

DOI: 10.7251/EMC1902352J

Datum prijema rada: 25. oktobar 2019.

Datum prihvatanja rada: 12. decembar 2019.

UDK: 336.71:339.923(497.6)

Časopis za ekonomiju i tržišne komunikacije

Godina IX • broj II

str. 352-367

PREGLEDNI NAUČNI RAD / OVERVIEW SCIENTIFIC PAPER

# THE VIENNA INITIATIVE AS AN EXAMPLE OF CROSS-BORDER POLICY COORDINATION – CASE OF BOSNIA AND HERZEGOVINA<sup>1</sup>

**Dragan S. Jović** | Associate Professor, PhD; Central Banka of Bosne and Hercegovine, Sarajevo; draganjovic@blic.net.

***Abstract:** At the very beginning of global economic and financial crisis, foreign capital started to withdraw from banking sector of Bosnia and Herzegovina. There was a huge danger that the domestic banking sector would suffer great instability due to high exposure to foreign investors. The big part of foreign funds was in the form of hot money, and the European banks highly exposed to Central and Southeast Europe had to act. EBRD and IMF launched a rescue plan aimed to slow down the deleveraging process and to preserve financial stability. The foreign banks promised that the pace of funds withdrawal would be accommodated to the preserving of home countries financial stability. The meeting about this issue was held in Vienna, which is an international banking hub for part of Central and especially for Southeast Europe. According to the meeting's place, rescue plan got the name Vienna Initiative (VI). VI was a cross-border activity with the final aim to reduce systematic risks appeared because of the withdraw of foreign capital from BH banking sector. In this view, VI was specific macroprudential tool for keeping financial stability. In addition, in a broader view, it was cross-border macroprudential policy coordination plan. For Bosnia and Herzegovina, the Vienna Initiative came in the right moment. Without VI it would be very hard or maybe even impossible for Bosnia and Herzegovina to preserve financial stability and to prevent the balance of payment crisis, and even currency crisis and banking crisis. Thus, in the case of BH, VI was very successful cross-border policy coordination due to the large exposure of domestic banking sector to the foreign investors. At the pick of crisis foreign liabilities of BH banking sector were 6 billion BAM (12/2008) i.e. 32,5% of total liabilities or 29% of total asset. All developed models show that foreign liabilities have a great influence on loans, deposits, and industrial production. The unexpected fall in foreign liabilities would have adverse and very strong effects on deposits, loans, and industrial production. All models show that foreign liabilities significantly affect economic and financial activity in Bosnia and Herzegovina. We used different techniques to show influences of foreign liabilities on domestic variables; Vector autoregression in level and in differences, Vector error correction model, Conditional VAR, and multiple regression models. All models show that in case of disorderly withdrawal of for-*

<sup>1</sup>The views expressed are those of the author and do not represent the views of the institution in which he is employed

*ign funds, fall in industrial production, deposits, and loans would be much higher than in the case when VI is applied. The main conclusion of the article is that VI helped BH to avoid huge and long negative credit growth i.e. credit crunch, and to avoid deeper economic crisis.*

**Key words:** *Vienna Initiative, cross-border macroprudential policy coordination, Bosnia and Herzegovina, VAR.*

## INTRODUCTION

As almost in all countries in *SEE* (South East Europe) the credit growth in Bosnia was also driven by the foreign inflow of money and capital. Bosnian banking sector owned to foreign investors 6 billions BAM which was around 25% of GDP. From December 2002 to December 2008 exposure to foreign investors rose for 3,34 times. Such structure of banking liabilities made domestic banking sector highly vulnerable to unexpected withdraw of foreign funds. The outbreak of financial crisis, especially Lehman Brother bankruptcy, increased liquidity risk, and also solvency in some domestic banks.

At the initiative of European banks (highly exposed to Central and South East Europe worried for not only for their investment but also for financial stability in home countries) EBRD and IMF launched some kind of rescue plan/program aimed to slowdown deleveraging process and keep financial stability. It got name according to the place of meeting, Vienna Initiative. Five countries participated at the very beginning of this program; Bosnia and Herzegovina was among them. In short, foreign banks promised that they would keep their exposure to these countries, or in other words they promised that the pace of withdrawal of fund will be accommodated to the preserving of home countries financial stability. In this sense, *VI* was some kind of cross-border macroprudential policy coordination plan.

Foreign banks have been present in banking sector of Bosnia and Herzegovina through so-called foreign liabilities of banking sector of Bosnia and Herzegovina (BSBH), which are our major variable of interest. These foreign liabilities are composed from foreign deposit and foreign credits provided to BSBH and these funds are claims of foreign banks on BSBH. This research tries to answer the question if *VI* in the case of BH was successful or what would happen without *VI*. The central point of this research is estimating banks' foreign liabilities influence on major BH banking and macroeconomic variables. Our working thesis is that *VI* helped Bosnia to preserve financial stability and to avoid credit crunch.

In the first part of research we give short literal review, followed by explanation in methodology. After that, we present the central part of research – results and discussion. Conclusion and references are at the end of the research.

## LITERARY REVIEW

We did not find any article regarding *VI* by Bosnian authors. Obviously, this topic was not interesting for domestic authors. There is one article (Jović & Jandrić, 2016) which analyzed the determinants of credit growth in Bosnia but it did not include foreign liabilities. Main findings of this article are as follows: 1) NPL and deposits on bank level, nominal GDP growth and inflation have biggest impact on credit growth 2) Credit growth is under direct and strong influence of global crisis and ECB monetary policy, and the influence of these variables comes with time lag. Authors, also, found that increase in capital ratio had positive impact on credit growth, and vice versa. The most comprehensive research of this kind of cross border policy coordination (De Haas, Korniyenko, Loukoianova, & Pivovarsky, 2012) was devoted to two issues and one of them was Vienna Initiative (*VI*). Authors analyzed how bank and *VI* affected credit growth during the 2008-2009 crisis. Main findings of this research is that foreign banks like domestic banks immediately reduced credit during the crisis but foreign banks that signed *VI* were on average stable lenders.

Many articles research determinants of credit growth or credit but *VI* is missing because this was a mainly European regional plan. Some of the articles of this type (Plekhanov & Skzypinska, 2018) have investigated the connection between non-performing loans (NPL) and cross-border spillovers, and influence of NPL on credit growth (Alihodžić & Halil Eksi, 2018). One research (Lane, Philip R, 2012) found that financial globalization had a different impact on different countries. In some countries, it provided a buffer against the crisis, and in another, it amplified the crisis. One author (Wosko, 2015) used panel data to forecast credit growth, while another (Kochler, 2012) showed that banks with high rates of credit growth are riskier. For Philippines and Asia is proved (Tan, 2012) that there is no strong direct connection between deposit growth and credit growth, and using VECM methodology two authors (Shijaku & Kalluci, 2013) found the cointegrating relationship between real bank credit growth to the private sector on one side and real GDP, net wages, financial liberalization indicators, exchange rate and NPL on another side (for Albania).

## METHODOLOGY AND DATA

In order to estimate the impact of *VI* on Bosnian banking sector and financial stability we used several (four) different methodologies, taking into account the interdependence between all key variables influenced by *VI*. All models are multivariate time series models. The first used model is VAR or unrestricted VAR which is used for the unconditional forecast. We have chosen VAR in level despite the fact that variables are nonstationary. Some authors<sup>2</sup> recommend performing VAR with nonstationary variables. This kind of approach is supported by the fact that information are lost by doing transformation (for example VAR in difference). Due to nonstationarity we checked for cointegration and used VEC. In both cases (VAR in level and VEC) for purpose of identification we have used Cholesky decomposition in order to construct impulse response function. All models we developed are stable<sup>3</sup>.

Also, two regression models are developed in order to estimate impact of foreign liabilities on loans. At the very end of the research we constructed Bayesian VAR in order to make conditional forecast and to answer question what would happen with loans, deposits and industrial production in 2010 in the case of extremely adverse scenario in which foreign liabilities fall for 20%, 30% and 40% i.e. in the case that *VI* was absent. The methodology of conditional forecast has been explained in details in Alistair Dieppe, Romain Legrand and Björn van Roye (2016).

Quarterly data (nonperforming loans, capital ratio) are transformed in monthly data by applying linear transformation. Our VAR models are composed from five or six endogenous variables, and/or theirs log transformation: foreign liabilities (*fl*), foreign asset (*fa*), loans, deposits and nonperforming loans (*npl*). Exogenous variables in VAR were constant, linear trend. Two kinds of dummies are used, one to mark Lehman Brothers bankruptcy (9/2008), and second one for change in foreign investor sentiment i.e. the start of withdrawal of foreign deposits and loans from domestic banking sector (01/2009).

In all models estimation sample is from 02/2006 to 12/2017 except in BVAR with estimation sample from 02/2006 – 12/2009. The list of used abbreviations is given below.

2 Enders, Walter. 2009. Applied Econometric Time Series. John Wiley & Sons, Inc.

3 The roots of the company matrix (Inverse Roots of AR Characteristic Polynomial) are eigenvalues. In order for the VAR model to be stable, the eigenvalues must lie within the unit circle. VEC model like VAR model should satisfy this condition.

**Table 1.** List of abbreviations

<b>Abbreviation</b>	<b>Full name</b>	<b>Unit of measurement</b>
<i>fl</i>	foreign liabilities	in BAM
<i>fa</i>	foreign assets	in BAM
<i>loan</i>	loans	in BAM
<i>deposit</i>	deposits (owned by residents)	in BAM
<i>ip</i>	industrial production (2010 = 100)	index
<i>capital ratio</i>	tier 1/risk weighted asset	%
<i>lfl</i>	natural logarithm of foreign liabilities	-
<i>lfa</i>	natural logarithm of foreign asset	-
<i>lloan</i>	natural logarithm of loan	-
<i>ldeposit</i>	natural logarithm of deposit	-
<i>npl</i>	nonperforming loans	
<i>lip</i>	natural logarithm of industrial production	-
<i>c</i>	constant	-
<i>dumc</i>	dummy for crisis, from 9/2008=1	-
<i>dumcs</i>	dummy for changing sentiment i.e. start withdrawing of foreign liabilities of BSBH (01/2009)	-
<i>trend</i>	linear trend	-
<i>d_</i>	in front of variables denotes the first difference	-

**Source:** Author

## SOME FACTS ABOUT BOSNIAN BANKING SECTOR

As in all other countries, the financial crisis hit Bosnian economy and banking sector very hard. Until 12/2008 the average annual credit growth was 22% (2003 – 2008) and in 2007 and 2008 it was 30,4% and 23% respectively. For the first time, after seven years, the annual credit growth was negative in 2009. Over time, the loan growth has become stronger, but it has not recovered at all comparing to pre-crisis level. The annual growth rate in eight year period (2010 – 2017) were much below the growth in 2008, 3,8% and in 2017 it was 7,1%. At the pick foreign liabilities were 6 billions BAM or 29% of GDP. At the end of 2017 foreign liabilities were 2,58 billions BAM, which is only 43% comparing to all times high (12/2008). The average annual growth rate of decline was 8,7% (2009-2017).

## RESULTS AND DISCUSSION

The first model that we developed was VAR in level. This model has six endogenous variables (*fl*, *fa*, *loan deposit*, *ip*, *npl*) and three exogenous variables (constant and trend, dummy for crisis). To select lag order we use the Schwarz criterion (model with one lag is chosen). The overall fit of model (see Table 2), measured by the coefficient of determination, is very good;  $R^2$  is in range 0.65 - 0.99.

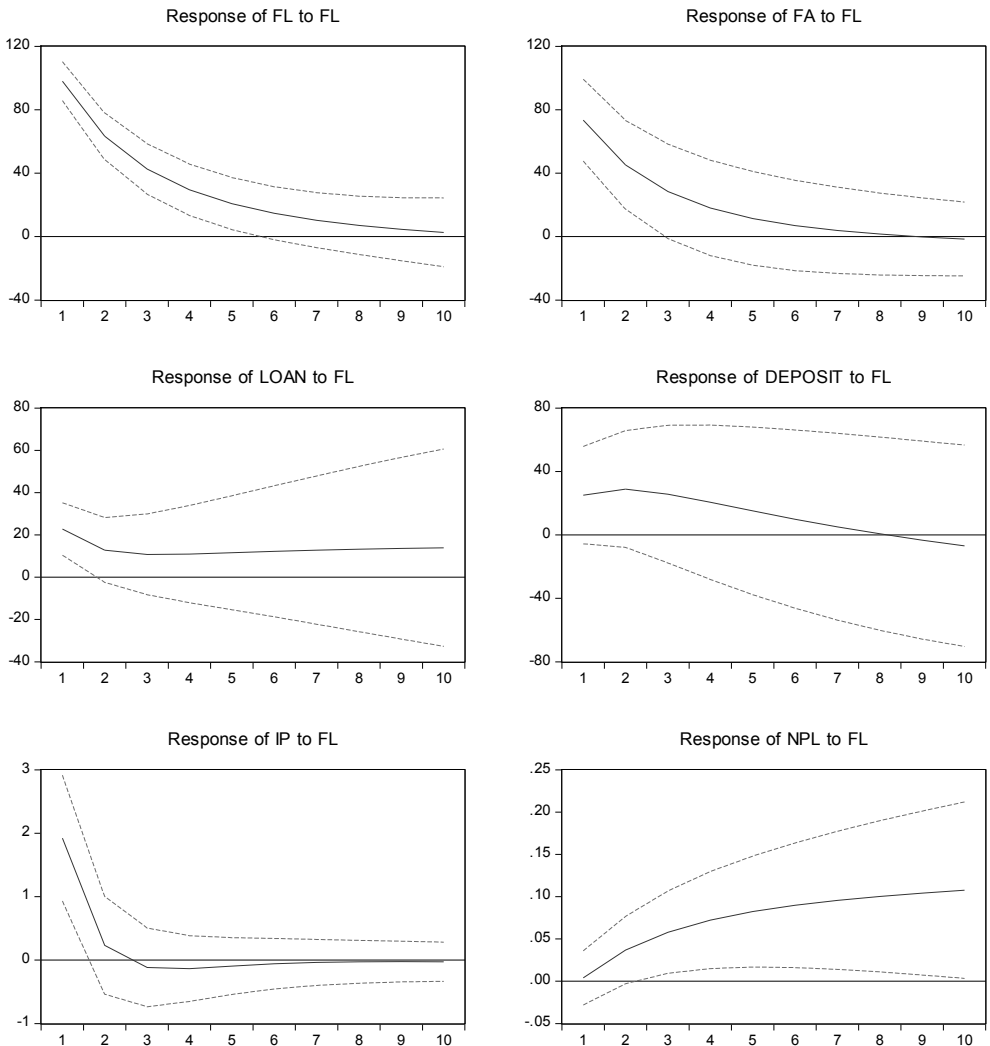
**Table 2.** Unrestricted VAR

Vector Autoregression Estimates  
 Date: 07/09/18 Time: 09:50  
 Sample: 2006M02 2017M12  
 Included observations: 143  
 Standard errors in ( ) & t-statistics in [ ]

	FL	FA	LOAN	DEPOSIT	IP	NPL
FL(-1)	0.664031 (0.06513) [ 10.1958]	-0.064716 (0.10334) [-0.62627]	-0.068818 (0.04703) [-1.46337]	0.132784 (0.10385) [ 1.27856]	-0.003961 (0.00375) [-1.05540]	0.000203 (0.00012) [ 1.72105]
FA(-1)	-0.004114 (0.04884) [-0.08423]	0.822096 (0.07750) [ 10.6083]	0.010798 (0.03527) [ 0.30616]	0.074206 (0.07789) [ 0.95277]	-0.001667 (0.00281) [-0.59233]	0.000204 (8.8E-05) [ 2.31283]
LOAN(-1)	0.151147 (0.03571) [ 4.23269]	0.044291 (0.05666) [ 0.78172]	1.013410 (0.02579) [ 39.3021]	0.008069 (0.05694) [ 0.14170]	0.001331 (0.00206) [ 0.64701]	-9.55E-05 (6.5E-05) [-1.47716]
DEPOSIT(-1)	0.046731 (0.03244) [ 1.44058]	-0.011966 (0.05147) [-0.23250]	0.077411 (0.02342) [ 3.30482]	0.770645 (0.05173) [ 14.8979]	0.003510 (0.00187) [ 1.87732]	-6.72E-05 (5.9E-05) [-1.14451]
IP(-1)	-0.587328 (1.42280) [-0.41280]	1.163506 (2.25749) [ 0.51540]	-3.608137 (1.02737) [-3.51200]	2.794555 (2.26883) [ 1.23171]	0.317170 (0.08199) [ 3.86821]	0.000147 (0.00257) [ 0.05700]
NPL(-1)	-32.62018 (9.74119) [-3.34868]	-26.76632 (15.4559) [-1.73178]	8.654255 (7.03391) [ 1.23036]	-31.75829 (15.5336) [-2.04449]	-0.288859 (0.56137) [-0.51456]	1.030665 (0.01763) [ 58.4631]
C	167.0564 (156.773) [ 1.06559]	516.7079 (248.745) [ 2.07726]	71.53082 (113.203) [ 0.63188]	842.6093 (249.995) [ 3.37051]	45.80109 (9.03462) [ 5.06951]	-0.263392 (0.28372) [-0.92834]
TREND	-17.47574 (3.19090) [-5.47674]	-1.982522 (5.06287) [-0.39158]	-7.710767 (2.30409) [-3.34656]	24.55223 (5.08830) [ 4.82523]	-0.294732 (0.18389) [-1.60278]	0.010229 (0.00577) [ 1.77136]
DUMC	171.8864 (78.9570) [ 2.17696]	44.22414 (125.278) [ 0.35301]	-75.32860 (57.0133) [-1.32125]	-705.3482 (125.907) [-5.60213]	5.941770 (4.55019) [ 1.30583]	0.130054 (0.14289) [ 0.91015]
R-squared	0.992592	0.851250	0.999351	0.996944	0.656019	0.998502

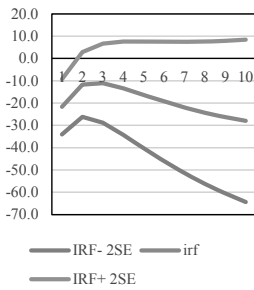
Impulse response functions (*IRF*) i.e. response to Cholesky one standard innovation in foreign liabilities (positive shock, i.e. increase) shows the expected and economically logical movement in all variables (Graphs 1-6). The exemption could be *NPL*, which is positively influenced by positive shock in foreign liabilities. Such a movement can be explained by the fact that with rise in foreign loans credit activity expands which leads to the rise in *NPL*. So, immediately after positive shock in foreign liabilities all variables, as expected, go up.

**Graphs 1-6.** Impulse response functions for VAR model (One S.D. positive shock)  
Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.

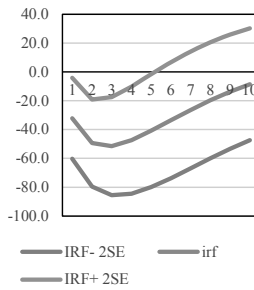


IRF for negative shock is symmetric with IRF for positive shock, so we constructed this kind of IRF (response to negative shock) in order to examine response of the key variables to the unexpected movement in foreign liabilities (Graphs 7-9). In the case of loans and deposits the IRF is very persistent and it is statistically significant 1 or 3 periods after shock. One impact one standard deviation shock in foreign liability decreases loans and deposits for 22.8 millions BAM and 25.0 millions BAM respectively. IRF for industrial production (IP) is not so persistent and on impact it reduces value of IP for 1.9 index points.

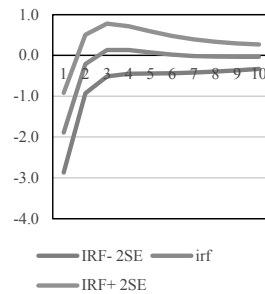
**Graph 7.** Response of LOANS to FL One S.D. negative shock (VAR model)



**Graph 8.** Response of DEPOSITS to FL One S.D. negative shock (VAR model)



**Graph 9.** Response of IP to FL One S.D. negative shock (VAR model)



From VAR in level we may conclude that absence of  $VI$ , which is similar to the unexpected shock, would have adverse effects on the value of loans and deposit, and generally on financial stability. Thus,  $VI$  helped to prevent the adverse scenario, and it also helped to stabilize banking sector through preserving financial stability and through transforming the unexpected shock in the expected one.

We checked this conclusion by using different kind of VAR's procedure. With respect to the fact that all variables are nonstationary (Table 3) we have tested for cointegration. By applying Johansen test (Table 4) we found that there are two cointegrated equations in line with the visual inspection of four endogenous variables, where we can see co-movement in two cases (Graph 10).

**Table 3.** Unit root test for endogenous variables

FL	FA	LOAN	DEPOSIT	IP	NPL
-1,367	-2,7870	-3,752	-0,698	-0,544	-1,96
(0,5965)	(0,0626)	(0,0043)	(0,8427)	(0,878)	(0,3016)

**Note:** Critical test values for 1%, 5%, and 10% are -3,47, -2,88 and -2,57 respectively.

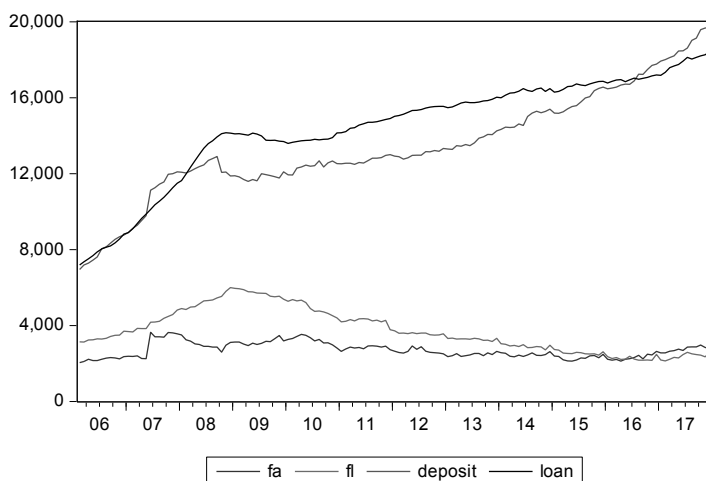


**Table 4.** Johansson test

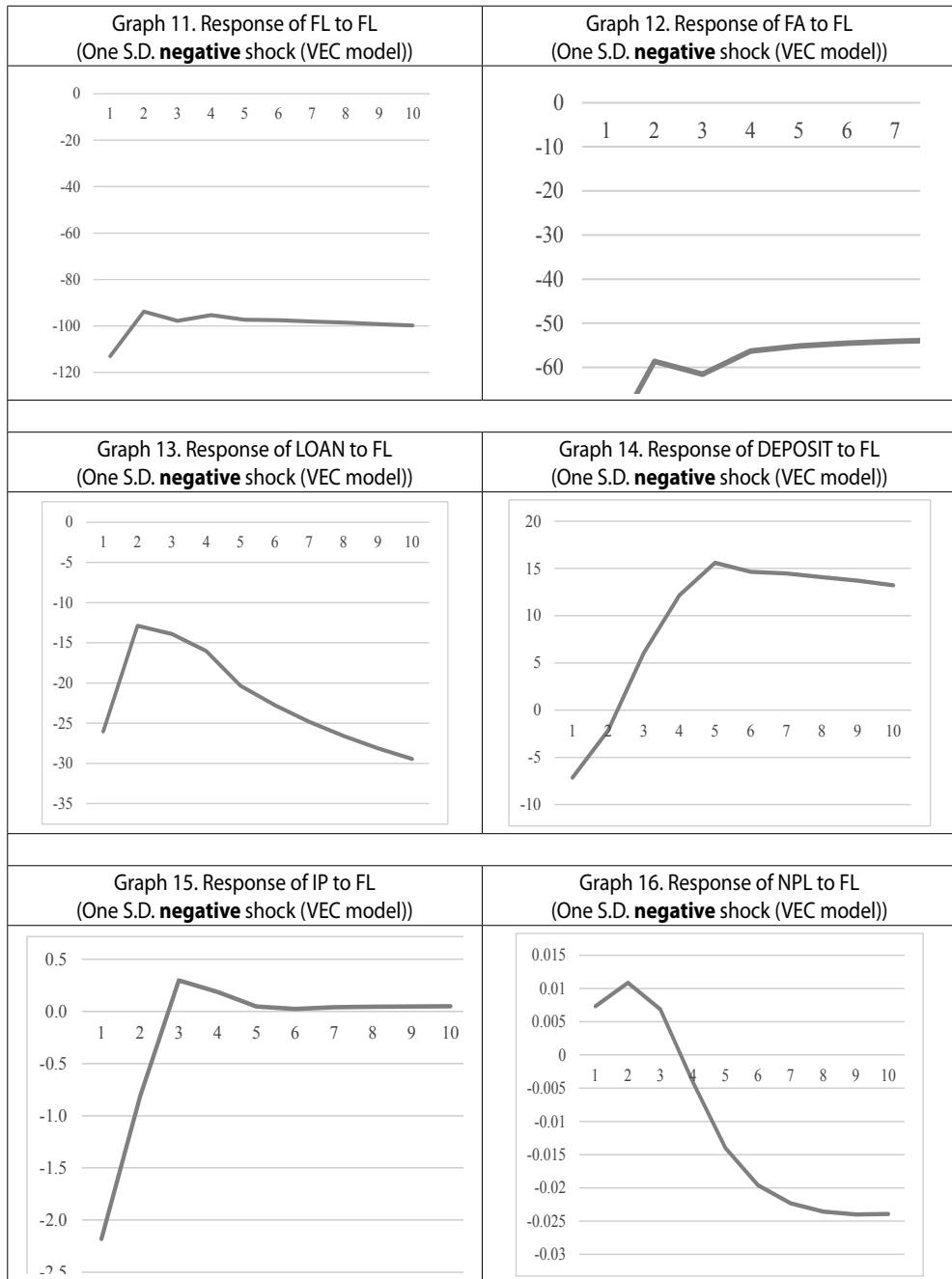
Series: FL FA LOAN DEPOSIT IP NPL, Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized	Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.268840	121.6577	95.75366	0.0003
At most 1 *	0.220307	76.88106	69.81889	0.0122
<b>At most 2</b>	<b>0.104534</b>	<b>41.29471</b>	<b>47.85613</b>	<b>0.1795</b>
At most 3	0.097213	25.50589	29.79707	0.1441
At most 4	0.056239	10.88146	15.49471	0.2189
At most 5	0.018047	2.604280	3.841466	0.1066

**Graph 10.** Cointegration between variables

*VEC* model with two lags, two error correction equations, five endogenous variables (*fl fa loan deposit ip npl*) and one exogenous variable (constant) give similar results like *VAR* in levels. The negative shock of one standard deviation in foreign liabilities (i.e. decrease in foreign liabilities) affects other endogenous variables in line with expectations (Graphs 11 - 16). On impact almost all variables, except *NPL*, go down. Among three key variables (loans, deposits and industrial production), foreign liabilities influence loans the most. On impact the fall in loans is 25 millions and *IRF* is very persistent. The fall in deposits is temporary caused by the fact that deposits and foreign liabilities are substitutes. *VEC* gives one more evidence how foreign liabilities would influence key macrovariables in the case of unexpected shocks which is equivalent to the disorderly withdraw of foreign deposits and foreign loans previously provided to the banking sector of BH.



Fit of regression models is good (Table 5), and on average around 60% of variation in loans (i.e. in loan difference) is explained by independent variables.

Diagnostics of models is satisfactory. There is no evidence of heteroscedasticity and autocorrelation, and the mean of residuals converge to zero. All variables have expected sign in line with economic logic. The rise in deposits, industrial production, CPI and capital ratio move up loans. On the other hand, rise in foreign asset decreases loans because it reduces liquidity which is a base for credit growth. The most influence variable in specifications are dummy (marked cells) for the financial crisis (dumc), i.e. for changes in sentiment (dumcs) which capture a huge share of changes in loans. Other things being equal, crisis decrease difference in loans for 145 millions BAM (EQ1).

Of course, the behavior of foreign liabilities is the most important for this research. The sign in front of foreign liability, as expected, is positive. It means the positive relation between movement in  $f\ell$  and loans. So, according to specifications, if  $f\ell$  goes up loans will also go up because the rise in  $f\ell$  provides liquidity for banking sector and the fall in foreign liability absorbs liquidity. If difference in  $f\ell$  goes down for 100 millions BAM, the difference in loans will go down for 24 millions BAM.

To conclude, leaving  $f\ell$  without any control i.e. at the discretion of foreign owned bank would leave banking sector to a big exposure to liquidity risk. VI helped to preserve enough amount of liquidity through the negotiation of orderly withdrawal of foreign asset.

**Table 5.** Evaluation and diagnostics of regression models, dependent variable first difference in loan ( $d_{loan}$ ), 02/2006-12/2017

	<b>EQ1</b>	<b>EQ2</b>
<i>D_LOAN(-1)</i>	0.170 (2.35)*	0.231 (2.97)***
<i>D_DEPOSIT(-2)</i>	0.040 (1.24)	0.073 (2.19)*
<b><i>D_FL</i></b>	<b>0.242</b> <b>(3.97)***</b>	<b>0.230</b> <b>(3.46)***</b>
<i>D_FA</i>	-0.103 (-2.58)***	-0.102 (-2.41)**
<i>D_IP</i>	3.208 (3.69)***	3.073 (3.343)***
<i>Capital ratio</i>	66.6 (1.86)*	57.6 (1.52)
<i>DUMC</i>	-145.73 (-6.41)***	

DUMCS		-110.70 (-4.69)***
CPI	1.753 (7.52)***	1.377 (5.86)***
<b>Diagnostics</b>		
R <sup>2</sup>	0.631	0.586
Mean value of residuals	-0.41	-0.16
DW test	1.88	1.87
Jarque	4,05	6.86
Bera test	(0.13)	(0.03)
Breusch-Pagan -Godfrey test	1.088 (0.37)	1.67 (0.109)
LM test (first lag)	1.28 (0.258)	2.18 (0.1419)
LM test (second lag)	0.641 (0.528)	1.11 (0.33)
LM test (third lag)	0.825 (0.482)	1.18 (0.316)

**Source:** Authors. Note: \*\*\* significant at the level of 1%, \*\* significant at the level of 5%, significant at the level of around 10%. In diagnostic tests, the first number denotes the value of the test statistics and the second is the probability. For the parameters of the models t statistics are in the brackets. For diagnostics in parenthesis is p-value.

## CONDITIONAL BVAR

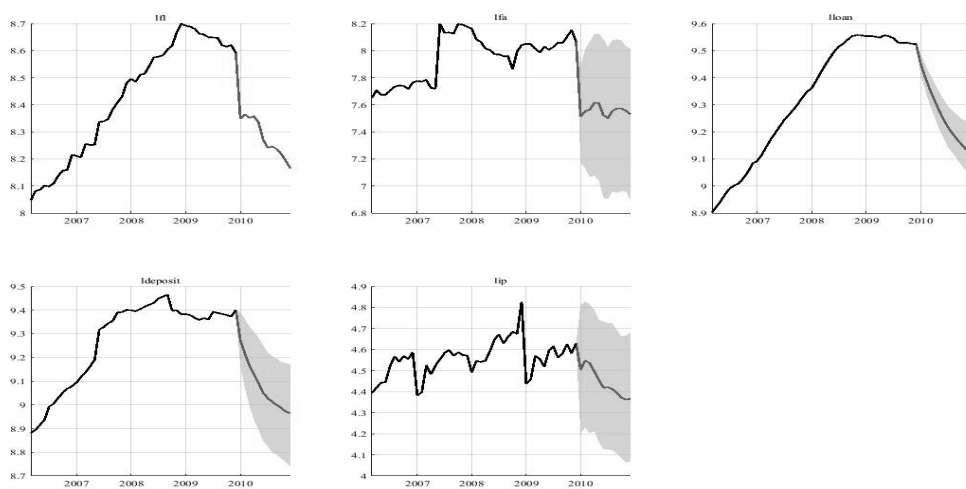
We estimated BVAR for the period 02/2006-12/2009. Endogenous variables are *lfa lfa lloan ldeposit lip* and exogenous variables are *constant, trend* and *dumc*. We applied Cholesky decomposition, and Normal Wishart with default setting for Normal-Wishart parameters.

**Table 6.** Default values for hyperparameters - Normal-Wishart priors

auto-regressive coefficient:	0.8
overall tightness $\lambda_1$ :	0.1
lag decay $\lambda_3$ :	1
exogenous variable tightness $\lambda_4$ :	100

In this part of research, the question is what would happen with foreign liabilities in the absence of VI. Or, in other words, what would happen if foreign banks had full discretion in withdrawing their assets from Bosnian banking sector. We make several scenarios for movements in foreign liabilities in 2010. As previously stressed, the annual foreign liabilities' growth in 2010 was on average -14%, so we wanted to see movement in endogenous variables, especially in loans in scenarios with unexpected fall in foreign liabilities of 20% (Graph 17), 30% and 40% per year, all other equal.

**Graph 17.** Conditional forecast, 20% unexpected fall/shock in foreign liabilities



**Source:** Author. Notes: Graphs from the left to the right are *Iff*, *Iffa*, *Iloan* (first row), *Ideposit*, *Iip* (second row).

In all three adverse scenarios, the fall in loans, deposits and industrial production is, comparing to the actual fall, huge (Tables 7-9). One possible explanation could be banking panic due to large, unexpected and unprecedented fall in foreign liabilities. All information about VI where transparent and available. Because of this very fact between mainly expected actual fall of 14% in foreign liabilities under VI agreement and 20% or more of unexpected fall in foreign liabilities must be huge difference in the quality of fall and its impact on loans, deposits, and industrial production. The drop in loans would be, on average, from -24,8% to -38,8% (2010/2009). If foreign banks in Bosnian banking sector had decided to withdraw asset at pace of 40% yearly the fall in deposits and industrial production would be 40,3% and 16,3% respectively. According to this last methodology, like in the all previous methodologies, the influence of sudden and

uncoordinated withdraw of foreign deposits and loans from Bosnian banking sector would have highly negative impact on Bosnian banking sector. Due to the policy coordination, i.e. VI, such a scenario was avoided.

**Table 7.** Average annual fall in **loans** in 2010 comparing to 2009 under different conditional forecasts (CFORECAST) of foreign liabilities (FL)

CFORECAST LOANS (2010/2009)			
Actual Fall in fl -14%	Fall in fl -20%	Fall in fl -30%	Fall in fl -40%
-1.0%	-24.8%	-31.6%	-38.8%

**Source:** Author.

**Table 8.** Average annual fall in **deposits** in 2010 comparing to 2009 under different conditional forecasts (CFORECAST) of foreign liabilities (FL)

CFORECAST DEPOSITS (2010/2009)			
Actual Fall in fl -14%	Fall in fl -20%	Fall in fl -30%	Fall in fl -40%
4.7%	-25.1%	-32.3%	-40.3%

**Source:** Author.

**Table 9.** Average annual fall in **industrial production** in 2010 comparing to 2009 under different conditional forecasts (CFORECAST) of foreign liabilities (FL)

CFORECAST INDEX OF INDUSTRIAL PRODUCTION (2010/2009)			
Actual Fall in fl -14%	Fall in fl -20%	Fall in fl -30%	Fall in fl -40%
4.3%	-11.5%	-13.8%	-16.3%

**Source:** Author.

## CONCLUSION

The banking sector of Bosnia and Herzegovina (BASH) has been highly dependent on foreign funds since 2002. At the pick (12/2008) foreign funds or foreign liabilities of BASH were 6 billions EUR and subsidiaries of foreign banks held more then 90% of total banking assets. Bosnia and Herzegovina, like other SEE countries, was not able on its own to cope with deleveraging process started after Lehman Brothers' bankruptcy. There was a huge danger that the uncoordinated withdraw of foreign funds could harm financial stability. The Vienna Initiative

(VI) came in that moment. The VI was policy coordination plan undertaken by EBRD, IMF and European banks with the large exposure to emerging Europe, during the first half of 2009 with the aim to keep financial stability in countries highly exposed to foreign funding. As it was expected, Bosnia and Herzegovina participated in this unique policy coordination plan, which had elements of macroprudential policy coordination.

The aim of this research was to answer the question whether the VI was necessary in the case of Bosnia and Herzegovina. In order to answer this question we developed a few models: VAR, VEC, multiple linear regressions, and BVAR. Our variable of interest was foreign liabilities of BSBH and their influence on loans, deposits, and industrial production. With VAR and VEC we showed that an unexpected fall in foreign liabilities would have a negative influence on all main banking and macro variables. With BVAR, i.e. with conditional forecast, we have proved what would happen in the case of extreme uncoordinated withdraw of foreign funds. Multiple linear regression models showed linear positive relation between foreign liabilities of BSBH on one hand and loans on the other hand.

The overall conclusion we draw from this research is that without VI it would not only be very hard, but even impossible to keep financial stability. VI was very successful policy coordination plan and it acted as some kind of macroprudential coordination. VI helped to preserve the financial stability in Bosnia and Herzegovina and to overcome the credit crunch.

## REFERENCES

- Alihodžić, A., & Halil Eksi, I. (2018). Credit growth and non-performing loans: evidence from Turkey and some Balkan countries. *Eastern Journal of European Studies*, 9(2), 229-249.
- De Haas, R., Korniyenko, Y., Loukoianova, E., & Pivovarsky, A. (2012). *Foreign banks and the Vienna Initiative: turning sinners into saints*. EBRD, WP, No. 143.
- Dieppe, A., Legrand, R., & Van Bjorn, R. (2016). *The Bayesian Estimation, Analysis and Regression (BEAR) Toolbox, Technical Guide*. ECB.
- Enders, Walter. (2009). *Applied Econometric Time Series*. New York: John Wiley & Sons, Inc.
- Jović, D., & Jandrić, M. (2016). Determinants of Credit Growth in Banking Sector of Bosnia and Herzegovina. *EMC Review*, VI(II), 233-248.
- Kochler, M. (2012). *Which banks are more risky? The impact of loan growth and business model on bank risk-taking*. Retrieved from <https://www.econstor.eu/bitstream/10419/67401/1/731863143.pdf> (accessed on February 30, 2019)
- Lane, Philip R. (2012). *Globalisation and the Crisis. Conference organized by Trinity College Dublin*

- and CERP*. Retrieved from <http://www.philiplane.org/FINGLOBLANE.pdf> (accessed on February 30, 2019)
- Plekhanov, A., & Skzypinska, M. (. (2018). *Cross-border spillovers reducing non-performing loans*. EBRD, Working paper No. XXX.
- Shijaku, G., & Kalluci, I. (2013). *Determinants of bank credit to the private sector: The case of Albania*. MPRA Paper No. 79092. Retrieved from [https://mpra.ub.uni-muenchen.de/79092/1/MPRA\\_paper\\_79092.pdf](https://mpra.ub.uni-muenchen.de/79092/1/MPRA_paper_79092.pdf) (accessed on Februar 2, 2019)
- Tan, T. B. (2012). *Determinants of Credit Growth and Interest Margins in the Philippines and Asia*, IMF Working Paper WP 12/123. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2012/wp12123.pdf> (accessed on February 30, 2019)
- Wosko, Z. (2015). *Modelling credit growth in commercial banks with the use of data from Senior Loan Officers Opinion Survey*. NBP Working Paper No.210.

