



Managing Crypto-pegged Exchange Rates Risks in Islamic Banks in the Era of Digitalization Economy and Tokenization

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Abstract

The FX markets of the world have become one of the largest of all financial markets. Trading turnover averaged as high as \$4.7 trillion¹ a day in recent years, 70 times the daily trading volume on the New York Stock Exchange. Online foreign exchange trading is increasing. Electronic foreign exchange trading volume tops 60 percent of overall global foreign exchange trading. Traditionally foreign exchange risk is considered as part of market risk despite being a profound one. Foreign exchange is a critical risk factor that has at times been profound enough to cause entire economies to face crises and move towards recession. In the world of globalization, digitalization and tokenization where banks are expanding their businesses internationally faster than ever the growing foreign exchange and new born cryptocurrency risk should be set as an independent source in risk management process. This paper analyses the growing pattern of foreign exchange risk within five years period of six (6) Islamic banks in GCC region namely National commercial bank Saudi Arabia, Al Baraka Banking group, Bahrain, Al Rajhi Bank, Saudi Arabia, Dubai Islamic Bank, UAE, Qatar Islamic Bank in Qatar and Samba Financial Group in Saudi Arabia (traditional bank with Islamic banking business). The analysis reveals the need for more robust exchange risk management and establishing a new “crypto-gold standard” or crypto-pegged exchange rates in eliminating the volatility and future losses due to it. The results show that tokenization could be a good tool for managing the exchange rate risk.

Keywords: Islamic banking, cryptocurrency, foreign exchange risk and cryptocurrency risk, risk management, tokenization and digital economy

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1. Introduction

Economy is viewed as an entire network of producers, distributors, and consumers of goods and services in a local, regional, or national community. The digitalization of economy may be viewed as a technology/supply shock which affects the main economic aggregates, notably via competition, productivity and employment effects, as well as through its interaction with institutions and governance². This process is an engine of the globalization that brings the use of using foreign currency markets.

Foreign exchange is a critical risk factor that has at times been profound enough to cause entire economies to face crises and move towards recession. For instance, in the recent past, foreign exchange price volatilities, commonly termed “currency crises”, have been named as the cause of the Latin American debt crises in the 1980s, the financial crisis in Asia in the 1990s, the Argentine economic crisis in the early 2000s and the very recent Argentine sovereign default in 2017. Economists have developed a wide range of theories to explain how exchange rates are determined. Empirical evidence shows that “real world” exchange rates have large and persistent deviations from their theoretical long-run equilibriums values. Some studies conclude that for short – and medium- term horizons, up to perhaps a few years, a random walk characterizes exchange rate movements better than most fundamentals-based exchange rate models. Some studies find that models that work well in one period fall in others. Most studies also find that models that work for one set of exchange rates fail to work for others.

One of the key reasons why fundamentals-based models perform so poorly in the short run is that changes in fundamental economic variables such as relative money supplies, interest rates, inflation rates,

economic growth rates, and current account balances simply do not exhibit anywhere near the variability that exchange rates exhibit on a monthly or quarterly basis. Given the shortcomings of most fundamentals-based models, currency strategists and market participants often have felt compelled to turn to non-fundamentals-based forecasting tools to get a better handle on shorter-run exchange rate trends. Such forecasting tools include technically based trend-following trading rules and order flow, sentiment, and positioning indicators.

A foreign exchange hedge (also called a FOREX hedge) is a method used by companies to eliminate or "hedge" their foreign exchange risk resulting from transactions in foreign currencies. For example, a domestic firm may have an overseas subsidiary with assets that are financed by loans (for the exact same dollar value) in the same currency. This represents a hedging of economic profits. However, if that subsidiary is not considered self-sustaining, and is integrated with the domestic firm, then the loan is maintained in the foreign currency but the assets must be translated to the domestic currency, thereby creating foreign exchange risk for the accounting profits. Thus, if the foreign currency appreciates relative to the domestic currency, upon translation to the domestic currency, there will be a translation loss for accounting purposes. Though the accounting profits could be hedged by purchasing a forward contract on the foreign currency that will create economic risk. The bottom line is that it is not possible to hedge both accounting and economic risk at the same time.

2. Foreign Exchange Market Concepts

An exchange rate is the price of the base currency expressed in terms of the price currency (P/B). If we take for example Bloomberg's USD/CAD¹ 1.3236 rate² means that the CAD, the base currency, costs 1.3236 US dollars (or said it differently 1USD would purchase 1.3236 CAD). The usual spot exchange rate settlement is on the second business day after the trade date. In foreign exchange markets the quotes are given as two-sided price in the form of bid price and offer price. The bid price is the price, defined in terms of the price currency, at which a counterparty providing a two-sided price quote is willing to buy one unit of the base currency. The offer price is the price, in terms of the price currency, at which that counter-party is willing to sell one unit of the base currency. There are two important points concerning bid-offer quotes:

1. The offer price is always higher than the bid price. The difference between the offer and bid price is the compensation for the counterparty offering it.
2. The counterparty in the transaction who inquires for a two-sided price quote will have the option (but not the obligation) to deal at either the bid (to sell the base currency) or offer (to buy the base currency) price quoted to them by a dealer.

The size of the bid-offer spread quoted to dealer's clients in the FX market can vary widely across exchange rates and is not constant over time, even for a single exchange rate. The size of this bid-offer spread depends primarily on three factors: the bid-offer spread in the interbank foreign exchange market for the two currencies involved, the size of the transaction, and the relationship between the dealer and the client.

The size of the bid-offer spread quoted in the interbank market depends on the liquidity in this market, which in turn depends on several factors like:

1. The currency pairs involved: For the major currency pairs there is considerable liquidity with smaller bid-offer spread and vice versa.
2. The time of day: the interbank FX markets are most liquid when the major FX trading centres are open.
3. Market volatility: As in any financial market, when major market participants have greater uncertainty about the factors influencing market pricing, they will attempt to reduce their risk exposures and/or charge a higher price for taking on risk. In the FX market, this response implies wider bid-offer spreads in both the interbank and broader markets. Geopolitical events (e.g. war, civil strife), market crashes, and major data releases (e.g. US nonfarm payrolls) are among the factors that influence spreads and liquidity.

¹ USD: US Dollar; CAD: Canadian Dollar

² <https://www.bloomberg.com/markets/currencies>

3. Literature Review

Many researchers have made their research in foreign exchange risk management. Most studies tend to show that FX risk is considered an important risk to be managed. Marshal (1999) finds that FX is the most important financial activities in large firms and banks of UK, North America and Asia. Loderer and Pichler (2000) made a similar survey but for Swiss organizations. They showed as main factors for managing currency risk guaranteeing the cash flow, reducing financing cost, preventing losses, and reducing taxes. Rahman and Hoque (2015) found that exchange rate risk, interest rate risk, settlement risk, and sovereign exchange risks are the major risks to the banks. Regarding use of foreign exchange risk management techniques, it is found that internal rating system and risk adjusted rate of return on capital are important.

Several studies have been conducted on the effects of hedging in risk management. For instance, Broccardo et al. (2013) conducted an empirical investigation on Italian banks on the use and motivations for credit derivatives. The findings did not seem to support the hedging theory in general. From the conclusions of the separate estimates for small/large banks and for listed/unlisted banks show that the likelihood of using CD differs when different subsamples were measured, and that the outcome for larger and listed banks tend to substantiate the results of the main regressions on the whole sample. Allayannis and Ofek (2000) divulge that exporters favour the use of foreign currency derivatives to foreign currency debt when hedging their operations. They use panel data, with a time period of 5 years (1990-1995), which gave a more accurate result as the longer time period accounts for seasonal effects. The advantage of derivatives is that they have a prearranged cost and are available to all companies whereas foreign debt is restricted only for large firms. Forwards are recommended for firm obligations while options may be ideal for uncertain foreign currency denominated future cash flows.

Shaofang and Matej (2014) examined the use of financial derivatives and risks of U.S. bank holding companies. The study looked at the impact of financial derivatives on systematic risk of publicly listed U.S. bank holding companies (BHCs) from 1997 to 2012. The empirical investigation employed a two-stage time series cross-section regression model to determine the relationship between systematic risk and the use of financial derivatives. They found that, the use of financial derivatives is considerably and positively related to BHCs' systematic risk exposures.

Zahan and Kenett (2011) found that from the hedging perspective, Islamic banks speculate in some cases with hedging instrument of conventional banking. This is one strategy for facing challenges and continued growth. Islamic banks should however consider different rules and regulations that are *Shariah* based and used in conventional banking. As the objective of Islamic banking is not just to be a commercial bank, they also apparently have a responsibility for social development and economic growth by supporting production and trade.

4. The Benefits of a Tokenized Economy

Tokenization is the process of digitally storing the property rights to a thing of value (asset) on a blockchain or distributed ledger, so that ownership can be transferred via the blockchain's protocol. Tokens have two fundamental requirements: The rights to a thing of value (an asset) are stored digitally on a blockchain or a distributed ledger. The rights can be transferred via the blockchain or ledger's protocol.

Within this definition of tokenization, there is a huge scope for variation. The thing of value being tokenized can be a unit of account (e.g. Bitcoin), or the right to revenue or dividend flows, or the rights to part or all of a physical or digital asset, or the right to use someone else's asset (e.g. renting a house for a night). Depending on the thing of value being tokenized, tokens can be fungible (interchangeable) or non-fungible (unique).

The issue with tokenization is whether or not it might be beneficial to a market or platform. There are many common reasons to why blockchain developers may prefer to tokenize the rights to an asset. Some of the more common reasoning include: It allows the secure transfer of assets without an intermediary, it improves record keeping of ownership and trades, reduces the paperwork associated with trade, improves market function (speed, ease of use) and liquidity and improves price discovery and information aggregation. While these are all legitimate reasons to embrace tokenization, economic theory tells us that there are some situations in which tokenization may not be beneficial to a platform.

Tokenization only works correctly if transferring ownership via the blockchain protocol guarantees that the asset itself changes the ownership, and if the blockchain protocol is the only way to transfer ownership

of the asset. In other words, the asset changes owners if and only if the owner changes via the protocol. Conversely, FX markets where tokenize could be a physical asset but bypass the blockchain and sell it outside of the protocol entirely. In this case, the blockchain becomes an optional ledger and useless for ownership verification or tracking, and the value of the blockchain is eliminated.

In attempting to tokenize physical assets with tentative mapping to tokens, organizations have had to expend extensive centralized resources to overcome these problems. Some gold exchanges have tried to address these problems by storing their blockchain-traded gold bars in a secure vault that they pay for, ensuring that their gold bars correspond to those traded and that no one else has the opportunity to trade these objects off the blockchain. This solution is costly and inconvenient, and destroys much of the value promised by implementing a blockchain solution.

5. Foreign Exchange Position in Islamic World

As per Islamic Financial Services Industry Stability Report (IFSB, 2018), the Islamic banking jurisdictions maintain various types of currency regimes, including fixed exchange-rate, managed exchange-rate, and relatively free-floating exchange-rate regimes. At least four jurisdictions (Afghanistan, Egypt, UAE and Iran) are identified where their Islamic banks, on average, have more than 10% exposure in foreign currency denominated financing as a ratio of total financing. Afghanistan does not maintain a dual exchange-rate policy, currency controls, capital controls, or any other restrictions on the free flow of funds abroad. Among other countries, Egypt (1H2017: financing 27.3% and funding 35.4%) and UAE (1H2017: financing 14.3% and funding 19.7%) have material engagements in foreign currencies on both the financing and funding sides of Islamic banks. Among these, the UAE Dirham is fixed to the US Dollar. However, the Egyptian Pound, which is managed by the government, was allowed to depreciate in November 2016; since then, the US Dollar has appreciated against it by nearly 125%. The depreciation of EGP can be seen in Figure 1.

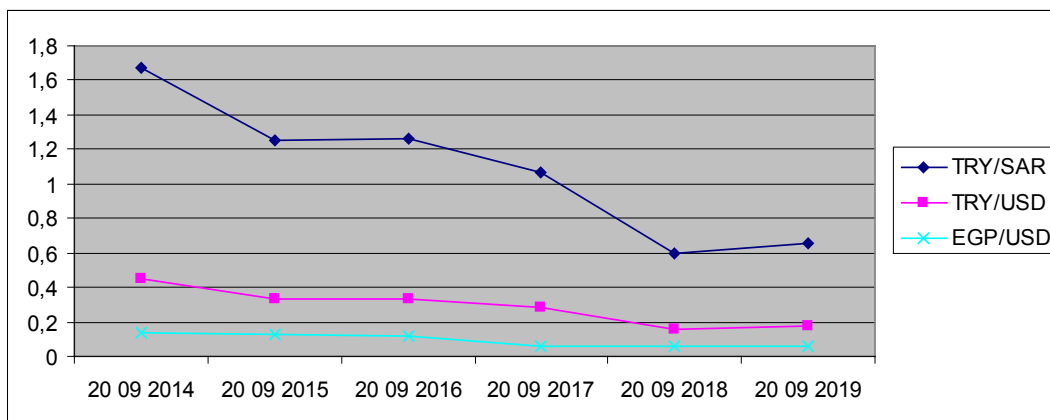


Figure 1: TRY/SAR; TRY/USD and EGP/USD³ 5 years Figure
Source: www.xe.com

Figure 1 shows the 5 years trends in the exchange rate market of Turkish lira towards Saudi Arabian riyal and towards US dollar related to the case study of the paper. The Turkish currency and debt crisis of 2018 was a financial and economic crisis in Turkey. It was characterized by the Turkish lira plunging in value, high inflation, rising borrowing costs, and correspondingly rising loan defaults. The crisis was caused by the Turkish economy's excessive current account deficit and large amounts of private foreign-currency denominated debt.

³ UAE: United Arab Emirates; EGP: Egyptian pound; TRY: Turkish lira; SAR: Saudi Arabian riyal

5.1 Hedging FX Risk in Conventional Banking

For major exchange rates other than the British pound, euro, Australian dollar, and New Zealand dollar, a spot or forward exchange rate is normally quoted as the number of units of the currency that are equivalent to one U.S. dollar. A foreign currency has the property that the holder of the currency can earn interest at the risk-free interest rate prevailing in the foreign country.

A commercial bank uses foreign currency derivatives to hedge foreign exchange risk. Foreign currency derivatives refer to the following: -

a. Foreign Currency Futures: is a type of futures contract to exchange a currency for another at a fixed exchange rate on a specific date in the future. Since the value of the contract is based on the underlying currency exchange rate, futures currency is considered a financial derivative. Futures contract is very similar to currency forwards however futures contracts are standardized and traded on centralized exchanges rather than customized as forwards.

b. Foreign Currency Swap: is an agreement to exchange currency between two foreign parties. The agreement consists of swapping principal and interest payments on a loan made in one currency for principal and interest payments of a loan of equal value in another currency. One party borrows currency from a second party as it simultaneously lends another currency to that party. The Federal Reserve System offered this type of swap to several developing countries in 2008.

For example, a hypothetical five years currency swap agreement between Aramco and JP Morgan was entered into on February 1, 2017. Saudi Aramco then paid a fixed rate of interest of 3% in dollars to JP Morgan and receives a fixed rate of interest of 4% in Saudi Riyals from JP Morgan. Interest rate payments were made once a year and the principal amounts were 15 million US Dollars and 10 million Saudi Riyals. This is termed as fixed-for-fixed currency swap. At the outset of the swap, Saudi Aramco pays 10 million Saudi Riyals and receives 15 million US Dollars. Each year during the life of the swap contract, Saudi Aramco receives 0.40 million Saudi riyals (4% of 10 million) and pays 0.45 million US Dollars (3% of 15 million). At the end of the life of the swap, it pays 15 million US Dollars and receives 10 million Saudi Riyals. The cash flows to JP Morgan are the opposite of those. A swap such as the one just considered can be used to transform borrowings in one currency to borrowings in another currency.

From the *Shariah* point of view, the problem with the conventional FX swap structure arises when the parties involved opt to exchange the currency sometime in the future but fix a rate on the day the contract is concluded. This contravenes with the basic *Shariah* ruling governing the exchange of currency (*sarf*). Under *sarf*, it is prohibited to enter a forward currency contract, where the execution of a deferred contract in which the concurrent possession of both the counter values by both parties does not take place.

c. Foreign Currency Options: is a contract that gives the buyer the right, but not the obligation, to buy or sell a certain currency at a specified exchange rate on or before a specified date. For this right, a premium is paid to the seller, the amount of which varies depending on the number of contracts. Currency options are one of the most common ways for corporations, individuals or financial institutions to hedge against adverse movements in exchange rates.

d. Foreign Currency Forward Contracts: is a binding contract in the foreign exchange market that locks in the exchange rate for the purchase or sale of a currency on a future date. A currency forward is essentially a hedging tool that does not involve any upfront payment. The other major benefit of a currency forward is that it can be tailored to a particular amount and delivery period, unlike standardized currency futures.

6. Hedging FX risk in Islamic Banks

The International Islamic Financial Market (IIFM) was as a neutral and non-profit infrastructure development organization to develop standardized *Shariah*-compliant Financial Documentation, Product Confirmations and Guidelines for the Islamic Financial Services Industry (IFSI)⁴:

⁴ <http://www.iifm.net/published-standards>

6.1 IIFM Standard 7

Himaayah Min Taqallub As 'aar Assarf or an Islamic Cross-Currency Swap (ICRCS) *Wa'ad*-based and involving a Two Sales structure. A party may enter into such an ICRCS where, for example, it is highly dependent on one currency (Currency A) (eg: AED⁵), being the currency of the country in which it operates, but it also has liabilities in another currency (Currency B) (eg: GBP⁶) and for risk management purposes it wishes to hedge itself against fluctuations in the exchange rate between Currency B and Currency A. For these purposes, this party may enter into an ICRCS under which it will receive payments in Currency B (thereby hedging its liabilities in Currency B) and it will make payments in Currency A (thereby applying some of its Currency A income to cover its Currency B liabilities and, in effect, fixing its liability in Currency A). One objective of engaging in a *Himaayah Min Taqallub As 'aar Assarf* or an ICRCS would be to enable a party to raise funds through a *Murabahah* in one currency for a certain period of time (currently unavailable to it through other means) against a *Murabahah* in another currency or a base currency that is available. In this situation, the profit rate, tenor and amount are all agreed-upon between the two parties before commencement of the transaction. It is mostly used to manage and mitigate the currency risks and rate risks associated with investments and should not be used for speculation.

6.2 IIFM Standard 8

Vanilla Islamic Foreign Exchange Forward or *Wiqayah Min Taqallub As'aar Assarf* ("IFX") based on a structure involving a single unilateral undertaking (*Wa'ad*). A buyer grants a *Wa'ad* (undertaking) to the Seller to exchange one currency for another currency at a pre-determined rate on a specified future date, at the Seller's option. If the seller exercises such undertaking, the buyer and the seller will need to execute an Offer and Acceptance.

6.3 IIFM Standard 9

Vanilla Islamic Foreign Exchange Forward or *Wiqayah Min Taqallub As'aar Assarf* ("IFX") is based on a structure involving two separate and independent unilateral undertakings (*Wa'ad*). Each of the two undertakings is only capable of being exercised if a relevant condition is satisfied. Because the conditions are different and mutually exclusive, only one of the undertakings can be exercised at the relevant time. Islamic Foreign Exchange Forward (IFX) essentially involves two dissimilar currencies. As per *Shariah* (Islamic Law) the exchange of two dissimilar currencies / counter values must be spot or simultaneous (i.e. hand to hand) as it is considered to be *Ribawi* items (i.e., interest). In the IFX Forward transactions as they are being practiced in the current IFX market, the rate of exchange will be locked under the *Wa'ad* principle on the date of the contract (i.e. the trade date) but the delivery of the two dissimilar currencies will be deferred to a future date (i.e. the settlement date). It is worth noting in this regard that *Shariah* does not prohibit a promise to buy and sell currencies on one date with delivery to be made on another date because the proper contract only concludes on the day of delivery

For example, Al Rajhi Bank offers to their clients (Annual Report, 2018):

- "Islamic FX Forward" (IFX FWD) a fully *Shariah* compliant. This product contractually obligates two parties to a reciprocal agreement, to exchange a certain amount in one currency to be exchanged to another currency at an agreed future date and price. The IFX FWD has been at the forefront, triggering further development in the Treasury OTC Islamic product suite.
- "Islamic FX flexible forward". This is an FX forward contract where settlement is flexible and the client chooses the date of settlement within the agreed/specific time period. Such a product offers to the clients the flexibility to withdraw the required FX amount at the agreed rate during the life of the contract.

⁵ AED: United Arab Emirates Dirham

⁶ GBP: Great Britain Pound

7. Cryptocurrency Risk

The European Central Bank (“ECB”) has classified cryptocurrencies as a subset of virtual currencies. In a report on Virtual Currency Schemes of 2012, it defined such currencies as a form of unregulated digital money, usually issued and controlled by its developers, and used and accepted among the members of a specific virtual community (European Central Bank, 2012). According to International Monetary Fund (“IMF”) the concept of virtual currencies covers a wider array of ‘currencies’, ranging from simple IOUs (“Informal certificates of debt” or “I owe you’s”) by issuers (such as Internet or mobile coupons and airline miles), virtual currencies backed by assets such as gold, and cryptocurrencies such as Bitcoin (IMF Staff Discussion Note, 2016). Antova and Tayachi (2019) argued that the total market capitalisation of the 100 largest cryptocurrencies is reported to exceed the equivalent of EUR 330 billion globally by early 2018. They showed how cryptocurrency gold standard is used as risk management tool. The total market capitalisation of all cryptocurrencies together in that period peaked at an even higher USD 728 billion, dropping just three weeks later to approximately USD 360 billion (Bratspies, 2018).

Cryptocurrencies are subjected to significant and unexpected exchange rate fluctuations. Classical example is the bitcoin exchange rate to the US dollar, which dropped from US\$ 19,435 on 17 December 2017 to US\$ 6,858 on 5 February 2018; it suffered a depreciation of 64.7% over a period of less than two months.

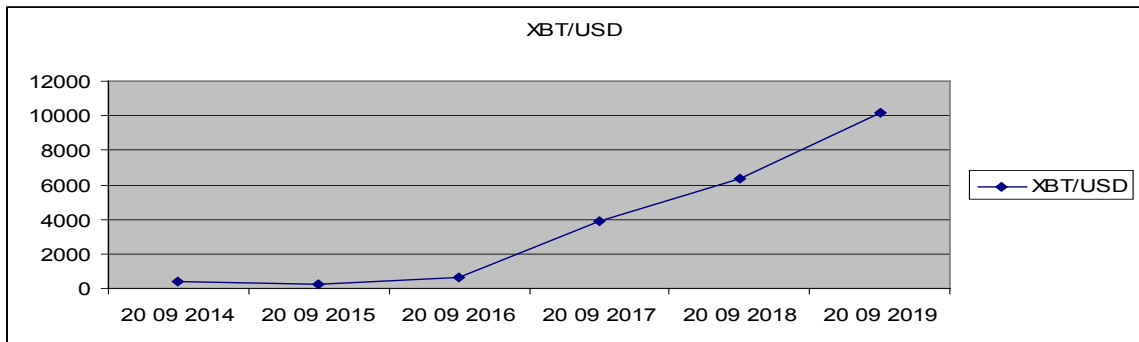


Figure 2: Bitcoin/USD 5 Years Exchange Rate
Source: www.xe.com

Gold-backed digital currency is backed by physical gold through allocated or unallocated gold storage. Other than being pegged to gold, gold cryptocurrencies operate in a similar fashion to traditional cryptocurrencies like bitcoin. The price is determined by the market value of gold. For example, each OneGram coin is backed by at least one gram of physical gold which provides a stable floor price. With this intrinsic feature of OneGram it has been combined with the best of the old world (gold) with features of the future (digital allocation). OneGram is the first cryptocurrency that has been certified in compliance with *Shariah*. It is inherently regulated by rules imposed on financial operations in the Islamic world (<https://onegram.org/whitepaper>). Some of the most popular gold-backed digital currencies include: OneGram (OGC); AgAu; Airgead; Anthem Gold (AGLD); AssetBase; AurumCoin (AU); BullionCoin (XAAU); Currensee (CUR); Darico (DEC); DinarDirham (DNC); Flashmoni (OZG OZT); Gold Bits Coin (GBC); GoldMineCoin (GMC); GOLDUSA (GOLD); HelloGold (Goldx); OZcoinGold (OzGLD)

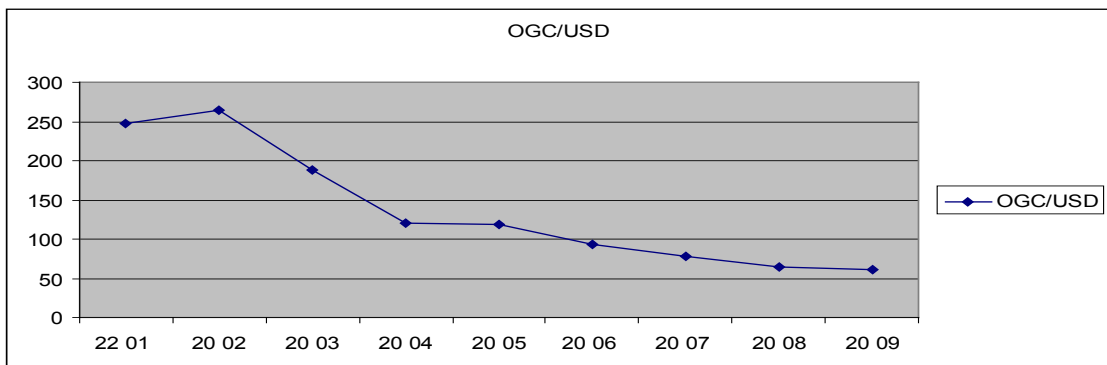


Figure 3: OGC/USD 9 Months Exchange Rate
Source: www.coingecko.com

Figure 3 shows 75.6% depreciation of OGC in 9 months period. Some of the experts submitted that in the future cryptocurrencies will become an inevitable part of the business of Islamic banks. Even an Islamic institution accepts gold backed cryptocurrency will be exposed to depreciation shocks. Such a shock could have negative effect on net income and shareholders' equity for the Islamic institution.

8. Case study

8.1 Data Description

The case study analyses six Islamic banks (one traditional with Islamic banking business) from three countries (Saudi Arabia, UAE and Bahrain) in the GCC. The following paragraphs provide a summary on the analyzed financial institutions.

Al Rajhi Bank in Saudi Arabia in 2018 launched 12 new products some of which were FX forwards. The bank installed one of the most sophisticated pricing engines for FX, and will now focus on expanding this across its network. The Bank is now able to offer competitive pricing which moves in line with the market 24 hours a day. The fully-integrated and automated FX pricing engine has state-of-the-art technology to process multiple FX prices across multiple channels within seconds.

National Commercial Bank, Saudi Arabia: The Group offers its customers a certain treasury product that complies with *Shariah* rules. Structured Hedging Products: These products are offered to clients to hedge their existing exposure to foreign currencies. It is based on the concept of *Wa'ad* (binding promise) where the Group promises to buy/sell a particular amount of foreign currency at an agreed upon price. It may include only one *Wa'ad* or a combination of *Wa'ads*. Structured Investment Products: These products are offered to clients to offer them a return that is typically higher than a standard *Al-Khairaat*. These are based on the Structured *Al-Khairaat* product and are designed to give the customers exposure to a number of indexes including foreign currencies, precious metals and *Shariah* compliant equity indexes.

Al Baraka Banking Group, Bahrain consolidated subsidiaries: Banque Al Baraka D'Algerie, Algeria; Al Baraka Islamic Bank Bahrain, Bahrain; Al Baraka Bank Tunis, Tunisia; Al Baraka Bank Egypt, Egypt; Al Baraka Bank Lebanon, Lebanon; Jordan Islamic Bank, Jordan; Al Baraka Turk Participation Bank, Turkey; Al Baraka Bank Limited, South Africa; Al Baraka Bank Sudan, Sudan; Al Baraka Bank Syria, Syria; BTI Bank, Morocco. As can be seen from the above-mentioned subsidiaries the banks have an exposure to a few foreign currencies.

Dubai Islamic Bank: The Group enters into a variety of Islamic derivative financial instruments to manage the exposure to profit and foreign exchange rate risks, including unilateral promise to buy/sell currencies. The Group obtains a significant income recorded in its overseas subsidiaries and is therefore exposed to movements in the foreign currency rates used to convert income into the Group presentation currency, the U.A.E. Dirham (Dubai Islamic Bank Annual Report, 2018).

Qatar Islamic Bank: The Group enters into certain Islamic derivative financial instruments to manage the exposure to foreign exchange rate risks, including unilateral promise to buy/sell currencies (Held for trading, Forward foreign exchange contracts: Notional amount 3,380,681). With 2018 being a challenging year, the Treasury Division effectively managed the liquidity challenge that was created by unexpected regional conditions the geo-political situation created additional challenges to the liquidity gap such as intensive competition in the pricing of deposits, a decreasing number of counter-parties to trade foreign exchange (Qatar Islamic Bank Annual Report, 2018).

Samba Financial Group: The bank's success rests partly on its strong deal in making business; over the past few years, Samba has arranged over \$44 billion in syndicated deals across the GCC as the bank took an active part in structuring, coordinating and arranging debt facilities for borrowers. Samba's Islamic debt-structuring expertise covers multiple market segments, including corporate-level financing, project financing and capital markets (*sukuk*). Its practice includes most of Islamic syndicated financing transactions, in which Samba has served as arranger or bookrunner, adviser or coordinator. Samba has crafted complex Islamic treasury products, such as Islamic structured deposit (dual *Murabahah* structure), swaptions, trigger swaps, cancellable swaps and forex *Wa'ad* target redemptions (FX-TARN). Other activities include collateralized *Murabahah*. Samba was recently involved in the conversion for a major corporate of a 3 billion Saudi Arabian riyal (\$800 million) in conventional finance to *Murabahah*. It was a unique deal in which Samba provided the *Shariah* structure, agency and Islamic operational support in the form of commodity intraday funding⁷.

⁷ <https://www.gfmag.com/magazine/may-2019/best-islamic-banks-world-2019>

8.2. Sources of Foreign Exchange Risk Exposures in Islamic Banks

An Islamic Financial Institution's (IFI) position in the FX markets generally reflects three trading activities:

1. The purchase and sale of foreign currencies to allow customers to partake in and complete international commercial trade transactions.
2. The purchase and sale of foreign currencies to allow customers (or the IFI itself) to take positions in foreign real and financial investments.
3. The purchase and sale of foreign currencies for hedging purposes to offset customer (or IFI) exposure in any given currency.

An IFI's overall FX exposure in any given currency can be measured by the net position exposure, which is measured in local currency as:

$$NE_i = (FXA_i - FXL_i) + (FXB_i - FXS_i)$$

$$NE_i = NFXA_i + NFXB_i$$

where i is the currency, NE is the Net Exposure, FXA is the foreign Assets, FXL is the foreign Liabilities, FXB is the foreign bought, FXS is the foreign sold, NFXA is the net foreign assets and finally NFXB is the Net foreign bought (Saunders and Cornett, 2007).

A positive net exposure position implies that the bank is net long in a currency (FI has bought more foreign currency than it has sold) and faces the risk that the foreign currency will fall in value against the domestic. A negative net exposure position implies that the bank is net short in a foreign currency (the FI has sold more foreign currency than it has purchased) and faces the risk that the foreign currency could rise in value against the domestic. The greater the volatility of foreign exchange rates given any net exposure position, the greater the fluctuations in value of an FI's foreign exchange portfolio.

The potential size of an FI's FX exposure can be measured by analyzing the asset, liability, and currency trading mis-matches on its balance sheet and the underlying volatility of exchange rate movements. Specifically, the following equation can be used:

$$DLGFX_i = NEFX_{id} * VOL_d$$

Where DLGFX is the Dollar loss/gain in currency i , NEFX is the net exposure in foreign currency i measured in domestic currency, Vol is the shock of volatility to the domestic/ foreign currency i exchange rate (Saunders and Cornett, 2007). FX risk exposure essentially relates to open positions taken as a principal by the FI. Most profits or losses on foreign trading come from taking an open position in foreign currencies. Even though the FI sets the net foreign exchange exposure on the balance sheet to zero, net return is still volatile. Thus, the FI is still exposed to foreign exchange risk (Saunders and Cornett, 2007).

Table 1: TRY Long Exposures of National Commercial Bank (NCB) and Al Baraka

Currency	NCB	Baraka
TRY	4,669,532 in SAR	179,024 in USD

Source: 2018 Banks' Annual reports

As shown in Table 1 both NCB and Al Baraka have long (open) positions in Turkish lira. NCB functional currency is SAR, but Al Baraka bank functional currency is USD.

Table 2: Shock Appreciation/Depreciation Percentage of NCB and Al Baraka

Bank	TRY shock depreciation	TRY shock appreciation
NCB	-10%	10%
Al Baraka	-20%	5%

Source: 2018 Banks' Annual reports

While NCB is using flat 10% of the shock currency movement in either direction, Al Baraka bank is using 20% shock depreciation towards TRY and 5% appreciation. The average 5Y approximation for the depreciation of the TRY towards SAR from closing value in 2014 to closing value in 2019 (using data from Figure 1, and ignoring highest and lowest for the period) is 60.81% or annually 12.16%. This shows that NCB is using lower percentage shock decrease towards TRY, and too high percentage shock increase (shown on table 2) due to recent economic events underpinning TRY outlook. The average 5Y approximation for the depreciation of the TRY towards USD from closing value in 2014 to closing value in 2019 (using data from Figure 1, and ignoring highest and lowest for the period) is 60.82% or annually 12.17%. This shows that Al Baraka bank uses appropriate conservative shock approximations for TRY appreciation and depreciation (shown on Table 2).

Table 3: Al Rajhi Bank Major Net FX Exposures

SAR'000	USD	JPY	EUR	GBP	Other
Net	3,807,308	2,319	-15,364	-7,569	282,013

Source: Al Rajhi 2018 Annual Report

Table 4: Shock Appreciation/Depreciation Percentage of Al Rajhi

Shock movement	AED	USD	EUR	INR	PKR
Currency appreciation	2%	2%	5%	5%	5%
Currency depreciation	-2%	-2%	-5%	-5%	-5%

Source: Al Rajhi 2018 Annual Report; INR: Indian Rupee, PKR: Pakistani Rupee

The highest next exposure of Al Rajhi Bank as shown in Table 3 is to USD, but the Riyal is currently pegged to the US Dollar at a rate of 1 USD = 3.75 SR⁸. thus, no further analysis in this exposure is required. In 2018 Annual report the bank shows flat shocks towards: AED, USD, EUR (Euro), INR and PKR as shown in Table 4. As per the data in the table the bank uses flat rate for both appreciation and depreciation. The bank does not show the exact exposures to AED, INR and PKR even though it shows shock percentage analysis for these currencies and their effect on net income and equity. Another thing that gives rise for further investigation is on why the bank accepts EUR as volatile as INR and PKR.

Table 5: Dubai Islamic Bank Major Net FX Exposures

Currency position	USD	Other G.C.C.	GBP	EUR	Other
long/(short)	17,411,491	-384,734	95,259	-38,305	541,608

Source: Dubai Islamic Bank 2018 Annual Report

Table 6: Shock Appreciation/Depreciation Percentage of Dubai Islamic Bank

Shock movement	USD	EUR	GBP	EGP	PKR
Currency appreciation	2%	2%	2%	5%	5%
Currency depreciation	-2%	-2%	-2%	-5%	-5%

Source: Dubai Islamic Bank 2018 Annual Report

Dubai Islamic Bank as shown in Table 6 uses flat +/-2% shock towards EUR, where Al Rajhi Bank uses flat +/-5% shock towards EUR. Dubai Islamic Bank uses AED as a functional currency, whereas Al Rajhi uses SAR as functional currency. Both currencies are pegged to USD and exhibit similar volatility. EUR/AED is 14% in 5 years period (using data from Figure 4 and ignoring highest and lowest for the period) and 2.8% annually. EUR/SAR depreciation is 13.96% in 5 years period (using data from Figure 4 and ignoring highest and lowest for the period) and 2.8% annually.

⁸ <https://www.wsj.com/articles/SB10001424053111903999904576468211853284114>

Table 7: Shock Appreciation/Depreciation Percentage of Qatar Islamic Bank

Shock movement	GBP	USD	EUR	Others
Currency appreciation	5%	5%	5%	5%
Currency depreciation	-5%	-5%	-5%	-5%

Source: Qatar Islamic Bank 2018 Annual Report

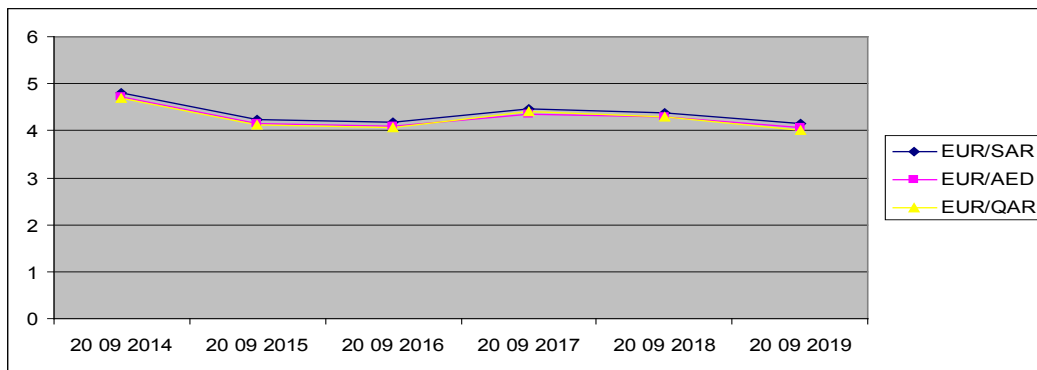
Qatar Islamic Bank functional currency is QAR (Qatari Riyal). QAR is pegged to USD, as SAR and AED and resembles the same exchange rate movement towards EUR as SAR and USD as shown in Figure 4. Qatar Islamic Bank uses as Al Rajhi Bank flat +/-5% shock rate towards EUR, shown in Table 7. EUR/QAR is 14.29% in 5 years period (using data from Figure 4 and ignoring highest and lowest for the period) and 2.9% annually.

Table 8: Shock Appreciation/Depreciation Percentage of Samba Financial Group

Shock movement	USD	EUR
Currency appreciation	1%	1%
Currency depreciation	-1%	-1%

Source: Samba Financial Group 2018 Annual Report

Samba Financial Group functional currency is SAR. Samba has net FX exposures to USD, AED, GBP, PKR and EUR, but provides flat FX shock percentage changes towards USD and EUR only presented in Table 8. We can see a big difference between rate of Rajhi bank: 5% and Samba: 1%, where both FIs use SAR as functional currency.

Figure 4: EUR/SAR, EUR/AED and EUR/QAR 5 years Figure
Source: www.xe.com

Based on Figure 4 and the above analysis on currency pairs, EUR/SAR, EUR/AED and EUR/QAR it can be assumed that appropriate depreciation shock that should be used by the banks is 3%, as practiced by Qatar National Bank in its foreign exchange risk analysis presented in Table 9.

Table 9: Shock Appreciation/Depreciation Percentage of Qatar National Bank

Shock movement	USD	GBP	EUR	EGP	TRY	Others
Currency appreciation	2%	2%	3%	3%	3%	3%
Currency depreciation	-2%	-2%	-3%	-3%	-3%	-3%

Source: Qatar National Bank 2018 Annual Report

Islamic banks' FX exposures are growing rapidly due to the expansion and globalization. As shown from Table 10, exposures to some currencies of Dubai Islamic Bank are growing with more than 16% annually per exposure.

Table 10: Dubai Islamic Bank FX Percentage Increase in 5 Years Period

Currency position	USD	Other G.C.C.	Other
2018 exposure	17,411,491	-384,734	541,608
2014 exposure	9,055,280	-159,497	298,610
Increase/ decrease	92.28%	141.21%	81.38%

Source: Dubai Islamic Bank 2018 Annual Report

Table 11 further reveals the percentage of the total net increase of FX exposures for both Al Rajhi Bank and Dubai Islamic Bank. The larger the net exposure in a foreign currency and the larger the foreign currency's exchange rate volatility, the larger is the potential dollar loss or gain to an Islamic bank's earnings.

Table 11: Net FX Exposures Al Rajhi Bank and Dubai Islamic Bank

TTL net exposure	Al Rajhi ‘000SAR	DIB ‘000AED
2018	5,688,743	12,908,482
2014	1,728,601	9,121,901
% increase	229.10%	41.51%

Source: Banks' 2014 and 2018 Annual Reports

Both QNB and QIB use QAR as a functional currency, but use very different flat percentage shock appreciations towards same currency pairs as shown in table 12.

Table 12: Shock Appreciation/Depreciation Difference between QNB and QIB

Shock movement	USD	GBP	EUR	Others
QNB appr./ deprec	+/-2%	+/-2%	+/-3%	+/-3%
QIB appr./ deprec	+/-5%	+/-5%	+/-5%	+/-5%

Source: QNB and QIB 2018 Annual Reports

Both Al Raihi and Samba use SAR as a functional currency and as QIB and QNB have totally different flat percentage shock towards EUR as shown on table 13.

Table 13: Shock % Differences Between Al Rajhi and Samba

EUR	Al Rajhi	Samba
appr/depr	+/-5%	+/-1%

Source: Al Rajhi and Samba 2018 Annual Reports

The data in Tables 12 and 13 are examples that show the need for settlement of equal exchange rates shocks percentages per currency pairs. Of course, we take into account the magnitude of different sizes of FX exposures, but this needs to be absorbed through the additional measures applied by the results from worst case scenario analysis. The above analysis calls the need of taking FX risk as an independent risk in risk management process and setting more robust analysis, by providing worst case scenario sensitivity analysis and required measures to be taken in such a case.

In order to explain how the token system can be applied in these selected banks to handle their foreign exchange rate risk, the following figure is proposed, which explains the uses of the term “token arrangement” to describe the set of platforms and/or entities that enable the issuance, redemption and transfer of the wholesale digital tokens. BIS (2019) explained that many actors may be involved in the various elements of a token arrangement and presented the stylised model of one possible type of token arrangement. For banks, AlRajhi, QNB and DIB, the workflow for issuing, transferring and redeeming tokens is:

1. Bank A buys tokens by transferring funds to a token arrangement’s bank account through book entry transfer.
2. The change in the balance in the token arrangement’s account triggers the Issuer to issue an equivalent number of new tokens.
3. The Issuer allocates these tokens to Bank A using the wholesale token arrangement.
4. Bank A transfers wholesale token directly to Bank B (peer-to-peer).
5. When Bank B redeems the tokens, it returns them to the Issuer.
6. This prompts the Issuer to return the equivalent amount of funds from the token arrangement’s bank account.
7. The Issuer transfers these funds from the token arrangement’s bank account to Bank B via book entry transfer.

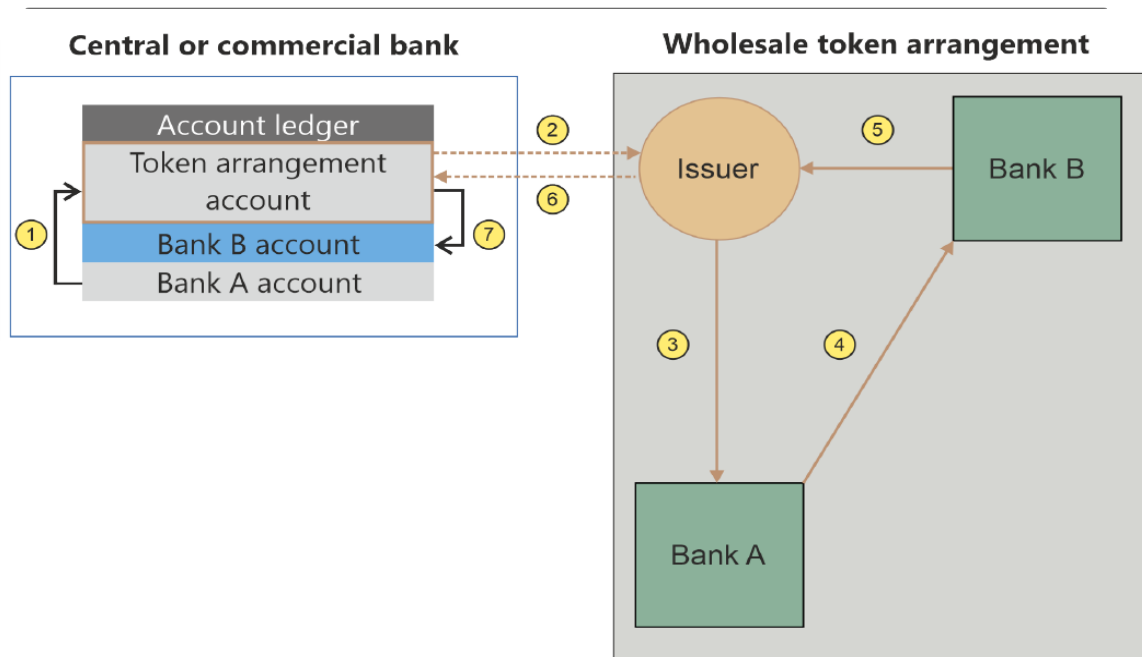


Figure 5: Stylized Model of One Possible Type of Token Arrangements
 Source: Bank for International Settlements, December 2019 from <https://www.bis.org/cpmi/publ/d190.pdf>

9. Conclusion

The globalization of financial markets has created an enormous range of possibilities for raising the funds in currencies other than domestic currency. As global financial markets have become increasingly interlinked, so have the interest rates, inflation, and foreign exchange rates. For example, higher domestic interest rates may attract foreign financial investment and impact the value of the domestic currency. With digital assets, such as bitcoin and ether, individuals can hold essentially an unlimited amount of currency, almost anywhere. This type of accessibility to spendable assets is ground-breaking and fascinating. But it also has created new risks.

Tokenization is the process of converting rights to an asset into a digital token on a blockchain. There is great interest by financial intermediaries and technologists around the world in figuring out how to move real-world assets onto blockchains to gain the advantages of Bitcoin while keeping the characteristics of the asset.

Forex markets have largely done away with physical paper by substituting electronic transactions and standardized agreements, but the overhead of these systems is enormous and generally rely on trusted participants. Start-ups and major financial companies in the FX domain around the world are now racing to develop the systems for the next phase of this evolution i.e the tokenizing assets.

Our world is full of assets: stocks, real estate, gold, carbon credits, oil, etc. Many of these assets are difficult to physically transfer or subdivide, so buyers and sellers instead of trading the paper that represents some or all of the assets. But paper and complex legal agreements are cumbersome, difficult to transfer and can be hard to track. One solution would be to switch to a digital system along the lines with Bitcoin but linked to an asset. An increasing number of companies are introducing cryptocurrency into their business models and, in the process of creating a new level of risk that may be under-insured or even wholly uninsured by today's market standard. Digital assets may soon become recognized as investable "stores of value," tradable on global, licensed exchanges, and accessible to a broad swath of individuals and institutions across the globe.

Finally, it is proposed that the Basel Committee to review and accept FX risk as independent risk measure in the risk management process, set the standard shock limits per currencies pairs and require banks to provide worst case scenario analysis for exchange rate fluctuations and the measures that would be taken in such a case.

End Notes

1. <https://www.wsj.com/articles/SB10001424053111903999904576468211853284114>
2. https://www.ecb.europa.eu/pub/economic-bulletin/focus/2018/html/ecb.ebbox201807_04.en.html

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