

-RESEARCH ARTICLE-

A STANDARD STUDY OF GOLD RESERVE DEVELOPMENT IN IRAQI CENTRAL BANK AND ITS RELATION TO ASSETS

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—Abstract—

This work investigates the time trajectory of the Iraqi Central Bank's gold holdings and their correlation to their total assets from 2005 to 2017 by applying time-series regression techniques. The study employs three mathematical forms linear, quadratic, and cubic regression models—and contrasts them to determine the trajectory of gold reserve expansion. The empirical work applies officially published datasets by the Central Bank of Iraq to determine the functional form that appropriately embodies the dynamics of gold reserve build-up. The empirical outcomes indicate a steady increase in gold reserves throughout the study period. Specifically, the linear regression model estimates an average annual growth of 412,712 ounces and accounts for 83.3% of the variance in reserve levels, as reflected by an R-squared value of 0.833. The inclusion of a quadratic term substantially enhances the model's performance, raising the R-squared to 0.915. Further refinement through the cubic model elevates explanatory power to

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0.939. The findings suggest that gold reserve growth follows an acceleration, nonlinear rather than a constant linear course, which translates to an increasingly stronger strategic priority on gold hoarding. The comparison shows that higher-degree polynomial models have improved gold reserve trend predictions, and the cubic specification achieves the greatest explanatory capability. The revealed acceleration in the growth rate of reserves from the quadratic and cubic estimates finds evidence on an evolving policy towards reserve holdings by the Iraqi Central Bank, which was presumably brought on by increasing regional economic turbulence and geopolitical threats.

Keywords: Gold Reserve, Central Bank, Develop, Iraqi Economy, Financial Variables.

INTRODUCTION

Iraq's economy has been prone to long-lasting volatility and unpredictability over the past decades, and, in particular, since the 2003 United States-led invasion (Khan, 2024). The most severe disruptions hit the monetary and financial sectors. Such occurrences have hindered achievement of sustained economic growth, blurred institutional arrangements, and negatively affected civil welfare (Abu-Ras et al., 2023). While such hardships to a degree are the by-product of war and global sanctions, to an identical or even wider degree, they are the origin of further structural harm to society and politicisation of financial organisations. Owing to the 2003 regime change, the Iraqi economy was supposed to transition to a market-based from a centralised, state-directed paradigm. The reforms launched comprised privatisation of state companies, opening up to the market, freedoms on the capital account, and introduction of a mechanism through a foreign exchange auction to support the exchange rate and curb inflation (Akata, 2023). While such moves served to enhance efficiency and stimulate external investment, their impacts on Iraq's economic architecture have proved mixed, resulting both in beneficial and adverse effects.

One major reform was the legal establishment of the Central Bank of Iraq (CBI) as an autonomous monetary agency. The autonomy was to prevent politics from affecting the CBI and curb outright borrowing by the government, thereby averting fiscal dominance and inflationary outcomes common among emerging market economies (Garriga & Rodriguez, 2023; Orhangazi & Erinç Yeldan, 2023; Reinsberg et al., 2021). The institutional shift enabled the CBI to autonomously execute its mandate to provide price stability and fiscal discipline. The CBI was initially a success in attaining macroeconomic stability. The erstwhile increasing inflation, which was over 60% during the early 2000s, was reduced to its single digits by 2013 by the managed exchange rate and the frequent exchange auctions, which maintained the parity between the dinar and dollar (Kohlscheen & Andrade, 2014; Roodman, 2007). These policy tools reaffirmed net positions to hold reserves, improved inflation expectations, and partially restored confidence within the monetary framework. However, the foreign

currency auction mechanism later came under scrutiny and proved problematic. Rather than solely serving monetary stabilisation and liquidity control, the auction was exploited for money laundering and capital flight (Benigno, 2024; Drebee et al., 2020). The mechanism operated with insufficient oversight and became susceptible to political manipulation by influential groups, who used it to divert foreign currency under the guise of import financing.

A more pervasive challenge lies in Iraq's ethno-sectarian power-sharing arrangement (Orhangazi & Erinç Yeldan, 2023) originally introduced as a temporary post-conflict solution but now institutionalised as a system facilitating elite access to state resources. Political elites have gained control of critical institutions, including the CBI, Ministry of Finance, and state-owned banks. This capture has facilitated the misallocation of public funds for private gain rather than national development goals (Burdekin & Tao, 2021; Griffin, 2025). Estimates suggest that 25% to 30% of public revenues have been lost to corruption since 2003, equating to hundreds of billions of dollars (Schwartz, 2007). Such systemic elite capture has eroded both the autonomy and operational capacity of Iraq's financial institutions. Although the CBI is formally independent, in practice it struggles to act autonomously due to opaque decision-making, entrenched factional interests, and the absence of legal enforcement.

This institutional deterioration has had clear economic consequences. Inflationary episodes continue to arise due to exchange rate volatility, weak fiscal policy, and disruptions in oil revenues the core of Iraq's economy. The exchange rate volatility has furthered widening socio-economic disparities by depressing purchasing power, suppressing real incomes, and misaligning domestic prices. The dinar depreciation has particularly impacted poor populations, internally displaced, and Kurdistan Region Government (KRG) residents reliant on imported goods without access to mainstream provision of financial service delivery. Worst still, poor private sector development bodes underlying systemic woes. An unfavorable climate for investors consisting of red-tape inefficiency, patronage politics, crumbling infrastructure, volatile monetary policy, and weak regulation institutionalality has subdued domestic and external investors equally. Small and medium-sized enterprises (SMEs), the centerpiece of innovation and job creation, suffer grave setback from the depredations of inflation, financial exclusion, and an extraordinarily corrupt banking industry. These push factors have resulted in one of the region's largest youth unemployment rates, which jeopardizes social cohesion and political stability equally.

Two interrelated and complementary dynamics have dominated Iraq's post-2003 economic governance. The first was an effort to liberalize the economy by shifting monetary control to the private level to attain increased market efficiency. Such an endeavor was executed without implementing adequate regulatory protection. Such policy enabled rent-seeking to take center-stage and engendered legal voids that inhibited healthy competition from occurring within the market. Secondly, chronic

corruptions and elite capture have impaired governance capacity, eroded public trust, and delegitimized monetary institutions and their performance. Together, both dynamics have engendered a cycle of volatility, inequalities, and institutional erosion. Loss of credibility and mandate by the CBI has not merely compromised macroeconomic policy spaces, but further, compromised broader population-level socio-economic well-being. Increasingly, levelling Iraqis find hard work to find jobs, sustain livelihoods, and access basic products and service provision amidst the volatility prescribed by kilometric monetary policy and variability of public infrastructure (Ferranti, 2022; Vieira et al., 2023) Overall, while the 2003 reforms revolutionized the financial architecture of Iraq, they failed to adequately address the underlying sources of political fragilities and systemic corruptions. Without an elemental policy reorientation from intervention and opaque financial treatment, capacity by the CBI to impose macroeconomic stability and inclusive development will continue to be circumscribed. Holistic reform agendas are essential to revitalize transparency, enhance regulatory enforcement, and de-politicize financial governance, thereby engendering transition from chronic fragilities to resilient expansion (Bni Lam & Hammood, 2021; Dharmireddi et al., 2025).

This study adopts a quantitative approach to forecasting key financial variables influencing the valuation of the Iraqi dinar within the framework of the CBI. Greater forecasting precision enhances the relevance and efficacy of economic planning and policy formulation. By isolating and estimating the most impactful variables, the study seeks to construct a robust econometric model capable of predicting critical indicators such as gold reserves and total assets managed by the CBI. These projections not only aid in evaluating present monetary conditions but also serve as the basis for strategic forward-looking policy initiatives. In turn, they equip CBI decision-makers with reliable data to guide future policy directions. This contributes to prudent financial resource management and greater confidence in macroeconomic policy environments. Accordingly, the research supports ongoing institution-building efforts at the CBI and advances improved financial governance in Iraq. The central issue addressed in this research is the need to develop forward-looking solutions for financial indicators that influence the purchasing power of the Iraqi dinar, including gold reserves. Identifying a suitable method for forecasting gold reserves and their association with total CBI assets is critical for designing future strategies to enhance the financial management capabilities of the CBI.

RESEARCH QUESTIONS

To explore the development of gold reserves at the CBI between 2005 and 2017 using linear, quadratic, and cubic regression approaches, and to assess their relationship with total assets, the study addresses the following research questions:

- In what ways do linear, quadratic, and cubic time-series models differ in their

explanatory strength when modelling the trajectory of gold reserve accumulation at the CBI during the period 2005–2017?

- How significantly does the inclusion of a quadratic term enhance the predictive precision of gold reserve changes compared to the linear specification, based on R-squared values and associated error statistics?
- What is the nature of the functional association between the CBI's gold reserves and its total assets, and how does the integration of a quadratic component for gold reserves improve the model's explanatory capacity regarding variations in total asset levels?

LITERATURE REVIEW

The central bank holds a vital position within every national economy, serving as an autonomous institution with responsibility for pursuing fundamental financial and monetary objectives. Among its core mandates are issuing and regulating national currency, maintaining monetary stability and value, and supervising the activities of commercial banks within the broader financial structure (Liu et al., 2025). These functions collectively contribute to fostering a stable financial environment that supports sustainable economic growth and cultivates public confidence in the financial system. The CBI has, over time, furthered its institutional penetration to increasingly deeper levels. It was established in 1947, when Iraq was still a monarchy, and afterwards christened the Iraqi National Bank, its creation was an inaugural milestone within the development of the country's monetary and financial architecture during the post-colonial era.

Following major geopolitical shifts, most notably the 2003 U.S.-led intervention, the CBI faced institutional reorganisation, embracing new powers and achieving formal autonomy from the executive branch. These amendments functioned to delimit its responsibilities' scope within monetary policy implementation and macroeconomic stabilisation. The CBI, which is situated in Baghdad, remains Iraq's key monetary authority (Gomis-Porqueras et al., 2022). Central to its success continues to be the principle of institutional autonomy, which protects financial decision-making from election cycles or politicking (Kartal et al., 2023). That autonomy enables the CBI to assume appropriate monetary policies, ensure protection for the national currency, stabilise prices, and provide public confidence, even amidst political turbulence or economic turbulence. Central banks have significant control over gold holdings and prices. According to World Gold statistics, global central bank gold reserves totalled 31,447.4 tonnes, with Arab nations collectively holding 1,006 tonnes. Iraq ranked 37th globally and 7th among Arab countries, with reserves of 90 tonnes (Echarte Fernández et al., 2021). Central bank reserves comprise not only gold but also foreign currency holdings and sovereign bonds, meaning gold represents only a portion of total reserves. Up to 2009, many central banks were net sellers of gold; however, in response to mounting concerns over the stability of dollar reserves, some institutions began

acquiring substantial gold quantities to diversify and mitigate currency risk (Öztunç & Orhan, 2021).

Gold has long held monetary significance due to its distinctive properties. Historically, 19th-century European economies operated under the gold standard, whereby cash was backed by physical gold (Anik et al., 2022; Humphreys, 2024). Following the Second World War, the Bretton Woods system established a fixed exchange rate framework underpinned by convertible currencies. This system was effectively dismantled in 1971, when convertibility into gold was eliminated, leading to the current era of fiat currency. Previously, national gold reserves served to back banknotes under a fixed gold parity system. A substantial gold reserve was also perceived as a symbol of sovereignty and economic independence on the global stage. Countries with the largest gold holdings agreed to limit the volume released to international markets to prevent devaluation of gold prices through oversupply (Aizenman et al., 2020). Modern monetary reserves, managed by central banks and monetary authorities, typically include deposits and securities held in foreign currencies. These assets span monetary gold, convertible currencies, deposits with overseas banks, special drawing rights, reserve positions at the International Monetary Fund, and foreign investments (Rathi et al., 2022; Singh & Kaur, 2024).

Time-series regression analysis indicates that the CBI's gold reserves increased at an average rate of approximately 412,712 ounces per annum between 2005 and 2017. A linear regression model explained 83.3% of this variation, while the addition of quadratic and cubic terms raised explanatory power to 91.5% and 93.9%, respectively, suggesting an accelerating trend in reserve accumulation (Griffin, 2025). Similar patterns have been documented in other resource-exporting states. For instance, Kazakhstan demonstrated improved reserve stability during periods of economic distress once gold exceeded 10% of its total reserve portfolio, highlighting the metal's role as a countercyclical asset (Dodonov, 2022). Political economy studies using logit regression across a sample of eighty countries show that higher levels of political stability, as measured by the Global Peace Index, are associated with greater allocations to gold, while variables such as regime type and military expenditure are statistically insignificant. These findings underscore the indirect influence of geopolitical risk on central bank gold holding decisions—a dynamic particularly relevant for Iraq, given its complex internal security environment (Koziuk, 2023). For countries subject to sanctions or pursuing de-dollarisation strategies, novel frameworks like the Sovereign Crypto Reserve Readiness Index propose limited Bitcoin allocations (less than 1%) in tandem with gold, although empirical support remains limited (Griffin, 2025).

Emerging literature advocates hybrid reserve strategies comprising 50–70% gold for stability, 20–30% liquid financial instruments for flexibility, and 5–10% in regulated digital assets, such as central bank digital currencies (CBDCs), to promote innovation. Although these diversified portfolios reduce dependence on dollar-denominated

reserves, their implementation in emerging markets remains constrained by regulatory uncertainty and technological readiness. Environmental, social, and governance (ESG) factors further complicate gold's risk profile, particularly in light of potential disruptions to mining supply chains. Analyses focused on resource-rich economies highlight the inverse relationship between oil and gold prices. During oil market downturns, the appreciation of gold provides a stabilising effect on reserves, suggesting that increased gold allocations enhance hedging efficiency. However, the strength of this countercyclical buffer is conditional on dynamic interactions between oil and gold prices, which are influenced by changes in monetary policy, inflation expectations, and geopolitical developments (Dodonov, 2022).

METHODOLOGY

To assess the influence of gold reserve expansion at the CBI and its association with other asset components, data on gold reserves and total assets were obtained from CBI publications covering the period 2005 to 2017. These data, summarised in Table (1), formed the basis for constructing standardised regression models aimed at capturing the relationship between gold reserves and total assets. The objective was to identify the most appropriate model specification for accurately representing this relationship.

Table 1: The Amount of Gold Reserves and Total Assets for the Period (2005-2017)

Year	Gold	Total
2005	142902	25684400
2006	159073	33799731
2007	191943	45145180
2008	119458	64765488
2009	243941	57957821
2010	311611	65012868
2011	348808	76541297
2012	1860236	85242207
2013	1903205	95155350
2014	4039626	81607163
2015	3627247	72475714
2016	3957959	76544213
2017	4434627	82381199

The following equation represents the relationship between the dependent and independent variables, where Y_i is the dependent variable and X_i is the independent variable. The terms β_0 and β_1 are the regression coefficients. The inclusion of an error term reflects the omission of certain independent variables that may influence the dependent variable but are not incorporated into the model. The regression coefficients can be estimated using the least squares method, as shown in the following estimation formulas.

$$\beta_1 = \frac{n\sum iX_iY_i - \sum iX_i\sum Y_i}{n\sum iX_i^2 - (\sum iX_i)^2}$$

$$\beta_0 = \bar{Y} - \beta_1 \cdot \bar{X}$$

In this context, \bar{x} represents the arithmetic mean of the independent variable x , and \bar{y} denotes the arithmetic mean of the dependent variable y . The resulting regression equation estimates the value of y based on x . The explanatory strength of the model is evaluated using the coefficient of determination, which is calculated according to the following formula.

$$R^2 = r^2 = 1 - \frac{ESS}{TSS} = 1 - \frac{RSS}{TSS}$$

The coefficient of determination, denoted as R^2 , quantifies the proportion of the total variation in the dependent variable Y_i that is accounted for by changes in the independent variable X_i . It reflects the extent to which the independent variable explains the variation in the dependent variable. Thus, R^2 serves as a measure of the model's explanatory power and is used to assess the strength of the relationship and the goodness of fit. The F-test, used to evaluate the overall significance of the simple linear regression model, can be calculated using the analysis of variance (ANOVA) table and is determined based on the following statistical formula.

$$F = \frac{ESS/1}{RSS/(N-2)} \sim F_{1,n-2}$$

In this context, ESS refers to the error sum of squares obtained from the analysis of variance (ANOVA) table, while RSS denotes the regression sum of squares, representing the portion of the variation explained by the linear regression model. Using the F-distribution, the model tests the joint null hypothesis that all regression parameters are simultaneously equal to zero, against the alternative hypothesis of statistical significance. The calculated F-value is then compared with the critical F-value from the F-distribution table, using degrees of freedom equal to 1 in the numerator and $n - 2$ in the denominator. The linear and cubic regression models assess the impact of a set of independent variables on the dependent variable. The linear regression model is estimated using the ordinary least squares (OLS) method, which aims to identify the best-fitting linear equation. In this study, a simple linear regression model, along with second- and third-degree polynomial models, is applied in the data analysis to determine the most suitable specification, based on the following statistical formulation of the model.

Estimations

Quantitative Analysis of Gold Reserves and Total Assets Variable

A linear regression model was developed to analyse the relationship between gold reserves and total assets of the CBI for the period 2005 to 2017, using 13 annual

observations obtained from the Ministry of Finance. These data were restructured to align with the requirements of regression analysis, as presented in [Table \(1\)](#). In addition, second- and third-degree polynomial regression models were constructed to examine the gold reserves as the dependent variable managed by the CBI, and to analyse the total assets in relation to time as an independent variable, capturing the trend and growth of the observed phenomena over the study period.

Simple Linear Regression Model (First-Degree)

The 1st degree linear regression model was applied with gold reserves at the CBI serving as the dependent variable and time considered the independent explanatory variable influencing the level of reserves. It was assumed that the error terms follow a normal distribution, forming the statistical foundation for model estimation. The model was estimated using the least squares method, accompanied by statistical tests to evaluate its efficiency. The detailed results of this analysis are reported in [Table \(2\)](#). The estimated regression equation is expressed as:

$$\text{Gold Reserves} = -1,247,399 + 412,712 (\text{Year}).$$

Where, S = 752679, R-Sq = 83.3% and R-Sq (adj) = 81.7%

Table 2: Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	3.10003E+13	3.10003E+13	54.72	0.000
Error	11	6.23178E+12	5.66526E+11		
Total	12	3.72321E+13			

The results exhibit an essential positive correlation between the CBI's gold build-up and the time variable, which implies that increments by time are connected to corresponding increments by gold build-up. The measure of the coefficient of determination (R^2), which measured 83.3%, exhibits the significant explanatory capability of the model, and this entails that the change by gold build-up is explained to a significant extent by changes over the study period. Such confirms the importance of time as an explanatory independent variable during reserve build-up. The overall statistical adequacy of the model was manifested by an F-statistic measuring 54.72 and a p-value below 0.001 ($P < 0.001$), which was considerably lower than the traditional 0.05 threshold level. The former confirms the explanatory capability of the model. The estimated value of the time variable was positive and significant and measured 412,712, which entails that an increment by one year translates to an increment by approximately 412,712 ounces by the CBI's gold build-up. [Figure \(1\)](#) displays the estimated model's results, which exhibit that the regression line fits the actual data points considerably well. The visual evidence confirms the adequacy of the model on the basis of customary statistical criteria, and the efficiency of the model was subject to further testing by customary statistical criteria, namely, the mean absolute percentage error (MAPE), mean absolute deviation

(MAD), and mean squared error (MSE). The criteria were estimated to subject the model's predictive capability and are presented in Table (3).

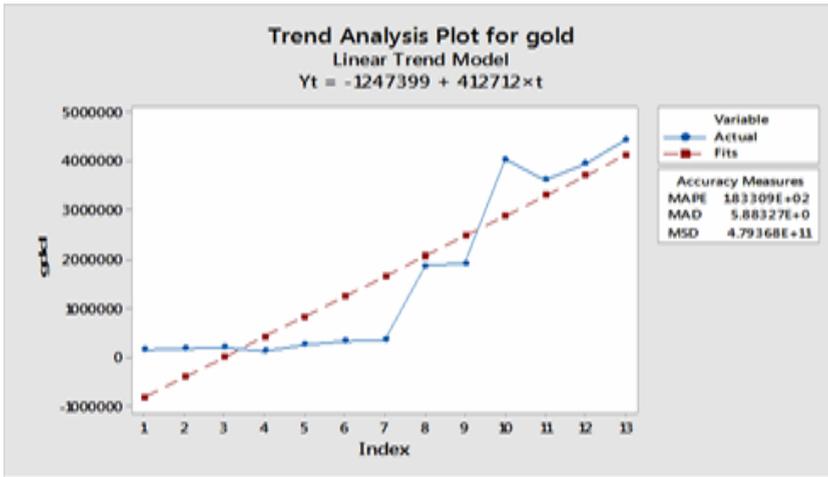


Figure 1: Simple Linear Trend Model

Table 3: Accuracy Measures of the Simple Linear Regression Model

Measure	Value
MAPE	183.309
MAD	5.883
MSD	4.79368×10^{11}

Quadratic Regression Model (2nd Degree)

The quadratic regression was formulated to find the relationship between gold reserves, which is the dependent variable, and time, which is the explanatory variable. The regression was formulated to find any potential nonlinear relationship that exists between the stock of gold reserves over the study period. The estimation results are presented in Table (4). The regression function estimate is:

$$\text{Gold Reserves} = 120,558 - 134,471 \times (\text{Year}) + 39,084 \times (\text{Year}^2).$$

$$\text{Where, } S = 563341, R^2 = 91.5\%, \text{ and } R^2 (\text{adj}) = 89.8\%$$

Table 4: Analysis of Variance for the Quadratic Regression Model (Gold Reserves vs. Time)

Source	DF	SS	MS	F	P
Regression	2	3.40586E+13	1.70293E+13	53.66	0.000
Error	10	3.17353E+12	3.17353E+11		
Total	12	3.72321E+13			

The results indicate a non-linear relationship between the dependent variable (gold reserves) and the explanatory variable (time). Specifically, the negative coefficient of

the linear term ($-134,471$) suggests that, in isolation, a one-unit increase in time initially leads to a reduction in the level of gold reserves held by the CBI. However, the positive coefficient of the squared term ($+39,084$) demonstrates a counteracting effect, indicating that over time, the rate of increase in gold reserves accelerates, confirming the presence of a quadratic growth trend. The coefficient of determination (R^2) is 91.5%, reflecting a notable improvement in the explanatory power of the model compared to the simple linear regression, which accounted for only 83.3%. This suggests that the time variable, in its quadratic form, explains approximately 92% of the variation in the CBI's gold reserves. The model is statistically valid, as indicated by the F-statistic value of 53.66 and a p-value of 0.000, which is well below the 0.05 threshold. Results confirm the statistical significance of the quadratic regression model. Generally, the model provides a satisfactory explanation of the growth in the CBI's holdings in gold, offering a better fit and higher predictive accuracy relative to the original linear model, which was unable to capture the entire degree of change among the values of the dependent variable. Figure (2) offers the results on the estimated quadratic model, which exhibits a good fit between prediction from the model and actual time series data on gold reserves in the CBI.

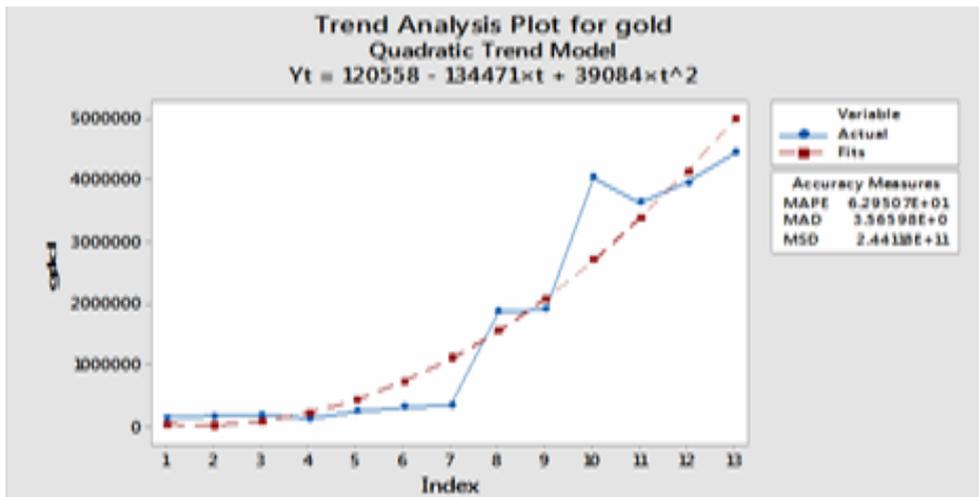


Figure 2: The Quadratic Trend Model

Efficiency measures from the model, displayed in Table (5), were much lower than those estimated from the simple linear model, denoting the improved predictive ability and overall goodness-of-fit from the quadratic specification. For additional assessment on the model's explanatory capability, a sequential variance test was employed, differentiating the effects between the linear and quadratic terms. The findings, reported in Table (6), confirm the statistical significance between the terms, since the p-value from each was less than 0.05. These results confirm that the quadratic model provides an excellent fit to observed information and captures efficiently the underlying trend. For additional refinement on accuracy and to compensate for residual variability not explained, a third-degree (cubic) regression model was established. The following,

more comprehensive model was created to further improve explanatory capability by diminishing residual errors and encapsulating more complex patterns within the time series behaviour of gold reserves.

Table 5: Accuracy Measures of the Quadratic Regression Model

Measure	Value
MAPE	62.9507
MAD	3.565598
MSD	2.44118×10^{11}

Table 6: Sequential Analysis of Variance

Source	DF	SS	F	P
Linear	1	3.10003E+13	54.72	0.000
Quadratic	1	3.05825E+12	9.64	0.011

Cubic Regression Model (3rd Degree)

The 3rd degree (cubic) regression model was formulated to determine the connection between the dependent (the level of gold reserve) and the independent (time) variable. The general aim was to enhance the predictive accuracy of the preceding models further by further reducing residual errors. The cubic model estimation outcome is presented in [Table \(7\)](#). The regression relationship estimate is expressed by:

$$\text{Gold Reserves} = 1,225,557 - 936,910 \text{ Year} + 177,209 \times \text{Year}^2 - 6,577 \times \text{Year}^3$$

Where, S = 503618, $R^2 = 93.9\%$, and $R^2(\text{adj}) = 91.8\%$

Table 7: Analysis of Variance

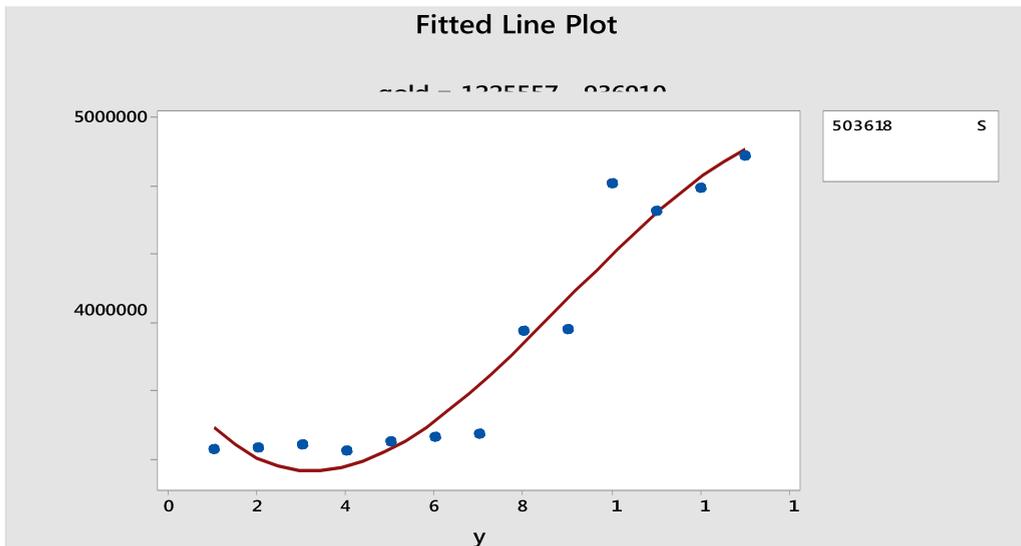
Source	DF	SS	MS	F	P
Regression	3	3.49494E+13	1.16498E+13	45.93	0.000
Error	9	2.28268E+12	2.53631E+11		
Total	12	3.72321E+13			

The cubic model is statistically valid overall, as confirmed by the F-test value of 45.93 with a p-value of 0.000, which is well below the 0.05 significance threshold. Although the improvement over the quadratic model is modest, the cubic specification slightly enhances the model's performance. This is reflected in the coefficient of determination, which rises to 93.9%, indicating a closer approximation to a perfect explanatory fit. A sequential variance analysis was conducted to decompose the effects of the linear, quadratic, and cubic components of the model. The results of this analysis are presented in [Table \(8\)](#), providing insight into the individual and combined contributions of each term to the overall explanatory power of the model.

Table 8: Sequential Analysis of Variance for the Cubic Regression Model

Source	DF	SS	F	P
Linear	1	3.10003E+13	54.72	0.000
Quadratic	1	3.05825E+12	9.64	0.011
Cubic	1	8.90847E+11	3.51	0.094

The results indicate that the linear and quadratic components of the estimated cubic model are statistically significant, whereas the cubic term itself is not, based on the F-test values and their associated p-values. This suggests that the inclusion of the cubic term does not contribute meaningfully to the model's explanatory capacity. Figure (3) presents the fitted cubic regression line plotted against the actual data on gold reserves, providing a visual assessment of the model's fit. However, when comparing the three regression models, the quadratic regression model (second-order) emerges as the most appropriate specification. Although the cubic model yields a marginal improvement in explanatory power, this gain comes at the cost of increased model complexity, which is not justified given the insignificance of the cubic term.

**Figure 3: The Cubic Regression Model**

The Relation Between the Total Assets and Gold Reserves in the CBI

A simple linear regression model was developed to examine the relationship between total assets (dependent variable) and gold reserves (independent variable). The aim was to assess the extent to which variations in gold reserves explain changes in the value of total assets. The estimated regression equation is as follows:

$$\text{Total Assets} = 54,361,490 + 7.292 \times \text{Gold Reserves}$$

Where, $S = 17001726$, $R\text{-Sq} = 38.4\%$, and $R\text{-Sq}(\text{adj}) = 32.8\%$.

The model is statistically valid based on the F-test result, which yielded a value of 6.85 with a corresponding p-value of 0.02. This indicates that the estimated regression equation is significant at the 5% level. However, the model's explanatory power is relatively weak, as reflected by a coefficient of determination (R^2) of only 38.4%. This suggests that less than half of the variation in total assets is explained by changes in gold reserves, limiting the model's reliability for predictive or analytical purposes. Subsequently, a second-order regression model was estimated to account for possible non-linear effects. The resulting equation is:

$$\text{Total Assets} = 45,395,267 + 34.55 \times \text{Gold reserves} - 0.000006 \times (\text{Gold Reserves})^2$$

Where, $S = 14307021$, $R\text{-Sq} = 60.3\%$, and $R\text{-Sq}(\text{adj}) = 52.4\%$.

The model is statistically valid based on the F-test value of 7.60, with a corresponding p-value of 0.010. This confirms the significance of the estimated regression equation at the 5% level. The coefficient of determination (R^2) has increased to 60.3%, indicating a substantial improvement in the model's explanatory power compared to the simple linear regression. This enhancement suggests that the quadratic model more effectively captures the relationship between the CBI's total assets and its gold reserves. As shown in [Table \(9\)](#), the individual components of the model were tested, and the results confirm the statistical significance of both the linear and quadratic terms. These findings reinforce the suitability of the quadratic model in explaining the variation in total assets. Overall, the estimated parameters of the model suggest that an increase of one unit in the gold reserve results in a corresponding rise in total assets by approximately 34.55 units. This highlights the fundamental influence of gold reserves on the total asset base of the CBI, as illustrated in [Figure \(4\)](#).

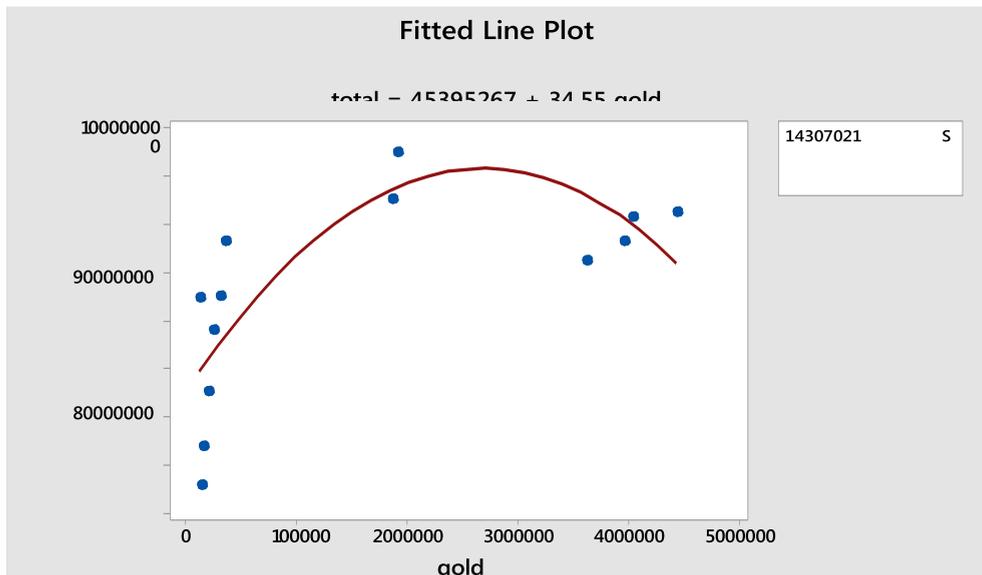


Figure 4: The Quadratic Linear Regression Pattern of Assets with the Gold Reserve

Table 9: Sequential Analysis of Variance for the Quadratic Model (Total Assets of CBI vs. Gold Reserves).

Source	DF	SS	F	P
Linear	1	1.97969E+15	6.85	0.024
Quadratic	1	1.13274E+15	5.53	0.040

The findings confirm that gold reserves play a critical role in shaping the composition and scale of the CBI's assets. However, the model also indicates that, during the final four years of the study period, total assets declined relative to the level of gold reserves, suggesting a weakening of this relationship over time.

CONCLUSIONS

This study offers a comprehensive and integrating analysis on CBI gold holdings and ancillary economic indices over the years. Utilizing generalized regression models, this book offers crucial information to monetary policy formulation and wealth management decisions by the CBI. These models, which are quantitative-based, are formulated to help future economic policymaking and enhance tools for wealth preservation and development. The simple linear regression provides a rudimentary account between time and holdings of gold, while standard regression models adequately discern the trend of building up gold reserves, and more sophisticated ones such as quadratic and cubic regression yield an accurate portrayal. These higher-order models confirm that the build-up of gold reserves is not definitively linear, and significant deviations are better explained by nonlinear models. From them, the quadratic model was found to best fit, where the coefficient of determination (R^2) was 92%, and therefore was both effective and efficient to discern the observed patterns. Although the cubic model slightly improves the fit, this comes at the expense of increased intricacy, and therefore the quadratic model takes precedence by striking a good balance between simplicity and accuracy.

The linear regression also revealed a statistically significant positive correlation between gold reserves and time, which estimated an average annual increase of about 412,712 ounces. The trend was consistent with a monetary policy objective to enhance the strength and stability of the Iraqi dinar. The accumulation of gold reserves is a crucial fiscal instrument, enhancing domestic and external confidence about Iraq's economic standing and creditworthiness. The relationship between gold reserves and aggregate assets was further tested using a quadratic regression function, which indicated a moderate explanatory capacity ($R^2 = 60\%$), implying a nonlinear though significant relationship. Total assets experienced a sudden contraction since 2014, which was likely induced by macroeconomic shocks such as reduced incomes from oil, external build-up of debt, and increased political tensions. The CBI, however, continued to build its holdings of gold even through this contraction, which indicated an active institutional push to build monetary resilience to economic shocks. The gap provides

evidence on the role of holdings of gold as a stabiliser, which was deliberately utilised by the CBI to maintain monetary muscle despite fiscal turbulence.

RECOMMENDATIONS

Based on the findings of the study, numerous recommendations are presented so that informed decision-making and policy formulation within the CBI are enhanced. The CBI should integrate quantitative appraisal methods within all stages of monetary planning, particularly within the reviewing of components of assets such as gold holdings. The use of statistical models to estimate temporal performance of monetary tools might enhance the management of reserves to better fit into overall economic objectives. Such methods offer objectivity, reproducibility, and credibility, and therefore serve as a rationale foundation for monetary decisions within an uncertain global economic environment. Continued use of regression analysis, while emphasizing on higher-order formulations such as quadratic regressions, is proposed to identify functional relationships between major economic variables, such as the relationship between total assets and gold holdings, and between the relationship between reserves and the value of currency, among others. The use of dynamic models gleaned from such analyses might help to identify financial turbulence much earlier to allow the implementation of corrective intervention by the CBI well ahead of time. Due to the very close association between trust by the public and the value of gold holdings, the CBI should pay special regard to the expansion in the visibility of its build-up policy of reserves. Provision of transparent rationale behind the purchase of gold, alongside empirical substantiations, will increase institutional credibility and trust by the governed. Periodic publication of statistical refinements and refinements on trends will further improve accountability and encourage participation by the stakeholders. Besides, evidence exists that gold holdings have continued to increase despite narrowing overall exposure to assets, thereby substantiating them to act as a consolidator during fiscal strain. Such confirmation further strengthens the argument that gold holdings should not just functionally serve merely to store value, but instead, comprise an integral core to national financial stability protection. Third, constituents of the overall assets should undergo regular reappraisal using quantitative tools to approximate discrete contributions by gold, holdings in foreign exchange, bonds, and other monetary tools to the overall framework on stability. Such appraisals will help the CBI to adjust its holdings book to better fit into domestic economic targets and global monetary scenarios, ensuring that its approach to monetary policy serves to better fit to long-run development agendas.

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