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Trading with National Currency: Is the Turkish Lira Stable?

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Abstract
The purpose of this paper is to study the stability of using national currencies for trading between Turkey and its partners in order to mitigate the risks of exchange rate volatility. We have employed wavelet coherence technique to data extracted for the Turkish lira against the currencies of its major trade partners: Germany, Russia, China, Italy, and UK. The time series cover the period from March 1996 to October 2019. Our findings show that the Turkish lira exchange rate with the German, Russian, Italian, and UK currency pairs is stable in the long-term. The exchange rate between the Turkish lira and the Chinese yuan needs further studying before a decision can be taken. The findings have important implications for policymakers and traders.

Keywords: Foreign Trade; Exchange Rate; Emerging Economies; Turkish Lira; Wavelet Coherence.

1. INTRODUCTION

Since the introduction of the floating exchange rate regime, interest in exchange rate and its relation to trade balance and trade flow increased substantially. It goes without question, at the heart of this subject is the importance of exchange rate-trade balance/flow stability. Thus, a valid thought is whether there exists any untapped method for reducing the effects of exchange rate volatility on the stability of trade. In other words, apart from the traditional currency forwards and moneyness as measures for overcoming the issues of volatility and uncertainty, are there other ways to reduce or mitigate the risks of exchange rate volatility?

Theoretically, in a free market, a floating exchange rate is dictated by the current account of its balance of payments. That is, if the demand for foreign currency needed to finance imports exceeds the supply provided by foreigners purchasing exports, causing a deficit, then the balance would be adjusted by foreign capital inflows. According to this perspective, if long term foreign capital inflows continued to back this deficit, the floating exchange rate should remain stable. Such a simplistic view seldom shows in reality and there are many factors that come into picture such as speculations and expectations that can make exchange rates volatile. It is often difficult to determine exactly which non-fundamental factors affect the short term (daily, weekly, monthly) exchange rate variability. However, taking less frequent observations (i.e., taking longer term observations) shows that the up and down fluctuations eventually cancel each other and that the exchange rate is less volatile over the long run. By removing such noise, then any real changes in exchange rates can be explained by fundamental determinants. There is a stream of thought that interest rate, and its component inflation rate, is one of those fundamental factors (Ramasamy and Abar, 2015). While in theory an increase in interest rate is expected to appreciate the domestic currency, in highly unpredictable environments the relationship between exchange rates and interest rate differentials is, in fact, blurred (Ismailov and Rossi, 2018). Real shocks caused by external trade terms as well as the effect of real disturbances on the relative price of non-tradable to tradable can also explain variations in the exchange rate (Makin, 1984).

There is an increasing inclination to trade with the national currencies in order to reduce costs and ease shocks caused by external trade terms, and as such help to alleviate the implications of volatility in exchange rates on trade and investment. Many emerging economies have started to explore this possibility. For instance, following a series of currency depreciations in Turkey, and the continuous rise in inflation rate, there has been several calls, on several occasions, for conducting trade using the Turkish lira[1]. More seriously, it has been indicated that there are hidden currency manipulations against the lira causing it to further devaluate. This claim seems to be underpinned by a research conducted by Gagnon (2012) where he asserts that there are widespread currency manipulations globally resulting in negative consequences and net drain on the currencies under study.

Motivated by the continuous call of several countries (including Turkey) to trade in national currencies, we seek in this paper to examine the viability of this demand with Turkey's major export and import trade partners - Germany, Russia, China, Italy, and UK[2]. In essence, we seek to test the stability of the Turkish lira currency with respect to the currencies of the major trade partners by looking at daily currency exchange rates using US dollar as the common denominator from March 1996 to October 2019. To the best of our knowledge there exists no other research that has attempted to assess the trade stability of Turkey using national currency as a substitution to foreign currencies.

The remainder of the paper is organized in the following manner: following this introduction is a discussion of the relevant and recent literature concerning the relation between exchange rates and trade flows. The various methods used (like vehicle currencies and trade unions) to

reduce the effects of exchange rate volatilities are also discussed. The next section discusses the type of extracted data and outlines wavelet coherence as the methodological technique used to determine currency pair stabilities. The section thereafter portrays the results in the form of wavelet coherence output figures and provides a thorough analysis of the 'warm and cold' charts while delineating possible explanations of the findings. In the subsequent section, the paper is concluded, and the policy implications of the study are presented.

2. Literature Review

Exchange rate volatility has been mostly associated with floating exchange rate regimes. In reality, even though fixed exchange rate regimes are pegged to one or more foreign currencies, they too can fluctuate with other currencies. Nonetheless, the higher the degree of volatility, the greater the risks and uncertainties associated with trade and investment. However, according to International Trade theory depreciation/devaluation of domestic currency has an effect of making imports more expensive while making exports cheaper leading to improvement in the trade balance provided the Marshall-Lerner-Robinson condition is met (Tille, 2001).

Many studies have been conducted on the nexus between exchange rates and trade balance. The results were inconclusive. Some studies found a positive relationship between the trade balance and real effective exchange rate. In essence this means that domestic currency devaluation will improve the trade balance. Examples of such studies include: (Bahmani-oskooee, 2001; Aziz, 2008; Ng, Har and Tan, 2009; Sun and Chiu, 2010). On the other hand, other studies failed to find any significant relationship between the two variables. From this category we find studies such as: (Wilson and Tat, 2001; Vergil, 2002; Hatemi-J and Irandoust, 2005).

The studies of both of the views above were conducted on the assumption that the relation between exchange rates and trade balance is symmetric. In other words, both depreciation and appreciation of the currency will act on the trade balance in the same way. However, in a study conducted by Arize, Malindretos and Igwe (2017), they established that the relation between exchange rates and trade balance is asymmetric where only currency depreciation was found to close the trade gap. Another reason for explaining this discrepancy perhaps is the dependency on whether the prices are rigid in the currency of the producer or whether they are rigid in the currency of the consumer. Antoniades (2012) explains that pricing of firms can help determine this relation and, in fact, have found that only when the prices are rigid in the currency of the producer that there will be an increase in the demand of a country's goods.

There are cases where depreciation of local currency may damage the trust relationship in an economic system even when the above conditions are met. Leading, in turn, to a worse economic situation rather than improving trade. Should that happen, attempts to stabilize price levels will fail and foreign investors will become hesitant to invest (Arize, Malindretos and Igwe, 2017). In fact, in times of heightened volatility, Ben Omrane *et al.* (2019) have

found that investors perceive the US dollar to be the safe haven currency vis-à-vis the euro. That leads to further depreciation of the domestic currency and the issue gets exacerbated. This is the case, for example, with the Turkish lira which according to Aslan and Kula (2009) an increase in the official exchange rate volatility leads to a depreciation of the Turkish lira vis-à-vis the US dollar. As imports become more expensive due to currency depreciation, the increase in price of imported tools needed to manufacture exportable products will raise the export prices. Arize, Malindretos and Igwe (2017) argue that in such cases, trade-adjustment programs that have strongly stressed the need for export expansion could fail.

In order to reduce transaction costs and attempt to avoid the aforementioned uncertainties, economies revert to using a vehicle currency or a common currency/currency union. The choice is dependent on several factors. That includes how much prepared the involved parties are to perform the required economic reforms, whether they are willing to overcome the limitations of each system, the stability of the scheme, and whether the benefits outweigh the costs.

Many trade transactions are performed using the US dollar as a vehicle currency. Goldberg and Tille (2008) analysis reveals that the US dollar is typically the lowest transaction cost currency in foreign exchange markets; although in some cases it has been reported that the US dollar advantage has been eroded or even lost for smaller countries within or around the European Union. According to them, the importance of invoicing in the US dollar stems from the fact that the US is an important consumer and producer of world markets (Goldberg and Tille, 2008). But, under the conditions stipulated in Giovannini's model, vehicle-currency invoicing is not preferred unless fixing relative prices of competing products becomes important to exporters (Johnson and Pick, 1997). Nyunt *et al.* (2010) disagree with the above as they see that the use of an out-of-region vehicle currency incurs several costs: cost for changing currencies for trade settlement, instability in export prices in response to exchange rate changes, and costs of hedging exchange rate risks. The issue can even develop further beyond such costs. Terzi (2006) maintains that problems posed by differences between international moneyness may cause currencies to be unequal and that can be considered as one of the fundamental factors behind any model of financial instability. In fact, what prevents the currencies of developing and emerging economies from transitioning to international media of contractual settlement is the downward pressure exerted on them by the speculative short-term investments funded in alternative currencies (Kaltenbrunner, 2015). The pressure is to the extent that the international demand for the currencies of such economies is low or negligible.

A viable solution to exit such a situation could potentially include trading in regional currencies with regional trade partners either by having a regional vehicle currency or joining a currency union. In their report, Nyunt *et al.* (2010) suggest a package of policy recommendations that include adopting regulations to foster the use of local and regional currencies in trade and investment, introducing new trade payment systems to enable more use of local currencies, and engaging in financial cooperation programs in the region. They

note that the use of local currencies for trade settlement enhances the efficiency in trade and investment transactions. In doing so, the cost of changing currencies, cost of exchange rate volatility, and cost of hedging risks are lowered resulting in enhancing exporting competitiveness and promoting trade and investment at the firm, country, and regional levels (Nyunt *et al.*, 2010).

Devereux and Shi (2013) agree that having a vehicle country reduces the average cost of currency trade, however, they emphasize some limitations. The gains from a vehicle currency may be substantial when the number of countries and currencies involved is large and the center country is large relative to the peripheral countries. In the case where the number of countries involved is small, the peripheral countries will be worse off with a vehicle currency. Devereux and Shi (2013) also note that even where there are many countries involved, if the vehicle currency country is characterized by high rates of inflation, these gains will be eroded. Moreover, if the center country suffers from heightened inflation rates, the use of vehicle currency will collapse.

Perhaps one of the most prominent examples of a regional vehicle currency is the Renminbi (RMB). According to Auboin (2012) the RMB will become a major currency of settlement in international trade. Improvement in understanding of the micro-economic determinants of invoicing in international trade at the firm level revived the discussion on currency use in international trade; which is further nurtured by the creation of an offshore market for RMB and the large desire for local currency financing of trade in the Chinese currency (Auboin, 2012).

The other viable solution, a currency union, can be far more rewarding, but far more complex. Although, previously it was thought that a currency union will have little or negligible effect on trade and might lead to higher economic costs (Feldstein, 1991; Obstfeld, 1997; Wyplosz, 1997), such claims later were easily dismissed (Rose and Stanley, 2005). In their meta-analysis, Rose and Stanley (2005) found that there is an evidence of positive trade effect due to currency unions where the latter is found to increase bilateral trade by between 30 and 90 percent. The effect found is much less than previous studies which showed that using a common currency triples trade (Rose, 2000; Frankel and Rose, 2002), however it does still confirm the positive trade effect (Micco, Stein and Ordonez, 2003). Those studies are based on the assumption that the effect that common currencies have on economic growth is that of promoting international trade flows only. Santana-Gallego *et al.* (2010) extended Frankel & Rose's study by adding that a common currency will also have a considerable effect on tourism as well.

With a currency union there are two major barriers to entry. First, it is thought that by adopting a common currency, a country will lose its monetary control. For example, the member countries who joined the Euro zone did so at a high economic cost since they gave up their ability to have their local currencies act as stabilizers during economic shocks (Antoniades, 2012). Second, there is a theoretical understanding that in order for a candidate

to join the union it must have increased industrial specialization. However, it is worth noting that, using a panel data of 20 industrialized countries in the EMU region over a span of 30 years, Frankel and Rose (1998) found, on the contrary to the theoretical understanding, increased bilateral trade intensity may result in more highly correlated business cycle activities. They explain that with the various Optimum Currency Area (OCA) criteria, due to historical data a country may appear to be a poor candidate for EMU entry. However, on the contrary, due to the endogenous nature of the relationship between these OCA criteria, entry to EMU may stimulate trade expansion, and in turn lead to highly correlated business cycles.

In summary, the use of out-of-region vehicle currency in trade incurs various costs including unstable export prices. The issue is multiplied with differences in international moneyness leading to financial instabilities in developing countries and emerging economies. While creating a trade/currency union with trade partners may be fruitful, such an endeavor requires complex planning, complex economic reforms, and complex agreements. Trading partners, on the other hand, can start by agreeing to trade in national currencies. Yet, according to Dorbec (2009) due to the wide use of the dollar, changing to another currency of substitution or back to the domestic currency is costly. Therefore, an important success factor for the shift to using national currencies is to ensure that the currency pairs of trading partners are stable over the long term.

3. DATA AND METHODOLOGY

The data is daily currency exchange rates of the Turkish lira (TRY), German mark (DEM), Russian ruble (RUB), Chinese yuan (CNY), Italian lira (ITL), and the British pound (GBP) using US dollar as the common denominator from sixth March 1996 to 30th October 2019 (Bakr, 2020). The sample sums up to 6171 observations. The data was retrieved from Thomson Reuters DataStream and transformed into log returns. As such, the number of observations used for analysis decreased to 6170.

A stable currency pair would be one in which the two currencies co-move together, whether in phase or out of phase, in the long run with negligible changes or fluctuations. A pair of currencies which observe substantial fluctuations over time is not considered ideal for trading and thus a foreign or vehicle currency would be deemed better. We apply the wavelet coherence technique to assess how coherent are our pairs of currency time series. This allows us to study the co-movement between pairs of the currencies in time-frequency spaces. The wavelet coherence significance level is determined by Monte Carlo methods. We set the number of Monte Carlo randomizations to 1000. Based on continuous wavelet transform, wavelet coherence uses a bivariate framework, with Morlet set to six, allowing for various forms of localizations (Nagayev *et al.*, 2016).

Wavelet coherence of two time series is defined as follows (Grinsted, Moore and Jevrejeva, 2004):

$$R_n^2(s) = \frac{\left|S\left(s^{-1}W_n^{XY}(s)\right)\right|^2}{S\left(s^{-1}|W_n^X(s)|^2\right)\cdot S\left(s^{-1}|W_n^Y(s)|^2\right)}, \quad \text{(Eq 1)}$$

where S is a smoothing operator. The wavelet coherence coefficient $R_n^2(s)$ falls between zero and one inclusive and measures the local linear correlation between two stationary time series, $x(t)$ and $y(t)$, at each scale. As noted by Grinsted, Moore and Jevrejeva (2004), the above definition closely resembles that of the traditional correlation coefficient. Smoothing is achieved by convolution in time (using a Gaussian window) and scale (using a rectangular window) (Nagayev *et al.*, 2016):

$$S(W) = S_{scale}\left(S_{time}\left(W_n(s)\right)\right), \quad \text{(Eq 2)}$$

where S_{scale} and S_{time} signify smoothing along the wavelet scale and time axes, respectively. We can choose the smoothing operator such that it has the same characteristics as the underlying wavelet. For the Morlet wavelet an appropriate smoothing operator is described by Torrence and Webster (1999):

$$S_{time}(W)|_s = \left(W_n(s) * c_1^{\frac{-t^2}{2s^2}}\right)\Big|_s ; S_{time}(W)|_s = \left(W_n(s) * c_2\Pi(0.6s)\right)\Big|_n \quad \text{(Eq 3)}$$

where c_1 and c_2 are normalization constants, Π is the rectangle function, and 0.6 is the empirically derived scale-decorrelation length for the Morlet wavelet (Torrence and Compo, 1998). The lead-lag relationship between two time series, $x(t)$ and $y(t)$, is indicated by the wavelet coherence phase differences. The wavelet coherence phase is defined as:

$$\phi_n^{XY}(s) = \tan^{-1}\left(\frac{I\left\{S\left(s^{-1}W_n^{XY}(s)\right)\right\}}{R\left\{S\left(s^{-1}W_n^{XY}(s)\right)\right\}}\right), \quad \text{(Eq 4)}$$

where $W_n^{XY}(s)$ is the cross-wavelet power and I and R are the imaginary and real parts of the smooth power spectrum, respectively. The cross-wavelet power can be viewed as the local covariance between two time series at each scale (Nagayev *et al.*, 2016). It is defined as follows:

$$W_n^{XY}(s) = W_n^X(s)W_n^{*Y}(s), \quad \text{(Eq 5)}$$

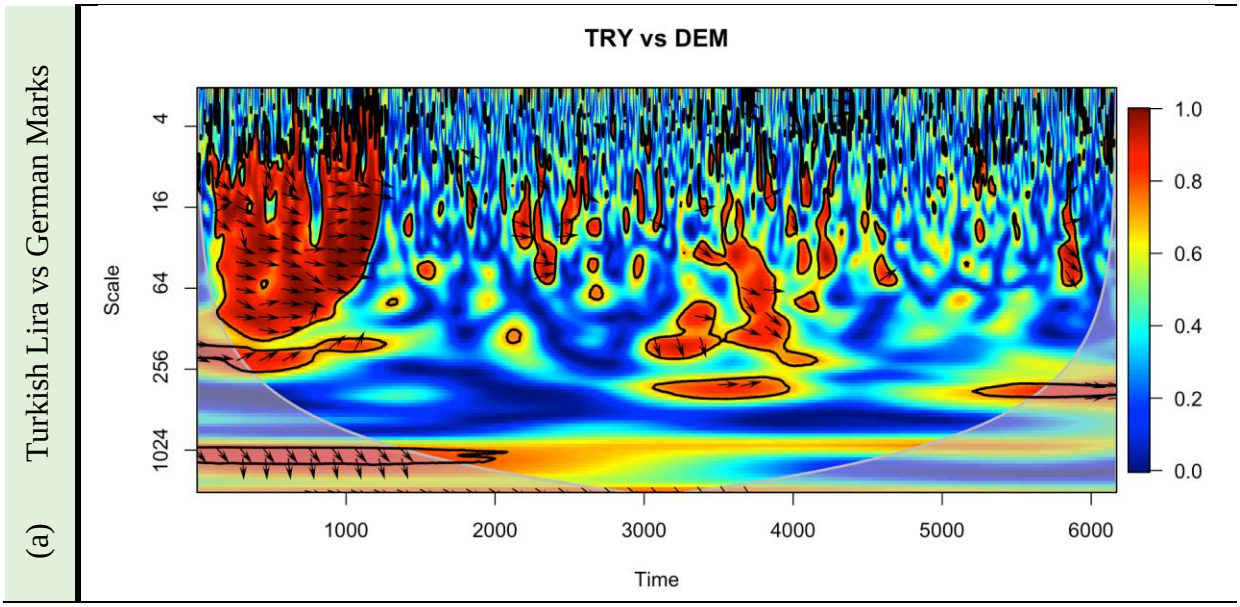
where $W_n^X(s)$ is the continuous wavelet transform of the time series $x(t)$, while $W_n^{*Y}(s)$ is the complex conjugate of the continuous wavelet transform of the time series $y(t)$.

The results of wavelet coherence are presented in the form of 'warm' and 'cold' zones chart as can be seen in

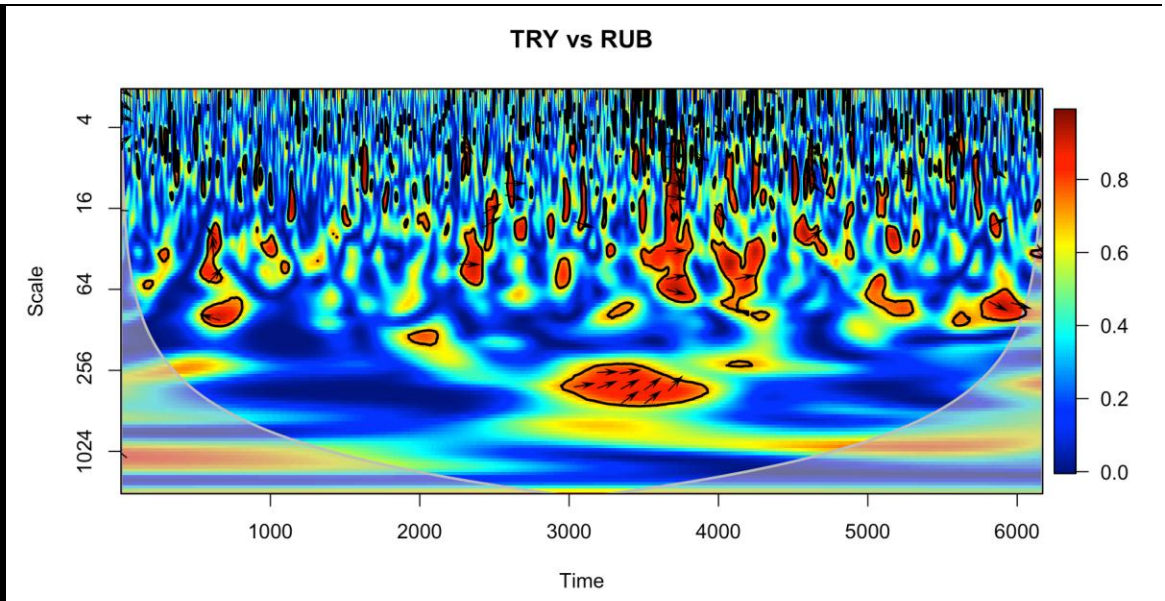
Figure *1*. It depicts the wavelet coherence and phase differences of all timeseries pairs from scale one (two days) up to scale eight (256 days), thus showing results for short-, medium-, and long-term movements. Frequency is displayed on the vertical axis such that the lower the frequency is, the higher is the scale. Time period, on the other hand, is displayed on the horizontal axis. The wavelet coherence plots allocate colors to depict the correlation between the two examined time series. Warm regions (red) denote regions with strong correlation between the time series, while cold regions (blue) represent lower dependencies. Cold regions beyond the significant areas portray no dependencies between the series. Nagayev *et al.* (2016) assert that caution should be taken when interpreting areas at the beginning and end of the time intervals (cone of influence) because continuous wavelet transforms employ information of neighboring data points. An arrow in the wavelet coherence plot denotes both positive/negative and lead-lag relationship between the series under study. Arrows point to the right when the two series are in phase, whereas they point to the left when the series are out of phase. Being in phase implies that the series move together in the same direction (positive correlation). However, when the series are out of phase, it means that they move in the opposite direction (negative correlation). Arrows pointing to the right-down or left-up indicate that the first variable leads the other variable. On the other hand, arrows pointing to the right-up or left-down indicate that the first variable is lagging. Regions bounded by a black enclosure indicate a five percent significance level. The windowed cone in the figure, or cone of influence, provides further information for five percent significance level out of which the significance level fails.

4. RESULTS AND DISCUSSION

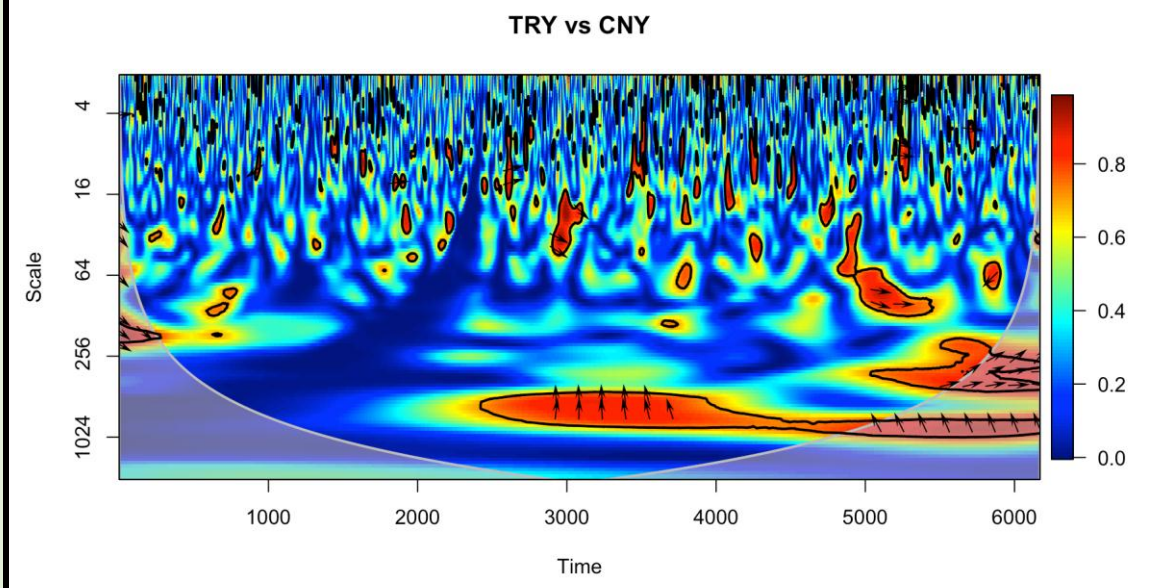
Figure 1 (a-e) depicts the results of wavelet coherence for each data set. One thing we observe is that all of the outputs share high correlation at the higher scale (low frequency) between timestamps 3000 and 4000; i.e., from August 2007 to June 2011.



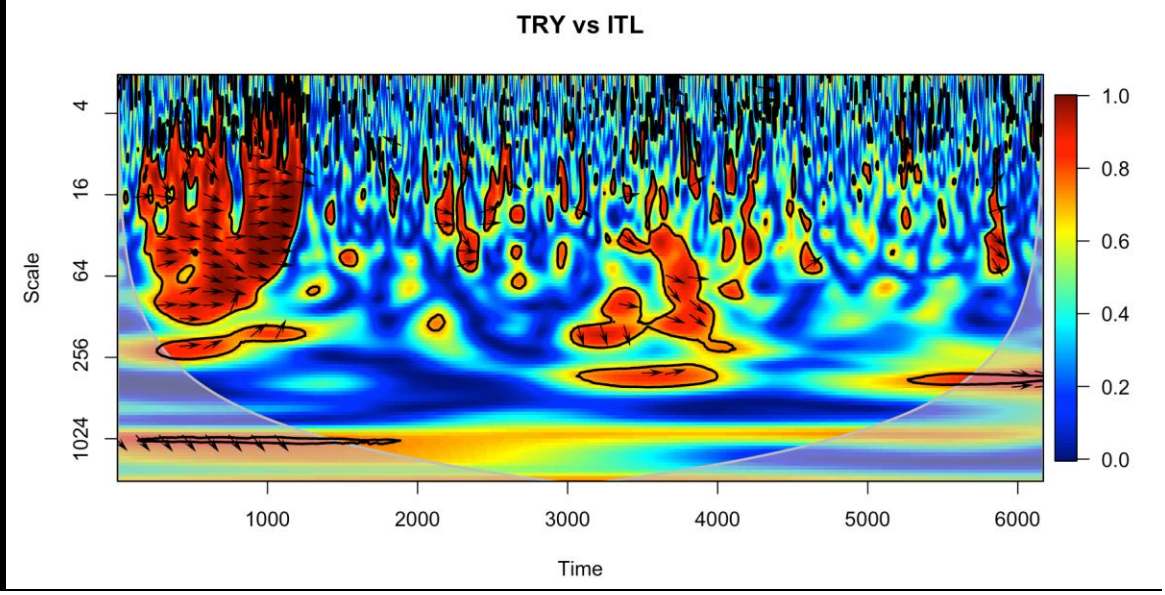
(b) Turkish Lira vs Russian Ruble



(c) Turkish Lira vs Chinese Yuan



(d) Turkish Lira vs Italian Lira



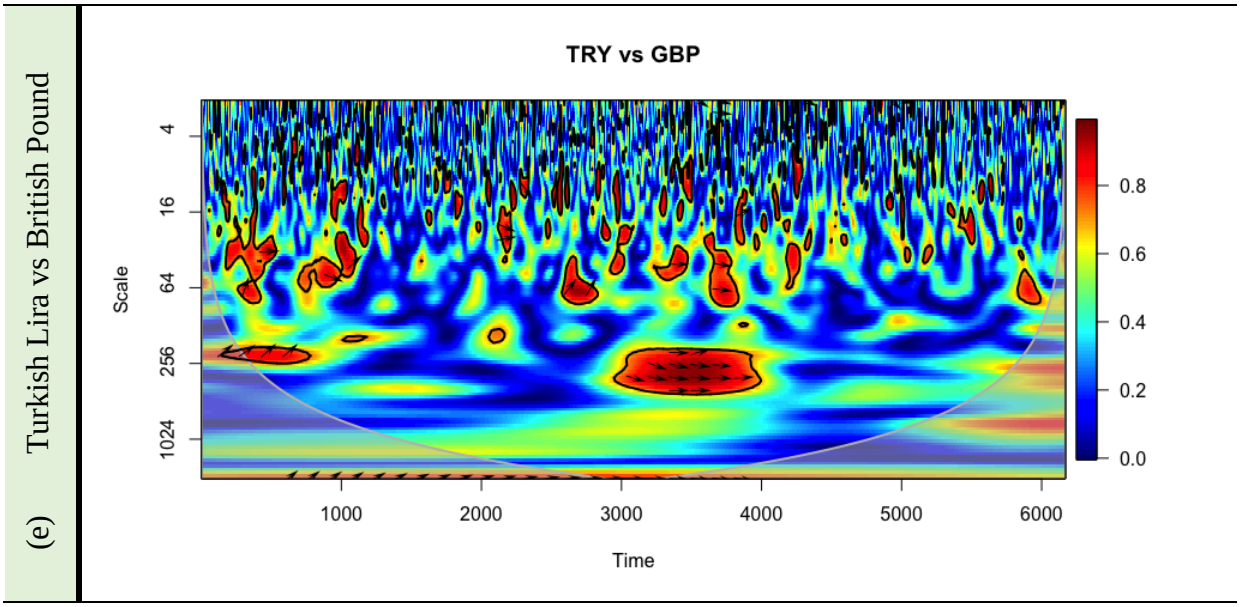


Figure 1. The figure depicts the wavelet coherence output for (a) TRY against DEM (b) TRY against RUB (c) TRY against CNY (d) TRY against ITL (e) TRY against GBP.

The start of the period points to the financial crisis that spread its shadows in 2007 and struck in 2008. Yet, the high correlation continues several years beyond the financial crisis. Perhaps this demonstrates the repercussions where the variables needed more time beyond the crisis to reach to the prior equilibrium states.

For the lower scales (below 32 days horizon) - in the short run, that is to say higher frequencies - we find that in all of the outputs there are a lot of 'noise' represented by the high and repetitive mingling of the 'cold' and 'hot' zones. However, for the Turkish lira against the Russian ruble, Chinese yuan, and the British pound, it can be easily seen that they are all dominated by low correlations despite the noise. As the correlation remains more or less uniform with minor changes over the whole time series, we can conclude that the Turkish lira exchange rate with the Russian, Chinese, and British currencies is to some extent stable in the short term. With similar analysis, the same cannot be said about the exchange rate of the Turkish lira against the German and Italian currencies because of the existence of considerable correlation changes throughout the period.

For the medium scales (32-256 days horizon) - in the mid run - only the Turkish currency against the Chinese currency seems to have the most uniform relation over the whole period except for a short noticeable period almost between readings 5000 and 5400, in other words between almost April 2015 to October 2016. Perhaps that short period (April 2015 to October 2016), where correlation is depicted in the wavelet coherence output between the Turkish lira and Chinese yuan at a five percent significance level, can be explained by the surprising decision taken by the People's Bank of China (PBOC) to devaluate the yuan in 2015 after a decade of steady appreciation. Empirical results suggest that the yuan devaluation in 2015, in fact, produced contagion effects on key trading partners (Anastasopoulos, 2018); hence, that

gives a strong justification for the abnormality of the relation between the Turkish lira and Chinese yuan during that period in time. Removing that irregularity shows that we can safely say that the Turkish lira and Chinese yuan currency pair is normally stable in the medium-term. The other plots concerning the other currency pairs depict a lot of abruptness (though relatively small) in terms of toggling between having low correlations and high correlations with no perceivable pattern; revealing that in the medium scale the currencies exchange rates for these pairs are not stable.

For the higher scales (more than 256 days) - representing the long run - apart from the financial crisis period and its repercussions, the correlations between the Turkish lira and the German mark, Russian ruble, Italian lira, and British pound currency pairs are low and uniform all over the time series. There are negligible abruptness throughout, and the exchange rate pairs are believed to be stable. As for the Turkish-Chinese exchange pair shifts from low to high correlation, within 95 percent confidence interval, starts way before the financial crisis and extends even further after 2011. Moreover, high correlation also exists during the time period where the coup attempt occurred in Turkey. It is worth mentioning though that the correlation during the financial crisis is a negative one where the Turkish lira is leading, while the direction for the high correlation during the coup attempt is inconclusive.

As exchange rates in the short and medium horizons are characterized by a lot of noise due to market speculations and trade transactional settlements, it would be more accurate to take the long-term horizon readings where all the noise would be eliminated. As such, our study finds that, apart from the financial crisis period, the Turkish lira exchange rates with the German mark, Russian ruble, Italian lira, and UK pound currency pairs are stable since the correlation pairs are more or less uniform with no abrupt changes throughout the time series. Stable currencies imply that these pairs can be directly used in trade transactions without reverting to a third currency as a medium of contract. The same cannot be implied from the output result of the Turkish-Chinese currency pair.

The above findings seem to be in line with some studies which implicitly point to trading in common currencies. Using several panel cointegration techniques with seven of Turkey's trade partners, Çelik and Kaya (2010) show that the effect of devaluation of Turkish currency on trade balance is country specific and there is no J-curve effect. On the other hand, Vural (2016) finds that only 20 out of 96 commodity groups with Germany exhibit a J-curve effect. Therefore, the majority remaining 76 commodities do not show a J-curve effect. In other words, devaluation in Turkish lira does not seem to solidly improve trade; a case which does not follow the International Trade theory. It is worth noting that for the past three decades, volatility has become deeply embedded in the Turkish lira causing it to be an inherent risk for both domestic and foreign investors (Taskinsoy, 2019). While these studies do not explicitly discuss the stability of Turkey's currency with the currencies of its trading partners, nonetheless it can be concluded that having a common currency in trading to further reduce

transaction costs is clearly warranted. This paper further reinforces these findings by confirming the long-term stability of the currency pairs of Turkey's key trading partners.

5. CONCLUSION AND RESEARCH IMPLICATIONS

International Trade theory states that depreciation in domestic currency leads to improvement in the trade balance. However, in times of heightened volatility people consider the US dollar a safe haven vis-à-vis the euro which can adversely affect the domestic currencies and render the International Trade theory unrealizable. Many economies revert to the use of out-of-region vehicle currencies in trading in order to reduce such shocks. This has been seen in the southeastern Asia region where the Chinese RMB was used successfully as a vehicle currency. Conversely, others are of the thought of forming trade unions of which the most prevalent is the European Union.

Yet, unstable export prices and various other costs are incurred by the use of out-of-region vehicle currency in trade. Coupled with differences in international moneyness, out-of-region vehicle currencies may cause financial instabilities in developing countries and emerging economies. On the other hand, entering a trade and currency union warrants the need for complex planning, economic restructuring and reforms, and various economic agreements which require dedication, time, and effort. Alternatively, by trading with their own national currencies, trading partners can reduce the aforementioned costs with the least efforts. A critical aspect for this move is to ensure that the currency pairs of trading partners are stable over the long term in order to overcome the high costs of shifting away from the US dollar, the latter idea which was pointed out by Dorbec (2009).

In this study we used wavelet coherence as a multidimensional analysis tool to study the time-frequency relation of the Turkish exchange rate with major trade partners: Germany, Russia, China, Italy, and UK. Our objective was to study whether the currency pairs were stable over a time series that started from March 1996 to October 2019. A stable currency pair would be one in which the two currencies co-move together, whether in phase or out of phase, in the long run with negligible changes or fluctuations. A pair of currencies which observe substantial fluctuations over time is not considered ideal for trading and thus a foreign or vehicle currency will gain the upper hand. Stable currencies imply they can be directly used in trade transactions without reverting to a third currency as a medium of contract. Essentially, this leads to reduced effect of manipulations, minimizes the exchange rate shocks, and mitigates the risks of volatility.

Our study finds that, apart from the financial crisis period, the Turkish lira exchange rates with the German, Russian, Italian, and UK currency pairs are stable since the correlation pairs are more or less uniform with no abrupt changes throughout the time series in the long-term. The Turkish lira exchange rate with the Chinese yuan seems to be stable to some extent, however the change from low correlation to high correlation needs further studying to see whether this will remain the same over a longer period. In summary, for Turkey and its

trade partners Germany, Russia, Italy, and UK we find that using their national currencies as a direct medium of contract is promising.

The time-frequency results could be captured by governments in the reformulation of their trade policies, allowing costs and trade risks to be managed appropriately in accordance with their specific objectives. The results of this study offer insights to reduce trading costs and mitigate the effect of exchange rate volatility and trading shocks. In our view, long-term stable currency pairs allows trading partners to realize these gains.

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