Which Data Can Be Useful to Make Decisions on Foreign Exchange Markets?

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Abstract. A communication, settlement of deals, and other services for participants of foreign exchange markets are mostly served by electronic infrastructures. Knowledge of the volume change of aggregated data of deals is useful for all evolved businesses to support their decisions in practice. This paper investigates whether market data of infrastructures, namely CLS, SWIFT, and ETFs, can be used as the volume indicators of some FX segments.

Keywords. Foreign Exchange, Data, Time Series, Review, Flow

Key Terms. DecisionMaking, Management

1 Introduction

The largest and the most influential market for the global and national economies, the foreign exchange market (FX) is opened 24 hours worldwide. According to a regular semi-annual market research an amount of monetary flows traded on the FX in all national currencies (global FX volume) is estimated at 5 trillion US dollar average per day (Bench & Sobrun, 2013). The survey of the Bank for International Settlement (BIS survey) is an important source of the FX knowledge as it aggregates semi-annual surveys from FX committees and provides aggregated statistics of the FX market segments (Fratianni & Pattison, 2001). The monetary amount of trades in every currency is considered in this research as a segment volume indicator of the FX market.

The volume dynamics demonstrates variable numbers which affect exchange rates for national currencies and present volatile level of risk for traders and investors. That is why a kind of the FX volume indicator is a part of system of key performance indicators for assets management among FX market participants. This system helps them in planning and decision making processes such as investment, currency diversification in saving, and development of transnational networks. Market volume is also necessary to be evaluated by national market regulators and central banks in order to have current information on global tendency of their currencies volumes and exchange rates as a consequence.

The concept of volatility is used on financial markets to measure fluctuations of exchange rates by their standard deviation during a taken time interval (Schwartz,

Byrne & Colaninno, 2011; Bubak, Kocenda & Zilkes, 2011). As the volatility of the FX volume is a recognized quantity indicator of the exchange rates dynamics, financial organizations use it in order to estimate their risks on the FX. They usually predict in which extent the exchange rates fluctuate between current level and expiration date.

In order to construct volatility-based market volume indicator, researcher is aimed to investigate area of electronic statistics which is relevant to the FX volume. Several types of time interval can be taken to construct the indicator, namely day, month, and year. The importance of choosing of the time interval for data was emphasized in previous research (Gill, Perera & Sunner, 2012, p.1): "Over recent years technological developments and the digitisation of information and activity have generated a vast array of electronic data, which can potentially be analysed on a daily basis, or even in real time. Some of these data cover very large numbers of individuals and businesses – far more than many traditional surveys used by statistical agencies – and have the potential to be useful for monitoring and measuring aggregate economic conditions."

The BIS survey cannot provide frequent FX statistics, meanwhile market participants become also more interested in monthly volume indicators (Cerutti, Claessens & McGvair, 2012).

Alternative sources of information are investigated in this paper. The FX electronic communication and settlement infrastructures also aggregate statistics on their transactions. Continuously Linked Settlement Bank (CLS) and Society for Worldwide Inter-bank Financial Telecommunication (S.W.I.F.T. or SWIFT) serve financial organizations by secure settlement of their interests on the FX. Exchange traded funds (ETFs) also widely play on the FX market as investment companies which provide efficient and attractive sets of financial instruments in a variety of currencies.

With this research we intend to get a better idea of how the FX market can be measured by using globally aggregated electronic statistics of CLS, SWIFT, and ETFs.

In the first paragraph we state the problem. In the second paragraph we study distinctions and commonality of CLS, SWIFT, and ETFs data regarding to the segments of the FX market. In the third paragraph we investigate relationships between some FX segments volume indicators, namely ETFs in developed currencies and CLS. In the fourth paragraph we discuss methods and our results and in the fifth paragraph we discuss findings and make conclusions.

2 Foreign Exchange Markets in the Last Decades

Developed in 2000s investment opportunities provide a ground for constant enlargement of trades in developing currencies (Bryan, 2008). The latter are reasonably called exotic currencies among the FX practitioners (Tsuyuguchi & Wooldridge, 2008) because they did not find suitable conditions for stable growth worldwide. Thus, from beginning of the post Bretton Woods system in condition of US dollar domination less than 5 % of global trading was made in other local currencies (Pojarliev, 2005). "The relative insignificance of these currencies in

international markets reminds us of the growing disjuncture between countries and "their" currencies. Most Indian- and Chinese-related trade and investment is undertaken in US dollars, with that currency often being used directly without any formal currency conversation (for example, for the purchase of US bonds). Alternatively, for those outside India and China looking for a share of their growth economies, it is possible, using derivatives, to take on exposure to their growth without the need for actual investment in these countries nor for foreign exchange conversion to local currencies." (Bryan, 2008, p. 503).

One could see different environments struggling with implementation of diversification strategies of exchange, saving, and investment in "3 big currencies" and domestic currency. Term of "3 big currencies", namely US dollar, euro, and yen, has become recognized due to trinity's domination in the FX structure (Pojarliev, 2005).

Next, after a crisis of 2008 the global FX market has created a fertile ground for diversification. The post-crisis market conditions have immediately influenced the exchange in a variety of currency pairs, especially in the currencies of developing countries (Bryan, 2008): "…with a declining role for the "big 3" currencies in aggregate, perhaps even the status of any leading national currency being treated as a proxy global anchor is being challenged. Consistent with this trend, it is apparent that foreign exchange is itself being treated increasingly as an asset class (a store of value) as well as a means of exchange, so that investors see intrinsic benefit in holding a wider range of currencies in a diversified asset portfolio."

Nowadays the first candidates to leaders on the FX are Chinese renminbi (yuan) and the Indian rupee which present economies of two members of BRICS (Brasil, Russia, India, China, and South Africa). By World Bank estimation, BRICS contributes a quarter to global domestic product that is more than any other group of developing countries. Although "evolution of the Chinese currency on the FX market remains slow and runs the risk of failing" (Batten & Szilagyi, 2012, p.2), there is an expectation of long-term shift in currency markets. As an evidence of this tendency, New Development Bank (BRICS Development Bank) has been established in 2013 by 5 developing countries as an alternative to International Monetary Fund and World Bank.

Along with currencies diversification a way of presence at the FX is also important for market players. As BIS survey reported, some participants of the FX communicate for trading by using services of brokers but major players replace such supervision by making over-to-counter operations (OTC) themselves. Such market participants are usually members of CLS or SWIFT.

CLS bank serves other banks and financial institutions by mitigating a settlement risk that appears when one party of exchange pays the currency it sold but does not receive the currency it bought (Fisher & Ranaldo, 2011). This kind of risk is called a settlement risk. CLS executes exchange operations (CLS instructions) through provision of its unique payment operation versus payment settlement service. Owing to its service value the CLS is highly appreciated by international financial community (Fisher & Ranaldo, 2011). According to CLS strategy, its large

contribution to the developed markets accompanies by absence on the developing ones.

To serve secure FX transactions, SWIFT plays another role in the industry (Scott & Zachariadis, 2010).

It communicates financial institutions, corporations and their counterparties by SWIFT messages. Their customers are financial institutions, fund managers and brokers, fund managers, settlement members and central settlement systems including CLS members. SWIFT message (MT300) consists of all information about transaction on the foreign exchange such as currency pair, monetary amount, type of trading, and others (SWIFT, 2015).

Nowadays SWIFT possesses a worthy demand in the industry because of its capacity to operate with high value delivered and relatively lower costs in comparison with rivals on both types of markets (developed and developing). This stable trend implies its importance in the industry which provides the SWIFT data potential contribution to the FX volume measurement. Besides, SWIFT does not limit its custodians by a kind of currency to trade. CLS, on the contrary, executes operations in 17 currencies which are mostly developed.

Current tendency on the market is an extremely high growth of ETF segment in both developed and developing economies. Nowadays such indices are traded in a number of currencies on the FX due to its attractiveness for investors.

3 Use of Global Data of CLS, SWIFT and ETFs

CLS data was usually an adequate way of the FX volume estimation. Its monthly market review indicates dynamics of trades on the developed part of the FX. For instance, recently BIS have leveraged CLS information and own data (Bench & Sobrun, 2013). Owing to a mixed approach in monthly numbers measurement, estimated this way FX dynamics was able to explain sources of odd jumps and drops of the market by concrete instruments, which have been described in the BIS survey in a detailed way. Fig. 1 illustrates this first attempt to measure aggregated FX volume for all currencies, including the developed and developing ones owing to the local FX committees' contribution. It makes clear the necessity of the different sources of data combination.

Meanwhile, being outside of mutual work of CLS and BIS, SWIFT could pretend to be considered as a source of data for the FX volume estimation. Its statistics is usually published only in its annual market review where the FX trends are shortly described and illustrated by SWIFT service activity during the year.

Resent research (Cook & Soramaki, 2014) shows that SWIFT data (MT300 message type) is correlated with the FX volume for currency pairs of US dollar and Chinese renminbi (yuan). Authors have found linear relationship between these values (Fig. 2). Absence of similar research of US dollar and yuan from other data sources (CLS, for example) makes impossible to conclude which data is more useful for market analysts by comparing with results of (Cook & Soramaki, 2014) with others.

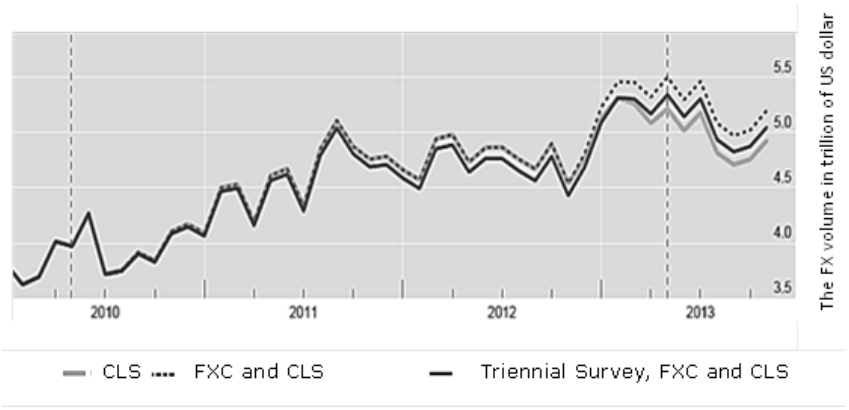

Fig. 1. Monthly CLS data in estimation of global FX volumes in all type of currencies (Bench & Sobrun, 2013)

Alternative source of information comes from investment funds or exchange traded funds which publish their indices volatility. The concept of volatility is used to indicate uncertainty regarding degree of ETFs' volume changes (Schwartz, Byrne & Colaninno, 2011). Although it has been traditionally used for analysis of exchange rates volatility dynamics (Britten-Jones & Neuberger, 2000), we have found examples of its application to measure the range of probable change of traded volume by its dispersion analysis (Melvin & Peiers Melvin, 2003).

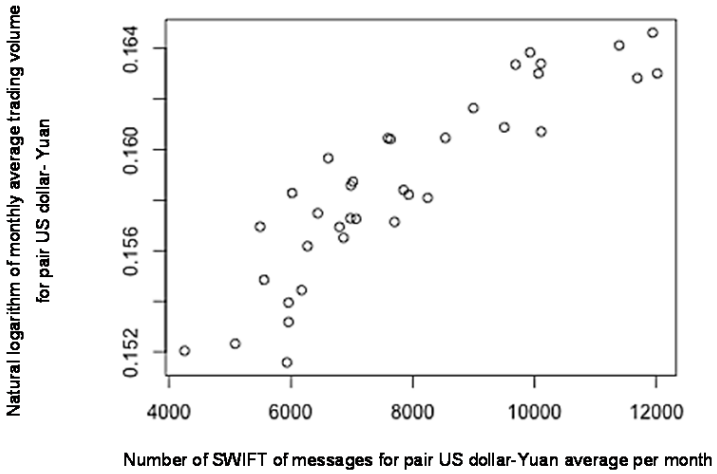

Fig. 2. Monthly relationship between SWIFT data and developed currencies FX segment volume (Cook and Soramaki, 2014, p.27)

As it was reported above nowadays constant growth of the ETF worldwide accompanies by increasing ETF contribution to the financial markets of developing economies. The evolution of financial instruments led to use of ETFs which had

provided implementation of extremely successful trading strategies after the global financial crisis in 2008 (Bryan, 2008, p. 502). As a result, in developed countries, for instance, in the United States ETFs have contributed 40 % of the financial market volume (Guedj & Huang, 2009). As for developing countries, ETFs in currencies have contributed 23 % of the FX market (Fig. 3).

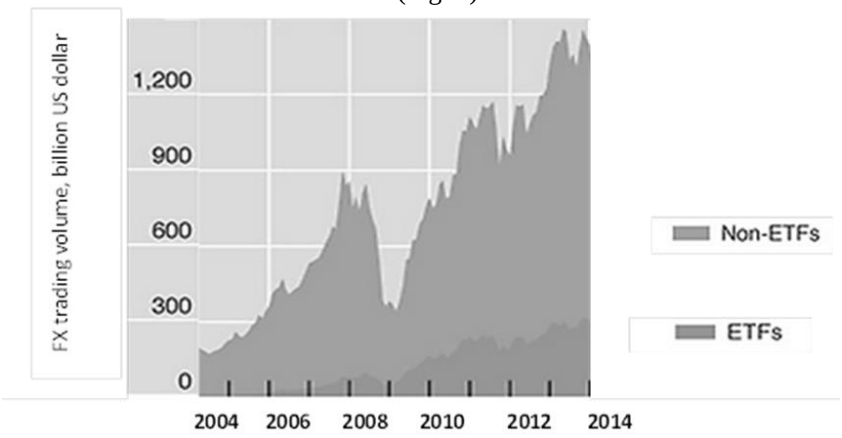

Fig. 3. Yearly ETFs contribution to FX developing currencies segment volume

We have found several studies which are focused on relation between volatility of volume of one of the FX ETF (FXE) and volume of other market segments (Daigler, Hibbert & Pavlova, 2014). Other researchers studied the ETF segment statistics much more widely (Li, Klein, & Zhao, 2012). The common way to construct time series is ARIMA method but the specific for volatility variables is ARCH method (Le & Zurbruegg, 2010). Data about ETFs flows is available on website of Currencyshares' and Powershares' on-line databases which present three largest global currency ETFs indices (US dollar, euro, and yen).

4 Methods and Findings

We have analysed the FX structure by using information from the BIS Survey (2013). According to the survey, traditionally the largest volumes of trading take place in Europe, USA and Japan. Respectively, this trend is presented by the biggest volumes of the FX trading in the main currency pairs, namely Euro versus US dollar (EUR-USD), US dollar versus Yen (USD-JPY), Euro versus Yen (EUR-JPY).

Data have been taken from the website of CLS bank, Currencyshares' and Powershares' on-line databases which present three largest global currency ETFs indices, namely ETF FXE (euro), ETF FXY (yen), and ETF UUP (US dollar).

Data of this research consist of five elements for every month during period from January 2008 till March 2014, namely:

- average number of CLS operations (instructions);
- volatility of volume of exchange-traded fund FXE;

– volatility of volume of exchange-traded fund FXY;
– volatility of volume of exchange-traded fund UUP.

We have studied autocorrelations of these volumes. Table 1 shows that all levels of tested variable of t-statistics are not statistically significant for CLS. According to these results, there are significant autocorrelations between the nearest levels of lags (from month to month) for each time series of ETFs except the time series of CLS.

Table 1. t-statistics of autocorrelation (ACF) and partial autocorrelation functions (PACF)

Lag	ACF				PACF			
№	ETF FXE	ETF FXY	ETF UUP	CLS	ETF FXE	ETF FXY	ETF UUP	CLS
1	6,59*	4,64*	5,74*	1,73	6,48*	4,56*	5,64*	1,62
2	5,37*	4,30*	4,93*	0,29	0,48	2,42*	1,82	-0,31
3	4,34*	3,14*	4,24*	0,95	-0,03	0,13	0,63	0,97
4	3,15*	2,90*	3,10*	0,69	-0,90	0,56	-0,80	0,01
5	2,19*	2,66*	3,16*	-1,13	-0,25	0,61	1,17	-1,32
6	1,28	1,99	3,06*	-1,79	-0,52	-0,35	0,74	-1,03
7	0,29	2,87	2,01*	0,31	-0,82	1,63	-1,33	1,13
8	-0,12	1,68	2,16*	-0,15	0,47	-0,85	0,64	-0,32
9	-0,62	0,86	1,97	-1,05	-0,45	-1,49	0,47	-0,11
10	-1,17	1,02	1,03	-0,59	-0,58	0,76	-1,21	-0,39
11	-1,05	0,92	1,32	-0,09	0,83	0,33	0,43	-0,6
12	-0,69	0,64	1,39	-1,59	0,75	-0,63	0,91	-1,19

Significant levels are signed by (*) on the base of *t*-statistics critical values at the confidence level of 97,5%

Next step should consist of regression models constructing on the base of the time series by using the results of significant lags' autocorrelation. As we have not found out existence of linear relationship between CLS operations from month to month, we could not estimate regression of the CLS and ETFs volumes.

5 Conclusion

A lack of frequently available data can negatively affect strategic decisions of businesses. This research has been motivated by industry's willingness to explain sources of the FX market volume dynamics in developed and developing currencies. In this field we found out several results. Owing to international finance

transformations, nowadays currencies of developing countries become more often used among deals on the FX market than several years ago. This trend had been appeared in the post-crisis period after 2008. The financial organizations had to struggle between two options by making choice on the FX markets. They could adapt to decreasing trends of US dollar domination or they could seize opportunities relating to currencies of developing economies. In 2013 the BIS survey has concluded that unpredictable trends on emerging currencies markets attract more attention of participants to this FX segment volume measurement.

We have also studied what kind of time interval should be taken for the FX volume indicator. We have found that market participants are interested in the FX volume indicators to fill absence of monthly data (Cerutti, Claessens & McGvair, 2012, p.2). Our findings are confirmed by existing statistics source, namely the Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity. It collects only long-term overall statistics of volume so the survey cannot respond to need of frequent availability of the FX data without additional market information. That confirms the opinion that "while official statisticians are increasingly using electronic data in the production of economic indicators, this is still very much in its infancy." (Gill, Perera & Sunner, 2012, p.1).

In our review we have concluded that month could be taken as a time interval to make decisions on the FX market by constructing volatility-based volume indicator. Meanwhile, our experimental findings did not provide enough evidence for that.

Next, we have studied the FX data regarding developed and developing currencies. The FX has a number of participants and nowadays only three infrastructures' performances can indicate its overall activity's performance from month to month. Thus, CLS, SWIFT and ETFs data' features analysis has helped to shed a light to data search for the FX volume estimation.

On the one hand, as class of major developed currencies has mostly become an area of CLS business. CLS data can help to measure a volume of trading in currencies of developed countries. CLS does not include trades in currencies of the BRICS countries. South Africa is only one exemption in this group of 5 countries as its currency is considered as a major one and it can be traded by CLS members.

On the other hand, today SWIFT is known as a provider of efficient supply chain for financial organizations in majority of countries including developing ones. SWIFT services are available for all exotic currency pairs on both developed and developing markets. That is why SWIFT membership has become more popular, especially for banks which were not members of CLS.

Potential role of SWIFT information for the FX volume measurement has not been acknowledged yet. Meanwhile, SWIFT has already presented its contribution to economy forecast which was presented by dynamic models for developed (Gill, Perera & Sunner, 2012), developing, and global economies (Bauwens, Gillain & Rombouts, 2011). Thus, SWIFT analytics are more concentrated on current trends of some developing currencies' internationalization such as Chinese Yuan, RMB (Batten & Szilagyi, 2012).

Finally, in our research we have stated a question: 'To which extent does volume of CLS activities indicate the standard deviation of volume during a month for three

major ETF FX segments in developed currencies?' We have calculated the ETF standard deviation on the base of daily volumes in order to aggregate data on the volatility of ETF volume for each month. We have obtained results which have not approved a hypothesis that relation between CLS volumes and ETFs volatility-based estimation of volumes does exist. We were focused on the ETF segment and its three major representatives. These imperfections have affected our research by its inability to extrapolate directly our results for the whole ETF segment of the FX. Next stage of this research could be conducted with more types of ETFs statistics and SWIFT data.

As CLS bank and SWIFT are rapidly evolving competitors in the industry, they consider promotion of the own business intelligence to the FX volume estimation. It makes possible to start research projects in this field. In future research a question can be stated as following: 'To which extent do SWIFT and CLS activities indicate the volume of the major FX segments?' The research objective can be FX volume indicator constructing. Sources of information for the FX size measurement can come from the website of CLS bank, SWIFT, and ETFs (Currencyshares, Powershares, and others) on-line databases.

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