JOURNAL OF ECONOMIC SCIENCES: THEORY AND PRACTICE, V.79, # 2, 2022, pp. 19-36

ECONOMETRIC ASSESSMENT OF OPTIMAL INTEREST BURDEN: CASE STUDY FOR AZERBAIJAN

MURAD Y. YUSIFOV

Institute of Control Systems, Azerbaijan National Academy of Sciences (ANAS), Baku, Azerbaijan, Email: yusifovmy@gmail.com

Received: October 14; accepted November 10, 2022; published online December 23, 2022

ABSTRACT:

In this study, the level of interest burden maximizing bank profits and tax revenues was assessed separately for lockdown and non-lockdown periods by using polynomial regression. According to the findings of the study, the interest burden that provides the maximum level of bank profitability for the non-lockdown period was estimated at 2.9%, and 2.0% for the lockdown period. But the interest burden that provides the maximum level of tax revenue for the non-lockdown period was estimated at 1.48%, and 1.63% for the lockdown period in Azerbaijan. Besides that, the interest burden that provides the minimum level of tax revenue for the non-lockdown period was found at 2.16%, and 1.87% for the lockdown period. In order to ensure fiscal and monetary compatibility, it is important to consider the difference between these interest burdens as far as possible within the framework of optimality.

Key Words*:* Interest burden, profit of banking sector, polynomial regression, optimality, tax revenue

JEL Classification: B23, C13, E58, E62, G21

INTRODUCTION

The issue of optimality in the economy determines the rational approach of economic entities in their economic activities. Optimality allows individuals to place assets adjusted to their behavioural bias in their investment activities by setting a framework for a rational approach. However, it is very difficult to ensure a rational approach at both the macroeconomic and microeconomic levels. This is because economic laws are not as stable or long-term evolutionary processes as physical laws. Economic processes are stochastic and change regularly. Behavioural biases of economic entities that affect economic processes take it away from the optimal level. These behavioural biases are divided into cognitive and emotional.

There are numerous articles in the economic literature on the topics of behavioural biases. Of course, it is important to keep in mind that people's tastes, feelings, thoughts, and views on the life are different. These differences are reflected in the rational and irrational economic behaviour of people.

The stochasticity of behaviour deviates the economic factors from this optimal level. As there is not a probability distribution of uncertain events, uncertainties require economic entities to be more prudent and rational in their financial behaviour. In this paper, the issues of optimality that maximize the profits of the banking sector, as well as tax revenues are considered.

Of course, as in the rest of the world, the effects of the pandemic in Azerbaijan have had a certain impact on the economy. In order to reduce the possible negative impact of the Coronavirus (COVID-19) pandemic on the banking sector of the Republic of Azerbaijan, the Central Bank of Azerbaijan has approved the "Rules for Temporary Regulation of Credit Institutions in the Coronavirus (COVID-19) Pandemic". It defines the classification and risk groups, capital adequacy ratio and its calculation rules in order to reduce the possible negative impact of the coronavirus (COVID-19) pandemic and consequently, sharp fluctuations in world energy and stock markets on the banking sector of the Republic of Azerbaijan. In the context of the pandemic, the adoption of a temporary tax regime, the reduction of the tax burden, the granting of deferrals for the payment of taxes are important measures taken in this direction.

Defining a level of optimal interest burden that provides the maximum level of profitability of banking sector and tax revenues assume an importance for harmonizing the development of fiscal and monetary policies. In this regards it is important to consider the difference between these interest burdens as far as possible within the framework of optimality. Our task in this paper is to determine the optimal interest burden that gives the maximum level of profitability of banking sector and tax revenues in Azerbaijan. Our goal in this article is to determine the optimal level of interest burden on bank loans that maximizes bank’s profits as well as tax revenues.

LITERATURE REVIEW

Theoretically, an increase in the interest burden increases banks' interest income in profit and loss statements, and as a result, interest income accrued during the period increases the bank's profit accordingly. The interest burden affects the amount of household`s consumption. The negative correlation between interest burden and consumption growth shows that higher interest burden bears higher macroeconomic risk (Kjersti, 2016).

David Rodgers noted that, there is a close relation between credit losses of banks and the interest burden of the business sector in Australia. Using econometric modelling it was found that the relationship between interest burden and credit losses in the economy was statistically significant. An increase in the interest burden increases the risk at the borrower level. D.Rodgers defined the interest burden for the economy as the ratio of interest payments to GDP (David, 2015). Marianne Gizycki's study found that both corporate and household interest rates had an increasing effect on credit risk. In the same study it was determined that increase in the share of interest in disposable income of household increases the amount of impaired assets of banks.

As well as, Marianne Gizycki's research found that the increase in the share of interest in the company's revenues increases the impaired assets of banks too. In other words, there is a positive relation between impaired assets of banks and both the corporate and household interest burden. Hence, it shows that there is a positive relationship between the interest burden and banking risks (Gizycki, 2001). The lower interest rates lead to lower loan losses (Michael Brei et.al, August 2019).

Francisco Palomino et.al studied the interest coverage ratio (ICR) which defined as the ratio of earnings before interest and taxes to interest expenses. They considered it as an indicator of the ability of a company to make interest payments using internal cash flows. As said in this study the level of the ICR can be considered an important indicator of financial distress for government policy decisions. As well as some studies found that the transmission of monetary policy becomes stronger while ICRs are low (Palomino et al., 2019). An increase in interest rates worsens balance sheets of borrowers directly by diminishing cash flows net of interest and by reducing the value of collateral assets in its turn as well. Consequently, it results in strengthening the overall influence of monetary policy on borrowers' spending and this process can also be encountered indirectly too. (Gertler M., Gilchrist S., 1994).

Note that the increase in the interest burden should be optimal in the context of economic growth and fiscal sustainability too. In addition, the chances of companies depended on bank, as well as start-ups and non-exporters to continue operating, especially in times of crisis, are more affected by changes in interest burden (Guariglia et al., 2015). The interest burden triggers fiscal regulation in terms of solvency. D.Xavier and K.Tidiane estimated the ratio of interest payments to government revenue, tax revenue, or GDP as an interest burden. Then, the relationship between the primary balance (i.e. net lending or net borrowing excluding interest expenses) in percent of GDP and the interest burden has been studied through panel regression

(International Monetary Fund, GFSM, 2014; Xavier and Tidiane, 2013). K.Torstensen defined the interest burden as interest expenses after tax as a percentage of disposable income plus interest expenses after tax. The interest burden impacts the volume of household income which is available for consumption (Kjersti, 2016). According to Guariglia Alessandra, Spaliara Marina-Eliza and Tsoukas Serafeim, a higher interest burden exposes the company to the higher interest costs (Guariglia et al., 2015). The growth of the interest burden affects the level of GDP in the real sector. As a result, the interest expenses debited to the enterprise's expense accounts exerts pressure on the enterprise's net profit, wages and social security contributions and consequently, at the same time it causes the reduction of tax revenues.

As a generalized indicator at the macroeconomic level, the interest burden was defined by D.Rodgers as the ratio of accrued interest to GDP. At the enterprise level, the interest burden is defined as the ratio of interest expenses to interest and pre-tax earnings (EBIT) (David, 2015). Jaroslav Sedlacek and Daniel Nemec determined the company's interest burden as EBT / EBIT (Sedláček & Nemec, 2018).

Hence, as it is shown the interest burden was investigated in the studies at the macro and micro levels depending on object of study. (Table 1).

Table 1. Summary of Representation of Interest burden

At the Macro level	At the Micro level	Research study
The ratio of interest payments to GDP		Xavier & Tidiane (2013)
The ratio of accrued interest to GDP		David, R. (2015).
	EBT / EBIT	Sedláček & Nemec, 2018
	Interest coverage ratio (ICR)	Francisco Palomino et.al

Source: Authors' compilation

Low-cost borrowing, as well as greater access to finance, increases the investment and consumption of entities in the economy. This, in turn, increases the burden of debt service on the private sector (Kohlscheen et al., 2018). The main operating income of banks falls on the share of loan interest income. The large amount of accrued interest can create problems with delays or non-repayment of the loan portfolio. As a rule, the repayment of interest is usually made at the expense of value added created by the borrower. According to the System of National Accounts (SNA), we can note the following equation (United Nations et al., 2009, Vu Quang Viet, 2012) for having some insight into this issue.

GDP = The sum of the gross value added at basic prices plus all taxes on products, less all subsidies on products

Value added = Compensation of employees + Mixed income + Other taxes less subsidies on production + Gross operating surplus

Gross operating surplus = Net operating surplus + Consumption of fixed capital.

The share of interest incomes on loans granted by banks of Azerbaijan for 2018-2021 averaged 58% of total bank incomes which includes the interest and non-interest incomes. (Source: Calculation made by author based on data obtained from the official web-site of Central Bank of the Republic of Azerbaijan, https://www.cbar.az/). In the study the accrued interest incomes calculated on bank loans divided by GDP is defined as interest burden. Theoretically, a rise in the interest burden results in delays and non-payment of debts in the economy, which causes the establishment of special reserves funds by banks for outstanding debts (both principal and interest) by debiting of profit and loss account. As a rule, special reserve funds are created at the expense of banks, which in its turn has a reducing effect on the profits of banks. An increase in the interest burden theoretically has an effect on banks' profits. However, there is a certain point at which the impact of the interest burden on the bank's profits reaches its maximum. After this point, the interest burden reduces the solvency of borrowers and, consequently, leads to delays or defaults, which reduces the profitability of the bank by increasing the cost of the reserve fund. Because the reserves are created at the expense of the bank for the total amount of loans. (The Chamber for Control over Financial Markets of the Republic of Azerbaijan, 2018, http://www.e-qanun.az/framework/40823).

The procedure for calculating the difference between the income of the borrower or members of the joint group of borrowers and the debt burden in Azerbaijan is as follows (The Chamber for Control over Financial Markets of the Republic of Azerbaijan, 2018, http://www.e-qanun.az/framework/40823).

$$\sum_{n}(I-(D+PMT)\geq SMxn$$

Here,

I - borrower's net income after tax,
D - borrower's debt burden,
PMT - monthly payment on a new loan,
n (*n* = 1,2, ...) - number of co-borrowers,
SM - subsistence minimum indicator.

Therefore, when determining the borrower's creditworthiness, it must be taken into account that the difference between the borrower's income and the debt burden is equal to or greater than the subsistence minimum for the country determined by the relevant law of the Republic of Azerbaijan for the relevant year.

As mentioned above GDP equals to the sum of the gross value added at basic prices plus all taxes on products, less all subsidies on products. Therefore, share of debt in borrower's net income after tax assumes an economic importance. That is why this ratio reliably indicates that particular borrower's ability to pay back its debts.

Determining the optimal level of the interest burden that maximizes the bank's profit and tax revenues as a whole is important from the point of view of macroeconomic analysis. From the point of view of statistical significance and reliability of the obtained results, the lack of longer time series can be considered as a limitation of the research.

DATA AND METHODOLOGY

Polynomial regression is a special case of multivariate regression involving only one independent variable. Relationships that are nonlinear in terms of variables but linear in terms of parameters can also be determined by OLS method. The polynomial regression model, which represents a nonlinear relationship from one independent variable point of view is expressed in the following form:

$$Y = B_0 + B_1X + B_2X^2 + \cdots + B_NX^N + e \qquad (1)$$

The degree of polynomial is the order of that model. Here, *N* is the degree of polynomial. In essence, it can be viewed the case with the multivariate regression model wherein

$$X_1 = X, X_2 = X^2, X_3 = X^3 \text{ ,..., } X_N = X^N.$$

Among non-linear polynomial equations, the simplest one is the equation with one variable and the highest power of 2 (or quadratic equation):

$$Y = B_0 + B_1X + B_2X^2 + e \qquad (2)$$

In general polynomial models are an effective and flexible having curve fitting method (Ostertagova, 2012). As mentioned above the most widely used regression analysis method here is the ordinary least squares method. Polynomial models have the following problems in this regard: The first problem is the difficulty in interpreting the results of polynomial regression.

The second problem is that these type models may have the overfit problem in case of higher-order polynomials. Therefore, the data should be taken into account while selecting such polynomial models. Increasing the order of model can lead to overfitting problem. Overfit (or over-adaptation) occurs when the training data used in building the model is very consistent with the data and as a result, it generates a model defining specific generalization to the data. In this case, although the training is in perfect harmony with the data, the model built on the next used data results in a high error. Xing Wan considers that in order to avoid over-fitting problem in polynomial regression, a regularization method should be used to suppress the coefficients of higher-order polynomial. As well as while solving polynomial regression problems, polynomial regression can be transformed into linear regression to solve. The more complexity of the model results in the higher degree of overfitting. Collecting the large volume of data can avoid overfitting problem too (Schönbrodt, 2015; Xing Wan, 2019). While estimating of the parameters of model it requires the assumption that the errors follow the normal distribution (Ostertagova, 2012).

For the purpose of the study, the statistical data involving the accrual interest income on loans and gross domestic product (GDP) are taken from the statistical bulletins of the Central Bank of Azerbaijan (Source: Official web-site of Central Bank of the Republic of Azerbaijan, https://www.cbar.az/page-40/statistical-bulletin). The amounts of tax revenues refer to the official web page of Ministry of Finance of the Republic of Azerbaijan (Source: Official web site of Ministry of Finance of the Republic of Azerbaijan, http://www.maliyye.gov.az/static-page/periodic-reports).

EMPIRICAL ANALYSIS AND ECONOMETRIC ESTIMATIONS

In addition to the complexity of the interpretation of polynomial regression models, it has a number of desirable features. The inclusion of a quadratic term in the model allows to determine the influence of the quadratic effect. In the absence of a quadratic effect between an independent and a dependent variable, in other words, in cases where the relationship curve is more complex, the polynomial regression equation of an independent variable can be included in a higher order (Stimson, James et al., 1978). The main goal of the study is to find the interest burden that gives the maximum level to the GDP and the tax revenues, so that in the same time it ensures the maximum level in the financial results of banking sector.

The study was based on a polynomial regression assessment in which the effects of the interest burden on bank profits in Azerbaijan. The dummy variable of COVID-19 used in the polynomial model takes into account the lockdown effect. Let us now consider the econometric assessment of the impact of the interest burden on the profits of the banking sector for the case study of country (Table 2):

Table 2. Polynomial Regression Assessment of the Relationship between the Profit of the Banking Sector and the Interest Burden in Azerbaijan

Variable	Dependent variable: Profit of The Banking Sector**
	Azerbaijan
c	-535,6153
	(-2.547774)*
i_b	60207,95
	(2.633506)
i_b^2	-1482026
	(-2.424778)*
$dummy * i_b$	-15239,3
	(-2.404782)
$dummy * i_b^2$	700811,6
	(2.272575)*
AR(2)	-
	-
AR(12)	-0.195670
	(-1.743196)*
MA(1)	-0.947746
	(-15.74095)*
MA(6)	-
	-
R-squared	0.357674
Observations (months)	48
Observations (years)	
* t - statistics are shown in bracket.	
The notes **, represent the stationarity significance. Test shows that, the first differences of all logarithmic variables are stationary at the 1%, 5% and 10% significance levels. Augmented Dickey-Fuller (ADF) procedure has been realized in Eviews (Annex 2). While evaluating of the parameters of model, it is defined that the errors follow the normal distribution.	

Source: Estimation made via EViews software and summary table of results compiled by the author.

As can be seen from the figure, the relationship between the interest burden and the bank's profit has been different over time. For this reason, it is necessary to study the issues of interest rate optimality. Here, in the study pre-tax profit is taken to make sense of the analysis for analytical purposes.

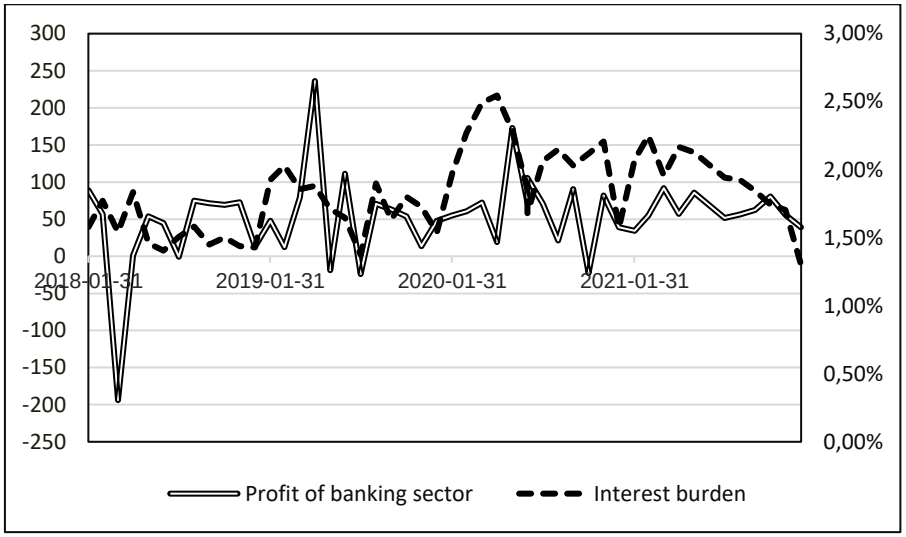


Figure 2. Graphical description of change in the profit of banking sector (before tax) and interest burden over periods (compiled by the author).

Figure 2 shows the graph of changes in the interest burden and profitability of the banking sector on a monthly basis from June 2020 to December 2021.

During the analysis, a dummy variable was included in the econometric model to take into account the lockdown effects of the COVID-19 pandemic. On the basis of econometric assessment, a polynomial regression assessment was fulfilled for determining the level of optimal interest burden on banking sectors, which gives the maximum level of profit (earnings) before tax to it. Hence, the extremum values were found.

Mathematically, if the derivative of the function $p(i_b)$ is equal to zero at the point $i_{b\,0}$, and the second derivative is negative, then this point is its maximum point. $\frac{dp}{di_b} = 44968{,}6469 - 1562428{,}87 * i_{\mathrm{b}} = 0$. Here, notation of PB is profit before tax of the banking sectors and $i_b -$ is the interest burden. According to the results of the model, the optimal level of interest burden for the banking sector for the lockdown period was 2.9%, and for the non-lockdown period was 2.0% (Figure 3).
In terms of analytical purposes, it should be noted that at the end of the study period, this figure was 1.3%.

The results of statistical tests of the polynomial regression model (Annex A) pave grounds to say that the model is adequate.

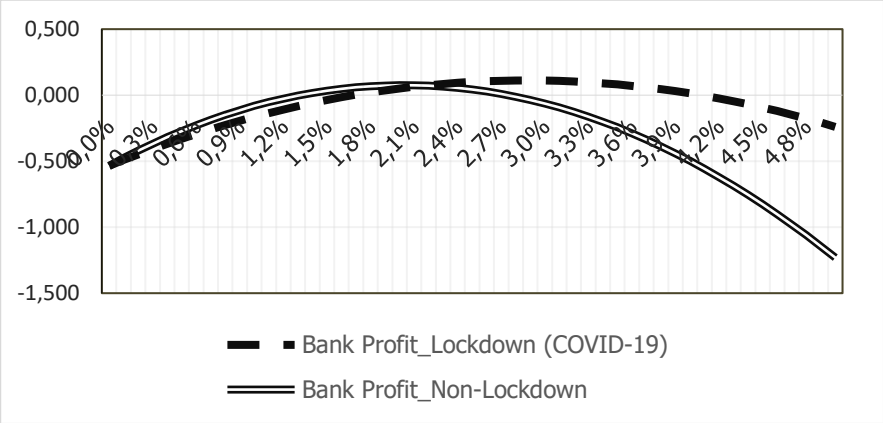


Figure 3. Description of the relationship (quadratic) between changes in the interest burden and the profits (before income tax) of the banking sector (compiled by the author).

According to Fermat's theorem, if there is a derivative of a function at the extremum point, that derivative is zero. In our study, we can call the point (i_{b_0}) that gives the maximum level of interest burden on the profit of the banking sector the optimum point of interest burden. Thus, the found point of interest burden (i_{b_0}) is the maximum point of the function $p(i_{b_0})$, since the inequality $p(i) < p(i_{b_0})$ or $p(i_b) - p(i_{b_0}) < 0$ is satisfied at all values around a certain $(i_{b_0} - \delta;\ i_{b_0} + \delta)$ (which, $\delta > 0$) and different from i_{b_0}. It should be considered that the maximum of a function, which is the extremum, is its greatest value in a given range, i.e., the local extremum point. In general, in order to find the extremum points of the function $p(i_{b_0})$ defined in a certain interval i.e. the crisis points of the function are found. Here, the points where the derivative of the function becomes zero are called the critical points. Then, at each critical point, if the sign of $p'(i_{b_0})$ changes from positive to negative, that point becomes its maximum, if it changes from negative to positive, it becomes the minimum point (Karimov, 1998; Bermant and Aramanovich, 1967). According to the theorem, if the first order derivative of the function $p(i_{b_0})$ at the point i_{b_0} is zero, and the second derivative is positive, then that point is its minimum point, and vice versa, if that point is its maximum point.

Figure 4 shows the graph of changes in interest burdens and tax revenues (receipts) on a monthly basis from January 2019 to December 2021.

In order to study in detail, the extremum values of the interest burden that affect tax revenues, we can determine the extremum points in a given range by evaluating the third order polynomial model or cubic regression model (Table 3).

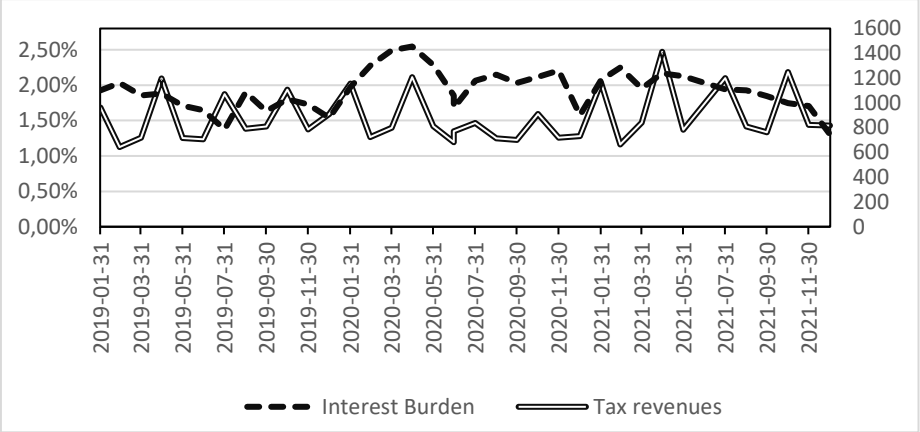


Figure 4. Description of the actual graph of tax revenues by periods of change in the interest burden (compiled by the author).

The dummy variable used in the polynomial model considers the COVID-19 lockdown effect in the model.

Table 3. Polynomial Regression Assessment of the Relationship between Tax Revenues and the Interest Burden (for the case of Azerbaijan)

Variables	**Dependent variable: Tax_Rev**
c	-14437.85
	(-2.344531)
i_b	2560364.
	(2.635003)
i_b^2	-1.38E+08
	(-2.763731)
i_b^3	2.43E+09
	(2.877102)
$dummy * i_b$	302714.2
	(1.657458)
$dummy * i_b^2$	-35347045
	(-1.802849)
$dummy * i_b^3$	1.02E+09
	(1.953688)
AR(6)	0.693504
	4.260883

MA(1)	-0.424926
	(-1.767698)
R-squared	0.664221
Adjusted R-squared	0.536305
Durbin-Watson stat	1.783698
* Note: *t* - statistics are shown in bracket. The notes **, represent the stationarity significance. Test shows that, the first differences of all logarithmic variables are stationary at the 1%, 5% and 10% significance levels. While evaluating of the parameters of model, it is defined that the errors follow the normal distribution.	

Source: Estimation made via EViews software and summary table of results compiled by the author.

In polynomial regression, if the first order derivative of the function $t(i_{b_0})$ at the point i_{b_0} which estimated by taking into account the lockdown factor becomes zero and the second derivative is positive, then that point is its minimum point, and vice versa, that point is its maximum point. The first order derivative of the function $t(i_{b_0})$ equals to $3614.99\ i_b^2 - 121.09 i_b + 1 = 0$. If we find the roots of this quadratic equation, we will get the values $i_{b1} = 0.0187$ and $i_{b2} = 0.0148$. We can find the second-order derivative of the function $t''(i_b) = 7229.98 i_b - 121.09$ and determine the extremum points. When we consider the values of the second order derivative at the stationary (crisis) points we find, we determine that $i_{b1} = 0.0187$ (1.87%) is the minimum point, and $i_{b2} = 0.0148$ (1.48%) is the maximum point. This means that during the lockdown period, the interest burden maximizing the tax revenues was 1.48%, but minimizing point was 1.87%.

Let us now consider the assessment of polynomial regression for the non-lockdown period. The first order derivative of the function $t(i_{b_0})$ equals to $t'(i_b) = 2847.25\ i_b^2 - 107.79 i_b + 1 = 0$. In order to find the critical points, we have to find the roots of the quadratic equation $2847.25\ i_b^2 - 107.79 i_b + 1 = 0$. By solving this equation, subsequently we will get the values $i_{b1} = 0.0216$ and $i_{b2} = 0.0163$. We can find the second-order derivative of the function $t''(i_b) = 7229.98 i_b - 121.09$ and determine the extremum points. When we consider the values of the second order derivative at the stationary (crisis) points we find, we determine that $i_{b1} = 0.0216$ (2.16%) is the minimum point, and $i_{b2} = 0.0163$ (1.63%) is the maximum point. This means that during the non-lockdown period, the interest burden maximizing the tax revenues was 1.63%. Conversely, interest burden, which leads to the minimum level of tax revenues during the non-lockdown period was found at 2.16%, but during the lockdown period was 1.87%.

Also, based on the results of the study, it was determined that the interest burden, which gives the maximum level of profits on banking sector in the lockdown period was 2.9%, and in the non-lockdown period was 2.0%. (Table 4).

Table 4. Summary findings on the levels of interest burden (for the case of Azerbaijan)

Objects of interest	The levels of interest burden	
	Lockdown	Non-lockdown
Maximum level of Profits of banking sector	2.9%	2.0%
Maximum level of Tax revenues	1.48%	1.63%
Minimum level of Tax revenues	1.87%	2.16%

Source: Summary table of results compiled by the author.

Determining the level of the interest burden that maximizes both bank profitability and tax revenues is an important in ensuring the harmony between monetary and fiscal policy. The smaller the differences between these interest burden levels would provide the more harmonious the development of economic policies.

CONCLUSIONS

In this study, the effects of the interest burden on the amount of bank profits and tax revenues were studied on the basis of polynomial regression. If we look at the figures, the average level of the interest burden in the Republic of Azerbaijan averaged 1.8% in 2018-2021. Determining the general pattern on a long-term basis and conducting additional analyses would further improve the results.

As a result of the study, it was found that the interest burdens maximizing profitability of the banking sector and tax revenues are different. In addition, the level of interest burdens maximizing the economic categories (such as bank profits and tax revenues) was assessed separately for lockdown and non-lockdown periods. Thus, the interest rate that maximizes tax revenues during the non-lockdown period was estimated at 1.48%, and 1.63% during the lockdown period, respectively. It was also found that the interest burden, maximizing tax revenue during the non-lockdown period, was 2.16%, and 1.87% during the lockdown period, respectively. According to the results of the model, the interest burden maximizing profit of banking system in the lockdown period is 2.9%, but in the non-lockdown period is 2.0%. In order to ensure fiscal and monetary harmonization, it is important to consider the difference between these interest burdens as far as possible within the framework of optimality.

Acknowledgement

I would like to bring my gratitute to the authors of the scientific works cited in the article.

REFERENCES

Bermant A.F. & Aramanovich I.G. (1967), Mathematical Analysis. A Brief Course For Engineering Students, 736 p.

David R., (2015). Credit Losses at Australian Banks: 1980–2013, Research Discussion Paper RDP 2015-06, Economic Research Department Reserve Bank of Australia, Retrieved April 25, 2022 from https://www.rba.gov.au/publications/rdp/2015/pdf/rdp2015-06.pdf

Gertler M., Gilchrist S., (May, 1994), Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms, The Quarterly Journal of Economics, Vol. 109, No. 2, pp. 309-340). https://www.uh.edu/~bsorense/Gertler%26Gilchrist.MP%20business%20cycles%20and%20behavior%20of%20small%20manufactoring%20firms.pdf

Gizycki M (2001). 'The Effect of Macroeconomic Conditions on Banks' Risk and Profitability', RBA Research Discussion Paper No 2001-06, Retrieved May 06, 2022 from https://www.rba.gov.au/publications/rdp/2001/pdf/rdp2001-06.pdf

Guariglia, A., Spaliara, M., & Tsoukas, S. ((August 2016). To What Extent Does the Interest Burden Affect Firm Survival? Evidence from a Panel of UK Firms during the Recent Financial Crisis. Oxford Bulletin of Economics and Statistics, Vol. 78, Issue 4, pp. 576-594, 2016, Retrieved February 13, 2022 from http://dx.doi.org/10.1111/obes.12120

Hajiyev N., Rustamov A.(2019). "How oil price drops are reflected by imported inflation in Azerbaijan?". *International Journal of Energy Economics and Policy*, vol 9(2), pp.182-193

Xavier D., & Tidiane K. (2013). That Squeezing Feeling: The Interest Burden and Public Debt Stabilization, International Monetary, Fund WP/13/125, Volume 2013: Issue 125, International Monetary Fund's (IMF) eLibrary, Retrieved February 13, 2022 from https://www.elibrary.imf.org/view/journals/001/2013/125/001.2013.issue-125-en.xml

Xing W. (2019). The effect of regularization coefficient on polynomial regression, IOP Conf. Series: Journal of Physics: Conf. Series 1213 (2019) 042054, Retrieved May 06, 2022 from https://iopscience.iop.org/article/10.1088/1742-6596/1213/4/042054/pdf

International Monetary Fund, Government Fınance Statıstıcs Manual, 2014, ISBN: 978-1-49834-376-3, Retrieved May 04, 2022 from https://www.imf.org/external/Pubs/FT/GFS/Manual/2014/gfsfinal.pdf

Karimov, K.R. (1998). Higher Mathematics, Baku, Maarif Publishing House, 410 p.

Kjersti N.T. (2016). Economic Commentaries, From a "critical interest burden" to a "vulnerable debt ratio", No. 2, Retrieved June 5, 2022 from https://norges-bank.brage.unit.no/norges-bank-xmlui/bitstream/handle/11250/2558033/economic _commentaries_ 2_2016.pdf? sequence=1&isAllowed=y

Kohlscheen E., Murcia A., & Contreras J. (January 2018), Determinants of bank profitability in emerging markets , BIS Working Papers No 686, Monetary and Economic Department, Retrieved April 25, 2022 from https://www.bis.org/publ/work686.pdf

Michael Brei, Claudio Borio, Leonardo Gambacorta, (August 2019), Bank intermediation activity in a low interest rate environment, BIS Working Papers No 807, Monetary and Economic Department, https://www.bis.org/publ/work807.pdf

Official web-site of Central Bank of the Republic of Azerbaijan, Retrieved February 03, 2022 from https://www.cbar.az/page-40/statistical-bulletin

Official web-site of Ministry of Justice of the Republic of Azerbaijan, Unified electronic database of legal acts, The Chamber for Control over Financial Markets of the Republic of Azerbaijan, "Rules for the classification of assets and establishment of special reserves to cover possible losses", November, 16, 2018, http://www.e-qanun.az/framework/40823.

Official web-site of the Ministry of Finance of the Republic of Azerbaijan, Retrieved February 5, 2022 from http://www.maliyye.gov.az/static-page/periodic-reports.

Ostertagova, E. (2012). Modelling Using Polynomial Regression. Procedia Engineering. 48. 500–506. Retrieved April 03, 2022 from 10.1016/j.proeng.2012.09.545.

Palomino F., Stephen P., Ander Perez-Orive, Gerardo S. (2019). "The Information in Interest Coverage Ratios of the US Nonfinancial Corporate Sector," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, January 10, 2019, https://doi.org/10.17016/2380-7172.2290 On-line Avaialable: https://www.federalreserve.gov/econres/notes/feds-notes/information-in-interest-coverage-ratios-of-the-us-nonfinancial-corporate-sector-20190110.htm

Schönbrodt, F. (2016). Testing fit patterns with polynomial regression models. 10.31219/osf.io/ndggf ., Retrieved April 10, 2022 from https://www.psy.lmu.de/gp/download/schoenbrodt/pub/rsa5_journal.pdf

Sedláček, J. & Nemec, D. (2018). Interest and tax burden on corporations in the Czech industrial and banking sector after 2008. Review of Economic Perspectives. 18. 409-424. Retrieved May 06, 2022 from https://doi.org/10.2478/revecp-2018-0021

Stimson, J. & Carmines, E. & Zeller, R. (1978). Interpreting Polynomial Regression. Sociological Methods & Research - Sociol Method RES. 6. 515-524, DOI: 10.1177/004912417800600405. Retrieved February 13, 2022 from https://www.researchgate.net/publication/249693568

United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, & World Bank. (2009). System of national accounts 2008. New York: United Nations, Retrieved June 05, 2022 from https://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf

Vu Quang V. (2012). Income approach to GDP, and other issues relating to the compilation of household income and consumption expenditures, International Workshop on Household Income, Consumption and Full Accounting of the Households Sector Beijing, China 26-28 March 2012, Department Of Economic And Social Affairs Statistics Division United Nations, National Bureau Of Statistics Of China May 06, 2022 from https://unstats.un.org/unsd/economic_stat/China/GDI/GDP%20by%20income%20approach,%20household%20income%20and%20household%20sector%20accounts.pdf

ANNEX A

ANNEX A1. Heteroskedasticity Test: White

Heteroskedasticity Test: White*				
F-statistic	18.10075	Prob. F(33,2)		0.0537
Obs*R-squared	35.87986	Prob. Chi-Square(33)		0.3350
Scaled explained SS	17.53588	Prob. Chi-Square(33)		0.9874

* Note: Result of test concerning to Polynomial Regression Assessment of the Relationship between the Profit of the Banking Sector and the Interest Burden for the case study of Azerbaijan.

ANNEX A2. Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey*			
F-statistic	0.812855	Prob. F(4,31)	0.5267
Obs*R-squared	3.417409	Prob. Chi-Square(4)	0.4905
Scaled explained SS	1.670220	Prob. Chi-Square(4)	0.7961

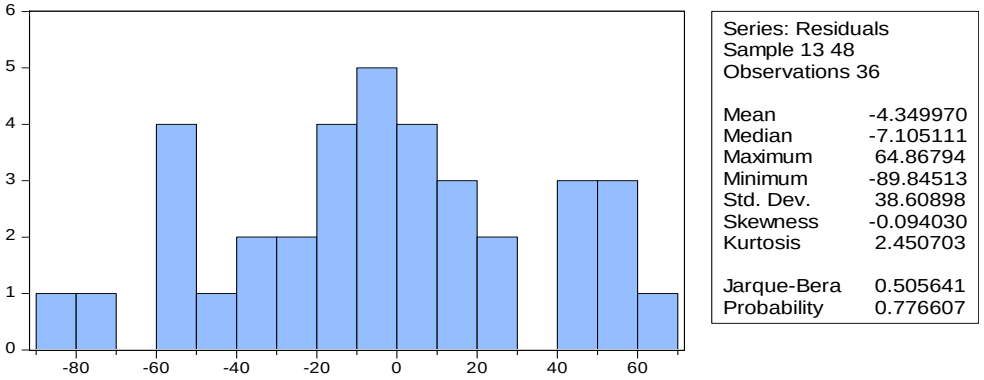
* Note: Result of test concerning to the Polynomial Regression Assessment of the Relationship between the Profit of the Banking Sector and the Interest Burden for the case study of Azerbaijan

ANNEX A3. Augmented Dickey-Fuller test statistic*

Null Hypothesis: RESID01 has a unit root				
Exogenous: Constant				
Lag Length: 7 (Automatic - based on SIC, max lag=9)				
			t-Statistic	rob.*
Augmented Dickey-Fuller test statistic			-3.947357	0.0054
Test critical values:	1% level		-3.689194	
	5% level		-2.971853	
	10% level		-2.625121	

* Note: Result of test concerning to the Polynomial Regression Assessment of the Relationship between the Profit of the Banking Sector and the Interest Burden for the case study of Azerbaijan

ANNEX A4. Normality test*



* Note: Result of test concerning to the Polynomial Regression Assessment of the Relationship between the Profit of the Banking Sector and the Interest Burden for the case study of Azerbaijan

ANNEX B

ANNEX B1. Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey**				
F-statistic	1.329063	Prob. F(6,23)		0.2845
Obs*R-squared	7.723523	Prob. Chi-Square(6)		0.2591
Scaled explained SS	3.641414	Prob. Chi-Square(6)		0.7251

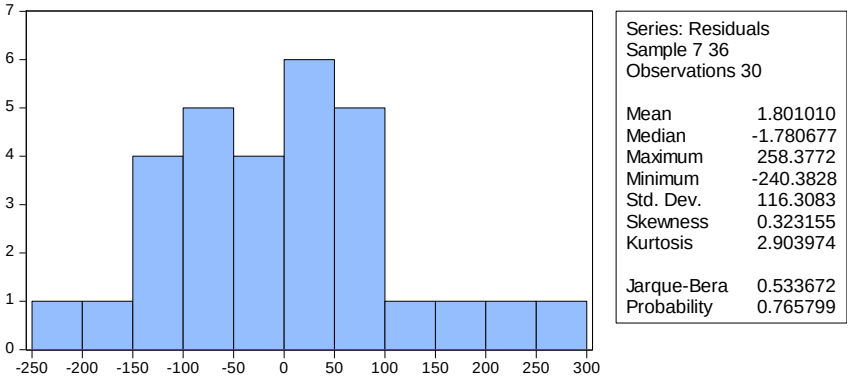
** Note: Result of test concerning to the Polynomial Regression Assessment of the Relationship between the Tax Revenues and the Interest Burden for the case study of Azerbaijan

ANNEX B2. Augmented Dickey-Fuller test statistic

Null Hypothesis: RESID04 has a unit root**				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=7)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.763734	0.0054
Test critical values:	1% level		-3.679322	
	5% level		-2.967767	
	10% level		-2.622989	

** Note: Result of test concerning to the Polynomial Regression Assessment of the Relationship between the Tax Revenues and the Interest Burden for the case study of Azerbaijan

ANNEX B3. Normality test**



** *Note*: Result of test concerning to the Polynomial Regression Assessment of the Relationship between the Tax Revenues and the Interest Burden for the case study of Azerbaijan