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Some Observations of Bank Interest Rates and The Impact of Negative Interest Rates

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Abstract

Objective: The purpose of the paper is to investigate the impact of the negative interest rate policy of the central banks on bank interest rates tracing the trendlines of interest rates of deposits and loans in short and midterm in Bulgaria and Germany. The current work aims to trace the power of the correlation between deposit and loans interest rates and to analyze the future perspectives of the monetary policy of the central banks in a situation of zero to negative interest rates. Methodology: The study examines 158 months data observations for interest rates on deposits with up to 1 and up to 2 year maturity and loans with maturity 1-5 years for households and for non-financial corporations in Bulgaria and Germany using descriptive statistics, correlation and regression analyses. Also, the correlation between deposit rates and credit card rates is studied. Results: It is found that there is a much stronger correlation between short term deposit interest rates and short to mid-term loans for non-financial corporations than for households in Bulgaria and Germany. Zero lower bound for interest rates in deposits in Bulgaria exists for deposits of households, where for a long period they stay on level of 0%. On the other hand, the zero lower bound breaks for non-financial corporations' deposits in Bulgaria just in the last year. The interest rates on deposits in both countries show rather low correlation impact on consumption loans for households. It is found that there is no or very weak correlation between deposit rates and credit card rates in. In general, the volume of deposits is not correlated to the interest rates. Implication: The study's results are beneficial indicator in terms of the existing negative interest rate policy and how it influences the nominal bank interest rates and how the deposit interest rates correlate to loans interest rates in a time of such policy. Important conclusions are made on a basis of the analysis in regard the future of the monetary policy in the beginning of one of the biggest crises the society has faced.

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INTRODUCTION

Following the financial crisis of 2007-2009 and measures taken by the central banks to help the economy, monetary policy rates crossed the zero-lower bound. Ever since 2014 when the first negative interest rates appeared discussions have been on for the impact and role of this unprecedent policy. The core theoretical assumptions are no longer in place as the relationship of interest rates with savings, lending, investment, pensions, etc. is no longer active. The psychological effect of negative interest rates is also important- it is hard and unlogic to be understood by people and even harder to be analyzed and researchers. Not only the appearance of negative interest rates is significant but nowadays it is rather the fact that they have been in place almost 6 years which means that living in a crisis conditions is a new normal.

Negative interest rates have various impact path. One of the strongest is the impact on savings. As stated in their report of Swiss Bank Association (SBA, 2019), Swiss pension funds will probably achieve zero or negative returns on their bond holdings, since they scored roughly 2.5% in CHF and 3% in foreign currencies between the beginning of 2009 and the end of 2018. Moreover, in the rise of the next crisis (COVID-19) it is important to know what the starting point is in which governments will have to apply new measures in order to smoother the impact of COVID-19 on the economy and help it to recover. The difference now with the crisis of 2007-2009 is that the current level of interest rates is negative or zero – for deposits and most of the government bonds. That means central banks will not be able to go further in the negative territory and will have to introduce different measures.

A variety of research has been done, and some of them achieve similar conclusions.

A central bank decreases the policy interest rates when aiming to decrease the rates on the debt, to increase the liquidity and borrowing facilities and thus to stimulate the consumption and investments, to lower the unemployment and boost the economic growth. The ordinary transmission channel of central bank monetary policy when lowering the policy interest rates would result in a lower cost for lending. However, up to 2014 it was generally been contended that the zero-lower bound (ZLB) of interest rate exists, e.g. that is the nominal interest rates down limit. They were not assumed to go into the negative area. That could be easily seen in all economic textbooks where all examples, formulas and theory is made through the assumption of a nonnegative rates. However, this myth is no longer actual. This phenomenon has appeared since 2014 by the actions of some central banks to decreases their policy interest rates below zero. Now, six years later, it seems like no perspective is on the way for going back in the positive interest rates area, moreover the unprecedent COVID-19 crisis that started in the beginning of 2020 is another reason for CBs to have expansionary policy.

Literature Review

There have been many discussion and doubts about the success of the negative interest rates policy (NIRP). The research in the area of negative interest rates gives a picture of the impact of this policy for the economy, which is an important ground for its further use. The research articles of this kind are usually on a country perspective investigating the impact of negative interest rate policy for different bank interest rates and economic indicators. The main direction of investigation is to observed the impact of negative interest rate on deposits and credit, also to see if there is a straight correlation between interest rates on deposits and credits, how that impacts banks' balance sheets and companies' balance sheets, also to trace the behavior of depositors and finally to find the total effect for the economy.

In their article Eggertsson et al. (2019) analyze the effectiveness of NIRP in stimulating the economy through the bank lending channel on the grounds of the Swedish banks. Some of the main conclusions that are made in that article argue that "deposit rates stopped responding to policy rates once they went negative and that bank lending rates in some cases increased rather than decreased in response to policy rate cuts." Another conclusion, that appears in other research, is that "once the policy rate turns negative, the usual transmission mechanism of monetary policy through the bank sector breaks down."

Once the deposit rate reaches its effective lower bound however, reducing the policy rate further is no longer expansionary. This makes the monetary policy inefficient which triggers the necessity of undertaking other actions for the central bank to reach its objectives.

ECB's research on euro area banks outlines interesting results (Altavila et al.,2019). Some of the finding show that "well capitalized and big banks can pass easier negative rates on to their corporate depositors without experiencing a contraction in funding and that becomes stronger as policy rates move deeper into negative territory." Altavila et al. investigated the impact of negative interest rate policy on companies' assets, which showed that these companies tend to decrease the amount of their current assets and to increase the one in tangible and intangible assets avoiding the costs. Other important conclusions of this investigation could be indicated too – authors have reported that "a corporate finance channel of

monetary policy also emerges below the ZLB. Firms that have relationships with banks that offer negative rates on deposits are more exposed to negative rates if they hold a lot of cash. These firms appear to lengthen the maturity of the assets to improve their profitability. Thus, they decrease their short-term assets and cash and increase their fixed investment."

The same paper states that interest rates became negative for around 5% of total deposits in the euro area where the share for the corporate deposits was 20%, as in Germany, these percentages are 15% and 50%, respectively.

Banks offering negative rates provide more credit than other banks suggesting that the transmission mechanism of monetary policy is not hampered. The negative interest rate policy provides further stimulus to the economy through firms' asset rebalancing. On the other hand, lengthening the term and increasing the leverage of the company's assets is correlated with a higher risk.

Kay (2018) summarizes key impacts of the negative interest rate policy for the financial stability which is another approach towards better understanding of this policy.

The more negative deposit rates stay lower, the stronger the substitution effect of deposits with cash will be. If this effect is large, then there may not be bills to satisfy the demand for cash. This may undermine confidence in financial institutions, which, though solvent, are unable to meet the demands for cash withdrawal (Kay, 2018).

Kay argues that the longer or deeper the negative interest rates go the more adhere market participants will be to replace deposits with alternatives. There are also controversial discussions and announcements in the media by some top management experts in the financial sector in regard of the effect and use of the negative interest rate policy. Negative interest rates could be a tax on banks, which in terns is paid by the business and individuals. On the controversary Mr. Mustier rather supports the NIRP because of their contribution to the eurozone economy and positive effect on bank "provisions" (FT, 1.10.2019). Some less immediately obvious problems stemming from very loose monetary policy is for example the huge build up in public and private debt across the developed world (the highest ever in peacetime) and the low quality of much of that debt (FT, 7.20.2019).

Hypotheses development and research methods

The questions that negative interest rates trigger are quite broad as they impact all market participants – banks, households, companies, government authorities. In this paper more accent will be put on deposit and loan interest rates for households and non-financial corporations. The main observed set of interest rates is for Bulgarian deposits and loans for the period of 1.1.2007 to 2.2.2020 and some observations for the Germany's interest rates on deposits and loans for the same period are done. Germany is chosen therefore to an ECB article (**Altavilla C. et. al**, 2019) where it is shown that impact of NIRP in Germany is rather stronger than in the other countries. In Bulgaria on the other side no negative interest rates for deposits of households are in place, though they are stuck on the 0 level.

The methodological approach is to test the correlation by multiple regression and to compare both countries, but not only comparative analysis is important, but a rather detailed analysis of the trendlines in Bulgaria for the levels of interest rates, as comparative analysis to be reliable should include also other factors which catch the differences in the researched economies. Data sets are taken from the websites of the Bulgarian National Bank and Deutsche Bundesbank.

RESULT

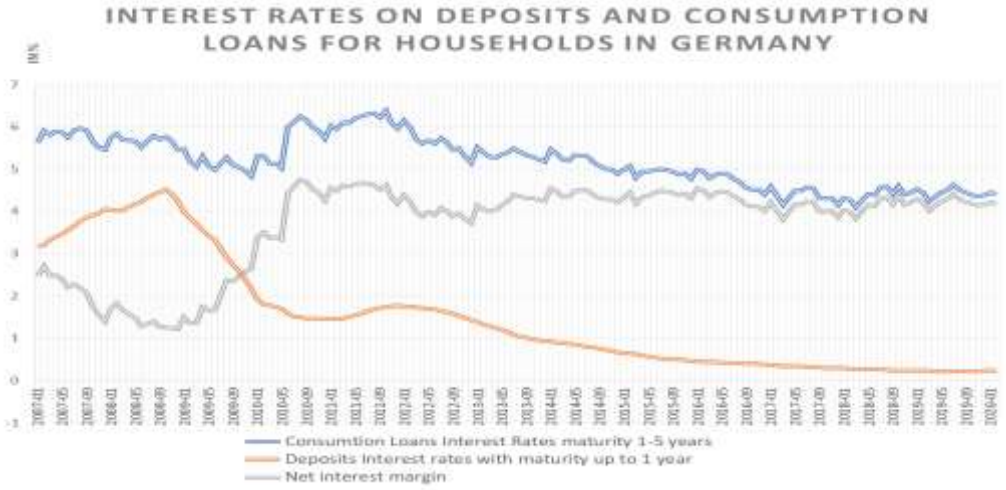
Altavilla C. et findings indicate in non-dependence of credit rates to deposit rates in some cases. This triggered interest to see what the correlation between deposit and loan interest rates is. As Bulgaria is not part of the ECB's survey a comparison is made about Bulgaria and Germany. Of course, for best results and conclusions more comparative analysis for more countries could be done, but that is part of a bigger survey, whit larger volume than the present paper. Here it is aimed to see what the interrelationships and characteristics of bank interest rates are and compare some of them with a sample country from the euro area.

Household deposits and loans interest rates

On Figure 1 and 2 information is given about deposit interest rates for households with maturity up to one year and household consumption loans interest rates with maturity from 1 to 5 years. For both deposits and loans is chosen a short to mid-term, where interest rates tend to be more sensitive to changes in market interest rates or policy interest rates also, they contain information on the events and shocks that

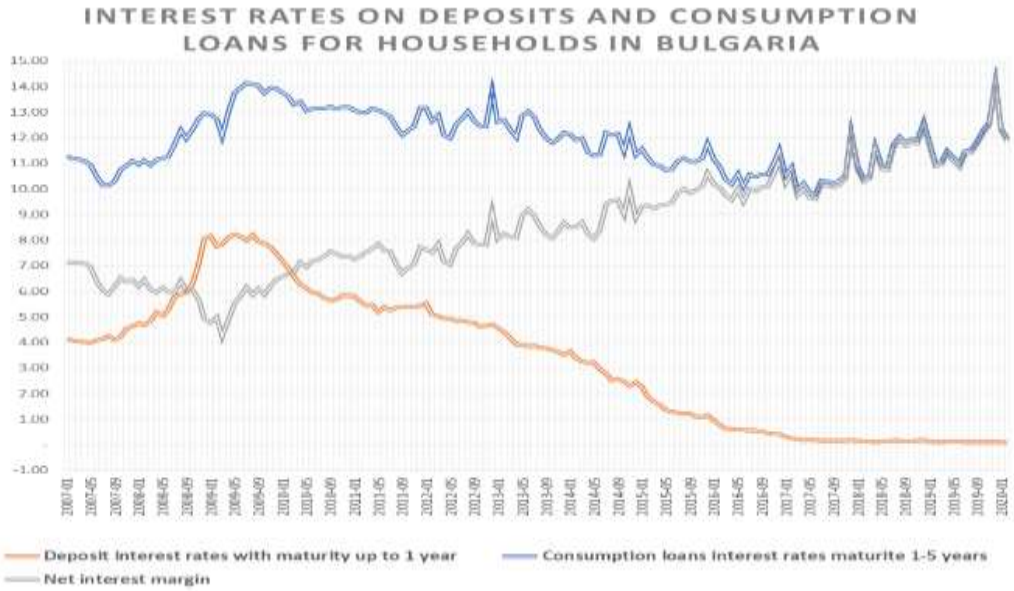
appear through the time. The deposits and loans for Bulgaria are in BGN currency on Figure 2. For the period of 2007-2020 the ratio between deposits in BGN and foreign currency in Bulgaria is approx. 57% to 43% as of all deposits (BNB statistics, self-calculations). The Bulgarian currency is fixed to the EUR with ratio 1,95583 BGN for 1 EUR, as the country is in currency board since July 1997.

Fig. 1



Source: Self calculations, Deutsche Bundesbank statistics

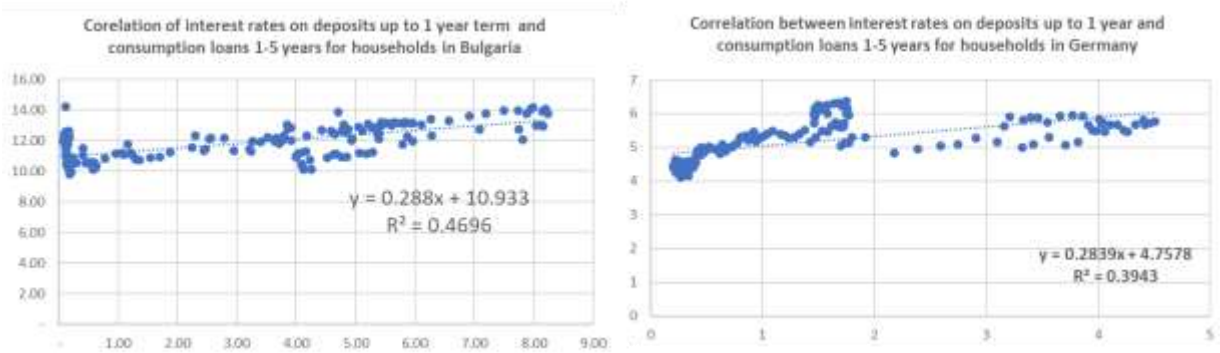
Fig. 2



Source: Self calculations, Bulgarian National Bank statistics.

From the figures above it could be clearly noticed that trendlines of German deposits and loans are similar as well as the net interest margin. Also, after 2014 the decrease in the deposit interest rates due to the negative interest rate policy are obvious as well as in the loans rates. On the other side, the picture in Bulgaria is slightly different. Since 2009 continuous decreasing trendline of deposit rates is observed reaching close to zero values once the Bulgarian National Bank (BNB) introduced negative interest rates on excess reserves in January 2016. Different trendline is observed about the household's midterm loans rates which show rather no trendline. This is proven from the increasing net interest margin between the two types of bank products. As a result, the consumption loans rates decreased slightly in comparison to the period 2008-2010 showing no obvious connection with the deposit rates. For more reliable results a statics analysis is made (Figure 3 and 4).

Fig. 3 Fig. 4



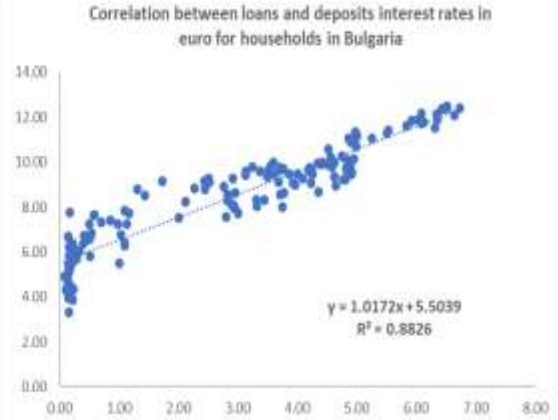
Source: self-calculations, Deutsche Bundesbank statistics, Bulgarian National Bank statistics.

As of the figures above the determination coefficient shows that stronger relationship between deposit rates and loan rates is observed in Bulgaria. However, it is evident that other factors are in place. Such could be based on the economic situation in loans rates, also banks could include more reserves for a negative future perspective on loan repayment and other factors that are included in the interest rate structure. For example, in 2014 there was a banking crisis, although passed without significant impact for the financial and economic stability it reflected on the short term indicators and triggered some short term events as a result, like a decrease in deposits and increase of cash, increase of bank reserves. Even though, it has cleared that banks are not in favor of decreasing the net interest margin which is straight correlated to their profit. On the other side, the lower decrease in loan interest rates in Bulgaria, shows that the negative interest rate policy does not necessarily impact on a lower cost of borrowing. Which means that regular monetary police transmission mechanism breaks. From the R2 indicator it can be observed that the correlation between interest rates on deposits and loans in Bulgaria is stronger than the one in Germany. One explanation is also the fact, that the starting point of the decrease in levels was different for the two countries, thus in Germany 0 or negative levels were reached much earlier.

On Figures 5 and 6 is given information about interest rates on deposits up to 1 year and consumption loans 1-5 term in EUR for households in Bulgaria.

Fig. 5

Fig. 6



Source: self-calculations Bulgarian National Bank statistics.

It is established that there is a strong correlation with high determination coefficient which explains the strong relationship between the dependent and independent variable. Comparing figures 2 and 3 with figures 5 and 6, where the same data for the same period but in different currency is given, it can be concluded that deposit rates impact much stronger loan rates in EUR, and also the net interest margin in EUR is slightly lower. In most of the investigated period the interest rates on deposits and loans in euro are lower than those in BGN, except for the period of 1.2017-2.2020 when rates in euro deposits are higher than those in leva. A significant difference is observed between the rates of loans in leva and euro, as the trendline is the gap between them to increase as of the end of the investigated period.

The impact of the negative interest rate policy could be observed in the sense that both euro and leva deposits rates in Bulgaria fall to values close to zero, as no negative rates are observed. That could be explained that the psychological zero lower bound exist for households' deposits, and, that banks could be afraid to cross that border on a country level.

Non-financial institutions deposits and loans interest rates

As Altavilla C. et. Al. (2019) findings showed, in Germany 50% of the number of corporate deposits have negative interest rate. For Bulgaria, in comparison to the households, the interest rates on deposits for non-financial corporations also have scored on the negative side for several months, most of them close to the end of the researched period (end of 2019 and beginning of 2020), counting that is a weighted average percentage for all banks (BNB, 2020), which means that majority of them offer negative interest rates for deposits of non-financial corporations. On Figures 7 and 8 a distribution of the weighted average interest rates on deposits and loans for non-financial corporation for the period 1.2007-2.2020 is presented.

Fig. 7

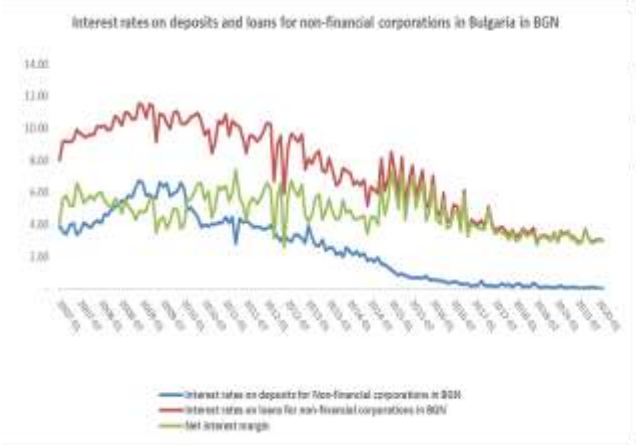
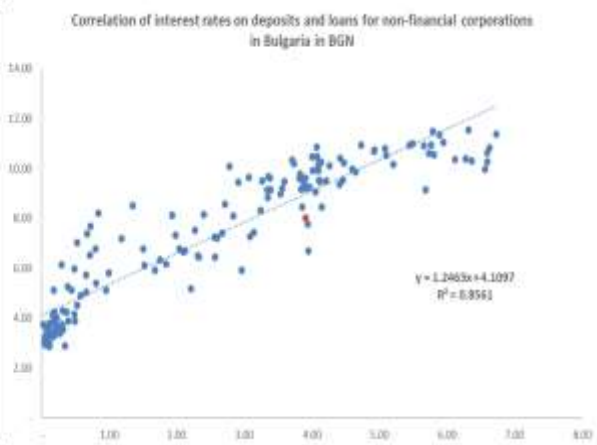


Fig. 8

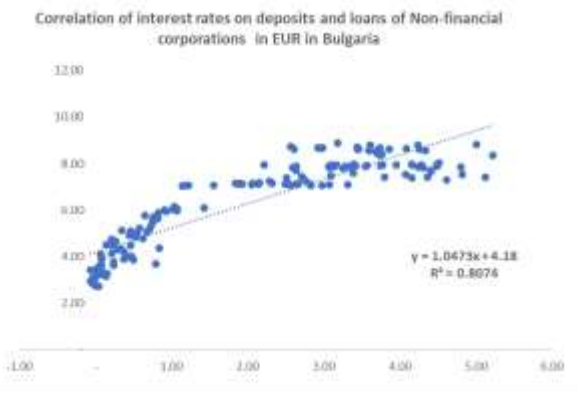


Source: self-calculations Bulgarian National Bank statistics.

If we compare it with the distribution and trendline for households it could be established that there is stronger correlation between the deposit rates and loan rates for non-financial corporations where the determination coefficient is 91,32%. Also, the net interest margin tends do decrease more than the one for households.

Fig. 9

Fig. 10



Source: self-calculations, Bulgarian national bank statistics.

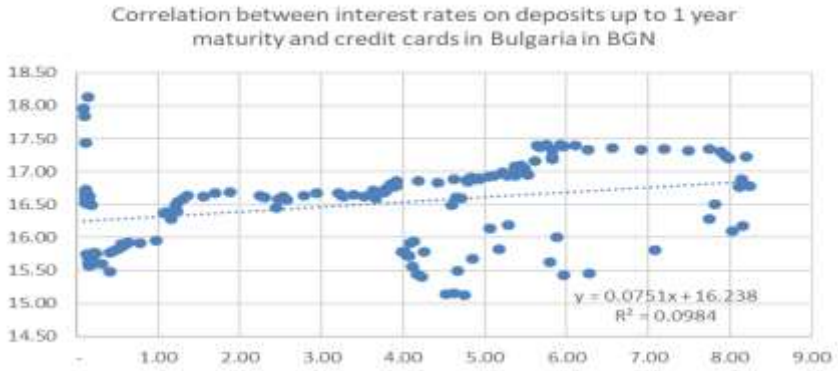
On Figure 9 and 10 information about the trendline and correlation in deposit and loans interest rates in EUR currency for non-financial corporation is given, where the determination coefficient show strong correlation.

The following conclusion could be outlined in the view of the above analysis. Zero lower bound for interest rates in deposits in Bulgaria exists for deposits of households, where for a long period they stay on level of 0%. On the other hand, the zero lower bound breaks for non-financial corporations' deposits in Bulgaria just in the last year. There is much stronger correlation between short term deposit interest rates and short to mid-term loans for non-financial corporations than for households in Bulgaria and Germany. Also, in terms of the currency of deposits and loans in Bulgaria, the one denominated in local currency

tend to have stronger correlation.

On Fig. 11 is given a correlation analysis of the relationships of deposit interest rates and credit cards interest rates for households in Bulgaria in BGN. It is observed a very low coefficient of determination which describes that just 9,8% of the value of the interest rates on credit cards is caused by the independent variable interest rates on deposits. Also, the data shows that there has been almost no change in the interest rates of credit cards which caused an increasing trendline in the net interest margin.

Fig. 11



Source: self-calculations, Bulgarian national bank statistics.

It is important also to see not only the impact of the negative interest rate policy on the interest rates of deposits and loans, but also on the volume of the deposits. The traditional monetary policy would expect that lower interest rates will lead to lower savings and higher debt and investments. For a long time, deposit volumes stop responding to the decreases in interest rates and that is easy to be explained. Cash funds are kept with banks as banks are now providing full monetary and payment services and are the main lending party on the market. They are the most regulated financial institutions with highest consumer credibility. Today this makes people to use banks not so much for savings as for an intermediary agent who provides them with all types of financial services that they need. Moreover, since most of the payment and transactions are now being done through electronic transfers or bank transfers this stipulates depositors to keep their funds in banks even if they do not receive any interest for that. That could be seen on the next Figure 12.

Fig. 12

Source: self-calculations, Bulgarian national bank statistics.

For the period of 2011-2.2020 the monthly growth rate of deposits in Bulgaria has mostly been positive and the nominal amount of deposits keeps increasing from 45 billion. BGN in the beginning of the period to 85,7 billion. BGN as of the end of 2019. This proves that money is not flowing out of credit institutions because of low or zero interest rates. However, it could be said that the down limit is reached. Banks could not further lower the interest rates on deposits and loans too if they could have done it already.

Another explanation for the increasing volume of deposits is the incentive to increase savings as a

reaction of decreasing profitability of investments.

Empirical results

The results of the regression analysis for the relation between interest rates on deposits and loans for non-financial corporations in Bulgaria (in BGN) for 158 months starting from January 2007 is shown on Table 1. The R^2 value is 0.8555 meaning that 85.5 percent of the total variance in the loan interest rates can been explained. The significant *F* statistic in ANOVA results indicate that the model is significant for our study.

The relationship between deposit and loans interest rates can be noticed from Table (1). The coefficients on independent variable (interest rates on deposits) is positive 1,24 and significant at 0.05 level.

Table 1. Deposits and loans for non-financial corporations in BGN in Bulgaria

Regression Statistics	
Multiple R	0.924950322
R Square	0.855533098
Adjusted R Square	0.854607028
Standard Error	1.065737802
Observations	158

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1049.2866	1049.285801	923.8321	2E-67
Residual	156	177.1843	1.135797062		
Total	157	1226.47			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4.149094966	0.133564	31.06455084	1.07E-68	3.885268	4.414922	3.885268	4.414922
X Variable 1	1.240376667	0.040809	30.39460666	2E-67	1.159767	1.320986	1.159767	1.320986

The results of the regression analysis for the relation between interest rates on deposits and loans for non-financial corporations in Bulgaria (in EUR) for 158 months starting from January 2007 is shown on Table 2. The R^2 value is 0.7349 meaning that 73,49 percent of the total variance in the loan interest rates can been explained. The significant *F* statistic in ANOVA results indicate that the model is significant for our study.

The relationship between deposit and loans interest rates can be noticed from Table (2). The coefficients on independent variable (interest rates on deposits) is positive 1,27 and significant at 0.05 level.

Table 2. Deposits and loans for non-financial corporations in EUR in Bulgaria

Regression Statistics	
Multiple R	0.857272
R Square	0.734915
Adjusted R Square	0.733216
Standard Error	1.23346
Observations	158

ANOVA

	df	SS	MS	F	Significance F
Regression	1	658.0006	658.0006	432.49	7.84601E-47
Residual	156	237.3421	1.521424		
Total	157	895.3427			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.933894	0.162413	24.2215	9.91E-55	3.61308065	4.254706	3.613081	4.254706
X Variable 1	1.272817	0.061204	20.79639	7.85E-47	1.15192204	1.393712	1.151922	1.393712

Discussion and conclusions

The global policy of low interest rates has also influenced the Bulgarian banking market, and a continues decrease since 2009 was at place till the beginning of 2020. The monetary policy of the BNB to charge negative interest on excess reserves of banks since January 2016 has led to deposit rates of 0 % for households and even negative for non-financial institutions. The study shown that interest rates on deposits impact the interest rates on loans both in local and euro currency in Bulgaria as shown by the numbers. It is concluded that joining the euro area lowers these interest rates (Gechev, R., Beev, I., Hristozov, Y.) However, zero lower bound exists for interest rates of household deposits and that one has still not been crossed. This could be explained by the fact that banks do not believe it is a right policy of crossing the ZLB and may be afraid of depositor's reaction and potential withdraw of deposits. The costs of negative interest rates are however compensated by banks through other channels like increasing fees on most of the bank services. Banks in Bulgaria have reported 1,6 billion leva net profit for 2019, besides the further decrease on excess reserves interest rates (ABB,2020, p.2).

Bulgaria in comparison to Germany has not crossed the ZLB for household's deposit rates but did do it for non-financial corporations. One of the reasons this could be explained is the fact that initially in 2007 and 2009 when the decreasing trendline started, the levels of interest rates in all products in Bulgaria were much higher than those of Germany, so that they had more value to lose until reaching the ZLB. From 7,24% in 2010 they went to 1 percent to 2016 (for short term deposits in BGN for households). Furthermore, after they reached 1 %, practically became zero for the last 2 years, they stayed at this level and no further changes are observed.

Contributions and future studies

The main question is if this policy of keeping for many years interest rates in the zero area is a good one. As it was quoted in the introduction there are different views of experts. Indeed, the low interest rate policy in the EU has led up to the end of 2019 to economic growth and low unemployment rates in most of the member states. But we must remember that this policy is a crisis policy and should be applied in a short time.

Now, the world has faced a crisis of a new scale – the COVID-19 pandemic caused an unprecedent shut down of whole sectors and made many people to stay home for months. The currents suggestions are that this will be may be a bigger crisis than all of those seen so far. The question is how central banks will react to that in the context of the current NIRP. They have voluntarily cut their further abilities to use the interest rates as a monetary tool as they have no more expansionary options when the rates are below zero. That will certainly make them think of other approaches of the monetary policy, but it will be difficult with the current interest rates. Very high probability is to observe an increase in the interest rates on government bonds, as the countries will have to borrow more to cover the budget deficit they will face caused to the lower revenues. The worse situation of state finances for all countries, and especially for those that have faced more sever Covid-19 crisis will lead to higher indebtedness and that will probably boost the interest rates up. In the next few years, the consequences of the NIRP will show its result.

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