.02	75685358.01	-0.23932016	0.817713476
FDI	-2.495942972	2.306581967	-1.082095936	0.315071718
Exports to China	41207.70477	75633.84529	0.544831545	0.602786312
Imports from China	11316.91055	1896.868979	5.966100282	0.000560941

MOROCCO

Regression Statistics	
Multiple R	0.878277366
R Square	0.771371131
Adjusted R Square	0.575403529
Standard Error	15720784229
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	5.83685E+21	9.72809E+20	3.93621763	0.047916958
Residual	7	1.73E+21	2.47143E+20		
Total	13	7.56685E+21			

	Coefficients	Standard Error	t Stat	P-value
Intercept	73089669364	43709866616	1.672154939	0.138413664
Debt:GDP	-888093221.6	916438480.7	-0.9690702	0.364793239
Capita Growth rate	-3945041553	2749274280	-1.434939242	0.194435707
Inflation	473887157.7	4915743164	0.096401936	0.925903292
FDI	12.95273539	5.885588075	2.200754661	0.063660062
Exports to China	-44869.03977	198836.6975	-0.22565774	0.82791448
Imports from China	10612.22682	17086.19043	0.621099646	0.554212064

MOZAMBIQUE

Regression Statistics	
Multiple R	0.960681426
R Square	0.922908802
Adjusted R Square	0.856830632
Standard Error	1537870662
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.98195E+20	3.30324E+19	13.96692438	0.001391383
Residual	7	1.65553E+19	2.36505E+18		
Total	13	2.1475E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	14002182931	4040245662	3.465676125	0.010466893
Debt:GDP	-84613897.43	40174365.55	-2.106166364	0.073201636
Capita Growth rate	206100296.2	331928533.4	0.620917684	0.554325121
Inflation	-52289361.61	135376821.5	-0.386250475	0.710782952
FDI	1.452854711	1.53230863	0.948147574	0.374629374
Exports to China	-4193.051255	8786.286958	-0.47722676	0.647740536
Imports from China	-2562.178141	15483.91091	-0.165473578	0.873248816

NAMIBIA

Regression Statistics	
Multiple R	0.991236768
R Square	0.982550329
Adjusted R Square	0.967593469
Standard Error	618464905.5
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.50763E+20	2.51272E+19	65.69228433	8.45154E-06
Residual	7	2.67749E+18	3.82499E+17		
Total	13	1.53441E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1580005150	1299131653	1.216200949	0.26332354
Debt:GDP	131327906.1	36528857.55	3.595182409	0.008796126
Capita Growth rate	79408157.33	42320669.19	1.876344558	0.102716063
Inflation	-329859158.1	72028334.91	-4.579574947	0.002545039
FDI	6.708144004	1.14155074	5.876343268	0.000613985
Exports to China	5497.047418	4467.571862	1.230432903	0.258274844
Imports from China	5634.519387	4283.274545	1.315470052	0.229798914

NIGER

Regression Statistics	
Multiple R	0.991431813
R Square	0.982937039
Adjusted R Square	0.968311644
Standard Error	339573363.4
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	4.64982E+19	7.74971E+18	67.20755553	7.81871E-06
Residual	7	8.0717E+17	1.1531E+17		
Total	13	4.73054E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	4420000559	295078729.7	14.97905513	1.41861E-06
Debt:GDP	-29423651.43	4066268.348	-7.236032872	0.000171995
Capita Growth rate	-4328045.675	25996859.75	-0.166483403	0.872483389
Inflation	55691908.97	31472279.79	1.76955433	0.120114546
FDI	2.421347991	0.635349388	3.811049536	0.006618861
Exports to China	41736.16222	5767.853814	7.23599515	0.000172001
Imports from China	-2002.71798	762.6229113	-2.626092071	0.03410578

NIGERIA

Regression Statistics	
Multiple R	0.805186979
R Square	0.648326072
Adjusted R Square	0.346891276
Standard Error	1.32021E+11
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	2.24926E+23	3.74876E+22	2.150800378	0.169693268
Residual	7	1.22007E+23	1.74296E+22		
Total	13	3.46933E+23			

	Coefficients	Standard Error	t Stat	P-value
Intercept	2.85115E+11	2.59265E+11	1.099705728	0.307836017
Debt:GDP	-3394656773	3495027910	-0.971281735	0.363765191
Capita Growth rate	-1398493993	10770863739	-0.129840468	0.900344938
Inflation	-2562335168	10511393892	-0.243767401	0.814401003
FDI	4.949797852	42.38805843	0.116773404	0.910319331
Exports to China	33959.0773	24136.86179	1.406938383	0.202259435
Imports from China	-7444.737608	23817.2828	-0.312577118	0.763708147

RWANDA

Regression Statistics	
Multiple R	0.969428026
R Square	0.939790697
Adjusted R Square	0.888182723
Standard Error	717204335.9
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	5.6202E+19	9.36699E+18	18.21018388	0.000602232
Residual	7	3.60067E+18	5.14382E+17		
Total	13	5.98026E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	5129427984	924620244.8	5.547605098	0.000862086
Debt:GDP	-33475907.47	10761736.53	-3.110641798	0.017065862
Capita Growth rate	-4062960.853	74881721.5	-0.054258379	0.958245388
Inflation	-102012879.9	64488877.83	-1.581867809	0.157693943

FDI	2.768480744	10.19641255	0.271515176	0.793827919
Exports to China	6041.864799	57164.99328	0.105691691	0.91879195
Imports from China	12133.59043	4492.462412	2.700877451	0.030600151

SENEGAL

Regression Statistics	
Multiple R	0.935490119
R Square	0.875141762
Adjusted R Square	0.768120415
Standard Error	1790583494
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.57307E+20	2.62179E+19	8.177263585	0.006942792
Residual	7	2.24433E+19	3.20619E+18		
Total	13	1.7975E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	3042669998	5404448751	0.562993589	0.591006978
Debt:GDP	17842003.54	58149795.11	0.306828313	0.7679001
Capita Growth rate	443609156.1	352204729.1	1.259520726	0.248211593
Inflation	-296580651.3	396582780	-0.747840467	0.47892155
FDI	30.1149626	8.990091143	3.349795026	0.012254199
Exports to China	5978.063945	157686.1188	0.037911162	0.970817043
Imports from China	626.8244997	8859.527061	0.070751463	0.945574471

SEYCHELLES

Regression Statistics	
Multiple R	0.943093162
R Square	0.889424711
Adjusted R Square	0.794645893
Standard Error	99325456.14
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	5.55482E+17	9.25804E+16	9.384213935	0.004649837
Residual	7	6.90588E+16	9.86555E+15		
Total	13	6.24541E+17			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1535895177	216917556.7	7.080548024	0.000197005
Debt:GDP	-14443176.53	3464983.715	-4.168324506	0.004197912
Capita Growth rate	-9453871.054	4431704.722	-2.133235774	0.070333332
Inflation	11084575.69	3897685.66	2.843886516	0.024905545
FDI	1.553342037	0.434263123	3.576960496	0.009012683
Exports to China	1102926.409	678373.3684	1.625839781	0.148010612
Imports from China	1181.441742	5218.552256	0.226392625	0.827364853

SOUTH AFRICA

Regression Statistics	
Multiple R	0.989903682
R Square	0.979909299
Adjusted R Square	0.962688698

	Standard Error	19895848404			
	Observations	14			

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.35149E+23	2.25249E+22	56.90331634	1.37833E-05
Residual	7	2.77091E+21	3.95845E+20		
Total	13	1.3792E+23			

	Coefficients	Standard Error	t Stat	P-value
Intercept	2.65199E+11	43436723894	6.105413156	0.00048847
Debt:GDP	-4806011016	1877745607	-2.559458	0.037581314
Capita Growth rate	-1654517386	3957322050	-0.418090154	0.68840854
Inflation	-2652518677	2998070249	-0.884742003	0.405658552
FDI	-3.015035307	2.308253503	-1.306197652	0.232766084
Exports to China	4505.295008	5820.167298	0.77408342	0.464218049
Imports from China	18519.7226	4448.803865	4.162854367	0.004226668

SWAZILAND

Regression Statistics	
Multiple R	0.955992558
R Square	0.91392177
Adjusted R Square	0.840140431
Standard Error	406053514.3
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.22541E+19	2.04234E+18	12.38689587	0.002016499
Residual	7	1.15416E+18	1.64879E+17		
Total	13	1.34082E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	5653741885	712830614.9	7.931395995	9.62982E-05
Debt:GDP	-131009105.1	42811368.5	-3.060147565	0.018319629
Capita Growth rate	-77975795.88	59514550.54	-1.310197173	0.231482177
Inflation	-50676930.85	53473733.43	-0.947697638	0.374843088
FDI	1.692833195	3.083984324	0.548911089	0.600129168
Exports to China	-5944.497669	4705.75222	-1.263240687	0.246949125
Imports from China	-5235.587111	7356.464648	-0.711698807	0.499675594

TANZANIA

Regression Statistics	
Multiple R	0.998372739
R Square	0.996748126
Adjusted R Square	0.993960806
Standard Error	880744185.9
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.66437E+21	2.77395E+20	357.6008454	2.41442E-08
Residual	7	5.42997E+18	7.7571E+17		
Total	13	1.6698E+21			

	Coefficients	Standard Error	t Stat	P-value
Intercept	7935451495	1757478272	4.515248707	0.002747716

	Coefficients	Standard Error	t Stat	P-value
Debt:GDP	5968850.597	27409075.93	0.217769129	0.833820894
Capita Growth rate	-40467689.66	91457529.07	-0.442475213	0.671494536
Inflation	204819538.8	116991103.9	1.750727465	0.123461917
FDI	4.555203995	0.919171872	4.955769572	0.00164546
Exports to China	-3458.097741	2503.221342	-1.381459036	0.209621294
Imports from China	17358.49661	1543.042161	11.2495284	9.7961E-06

TOGO

Regression Statistics	
Multiple R	0.993471795
R Square	0.986986207
Adjusted R Square	0.975831528
Standard Error	153745016.1
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.25489E+19	2.09149E+18	88.48180814	3.04877E-06
Residual	7	1.65463E+17	2.36375E+16		
Total	13	1.27144E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1618753253	174061299.2	9.299903313	3.44499E-05
Debt:GDP	-2245601.055	1711908.867	-1.311752687	0.230984498
Capita Growth rate	98693370.93	27388104.41	3.603512293	0.008699012
Inflation	27710347.92	22113238.22	1.253111265	0.25039978
FDI	0.138347246	0.052456787	2.637356456	0.033552068
Exports to China	1476.393605	1698.417571	0.869275984	0.41350655
Imports from China	7389.07413	823.30294	8.974915272	4.34383E-05

TUNISIA

Regression Statistics	
Multiple R	0.947028094
R Square	0.89686221
Adjusted R Square	0.80845839
Standard Error	4173783786
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	1.06039E+21	1.76732E+20	10.14506171	0.00369019
Residual	7	1.21943E+20	1.74205E+19		
Total	13	1.18233E+21			

	Coefficients	Standard Error	t Stat	P-value
Intercept	38751249679	15024279697	2.579241765	0.036512644
Debt:GDP	-271211813.5	245713588.2	-1.103772142	0.306184426
Capita Growth rate	575143172.8	862384427.1	0.66692203	0.526186986
Inflation	-230426791	1796373609	-0.128273311	0.901540206
FDI	-3.117214722	7.85542094	-0.396823384	0.703317778
Exports to China	53609.59625	84956.35563	0.63102514	0.548066136
Imports from China	15601.44811	9603.485582	1.624560996	0.148284222

UGANDA

Regression Statistics	
Multiple R	0.995012958
R Square	0.990050787
Adjusted R Square	0.98152289
Standard Error	937279292.5
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	6.11934E+20	1.01989E+20	116.0955406	1.1969E-06
Residual	7	6.14945E+18	8.78492E+17		
Total	13	6.18084E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	5024264888	2183647016	2.300859457	0.054921495
Debt:GDP	8846024.14	31629112.74	0.279679807	0.787806919
Capita Growth rate	199620.6962	164600782.8	0.001212757	0.999066198
Inflation	19398725.68	79661024.36	0.243515895	0.814588225
FDI	2.100266188	1.204511982	1.743665667	0.124740296
Exports to China	569901.1208	73663.92664	7.736502068	0.000112811
Imports from China	-623.956403	338.1273305	-1.845329693	0.107501222

ZAMBIA

Regression Statistics	
Multiple R	0.989935014
R Square	0.979971332
Adjusted R Square	0.962803902
Standard Error	1640478113
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	9.21723E+20	1.5362E+20	57.08317036	1.36363E-05
Residual	7	1.88382E+19	2.69117E+18		
Total	13	9.40561E+20			

	Coefficients	Standard Error	t Stat	P-value
Intercept	9734145908	5883270684	1.654546668	0.141991337
Debt:GDP	-16184866.11	22708474.01	-0.712723634	0.499079106
Capita Growth rate	387827284.2	748370600.9	0.518228915	0.620271142
Inflation	-172362688.8	353469005.1	-0.487631691	0.64071143
FDI	0.458071846	2.12260284	0.215806668	0.835292047
Exports to China	4506.435795	3246.954553	1.387896172	0.207739262
Imports from China	8166.163654	7281.419373	1.121507118	0.299065304

ZIMBABWE

Regression Statistics	
Multiple R	0.962198121
R Square	0.925825223
Adjusted R Square	0.862246843
Standard Error	1008531583
Observations	14

ANOVA

	df	SS	MS	F	Significance F
Regression	6	8.88689E+19	1.48115E+19	14.56195048	0.001221555
Residual	7	7.11995E+18	1.01714E+18		
Total	13	9.59889E+19			

	Coefficients	Standard Error	t Stat	P-value
Intercept	7289405418	1400579285	5.204564638	0.001246742
Debt:GDP	-29262610.93	14201320.02	-2.060555701	0.078300839
Capita Growth rate	-4767607.663	40333885.35	-0.118203531	0.909226801
Inflation	19652025.77	15805042.07	1.243402306	0.253745801
FDI	9.303264908	5.688056933	1.635578725	0.145942278
Exports to China	-778.8014433	6327.703297	-0.12307806	0.905504555
Imports from China	9476.07735	6144.259559	1.542265143	0.166914099

Appendix E – TurnItIn Report

Turnitin Originality Report

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Harris, Ashley D., Nicolaas A.J. Puts, and Richard A.E. Edden. "Tissue correction for GABA-edited MRS: Considerations of voxel composition, tissue segmentation, and tissue relaxations : Tissue Correction for GABA-Edited MRS", Journal of Magnetic Resonance Imaging, 2015.

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The rationale for Renminbi-denominated foreign reserves for African countries Student Name: Student Number: Purpose: Submission Date: Ms. Sanusha Chetty 445513 A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Masters of Business Administration. 09 November 2015 i

Abstract International Monetary Fund ("IMF") member countries are required to hold foreign reserves denominated in reserve currencies and China has indicated its intention to obtain a reserve currency issuer status. Given increased Sino-Africa trade, African countries may consider strategically realigning their foreign reserves to assist China, in order to secure beneficial trade arrangements. The purpose of this research was to evaluate the suitability of Renminbi-denominated foreign reserves for African countries, with a particular focus on Gross Domestic Product ("GDP") growth. Africa could improve the market depth and liquidity of the Renminbi and support its acceptance within the IMF. China may find this beneficial as it would not affect its foreign reserve valuations nor result in significant transactional costs. The research assessed the comparability between the Renminbi and reserve currencies, China's capital account liberalisation and the impact of Sino-Africa trade on African GDP growth. The Renminbi was somewhat comparable to other reserve currency issuers. However, the impact of Sino-Africa trade on African GDP growth was limited. African GDP growth was more significantly linked to debt and Foreign Direct Investment ("FDI"). Thus African countries may rather consider pursuing Renminbi-denominated debt or FDI in order to enhance their GDP growth and Sino-Africa relationships.

Keywords:...Africa; China; Renminbi; Foreign Reserves; and Trade. ii

Chapter 1 – Introduction to the Research
Problem In July 1944, the Bretton Woods system established the United States Dollar ("USD") as
the global reserve currency and moved away from the gold-exchange standard. Over time, other
reserve currencies such as the European Union Euro ("EUR"), Japanese Yen ("YEN") and British
Pound Sterling ("GBP") were introduced to limit the dependency on the United States of America's
("United States") balance of payments deficit (Austin, 2014). As at September 2015, 188 countries
were members of the International Monetary Fund ("IMF"). According to the IMF, member countries
are required to maintain certain quotas or foreign reserves in the form of foreign currency
securities, gold or international reserve assets designated as Special Drawing Rights ("SDRs"). An
SDR is a potential claim on the freely usable currencies of IMF members and can be traded between
members at any time for freely transferable currencies. SDR quotas are based on a member's
relative position of within the global economy and change over time. As of September 2015, the IMF
held c.USD285 billion in global SDR reserves (see Figure 1). Figure 1: World SDR Allocations
(Figures in USDbn) 350 300 250 200 150 100 50 0 2000 2001 2002 2003 2004 2005 2006 2007
2008 2009 2010 2011 2012 2013 2014 Source: International Monetary Fund The SDR is a quasi-
currency that is derived from a basket of global reserve currencies according to predetermined
basket weightings set by the IMF. Each underlying currency component represents a country or
region with significant presence within the global economy. The SDRs were created to support a
multi-currency based system with less reliance upon any single or significant trading currency. An
IMF member can exchange its SDR holdings at any time for the underlying reserve currencies. Each
member can either earn or be charged interest if its SDR holdings are respectively above or below
its allocated quota. The SDR currency rate is predominantly determined by the USD, which over the
last 15 years has averaged around 42% of the SDR's valuation (see Figure 2). In 2009, an
amendment to the IMF SDR regulations required all IMF members to hold SDR allocations on an
equitable basis. The last amendment to the underlying currency weightings was implemented in
2011 and the weightings were adjusted to 41.9% USD; 37.4% EUR, 11.3% GBP and 9.4% YEN
respectively. Figure 2: Currency Weighting within the IMF SDR Basket (Figures in %) 50% 40%
30% 20% 10% 0% 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
2014 2015 USD EUR YEN GBP Source: International Monetary Fund The Peoples Republic of China
("China") has indicated an intention to obtain a reserve currency issuer status. This is embedded
within China's 12th Five-Year Development Plan, which outlines various objectives concerning the
improvement of the RMB's technical status as a trading currency. Most notably, the execution of
planned objectives coincided with the 2015 IMF review of the SDR currency basket. Taylor (2013)
proposed that global trade has realigned from North-South (between developed and emerging
countries) to South-South (within emerging countries) and China is likely to be a key facilitator.
Furthermore, China may be well positioned to adopt a reserve generation stance as opposed to its
current reserve accumulation strategy. During the 2015 United Nations Sustainable Development
Summit, China's President Xi Jinping pledged a further USD2 billion to support the South-South
cooperation assistance fund (FOCAC, 2015). According to the IMF, China currently represents more
than 30% of total global reserves, excluding gold, and has recently adopted an internationalisation
strategy for its currency, the Renminbi ("RMB"). As at September 2015, China's foreign reserves
amounted to USD3.557 trillion, with the majority of holdings within USD-denominated assets
(c.USD1.4 trillion) and not SDRs (see Figure 3). Lizardo & Kelly (2014) suggest that China's usage
of USD-denominated reserves is linked to its need for an undervalued currency to support an ever-
growing trade surplus. Figure 3: China and Reserve Currency Issuer SDR Holdings (Figures in
USDbn) 200 175 150 125 100 75 50 25 0 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

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2010 2011 2012 2013 2014 2015 China United States Euro area excl. UK United Kingdom Japan Source: International Monetary Fund Upon referring to the matter of including the RMB within the 2015 SDR basket, IMF Managing Director Christine Lagarde commented "It's not a question of if, it's a question of when" (Taplin & Sweeney, 2015). In order to achieve a reserve currency designation, the IMF has highlighted China's need for a deeper global RMB utilisation, improved settlement infrastructure and finally IMF Board approval. As at September 2015, the United States, United Kingdom and Japan represented a combined 27% of total IMF voting rights, whereas China and Africa represented 3.651% and 5% respectively. China's allocated voting rights do not reflect its reserve position held within the IMF (see Figure 4). The 2010 IMF quota and governance reform framework, which provides increased voting power to developing economies, has yet to be ratified within the IMF and awaits final approval by the United States. Thus, China will require additional support from other IMF members to fulfil the 75% voting requirement to achieve a reserve currency status. Figure 4: China and Africa as a Percentage of Total World Foreign Exchange Reserves (Figures in %) 40% 35% 30% 25% 20% 15% 10% 5% 0% 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 Africa/World FER% China/World FER% Source: International Monetary Fund Africa's foreign reserve accumulation has not shown significant growth, which may be reflective of its historic real GDP growth rate (see Figure 5). Foreign reserve requirements are typically increased by the IMF as countries increase their market share within global trade. Despite the muted growth in foreign reserves, African countries may utilise their associated IMF voting rights to obtain beneficial agreements with other IMF members. Figure 5: Africa's Average Real GDP Growth Rate (Figures in %) 8 7 6 5 4 3 2 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 Source: International Monetary Fund Most African countries have historically held less than their designated SDR allocations (see Figure 6). Over the last 15 years, 80% of African countries on average do not meet their allocated SDR quotas. Countries may either elect to incur an interest charge levied by the IMF on any unfulfilled quotas or seek external debt financing to fulfil these obligations. As such, IMF reserve requirements result in a redistribution of income from the developing to the developed world (Ocampo, 2008). Figure 6: Africa's Net SDR Position (Figures in USDbn) 1,000 500 0 2003 -500 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 -1,000 -1,500 -2,000 -2,500 Source: International Monetary Fund Despite reduced reserves relative to other IMF members, Africa's overall debt position has grown (see Figure 7). This is contrary to the emerging market trend of increasing foreign reserves and decreasing short term debt finance simultaneously, as well as the Guidotti-Greenspan-IMF rule of maintaining foreign reserves to at least meet short term debt obligations (Rodrik, 2006). African countries have not elected to fund their reserve shortfalls through the use of external debt funding. Figure 7: Africa's Growing Debt Obligations (Figures in USDbn) 600 550 500 450 400 350 300 250 200 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 Source: African Development Bank During the 2014 African Union summit, China's Premier Li Keqiang forecasted a growth in Sino-Africa trade to USD400 billion and direct investment to USD100 billion in Africa by 2020, far surpassing that of the United States and European counterparts (Keqiang, 2014). Africa's dependency on global commodity demand has been predominantly driven by the performance of the Chinese economy and its associated infrastructure needs (see Figure 8). China has also migrated its dealings with Africa towards a two-tiered bargaining model (Li, Newenham-Kahindi, Shapiro, & Chen, 2013). The Chinese government and multi- national corporates engage African trade on a mutual basis, firstly to lower entry barriers and secondly to enhance the bargaining power of Chinese firms. Thus African countries may need to consider alternative means to manage their trading relationships with China. Figure 8: Africa as a Percentage of Total Chinese Net Exports (Figures in %) 25% 20% 15% 10% 5% 0% 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 Source: World Bank WITS Database This research document will investigate the feasibility of linking China's RMB internationalisation strategy, growth in Sino-Africa trade and the associated impact on African GDP growth. A review of the RMB's suitability as a reserve currency and the impact of Africa's trading relationship with China will be required. China may accelerate its RMB strategy through the use of African trading agreements and secure beneficial IMF voting to approve the RMB's reserve status. In return, African countries may request enhanced Sino-Africa trade volume, improved trading terms and/or lower transactional costs. However, the relationship between Sino-Africa trade and sustainable GDP growth requires further investigation. In terms of business applicability, the research may provide insight into strategic risk management policies for African reserves. Any changes in foreign reserves may have a significant impact on the global currency and derivative markets. Secondly, the research may propose alternative means for African countries to enhance Sino-Africa trade beyond focussing on trade terms and conditions. The research may also indicate whether African countries or China dictate the directional flow of Sino-Africa trade and hence a bias towards positional power. Lastly, China may wish to circumvent a large USD devaluation given its exposure to the USD-denominated reserve assets. China may consider directly absorbing a large amount of Africa's USD-denominated reserves in return for RMB-denominated assets. This may indirectly promote the market depth of the RMB and limit the risk of excess USD-denominated assets being released into the global markets. . Chapter 2 - Theory and Literature Review This chapter presents a literature review on the relative importance of reserve currency issuers within the international monetary system, the ability of China to achieve a reserve currency issuer status and the peripheral benefits of foreign reserve management and Sino-Africa trade. The International Monetary System's Bias towards Reserve Currency Issuers According to the IMF, the objective of the international monetary system is to foster stable and high global growth, while supporting price and financial stability. The system comprises a set of official arrangements that regulate key dimensions of the global balance of payments, which include exchange arrangements and exchange rates; international payments and transfers relating to international transactions; international capital movements; and international reserves. Its purpose is to facilitate the exchange of goods, services and capital amongst countries. Eichengreen (2013) described the international monetary system as the "glue that binds national economies". The system is currency-based in order to respond to global liquidity needs, as opposed to asset-based such as the previous gold standard. Global liquidity is facilitated by trading primary reserve currencies, which are inherently based on the currency's credit quality, confidence and trust to foster stability. However, the system is plagued by volatility, notable information asymmetry and clashes of global and national policy objectives (Subacchi, 2010). Austin (2014) proposed that a

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new Bretton Woods system has evolved. Reserve accumulators peg their exchange rates to reserve currencies and freely purchased reserves to resist appreciation of their own currencies. As such, reserve accumulators benefitted from the system by setting low currency values in order to engineer large current account surpluses and strategic reserve purchases. The burden of global readjustment always fell upon the reserve currency issuer. Such asymmetries fostered two main effects – quantity and price. Banchs & Mollejas (2010) argued that monetary system asymmetries were created by non-reserve currency issuers. Non-reserve currency issuers targeted a minimum amount of foreign reserves as their own domestic currencies were not globally liquid. The demand for non-reserve currencies was not market driven but rather determined by domestic interest rate policies. Secondly, Banchs & Mollejas (2010) proposed that non-reserve currency issuers had the option to accumulate local or foreign currency reserve holdings, essentially considering both interest and exchange rate policy implications for foreign reserve management (see Figure 9). Reserve currency issuers had more flexibility in reserve accumulation and were less constrained by global interest rate policy implications. Thus the endogenous theory of money was applicable whereby central banks, and not the markets, determined short term interest rates. Figure 9: International Monetary Asymmetries and the Link between the Foreign Exchange Rate and the Short Term Interest Rate Source: Banchs, A., & Mollejas, L. (2010) International Monetary Asymmetries and the Central Bank, Journal of Post Keynesian Economics. Furthermore, Banchs & Mollejas (2010) discussed a hierarchy amongst reserve currency issuers whereby their influence was limited by the regional access of their currencies (see Figure 10). This in turn led to a global distinction in preference between reserve currencies for reserve assets. The ranking between reserve currency issuers was directly linked to the utilisation of the currency, similar to that of the SDR basket weighting allocations. Figure 10: Rank Order between Reserve Issuers and Reserve Earners Source: Banchs, A., & Mollejas, L. (2010) International Monetary Asymmetries and the Central Bank, Journal of Post Keynesian Economics. The international monetary system could be viewed as a means to achieve and/or maintain sovereign power on a global basis. Cohen (2008) considered that significant entities could use the system to enhance their global power either through autonomy or influence. China had demonstrated its autonomy with regards to a soft currency peg and is now focussed on influence through the RMB's internationalisation. If China obtained a reserve currency issuer status, the USD may experience some devaluation as investors could expect that China would relinquish a portion of its USD-denominated reserves in favour of RMB-denominated assets. China had already demonstrated a rebalancing within its global reserve portfolio during 2000 to 2007 (Sheng, 2013). However, Cohen (2008) proposed that reserve accumulation alone does not necessarily lead to enhancement of global power. According to the IMF, a number of challenges exist prior to China achieving its internationalisation strategy: • The availability and liquidity of the RMB within global currency and settlement markets required further enhancement (Raymaekers, 2011). This had a direct impact on RMB-denominated debt instruments as well as global access to China's stock exchange; • China maintained a dual currency system (refer to Appendix A for additional detail). The RMB typically refers to both the onshore Yuan ("CNY") currency traded within China and the offshore currency ("CNH") traded through Hong Kong. However, global trades are typically executed through the offshore or CNH market and collectively settled through Hong Kong. In both markets, China actively managed the supply of RMB and allowed some divergence between the CNY and CNH currency rates; and • To date, the USD has remained the cornerstone of global market valuations and a trading currency of choice (Subacchi, 2010). Any currency trades that do not include the reserve currencies are indirectly settled through the USD. For example, a RMBZAR trade is settled in two components i.e. two separate currency transactions are executed as RMBUSD and then a USDZAR conversion. This intermediate conversion results in increased trade costs for non-reserve currency transactions. China may require a number of global partnerships to support increased direct RMB- denominated trade in order to reduce transactional costs. The Influence of Reserve Currency Issuers In order for a currency to be included within the SDR basket, it must receive a 70% to 85% approval by the IMF council, which is then ratified by the IMF Executive Board. Over 20% of the Board's directors are represented by reserve currency issuers. Thus a certain degree of IMF voting power is held within the reserve currency group. Banchs & Mollejas (2010) highlighted that during times of global economic strain, reserve currency issuers tend to be more resilient to economic shocks as opposed to other countries. Non-reserve currency issuers were heavily reliant on monetary policy actions which may have proven ineffective or resulted in delayed interventions. In addition, non-reserve currency issuers were predominantly focussed on aggregating foreign reserves in order to manage their exchange rates. This was unlike reserve currency issuers who had inherent support for their currencies within the international monetary system. Despite the economic costs borne by non-reserve issuers, Banchs & Mollejas (2010) argued that such costs were well surpassed by the associated benefits of welfare and economic growth. Reserve currency issuers were typically from developed countries due to their assessed stability, currency strength and portion of global trade (Bird, 2011). Reserve issuers benefitted from seigniorage, an increased ability to borrow in local currency and development of political power and influence. In addition, there were fundamental connections between international reserves and international adjustments; with causal relationships irrespective of direction. Bird (2011) likened obtaining reserve currency status to that of Dutch disease, whereby a country may become less competitive with regards to its exchange rate management policies. Furthermore, reserve currency issuers may become complacent with considering their impact on non-reserve currency issuers' domestic policies. Reserve currencies did not retain their international status due to inherent intrinsic value, but rather their global usage. As such, non-reserve currency issuers found it difficult to emulate a similar status given the inertia required for reserve currency transactions. Developing markets were less able to rely upon establishing reserve currency status and deferred to hoarding large foreign reserves to protect against economic shocks (Delatte & Fouquau, 2012). Although the rationale for holding a certain level of foreign reserves should be in response to competitive exchange rate management, the notable acceleration of reserves in recent years has been in response to fears of mounting market contagion and economic crisis. As developing countries adopted protectionist monetary policies, which promoted the usage of flexible exchange rates, the demand for international reserves considerably fell. The indirect economic and soft power provided to reserve currency issuers came under significant disdain. Subacchi (2010) argued that the international monetary system was unduly biased towards reserve currency issuers and required

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**Gordon Institute
of Business Science**
University of Pretoria

Dear Sanusha Chetty

Protocol Number: **Temp2015-01414**

Title: **The Rationale for Renminbi-denominated Foreign Reserves within Africa**

Please be advised that your application for Ethical Clearance has been APPROVED.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards,

GIBS Ethics Administrator

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