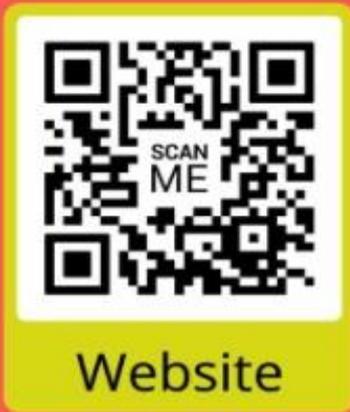


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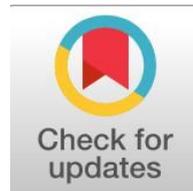
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## Monetary Policy and Its Role in Promoting a Circular Economy in Iraq

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### Abstract

**General Background:** The transition from a linear to a circular economy has become essential for sustainable resource management and environmental protection, particularly in developing economies. **Specific Background:** In Iraq, monetary policy implemented by the Central Bank plays a role in supporting circular economy initiatives through non-traditional instruments such as Special Drawing Rights, green quantitative easing, and carbon emission reduction certificates. **Knowledge Gap:** Despite the availability of these tools, limited empirical evidence exists on their role in advancing circular economy practices within the Iraqi context. **Aims:** This study aims to examine the role of unconventional monetary policy tools in promoting the transition to a circular economy in Iraq. **Results:** Using a descriptive-analytical approach and questionnaire data from 69 entrepreneurs analyzed via SPSS, the findings reveal strong positive relationships between Special Drawing Rights ( $R^2=55.2\%$ ), green quantitative easing ( $R^2=70.3\%$ ), and carbon emission reduction certificates ( $R^2=42.3\%$ ) with circular economy promotion. **Novelty:** The study provides empirical validation of integrating smart monetary instruments within circular economy frameworks in a developing country context. **Implications:** The findings suggest that activating non-traditional monetary tools can support financial stability, diversify the economy, reduce dependence on oil revenues, and facilitate sustainable development strategies in Iraq.

#### Highlights:

- Strong Correlations Identified Between Unconventional Financial Instruments and Circular System Adoption
- Green Quantitative Easing Shows Highest Explanatory Power Among Examined Variables
- Carbon Certificates and Reserve Assets Linked With Investment in Low-Carbon Projects

**Keywords:** Monetary Policy, Circular Economy, Special Drawing Rights, Green Quantitative Easing, Carbon Emission Certificates.

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## Introduction

Energy and its resources are the backbone of economic growth, no less important than food in all countries, especially developing ones. Fossil fuels are the primary source of carbon dioxide emissions and cause environmental problems. The oil crises of the 1970s forced developed countries to focus on a long-term transition from fossil fuels to sustainable and inexhaustible energy sources. Environmental pollution, the rapid increase in the world's population, and economic pressures are all factors driving the world towards renewable energy resources and the use of biomass energy as a suitable alternative to expensive energy sources. The transition to a circular economy requires mobilizing resources and investments that support the adoption and scaling up of new environmentally friendly technologies and business models. Therefore, economic policies (fiscal and monetary) play a key role in financing and facilitating the transition to a circular economy. Central banks can adopt unconventional "green" monetary policies by using non-traditional tools such as Special Drawing Rights (SDRs) issued by the International Monetary Fund (IMF), green quantitative easing (QE) instruments that allow central banks to redeem bonds, and the creation of carbon certificates as an innovative way to address the negative impacts of climate change. These certificates can be issued to any entity implementing projects to reduce greenhouse gas emissions. These tools can support and encourage the financial system to promote projects that incorporate the circular economy and influence credit allocation and the investment behavior of financial institutions. This research examines the circular economy indicators used in various literature and assesses their applicability and limitations in Iraq. It will also address the role of monetary policy, specifically that of the Central Bank of Iraq and its unconventional tools, in supporting the transition to a circular economy. Finally, the research proposes recommendations for transitioning to a circular economy and improving its indicators.

## The Importance of Research

There is a growing need in developing countries in general, and Iraq in particular, to transition to a circular economy, as circular economy strategies enable these countries to be more sustainable in their use of limited resources. A new approach to economic growth has been proposed that focuses on reducing and recycling consumer and production waste [1]. Embracing this change would enhance sustainability by boosting economic and environmental performance without increasing waste management costs or requiring new resources [2]. Successfully implementing a circular economy will benefit developing countries, including Iraq, especially as it will address waste and resource issues, thus saving money and protecting the environment for future generations.

## Research Problem

Iraq is characterized by an abundance of natural and human resources, but this abundance has not been utilized and has been neglected. The waste of water, energy, and other resources could have been invested in, especially since Iraqi cities suffer greatly from neglect. The high rates of cancer among residents of some Iraqi cities (such as Basra) are evident, resulting from the flaring of associated gas during oil production. Gas flaring is a major cause of environmental pollution and represents a waste of a significant energy resource. Despite the substantial economic and social benefits of circular economy projects, there are no genuine government programs aimed at stimulating them. Monetary policy has not played a significant role in achieving this goal. On the one hand, there is a delay in enacting legislation that contributes to the adoption of circular projects, such as a clean energy law or a circular investment law. On the other hand, widespread financial and administrative corruption, in addition to the fight against terrorism, are two major obstacles to implementing and financing proposed recycling projects in Iraq. Therefore, the research problem lies in answering the following main question: What is the role of unconventional monetary policy in supporting the transition to a circular economy in Iraq?

## Research Hypotheses

Based on the research problem and questions, this research aims to test the following hypotheses:

- 1- There is a statistically significant effect of Special Drawing Rights (SDRs) on promoting the circular economy in Iraq.
- 2- There is a statistically significant effect of green quantitative easing (QE) instruments on promoting the circular economy in Iraq.
- 3- There is a statistically significant effect of carbon emission reduction certificates (CERCs) on promoting the circular economy in Iraq.

## Research Methodology

The researcher used the descriptive analytical method in an attempt to identify the relationship of influence between the non-traditional tools of the Central Bank of Iraq in influencing the promotion of the circular economy. The researcher focused on two branches of the descriptive method: the "documentary method" by reviewing the literature on the subject in relevant books, references and periodicals, and the questionnaire that was developed for this purpose. The research sample was selected from Iraqi entrepreneurs, numbering (69) entrepreneurs, and the questionnaire was distributed to them using the comprehensive survey method. It included four sections that covered aspects of the topic under study, and it used the five-ranked Likert method, and the scores were given as follows: (Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1)). The researcher used the appropriate statistical methods and techniques to analyze the study data using the SPSS program, version 25.

## 1. The Concept of the Circular Economy

While the precise origins of the circular economy concept cannot be attributed to a single author, its practical applications have been widespread since the late 1970s [3]. The circular economy has its roots in environmental economics and industrial ecology. Economists Pearce and Turner introduced the idea of a circular economic system based on studies conducted by environmental economist Boulding in 1966 [4] [5]. There is no single, universally accepted definition of the concept. The circular economy is defined as a regenerative system in which resource inputs, waste, emissions, and energy leakage are reduced by slowing down, closing, and shrinking the material and energy cycles. This can be achieved through sustainable design, maintenance, repair, reuse, remanufacturing, renewal, and recycling [6]. The core idea of the circular economy is to close the entire loop in the production cycle and maximize recycling and reuse of materials throughout their lifecycle. Stahel defines the circular economy as a system in which goods at the end of their operational life are transformed into resources for others [7]. By doing so, the loop is closed in the industrial ecosystem, and waste is reduced. Morsetto defines the circular economy as an economic model that aims for the efficient use of resources through waste reduction, long-term value retention, and the minimization of primary resources and closed loops of products, product components, and materials, all within the bounds of environmental protection and socioeconomic benefits [8]. Korhonen et al. indicate that the circular economy is an economy that focuses on the reuse of products, components, and materials, as well as remanufacturing, renewal, repair, cascade, and upgrading, in addition to the use of waste-derived energy throughout the product value chain [9]. The Ellen MacArthur Foundation (EMAF) provides a comprehensive definition of the circular economy as: a regenerative industrial system that replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals that hinder reuse, and aims to eliminate waste through the good design of materials, products, production systems, and business models [3].

## 2. The Benefits and Importance of the Circular Economy

Before the second half of the 20th century, economic and social development was profoundly influenced by the intensive use of available natural resources, with a direct impact on the environment. These impacts, some of which are irreversible, led stakeholders to believe in the necessity of rethinking how the economy operates, by considering the effects on future generations. The transition from the current linear economy (based on the intensive use of natural resources, which impacts the environment and generates waste) to a circular economy is what economic plans in Iraq should entail. Given the scarcity of resources and the current rate of economic growth, reliance on linear production is no longer practical today [10]. Recycling materials used in both production and consumption is essential to maximizing the use of limited natural resources. It is estimated that widespread adoption of the circular economy could lead to a significant reduction in carbon dioxide emissions, helping countries achieve their climate goals [11]. This is because the main objective of the circular economy is to maximize the use of resources; minimize the exploitation of raw materials and increase the reuse of existing materials, thus extending product lifecycles; and better manage waste and reduce the quantities produced, thereby minimizing environmental impact, for example, by avoiding landfilling or converting waste into energy. Therefore, developing a circular economy is pivotal in addressing climate change and achieving long-term economic growth. The circular economy not only helps mitigate the effects of climate change but also creates new opportunities for economic growth [12]. Most studies on the circular economy focus on creating economic value. For example, a recent study by McKinsey & Co. indicates that adopting circular economy principles could generate a net economic benefit of €1.8 trillion by 2030 [13]. Resources are used in processing the recycled materials themselves, so value may be better retained through repair, remanufacturing, and reuse. The defining characteristic of the circular economy lies in ensuring that resources remain in use for as long as practically possible. This means that once a product's maximum value is exhausted, that same value can then be recovered, recycled, and reused to create new products. The circular economy also facilitates business collaboration, reducing production waste costs. Repairing and reusing well-made products can be cheaper in the long run, while avoiding the externalities resulting from unsustainable resource extraction and disposal. From a social perspective, adopting the principles of the circular economy can lead to numerous benefits, creating new job opportunities, particularly in waste management, recycling, and renewable energy. This contributes to economic diversification and reduces dependence on traditional energy sources like oil and gas [14].

Third: The Difference Between the Linear Economy and the Circular Economy: The traditional economy, or what is called the linear economy, is an economic system that promotes the use of raw materials in production and consumption, with the resulting waste being disposed of, discarded, or destroyed. The circular economy, on the other hand, is an economic system that eliminates waste and promotes the continuous use of resources. It is an economic system that enhances efficiency by eliminating waste and ensuring the continuous use of resources [15]. The linear economy is based on a linear production and consumption model, where the primary goal is to produce new goods and encourage consumption practices. This model led to significant economic growth and social prosperity in previous decades, but it is no longer sustainable [15]. Under the linear model, value is created by producing and selling as many products as possible. In contrast, the circular economy model describes a set of processes and business activities that collect raw materials and transform them into products that are consumed or used. The waste used is then recycled for reuse as raw materials that are fed back into the supply chain [16]. In the circular economy model, value is created by preserving waste that can be used for alternative purposes. In other words, value is created by focusing on resource conservation. The linear economy model links economic growth to the production and consumption of resources and stops there. In contrast, the circular economy model decouples economic growth from the consumption of raw materials [3]. Under the linear economy model, economic growth is achieved through the consumption and disposal of raw materials without opportunities for reuse through recycling or reprocessing [17]. In contrast, the circular economy model provides opportunities for the continuous reuse of materials [16]. Under the circular economy model, reusing, reprocessing, and renewing products requires fewer resources and less energy to produce new goods. In contrast, the linear economy model requires the use of more resources to produce new goods. Table 1 illustrates the differences between the linear economy and the circular economy.

**Table No. (1):** The difference between the circular economy and the linear economy.

Comparison between linear economics and circular economics		
Circular economy	linear economics	
Prevent waste through sharing, reuse, repair, and recycling.	It generates waste after production and consumption.	The goal
Designing waste and pollution; keeping products and materials in use; restoring natural systems.	Take-Make-Dispose Model	The model
(1) From production to waste, (2) it is then recycled Recycling waste as raw materials for reuse	(1) From production to consumption; (2) From consumption to waste; (3) From waste to the destruction of waste materials	Operations
Either share waste materials, reuse them, or recycle them as raw materials for other uses in innovative ways.	The waste is disposed of and serves no other purpose.	waste
Protects the environment	It harms the environment	Environmental impact
Recycling waste creates new and unique job opportunities for community members. It can even lead to the development of a new industry, such as the recycling sector.	No new, unique jobs are created for community members. Only the same jobs are created.	Impact on employment
It uses fewer resources and less energy to produce new goods.	More resources and energy are used to produce new goods.	Amount of energy used
The circular economy is the least widely adopted economic model in the world.	The linear economy is the most widespread economic model in many countries around the world.	Global spread

Source: Prepared by the researcher.

### 3. Monetary Policy and the Circular Economy in Iraq

Financial institutions need to allocate more capital to stimulate economic growth by transitioning from a linear to a circular economy [18]. One way financial institutions can do this is by creating financial instruments that can be used to raise capital to finance circular economy projects and activities. Common terms used to describe financial instruments designed for circular economy purposes are "circular finance" or "circular economy finance" [19]. Circular finance, or circular economy finance, refers to financial instruments where the funds raised (e.g., investments, loans, or donations) will be used exclusively to finance or refinance, in whole or in part, new eligible businesses based on circular economy projects [20]. Monetary policy significantly impacts the transition to a circular economy through the powerful conventional and non-conventional tools that central banks possess to influence credit allocation and the investment behavior of financial institutions. One of the conventional tools available to the Central Bank of Iraq is encouraging the banking sector to increase credit granted to circular economy projects, thereby providing financing and incentives for investors in this sector to increase their investments. It is worth noting that there are 71 banks operating in Iraq, including foreign banks, with total assets of 124 trillion Iraqi dinars, equivalent to approximately \$110 billion. Central banks can play a crucial role in accelerating the transition to a circular economy by ensuring the availability of ample financing tools to meet the funding needs of the circular economy. These financing tools include: private capital, such as personal savings of entrepreneurs and contributions from family and friends; grants and subsidies; venture capital, such as capital provided by angel investors; crowdfunding, such as funds contributed or donated by generous members of the public who support the goals of the circular economy; and bank financing, such as loans provided by banks [21]. As for the non-traditional tools available to the Central Bank of Iraq, we mention three proposals for "Unconventional Smart Monetary Policy" (SUMO): (1) the use of Special Drawing Rights (SDRs) issued by the International Monetary Fund (IMF). These are international reserve assets whose original role was to supplement the foreign exchange reserves of IMF member countries. They are issued by the IMF and allocated to member countries according to their quotas, which are based on their wealth. The idea here is to use existing or newly issued Special Drawing Rights (SDRs) to capitalize an international climate fund that provides grants and low-interest loans to finance low-carbon projects in developing countries [22][23][24][25]. (2) Green Quantitative Easing (GQE), a monetary policy measure taken by central banks to increase the money supply in the economy and stimulate economic growth, as well as encourage lending and investment to finance low-carbon projects. (3) The creation of carbon (CC) certificates, or "carbon emission reduction certificates," issued by the central bank, which would allow green project owners to repay part of their loans to commercial banks using these certificates earned through emission reductions [26][27][28][29]. When the central bank issues such certificates to investors in the circular sector, it will achieve several results: First, it will encourage investors, both inside and outside Iraq, to invest in circular projects, thereby diversifying the Iraqi economy. Second, it will provide a new source of foreign currency reserves, reducing reliance on foreign currency generated from oil exports, which in turn will lower the exchange rate of the Iraqi dinar against the US dollar [30][31].

### 4. The Field Study

1- Characteristics of the Study Sample: The researcher distributed (86) questionnaires to all members of the sample. The number of questionnaires returned suitable for analysis was (69), representing (80.232%) of the distributed questionnaires. This percentage is sufficient and acceptable for analyzing the data and using the necessary statistical methods to answer the research questions and test the hypotheses. Thus, the total number of members of the research sample settled at (69). The questionnaire was designed according to a five-point Likert scale, where (5) means strongly agree, (4) means agree, (3) means neutral, (2) means disagree, and (1) means strongly disagree. Table (2) below shows the characteristics of the

sample. Table (2) indicates that the percentage of males in the sample was (75.4%) compared to (24.6%) females. As for the age group variable, the majority of the sample members were in the age group between (30 and 40 years), representing (36.2%), followed by the age group between The percentage of those under 30 years old was (33.3%), and the percentage of those aged 40-50 years was (21.7%), with the lowest percentage being (50 years and over), which amounted to (8.7%). As for the educational attainment variable, (43.5%) of the sample had a university degree, followed in second place by those with postgraduate degrees (Master's - PhD) at a percentage of (34.8%). As for those with a secondary school certificate, their percentage was (14.5%), and the last place was those with less than a secondary school certificate at a percentage of (7.2%). As for the variable of the duration of work as an entrepreneur, it was in first place (5-10 years) at a percentage of (46.4%), and at a percentage of (24.6%) for the duration of work as an entrepreneur (less than five years), then (17.4%) for the duration of work as an entrepreneur (10-15 years), and finally (15 years and over) at a percentage of (11.6%).

**Table 2:** Frequency and percentage distribution of the sample members according to demographic variables

gender		repetition	Percentage
	Male	52	%75.4
Female	17	%24.6	
<b>Total</b>	<b>69</b>	<b>%100</b>	
age group	Under 30 years	23	33.3%
	30-40 years	25	36.2%
	40-50 years	15	21.7%
	50 years and over	6	8.7%
	<b>Total</b>	<b>69</b>	<b>%100</b>
academic achievement	Less than high school	5	
	High school	10	14.5%
	University degree	30	43.5%
	Postgraduate studies	24	34.8%
	<b>Total</b>	<b>69</b>	<b>100.0</b>
Duration of working as an entrepreneur	Under 5 years	17	
	5-10 years	32	46.4%
	10-15 years	12	17.4%
	15 years and over	8	11.6%
	<b>Total</b>	<b>69</b>	<b>100.0</b>

**Source:** Prepared by the researcher based on SPSS program outputs:

2-This refers to the internal consistency between the items on the scale. Several methods exist for calculating scale reliability; however, the researcher adopted Cronbach's alpha. The reliability coefficient should range between 0 and 1, and for the scale to be considered reliable, the minimum value of the reliability coefficient in this test must be at least 0.7. The results indicated that Cronbach's alpha was 0.861 for the Special Drawing Rights (SDR) axis, 0.871 for the Green Quantitative Easing (GQE) axis, 0.705 for the Carbon Emission Reduction Certificates (CERC) axis, and 0.959 for the Circular Economy axis. As shown in Table 3, these values are considered acceptable in management research. Therefore, it can be concluded that all the scales used in this research exhibit internal consistency among their items.

**Table 3:** Cronbach's Alpha coefficients for research axes.

Questionnaire topics	Number of items	Cronbach's alpha coefficient
Special Drawing Rights	6	0.861
Green Quantitative Ease	6	0.871
Emission Reduction Certificates	7	0.705
Circular Economy	14	0.959

**Source:** Prepared by the researcher based on SPSS program outputs

4- Descriptive Analysis of Study Variables: The measure of central tendency (arithmetic mean) and the measure of dispersion (standard deviation) were used as descriptive statistical values to characterize the respondents' answers regarding the various statements and themes of the study questionnaire. These measures will help in assessing the availability of the studied elements. Tables 4, 5, 6, and 7 present these important descriptive analytical indicators.

**Table 4:** Descriptive statistics for the Special Drawing Rights variable.

	Sample size	standard deviation	arithmetic mean
The central bank's use of Special Drawing Rights to provide concessional loans to commercial banks has increased the provision of such loans.	69	.705	4.13
The central bank's use of Special Drawing Rights has increased entrepreneurs' chances of obtaining funding.	69	.867	4.12

Special Drawing Rights (SDRs) contribute to paying off part of Iraq's external debt, thus easing the burden on the budget.	69	.744	4.35
Special Drawing Rights (SDRs) contribute to improving Iraq's credit rating, which in turn attracts more foreign investment.	69	.739	4.20
Special Drawing Rights (SDRs) have contributed to boosting Iraq's foreign exchange reserves, which has strengthened the stability of the local currency.	69	.797	4.20
Special Drawing Rights (SDRs) are issued annually in Iraq.	69	.717	4.32
Special Drawing Rights	69	<b>0.7615</b>	4.22

**Source:** Prepared by the researcher based on SPSS program outputs

The arithmetic mean for the entire axis was 4.22, with a high degree of agreement and a standard deviation of 0.7615 at a significance level of 0.000. All statements related to Special Drawing Rights received very high approval, and therefore the respondents agreed in their judgment of the content of these statements, indicating the agreement of the sample members on the Special Drawing Rights statements.

**Table 6:** Descriptive statistics for the variable of carbon emission reduction certificates.

	Sample size	standard deviation	arithmetic mean
Do you believe that issuing and purchasing carbon emission reduction certificates will stimulate investment in green projects in Iraq?	69	.747	4.03
Do you believe that obtaining carbon emission reduction certificates will help your company increase its competitiveness in local and global markets?	69	.893	3.71
Is your company facing any difficulties in obtaining the necessary information to obtain carbon emission reduction certificates?	69	1.006	3.75
Do you believe that the existence of a local market for carbon emission reduction certificates will contribute to the growth of the Iraqi economy?	69	.812	4.25
Investors and emitters buy and sell carbon certificates.	69	.832	4.12
There is a reliable auditor with experience in the project sector.	69	.705	4.28
Do you believe that the Iraqi government provides sufficient support to encourage companies to use carbon emission reduction certificates?	69	.816	4.26
Carbon Emission Reduction Certificates	69	<b>0.8325</b>	4.02

**Source:** Prepared by the researcher based on SPSS program outputs

The arithmetic mean for the entire axis was 4.02 with high agreement and a standard deviation of 0.8325 at a significance level of 0.000, where all statements related to carbon emission reduction certificates received very high agreement.

Therefore, those surveyed agreed in their judgment of the content of these statements, which indicates the agreement of the sample members with the statements of carbon emission reduction certificates.

**Table 7:** Descriptive statistics for the dependent variable, Circular Economy.

	Sample size	standard deviation	arithmetic mean
Does your company rely on modern technology in managing its daily operations?	69	.856	4.06
Your company uses software or applications that help reduce paper and energy consumption.	69	.777	4.12
Your company periodically assesses the environmental impact of its activities.	69	.923	4.17
Your company is taking steps to reduce water and energy consumption.	69	.857	4.00
Your company uses recycled raw materials in the production of its products.	69	.796	4.12

**Source:** Prepared by the researcher based on SPSS program outputs

The arithmetic mean for the entire axis was 4.26 with high agreement and a standard deviation of 0.751 at a significance level of 0.000, as all statements related to the circular economy received very high agreement. Therefore, those surveyed agreed in their judgment of the content of these statements, which indicates the agreement of the sample members with the statements of the circular economy.

## 5. Hypothesis Testing

The research hypotheses were tested using simple linear regression. Simple linear regression is one of the most important research tools in various fields. It aims to describe the relationship between the independent and dependent variables. It is a method used to determine the effect of the independent variable on the dependent variable. Linear regression is based primarily on correlation. It can also be used to determine the extent to which the independent variable predicts a specific outcome. The researcher relied on the significance value (Sig) to answer the research questions. If the significance value is greater than 0.05, this means that the result at 0.05 is not statistically significant. If the significance value is less than 0.05, this means that the result at 0.05 is statistically significant. To test the first hypothesis, "There is a statistically significant relationship between Special Drawing Rights (SDRs) and the promotion of the circular economy," simple linear correlation and simple linear regression were used. SDRs were considered the independent variable and the promotion of the circular economy the dependent variable. Table (8) shows the test results.

**Table 8:** Pearson correlation coefficient between the Special Drawing Rights axis and the Circular Economy axis

		Circular economy	Special Drawing Rights
Circular economy	Pearson Correlation	1	.743**
	Sig. (2-tailed)		.000
	N	69	69
Special Drawing Rights	Pearson Correlation	.743**	1
	Sig. (2-tailed)	.000	
	N	69	69
**. Correlation is significant at the 0.01 level (2-tailed).			

**Source:** Prepared by the researcher using SPSS software output.

The table shows that Pearson's correlation coefficient is 0.743 and the calculated significance level is P-Value = sig. = 0.000 < 0.05. This leads us to accept the hypothesis that there is a statistically significant relationship between Special Drawing Rights (SDRs) and the circular economy, a strong relationship as indicated by the correlation coefficient. To confirm the strength of the relationship, the researcher conducted a simple regression analysis between SDRs and the circular economy. The aim of the regression study is to find the relationship function between the independent and dependent variables, which helps explain the change that may occur in the dependent variable (Y), the circular economy, as a result of changes in the values of the independent variable (x), SDRs.

**Table 9:** Values of the correlation coefficient, coefficient of determination, and adjusted coefficient of determination between the Special Drawing Rights axis and the circular economy axis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.743 <sup>a</sup>	.552	.546	.41279

a. Predictors: (Constant), Special Drawing Rights

**Source:** Prepared by the researcher based on SPSS program outputs

From the previous table, we find a high correlation coefficient ( $R = 0.743$ ), indicating a strong correlation between Special Drawing Rights (SDRs) as the independent variable and the circular economy as the dependent variable. The coefficient of determination ( $R^2 = 0.552$ ) means that the independent variable explains 55.2% of the behavior of the dependent variable, thus demonstrating the independent variable's influence on the dependent variable. The analysis of variance (ANOVA) shows that Fisher's F-test value for regression analysis was (82.710) at 68 degrees of freedom, and the significance level for the F-test ( $\text{Sig} = 0.000$ ) is less than the statistical significance level ( $\alpha = 0.05$ ). This indicates a significant effect of the independent variable on the dependent variable, leading to the following conclusion: Special Drawing Rights have a statistically significant effect on promoting the circular economy in Iraq.

**Table 10:** Results of the ANOVA test for the significance of the relationship between the Special Drawing Rights axis and the Circular Economy axis

ANOVA <sup>a</sup>						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.093	1	14.093	82.710	.000 <sup>b</sup>
	Residual	11.416	67	.170		
	Total	25.510	68			
a. Dependent Variable: Circular economy						
b. Predictors: (Constant), Special Drawing Rights						

**Source:** Prepared by the researcher based on SPSS program outputs

To determine the degree of influence of the independent variable on the dependent variable, a table of parameters for the simple linear regression model was extracted, as shown in the following table:

**Table 11:** shows the values of the regression coefficients for the linear regression model.

Coefficients <sup>a</sup>						
	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.986	.363		2.714	.008
	Special Drawing Rights	.776	.085	.743	9.095	.000
a. Dependent Variable: Circular economy						

**Source:** Prepared by the researcher based on SPSS program outputs

From the previous table, we find that all significance values (Sig.) are less than 0.05. This means that the independent variable, Special Drawing Rights (SDRs), affects the dependent variable, the circular economy, and this effect is positive. That is, an increase of one unit in SDRs will boost the circular economy by 0.776. This confirms that the Central Bank of Iraq should work to activate SDRs to strengthen the Iraqi circular economy. Second Hypothesis: "There is a statistically significant relationship between green quantitative easing and the promotion of the circular economy." Simple linear correlation and simple linear regression methods were used. Green quantitative easing was considered the independent variable, and the promotion of the circular economy the dependent variable. Table (12) shows the test results.

**Table 12:** Pearson Correlation Coefficient between the Green Quantitative Easing Axis and the Circular Economy Axis

Correlations			
		Circular economy	Green quantitative easing
Circular economy	Pearson Correlation	1	.838**
	Sig. (2-tailed)		.000
	N	69	69

Green quantitative easing	Pearson Correlation	.838**	1
	Sig. (2-tailed)	.000	
	N	69	69
**. Correlation is significant at the 0.01 level (2-tailed). Source: Prepared by the researcher based on SPSS program outputs			

The table shows that Pearson's correlation coefficient is 0.838 and the calculated significance level is P-Value = sig. = 0.000 < 0.05. This leads us to accept the hypothesis that there is a statistically significant relationship between green quantitative easing and the circular economy, a relationship that is strong, as indicated by the correlation coefficient. To confirm the strength of the relationship, the researcher conducted a simple regression analysis between Special Drawing Rights (SDRs) and the circular economy. The aim of the regression study is to find the relationship function between the independent and dependent variables, which helps explain the change that may occur in the dependent variable (Y), the circular economy, according to changes in the values of the independent variable (x), SDRs.

**Table 13:** shows the values of the correlation coefficient, coefficient of determination, and adjusted coefficient of determination between the green quantitative easing axis and the circular economy axis.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.838 <sup>a</sup>	.703	.699	.33630
a. Predictors: (Constant), Green quantitative easing				

**Source:** Prepared by the researcher based on SPSS program outputs

From the previous table, we find a high correlation coefficient,  $R = 0.838$ . This indicates a strong correlation between green quantitative easing as the independent variable and the circular economy as the dependent variable. The coefficient of determination ( $R^2$ ) is 0.7030, meaning that the independent variable explains 70.3% of the dependent variable's behavior. Therefore, the independent variable influences the dependent variable. The analysis of variance (ANOVA) shows that Fisher's F-test value for regression analysis was 158.554 at 68 degrees of freedom, and the significance value of the F-test (Sig = 0.000) is less than the statistical significance level ( $\alpha = 0.05$ ). This indicates a significant effect of the independent variable on the dependent variable. This leads us to the following conclusion: Green quantitative easing has a statistically significant effect on promoting the circular economy in Iraq.

**Table 14:** shows the results of the regression analysis of the effect of green quantitative easing on the circular economy.

ANOVA <sup>a</sup>						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	17.932	1	17.932	158.554	.000 <sup>b</sup>
	Residual	7.578	67	.113		
	Total	25.510	68			
a. Dependent Variable: Circular economy						
b. Predictors: (Constant), Green quantitative easing						

**Source:** Prepared by the researcher based on SPSS program outputs

To determine the degree of influence of the independent variable on the dependent variable, a table of parameters for the simple linear regression model was extracted, as shown in the following table:

**Table 15:** shows the values of the regression coefficients for the linear regression model

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	.981	.264	3.723	.000

	Green quantitative easing	.785	.062	.838	12.592	.000
a. Dependent Variable: Circular economy						

**Source:** Prepared by the researcher based on SPSS program outputs

From the previous table, we find that all significance values (Sig.) are less than 0.05. This means that the independent variable, green quantitative easing, affects the dependent variable, the circular economy, and this effect is positive. That is, increasing green quantitative easing by one unit will boost the circular economy by 0.785. This confirms that the Central Bank of Iraq should work to activate green quantitative easing to strengthen the Iraqi circular economy. Third Hypothesis: "There is a statistically significant relationship between carbon emission reduction certificates and the promotion of the circular economy." Simple linear correlation and simple linear regression methods were used. Carbon emission reduction certificates were considered the independent variable, and promoting the circular economy was considered the dependent variable.

**Table 16:** shows the test results, Pearson Correlation Coefficient between the Carbon Emission Reduction Certificates Axis and the Circular Economy Axis

Correlations			
		Circular economy	Carbon emission reduction certificates
Circular economy	Pearson Correlation	1	.650**
	Sig. (2-tailed)		.000
	N	69	69
Carbon emission reduction certificates	Pearson Correlation	.650**	1
	Sig. (2-tailed)	.000	
	N	69	69

\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Source:** Prepared by the researcher based on SPSS program outputs

The table shows that Pearson's correlation coefficient is 0.650 and the calculated significance level is P-Value = sig. = 0.000 < 0.05. This leads us to accept the hypothesis that there is a statistically significant relationship between green quantitative easing and the circular economy, a strong relationship as indicated by the correlation coefficient.

**Table 17:** shows the values of the correlation coefficient, coefficient of determination, and adjusted coefficient of determination between the carbon emission reduction certificates axis and the circular economy axis.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.650 <sup>a</sup>	.423	.414	.46874

a. Predictors: (Constant), Carbon emission reduction certificates

**Source:** Prepared by the researcher based on SPSS program outputs

From the previous table, we find a high correlation coefficient,  $R = 0.650$ . This indicates a moderately strong correlation between carbon emission reduction certificates as the independent variable and the circular economy as the dependent variable. The coefficient of determination ( $R^2$ ) is 0.4230, meaning that the independent variable explains 42.3% of the behavior of the dependent variable. Therefore, the independent variable influences the dependent variable. The analysis of variance (ANOVA) shows that Fisher's F-test value for regression analysis was (49.104) at 68 degrees of freedom, and the significance value of the F-test (Sig = 0.000) is less than the statistical significance level ( $\alpha = 0.05$ ). This indicates a significant effect of the independent variable on the dependent variable. This leads us to the following conclusion: There is a statistically significant effect of carbon emission reduction certificates on promoting the circular economy in Iraq.

**Table 18:** shows the results of the ANOVA for the effect of carbon emission reduction certificates on the circular economy.

ANOVA <sup>a</sup>						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	10.789	1	10.789	49.104	.000 <sup>b</sup>

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	Residual	14.721	67	.220		
	Total	25.510	68			
a. Dependent Variable: Circular economy						
b. Predictors: (Constant), Carbon emission reduction certificates						

**Source:** Prepared by the researcher based on SPSS program outputs

To determine the degree of influence of the independent variable on the dependent variable, a table of parameters for the simple linear regression model was extracted, as shown in the following table:

**Table 19:** shows the values of the regression coefficients for the linear regression model

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.540	.534		1.011	.0316
	Carbon emission reduction certificates	.917	.131	.650	7.007	.000
a. Dependent Variable: Circular economy						

**Source:** Prepared by the researcher based on SPSS program outputs

From the previous table, we find that all the significance values (Sig.) are less than 0.05. This means that the independent variable, which is carbon emission reduction certificates, affects the dependent variable, which is the circular economy. This effect is positive in direction, meaning that increasing carbon emission reduction certificates by one unit will lead to strengthening the circular economy by 0.917. This confirms that the Central Bank of Iraq should work on activating carbon emission reduction certificates to strengthen the Iraqi circular economy.

## Results

Through theoretical and field studies, and analysis of questionnaire data, the researcher reached the following conclusions:

- 1- The monetary policy tool of Special Drawing Rights (SDRs) has a positive impact on promoting a circular economy in Iraq; therefore, activating SDRs increases the chances of transitioning to a circular economy in Iraq.
- 2- The monetary policy tool of green quantitative easing has a direct impact on the circular economy; therefore, the more the Central Bank of Iraq activates green quantitative easing, the greater the chances of transitioning to a circular economy in Iraq.
- 3- There is a positive impact of the monetary policy tool of carbon emission reduction certificates on promoting a circular economy in Iraq.

### Ninth: Recommendations and Proposals:

Following the discussions in the preceding paragraphs, and focusing on the findings, the researcher proposes the following:

- 1- The Central Bank of Iraq can restructure its assets and shift its investments from Special Drawing Rights (SDRs) and gold to investment assets to encourage economic projects.
- 2- The Central Bank of Iraq can reduce the rediscount rate for banks that finance small projects or implement specific tools, such as providing banks with zero-rated loans, to incentivize lending.
- 3- The Central Bank of Iraq should launch initiatives to support small economic projects, such as the trillion-dollar initiatives it launched in 2019 to support cooperative small projects in cooperation with government authorities. This will stimulate the economy and provide sufficient financial resources, leading to economic growth, diversification, and increased job opportunities. Furthermore, the Central Bank of Iraq should invest some of the foreign currency it has recently invested in this initiative at the national level. This initiative has been implemented across Iraq.

4-The Brazilian government should stimulate and finance the transition to a diversified economy through its financial instruments and both conventional and unconventional monetary policy strategies. This transition relies on artificial intelligence, which attracts private sector investment in projects as a second step, thereby strengthening the economy and positively impacting the price of US debt.

5- The Iraqi government should take significant steps to establish or encourage investment projects across a wide range of sectors, given their substantial impact on the Iraqi economy. The primary objective is to diversify the Iraqi economy, stimulate economic activity, and drive economic growth, thereby fostering customer dependency. The secondary objective is to achieve environmental goals and improve the lives of those who have suffered from high marketing costs as a result of the ongoing conflicts.

## Conclusion

Overall, the results of this study showed that the unconventional monetary policy tools utilized by the Central Bank of Iraq (SDRs, GQE and CERCS) have a significant and positive impact in promoting the transition towards a circular economy in Iraq. The empirical results confirm the validity of all proposed hypotheses by signalling robust correlations of such instruments with circular economy indicators, with the exception of green quantitative easing ( $R^2=70.3\%$ ) that exhibited the highest (and Special Drawing Rights ( $R^2=55.2\%$ ) and carbon emission reduction certificates ( $R^2=42.3\%$ ) providing an intermediate value, respectively. Thus, these findings reveal how the smart, and nontraditional monetary tools can do wonders not just in the support of saving economy of the environment, but in the support of financial stability, diversification of the Iraqi economy and reducing the dependency on oil revenues as well. The findings of this research indicate that the national-level financial arrangements would benefit if green monetary instruments could be integrated into the national money supply process which in turn would expedite sustainable development and macroeconomic resilience. Considering the descriptive-analytical nature of the current research, and the limited number of entrepreneurs involved in the sample, longitudinal data, sectoral wider assessments and cross-regional studies would be recommended in future research to provide evidential support on long-term values, absorptive capacity, efficiency vs discretionary debate regarding the con structure of monetary, fiscal and regulatory policies together in facilitating the circular economy in Iraq and/or the developing economies in general.

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