

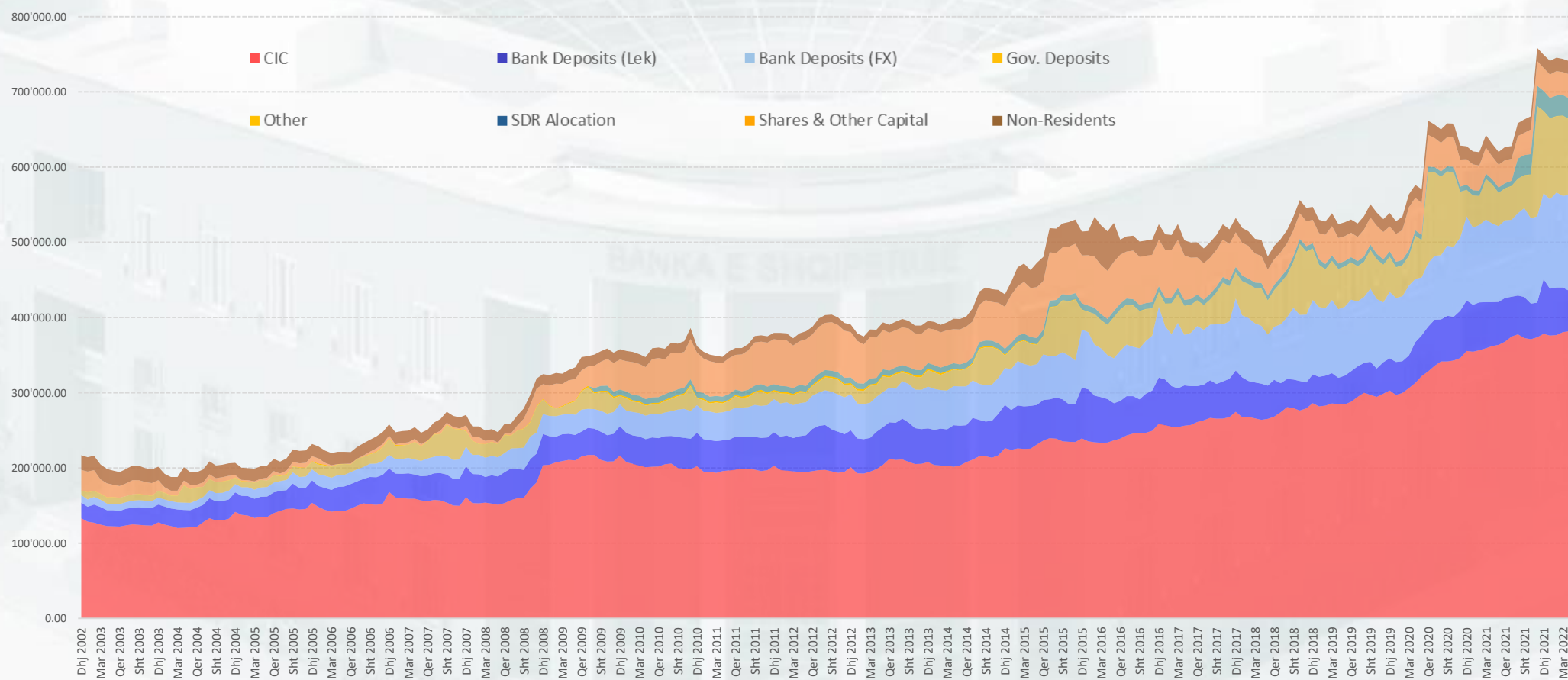


CENTRAL BANK BALANCE-SHEET AND INFLATION in **A SMALL OPEN EUROIZED ECONOMY** with **CONSTRAINED CAPITAL MARKETS**

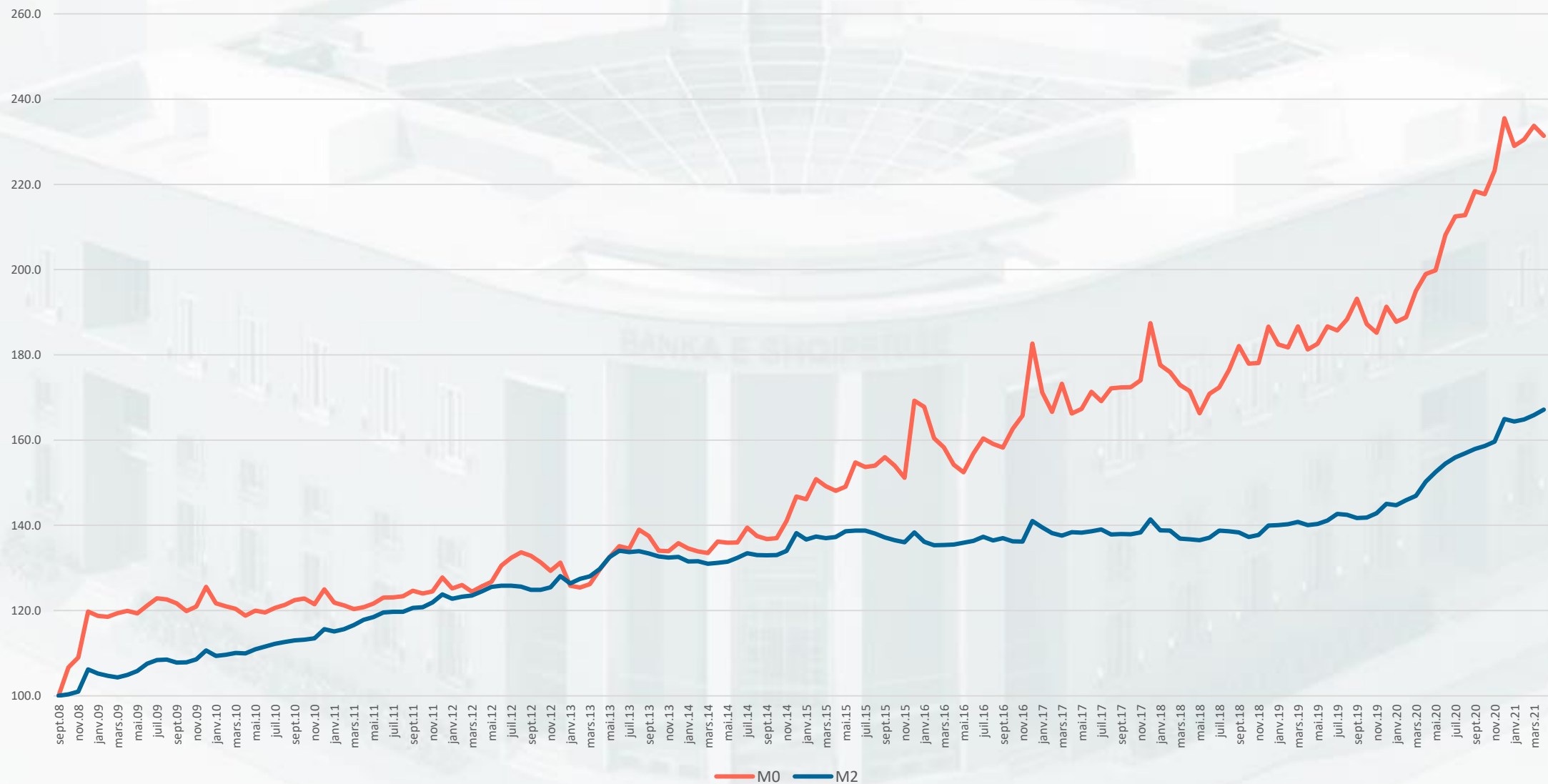
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*BCC conference “Is inflation back, and in which form?”
Geneva, 22-23 September 2022*

BoA Balancesheet Composition (*Liabilities*)



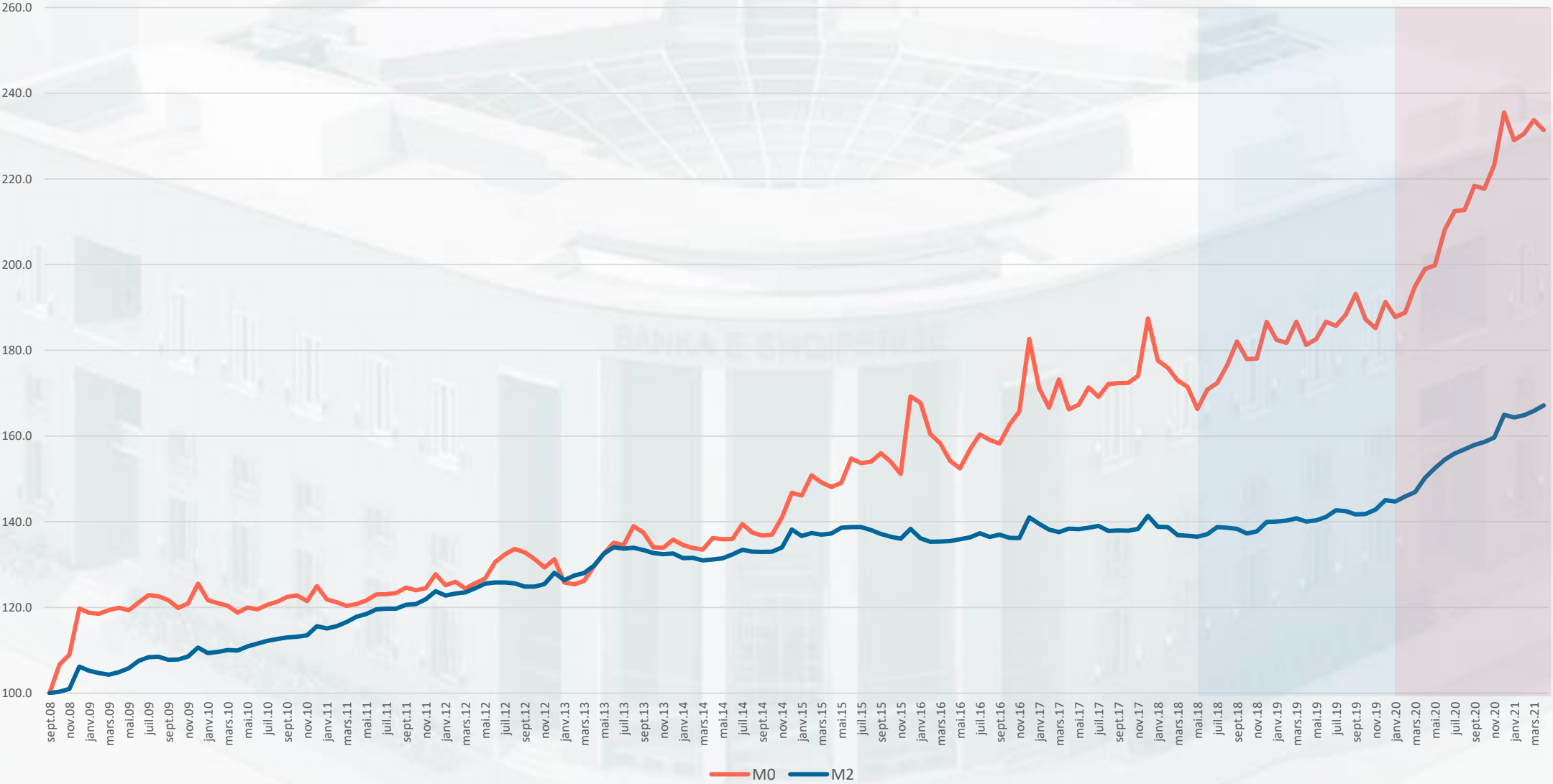
Financial Intermediation and Money Multiplier



BoA Monetary Policy Setup

- Objective: ***Price Stability***
- Monetary Policy Regime: ***Inflation Targeting***
 - Policy Instrument: *Repo Interest Rate (weekly BoA liquidity auctions)*
 - MP Operations: *Designed Around Structural Liquidity*
Liquidity is adjusted to keep market rate close to repo rate
- Exchange Rate Regime: ***Free Floating** — interventions (if any) target:*
 - i. level of net international reserves (announced)*
 - ii. excess volatility & market failures (rare, short & limited)*
- Cap. & Curr.Acc. Restrictions: ***No***

Financial Intermediation and Money Multiplier (perfshi edhe normen repo ketu)



BoA Policy Innovations

- Redefine optimal level of international reserves to cover risks related to financial stability and short term debt

Action: Increase the level of international reserves

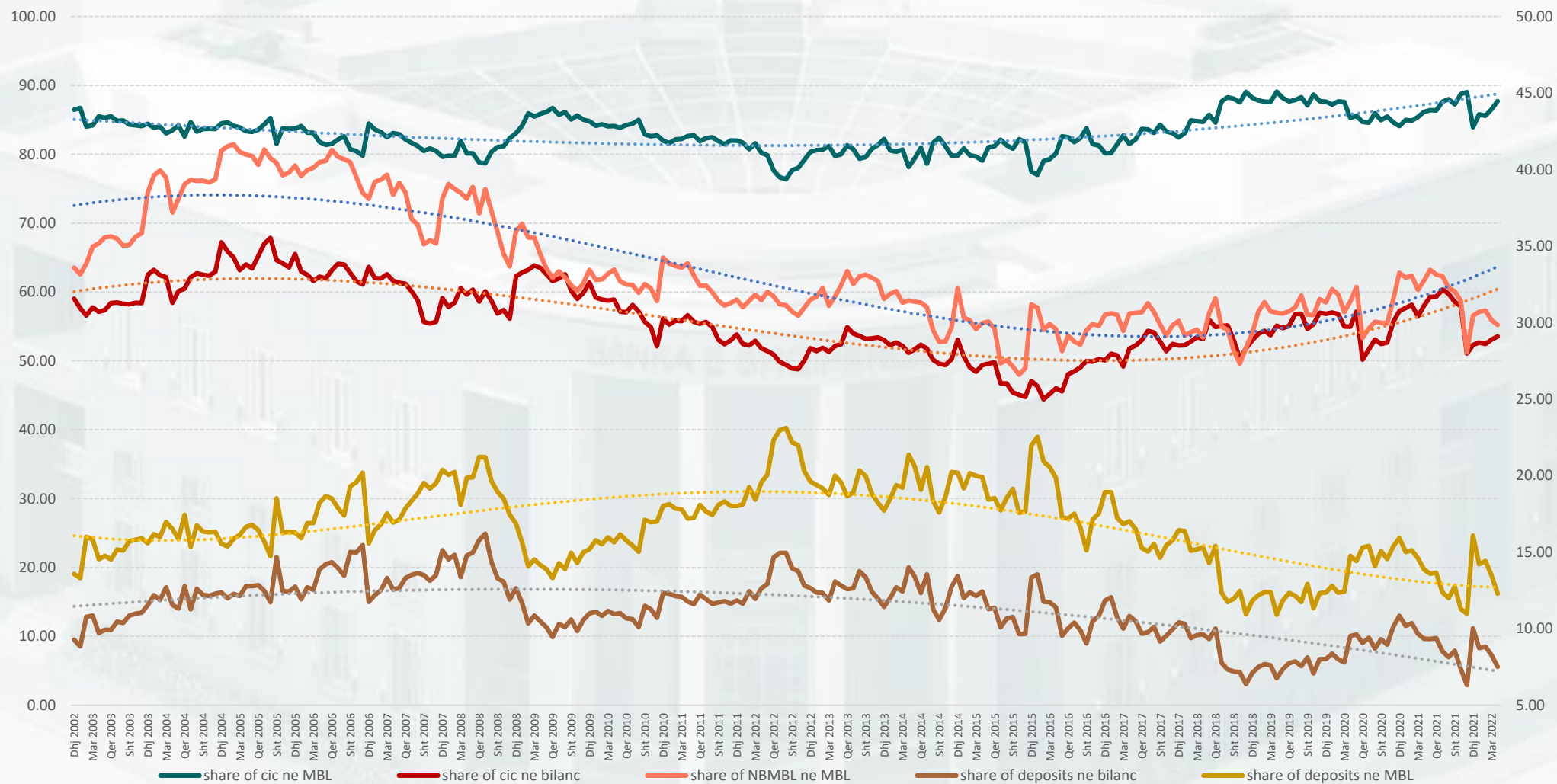
- Counter balance the effect of domestic currency appreciation

Action: Buy foreign exchange in market

- De-euroisation Strategy

Action: Change reserve requirements: FX deposits (up) & Lek deposits (down)

BoA Balancesheet Items (as % of Total and Monetary Base)



Objective

Positive and statistically significant *balance-sheet structural shocks*, have a direct and positive effect on inflation and can also be identified as a potential alternative to balance sheet policy in an economy with financial market constraints.

HYPOTHEIS

Changes in the structure of BoA balance-sheet in favor of non-borrowed non-bank components, provide additional money supply shock beyond and above traditional expansionary effects of the policy rate and traditional monetary operations.

Conclusion

Our preliminary results indicate:

An increase in the balance-sheet structure indicator can be identified as a money supply shock and has a positive and expected influence in inflation.

The change in the structure of monetary base is acting like an alternative to balance sheet policy, and to some extends, it is one of the factors that can control inflation in the Albanian economy.

Balance sheet structure could provide alternative to balance-sheet policies when increasing balance-sheet size is constrained by country characteristics.

Research Strategy

- Estimating a small structural VAR model with policy and non-policy variables
 - *First, the identification and correct construction of the liquidity variable*
 - *Second, the correct identification of the of the correct identification SVAR methodology*
- List of non-policy variables:
 - *CPI*
 - *GDP as a measure of economic activity,*
 - *Lek-euro exchange rate important & multidimensional role in the Albanian economy,*
 - *Monetary aggregate M3 as a measure of demand for money*
- List of Policy variables
 - *Monetary policy rate*
 - *The balance sheet structure indicator (liquidity indicator) as a second policy variable.*
- To achieve proper identification of shocks, foreign prices are introduced in the model as exogenous shock.

Balance-sheet Structural variable

- BoA monetary policy involves “**LEK**” balance-sheet liabilities.
- Focus on *monetary base* rather than *bank reserves* **Beekworth (2017)**
- Define the *permanent monetary base* equal to non-borrowed monetary base **$NBMB^L = COB^L + NBR^L$**

where

$$NBR^L = TR^L - TBR^L$$

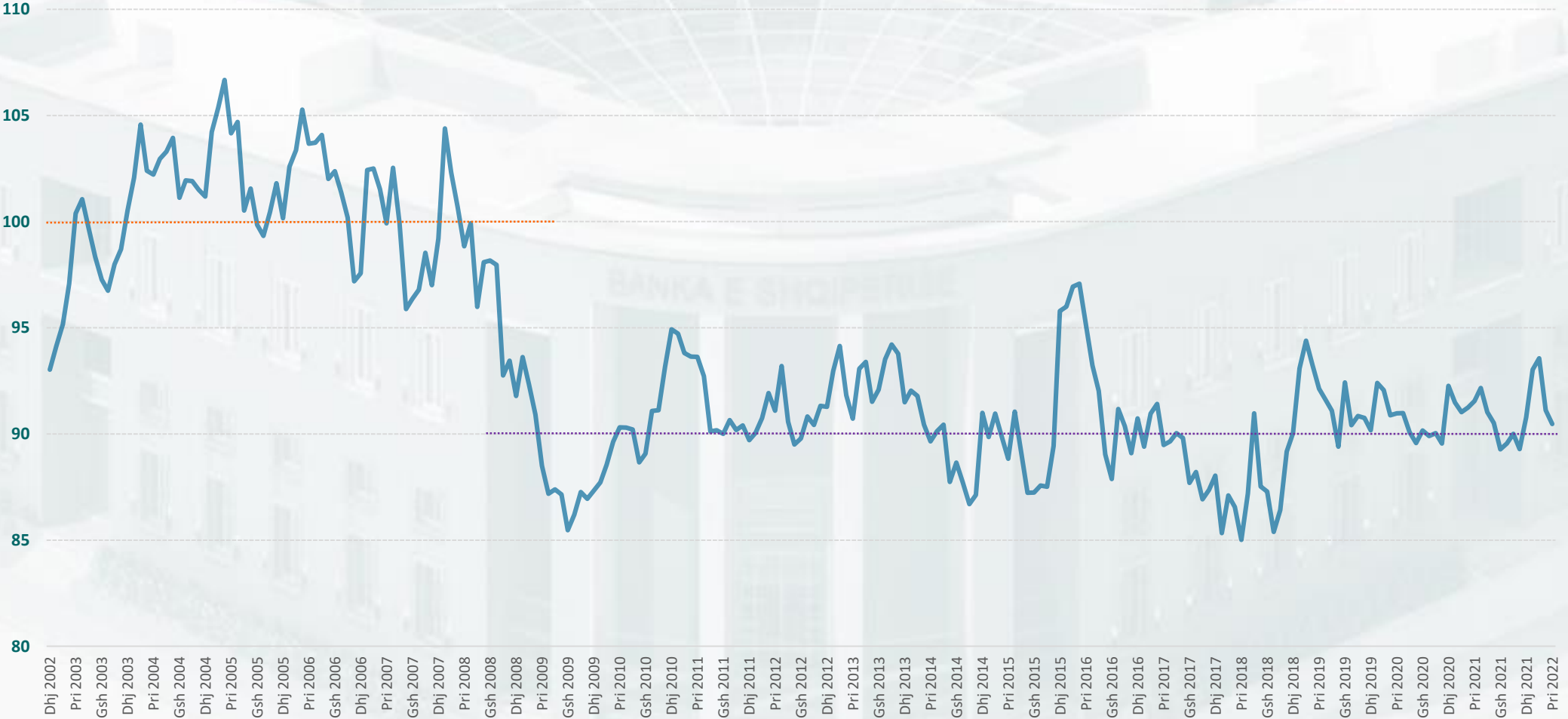
$TBR^L = \text{Net Repo transactions} + \text{Other Lending \& Deposit Facilities}$

- Our Variable

$$Li = NBMB^L / MB^L$$

Bernanke & Mihov (1998)

Balance-sheet Structural Indicator (Li)



Identification of SVAR

Guided by two important insights:

- First, we conduct a thorough analysis of the dataset to identify existing structure of the DGP that might and should be considered in the structure of the model:

the order of integration and potential existence of cointegration relationships.

- Second, we rely heavily on our knowledge of the decision making process as described in BoA Annual and Monetary Policy Reports to decide the order and the interaction of shocks in the model.

The policy variables are listed at the end with the balance-sheet structure indicator being ordered last.

Table 1: Summary Statistics for All Variables							
	CPI	M3	LEKEUR	Y	REPO	LI	PCOM
Mean	83.03	906759.2	131.35	298645.3	4.30	93.95	118.40
Maximum	103.07	1582310	141.75	429309.3	13.18	106.66	189.51
Minimum	59.79	289340.6	121.55	143213.3	0.50	85.39	48.82
Std. Dev.	12.52	371910.3	7.036	69616.80	2.70	5.083	40.02
Skewness	-0.137	-0.183	-0.0185	-0.284088	0.405	0.673	0.052
Kurtosis	1.756	1.706	1.353	2.186591	3.071	2.462	2.041
Observations	88	88	88	88	88	88	88

Augmented Dickey-Fuller test								
		Variables						
		LCPI_SA	LPC_SA	LY_SA	LER_SA	LRM3_SA	REPO	LI_SA*
Constant	Level	-2.117	-1.822	-2.089	-1.554	-3.786***	-1.937	-2.212
	First Difference	-12.31***	-5.97***	-11.38***	-6.69***	-2.887	-5.152***	-3.24**
Constant & Trend	Level	-1.833	-2.15	-2.475	-1.523	-1.527	-5.597***	-10.209***
	First Difference	-13.06***	-5.94***	-11.61***	-6.68***	-8.475***	-5.074***	-10.159***

*/ LI_SA resulted to be break point stationary with a structural break identified at 2008q3.

Table 2: Johansen Cointegration Test Results					
Sample: 2000Q1 2022Q1 Included observations: 85 Series: LY_SA LCPI_SA LER_SA LPC Lags interval: 1 to 2 Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	1	1	1	1	1
Max-Eig	1	1	0	1	1
*Critical values based on MacKinnon-Haug-Michelis (1999)					

Table 3. Estimates of Linear ARDL Equation (1)						
Panel B: Long-run Coefficients				Panel C: Diagnostic Statistics		
Constant	LY_SA	LER_SA	LPC_SA	F-Bound test statistic		ECM
0.59***	0.18***	-0.12***	0.016**	11.23***		-0.48***
(2.27)	(5.15)	(5.64)	(2.56)	I(0) at 1%	I(1)at 1%	(6.83)
				5.17	6.36	

SVAR-SVECM IDENTIFICATION

F matrix: Oularis, Paga & Restrepo (2018) & S matrix: BoA Monetary policy and operational procedures

<i>F</i>	ε_{pc}	ε_y	ε_{er}	ε_{ec0}	ε_r	ε_{li}		<i>S</i>	ε_{pc}	ε_y	ε_{er}	ε_{ec0}	ε_r	ε_{li}
PC	NA	0	0	0	0	0		PC	NA	NA	NA	NA	NA	NA
Y	NA	NA	NA	0	0	0		Y	NA	NA	NA	NA	NA	NA
ER	NA	NA	NA	0	0	0		ER	NA	NA	NA	NA	NA	NA
$CPI_{(ECO)}$	NA	NA	NA	NA	0	0		$CPI_{(ECO)}$	NA	NA	NA	NA	NA	NA
R	NA	NA	NA	NA	NA	NA		R	NA	NA	0	NA	NA	0
Li	NA	NA	NA	NA	NA	NA		Li	NA	NA	NA	NA	NA	NA

- All variables but policy rate (R) enter SVAR in differenced form despite being I(1) or I(0). R enters VAR in level to account for the permanent effect of monetary policy shock. Liquidity (Li) like money is not supposed to leave permanent effects on I(1) variables.
- An alternative SVAR in levels, similar to Gali (1992) yields similar results.

Results

Response to Structural VAR Innovations ± 2 analytic asymptotic S.E.s

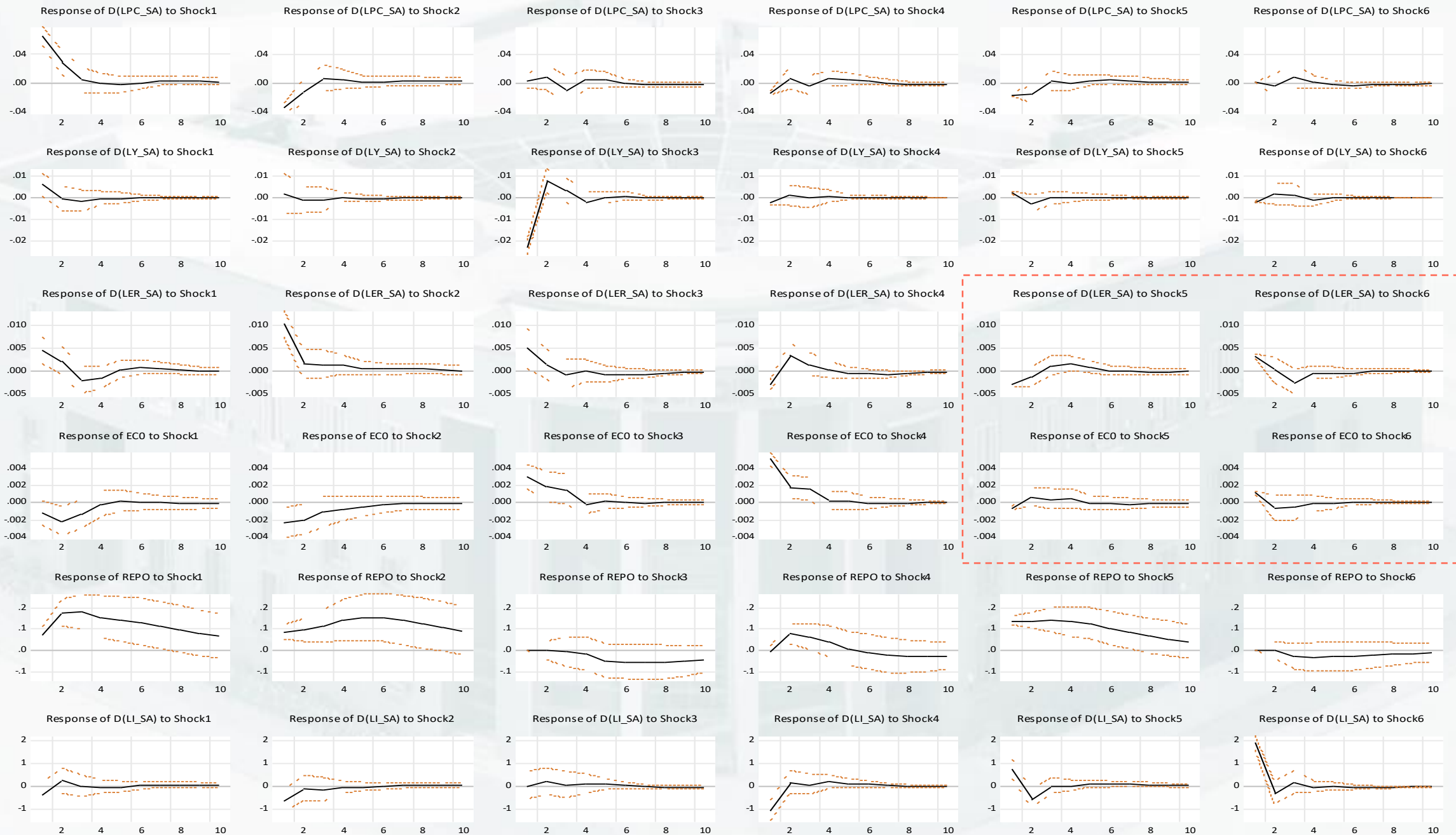


Figure 4.1 Differenced I(1) variables

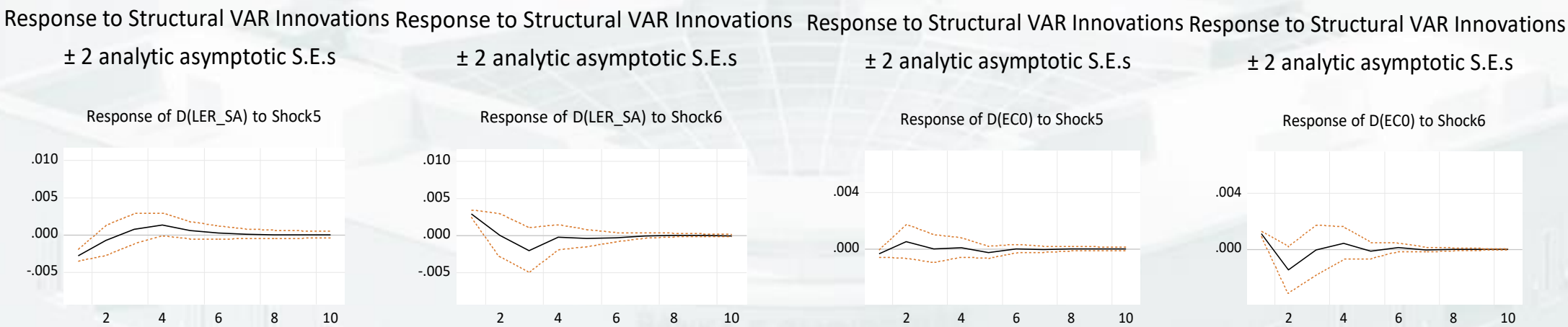
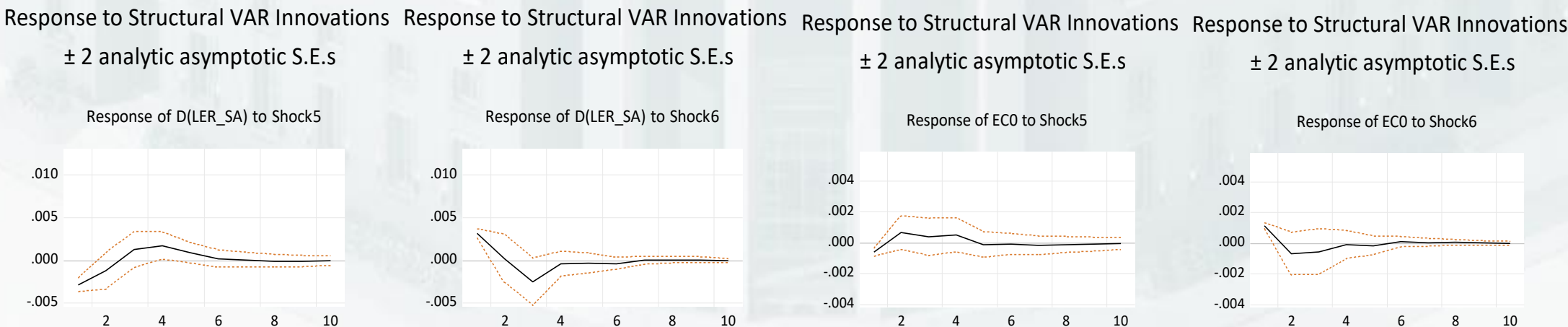


Figure 4.2 I(1) variables in levels



Summary

- Results indicate that changing the structure of BoA liabilities in favor of permanent monetary injections increases the effectiveness of monetary policy and give BoA more control on prices and inflation.
- The impact of permanent monetary expansion on prices works via direct and indirect channels, with the latter being the exchange rate channel.
- Exchange rate channel is an important mechanism in the transmission of monetary policy.

Conclusion

- An increase in the balance-sheet structure indicator can be identified as a money supply shock and has a positive and expected influence in inflation.
 - *Changing the structure of the balance-sheet might help increase the effectiveness of monetary policy and give BoA more control during periods when the traditional interest rate channel has lost its efficiency.*
 - *Altering CB balance sheet structure could provide an alternative to balance-sheet policies when increasing balance-sheet size is constrained by country characteristics.*
- Exchange rate developments (*persistent trends or shocks*) that are driven by exogenous factors which are not aligned with fundamentals, should be considered in the policy context.

Future research

- Some results are however puzzling and need further investigation in future research.
- Potentially one could explore the use of alternative methods of estimation which allow for a more flexible and parsimonious approach to modeling of our equations like the *full information maximum likelihood estimator*.

FIML will likely allow for more flexibility and precision in the specification of the correct functional form of the SVAR.



Thank You