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The Effects of COVID-19 on the Foreign Exchange Market Liquidity in Emerging and Frontier Markets Africa

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Abstract

The COVID-19 pandemic has surely dealt a blow to the world economy, this further led to human livelihoods being affected in different ways. The economic impact of the COVID-19 crisis is said to have had more impact than the global financial crisis. This paper looks at how COVID-19 affected the Foreign Exchange market liquidity in Emerging and frontier markets in Africa.

Keywords: COVID-19, Foreign Exchange, market liquidity

1. Introduction

Liquidity in financial markets refers to the ability to trade a large quantity of securities with a minimal change in the price of the counter (Igbinosa & Uhunmwangho, 2019). Asset prices will therefore fall significantly if there's a negative abrupt liquidity shock in the market and also rise if there a positive shock. Liquidity is a factor that an investor will look at when choosing to invest in a particular asset class or even company.

Emerging and frontier markets in Africa are often used to describe countries with developing economies and markets that are not yet fully established or mature. The terms "emerging" and "frontier" are often used interchangeably, but they have slightly different meanings.

An emerging market is a country that has some characteristics of a developed market, but not all. These countries have low-to-middle per capita income levels, and they are typically characterized by high economic growth rates, a rapidly expanding middle class, and a growing consumer market. Emerging markets also tend to have a relatively high level of political risk and volatility compared to more developed markets. Frontier markets, on the other hand, are countries that are even less developed than emerging markets. These countries typically have low levels of income, infrastructure, and institutional development, but they are also experiencing significant growth potential. Frontier markets are often characterized by higher political risk and less transparent legal systems. Countries that are regarded as frontier markets in Africa include; South Africa, Nigeria, Mauritius, Egypt, Tunisia and Morocco. According to a study done by

Dietrich Domanski et.al, emerging market economies (EMEs) have experienced large shifts in FX market conditions. A period of sustained capital inflows and high

commodity revenues between 2009 and 2013 resulted in appreciation pressure for many EME currencies.

February 14th 2020 marked the entry of the Corona virus in Africa, as confirmed by Dr. Hala Zayed Minister for Health in Egypt. Since then there has been a lot of transformation in livelihoods across the continent. As soon as this news broke out there was a lot of uncertainty spanning all across and the downside seemed unlimited. Going forward COVID-19 is going to pose a threat to economic growth and development of many economies especially emerging economies here in Africa.

Africa frontier markets received a huge blow to their Forex markets as the effects of COVID-19 started presenting themselves in the economy. The South African Rand for the example stood at

ZAR16.2: USD 1 due to reduced Forex earning as a result of reduced exports. Africa's heavy dependence on the outside world also led to currencies of frontier markets heading on a downtrend due to trade disruptions across the globe. These frontier markets have been witnessing a lot of foreign direct investments in the previous years but due to the coronavirus investors were averse about continuation of these investments thus this meant that there were reduced Foreign Exchange reserves thus the local currencies faced downward pressure.
Figure 1; graph representing the currencies movements since 2018-2022

According to a report by the South African Institute of International Affairs; most emerging and frontier markets had an easy investment environment pre-COVD-19. This, they say, had an effect on the Forex market, in that the long-running low yields in emerging economies, coupled with easy and cheap money, ensured widespread investment in Africa and increased sales of local currency assets. This led to a reliance Sby African economies, sovereigns and corporates on foreign investment activity. These phenomena resulted in the volatile market corrections experienced during the pandemic as all of these factors suddenly reversed and investor sentiment rapidly became pessimistic. The South African rand for example lost about 25% of its value against the U.S dollar. This is to be expected to a certain extent, as the rand is a leading emerging market currency and is highly vulnerable to, and influenced by, international events and foreign investor sentiment.

Problem statement.

Covid-19 has plunged economies across the world into recessions resulting from disrupting international trade and commerce. This has in turn placed immense pressure on foreign exchange markets in developing markets in Africa, posing a threat to economic stability in these countries. Most of these countries are net importers and therefore looking at their foreign exchange situation given the effects of COVID-19 will be of importance to this study. Sovereign debt is also an issue in developing and frontier markets; thus these countries experienced less foreign exchange receipts and this coupled up with rising fiscal deficits and rising debt to GDP ratio in the countries under this study would therefore raise an interest into researching some of the effects COVID-19 had on the Forex market. In particular this study will tend to shed light into the effects of COVID-19 in the liquidity of the forex market in emerging and frontier markets. This was a recent and new event thus the need for research and presence of a research gap. The foreign exchange rate is an indicator of a country's economic health level.

Research Objective

This study will look at the effects COVID-19 had on the liquidity of forex markets in emerging and frontier markets in Africa.

Significance of the Study

It may give policy makers and market participants empirical evidence of the effects of such unprecedented events. There has been very minimal research in this area concerning liquidity of foreign exchange markets in Africa. The study may also be used as a reference point by portfolio managers when coming up with hedging strategies. More research will also be built upon later by other students and researchers.

2. Emperical review

Eren et al, 2020)in their article focus on n the developments in FX swap markets and the divergence in key US dollar funding rates during the Covid-19 crisis. The article focuses primarily on the pull-back of funding from non-US banks and the associated international spillover effects. It shows that key dollar funding rates – which usually track each other closely – diverged markedly during this episode, and that the funding costs for market participants reliant on MMF funding varied greatly between banks, even for institutions of comparable creditworthiness. (Tabaković, 2021) in his paper looks at how the National Bank of Serbia adopted temporary measures to ensure stability in the foreign exchange markets during the COVID-19 pandemic. The author in the paper looks at the liquidity in FX markets before the COVID-19 pandemic and concluded that the Serbian banking sector enjoyed excess liquidity over a longer period and that bank liquidity was extremely high even before the crisis-motivated activities and operations of the National Bank of Serbia, it goes further to say that The analysis of factors which determined liquidity movements in the prior period indicates a change in the direction and significance of individual factors which affected liquidity movements before and after the COVID19 pandemic.

A study undertaken by (Mancini et al., 2013.) looked at the liquidity of exchange rates during the financial crisis, they used six liquidity measures for their study i.e price impact, return reversal, bid-ask spread, effective cost, price dispersion, and principal component. The conclusion from the study was that most exchange rates were relatively liquid and stable at

the beginning of the sample. Liquidity suddenly dropped during the major unwinding of carry trades in August 2007. In the following months liquidity rebounded slightly for most currency pairs before it entered on a downward trend at the end of 2007. The decrease in liquidity continued after the collapse of Bear Stearns in March 2008. A potential reason for the increase in liquidity during the second quarter of 2008 is that investors believed that the crisis might soon be over and began to invest in FX markets again. Moreover, central banks around the world supported the financial system by a variety of traditional as well as unconventional policy tools. However, in September and October 2008, liquidity plummeted following the collapse of Lehman Brothers. This decline reflected the turmoil and uncertainty in financial markets caused by the bankruptcy. During 2009, FX liquidity returned slowly but steadily.

(Hofmann et al., 2021) in their paper titled 'Emerging Market Economy Exchange Rates and Local Currency Bond Markets Amid the COVID-19 Pandemic.' came to the conclusion that borrowing through domestic currency bonds did not insulate emerging market economies from the financial shock that was unleashed by COVID-19, Portfolio investors faced amplified losses as local currency spreads and exchange rates moved in lockstep; their revised portfolio allocations in turn strengthened this correlation. They also found that EMEs with monetary policy frameworks that are equipped to address the feedback loop between exchange rate depreciation and capital outflows stand a better chance of weathering the financial fallout from the Covid-19 pandemic.

This section will show some of the studies undertaken regarding liquidity in foreign exchange markets. The currencies in this study are classified as exotic currencies which means that they are thinly traded, are illiquid and are traded at low volumes. According to a research that was conducted by Emanuel Kohlscheen et al., whereby they discuss how EMEs have adapted FX market operations, they suggest that FX market operations aim at influencing market liquidity conditions in a broad manner. These market operations refer to the evolving foreign exchange market and policy backdrop. The same paper also suggests that central banks also intervene in FX markets to build FX reserves for precautionary reasons. The demand for foreign currency for hedging purposes has increased. Investments in emerging and frontier economies by foreign corporates and domestic entities before the coronavirus pandemic put these investors at high risk exposure during the COVID-19 pandemic. In this case this resulted in high demand for insurance against depreciation of the currencies. Therefore in a case of an illiquid FX market very large bid-ask spreads, can imply large costs for the financial and non-financial sectors and the large costs might make it difficult for investors to close their positions exposing them to losses. A study undertaken by (Evans, 2020) suggests that liquidity risk affects the behavior of currency returns. (Rogoff et al., 2008) uses the CBOE VICX and LIBOR spreads to examine the link between reductions in liquidity funding and losses on carry trades. (Menkhoff et al., 2012) on the other hand uses an aggregate measure of foreign currency bid-ask spreads and equity based liquidity measure as a proxy of global liquidity risk in foreign currency trading. An analysis done by (Evans, 2020) focuses on differences in liquidity across currency pairs rather than an aggregate economy-wide measure of liquidity. This approach according to the researcher has got two benefits, first, it directly ties trading conditions for particular currency pairs to the behavior of returns. Second it allows for how different liquidity measures contribute to systematic risk through the construction of liquidity-sorted portfolios.

3. Research methodology

Research Design

This study is meant to provide insights into how COVID-19 affected Foreign exchange liquidity in the emerging and frontier markets in Africa. This study will therefore take an Event study analysis approach, in an attempt to capture the event which is COVID-19, to explain its effects on FX liquidity in emerging and frontier markets in Africa. The study will be quantitative in nature and will also use statistical methods to analyse the data.

Population and Design

The countries chosen for this study include; South Africa, Nigeria, Mauritius, Egypt, Tunisia and

Morocco; this is because these are just a sample of the emerging and frontier economies in Africa, and also are typically included in indices and rankings of emerging and frontier markets on the continent, therefore the results of this study are going to give a good representation of the whole population. The estimation window chosen for this study is from 1st January 2018 to 30th June 2019, the first COVID-19 case in Africa was announced on 20th February 2020 therefore this will be the event day. The period prior to the event day will be from 21st January 2020 to 19th

February 2020, 30 days before the event day, the period after the event will be represented by 21st February 2021 to 31st March 2021.

A detailed outline is given below of how the event study is to be carried out:

• Event definition

The main purpose of this step is to identify the period over which the event will be examined.

Diagram Representing the Event

Below is are the respective dates in which each country announced its first COVID-19 case;

4. Data collection

This study will use the Bid-Ask spreads of the respective currencies to show the level of liquidity in FX markets in emerging and frontier markets in Africa. Bid-ask prices will

be needed to calculate the spreads, therefore the daily prices for these currencies will be obtained from Refinitiv. Refinitiv is a global provider of financial market data, analytics, and trading solutions.

It offers a wide range of data feeds, news services, and platforms for financial professionals.

5. Data analysis

Data analysis will begin with testing the data obtained for stationarity. All the data is expected to be stationary and if not then the data must be made stationary by differencing. The model that shall be used to carry out the analysis is a Market model. In "The Econometrics of Financial Markets" by John Campbell, Andrew Lo, and Craig MacKinlay (1997), the authors define a market model as "a statistical model of the joint behavior of a set of asset returns, reflecting the underlying interdependencies among these assets". The authors use market models to analyze the risk and return characteristics of different investment strategies and evaluate the performance of various asset pricing models. A market model relates the return of any given security to a market portfolio. The Market model is defined as follows;

$$Rit = \propto i + \beta iRmt + \varepsilon it$$

Rit – period t returns on security i λ

Although the constant mean return model is the simplest model, empirical evidence indicates it often yields results similar to those of more sophisticated models.

The selection criteria.

The rationale behind using 20th February 2020 is because it was on this day that the first case of

COVID-19 was announced Africa, also there's only difference of 20 days between the first country to report a case and the last country, in this case South Africa.

Normal and Abnormal liquidity levels.

In order to observe the impact COVID-19 had on the liquidity levels in these markets, a measurement of the actual liquidity during the event window then minus the normal liquidity over the event window. The normal liquidity would be what levels were expected if the event did not take place. There exists no direct data on liquidity levels in Foreign exchange markets, therefore the Bid-Ask spread will be used to determine the liquidity on these currencies. The bid –ask spread reflects the willingness of buyers and sellers to trade at a given point in time. A narrower spread indicates that there are many buyers and sellers willing to trade at similar prices, which means that the market is less liquid.

The Estimation procedure.

After selection of the Market model as a method of looking at the normal performance, the parameters of the model must be estimated using the data that will correspond to the estimation window. In this case a choice of 253 days would be ideal since this is the standard number of trading days in a year. Under general conditions ordinary least squares (OLS) is a consistent estimation procedure for the market model parameter.

Testing procedure

Given that the model for calculating the normal liquidity levels and the measure of liquidity have already been chosen, calculations of the abnormal liquidity levels on an out of sample basis will be carried out.

$$ARi\tau = Ri\tau - \alpha i - \beta iRm\tau$$

(MacKinlay, 1997) suggests that under the null hypothesis, conditional on the event window market returns, the abnormal returns will be jointly normally distributed with a zero conditional mean and conditional variance $\sigma 2ARi\tau$ where:

$$\sigma 2ARi\tau = \sigma \varepsilon i2 \quad + l\ 11\ [1 + Rm\sigma\tau - m2\mu m]$$

The conditional variance has two components. One component is the disturbance variance $\sigma \varepsilon i2$ and a second component is additional variance due to the sampling error in αi and βi, this leads to serial correlation of the abnormal returns.

Estimates for αi and βi are Parameter estimates used to calculate abnormal liquidity

Obtained. Levels. $ARi\tau = Ri\tau - \alpha i - \beta iRm\tau$

6. Data analysis and results

Data Description

This study uses secondary data, recorded daily but form different dates depending on when the first case of COVID-19 was announced in the respective countries. The bid and ask prices in this study were obtained from Refinitiv. Various countries regarded as emerging economies still have scanty data with regards to daily trading volume or even daily bid ask prices, therefore they are not included in the study. The countries in this study had bid ask prices ranging all the way from 2017 to 2022.

Figure 1 below shows the daily price levels of the currencies in this study.

Figure 1.2; Daily prices for the 5 currency pairs in this study.

The data shows the demeaned prices after differencing has been carried out. The data seems to be mean reverting around 0.00 apart from some anomalies that show really high swings.

Determination of the event window

Each country had a specific day when COVID-19 was first announced. A table for each country will be showed to give an overview of the period under research. The dates 1st Jan 2018 to 1st Jan 2019 will be used to provide a subset of the data known as the estimation window. This data will be used to determine the estimates for αi and βi. These parameter estimates will be used to estimate the normal performance model. The market model is described as follows;

$$Rit = \alpha\ i + \beta\ iRmt + \varepsilon it$$

With the parameter estimates for the normal performance model, the abnormal liquidity levels can be calculated.

The abnormal returns are calculated on an out of sample basis for the event window τ.

$$ARi\tau = Ri\tau - \alpha i - \beta iRm\tau$$

The period under study in the event window before the event day is 30 days (period prior) and the days after the event were 365 days (period after). This will be enough time to see the effect that COVID-19 had on the different currencies.

NIGERIA (NGNUSD)

Nigeria's first case of COVID-19 was announced on 28th February 2020, this will therefore inform the decision of having this as the event day, as will be indicated later in the study. The market model estimates for NGNUSD are as shown in the table below;

Table 1.1; estimates for a market model

The slope of the regression line represents the average abnormal return (AR) in the security or portfolio over the time period, while the intercept represents the average cumulative abnormal return (CAR) over the time period. In this case, the slope of 25.801 indicates that the average abnormal return of the security or portfolio is positive over the time period (1st Jan 2018 to 1st Jan 2019).

Figure 2 below shows the Bid-Ask spread for the event window, the spreads are marked using green circular shapes to represent the daily spreads;

Figure 2; Daily spread for NGNUSD

From the data above one can observe that the spread on the NGNUSD currency pair increased after a certain period, indicating that liquidity of NGNUSD had reduced significantly meaning COVID-19 had a negative impact on the currency pair.

Cumulative Abnormal returns

The cumulative abnormal returns are calculated over the event window τ, (29th Jan 2020 to 1st March 2021), the event day was set on 28th Feb 2020. The cumulative abnormal returns before and after the event day are as show in the table below;

Table 1.2; CAR for NGNUSD

In this case, the CAR before the event is 1.018 and the CAR after the event is -0.104. A positive

CAR value indicates that the currency performed better than expected (outperformed) based on the benchmark, but these results suggests that COVID-19 had a negative impact on the returns of the NGNUSD currency pair.

Testing the Null Hypothesis.

The Null Hypothesis is Ho: The event has no impact on the behavior of the spreads, while the alternative hypothesis is Hα: The event has an impact on the behavior of the spreads. To test this hypothesis, various statistical tests are used such as the t-test, a commonly used test statistic in event study analysis is the t-statistic. If the calculated t-statistic is greater than the critical value, then the null hypothesis is rejected, indicating that the event had a significant effect on the stock.

In the case of NGNUSD currency pair the table below shows the t-statistic and the p-value observed that are used to test the significance of the cumulative abnormal returns (CAR) obtained from the event study analysis. A low p-value (typically less than 0.05) indicates that the results are statistically significant and that the event had a significant impact on the currency returns.

Table 1.3; NGNUSD

The t-statistic of 1.05 indicates that the difference in cumulative abnormal returns between the before and after event periods is 1.05 standard deviations away from the mean of the differences, since the p-value is larger than 0.05, it suggests that the difference in cumulative abnormal returns between the two periods is not statistically significant, and we cannot reject the null hypothesis that the event had no effect on the NGNUSD currency spread.

TUNISIA (TNDUSD)

Tunisia's first case of COVID-19 was announced on 2nd March 2020. The market model estimates for TNDUSD are as shown below;

Table 2.1; estimates for TNDUSD

In this case, the slope of 3.291 indicates that the average abnormal return of the security or portfolio is positive over the time period (1st Jan 2018 to 1st Jan 2019).

Figure 3 below shows the Bid-Ask spread for the event window (1st Feb 2020 to 2nd Mar 2021), the spreads are marked using green circular shapes to represent the daily spreads.

Figure 3; Daily spread for TNDUSD

The figure above shows that the spread of TNDUSD currency pair was really high way before the events of COVID-19 but reduced by almost half (as seen on the right half side of the graph) meaning COVID-19 had a positive impact on the liquidity of the TNDUSD.

Cumulative Abnormal returns

The cumulative abnormal returns are calculated over the event window τ (1st Feb 2020 to 2nd Mar 2021) the event day was set on 2020/03/28. The cumulative abnormal returns before and after the event day are as show below;

Table 2.2; CAR for TNDUSD

In this case, the CAR before the event is 0.104 and the CAR after the event is 0.0840. As was written earlier, a positive CAR value indicates that the currency performed better than expected (outperformed) based on the benchmark, these results suggests that COVID-19 had a positive impact on the returns of the TNDUSD currency pair.

Testing the Null Hypothesis.

In the case of TNDUSD currency pair the table below shows the t-statistic and the p-value observed that are used to

test the significance of the cumulative abnormal returns (CAR) obtained from the event study analysis.

Table 2.3; TNDUSD

A T-statistic of 0.065 means that the sample mean is not significantly different from the hypothesized population mean. The P-value of 0.947 is large, which means that there is no evidence to reject the null hypothesis. This would mean that the event had no effect on the TNDUSD currency spread.

SOUTH AFRICA (ZARUSD)

South Africa's first case of COVID-19 was announced on 12th March 2020. The market model estimates for TNDUSD are as shown below;

Table 3.1; estimates for ZARUSD

In this case, the slope of 3.291 indicates that the average abnormal return of the security or portfolio is positive over the time period (1st Jan 2018 to 1st Jan 2019).

Figure 4 below shows the Bid-Ask spread for the event window (11th Feb 2020 to 12th March 2021), the spreads are marked using green circular shapes to represent the daily spreads;

Figure 4; Daily spread for ZARUSD

The figure above shows that the spread of ZARUSD currency pair was low way before the events of COVID-19 but the spreads started increasing as we move further to the right of the graph. This may suggest that the events of COVID-19 had a negative effect on the liquidity of the currency pair.

Cumulative Abnormal returns

The cumulative abnormal returns are calculated over the event window τ, (11th Feb 2020 to 12th March 2021) the event day was set on 12th March 2020. The cumulative abnormal returns before and after the event day are as show below;

Table 3.2; CAR for ZARUSD

In this case, the CAR before the event is 1.018 and the CAR after the event is -0.104. These results suggest that COVID-19 had a negative impact on the returns of the TNDUSD currency pair, which is in line with the reduced liquidity after the event.

Testing the Null Hypothesis.

In the case of ZARUSD currency pair the table below shows the t-statistic and the p-value observed that are used to test the significance of the cumulative abnormal returns (CAR) obtained from the event study analysis.

Table 3.3; ZARUSD

The results of the t-statistic and p-value from the event study analysis of the ZARUSD currency pair show that the results are not significant. A low t-statistic and a high p-value suggest that there is no statistically significant difference between the abnormal returns before and after the event. The p-value of 0.450 is higher than the commonly used significance level of 0.05, which means that the results are not statistically significant at the 5% level. This suggests that the event had no significant effect on the ZARUSD currency pair.

MOROCCO (MADUSD)

Morocco's first case of COVID-19 was announced on 2nd March 2020. The market model estimates for MADUSD are as shown below;

Table 4.1; estimates for MADUSD

In this case, the slope of -0.441 indicates that the average abnormal return of the security or portfolio is negative over the time period (1st Jan 2018 to 1st Jan 2019).

Figure 5 below shows the Bid-Ask spread for the event window (1st Jan 2020 to 2nd March

2021), the spreads are marked using green circular shapes to represent the daily spreads;

Figure 5; Daily spread for MADUSD

The figure above shows that the spread of MADUSD currency pair kind of remained the same throughout the whole period given that most spreads were quite low, between 0.00 and -0.02, but this was also coupled with cases of high spreads indicating low liquidity.

Cumulative Abnormal returns

The cumulative abnormal returns are calculated over the event window τ, (1st Jan 2020 to 2nd March 2021) the event day was set on 2020/03/02. The cumulative abnormal returns before and after the event day are as show below;

Table 4.2; CAR for MADUSD

In this case, the CAR before the event is 0.903 and the CAR after the event is 0.0129. These results suggest that COVID-19 had a positive impact on the returns of the MADUSD currency pair, but the effects were quite minimal.

Testing the Null Hypothesis.

In the case of MADUSD currency pair the table below shows the t-statistic and the p-value observed that are used to test the significance of the cumulative abnormal returns (CAR) obtained from the event study analysis.

Table 4.3; MADUSD

In this case, the T-statistic value of 0.850 and the P-value of 0.395 suggest that there is not enough evidence to reject the null hypothesis that there is no significant effect on the behavior of the MADUSD currency pair. This therefore means the spreads of the MADUSD currency pair were not widely affected by the entry of COVID-19 into the country.

EGPYPT (EGPUSD)

Egypt's first case of COVID-19 was announced on 20th Feb 2020. The market model estimates for EGPUSD are as shown below;

Table 5.1; estimates for EGPUSD

In this case, the slope of -1.362 indicates that the average abnormal return of EGPUSD is negative over the time period (1st Jan 2018 to 1st Jan 2019).

Figure 6 below shows the Bid-Ask spread for the event window (21st Jan 2020 to 20th Feb 2021), the spreads are

marked using green circular shapes to represent the daily spreads;

Figure 6; Daily spreads for EGPUSD

The figure above shows that the spread of EGPUSD currency pair was really high before the COVID-19 pandemic and the spreads were quite low further ahead after the pandemic. This shows that the liquidity on EGPUSD was positively affected by the COVID-19 pandemic.

Cumulative Abnormal returns

The cumulative abnormal returns are calculated over the event window τ, (21st Jan 2020 to 20th Feb 2021) the event day was set on 20th Feb 2020. The cumulative abnormal returns before and after the event day are as show below;

Table 5.2; CAR for EGPUSD

In this case, the CAR before the event is -0.566 and the CAR after the event is -1.045. These results suggest that COVID-19 had a negative impact on the returns of the EGPUSD currency pair due to the reduced spreads.

Testing the Null Hypothesis.

In the case of EGPUSD currency pair the table below shows the t-statistic and the p-value observed that are used to test the significance of the cumulative abnormal returns (CAR) obtained from the event study analysis.

Table 5.3; EGPUSD

In this case, the t-statistic of 2.045 suggests that the cumulative abnormal return after the event is significantly different from the cumulative abnormal return before the event. The p-value of 0.0409 is less than 0.05, which means that there is strong evidence against the null hypothesis that the event had no significant effect on the currency returns. Therefore, the results of the event study analysis indicate that the event had a significant impact on the currency returns.

6. Conclusion

The inferences made in chapter 4 show that COVID-19 had an effect on the liquidity of certain currencies, either positively or negatively and also how significant were these effects. Those that had a positive effect were TNDUSD, and EGPUSD, but the EGPUSD pair was faced by a significant effect given the results from the t-test while those that had a negative effect included MADUSD, NGNUSD and ZARUSD. Even though the effect was negative the t-test statistics and p-values from these 3 currencies show that the effect was not significant.

There exists a number of reasons as to why COVID-19 had a negative impact; one would be that there was a higher demand for safer currencies such as the US dollar and therefore it demand rose sharply compared to the currencies in this study. During the COVID-19 period there was also a reduction in trade activities and disruption of supply chains especially in the emerging and frontier markets thus the demand for these currencies was low.

There's also a possibility that the reason why currencies such as the Tunisian Dinar experienced a positive effect was due to the fact that The Central Bank of Tunisia lowered its main policy rate in March 2020 and injected TND 9.9 billion to increase bank liquidity. Emerging and frontier markets still remain at very fragile financial conditions, particularly those that face high risks to debt sustainability. The liquidity problem that some of these countries face could also morph into solvency concerns. The complexity of these challenges will require a multifaceted policy response.

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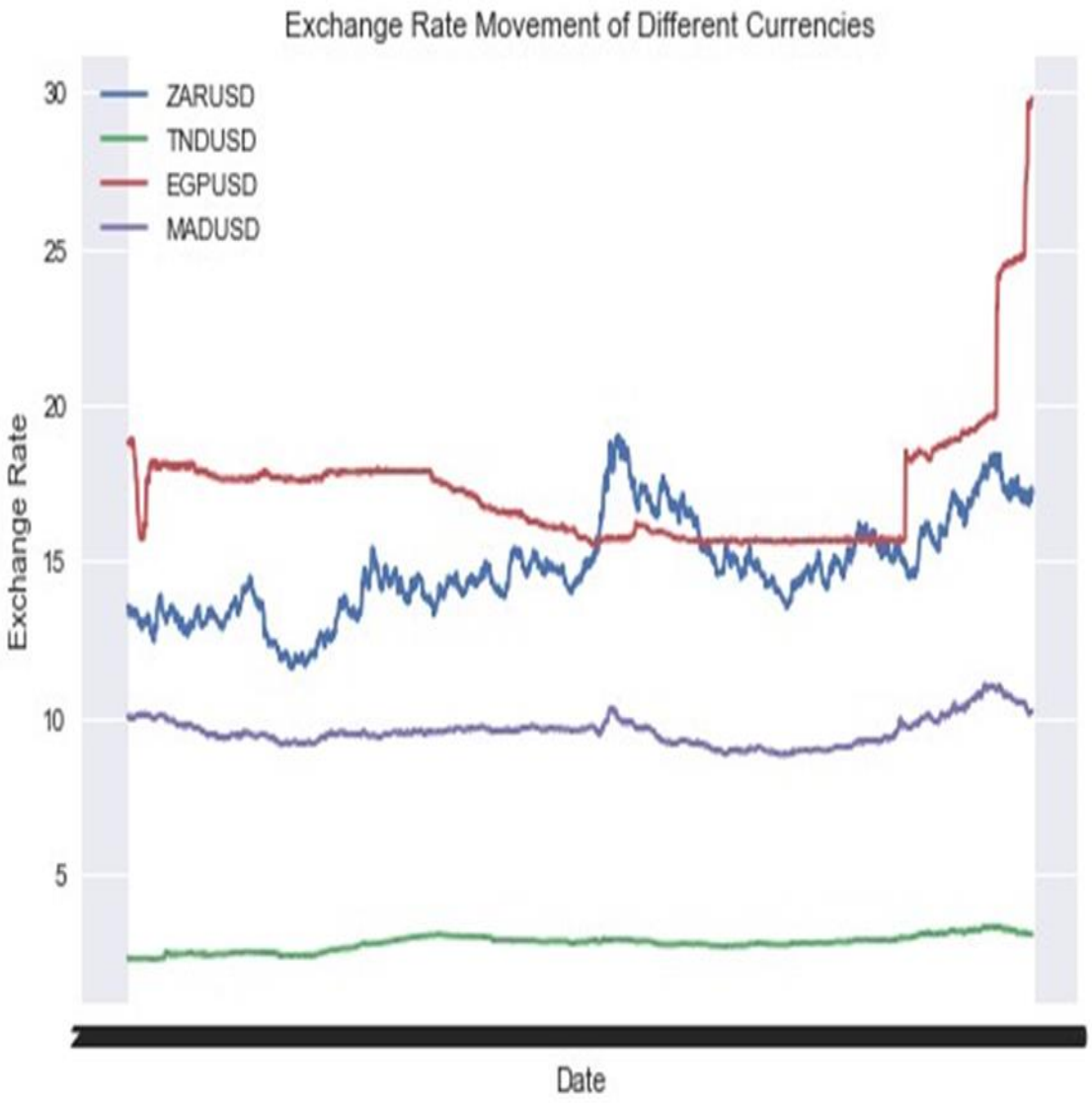
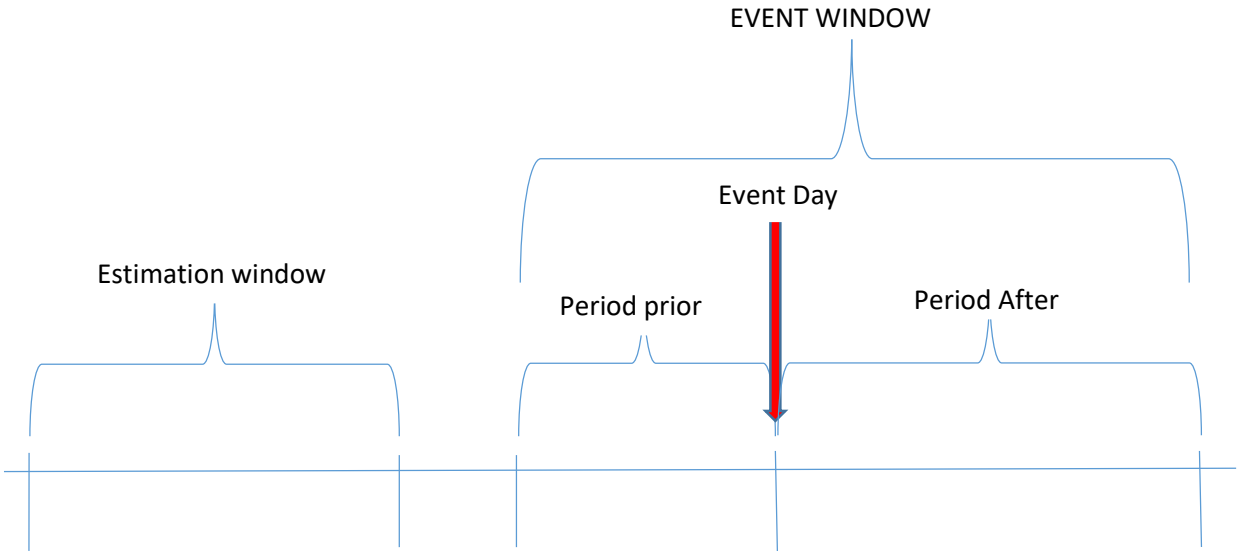


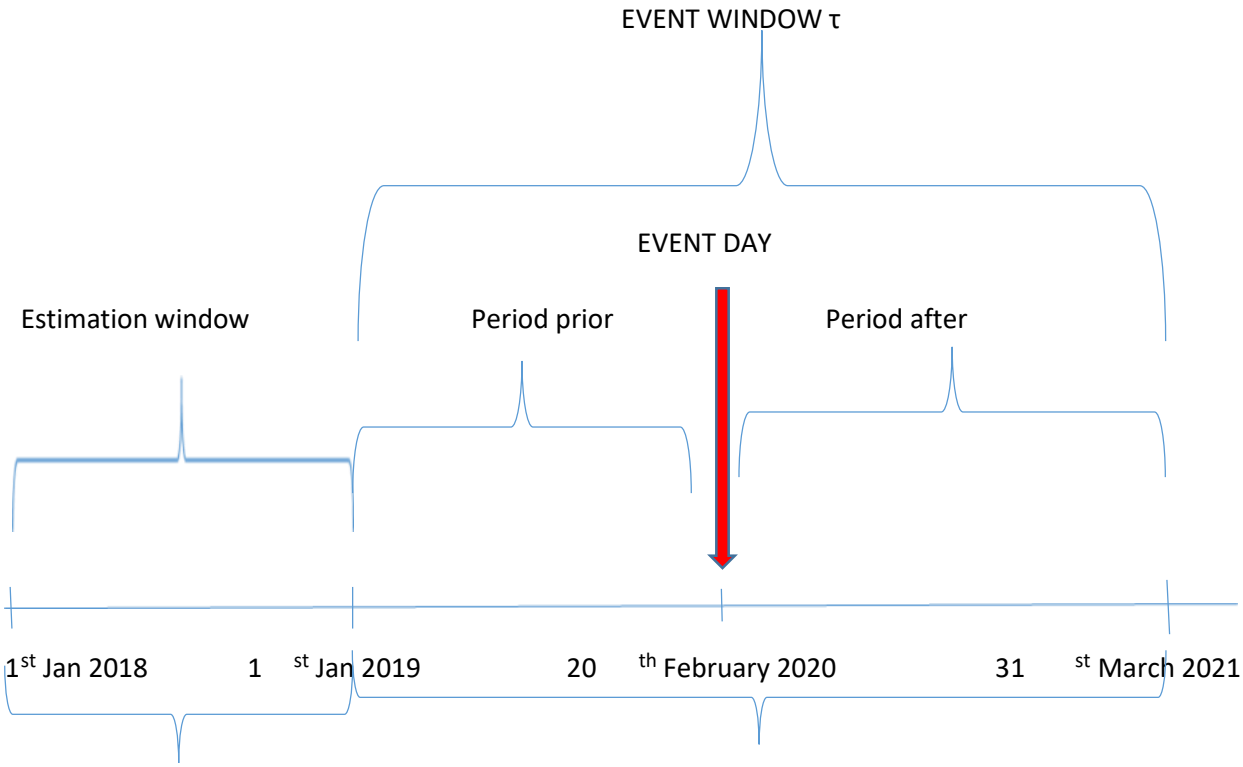
Figure 1; graph representing the currencies movements since 2018-2022

DIAGRAM REPRESENTING THE EVENT.



Below is are the respective dates in which each country announced its first COVID-19 case;

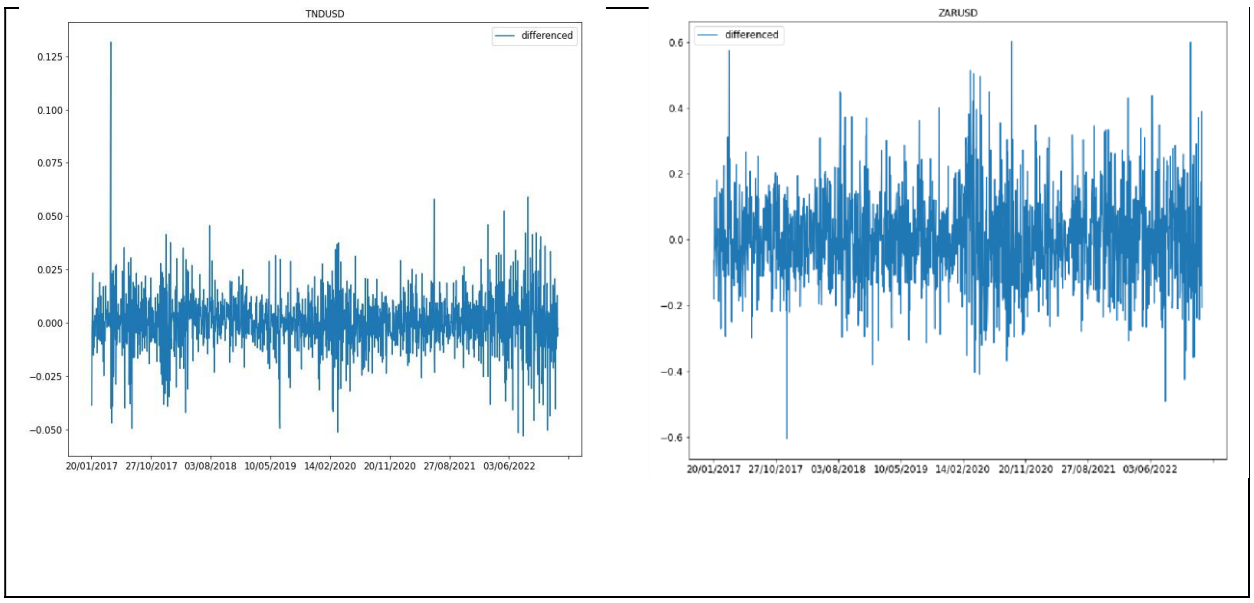
Country	**Event Day**	**Pre-event window.(30 days)**	**Post-event window (365 days).**
South Africa	12th March 2020	11th Feb 2020 - 11th March 2020	12th March 2020 – 12th March 2021
Nigeria	28th February 2020	29th Jan 2020 - 27th Feb 2020	28th Feb 2020 – 1st March 2021
Egypt	20th February 2020	21st Jan 2020 - 19th Feb 2020	20th Feb 2020 – 20th Feb 2021
Tunisia	2nd March 2020	1st Feb 2020 - 1st March 2020	2nd March 2020 – 2nd March 2021
Morocco	2nd March 2020	1st Feb 2020 - 1st March 2020	2nd March 2020 – 2nd March 2021



Estimates for α_i and β_i are Obtained.

Parameter estimates used to calculate abnormal liquidity Levels. $AR_{i\tau} = R_{i\tau} - \alpha_i - \beta_i R_{m\tau}$

Figure 1 below shows the daily price levels of the currencies in this study.



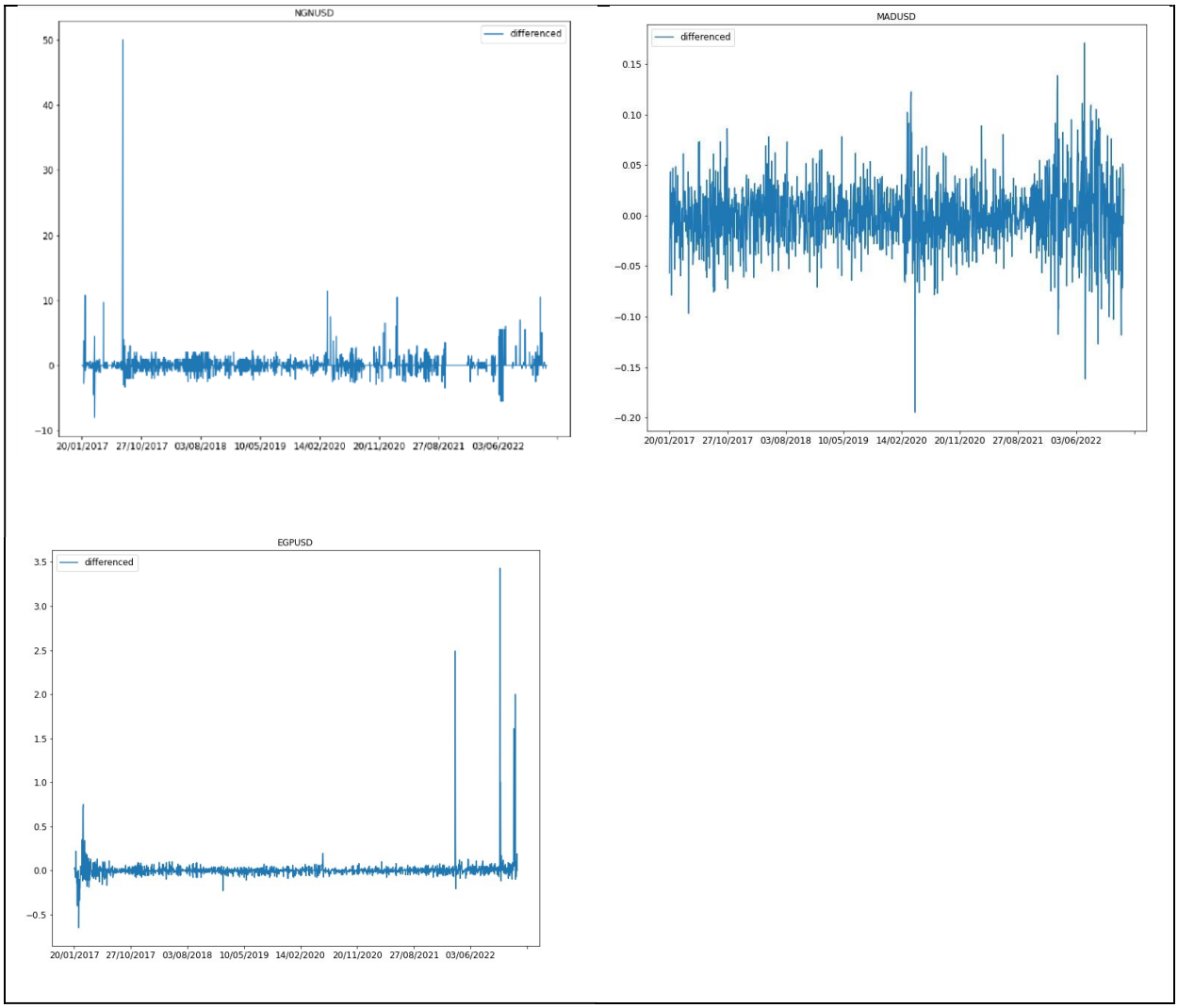


Figure 1.2; Daily prices for the 5 currency pairs in this study

Slope (β_i)	25.801
Intercept (α_i)	-0.0053
R- Squared	0.0109

Table 1.1; estimates for a market model

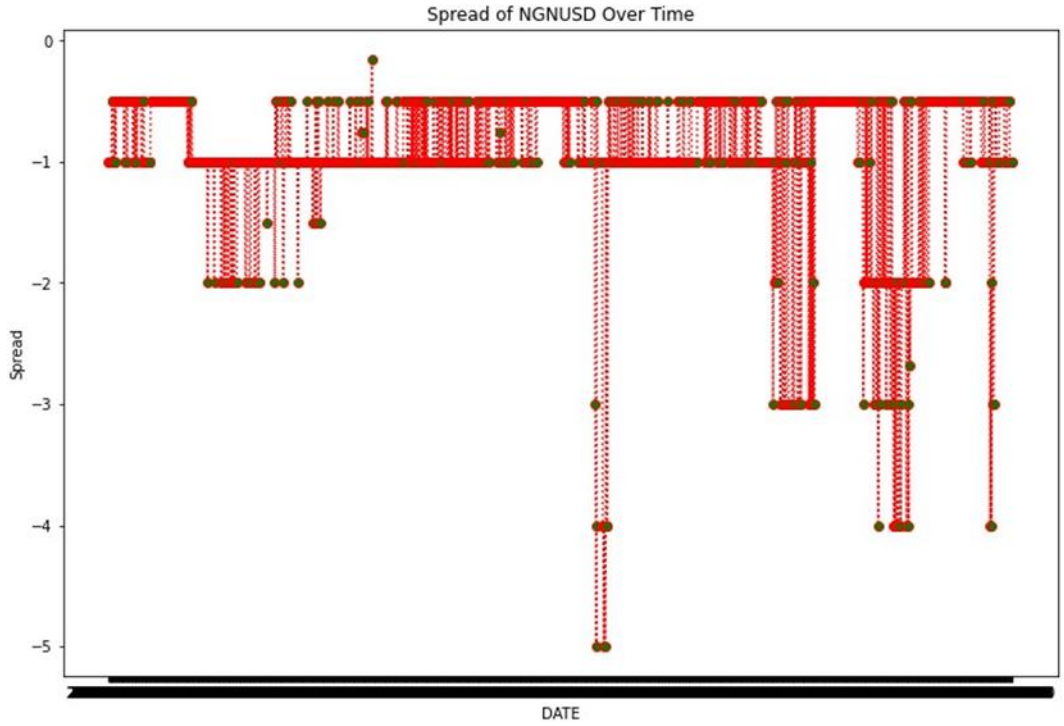


Figure 2; Daily spread for NGNUSD

CAR before event	1.018
CAR after event	-0.104

Table 1.2; CAR for NGNUSD

T-statistic	1.050

P-value	0.293

Table 1.3; NGNUSD

Slope (β_i)	3.291
Intercept (α_i)	-0.00074
R- Squared	0.00186

Table 2.1; estimates for TNDUSD

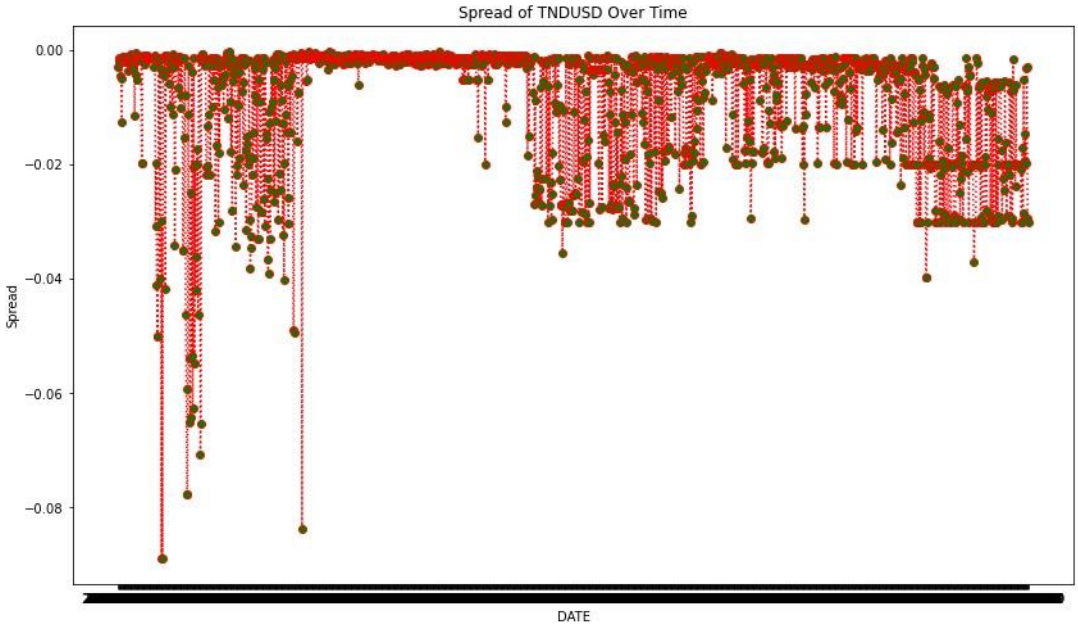


Figure 3; Daily spread for TNDUSD

CAR before event	0.104

CAR after event	0.0840

Table 2.2; CAR for TNDUSD

T-statistic	0.065
P-value	0.947

Table 2.3; TNDUSD

Slope (β_i)	-7.187
Intercept (α_i)	0.000209
R- Squared	0.00764

Table 3.1; estimates for ZARUSD

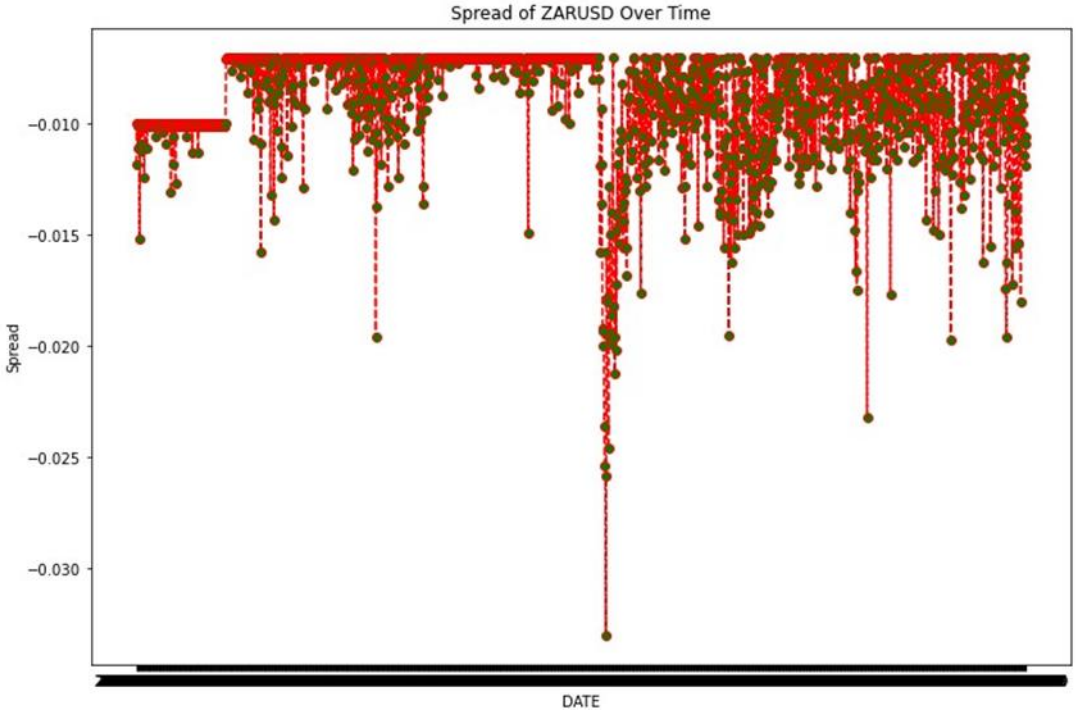


Figure 4; Daily spread for ZARUSD

CAR before event	1.018
CAR after event	-0.104

Table 3.2; CAR for ZARUSD

T-statistic	0.754
P-value	0.450

Table 3.3; ZARUSD

Slope (β_i)	-0.441

Intercept (α_i)	-0.000339
R- Squared	0.000100

Table 4.1; estimates for MADUSD

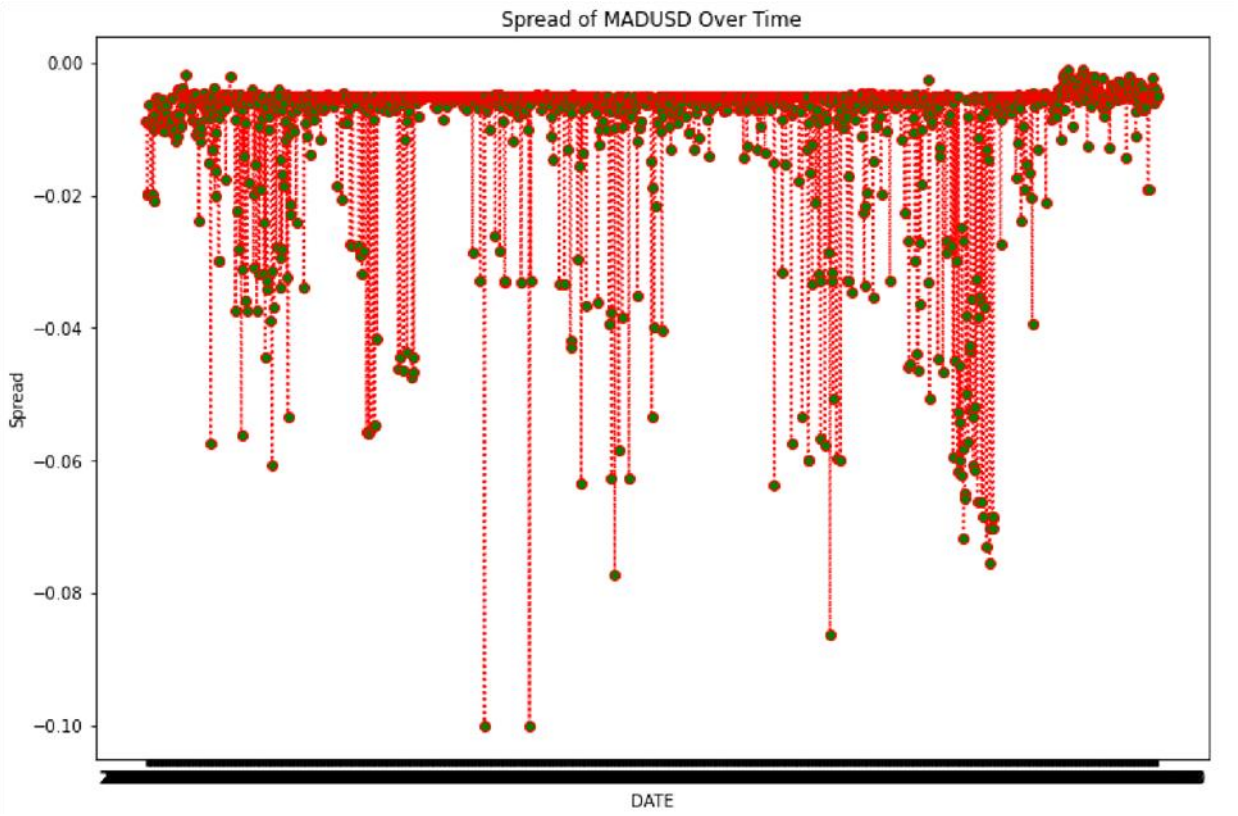


Figure 5; Daily spread for MADUSD

CAR before event	0.903
CAR after event	0.0129

Table 4.2; CAR for MADUSD

T-statistic	0.850

P-value	0.395

Table 4.3; MADUSD

Slope (β_i)	-1.362
Intercept (α_i)	0.000317
R- Squared	0.00961

Table 5.1; estimates for EGPUSD

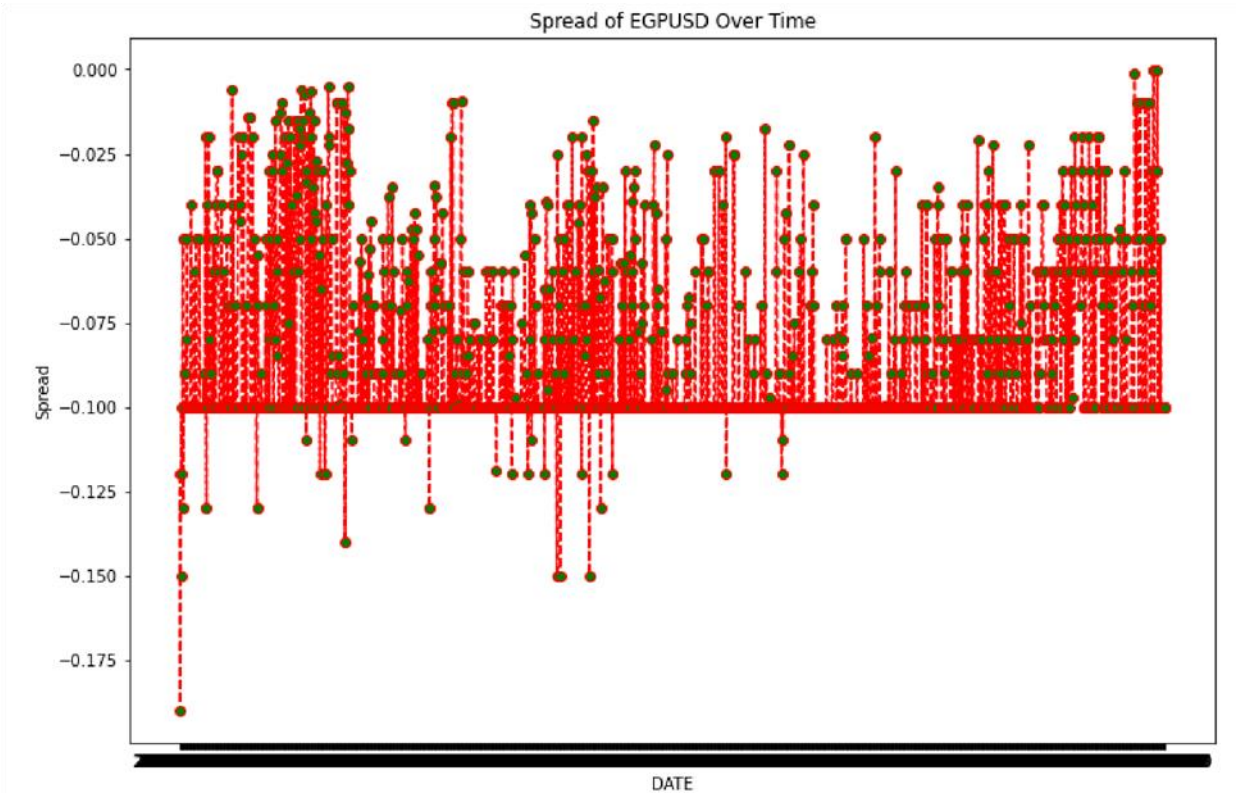


Figure 6; Daily spreads for EGPUSD

CAR before event	-0.566

CAR after event	-1.045

Table 5.2; CAR for EGPUSD

T-statistic	2.045
P-value	0.040

Table 5.3; EGPUSD