The Impact of Bank Credit on the Gross Domestic Product in Iraq

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Abstract

In the Vision 2030, which aims to increase the productivity of the Iraq economic sectors, the importance of measuring the outputs of the use of economic resources by those sectors emerges, as well as the importance of identifying the factors affecting the increase in the output of each of those sectors.

From here, the current study began to measure the impact of bank credit granted by Iraq banks on the gross domestic product.

The study also aimed to measure the impact of bank credit on the contribution of the economic sectors operating in Iraq to the gross domestic product. Detailed data on bank credit were used according to the economic sectors benefiting from it, and detailed data on the contribution of these sectors to the GDP. A regression analysis was conducted for time series representing bank credit and representing the contributions of economic sectors to the Iraq GDP, and it was found that there was a partial effect of bank credit on the contributions of Iraqi economic sectors to the Iraqi GDP.

The different economic sectors particularly affect the contributions of the energy and basic utilities sectors, and this indicates that the financing granted to the economic sectors is often used for operational purposes. This raises a question mark about the efficiency of those sectors in terms of their benefit from bank credit in expansion and growth and in increasing their contributions to the Iraqi GDP. Economic sectors for the financing granted to them.

Keywords: bank credit, economic sectors, gross domestic product.

Introduction

Economic development theories point to the importance of having adequate financing to support this development Economists believe that financing policy has a major role in economic growth and development, and that a shortage of financing arises It has negative effects on the use of available economic resources Abadi Muhammad. (2012). believes that the importance of commercial banks comes from their role in mediating between surplus units and deficit units, in addition to their role in determining the money supply, as economic theories agree that there is an impact of monetary policy on real economic activity. The Gross Domestic Product (GDP) is one of the important economic indicators that measure the level of economic activity, and its growth is one of the most important indicators of economic growth. This study

comes to test the actual relationship between bank credit, which is one of the tools of monetary policy, and GDP as an economic indicator.

The study Problem

The Gross Domestic Product (GDP) is one of the most important economic indicators by which the capacity of sectors is measured

Knowledge of the factors influencing it is one of the reasons for rationalizing economic plans that aim to increase economic growth rates. Bank credit is also a means of financing that helps the establishments of economic sectors to survive and continue, as well as growth and expansion. From here comes the question of this study about the extent of the contribution of Iraqi bank credit in assisting the establishments of the Iraqi economic sectors in operation and growth, and thus increasing their contribution to the Iraqi GDP.

the importance of studying

The world is witnessing rapid developments in various fields of life, and this requires keenness on scientific and technical achievements, especially in light of the scarcity of available economic resources, which requires work to increase the effectiveness and efficiency of the use of economic resources, and then obtain the highest possible outputs from production processes in economic sectors. different. In light of the Iraq Vision 2030, which aims to increase the productivity of the Iraqi economic sectors, the importance of measuring the outputs of the processes of using economic resources, and knowing the factors affecting the increase in the output of each of the economic sectors, emerges. This study comes to shed light on one of the most important potential factors affecting the gross domestic product of Iraq, and the contribution of the various economic sectors to this output, as it is assumed in theory that bank credit should have a positive impact on those outputs at the local level. The importance of this study also increases Because it is linked to the largest economy in the Arab world

Objectives of the study

This study aims to determine the potential quantitative impact of bank credit granted by Iraqi banks on the Saudi gross domestic product and the contributions of the economic sectors to that output individually.

The study population and its sample

This study is related to an important economic indicator, which is the Gross Domestic Product. It is the study sample that represents the "Iraqi Economic Indicators" community. It is also related to the time frame (2008-2020) as a sample of the history of the Iraqi economy. The study was applied to seven economic sectors. Of the sectors of the Iraqi economy, due to the availability of data about it, as a representative of all Iraqi economic sectors, and these sectors are: the agricultural and fish sector, the industry sector, the mining and mines sector, the water, electricity and gas sector, the building and construction sector, the transport and communication sector, in addition to the trade sector. The main data is the economic and statistical reports issued by the Arab Monetary Agency on the website: http://bit ly/2qUPtw3.

Study Hypotheses

This study is based on a main hypothesis: "There is a statistically significant effect (that can be measured)

The bank credit granted by Iraqi banks to the various economic sectors in Iraq (during the study period) on the Iraqi gross domestic product in its various economic sectors.

This hypothesis can be understood as a set of relationships that can be detailed according to Figure (1), which represents the study model, as follows:

1. There is a statistically significant measurable impact of bank credit granted to the agricultural and fisheries sector, AgrCR, on the contribution of this sector to the GDP. AgrDP.

2. There is a statistically significant and measurable effect of bank credit granted to the industrial sector - Man Cr on the contribution of this sector to GDP. ManDP.

3. There is a statistically significant measurable effect of bank credit granted to the mining and mining sector, MinCR, on the contribution of this sector to the GDP. MinDP.

4. There is a statistically significant effect that can be measured for bank credit granted to the water and electricity sector EleCR and gas on the sector's contribution to GDP .EleDP

5. There is a statistically significant effect that can be measured for bank credit granted to the construction sector. ConCR on the sector's contribution to GDP .ConDP

6. There is a statistically significant and measurable impact of bank credit granted to the transport and communications sector (TraCR) on the contribution of this sector to GDP. TraDP

7. There is a statistically significant and measurable effect of bank credit granted to the trade sector - Com CR on the contribution of this sector to the GDP ComDP.

Study determinants

One of the most important determinants of the study is the time range, where data was collected on the variables of the study for the period from 2008 to 2020, that is, for a period of twenty-two years, as the researcher was unable to obtain data related to bank credit for the period before 2008, on the other hand, the researcher did not have data Regarding all Iraqi economic sectors, the sectors shown in the study form were satisfied. Study form

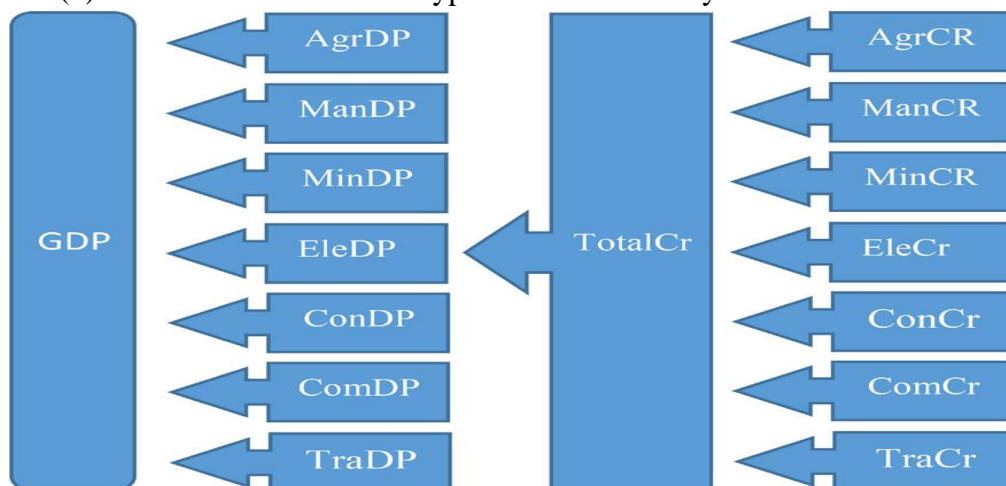Figure No. (1) shows the variables and hypotheses of the study:

Figure No. (1): Study model (prepared by the study)

The concept of gross domestic product

Gross domestic product is defined by the production method as the total monetary values of the final goods and services produced within the local economy by the factors of production located within the geographical perimeter of a specific country during a certain period of time (usually a year). GDP is also defined by the income method, as the total inputs of the factors of production (labor, Capital, land) located within the geographical perimeter of a given country, which contributed to the production process during a certain period of time (usually a year). Gross domestic product is also known by the method of expenditure, as the total commodities directed to meet the aggregate demand in society (i.e. the total final expenditure). It includes private consumption spending, investment spending, government spending, and net external dealings (exports - imports) during a certain period of time (usually a year). As for the factors determining the size of gross domestic product, the most important of them are: the extent of political stability in the country, in addition to the quantity and quality of economic resources that determine the amount of And the quality of what is produced, in addition to the relationship between the elements of production and the surrounding environment, and natural conditions that humans cannot predict, such as natural conditions Afza T, Asghar MJEKA (2017)

Bank credit in Iraq

A sound banking system contributes to economic growth by pumping financial resources into the economy, especially for high-productivity activities. The banking sector in Iraq is one of the important sectors affecting all sectors of the national economy. Due to the successful and developed monetary and financial policies that constitute financial and recreational stability that supports economic and social development, and the banking system represents the cornerstone of the development process through its basic function as a collector of financial resources from the economic sectors with a surplus and then transferring them and feeding the economic sectors with a deficit, and it is from this standpoint It achieves two main goals: to contribute to the economic development process on the one hand, and to achieve the profits that are necessary for the continuation of the work of the banking system on the one hand.

The ability of banks to contribute to the process of economic and social development depends to a large extent on the degree of development and effectiveness of the banking system, especially commercial banks, and the extent to which they conform to the requirements of the economic vision of the responsible authorities. On the other hand, the indicators of the banking system in Iraq indicate its durability and strong performance (Al-Anazi, 2017), as it still records a good average performance within the performance rates according to international standards. Also, banks have increased the introduction of banking technology in their business, which has established banking awareness among the public, and contributed to the drop in cash circulating outside the banking system to its lowest level.

The largest international rating institutions have a role in continuing to enhance confidence in the national economy, and bank credit is one of the main activities of commercial banks in Iraq through which they achieve most of their profits, and the bulk of these profits comes from providing financing to investors in several ways, including direct loans and Islamic financing loans. By examining bank credit granted according to economic activity in Iraq, it is noted that

consumer loans (and some other items) usually record the highest percentage of total bank credit provided to the private sector. Likewise, the trade sector gets the next percentage, followed by the industry and production sector. Previously, a large proportion of bank credit was directed to the consumer sectors compared to the productive sectors, and this is due to the existence of strict conditions regarding loans granted to different economic sectors.

Previous studies
The researcher looked at a number of previous studies on the subject of bank credit and its impact on a number of economic variables, the most important of which was: a study (Blinder and Stiglitz (1983) aimed at clarifying the relationship between bank credit represented by commercial bank reserves, and US economic activity during the period from 1952 to 1981, the study concluded by using the multiple regression method that there is a positive effect of monetary reserves on the US domestic product. As for the study of Afonso and Aubyn (1998), it aimed to show the impact of bank credit on Portuguese economic activity during
The period from 1990 to 1997, and the study concluded that there is a positive relationship between bank credit and Portuguese economic activity represented by the industrial index. On the other hand, Levine et al. (2000) investigated the effect of the degree of financial deepening (represented by domestic private credit) on the rate of economic growth, and the result was positive. As for the study Al-Hadi, & Hamouda Al-Sayeh. (2009) It aimed to analyze the impact of bank credit directed to the private sector on Mexican economic growth, and the result was positive. As for the study (Hofmann 2001), it examined the relationship between private credit and gross domestic product and the factors determining this credit and its impact on industrialized countries through a study Cross-sectional in sixteen industrialized countries during the period from 1980 to 1995, it was shown that there is a positive relationship between bank credit and GDP. As for the study of Al-Jaloudi (2001), it aimed to investigate the impact of bank credit on investment in Jordan during the period from 1979 to 1997, and it was found that investment is positively affected by the levels of bank credit. Likewise, the study of Al-Faleet (2004) aimed to determine the impact of banking facilities for operating banks. In Palestine on the various economic sectors, in addition to knowing the reality of the banks operating in Palestine and the most important problems that stand in the way of their progress in economic development.A set of results were reached, the most important of which are: that the banks operating in Palestine have a desire to expand in granting facilities to various economic sectors, with the exception of The agricultural sector, due to the high degree of risk in it, yet the banks do not play the role required of them in supporting economic development inside Palestine, and the study also found that the banks did not reach the minimum percentage of facilities on deposits set by the Palestinian Monetary Authority, as confirmed by the study The commercial sector is one of the most attractive sectors for bank facilities, while the study of Ibrahim (2006) used the regression model
The results showed that loans provided by commercial banks in Malaysia do not lead to an increase in real output. As for the study (Loayza and Ranciere (2006), it showed a positive relationship between the role of financial intermediation played by financial institutions and economic growth in the long term, while the relationship was negative in the short term. As for the study of Maui and Majali (2008), it aimed to investigate the effect of credit Banking on the

Jordanian economic activity during the period from 1970 to 2003, where the results of the study showed the existence of a reciprocal effect relationship between the variables of the study: bank credit and gross domestic product in Jordan. business on Jordanian economic growth (represented by output gross domestic product) at the level of the economy as a whole, and at the level of various economic sectors during the period from 1980 to 2013, it was found through the study that there is a significant positive correlation Statistics between the credit facilities granted by commercial banks and the gross domestic product on economic sectors; The contribution of these sectors to the GDP varied. In the study of Al-Khorayef and Al-Saadoun (2016), which aimed at estimating the achievable gross domestic product (GDP) and the production gap in the real GDP of the Saudi economy, during the period from 1980 to 2015, by extrapolating both total and non-oil output, the focus was on the GDP. In order to examine the progress made in diversifying the economy and measure the potential impact of economic diversification on potential output, the results of the paper indicate that the output gap (the difference between actual output and potential output) was positive during the entire period, but it turned negative in recent years. Al-Ghafis (2016) study aimed to study the relationship between the development of the financial sector and the economic growth of the non-oil sector in Iraq. Autoregressive distributed slowing periods ARDL The most important results of this study are summarized in the existence of a statistically significant positive effect of the development of the financial sector on the total economic growth of the non-oil sector in both parts government and private.

This study differs from previous studies in that the subject of the study is the Iraqi economy, which the researcher did not find - in what he viewed - rich and many previous studies in its field, and the data used are more recent from its predecessors, it is classified by economic sectors, as well as by method of analysis.

Statistical analysis

To test the potential relationships between the dependent study variables and their independent variables, the researcher (using the SPSS program) developed a number of linear regression models for the time series representing the study variables, where the Expert Modeler option was used, through which the aforementioned program develops models. possible and choose the independent variables (including the dependent variable itself) that have an impact on the dependent variables (all or some of them), and put them in certain models, and first it performs a test of the stability of the data and removes the autocorrelation in the time series representing the variables of the study, and it has been reached The models shown in Table No. (1).

Table No. (1): Description of the study models

Model Description		
Model ID		Model Type
Model.1	GDP	ARIMA (0, 1, 0)
Model.2	AgrDP	ARIMA (0, 1, 0)
Model.3	MinDP	ARIMA (0, 1, 0)
Model.4	ManDP	ARIMA (0, 1, 0)
Model.5	EleDP	ARIMA (0, 1, 0)

Model.6	ConDP	ARIMA (0, 2, 0)
Model.7	TraDP	ARIMA (0, 2, 0)
Model.8	CmmDP	ARIMA (0, 2, 0)

Source: Prepared by the researcher

Table No. (1) shows eight regression models with eight dependent variables, which are:

1 GDP-Model

2 Model of the contribution of the agriculture, forestry and fisheries sector to the GDP. AgrDP-Model

3 Mining sector contribution model to GDP.MinDP-Model

4 ManDP-Model of the contribution of the industrial sector to the GDP

5 Electricity and gas sector contribution model to GDP. EleDP-Model

6 Model of the construction sector's contribution to the GDP. ConDP-Model

7 Model of the contribution of the transport and communication sector to the GDP. TraDP-Model

8 Model of the contribution of the social and personal services sector to the gross domestic product CmmDP-Model

The results of the statistical analysis showed, in addition to the above, the statistical characteristics of the study models, and this is shown in Table No. (2).

Table No. (2): Statistical characteristics of the study models

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig	
GDP-Model	1	0.788	0.99	39.755	18	0.002	0
AgrDP-Model	1	0.553	0.996	.	0	.	0
MinDP-Model	1	0.646	0.946	29.514	18	0.042	0
ManDP-Model	1	0.275	0.988	9.775	18	0.939	0
EleDP-Model	2	0.944	0.998	14.941	18	0.666	0
ConDP-Model	2	0.883	0.999	.	0	.	0
TraDP-Model	1	0.202	0.997	10.83	18	0.901	0
CmmDP-Model	0	2.10E-16	0.998	17.137	18	0.514	0

Source: Prepared by the researcher

From the review of Table No. (2), it is noted that the aforementioned regression models showed high interpretation rates (R-Squared), with an average of 98.9%, the lowest being 1% for the third model. The table also shows this Number 3(.

Table No.3 (Model Summary):

					Percentile						
Fit Statistic	Mean	SE	Minimum	Maximum	5	10	25	50	75	90	95
Stationary R-squared	0.536	0.344	2.10E-16	0.944	2.10E-16	2.10E-16	0.22	0.6	0.859	0.944	0.944
R-squared	0.989	0.018	0.946	0.999	0.946	0.946	0.988	0.996	0.998	0.999	0.999
RMSE	2.45E+04	4.08E+04	369.412	9.59E+04	369.412	369.412	422.092	2.02E+03	6.59E+04	9.59E+04	9.59E+04
MAPE	4.983	6.476	0.822	20.003	0.822	0.822	1.01	2.268	6.764	20.003	20.003
MaxAPE	23.298	38.683	2.171	115.577	2.171	2.171	3.76	6.788	28.719	115.577	115.577
MAE	1.83E+04	3.08E+04	226.019	7.04E+04	226.019	226.019	277.249	1.31E+03	5.09E+04	7.04E+04	7.04E+04
MaxAE	5.90E+04	1.00E+05	534.501	2.49E+05	534.501	534.501	1.09E+03	4.67E+03	1.47E+05	2.49E+05	2.49E+05
Normalized BIC	16.805	4.364	12.202	23.088	12.202	12.202	12.897	15.757	21.85	23.088	23.088

Model Fit

However, the Expert Modeler He showed that most of these results showed relationships, most of them false, resulting from the general trend in the time series on which the analysis was conducted, and therefore he smoothed out these series by removing the autocorrelation in them through the use of differences for one period (as in models 1-5), or for two periods (as in models 1-5). In models 6-8), and accordingly, the determination coefficients appeared in their true form (Stationary R-squared), with an average of 53.6%, the highest being 94.4% for the fifth model. On the other hand, it was found that the models that are suitable for representing the study relationships based on significant values of autocorrelation (Ljung-Box Q), which is more than 5% (i.e. devoid of autocorrelation) is (1):-

1. Model No. 4, and represents the contribution of the industrial sector to the gross domestic product (ManDp) as a dependent variable, as it was found that this contribution is significantly affected positive   with both differences for one period in the natural logarithm of the same dependent variable.

Present values (lag 0) and past values for two periods (lag 2) of the natural logarithm of bank credit granted to the electricity, gas and water sector (EleCr).

Deviations of the previous values for two periods (lag 2 of the natural logarithm of bank credit granted to the electricity, gas and water sector (EleCr), where the effect is relatively large.

One-time differences in the natural logarithm of bank credit granted to the electricity and gas sector and water (EleCr). The (T-test) tests indicated the significance of the coefficients of the parameters of this model, as the percentage of significance for all the parameters of the model was less than 5%, which means that it is statistically acceptable. For the model variables and the removal of the autocorrelation in them (- station ary R-square d) is 27.5% (after it was 98.8% before it was settled), which is the percentage that changes in the independent variables are explained by changes in the dependent variable. (See Table 2).

2- Model No. 5, which represents the contribution of the electricity, gas and water sector to the gross domestic product (EleDP).

As a dependent variable, it was found that this contribution is affected by:

Present values (lag 0), and previous values for one period (lag 1) of Total Bank Credit Granted (TotalCR), positively.

The previous values for two periods (lag2) of the total bank credit granted (TotalCR), in the form of: negative. Deviations of the previous values for one period (lag 1 from the mean of the total bank credit granted TotalCR), in a relatively large positive way. the differences for one slowing period of the total bank credit granted (TotalCR), in the form of positive. One-time differences for the same dependent variable (EleDP), in a positive way.

The current values (lag 0) and the previous values of two periods (lag 2) of the credit granted to the Transport, Storage and Communications (TraCr) sector, in a negative way.

the differences for one period of the credit granted to the transport, storage and communications sector (TraCr), and that positively.

Deviations of the previous values for one period (lag1) of the credit granted to the transportation, storage and communications sector (TraCr), in a negative way. The (T-test) indicated the significance of the model's parameters, as the percentage of significance of the model's parameters was less than 5%, which It means that it is statistically accepted, and the results of the analysis indicated that the coefficient of determination after the placement of the time series of the model variables and the removal of the autocorrelation in them (- stationary R-square d) is 94.4% (after it was 99.8% before the placement), which is explained by the changes that occurred. In the independent variables, the changes in the dependent variable.

3- Model No. 7, which represents the contribution of the transport and communications sector to the gross domestic product (TraDP).

As a dependent variable, it was found that this contribution is positively affected by:

• The current values (lag 0) of the total bank credit granted (TotalCR).

• Differences for two periods in the total bank credit granted (TotalCR).

• Differences in the same dependent variable (TraDP) for two periods. The (T-test) indicated the significance of the coefficients of the model's parameters, as the significance of the three parameters was less than 5%, which means statistically accepted, as the results of the analysis indicated that the coefficient of determination after the chains are populated

Represented by the model and the removal of the autocorrelation between them (stationary R-squared), which is 20.2% (after it was 99.7% before it was settled), which is the ratio of what changes in the independent variables are explained by changes in the dependent variable.

4 Model No. 8, which represents the contribution of the collective, social and personal services sector to the output gross domestic product (CmmDP) as a dependent variable, as it was found that this contribution is affected by the differences for two periods in the dependent variable itself. The T-test indicated (significance of the coefficient of the independent variable) – CmmDP (and the non-significance of the constant in this model, as the significant percentage of the mentioned parameters was 0% and 9%, respectively, which means that the first parameter was accepted statistically, and the results of the analysis indicated that the coefficient of determination after populating the data of the dependent variable and removing the autocorrelation between them) stationary R -squared is close to zero (as there are no independent variables other than the dependent variable itself) after the regression model showed before the data was populated, the coefficient of determination was 99.8%, and thus this model can be dropped.

Findings and recommendations

After examining the results of the statistical analysis, the following appears:

1 Referring to Form No. 4 (Point No. 1), from the results of the statistical analysis, it is clear that credit the banking sector granted to the electricity, water and gas sector has a positive and significant impact on the sector's contribution industry in the gross domestic product, as it appears from this result that the success of the industrial sector depends on the volume of funding granted to the electricity, water and gas sector (energy and basic benefits on which the industry is based), and this relationship is logical, and thus we can partially accept the hypothesis of the study, as the bank credit (for one of the sectors) has had a positive (indirect) impact on the GDP.

2 Referring to Form No. 5 (Point No. 2) of the results of the statistical analysis, it is found that total bank credit affects (often) (1) positively   Significant positively in the contribution of the electricity, water and gas sector to the gross domestic product. This result can be explained by the fact that the bank credit granted to all sectors increases the use of these sectors for energy sources and basic utilities, thus increasing the contribution of this sector in the GDP, but it does not necessarily increase the contribution of those sectors in the GDP. This may indicate that the bank credit is used in The purposes of operation and continuity and not necessarily for the purposes of growth and expansion, and thus indicates the weakness of the efficiency of those sectors in using the funding granted to them to increase their productivity and thus increase their contribution to the gross domestic product despite their access to financing and their use of energy sources and basic benefits, however, the industry, transportation and communications sectors are better off than other sectors, because the first is directly affected by the funding granted to the electricity, water and gas sector (as stated in Outcome 1 above), and the second is directly affected by total bank credit (as stated in Outcome 3 below), and depending on In the foregoing, it can be said that the hypothesis of the study is partially accepted.

3 Referring to Form No. 7 (Point No. 3) of the results of the statistical analysis, it is found that total bank credit has a positive and significant impact on the contribution of the transport and communications sector to GDP, and the same thing can be said (which was said in the interpretation of the relationship mentioned in Result 2 above) in explaining this relationship as the telecommunications and transport sector is a sector belonging to a group basic services and benefits used by all sectors, and since the contribution of this sector It increases with the increase in total credit granted to all sectors, which means that the sectors that It obtains financing to increase its production inputs by using energy and basic benefits, but it Its outputs themselves do not necessarily increase the percentage, and this is mostly due to the use of funding for operational purposes with the aim of continuity, and this raises a question about the growth and expansion of the productivity (efficiency) of these sectors. Based on the foregoing, it can be said that the study hypothesis is partially accepted.

4 Based on the foregoing, it can be said that the financing granted to the economic sectors (with the exception of the sectoral electricity, gas, water, transportation and communications (mostly used for current spending and not Expansionary capital spending that leads to an increase in the productivity of those sectors.

Recommendations

Based on the results of the study, the researcher recommends the following:

1 . Benefiting from the relationships that appeared in this study in the planning of bank credit granted by Iraqi banks.

2 . Reviewing the development plans for the economic sectors that benefit from bank credit, so that the productivity of these sectors increases by increasing their benefit from the financing granted to these sectors.

3 . Monitoring how the economic sectors use the financing granted to them, and this can be achieved by employing musharaka and murabaha contracts instead of the loan contract that governs most bank financing operations.

 4. Conducting more studies and research to explore factors of potential impact on the contributions of economic sectors to the gross domestic product.

References

1. Abadi Muhammad. (2012). The role of the credit policy of commercial banks in stimulating investments in Algeria (Doctoral dissertation, University of Badji Mokhtar Annaba, Sidi Achour).

2. Afza T, Asghar MJEKA (2017) Efficiency of Commercial Banks in Pakistan: application of SFA and value added approach.

3. Al-Hadi, & Hamouda Al-Sayeh. (2009). The role of bank credit in the development of the Libyan economy 1985-2003.

4. Allen J, Engert W, Liu Y (2006) Are Canadian Banks Efficient? A Canada--U.S. Comparison. Staff Working Papers 63.

5. An Q, Liu X, Li Y, Xiong B (2019) Resource planning of Chinese commercial banking systems using two-stage inverse data envelopment analysis with undesirable outputs. Plos One 14(6). https://doi.org/https:// doi. org/ 10. 1371/ journ al. pone. 02182 14

6. Argumenta Oeconomica 38(1): 195–220. https://doi.org/https:// doi. org/ 10. 15611/ aoe. 2017.1. 07

7. Ausloos M, Ma Q, Kaur P, Syed B, Dhesi G (2019) Duration gap analysis revisited method in order to improve risk management: the case of Chinese commercial bank interest rate risks after interest rate liberalization. Soft Comput 24(18):13609–13627. https:// doi. org/ 10. 1007/ s00500-019-04376-7

8. Banker RD, Charnes A, Cooper WW (1984) Some models for estimating technical and scale inefficiencies in data envelopment analysis. Manage Sci 30(9):1078–1092. https:// doi. org/ 10. 1287/ mnsc. 30.9. 1078

9. Bhattarai, Y. R. (2016). Effect of credit risk on the performance of Nepalese commercial banks. NRB Economic Review, 28(1), 41-64.

10. Black, S. E., & Strahan, P. E. (2002). Entrepreneurship and bank credit availability. The Journal of Finance, 57(6), 2807-2833.

11. Calmes C, Theoret R (2020) Bank fee-based shocks and the U.S. business cycle. N Am J Econ Finance 51. https://doi.org/https:// doi. org/ 10. 1016/j. najef. 2018. 09. 002

12. Dr.. Ammar Abdel Hadi Shalal. (2021). The impact of GDP growth on direct cash credit granted by the banking sector: a study in the Iraqi economy for the period (2004-2017).

13. Helou, S.H.M. (2022). The impact of bank savings and domestic credit on GDP (for selected countries for the period 2004-2018). Tikrit Journal of Administrative and Economic Sciences, 18 (59, 2), 401-417.

14. Honda, Y. (2002). The effects of the Basle accord on bank credit: the case of Japan. Applied Economics, 34(10), 1233-1239.

15. Huang, Y. L., & Shen, C. H. (2015). The sovereign effect on bank credit ratings. Journal of Financial Services Research, 47, 341-379.

16. Ibrahim Haiba, a. (2018). The impact of bank credit on economic growth in Egypt. Scientific Journal of Economics and Commerce, 48(1), 353-394.

17. Ibrahim. M. H. 2006. Stock prices and bank loan dynamics in a developing country: The Case of Malaysia. Journal of Applied Economics.9: 71-89. Retrieved on 25/6/2016

18. Jaabi, Ahmed Abdel-Khalek Ahmed, Malawi, & Ahmed Ibrahim. (2017). The impact of financial deepening on economic growth in Jordan, an econometric study (1980-2015).

19. Joseph, E. (2020). The Effect of Bank Credit on the Economic Growth of Tanzania. Journal of Finance and Economics, 8(5), 211-221.

20. Love, I., Preve, L. A., & Sarria-Allende, V. (2007). Trade credit and bank credit: Evidence from recent financial crises. Journal of Financial Economics, 83(2), 453-469.

21. M. Hendrine Hussein Hassan. (2022). The role of monetary policy in enhancing bank credit in Iraq for the period (2005/2021). Iraqi Journal of Economic Sciences, 20 (75), 113-122.

22. Patwary, M.S.H., Islam, M.S., & Al Mosharrafa, R. (2023). Effect of bank credit on agricultural gross domestic product. Agricultural and Resource Economics: International Scientific E-Journal, 9(1), 188-204.

23. Shi, Z., Qin, S., Chiu, Y. H., Tan, X., & Miao, X. (2021). The impact of gross domestic product on the financing and investment efficiency of China's commercial banks. Financial Innovation, 7, 1-23.

Study supplement:

Outputs of the statistical analysis

ARIMA Model Parameters					Estimate	SE	t	Sig.
GDP⁐Model_1	GDP	No Transformation	Difference		1			
	ConCR	No Transformation	Numerator	Lag 0	31.412	2.990	10.506	0.000
			Difference		1			
AgrDP⁐Model_2	AgrDP	No Transformation	Constant		854.313	146.713	5.823	0.000
			Difference		1			
	TotalCR	No Transformation	Numerator	Lag 0	0.005	0.002	2.665	0.018
			Delay		1			
			Difference		1			
			Denominator	Lag 1	1.077	0.149	7.207	0.000
				Lag 2	⁐1.000	0.136	⁐7.333	0.000
MinDP⁐Model_3	ConCR	No Transformation	Numerator	Lag 0	21.843	3.392	6.440	0.000
			Difference		1			

	MinDP	No Transformation	Difference		1			
ManDP Model_4	ManDP	Natural Log	Difference		1			
	EleCR	Natural Log	Numerator	Lag 0	0.073	0.030	2.446	0.026
				Lag 2	0.071	0.027	2.579	0.020
			Denominator	Lag 2	0.991	0.075	13.169	0.000
			Difference		1			
EleDP Model_5	TotalCR	No Transformation	Numerator	Lag 0	0.009	0.003	2.927	0.014
				Lag 1	0.018	0.004	4.504	0.001
				Lag 2	⌐0.019	0.003	⌐5.886	0.000
			Denominator	Lag 1	0.515	0.112	4.603	0.001
			Difference		1			
	EleDP	No Transformation	Constant		327.619	146.986	2.229	0.048
			Difference		1			
	TraCR	No Transformation	Numerator	Lag 0	⌐0.0970	0.021	⌐4.550	0.001
				Lag 2	⌐0.1370	0.021	⌐6.508	0.000
			Denominator	Lag 1	⌐0.3300	0.122	⌐2.694	0.021
			Difference		1			
ConDP Model_6	TotalCR	No Transformation	Numerator	Lag 0	0.043	0.010	4.443	0.001
			Delay		3			
			Difference		2			
	TraCR	No Transformation	Numerator	Lag 0	⌐0.158	0.058	⌐2.744	0.019
				Lag 1	0.411	0.076	5.407	0.000
				Lag 2	0.352	0.066	5.304	0.000
			Denominator	Lag 1	⌐0.561	0.223	⌐2.515	0.029
			Difference		2			
	ConDP	No Transformation	Constant		1.034E3	396.682	2.608	0.024
			Difference		2			
TraDP Model_7	TotalCR	No Transformation	Numerator	Lag 0	0.025	0.011	2.370	0.029
			Difference		2			
	TraDP	No Transformation	Difference		2			
CmmDP Model_8	CmmDP	No Transformation	Constant		165.644	92.615	1.789	0.090
			Difference		2			