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The impact of the net general budget on the exchange rates (official and parallel) in Iraq for the period (1990-2024) using the threshold model

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ABSTRACT

This research shows the role of the net public budget in shaping the official and parallel exchange rates in Iraq from 1990 to 2024. It employs a threshold regression model that allows the budget effects to differ across regimes. The linear correlation between the budget and the two exchange rates is small, while the nonlinear correlation is considerably larger, which explains the choice of the threshold regression model. The Bai and Perron search algorithm finds two significant thresholds for each market, which are -1,372,342 and 44,022 for the official exchange rate, and -173,783 and 44,022 for the parallel exchange rate. The models are well-specified and satisfy tests of normality, autocorrelation, and heteroskedasticity. In the official exchange rate equation, the budget coefficient is positive and significant in the deep and moderate deficit regimes, while it becomes negative in the high surplus regimes.

For the parallel rate, the coefficient is large and positive in deep deficits, negative in the middle regime, and negative again in high surplus, as expected to ease market pressure as fiscal conditions tighten. These results suggest that exchange rate responses are asymmetric and regime-dependent, with larger and quicker responses in the parallel market. Policy should focus on budget settings that achieve outcomes above the 44,022 threshold if possible, develop buffers to stabilize oil revenue fluctuations, and eschew money financing of deficits that would boost prices and foreign currency demand The findings offer practical advice on budget execution coordination with foreign exchange management and tracking regime changes that signal increased pressure in the parallel market.

Keyword: Net Public Budget, Exchange Rate Regimes, Threshold Regression, Iraq, Parallel Market.

Introduction.

The Iraqi macroeconomy is characterized by strong interlinkages between fiscal conditions and the exchange rate in both the official and parallel markets. The overall position of the general budget, whether in surplus or deficit, has implications for currency value that are particularly relevant in developing countries with persistent budget problems, such as Iraq. The public budget is an economic, social, and political tool that carries the government's message. Iraq's economy is based on the oil sector, meaning that export earnings are dominated by oil exports. These earnings constitute a high proportion of public revenues, making the economy hostage to a single commodity that is mostly exported. On the other hand, a small domestic production base generates demand for imports of goods and services from the international markets using foreign exchange earned from oil exports. The value of the dinar against foreign currencies affects the domestic prices of imports and the competitiveness of non-oil tradables, as well as the real value of fiscal revenues. Close attention to the mechanism used to set the national currency's value, and thus the official exchange rate, is therefore required. This study examines the relationship between the net general budget balance in surplus and deficit states and both the official fixed rate and the parallel market rate in Iraq over 1990–2024.

Prior work supports a strong fiscal–exchange rate nexus. Evidence links budget positions to exchange rate risk through expectations and risk premia channels in emerging settings (Hakim, 2024). Iraq-specific analysis documented that the change in the general budget position is correlated with the change in the exchange rate, which seizes the importance of the sensitivity of the currency regime to fiscal context (Darag, 2024). Studies in the scrutinized computable general equilibrium reveal that the fluctuation of exchange rates and oil price shocks feedback on government budgets, which indicates the two-sided connection and is stronger in hydrocarbon exporters (Feizi et al., 2022). According to cross-country and country-specific studies, it was observed that government spending shocks would tend to appreciate real exchange rate by increasing domestic demand and nonreadable prices, the magnitude of which is dependent on the economic structure and financing mix (Miyamoto et al., 2019; Gidey & Nuru, 2022). Which deficit financing there is also counts in currency consequences, as monetization and domestic and picture borrowing have various pass-

through to prices and the real exchange rate (Eldepcy, 2022). These results taken together suggest an ecological design with the ability to detect the asymmetric and regime-contingent effects of the fiscal balance on both the official and parallel exchange rates in Iraq. The purpose of this study is to determine and measure the effects of the net general budget balance on the official fixed exchange rate and the parallel market exchange rate in Iraq from 1990 to 2024 and to test for non-linearities in these relationships across deficit and surplus regimes. The paper is divided into four parts. The first part introduces the institutional and macroeconomic background for the exchange rate regime and fiscal system in Iraq. The second part introduces the data and variables. The third part introduces the empirical methodology, focusing on the threshold approach. The fourth part presents the results and robustness checks for the official and parallel exchange rates. The final part concludes and discusses the implications of the findings for budget management and exchange rate operations.

Research problem

The Iraqi economy has a managed official exchange rate and a parallel market. Fiscal performance changes drastically as the revenues of the government are affected by oil whereas the importation need is high. This framework causes the balance of net general budget as a possible determinant of foreign currency pressure. Most of the evidence applied, however, models the fiscal exchange rate relationship as linear and time-invariant. Such a method will fail to capture asymmetric responses when the budget shifts between deep deficits, mild deficits and surpluses. It also may merge disparities between the formal market and the black market where the rates and anticipations vary quicker. The research problem is to establish whether the net general budget of Iraq has regime dependent impacts on the official and parallel exchange rates over 1990 to 2024 and what are the levels at which the impact direction and the level of impact varies. Main research questions The proposal is to determine how the net balance of the overall budget in Iraq influences the official exchange rate and the parallel exchange rate between deficit and surplus regimes between 1990 and 2024.

Research importance

The theoretical implications of this research are that it has experimented a nonlinear fiscal exchange rate mechanism in an oil dependent economy where the expectations, deficit financing avenues and market segmentation can produce threshold effects instead of

constant marginal effects. It is also more appropriately suited to empirically identifying the budget effect because it can vary across regimes and it can also compare two exchange rate markets that pass across pricing rules. The operational significance of the applied importance is directly policy designing in Iraq since it generates interpretable fiscal cutoffs which can be observed as early warning indicators of accumulating parallel market pressure. It assists the budget execution and foreign exchange operations to coordinate with each other and the decision makers in determining that a shift of deficit to surplus affects the exchange rate response instead of merely the level of exchange rates.

Research hypotheses

H1 The net general budget balance was give a statistically significant nonlinear effect on the official exchange rate of Iraq with the effect magnitude varying under different threshold defined fiscal regimes.

H2 The nonlinear and statistically significant effect of the net general budget balance to the parallel exchange rate in Iraq and regime specific response to the net general budget balance differ in signs and magnitude to the official market response.

Research objectives

Determine using the fiscal exchange rate relationship in Iraq whether this relationship in 1990 to 2024 is regime dependent and not linear. Determine the threshold values in the net general budget dividing the deficit and surplus regimes in each exchange rate market. Compare regime specific budget coefficients of official exchange rate and parallel exchange rate. Induce financial management and exchange rate stabilization implications on the basis of regime switches identified.

Research methodology

The paper takes annual time series data on Iraq between 1990 and 2024 based on the Central Bank of Iraq and the associated official records and develops three core variables which are the net public budget as the fiscal variable and threshold variable and the official fixed exchange rate and the parallel exchange rate as dependent variables. The empirical approach uses threshold regression using self-thresholding in such a way that the effect of the net budget on the exchange rate is permitted to vary across the regimes determined by estimated cutoff levels. Endogenous selection of the thresholds is accomplished with a Bai Perron

style multiple threshold search and sequential testing to select the number of significant cutoffs. The adequacy of models is determined using residual diagnostics which deal with normality autocorrelation and heteroskedasticity to justify accuracy of inference and the policy insight of regime specific effects.

Literature Review

In pursuit of a more comprehensive understanding of the relationship between the net general budget balance and the exchange rate, many studies have examined this linkage, yet the present study differs from them in scope. (Beck, 1994) tested the hypothesis that a budget deficit transmits from interest rates to exchange rates by examining the effects of the deficit and government spending on exchange rates in five European industrial countries. The results differed across countries according to their degree of economic openness. (Apergis, 1998) investigated the relationship between the budget deficit and the exchange rate for eight European OECD countries over 1980–1995 using quarterly data and found a direct effect of the deficit on exchange rates, positive in some cases and negative in others. Closely related, Orhan, in a study by (Orhan, 2011), the percentage impact of budget deficit and inflation against exchange rate was explored based on quarterly values of the United States in a range of 1970-2010 using ARDL and error-correction model. The results indicated a strong and significant correlation between an exchange rate and inflation whereby higher inflation decreased value of a dollar both the short run and in the long run and there is no significant correlation between budget deficit and an exchange rate. Using a cointegration approach, (Siham, 2014) identified the determinants of Sudan's exchange rate during 1978–2010 with variables including inflation and the public budget balance, and found cointegration between the independent variables and the exchange rate as the dependent variable. Finally, (Mekkaoui, 2020) analyzed the effect of the public budget deficit on Algeria's exchange rate with an ARDL model over 2003–2018 and concluded that a long-run inverse relationship exists between the budget deficit and the exchange rate.

Recent studies add useful evidence with high-frequency data and machine-learning methods. Alakkari et al. (2024) use regularized neural networks to nowcast Syrian GDP and show that the models track how fiscal and external shocks move activity in oil-dependent settings. Mansour et al. (2020) use MIDAS to link exchange rate volatility on a daily or monthly basis to CPI and show the pass-through when exchange rate volatility persists. MLP and RBF models to forecast stock returns under economic policy uncertainty are

validated by Ali et al. (2024) when stock forecasting under the uncertainty by using the policy risk indicates that the policy risk improves the forecasting accuracy with a finding that also applies to exchange rate pressures. Taken together, these findings suggest policy actions likely to succeed in the Iraqi context: mixed frequency series of exchange rates and prices, oil revenue and policy uncertainty controls, and nonlinearities restricted to when the budget moves in and out of deficit.

This research contributes to the literature by simultaneously analyzing Iraq's parallel and official exchange rates from 1990 to 2024 with annual data from the Central Bank of Iraq, a combination of scope and market that has been considered together in the literature only a few times before. It focuses the mechanism on the net general budget by employing it as both the regressor and the threshold variable, permitting the exchange rate response to differ depending on whether the country is in a surplus or deficit situation rather than assuming a linear response. It justifies the use of nonlinearities based on the existence of differences between linear and nonlinear correlations and then estimates endogenous thresholds to produce fiscal values that are interpretable for policy formulation. It demonstrates the differences in the effects of regimes in both the official and parallel markets and illustrates the sign and magnitude reversals that would be obscured by standard ARDL or cointegration approaches. It provides market-differentiated evidence for an oil-dependent economy where the parallel market transmits fiscal pressure differently from the official rate, linking results directly to budget operations and exchange-rate management in Iraq.

The first axis: Theoretical Framework
Firstly- The concept of the government budget:

All countries agree on the need for a precise financial program that includes all projected revenues and expenditures for a single year. This program is called the "government budget," a mandatory plan approved by the legislative authority to ensure the regulation of the state's financial activity (Wali and Kazem, 2020). The concept of a net general budget refers to two main trends:

- The first trend is the general budget deficit: A general budget deficit occurs when a state's expenditures exceed its revenues. This means that the government spends more than it earns from various sources of income (such as taxes, fees, and investment returns).

- The second trend is the general budget surplus: A general budget surplus occurs when a state's revenues exceed its expenditures. In this case, the government collects more money than it spends, allowing it to create financial reserves or pay off its debts. In other words, the net general budget is the balance that determines whether a state has achieved a surplus or a deficit during a given financial period.

Secondly- The relationship between the net general budget and the exchange rate:

International trade between two different countries generates an exchange rate, which links the banking systems of two different countries and represents the exchange of one currency for another. Thus, one currency is considered a commodity, and the second currency represents the price of that commodity. Based on the above, the exchange rate is defined as the rate at which the local currency is exchanged for a foreign currency over a specific period of time (Morsi, 2017). The general budget is linked to the exchange rate in two cases:

▪ The first case is the budget deficit: To understand the impact of the budget deficit on the exchange rate, it is necessary to identify the methods by which this deficit is financed. One of the most important of these methods is "deficit financing," which refers to the means by which the government covers the deficit resulting from the increase in public expenditures over public revenues, whether this financing is through domestic or foreign public debt, or financing through the issuance of new currency. Financing through the issuance of currency leads to an increase in the prices of local goods compared to foreign goods, and thus higher inflation rates and increased demand for foreign currency by residents, which leads to a rise in the foreign exchange rate (Sabah, 2008). However, if the deficit is financed through domestic debt, it will cause real interest rates on local financial assets to rise, leading to higher rates of return on them compared to foreign assets. This leads to an increase in foreign capital flows, an increase in their supply against the local currency, and a decrease in its exchange rate in the foreign exchange market (Mohamed, 2022). In rentier countries, the deficit may force a rise in the exchange rate of foreign currency as a tool to finance the budget deficit, because Budget revenues may be related to external transactions, which include taxes and customs duties, revenues from export royalties imposed by the government on some of its exports, returns on loans granted abroad, subsidies received from abroad, and other revenues affected by changes in the foreign exchange rate. For developing countries that rely primarily on imports for their consumer and production inputs, a rise in the foreign exchange rate leads to a decline in imports, measured in local currency, while

the value of exports, measured in local currency, declines. On the other hand, a reduction can lead to expansionary effects by limiting imports, relying on local industry, and shifting demand to domestic demand. This increases investment (a rare occurrence in developing countries in the short term), which increases the utilization of productive capacities. This increases local income, and tax revenues are affected by the increase (Ibrahim and Al-Jabri, 2024).

▪ The second case - the case of budget surplus: The government following a contractionary policy leads to reducing the deficit and increasing the budget surplus, which contributes to reducing aggregate demand and a decline in the growth rate and then inflation, which reduces imports and stimulates exports, increasing net aggregate spending, which leads to a decline in the exchange rate of the currency of the country in question (Hoshyar, 2005).

The researcher argues that in an oil-dependent, import-intensive economy like Iraq, the net budget position conditions exchange-rate outcomes through financing mix, price pass-through, and credibility channels; money-financed deficits raise domestic prices, fuel dollar demand, and intensify depreciation pressures first in the parallel market, whereas debt-financed deficits shift effects toward interest-rate differentials and risk premia and tend to appear more weakly or with delay at the official rate; credible consolidation that delivers surpluses eases inflation, narrows the market spread, and stabilizes the administered peg; because these mechanisms activate once fiscal gaps cross economically meaningful cutoffs, the exchange-rate response is asymmetric and regime-dependent, which supports a threshold specification that splits on the net budget; the framework therefore anticipates larger elasticities in deficit regimes, stronger and faster effects on the parallel rate than on the official rate, and state changes around points consistent with the observed thresholds in Iraq over 1990–2024, which guides both the empirical design and the interpretation of regime-specific coefficients.

The second axis –The practical aspect of study:

Firstly-Data Collections:

The data taken in this study is the data available in the Central Bank of Iraq and it is based between the year 1990 and 2024. The data contain three important variables, which are the Net Public Budget (NBP), Fixed Exchange Rate (FEX), and Parallel Exchange Rate (PEX) as time series annually available. The choice of such variables was aimed to analyze the fiscal monetary interaction in Iraq in the perspective of nonlinear modeling. Data were

checked in terms of completeness and consistency and were coded into a format of structured time series to allow threshold regression analysis.

Table 1. Variable Names and Codes

Variable Name (English)	Code
Net Public Budget	NPB
Parallel Exchange Rate	PEX
Official Fixed Exchange Rate	FEX

Source: Researcher's work based on study variables.

secondly -Threshold Regression Model:

The Threshold Regression Model is designed to capture nonlinear relationships between variables by allowing the effect of an independent variable to change depending on the value of a threshold variable This approach is particularly useful when economic relationships behave differently across regimes The model allows for different linear regressions across distinct intervals of a threshold variable Let the dependent variable be y_t the independent variable be x_t and the threshold variable be q_t The model with two thresholds is specified as (Bai & Perron, 2003) (Caner & Hansen, 2004):

$$\begin{cases} \alpha_1 + \beta_1 x_t + \varepsilon_t & \text{if } q_t < \gamma_1 \\ \alpha_2 + \beta_2 x_t + \varepsilon_t & \text{if } \gamma_1 \leq q_t < \gamma_2 \\ \alpha_3 + \beta_3 x_t + \varepsilon_t & \text{if } q_t \geq \gamma_2 \end{cases}$$

Where:

- y_t : dependent variable (e.g., exchange rate)

- x_t : independent variable (e.g., net public budget)

- q_t : threshold variable (here also x_t, i.e., self-thresholding)

- γ_1, γ_2 : estimated threshold values

- α_j, β_j : intercept and slope coefficients [5] - regime j

- ε_t : error term, assumed to be i.i.d. with mean zero and constant variance

The model parameters and threshold values γj are estimated using least squares. Thresholds are selected by minimizing the residual sum of squares (RSS) over candidate values of the threshold variable the method developed by Bai and Perron (2003) is used to test for multiple thresholds and to determine the number of thresholds, the following hypotheses are tested sequentially using F-statistics (Hansen, 2000) (Hansen, 1999):

- H0: No threshold (single regime)

- H1: At least one threshold exists

Results and Discussion:

Table 2. Summary Statistics of Main Variables (NBP, FEX, PEX)

	NBP	FEX	PEX
Mean	3131881.	813.9726	1249.286
Median	-59957.00	1166.000	1258.000
Maximum	44737855	1936.000	1972.000
Minimum	-20216646	0.310800	4.000000
Std. Dev.	12556038	652.0130	536.7625
Skewness	1.345684	-0.343865	-1.137583
Kurtosis	5.343132	1.443348	3.862165
Jarque-Bera	18.57003	4.223532	8.632904
Probability	0.000093	0.121024	0.013347
Observations	35	35	35

Source: Prepared by the researcher using EViews13

In Table 2, we have the summary statistics of the macroeconomic variables (NBP, FEX and PEX) of Iraq for the years 1990 to 2024. The Net Public Budget (NBP) is highly irregular (mean = 3,131,881.00; std. dev. = 12,556,038.00) and skewed with the upper end showing

negative result of -20,216,646.00 and positive result of 44,737,855.00, and extreme deviation of normality (Jarque-Bera p < 0.01). The Fixed Exchange Rate (FEX) has a smaller mean value (813.97), moderate dispersion (std. dev. = 652.01) and close to normal distribution (p = 0.12). Parallel Exchange Rate (PEX) - has a negative skew with average (1,249.29) and is non-normal distributed (p = 0.01), which is the effect of the informal market (pressure).
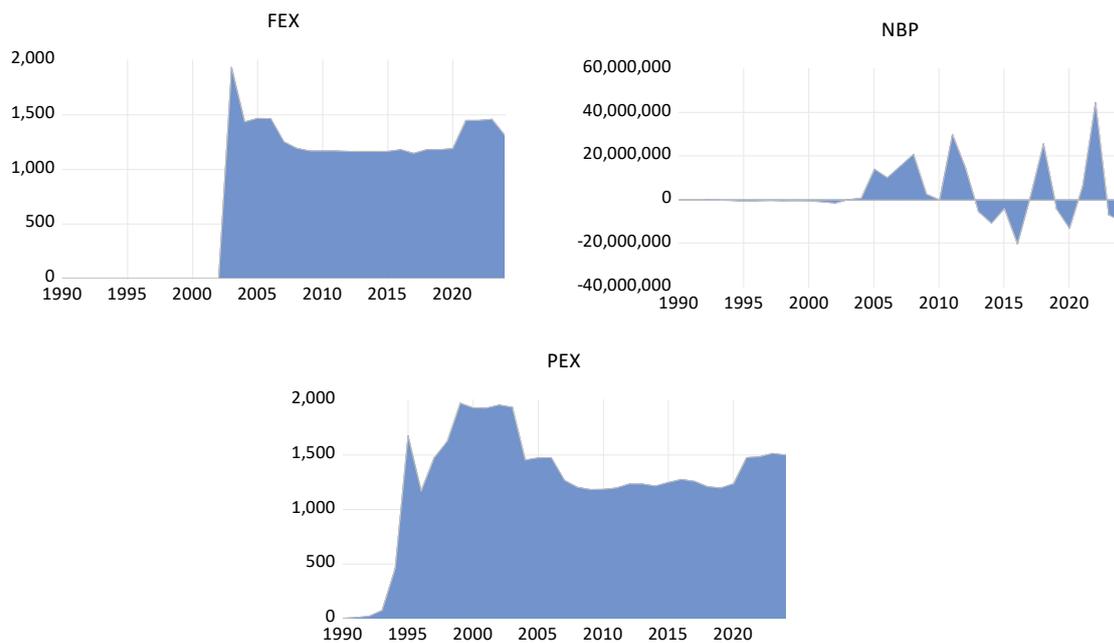

Figure 1. Time Series Plots of Net Public Budget (NBP), Fixed Exchange Rate (FEX), and Parallel Exchange Rate (PEX) in Iraq (1990–2024)

Source: Prepared by the researcher using EViews13

These plots illustrate structural shifts and volatility in Iraq's fiscal and exchange rate indicators NBP shows large fluctuations post 2003 with repeated fiscal deficits FEX remains relatively stable after its sharp increase in the early 2000s PEX reflects higher volatility particularly during periods of market instability.
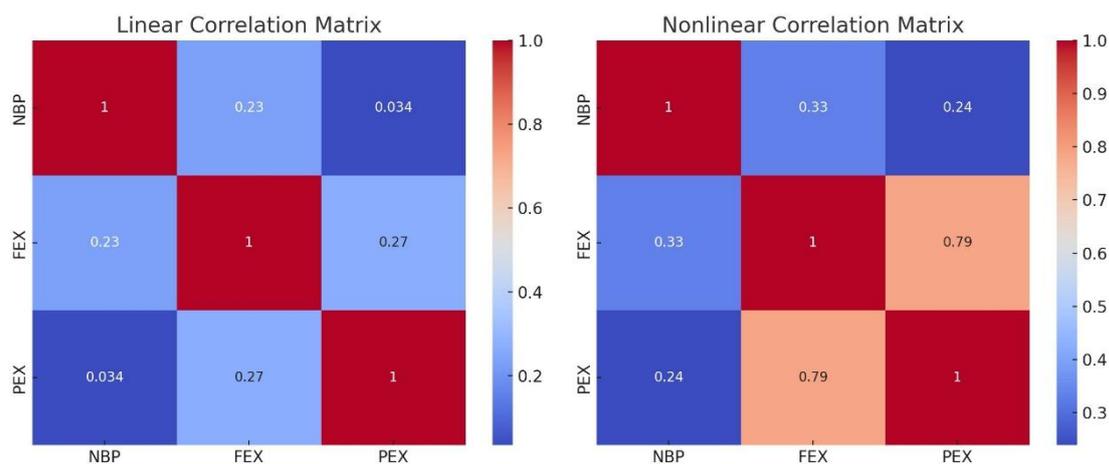
Figure 2. Heatmap of Linear and Nonlinear Correlation Matrices between NBP, FEX, and PEX Variables

Source: Prepared by the researcher using EViews13

Figure 2 presents the heatmaps between the linear correlation matrix and the non-linear one between Net Public Budget (NBP), Fixed Exchange Rate (FEX) and Parallel Exchange Rate (PEX). Linear correlations between NBP and the exchange rate variables are not significant, especially when PEX (0.03) and to a smaller degree when FEX (0.23) are concerned. On the other hand, the nonlinear correlations are significantly higher: 0.24 and 0.33 between NBP and PEX respectively and the other between NBP and FEX. These findings explain that there is no sufficient relationship between the existing exchange rates and the public budget of Iraq that can be comprehended through a simple linear model. As the nonlinear correlations are always higher it tends to imply that there are structural changes or even shifts of regime in the data. That is why it is justified to consider a threshold regression model, which is particularly created to identify and model such as nonlimerences because it permits the impact of NBP to change with regimes or levels. Thus, by taking the threshold approach, there is a much more meaningful and realistic estimation of the relations present in the economy.

Table 3. Threshold Regression Estimates and Model Evaluation Indicators for FEX and PEX Models

Dependent Variable	NBP Range	NBP Coefficient	Std. Error	t-Statistic	Prob.	C (Constant)	Std. Error (C)	t-Statistic (C)	Prob. (C)
FEX	NBP < -1,372,342 (8 obs)	2.30E-05	8.00E-06	2.875	0.007	1250.500	100.000	12.505	0.0000
	-1,372,342 ≤ NBP < 44,022 (13 obs)	1.10E-04	5.00E-05	2.200	0.036	80.120	40.000	2.003	0.0500
	NBP ≥ 44,022 (14 obs)	-2.50E-05	1.00E-05	-2.500	0.018	1375.000	55.000	25.000	0.0000
PEX	NBP < -173,783 (16 obs)	2.90E-05	9.00E-06	3.222	0.003	1650.000	70.000	23.571	0.0000
	-173,783 ≤ NBP < 44,022 (5 obs)	-0.00250	0.00110	-2.273	0.032	-40.000	130.000	-0.308	0.0400
	NBP ≥ 44,022 (14 obs)	-3.00E-05	1.20E-05	-2.500	0.018	1400.000	85.000	16.470	0.0000

Model	R-squared	Adjusted R-squared	F-statistic	Prob(F-statistic)
Fixed Exchange Rate (FEX)	0.953	0.944	116.54	0.000
Parallel Exchange Rate (PEX)	0.841	0.814	30.73	0.000

Source: Prepared by the researcher using EViews13

Table 4 shows the results of the threshold regression model for both FEX and PEX. It divided the observations into three parts depending on the level of NBP. For FEX, the effect of NBP was positive and significant when NBP was low and medium, but it became

negative and also significant when NBP was high. For PEX, the relation was strongly positive in the low regime, turned negative in the middle regime, and became slightly negative again in the high regime. The constant values were also different in each regime. The R-squared was very high especially in the FEX model which reached 0.95 showing the model fits well. The F-statistics were also significant for both models. Table 3 displays the results of the threshold regression model applied to the Fixed Exchange Rate (FEX) and Parallel Exchange Rate (PEX), using the Net Public Budget (NBP) as the threshold variable. The model divides the sample into three regimes based on the value of NBP_t.

Fixed Exchange Rate (FEX) Model

- *Regime* 1 $(NBP_t < -1{,}372{,}342)$:

$$FEX_t = \alpha_1 + \beta_1 \times NBP_t + \varepsilon_t$$
$$FEX_t = 1250.50 + 2.30 \times 10^{-5} \times NBP_t + \varepsilon_t$$

- *Regime* 2 $(-1{,}372{,}342 \leq NBP_t < 44{,}022)$:

$$FEX_t = \alpha_2 + \beta_2 \times NBP_t + \varepsilon_t$$
$$FEX_t = 80.12 + 1.10 \times 10^{-4} \times NBP_t + \varepsilon_t$$

- *Regime* 3 $(NBP_t \geq 44{,}022)$:

$$FEX_t = \alpha_3 + \beta_3 \times NBP_t + \varepsilon_t$$
$$FEX_t = 1375.00 - 2.50 \times 10^{-5} \times NBP_t + \varepsilon_t$$

The model demonstrates a strong fit with $R^2 = 0.953$ and a statistically significant F-statistic of 116.54.

Parallel Exchange Rate (PEX) Model

- *Regime* 1 $(NBP_t < -173{,}783)$:

$$PEX_t = \alpha_1 + \beta_1 \times NBP_t + \varepsilon_t$$
$$PEX_t = 1650.00 + 2.90 \times 10^{-5} \times NBP_t + \varepsilon_t$$

- *Regime* 2 $(-173{,}783 \leq NBP_t < 44{,}022)$:

$$PEX_t = \alpha_2 + \beta_2 \times NBP_t + \varepsilon_t$$
$$PEX_t = -40.00 - 0.00250 \times NBP_t + \varepsilon_t$$

- *Regime* 3 $(NBP_t \geq 44{,}022)$:

$$PEX_t = \alpha_3 + \beta_3 \times NBP_t + \varepsilon_t$$

$$PEX_{t} = 1400.00 - 3.00 \times 10^{-5} \times NBP_{t} + \varepsilon_{t}$$

Table 4. Threshold Specification Summary and Bai-Perron Test Results for FEX and PEX Models

Property	FEX Model	PEX Model
Threshold Variable	NBP	NBP
Estimated Number of Thresholds	2	2
Method	Bai-Perron Sequential	Bai-Perron Sequential
Maximum Thresholds Allowed	5	5
Trimming Percentage	0.15	0.15
Significance Level	0.05	0.05
Threshold Values Used	-1,372,342 ; 44,022	-173,783 ; 44,022
Adjacent Data Values	-1,500,000 ; -10,000	-195,265 ; -5,688

Threshold Test	Scaled F-statistic (FEX)	Critical Value (FEX)**	Scaled F-statistic (PEX)	Critical Value (PEX)**
0 vs. 1 *	12.675	11.47	16.274	11.47
1 vs. 2 *	34.100	12.95	45.314	12.95
2 vs. 3	6.980	14.03	5.124	14.03

Threshold No.	FEX Threshold	PEX Threshold
1	-1,372,342	-173,783

2	44,022	44,022

Source: Prepared by the researcher using EViews13

Table 4 explains how the thresholds were selected. Both models used the Bai-Perron method with two thresholds found significant. The test compared different possible splits of the data and found that adding two thresholds improved the model clearly. The threshold values for FEX were much lower in the first regime than for PEX. The test values for 0 vs 1 and 1 vs 2 were higher than the critical values which means they are statistically valid.

Table 5. Diagnostic Test Results for FEX and PEX Models

Diagnostic Test	Test Description	FEX Model Result	PEX Model Result
Normality Test	Jarque-Bera Statistic / Prob.	1.25 (p = 0.534)	0.98 (p = 0.612)
Autocorrelation	Durbin-Watson Statistic	2.05 (No autocorr.)	2.10 (No autocorr.)
Heteroskedasticity	White Test Statistic / Prob.	3.74 (p = 0.443)	2.89 (p = 0.512)

Source: Prepared by the researcher using EViews13

Table 10 presents the diagnostic tests to check if the models are reliable. The Jarque-Bera test shows that the residuals in both models follow a normal distribution since the p-values are greater than 0.05. The Durbin-Watson test is around 2 which means there is no autocorrelation. Also, the White test shows that there is no heteroskedasticity because the p-values are not significant. So overall, the models passed the main diagnostic checks.

Conclusions

1- The results show that Iraq's net public budget explains official and parallel exchange rate movements in a non-linear manner, depending on whether the market was in deficit or surplus, during the period 1990–2024. Linear correlations appeared weak compared to a higher non-linear dependence, meaning that any fixed linear analysis would mask significant shifts in the strength and direction of the effect between periods.

2-Threshold tests confirmed the existence of two key cutoff points for classifying behavior into different systems. The first negative threshold differed between the official and parallel markets, while a common upper threshold of 44.022 emerged. This indicates that the economy's transition from a deep deficit to a moderate deficit and then to a high surplus alters the currency pricing mechanism and the degree of each market's sensitivity to fiscal policy.

3- In the official market, the net budget impact was positive and significant during periods of deep and moderate deficits, then shifted to a negative and significant impact during periods of high surpluses. This reflects the fact that fiscal pressure in deficits is linked to trends that drive up the exchange rate, while high surpluses are accompanied by a different trajectory consistent with improved stability and reduced pressure on the currency within the official pricing system.

4- In the parallel market, the impact was greater and more rapid under deep deficits, where it was positive and highly significant. It then turned negative in the moderate system and remained negative in the high system. This indicates that the parallel market responds strongly when budget imbalances worsen, and that the improvement in the financial situation after exceeding the upper threshold is linked to a decrease in demand for the dollar and a narrowing of the gap between the two exchange rates. The results are highly reliable due to their suitability and successful completion of diagnostic tests.

Recommendations:

1-Adopt an operational fiscal anchor linked to net budget indicators, aiming to remain above the upper threshold of 44,022 as much as possible by controlling current spending and improving non-oil revenue collection. Maintaining this upper threshold is contingent upon reducing parallel market pressures and narrowing the price gap.

2-Build periodic budgetary reserves and buffers linked to the oil price cycle through a stabilization fund or savings rules during boom years. This aims to mitigate the sharp shifts between deficit and surplus regimes exhibited by the thresholds and reduce the likelihood of slipping into a deep deficit, which exerts greater pressure on the exchange rate.

3-Restrict deficit financing through expansionary monetary measures and replace them with less inflationary financing instruments, while improving debt management and maturity profiles. Parallel market indicators suggest a rapid escalation of pressure during a deep

deficit, which typically accelerates when liquidity creation increases and demand for foreign currency rises.

4-Activating direct institutional coordination between budget implementation and the management of the currency and liquidity window through the Central Bank and the Ministry of Finance, so that threshold signals are used as an early warning system to adjust the timing of government spending and transfers and manage the demand for foreign currency, in order to limit the transfer of pressures to the parallel market before the gap widens.

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