Interest rate's determinants originating in the public sector

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Abstract: The sovereign risk premium has risen not only in Euro area, but also in non-Euro area member states of EU after COVID-19 pandemic.This paper uses the new Keynesian model to research sovereign risk channel. The model is changed for non-Euro area countries because there is no common monetary policy for Euro area. Due to this reason, the model applies separately for a single country. By to the low level of GDP per capita in non-Euro area states, the main purpose of economic policy for all of them is to achieve high economic growth reaching the average level shortly for the Euro area. Due to this, an important aim for these countries is for the sovereign risk to be kept at an optimal level.

Keywords: Mathematical and quantitative methods, Economic cycle, Fiscal policy, Interest Rate Determination, Post Keynesian

JEL: C13, E12, E32, E43, E62

Introduction

In the new Keynesian model, the government spending influences on economic activities through different channels. First, the public expenditure adds directly to the aggregate demand and it is positive impact. Second, by high economic activity the marginal costs and inflation increase. By the constant nominal interest rate, real such declines and private expenditure rises. Third, the fiscal policy also has an effect through the sovereign risk channel. The high government spending could raise the deficit, the debt and thereby increases interest rate spreads. This paper researches only sovereign risk channel and try to give a proof for the impact of high sovereign risk on the spread between credit and deposit interest rates in non-Euro area member states of EU. Until now the sovereign risk is researched for the countries in Euro area (P.R. Lane(2012) as well as ECB(2012), IMF(2013), Annika Westphal(2015) and Aymeric Ortmans & Fabien Tripier(2021)).

The economies with weaker fundamentals depend on the fiscal policy made. There are two possibilities:

- To make precautionary fiscal policy to keep government debt on optimal level by this amount of Gross Domestic Product (GDP) ensuring stable conditions on the market and do not raise risk premium for the business;
- To raise government debt, to elevate the sovereign risk and after it, risk premium, to increase the cost of lending and reduce the aggregate demand in the economy.

The theoretical framework of this paper is New Keynesian model considered by Corsetti, Kuester, Meier and Muller (2013). In the model government debt is not risk – free, the sovereign risk premium increases and fiscal outlook of country deteriorates. In the same time, the private sector credit spread rises with higher sovereign risk, because worsening public finance increases the costs of financial intermediation. The link between sovereign risk and private spread creates a “sovereign risk channel” for the transmission of macroeconomic shocks. This channel is not so important by the stable situation, but when government debt increases, the borrowing costs rise due to the high risk and private credit becomes more expensive. For the Euro area is confirmed by an increase of sovereign risk premium related raises the private sector risk premium.

The literature so good explains a sovereign risk channel. Neri (2013) and Neri et. al. (2013) estimates between April 2010 and the end of 2011, the sovereign spread in the crisis countries led to an increase of borrowing costs for nonfinancial firms and households by 130 and 60 basic points, respectively. For Italy (the largest of stressed economies) Zoli(2013) finds that some 50-60% of increase of sovereign spread is transmitted to firms borrowing rates.

For the economics with weaker fundamentals like in the countries in non-Euro area, we accept different criteria for the level of government debt compared with such in Euro area (for the stressed economies in Euro area – exceed 125% of GDP and more than 90% for other countries in Euro area). The level of government debt that influences on the cost of private lending is lower. It requires additional research to define exactly the stressed level of government debt. The macroeconomic stability depends on fiscal policy, public spending and government debt. Some more by the different monetary regime as a Currency Board (like in some EU countries), when there is not active monetary policy and its policy does not add the effect to fiscal one ensuring stable economic development.

The different stages of impact by increasing government debt are:

Government debt ↑ **=>** Risk in the economy ↑ **=>** Risk premium ↑ **=>**

=> Cost of lending in private sector ↑ **=>** aggregate demand ↓ **=>**

=> aggregate supply (GDP) ↓

Limitations of the research

- By the research is used the data for deposits and credits of nonfinancial firms and of households in Bulgaria quarterly, their average interest rates for all maturities, without accumulation for the period 2014 – 2022;
- By the research is used the data for new issued government securities annually and average annual rate of return for the period 2014 – 2022;
- An average yields are calculated by the using such realizing by every auction and multiplied with an amount of government securities by this yield and after it is collected annually;

- To calculate the depend variable in one of equation – wealth - we use the GDP, because it shows the change of disposal wealth in the economy during the year;
- The impact of increasing sovereign risk is measured through the change of spread between lending and deposits interest rates noting the conditions to be changed the aggregate demand, respectively the GDP.

Model

It is tested the model considered by Corsetti, Kuester, Meier and Muller (2013 – already cited) adjusted for the conditions in the non-Euro area economies. It is noted, due to the lack of data of national statistics, we not able to test all functions concerning the model above.

$$1+w_t = \frac{1+ibt}{1+idt} \quad (1)$$

where

w_t - spread between lending and deposit rates

i^b_t - average bank credit rate in the current quarter

i^d_t – average bank deposit rate in the current quarter

$$A_t = a_1 + a_2 S^f_{t-1} (1+ i^{dep}_{t-1}) + a_3 S^h_{t-1} (1+ i^{dep}_{t-1}) + e \quad (2)$$

where

S^f_{t-1} - nonfinancial firms deposits at home banks at the end of previous quarter

S^h_{t-1} - households deposits at home banks at the end of previous quarter

i^{dep}_{t-1} - interest rates of nonfinancial firms or households deposits average for previous quarter

Third part of model researches how the government debt in the current quarter depends on such in previous quarters, because the payments of collateral and of interest and also from total debt and average yield of new issues. It requires because the weaker fundamentals of budget constrain in the countries in non-Euro area and short maturity of government securities sold, which could influence on the government debt in the current quarter and expands sovereign risk. Due to this the sovereign risk in the future depends on the fiscal policy in the current quarter.

$$B^g_t = a_1 + a_2 B^g_{t-1}(1+ i^g_{t-1}) + a_3 B^g_{t-2}(1+ i^g_{t-2}) + a_4 B^g_{t-3}(1+ i^g_{t-3}) + a_5 TDEBT_t + a_6 AvRR \quad (3)$$

where

B^g_t – new issued government debt in the current year

B^g_{t-1} –new issued government debt in the previous year

B^g_{t-2} – new issued government debt in two years before

B^g_{t-3} – new issued government debt in three yearss before

i^g_{t-1}, i^g_{t-2}, i^g_{t-3} – average yield of new issued government debt for the quarter

TDEBT – total debt to end of current quarter

AvRR – average yield of new issues

Financial intermediation

Savers and borrowers have access to area – wide perfect competitive intermediaries. The banks accept risk – free deposits, paying the interest rate i^d_t . The borrowing depends on the price of resources and the amount of saving. The lender pays the interest rate i^b_t.

It is tested the first part of the model considered by Corsetti, Kuester, Meier and Muller (already cited) to measure the sovereign risk. The spread between credit and deposit interest rates is calculated according the formula: $1+w_t = \frac{1+ibt}{1+idt}$. By the calculation of the spread we use the average rates for credits and deposits with all maturate. First, to calibrate the sovereign risk, the research estimates the sprea firms in non-Euro area country – the case in Bulgaria. During the period 2014 -2023 we distinguish three stages in economic activities in the country – first – before COVID 19 pandemic, second – period of COVID 19 and the recession due to it and third – period of slowly recovery in supply chain and in the world economy. We accept that banks take only free – risk deposits (as in the model above) and the spread between lending and deposit interest rates shows the change of risk. Because the different data, we calculate separately the spread for the households. As it was written above, due to the low level of GDP per capita in non-Euro area states, the main purpose of economic policy for all of them is to achieve high economic growth reaching the average level in near future for the area. Due to this, it is important sovereign risk to be kept on optimal level.

By the calibration for firms, for the first stage (see above) – the spread moves from 2.9317 in the beginning of 2014 to 3.2684 in the fourth quarter 2019. The increase is small; the risk keeps on constant level. This period characterizes with:

- For the real sector – the reduction of the risk;
- For the banks - with huge amount of disposal resources and restrictive credit policy.

During the second stage – world and Euro area recession due to COVID 19 – the spread between credit and deposit interest rates changes in small dimension – from 3.0571 in the beginning of 2020 to 3.4946 in fourth quarter 2021. The differences is only 44 basic point.

- For the real sector – As it is usual for the recession period, there are not many projects with enough rate of return and firms realize precautionary investment policy. It keeps the demand for bank lending (noted again – most of non-Euro area countries characterized with undeveloped financial markets and bank lending is main source of funds);
- For the banks – the credits are only to balance incoming and outgoing cash flows for firms and household. Due to uncertainly the business do not look for borrowing for investments.

By the third stage – after Euro area slowly recovery – it is noted spread between credit and deposit interest rates decrease with 99 basic points for the period from first quarter 2022 until fourth . We look for the reason for such risk.

- For the real sector - it is observed smooth recovery.

- For the banks – the deposits are raised for the last years and intermediaries have the recourses to finance real sector; An decrease of spread between credit and deposit interest rates probably depends on slowly recovery.

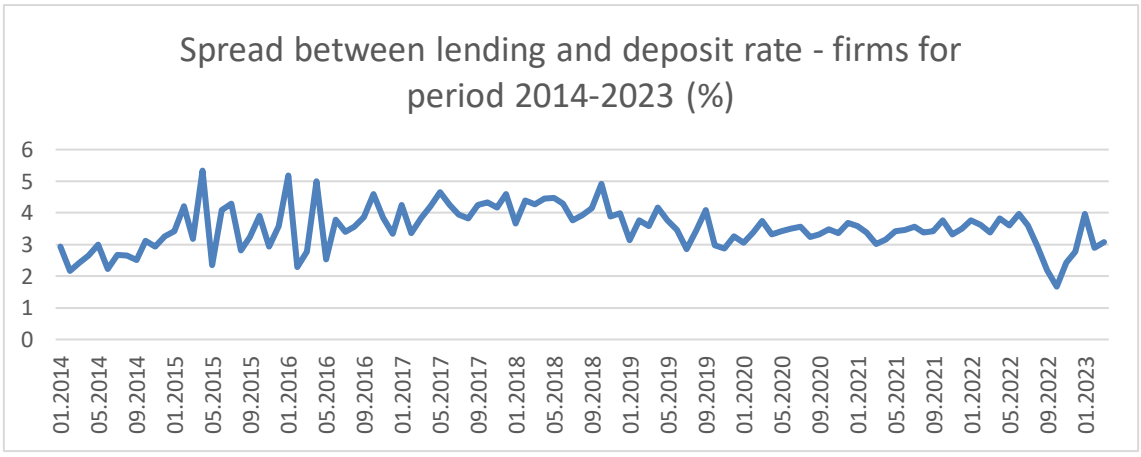
By the testing the model for households, we calculate the spread between credit and deposit interest rates for all maturates. For the first sub-period the spread is smaller compared with such for nonfinancial firms. The reasons for this situation are probably:

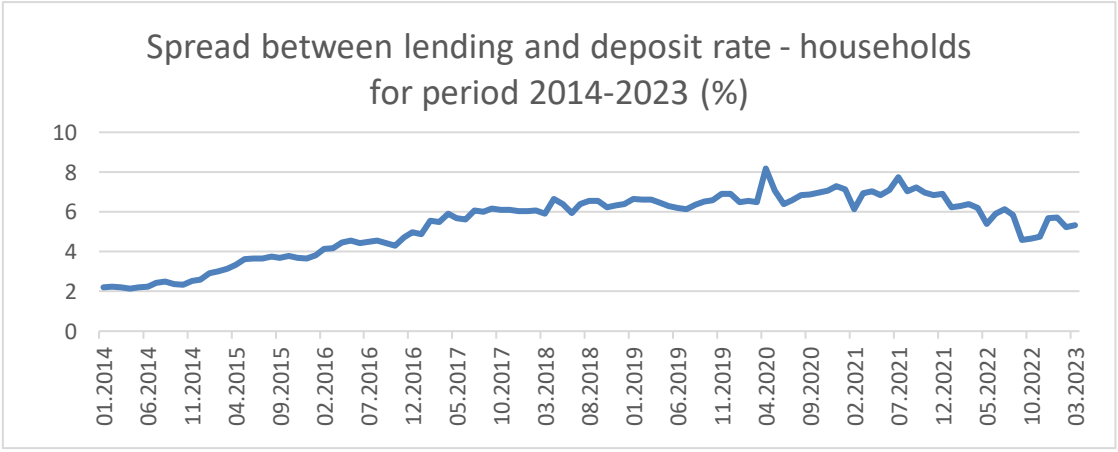
- For households – consumer credit demand increased, but the risk in the side of households keep on the same level;
- For the banks –as we noted above, the disposal recourses are on high level.

After it the spread for households has risen. For the period from first quarter 2017 until fourth such 2019 – the spread changed from 4.8821 to 6.9025. Due to slowly recovery in the economy, the households do not increase the demand for lending by the banks. The intermediated institutions dispose with liquidity resources. The equilibrium level of interest rate on this market is not changed. Due to this, probably an increase of spread depends on the sovereign risk.

Below is presented the spread between lending and deposit rates for firms and households in the case of Bulgaria:

Figure 1 Spread between Lending and Deposit rate – firms and households





Financial conditions and policy measures in non-Euro area

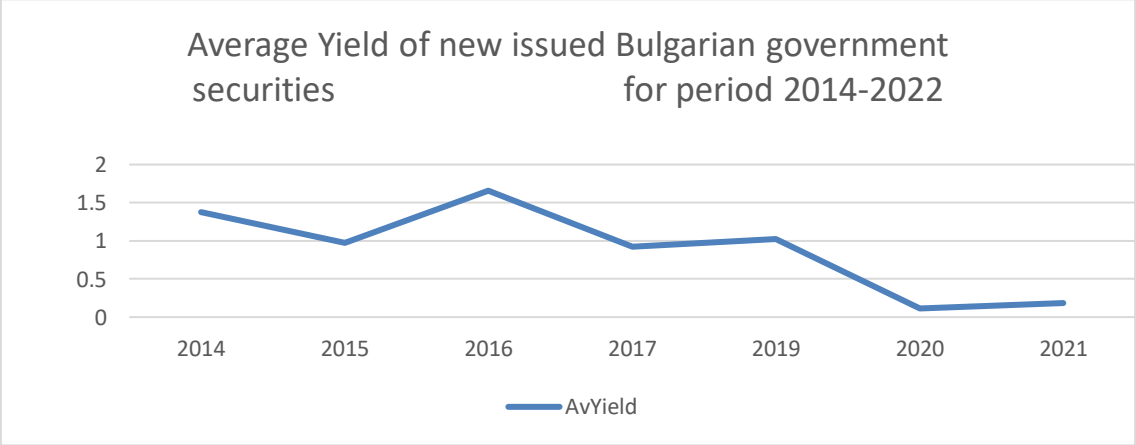
Our example for non-Euro area is Bulgaria. The situation in a country is more specific, there is not typical Central Bank. The monetary institution works by the rules of Currency Board and is not able to make active monetary policy to smooth imbalances in the fiscal policy.

To estimate of sovereign risk , on the first stage we need to investigate the maturity structure and average yield of issued and sold Bulgarian government securities for the period 2014-2022, after it to evaluate the sovereign risk. The change of such risk influences on economic conditions. An increase raises the price of money, deteriorates investments, consumer expenditure for durable goods and net export and reduces the aggregate demand and finally - the aggregate supply (GDP).

During observed period (2014 – 2022) are noted several stages in the world economy (see above). First stage is until world financial crisis.

To estimate average yield, we could be interested about the maturities of new issued government securities, because it defines average yield for every issue. According the maturities we distinguish several periods: first – from 2014 until 2017 with very actively using of government securities with maturity 3 - months, 3-,5-,10- years. Second, by the using the government securities with more long maturity – 1- and 1,5 year, 10- and 15-years. It has some positive effects. Because long maturity, there are not payment of collateral in near future and it make possible to be realized an increase of public spending. During the recession, when private expenditure decreases, to keep the aggregate demand on high level, respectively the value of GDP, it could replace by an increase of public spending. The negative point is higher price of accumulated funds and on every stage stays this question what to be chosen between these alternatives. After 2019, the new issues government securities characterizes with long maturity with relatively low yield. By this distribution of maturities, average yield of new issued government securities is presented graphically below.

Figure 2 Average Yield of New Issued BGS



Source: Bulgarian Government Ministry of Finance (2021)

$$A_t = a_1 + a_2 S^{f}_{t-1} (1+ i^{dep}_{t-1}) + a_3 S^{h}_{t-1} (1+ i^{dep}_{t-1}) + e \quad (2)$$

By the testing the model we calculated following results:

Table 1 Correlation coeficiants – Deposits

	A_t
A_t	1.00
$S^{f}_{t-1} (1+ i^{dep}_{t-1})$	1.609
$S^{h}_{t-1}(1+ i^{dep}_{t-1})$	-0.691

Source: own

The statistical analysis shows the correlation coefficients are significant. The coefficient of determination is close to 0.9, which is evidence for stable relation between dependent and independent variables. The economic analysis notes strongest influence of saving of firms on the change of wealth in the current quarter. The calculated correlation coefficient between A_t (GDP) and saving of households in developed countries is positive. The coefficient calculated for Bulgaria is negative and probably shows the short time horizon of economic agents in non-Euro area countries. The economic analyze shows bank accumulate enough resources and they could reduce the interest rate of credits and as a result the spread between interest of deposits and credits.

By the testing of third equation are calculated following results:

$$B^{g}_{t} = a_1 + a_2 B^{g}_{t-1}(1+ i^{g}_{t-1}) + a_3 B^{g}_{t-2}(1+ i^{g}_{t-2}) + a_4 B^{g}_{t-3}(1+ i^{g}_{t-3}) + a_5 TDEBT_t + a_6 AvYield \quad (3)$$

Table 2 Correlation coefficients – Sovereign Debt

	B^{g}_{t}
B^{g}_{t}	1.00
SDtotal	0.685
AvYield	-0.754
$B^{g}_{t-3}(1+ i^{g}_{t-3})$	0.742

Source: own

The impact on new issued government securities is stronger for two previous periods only for first two years from observed period due to probably the short maturates. According the results, strongest impact on B^{g}_{t} has the variable three periods before, because usually the maturity is longer than 5 years for the years after 2015. Also strong impact it found for the government total, probably due to refinance previously used security credits. The price of borrow has strong impact on new issued securities, but for the last years the average yield is low and this price of money do not cause the redaction of new issued government securities.

Conclusion

During the period 2014 -2023 we distinguish three stages in economic activities in the country – first – before COVID 19 pandemic, second – period of COVID 19 and the recession due to this and third – period of slowly recovery in supply chain and in the world

economy. By the calibration for firms, for the first stage - the spread between credit and deposits interest rates increases very small. During the second stage – world and Euro area recession due to COVID 19 – the spread between credit and deposit interest rates changes in small dimension. By the third stage – after Euro area slowly recovery – it is noted spread between credit and deposit interest rates decrease with 99 basic points for the period from first quarter 2022 until fourth. The spread between credit and deposit interest rates do not depends on the sovereign risk. By the testing the model for households, we calculate the spread between credit and deposit interest rates for all maturates. For the first sub-period the spread is smaller compared with such for the firms. After it the spread for households has risen. For the period from first quarter 2017 until fourth such 2019 – the spread changed from 4.8821 to 6.9025. Due to slowly recovery in the economy, the households do not increase the demand for lending by the banks. The intermediated institutions dispose with liquidity resources. The equilibrium level of interest rate on this market is not changed. Due to this, probably an increase of spread depends on the sovereign risk.

The intermediated institutions dispose with liquidity resources. The equilibrium level of interest rate on this market is not changed. Due to it, an increase of spread depends on the sovereign risk. Because the low level of GDP per capita in non-Euro area states, the main purpose of economic policy for all of them is to achieve high economic growth reaching average level in near future for the Euro area. Due to this, important aim for these countries is the sovereign risk to be kept on optimal level.

References

1. Acharya, V.V., Drechsler,I and Schnabl, P., (2013), " A Pyrrhic Victory? Bank Bailouts and Sovereign Credit Risk ", mimeo, NYU – Stern
2. Annika Westphal,Systemic Risk in the European Union: A Network Approach to Banks' Sovereign Debt Exposures, Int. J. Financial Stud. 2015, 3(3), 244-279; https://doi.org/10.3390/ijfs3030244 - 23 Jul 2015
3. Assenova, Silvia,(2023), Metodology for optimizing of route network in the sity, International Journal Knowledge, Vol 60(3), p.497-502, ISSN 2545-4439(print) 1857-923X(e-version)
4. Aymeric Ortmans , Fabien Tripier , COVID-induced sovereign risk in the euro area: When did the ECB stop the spread?European Economic Review, 137: 103809, 2021 https://doi.org/10.1016/j.euroecorev.2021.103809
5. Bulgarian Government Ministry of Finance, "Government debt – Annual Report of Government debt - 2014-2021" (quarterly), www.minfin.bg
6. Bulgarian National Bank, "Statistics – Monetary statistic – 2014-2023" (quarterly), www.bnb.bg
7. Corsetti,G.,Kuester,K., Maier,A., Muller,G, (2013), " Sovereign Risk, Fiscal Policy and Macroeconomic Stability", IMF, Working paper 13/227
8. ECB, Financial Stability Review, December 2012,, Frankfurt am Main, Germany, ISSN 1830-2017 (print) ISSN 1830-2025 (online)
9. IMF, Global Financial Stability Report, April 2013, Washington D.C., ISBN 978-1-47558-958-0 (paper)

10. Lane, P.R., (2012)" The European Sovereign Debt Crisis", Journal of Economic Perspectives, 26(3), p. 49-67, ISSN 0895-3309 (print); 1944-7965 (web)
11. National Statistics Institute, "Statistics – Macroeconomic indicators – 2014-2022" (quarterly), www.nsi.bg
12. Neri,S., (2013), " The impact of the Sovereign Debt Crisis on Bank Lending Rates in the Euro area", mimeo, Banca d'Italia
13. Neri, S. and Ropele,,T.(2013)," The Macroeconomic Effects of Sovereign Debt Crisis in Euro Area", mimeo, Banca d' Italia
14. Zoli, E., (2013), "Italian Sovereign Spreads: Their Determination and Pass – through to Bank Funding Costs and Lending Conditions", IMF, Working Paper 13/84