ECONOMIC ANNALS, Volume LXIII, No. 219 / October – December 2018
UDC: 3.33 ISSN: 0013-3264

https://doi.org/10.2298/EKA1819061K

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FOREIGN EXCHANGE MARKET PRESSURE INDEX AND MONETARY POLICY IN IRAQ

ABSTRACT: *This paper's aims are to adequately measure a foreign exchange market pressure index that can be used to discover pressures in the Iraqi foreign exchange market early on, and to examine the effect of monetary policy intervention in the Iraqi foreign exchange market. The modelling approach used is Autoregressive Distributed Lag (ARDL), with monthly time series data spanning 2013–2017.*

The index used in this paper was able to identify different periods of pressure in the Iraqi foreign exchange market. In addition, the econometric analysis found that the traditional proxies for monetary policy intervention in the foreign exchange market, such as domestic credit and money multiplier, were ineffective in the case of Iraq. The results show that the Central Bank of Iraq (CBI) relied extensively on foreign reserves to mitigate pressures in the foreign exchange market. Due to the nature of the Iraqi economy and where the main source of foreign currency is oil exports, the CBI adopted a fixed exchange rate regime to control inflationary expectations and stabilize the foreign exchange market.

KEY WORDS: *Foreign exchange market pressure index, foreign reserves, exchange rate, ARDL, Central Bank of Iraq.*

JEL CLASSIFICATION: C43, F39, F31, C32, E58.

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The views expressed in this paper are those of the author and do not necessarily represent the views of the Central Bank of Iraq.

1. INTRODUCTION

A stable exchange rate is an important objective for central banks and can be used as a monetary policy instrument to stabilize price levels. The nature and structure of the Iraqi economy, with its undeveloped financial system, makes the foreign exchange rate an important monetary policy instrument to stabilize and control economic agents' and individuals' inflation expectations. The Central Bank of Iraq (CBI hereafter) is working hard to monitor and stabilize the foreign exchange rate, as it is the main instrument in has to control money supply and achieve other targets where traditional monetary policy instruments are ineffective .

Since 2004 the CBI has intervened directly in the foreign exchange market using an auction window as an instrument in the open market. The auction window for selling foreign currency is the main formal channel to meet the demand for foreign currency.

The consequence of the CBI's intervention in the foreign exchange market is examined in this paper by applying a new technique. A weighted index is used to gauge foreign exchange market pressure (EMP). This index has been widely used in the literature, and may help the CBI to monitor signals and fluctuations in the foreign exchange market and adequately intervene to correct undesired movements.

Following this introduction, the paper presents the conceptual framework of foreign exchange market pressure. Section three reviews the measuring of the EMP index in the literature. The nature of the foreign exchange regime in Iraq is illustrated in section four. The EMP index in Iraq is measured in section five, and section six presents the econometrics analysis and interpretation of results. Section seven presents the conclusions.

2. THE CONCEPT OF FOREIGN EXCHANGE MARKET PRESSURE

Foreign exchange market pressure refers to the scale of money market disequilibrium that must be controlled through foreign reserves or exchange rate changes (Ratnasari and Widodo 2017: 6). Exchange market pressure measures the demand for foreign currency against the domestic currency. There

will be pressure in the foreign exchange market when the demand for foreign currency exceeds its supply (Central Bank of Nigeria 2016: 2).

Exchange market pressure shows the tendency of a domestic currency to increase/decrease its value and the equilibrium of the domestic money market. Pressure in the exchange market can be absorbed by a change in the nominal exchange rate, an increase/decrease in official foreign reserves, or an increase/decrease in the interest rate (Tsedevsuren and Batsuuri 2016).

Exchange market pressure means there is an excess of domestic currency in the foreign exchange market, which can depreciate the domestic currency if the monetary authorities do not intervene to protect it (Jager and Klaassen 2010).

Exchange market pressure measures the total excess demand for a currency in international markets as the exchange rate change which would be required to remove this excess demand in the absence of money or foreign exchange market intervention, given that the exchange rate policy implemented generates expectations (Spolander 1999: 19).

Gilal et al (2016: 105) define exchange market pressure as an excess demand for domestic currency in the foreign exchange market. It may take either a positive or a negative sign. An excess demand for domestic currency in the foreign exchange market is consistent with its appreciation against foreign currency. Lower demand, on the other hand, is associated with the depreciation of domestic currency and makes it lose its value against foreign currency.

3. MEASURING THE EMP INDEX IN THE LITERATURE

The intervention of the monetary authority in the foreign exchange market is essential and desirable for the following reasons (Boroujerdi 2001: 92):

1. To neutralize or minimize the effects of political, economic, social, and psychological shocks.
2. To facilitate short-run fluctuations in the foreign exchange market.
3. To remove periodical and seasonal fluctuations in the balance of trade.

The variables used to measure the index of foreign exchange market pressure depend on a country's economic structure and exchange rate regime. The literature reveals that changing the exchange rate is an important means for countries that follow a free-floating exchange rate regime to achieve equilibrium and stability in the foreign exchange market. On the other hand, changing foreign reserves is necessary to rebalance the foreign exchange market in countries that follow a hard peg regime. Many countries use a managed exchange rate regime, where it is useful to apply both variables together to avoid fluctuations in the foreign exchange market.

In the literature there are various models for measuring the foreign exchange market pressure index. Girton and Roper (1977), the pioneers, calculate the index of exchange market pressure based on the monetary model of balance of payments. Their EMP index is derived from the Cambridge cash balance model, as follows:

$$M^d = kPY \quad (1)$$

This equation represents the demand for money where *P* stands for the domestic price level, *Y* is real income, and *k* is a fraction of nominal income that people want to hold as cash.

$$M^s = A(R+D \quad (2)$$

Equation (2) explains the supply of money where *R* is net foreign assets, *D* is domestic assets, and *A* is a money multiplier (*A*=*M2*/Monetary Base).

$$P = EP^* \quad (3)$$

Equation (3) represents a purchasing power parity condition where *P* is the domestic price level, *E* is the exchange rate in nominal terms, which is defined as the domestic currency per unit of foreign currency, and P^* is foreign inflation.

$$M^d = M^s \quad (4)$$

Equation (4) represents a money market equilibrium identity where money demand equals money supply.

Substituting (1) and (2) into (4) we get

$$kPY = A(R+D) \quad (5)$$

Replacing P by XP^*, we get

$$k(EP^*)Y = A(R+D) \quad (6)$$

By rearranging Equation (6) with the percentage change, we get the following:

$$r + e = p^* + y - a - d \quad (7)$$

where
r = the percentage change in international reserves;
e = the percentage change in the exchange rate in nominal terms;
d = the percentage change in domestic credit;
p^* = the percentage change in the foreign price level;
y = the percentage change in domestic real income; and
a = the percentage change in the money multiplier.

The left-hand side of the equation represents the EMP index and the right-hand side represents the factors that affect the EMP index. As the sign of each variable shows, we expect a positive relationship between (P^*, Y) and the EMP index and a negative relationship between (a, d) and EMP index.

However, to assess whether the pressure is absorbed by e or by r, Girton and Roper (1977) and Connolly and Silveira (1979) suggest including a variable $Q = (e\text{-}1)/(r\text{-}1)$ on the right-hand side of Equation (7). The variable Q can identify the method that a central bank uses to absorb pressure in the exchange market. The central bank uses exchange rate depreciation when the coefficient of Q is significant and positive, while a significant and negative coefficient of Q implies that more pressure is absorbed by reserve losses. The central bank is not sensitive to the changes in the EMP components when the coefficient of Q is insignificant.

Weymark (1995) extends the concept of the EMP index developed by Girton and Roper (1977) by including interest rate changes. The new index takes the following form:

$$EMP_t = \Delta e_t - B\Delta r_t + y\Delta i_t \quad (8)$$

where i_t is the interest rate and y is the reserve-to-deposit ratio. This index shows that an increase in the exchange rate, an increase in the interest rate, and a loss of foreign reserves will increase the EMP index.

Eichengreen et al. (1995) introduce another approach to calculating the EMP index, which takes the following form:

$$EMP_{it} = \alpha\Delta ex_{it} - \beta\Delta r_{it} + \gamma\Delta dr_{it} \quad (9)$$

where Δ denotes monthly percentage change; ex_{it} is the nominal exchange rate (domestic currency: \$US); r_{it} is the Central Bank's foreign exchange reserves; dr_{it} is the discount rate; the parameters α, β, and γ are weighted averages calculated as $1/\sigma_t$, where σ_i is the S.D. (Standard Deviation) of each variable for the exchange rate, reserves, and interest rate, respectively. The signs in the above equation (9) indicate a positive relationship between *ex, dr* with the EMP index and a negative relationship of *r* with the EMP index.

The International Monetary Fund (2007: 129–130) uses the following formula to calculate the EMP index:

$$EMP_{i,t} = \frac{1}{\sigma\Delta\%er}\Delta\%er + \frac{1}{\sigma\Delta res}\Delta res \quad (10)$$

$$\Delta\%\mathrm{er} = \frac{\mathrm{er} - \mathrm{er}_{t-1}}{\mathrm{er}_{t-1}} \quad (11)$$

$$\Delta res = \frac{NAF - NAF_{t-1}}{Mb_{t-1}} \quad (12)$$

where:

$\Delta\%er$ refers to the percentage change in the nominal exchange rate against a reference country
Δres refers to the change in net foreign reserves normalized by the monetary base
$\sigma\Delta\%er$ refers to the weight of standard deviations of the exchange rate
$\sigma\Delta res$ refers to the weight of standard deviations of the foreign reserves
NAF refers to the net of foreign assets with the central bank
Mb refers to the monetary base

To identify the level of foreign exchange market pressure the results obtained from one of the four equations above (7,8,9, or10) can be compared with the critical values (threshold) obtained from the following equation (Zhuang 2005; 41).

$$\text{Threshold} = \mu_{EMP} + \omega\, \sigma_{EMP} \tag{13}$$

where:
μ_{EMP} refers to the mean of the foreign exchange pressure index
σ_{EMP} refers to the standard deviations of the foreign exchange pressure index
ω refers to a factor with values ranging between 1.5 and 3

Therefore, a currency crisis may occur at any period if the value of the foreign exchange market pressure index exceeds the threshold value. Accordingly, the index indicator takes the value 1 when indicating a currency crisis and the value 0 otherwise, as expressed by the following:

$$C = \begin{cases} 1 if\ EMP > Threshold\left(crisis\right) \\ 0 if\ EMP < Threshold\left(no\, crisis\right) \end{cases}$$

A higher and positive value of foreign exchange market pressure index compared with the threshold values indicates more pressure in the exchange market toward domestic currency depreciation against foreign currency. By contrast, a higher and negative value of the foreign exchange market pressure index compared with the threshold values indicates an appreciation of domestic currency against foreign currency.

4. THE FOREIGN EXCHANGE REGIME IN IRAQ

An exchange rate system or regime can be defined as a legal framework that reflects the nature of the exchange rate policy adopted by a country to determine the local currency exchange rate during a period of time. The purpose of this policy is either to leave the exchange rate to be determined by the interaction of market forces or to regulate an effective intervention in the market and maintain the exchange rate at a desirable and stable rate. This definition also refers to the framework that regulates market operations and aspects of the monetary authority's intervention, and the degree of its effect on exchange rate behaviour (Harrison, et al. 2000, p.241). According to the literature there are three main types of foreign exchange rate regime, which can be summarized as (1) fixed exchange rate regimes, (2) floating exchange rate regimes, and (3) intermediate exchange rate regimes. Each regime has its pros and cons (Frankel 2003).

The Iraqi economy is a small open economy that relies mostly on exporting petroleum, which is the main source of foreign currency. At the same time, the Iraqi economy depends heavily on imports to meet the increased macro demand for goods, since almost all its manufacturing has been destroyed by civil war, looting of state-owned enterprises, and violence during the 2003 USA invasion. In addition, the financial sector is undeveloped: in 2017 total banking sector assets reached 69.22% of GDP and credit to the private sector 8.6% of GDP. In 2004 the monetary authority adopted a fixed exchange rate regime by creating a window to sell and purchase foreign currencies and accumulate international reserves. This foreign currency window works through the CBI purchasing petroleum revenues in foreign currency from the Ministry of Finance at the fixed exchange rate and selling the foreign currency through banks to economic agents to finance their imports, also at the fixed exchange rate. The CBI's sale of dollars is the only channel for a domestic supply of foreign currency. In 2017 net foreign investment in Iraq was –2.55% of GDP (TheGlobalEconomy.com). The CBI's accumulated international reserves, which peaked in May 2014 at 93,044.78 million Iraqi Dinars,[1] enabled the monetary authority to adopt a fixed exchange rate regime. The CBI implemented a fixed exchange rate regime as a nominal anchor to control

[1] Central Bank of Iraq (2014), Annual Statistic Bulletin, Department of Statistics and Research.

inflationary expectations, boost investment, mitigate speculative attacks on the Iraqi Dinar, and regain the public's confidence in monetary authority policy. As a result of this policy, by September 2018 the CBI had reduced inflation to below 2%.[1] In addition, the gap between the official and the market exchange rate dropped from 143 points in May 2015 to 18 points in April 2018.

5. MEASURING THE EMP INDEX IN IRAQ

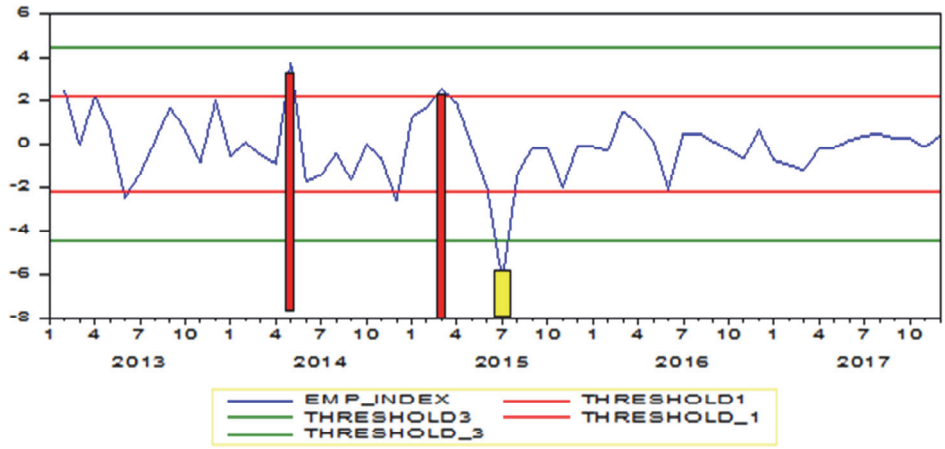
We have chosen the model proposed and used by the IMF to measure the EMP index for Iraq because it is comparable with threshold values, unlike other indices that have high values. In addition, in a small open economy like Iraq's, with an underdeveloped financial system, interest rate changes will not affect the foreign exchange market.

Figure 1 shows the foreign exchange market pressure index compared with the threshold values, and clearly identifies the periods that registered high pressure on the Iraqi Dinar in the foreign exchange market. Using monthly data for the period 2013–2017, Figure 1 indicates three periods when the Iraqi Dinar was exposed to pressure .

The first period of pressure was in May 2014 and the second was in March 2015 when the value of the Iraqi Dinar depreciated against the US dollar. The circumstances were similar during these periods. Both the foreign exchange rate and net foreign assets increased at the Central Bank of Iraq, meaning that the CBI did not react adequately to meet increased demand for foreign currency. The auction window's data demonstrates that the number of dollar sales decreased during the months previous to May 2014 and March 2015. In addition, speculation and negative expectations fuelled pressure on the Iraqi Dinar, decreasing demand in favour of the US dollar. Although the Central Bank of Iraq tried to sell more foreign currency during these two months it could not stabilize the demand for its currency, which depreciated. During the following months the Central Bank of Iraq's increased demand for the Iraqi Dinar through the sale of foreign currency played a key role in decreasing the exchange rate, appreciating the local currency, and stabilizing pressure in the foreign exchange market at the desired level.

[1] Central Bank of Iraq (2018), Economic and Statistic Data.

Figure 1: Foreign Exchange Market Pressure in Iraq 2013M1–2017M12



Source: Authors' calculation.

The third period of pressure in the Iraqi foreign exchange market was in July 2015, but it was pressure in a different direction. During this month the foreign exchange market index dropped sharply to –6. The Iraqi Dinar appreciated, the Central Bank of Iraq registered the sale of more foreign currency and a decrease in net foreign assets, and between June and July 2015 the exchange rate dropped from 1,306 dinars to the dollar to 1,231 dinars. Afterwards the exchange rate remained stable until the end of 2017.

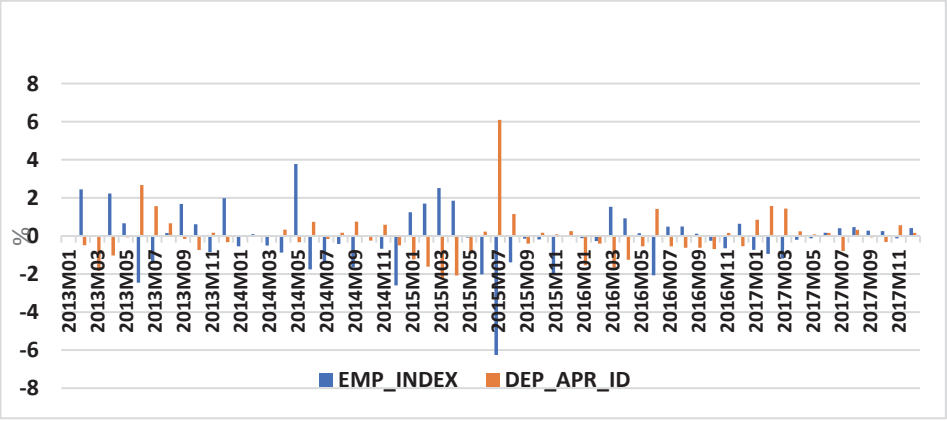
Figure 2 shows the reverse relationship between the foreign exchange market pressure index and the value of the Iraqi Dinar[1] during the period 2013–2017. The same figure indicates that a positive value of the index means depreciation of the Iraqi Dinar and a negative value indicates appreciation.

[1] The value of the Iraqi Dinar was calculated according to the following form:

$$\text{ID Value} = \frac{ex_{t-1} - e_{x_t}}{ex_t} * 100$$

e_{x_t} represents the market exchange rate.

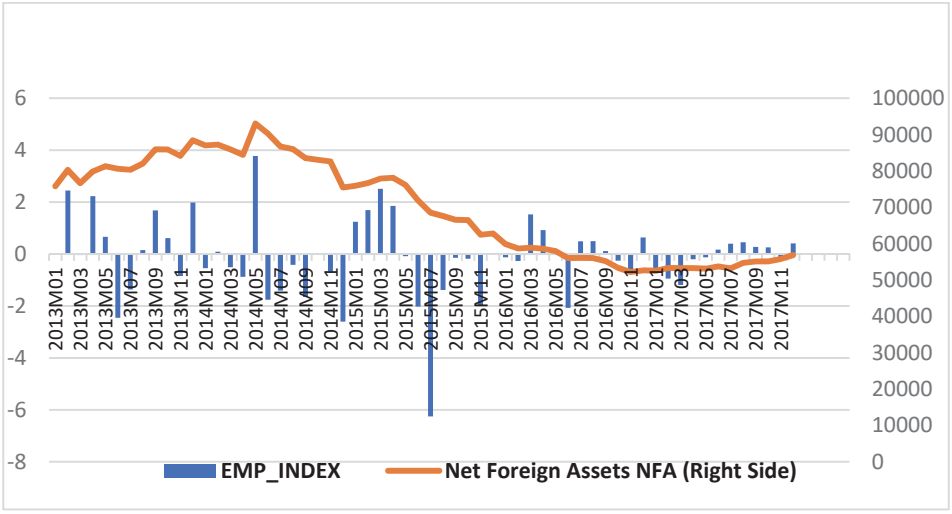
Figure 2. Relationship between the Foreign Exchange Market Pressure Index and Value of the Iraqi Dinar 2013–2017



Source: Authors' calculation.

On the other hand, Figure 3 shows a positive nexus between the CBI's net foreign assets and the foreign exchange market index. An increase in net foreign assets, which means insufficient sales of foreign currency in the foreign exchange market by the auction window, leads to increased foreign exchange market pressure. This relationship was more obvious during May 2015, the month during the period under study when net foreign assets peaked at 93044.78 million Iraqi Dinars. At the same time the value of the foreign market pressure index was higher (3.77). Moreover, the reduction of net foreign assets associated with the stabilization of foreign exchange market pressure means that Central Bank of Iraq adequately sterilized the currency to protect it from the danger of speculation.

Figure 3. Relationship Between the Foreign Exchange Market Pressure Index and Net Foreign Assets 2013–2017



Source: Authors' calculation.

6. ECONOMETRIC ANALYSIS

Following the literature that examines the relationship between the EMP index and monetary policy (Connolly and Silveira 1979; Hodgson and Schneck 1981; Kim 1985; Youns 2010; Bahmani-Oskooee & Shiva 1998; Deressa 2005; Tanner 2001; Al-Assaf 2017), we selected the following variables to examine the influence of the EMP index in Iraq.

$$EMP_t = (DC, MM, P^*, AL, SP, Q) \quad (14)$$

where:
EMP = exchange market pressure index from Equation (10).
DC = changes in domestic credit as a portion of the money base.
MM = change in the money multiplier.
*P** = foreign inflation measured by the US Consumer Price Index.
AL = ratio of foreign assets to foreign liabilities in the central bank.
SP = spread between the official and market exchange rate.

$Q = \frac{e-1}{r-1}$ where e = exchange rate and r = foreign reserves. It is a measure of how a central bank can absorb exchange market pressure by changes in either the exchange rate or foreign reserves. If Q is positive and significant it indicates that the central bank is using exchange rate depreciation to absorb pressure. A negative and significant value of Q indicates that the central bank is absorbing pressure through foreign reserve loss. However, an insignificant coefficient indicates that the central bank is not sensitive to the components of EMP.

Table 1: The Effect of Independent Variables on the EMP Index in Iraq

Variable	Channel of Effect	Expected relationship
Domestic credit (DC)	1– Loss of reserves. 2– Depreciation of domestic currency.	+
Money Multiplier (MM)	1– Loss of reserves. 2– Depreciation of domestic currency.	+
Foreign Inflation (P*)	1– Appreciation of national currency 2– Increased inflow of foreign currency	–
Ratio of foreign assets to foreign liabilities in central bank (AL)	1– Increased foreign reserves. 2– Appreciation of national currency.	–
Spread between official and market exchange rate (SP)	1– Loss of reserves. 2– Depreciation of domestic currency.	+
Central Bank intervention (Q)	1– Changes in the exchange rate.	+ significant
	2– Changes in foreign reserves.	- significant
	3- Central bank is not sensitive to the components of EMP.	insignificant

Empirical research has produced different econometric models to measure the nexus between the EMP index and its determinants. The first approach is the single equation model. Girton and Roper (1977) use the OLS model to analyse the determinants of EMP in Canada during the period 1952–1974. Connolly and da Silveira (1979) use OLS to explain EMP in Brazil during the period 1955–1975. Bahmani-Oskooee & Shiva (1998) apply the OLS model to Iranian

experiences with the EMP of both the official exchange rate and the black-market exchange rate for the period 1959–1990. In addition, Al-Assaf (2017) applies the Multinomial Logit Model to estimate the relationship between EMP and monetary policy in Jordan and Egypt for the period 1980–2015.

The second approach applies a dynamic causality model such as the Vector Autoregressive (VAR) model. Akcoraoglu (2000) uses the VAR model to estimate the nexus between EMP and monetary policy in Turkey, using monthly data for the period 1990–1998. Kamaly and Erbil (2000) apply the VAR model to study the EMP in selected MENA countries (Egypt, Tunisia, and Turkey) for the period 1990–2000. García & Malet (2007) apply the VAR model to estimate the relationship between the EMP index and monetary policy in Argentina using annual data for the period 1993–2004. Tsedevsuren and Batsuuri (2016) apply structural vector autoregression models (SVAR) to estimate the relationship between EMP and monetary policy in Mongolia for the period 2000–2010.

Recent empirical research uses the Autoregressive Distributed Lag (ARDL) model to analyse the relationship between the EMP and monetary policy. This model is widely used when there are differences in the properties of the time series of variables. For example, Adebiy (2007) estimates the impact of foreign exchange intervention in the Nigerian foreign exchange market using the ARDL modelling approach for the period 1986:1 to 2003:4. Feridun (2009) uses the ARDL model to examine the nexus between EMP and monetary policy in Turkey for the period August 1989–August 2006. Feridun and Kartircioglu (2011) investigate the relationship between EMP and macroeconomic fundamentals in Turkey using ARDL. Shabbir, Abul & Malcolm (2012) also use the ARDL model to estimate the relationship between EMP and monetary policy in Fiji.

6.1. Autoregressive Distributed Lag Model (ARDL) Results Analysis

Following literature such as Adebiyi (2007), Feridun (2009), Feridun and Kartircioglu (2011), and Shabbir, Abul and Malcolm (2012), this paper applies the ARDL model to estimate the effects of monetary policy on the exchange market pressure index in order to implement adequate policies. The ARDL model takes the following form:

$$\Delta EMP = a_0 - \sum_{i=1}^{p} \beta_1 \Delta EMP_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta DCA_{t-i} + \sum_{i=1}^{p} \beta_3 \Delta P^*_{t-i} +$$
$$\sum_{i=1}^{p} \beta_4 \Delta MMA_{t-i} + \sum_{i=1}^{p} \beta_5 \Delta SP_{t-i} + \sum_{i=1}^{p} \beta_6 \Delta AL_{t-i} + \sum_{i=1}^{p} \beta_7 \Delta Q_{t-i} +$$
$$\lambda_1 EMP_{t-i} + \lambda_2 DC_{t-i} + \lambda_3 P^*_{t-i} + \lambda_4 MM_{t-i} + \lambda_5 SP_{t-i} + \lambda_6 Q_{t-i} + \lambda_7 AL_{t-I} + \mu_t \quad (15)$$

where:
Δ = first difference
a_0 = intercept
p = maximum lag
β_1……. B_7 = coefficients of short-run estimation
λ_1…….. λ_7 = coefficients of long-run estimation
i = time
μ_t = error term

6.2. Unit Root Test

We apply augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to examine the stationarity of the series. The results in Table 2 show that the data series for both *AL* and *Q* became stationary after taking the first difference. The other variables are stationary at level. Therefore we use the ARDL model, which accept variables with different orders of integration.

Table 2: Unit Root Test Results

Regressor	ADF Test		PP Test		Integration Order I(d)
	Level	1st difference	Level	1st difference	
EMP	0.000*	0.000*	0.000*	0.000*	I(0)
DC	0.001*	0.000*	0.000*	0.000*	I(0)
P*	0.008*	0.000*	0.000*	0.000*	I(0)
MM	0.002*	0.000*	0.000*	0.000*	I(0)
SP	0.0112*	0.000*	0.0651**	0.000*	I(0)
AL	0.8528	0.001*	0.8528	0.000*	I(1)
Q	0.8646	0.0714**	0.8987	0.000*	I(1)

Notes: * Significant at 5%.** Significant at 10%.

6.3. Test of Cointegration (F-Bound Test)

The results of Table 3 indicate that there is long-run equilibrium among variables, since the estimated F-bound test is greater than the upper and lower bound critical values. Thus, we reject the null hypothesis that there is no cointegration among the variables, and accept the alternative hypothesis that an equilibrium exists. This fact supports our use of the ARDL model.

Table 3: Cointegration Test Results

Estimated F-Bound Test = 144.0156			**H_0 = No Cointegration**
Significance	**I (1)**	**I (0)**	
10%	3.23	2.12	Reject
5%	3.61	2.45	Reject
2.50%	3.99	2.75	Reject
1%	4.43	3.15	Reject

Source: Authors' calculation using Eviews 9.

6.4. Analysis of ARDL Results

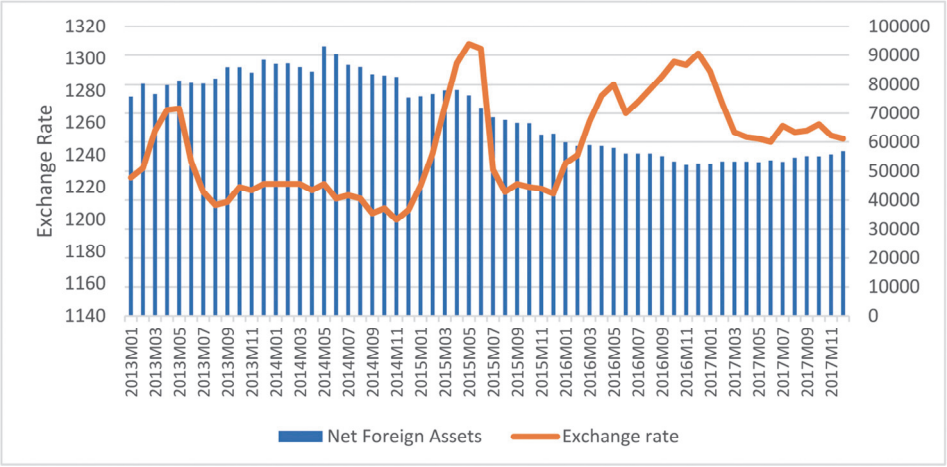
The results in Table 4 indicate a short-run relationship between the spread of exchange rate (SP) and EMP index that has the expected positive sign and is statistically significant. This implies that whenever the spread between market-based and official exchange rate increases through speculation it will lead to more loss of foreign reserves by the monetary authority to fill the gap in the spread and stabilize the exchange rate as a monetary policy objective. The negative and statistically significant variable *Q* implies that the Central Bank of Iraq (CBI) lost part of its foreign reserves mitigating the EMP index. This is true in the case of Iraq, where as long as it is using a fixed exchange rate regime, more than 50% of its foreign reserves will be lost stabilizing the exchange rate and maintaining the value of the Iraqi Dinar. Figure 4 shows the relationship between foreign reserves and exchange rate.

Table 4: Results of Short-Run Estimation from ARDL Model

Short-Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EMP_INDEX(-1))	0.07	0.02	3.14	0.003
D(SP)	0.09	0.0026	36.73	0
D(Q)	–	84.92	–	0
D(DC)	–	6504.07	–	0.7306
D(MM)	0.00067	0.00103	0.65	0.5182
D(P*)	0.025	0.17	0.14	0.8847
D(AL)	–	0.008	–	0.026
D(AL(–1))	–	0.008	–	0.0003
C	2.89	0.091	31.56	0
CointEq(–1)	–	0.034	–	0

Notes: The results are obtained using Eviews9. The dependent variable is foreign exchange market pressure index. The estimated ARDL model is based on 2, 1, 1, 0, 0, 0, 2.

Figure 4: Relationship Between Foreign Reserves and Exchange Rate



Source: Central Bank of Iraq, Statistical Annual Bulletin (Different Issues).

The insignificant coefficient of domestic credit (DC) is not surprising: it indicates that this variable has no effect on the EMP index in the case of Iraq, as shown in Table 4. This is because the CBI did not provide domestic credit; thus, in the Iraqi fixed exchange rate regime, foreign assets were the sole source of money supply. During most years of the research period the CBI's domestic

credit was negative because of the sterilization policy (Ali 2015: 10). The ratio of foreign assets to foreign liabilities has the expected negative sign and is statistically significant, indicating that any decrease in this ratio will increase the pressure in the foreign exchange market. This ratio dropped sharply from 44% in December 2013 to 2.8% in December 2107. This shows that the CBI is using foreign assets to mitigate speculation and pressure in the foreign exchange market. Change in the money multiplier (MM) has no effect on the EMP index, as its estimated coefficient is not statistically significant. This fact indicates that the credit channel was not influencing the EMP index because the MM ratio was almost stable during the period under study. Finally, the estimated coefficient of foreign inflation (P^*) was not statistically significant, implying that this variable has no effect on the EMP index in the case of Iraq.

In addition, the estimated error correction term (ECM) is statistically significant and emphasises the existence of a stable long-run relationship between the variables. The estimated ECM coefficient is –1.11 and this value implies that the estimated regression returns to equilibrium very quickly. This means that 111% of disequilibrium in the last period has been corrected in the present period.

On the other hand, the results of Table 5 show the same behaviour or effect of the exogenous (independent) variables on the EMP index. The variables *SP, Q*, and *AL* affected the EMP index in the long-run relationship with the expected signs. Meanwhile, the other exogenous variables, *DC, MM*, and P^*, did not affect the EMP index in either the long run or the short run.

Table 5: Results of Long-Run Estimation from the ARDL Model

Long-Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
SP	0.0077	0.0024	3.2	0.0026
Q	–	45.842	–	0.0052
DC	–	9029.7	–	0.8895
MM	0.00033	0.0013	0.24	0.8103
P*	0.045	0.205	0.22	0.8259
AL	–	0.0085	–	0.0058

Notes: The results were obtained using Eviews9. The dependent variable is the foreign exchange market pressure index. The estimated ARDL model is based on 2, 1, 1, 0, 0, 0, 2.

7. CONCLUSIONS

The method used in this paper to measure the foreign exchange market pressure index reliably discovers the periods of pressure in the Iraqi economy. The index identified the pressure periods in May 2014 and March 2015 through an increase in the index and a depreciation of the Iraqi Dinar. Another pressure period was found in July 2015, when the value of the index dropped and the Iraqi Dinar appreciated. The CBI had to monitor this index to ensure stability in the foreign exchange market.

Econometric analysis using the ARDL model revealed that the Central Bank of Iraq is dependent on foreign reserves to mitigate pressure in the foreign exchange market, especially by supplying more foreign currency (US dollars). This can clearly be seen by the negative signs and significant coefficients of both variables (AL and Q) in both the short and long run.

The econometric analysis also shows that the spread exchange rate (SP) variable influences the EMP index during both the short and long run. The main objective of the Central Bank of Iraq is to reduce the gap between the official exchange rate and the market rate. The success of the CBI in doing so implies greater loss of foreign reserves, and the latter dropped sharply during the period under study.

The CBI has a monopoly on international reserves, which come mainly from oil revenues. This encourages the CBI to rely on a fixed exchange rate regime, as long as it has sufficient international reserves that can be used to adequately manage the exchange rate and maintain a stable Iraqi Dinar against fluctuations and speculation.

The main implication of this paper is that when foreign reserves are the CBI's main tool, the Iraqi monetary authority has to manage foreign reserves carefully to stabilize the exchange rate and reduce the EMP index. This is because in the Iraqi economy other tools, such as changes in domestic credit and in the money multiplier, do not reduce undesirable movements in the EMP index.

This paper measures the foreign exchange market pressure index for the Iraqi economy and determines the role of monetary policy in fluctuations in the

foreign exchange market. It is the first paper to do so in Iraq and the results contribute to the debate on the relationship between foreign exchange market pressure and monetary policy in oil-exporting countries.

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Received: August 15, 2018
Accepted: January 15, 2019