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DOES INFLATION TARGETING WORK IN EMERGING COUNTRIES? AN EXAMPLE OF GEORGIA

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Abstract. Monetary policy is the macroeconomic policy that allows central banks to influence the economy. It involves managing the money supply and interest rates to address macroeconomic challenges such as inflation, consumption, growth and liquidity. Historically, for a long time, the task of monetary policy was limited to controlling the exchange rate, which in turn was fixed (at the beginning of the 20th century on the gold standard) for the purposes of promoting international trade. Eventually such a policy contributed to the Great Depression of the 1930s. After the depression, governments prioritized employment. The central banks have changed their direction based on the relationship between unemployment and inflation, known as the Phillips curve. They believed in the link between unemployment and inflation stability, which is why they decided to use monetary policy (putting money into the economy) to increase total demand and maintain low unemployment. However, this was a misguided decision that led to stagflation in the 1970s and the addition of an oil embargo in 1973. Inflation rose from 5.5% to 12.2% in 1970-1979 and peaked in 1979 at 13.3%. Over the past few decades, central banks have developed a new management technique called «inflation targeting» to control the growth of the overall price index. As part of this practice, central banks are publicizing targeted inflation rate and then, through monetary policy instruments, mainly by changing monetary policy interest rates, trying to bring factual inflation closer to the target. Given that the interest rate and the inflation rate are moving in opposite directions, the measures that the central bank should take by increasing or decreasing the interest rate are becoming more obvious and transparent. One of the biggest advantages of the inflation targeting regime is its transparency and ease of communication with the public, as the pre-determined targets allows the National Bank›s main goal to be precisely defined and form expectations on of monetary policy decisions.

Since 2009, the monetary policy of the National Bank of Georgia has been inflation targeting. The inflation target is determined by the National Bank of Georgia and further approved by the Parliament. Since, 2018- 3% is medium term inflation target of National Bank of Georgia.

The inflation targeting regime also has its challenges, the bigger these challenges are in developing countries. There are studies that prove that in some emerging countries, the inflation targeting regime does not work and other monetary policy regimes are more efficient.

It should be noted that there are several studies on monetary policy and transmission mechanisms in Georgia. Researches made so far around the topic are based on early period data. Monetary policy in the current form with inflation targeting regime started in 2009 and in 2010 monetary policy instruments (refinancing loans, instruments) were introduced accordingly, there are no studies which cover in full the monetary policy rate, monetary policy instruments and their practical usage, path through effect on inflation and economy. It was important to analyze the current monetary policy, its effectiveness, to determine the impact of transmission mechanisms on the small open economy and business development.

The study, conducted on 8 variables using VAR model, identified both significant and weak correlations of the variables outside and within the politics like GDP, inflation, refinancing rate, M3, exchange rate USD/GEL, exchange rate USD/TR and dummy factor, allowing to conclude, that through monetary policy channels and through the tools of the National Bank of Georgia, it is possible to have both direct and indirect (through inflation control) effects on both, economic development and price stability.

KEYWORDS: MONETARY POLICY, MONETARY POLICY RATE, INFLATION, INFLATION TARGETING.

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INTRODUCTION:

Central banks are responsible for the creation and implementation of monetary policy, the stability of the exchange rate, control of monetary aggregates in the economy and ensuring price stability.

Since 2009, the National Bank of Georgia's monetary policy regime has been inflation targeting, likewise in all developed and many developing countries.

Price stability is the mandate of 60% of countries Central Banks. According to a survey by the Central Bank of Poland (Niedźwiedzińska, 2018), of more than 40 countries with an inflation targeting regime, 14% have the sole mandate of price stability and 86% have mixed objectives. From mixed mandates, 52% prioritize price stability and 33% do not have explicit priority. Mixed objectives include price stability, economic activity, financial stability and other goals. Price stability is also concerned with maintaining the value of money. Economic activity has a broader interpretation, but it is also concerned with promoting full employment. Financial stability includes supporting the development of the banking system, while other objectives include a stable payment system. Out of 14 inflation targeting countries with no explicit prioritized objective there are 5 developed countries (Australia, Canada, Switzerland, UK, USA) and 9 developing countries (Argentina, Brazil, Chile, Dominican Republic, Guatemala, Paraguay, Russia, Thailand, Uganda). Price stability is a priority for 22 countries (8 developed countries and 14 developing countries including Georgia). Among the six countries with the only mandate of price stability are 1 developed country New Zealand and 5 developing countries: Colombia, Kazakhstan, Peru, the Philippines and Romania. After price stability, priority is economic activity, which aims to promote sustainable and full employment. The objective of economic activity is prioritized by 30 countries (12 developed and 18 developing). Financial stability takes second place after economic activity. The financial stability mandate has 23 countries out of which 6 are developed and 17 are developing.

Also, inflation target level is an important factor and according to a survey by the Central Bank of Poland (Niedźwiedzińska, 2018), the developed countries when first establishing the regime set inflation target at 3.8% on average and now the average target of 2.1%. In developing countries, the initial target was 6% on average and 4.3% in the current period.

The main objective of the National Bank of Georgia is price stability, but it also ensures the stable functioning of the financial system if possible so as not to jeopardize its primary objective. There are four main transmission channels: credit channel, exchange rate channel, interest rate channel and expectations channel. Monetary policy instruments include refinancing loans, open market operations, certificates of deposit, treasury securities, overnight loans/deposits and minimum reserve requirements (currently in Georgia: liabilities in national currency 5% and liabilities in foreign currency 25%). Depending on the specifics of the country, the transmission of channels and instruments to the economy and their capacity will vary.

Despite the regime has been proven to be the most effective it still has its challenges. In contrary to exchange rate or monetary aggregates, inflation control is not easy. Effect from monetary policy instruments make effect (path through) on inflation only after some lags. Controlling inflation is much difficult in developing counties since, inflation has to be pushed down from high levels. In such circumstance, it is high error probability in inflation forecasts, which results in missing targets. It will be very difficult to build credibility on inflation targeting strategy and hard to explain the reasons of not meeting the targets from monetary authority perspective. It is proven effective strategy, when adoption happens gradually and it is preceded by a decline in inflation (Paul,R.M. Miguel, A.S. Sunil, Sh., 1997). High dollarization may complicate inflation targeting. In many developing countries the balance sheet of companies, households, banks is substantially dollarized, with both assets and liabilities on both sides (Guillermo, 1999). Since, floating exchange rates are required for inflation targeting, fluctuations in the exchange rate are inevitable. However, the large and sharp depreciation of local currency increases the burden of foreign currency denominated debts, which causes a massive deterioration of the balance sheet and increases the risks of financial crisis (Mishkin F. , 1999). Developing countries do not have the luxury of ignoring the exchange rate when conducting monetary policy under the inflation targeting regime, but the role should clearly serve the purposes of inflation. Inflation targeting, especially for dollarized economies, may not be effective until strict prudential regulations and appropriate oversight of financial institutions ensure the stability of the exchange rate shocks.

Today, a more complex policy is being actively pursued, which on the one hand will maximize economic growth and at the same time prevent crises. Some experts have suggested an alternative to inflation targeting, price level targeting or nominal income targeting. Some findings showed that a traditional inflation index fails to fully reflect the problems caused by price changes (Charaia, Papava, 2017; Papava, Charaia, 2018). Experts suggest replacing IT regime with CIT (complex IT) regime (Papava, Charaia, 2019).

As has been already mentioned, monetary policy in the current form with inflation targeting regime started in Georgia in 2009 and in 2010 monetary policy instruments (refinancing loans, instruments) were introduced. The researches made so far are based on early period data (Bakradze, G. and Billmeier, A., 2007), (Alanidi, 2007), (Samkharadze, 2008), (Machavariani, 2012),accordingly, there are no studies which fully cover the monetary policy rate, monetary policy instruments and their current practical usage, path through effect on inflation and economy. It was important to analyze the current monetary policy, its effectiveness, to determine the impact of transmission mechanisms on the small open economy.

2. Research Methodology and Applied Data

The methodology and models presented in the paper are fully consistent with the given empirical literature. VAR structuring and performed tests are based on existing studies

published by IMF and (Vinayagathasan, 2013) on Monetary Policy Transfer Mechanisms. Variables in the model are selected considering the local specifics.

The model includes endogenous vectors

$\{Y\_t$=GDP, Inf, USE_GEL, RefR, M3, MR$\}$,

which in turn is divided into two parts.

Variables outside of politics

$\{Y\_t$=GDP, Inf$\}$ and variables within politics

Y_t=USE_GEL, RefR, M3, MR. $\{X\_t$=USD_TR, DUMMY$\}$

selected as an exogenous vector, given that Turkey is Georgia›s trading partner it was interesting to find if the dramatic depreciation of the exchange rate (USD/TR) could affect the GEL exchange rate (USD/GEL), inflation or other variables. The DUMMY factor is the 2008 war and the global financial crisis.

Since, only quarterly GDP data available and monthly data were needed to collect sufficient data for analysis, quarterly GDP was converted to monthly GDP via extrapolation method. Finally, monthly GDP (12-month change) from December 2008 to December 2018 was incorporated in the model. The real inflation rate, because it is available on a monthly basis, was included as its 12-month change rates over the full observation period. The USD/GEL exchange rate was used in the model as 12-month change of the average monthly indicators for the full observation period. The refinancing rate indicators of a 12-month change was considered on monthly basis over the full observation period. The 12-month change of the monthly M3 money mass aggregate was used for the full observation period. Turkish Lira exchange rate as exogenous factors was included as the 12-month change of the average monthly indicators for the full observation period. 2008 war and the global financial crisis was applied as "Dummy" factor. In line with expert's recommendations and similar studies, the effect of this variable in this model is given in the period 2008-2010.

The full period of the analysis, cover monthly data for the period from December 2008 to December 2018 (Table 1).

Stationary test, determining the number of lags and robustness of results:

ADF (Augmented Dickey–Fuller) test was performed to find out whether data were stationary or not. For this purpose, each variable was tested and results showed that null hypothesis could not be rejected (except for M3) that means that variables were stationary.

Johansen cointegration test showed cointegration between the variables (Table 2).There are many empirical studies using non-stationary data in VAR model for example: (Kim, Soyoung and Roubini, Nouriel,, 2000), (Citu, 2003), (Sims, C.A. and Zha, T., 1998) (Peersman Gert and Smets Frank, 2001) therefore, variables were used without conversion or other additional filters.

In order to determine the correct lag length, which is a very important part of the model, Likelihood-Ratio (LR), final prediction error (FPE), Schwarz›s Bayesian information criterion (SBIC), Akaike›s information criterion (AIC), Hannan and Quinn information criterion (HQIC) were checked. Results showed to choose 8 as lag length criteria (Table 3, Graph 4).

Basic model of VAR including 8 variables on Georgia's economy is illustrated via following equation:

$A(L)\ Y\_t + B(L)\ X\_t = v\_t$

Where, $A(L)$ and $B(L)$ are n × n and n × k matrix polynomials and Y_t is n × 1 endogenous variables vector which can be divided in two blocks: Variables outside the policy and within the policy. Assuming that variables within the policy are under National Bank's control. X_t is k × 1 vector for exogenous variables and v_t is × 1 structural violation vector where mean is 0 and VAR (vt) = Ψ (Ψ diagonal matrix). Structural parameters need to introduce some restrictions on A matrix elements (Vinayagathasan, 2013). However, due to the fact that the model output showed solid and logical results, restrictions were not incorporated, therefore VAR structuring was not performed.

Robustness of results were confirmed by several tests. Darby Watson test results, which is mostly >2. VAR Residual tests showed that standard deviations of given autoregression were within the limits. VAR Residual Normality tests (Cholesky Ordering) show that data based on Jarque-Bera results matching a normal distribution (table 9). White Heteroskedasticity tests showed that data used in the model is not heteroscedasticity because probability exceeds 5% by which null hypothesis was accepted (table10).

3.Results:

The Vector Autoregression model identified both significant and weak correlations of the given variables (according to T statistical and P value results), summarized results are provided in the Table 5.

Variance-decomposition show how these variables affect each other over time, for example: the monetary policy rate shock for the period of 8 has 43.68% effect on the fluctuation of the GEL exchange rate and a 4.3% impact on inflation for period of 5 (See Table N 6).

Variance Decomposition is also a good way to see the Cholesky Ordering in a given period, as shown in Graph N7 / N8.

The study, conducted on 8 variables using VAR, showed the material impact of the monetary policy rate on inflation as well as other material dependences of different variables that allow to conclude that through monetary policy channels and through the tools of the National Bank of Georgia, it is possible to have both direct and indirect (through inflation control) effects, both economic output and price stability.

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Annex 1

Tables and Graphs:

Table 1. *Variable analysis used in the model:*

	_GDP	_INF_	__USD_GEL	_REF_RATE	_M3	_MR	_USD_TR	DUMMY
Mean	-0.0047	0.0341	0.0590	-0.0036	0.1643	0.1528	0.1491	0.2066
Median	0.0036	0.0276	0.0356	0.0000	0.1698	0.1513	0.1290	0.0000
Maximum	0.0989	0.1433	0.3739	0.0400	0.4659	0.3373	0.8359	1.0000
Minimum	-0.1617	-0.0330	-0.1093	-0.0600	-0.1697	-0.0575	-0.1034	0.0000
Std. Dev.	0.0509	0.0365	0.1020	0.0211	0.0977	0.0794	0.1493	0.4066
Skewness	-0.8104	0.8675	1.2274	-0.3911	-0.5472	-0.4352	1.2319	1.4493
Kurtosis	4.5252	3.9001	4.4003	3.5340	5.9970	3.8098	6.2944	3.1004
Jarque-Bera	24.9705	19.2634	40.2697	4.5221	51.322	7.12516	85.326	42.409
Probability	0.0000	0.0001	0.0000	0.1042	0.0000	0.0283	0.0000	0.0000
Sum	-0.5743	4.1356	7.1388	-0.4350	19.885	18.487	18.046	25.000
Sum Sq. Dev.	0.3110	0.1601	1.2485	0.0535	1.1439	0.7562	2.6750	19.835
Observations	121	121	121	121	121	121	121	121

Table 2. *Johansen cointegration test output:*
Date: 02/07/20 Time: 11:18
Sample (adjusted): 2009M09 2018M12
Included observations: 112 after adjustments
Trend assumption: Quadratic deterministic trend
Series: _GDP _INF_ _REF_RATE __USD_GEL _M3 _MR
Exogenous series: _USD_TR DUMMY
Warning: Critical values assume no exogenous series
Lags interval (in first differences): 1 to 8

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.461814	204.3518	107.3466	0.0000
At most 1 *	0.422554	134.9620	79.34145	0.0000
At most 2 *	0.318144	73.45841	55.24578	0.0006
At most 3	0.168409	30.56942	35.01090	0.1383
At most 4	0.083574	9.914956	18.39771	0.4887
At most 5	0.001252	0.140334	3.841466	0.7079

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Table 3. *Determination of Lag Length:*
VAR Lag Order Selection Criteria
Endogenous variables: _GDP _INF_ _REF_RATE __USD_GEL _M3 _MR
Exogenous variables: C _USD_TR DUMMY
Date: 02/06/20 Time: 23:19
Sample: 2008M12 2018M12
Included observations: 113

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1305.524	NA	5.11e-18	-22.78803	-22.35358	-22.61174
1	2121.214	1501.448	5.20e-24	-36.58787	-35.28451	-36.05898
2	2288.505	290.1686	5.13e-25	-38.91160	-36.73935*	-38.03012*
3	2321.328	53.44493	5.52e-25	-38.85536	-35.81420	-37.62129
4	2355.958	52.71177	5.83e-25	-38.83112	-34.92106	-37.24445
5	2408.311	74.12852	4.58e-25	-39.12055	-34.34159	-37.18130
6	2460.808	68.75705	3.68e-25	-39.41254	-33.76467	-37.12069
7	2506.984	55.57402	3.40e-25	-39.59263	-33.07586	-36.94820
8	2567.088	65.95550*	2.56e-25*	-40.01926*	-32.63359	-37.02223

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Graph 4.

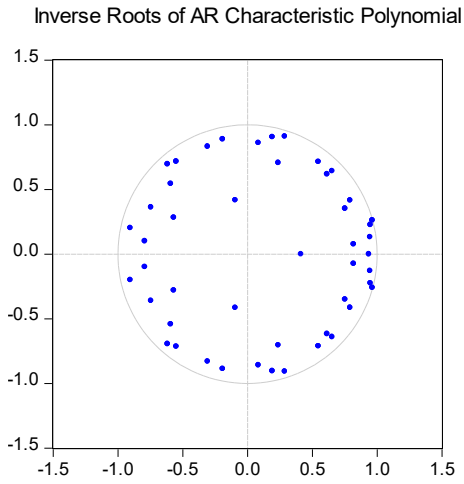


Table N5
Vector Autoregression model output summary:

Dependent Variables	Independent Variables	Sign	Dependence Level
GDP	INF	(-)	Highly Significant
GDP	M3	(+)	Highly Significant
GDP	MR	(-)	Highly Significant
GDP	USD_GEL	(-)	Significant
GDP	Dummy	(-)	N/A
INF	REF_RATE	(-)	Highly Significant
INF	USD_GEL	(+)	Highly Significant
INF	M3	(+)	Highly Significant
INF	MR	(-)	Highly Significant
INF	TR_USD	(+)	Highly Significant
INF	Dummy	(-)	N/A
USD_GEL	INF	(+)	Highly Significant
USD_GEL	REF_RATE	(-)	Highly Significant
USD_GEL	TR_USD	(+)	Highly Significant
USD_GEL	M3	(+)	Weak
USD_GEL	MR	(-)	Weak

Table 6.

Variance Decomposition of _GDP:

Period	S.E.	_GDP	_INF_	_REF_RATE	__USD_GEL	_M3	_MR
1	0.0030	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0056	96.2869	1.2995	0.1095	0.2804	0.5352	1.4884
3	0.0077	90.7635	0.7401	0.5841	0.3830	4.3655	3.1638
4	0.0092	86.0893	0.5898	1.9912	0.3119	8.3712	2.6465
5	0.0104	79.3452	1.6999	3.4396	0.3619	12.962	2.1912
6	0.0113	74.7741	3.2616	3.6221	0.5956	15.616	2.1305
7	0.0121	71.3043	5.4457	3.4307	0.8487	17.059	1.9116
8	0.0129	67.0644	8.3445	3.0060	1.1884	18.694	1.7027

Variance Decomposition of _INF_:

Period	S.E.	_GDP	_INF_	_REF_RATE	__USD_GEL	_M3	_MR
1	0.0083	1.4481	98.5519	0.0000	0.0000	0.0000	0.0000
2	0.0124	0.6478	94.6794	0.5758	0.1662	3.9301	0.0007
3	0.0147	1.8914	79.0173	0.6753	1.0024	8.0028	9.4108
4	0.0170	8.0832	60.9304	0.5674	3.3633	11.0298	16.026
5	0.0192	8.6643	48.4467	0.8662	4.7300	16.2408	21.0518
6	0.0208	8.6639	41.6264	1.0710	4.9433	15.3298	28.3656
7	0.0227	8.4798	35.0436	3.58322	9.2566	13.2827	30.3541
8	0.0241	8.6327	31.3477	4.86332	12.7484	11.8596	30.5483

Variance Decomposition of _REF_RATE:

Period	S.E.	_GDP	_INF_	_REF_RATE	__USD_GEL	_M3	_MR
1	0.0023	3.87E-05	2.9664	97.0336	0.0000	0.0000	0.0000
2	0.0031	3.4064	1.6405	84.6393	8.2586	1.9345	0.1209
3	0.0038	4.4754	3.8689	70.7132	14.4522	3.2013	3.2891
4	0.0044	3.5796	3.1153	65.2877	18.3349	6.2531	3.4293
5	0.0052	2.5712	4.3127	55.2950	23.3934	11.6556	2.7721
6	0.0060	2.5463	3.2115	49.7057	30.8335	11.1552	2.5477
7	0.0069	1.9911	2.5690	44.3941	36.4999	11.2570	3.2887
8	0.0078	1.8649	3.2317	37.8602	43.6823	10.7414	2.6195

Variance Decomposition of __USD_GEL:

Period	S.E.	_GDP	_INF_	_REF_RATE	__USD_GEL	_M3	_MR
1	0.0264	0.1116	0.1686	21.6967	78.0231	0.0000	0.0000
2	0.0433	0.4486	1.9873	23.0373	72.2301	1.9074	0.3893
3	0.0570	1.0670	7.3603	23.5841	66.2462	1.51715	0.2253
4	0.0664	1.0366	10.6550	20.7358	65.8273	1.38916	0.3561
5	0.0730	2.8907	13.3169	18.2009	64.0152	1.15003	0.4263
6	0.0798	4.4666	14.8546	15.4596	63.4629	1.34897	0.4074
7	0.0873	4.1922	16.4709	13.3018	62.4632	2.53767	1.0342
8	0.0925	3.7380	19.4277	11.9290	58.7645	4.20428	1.9365

Variance Decomposition of _M3:

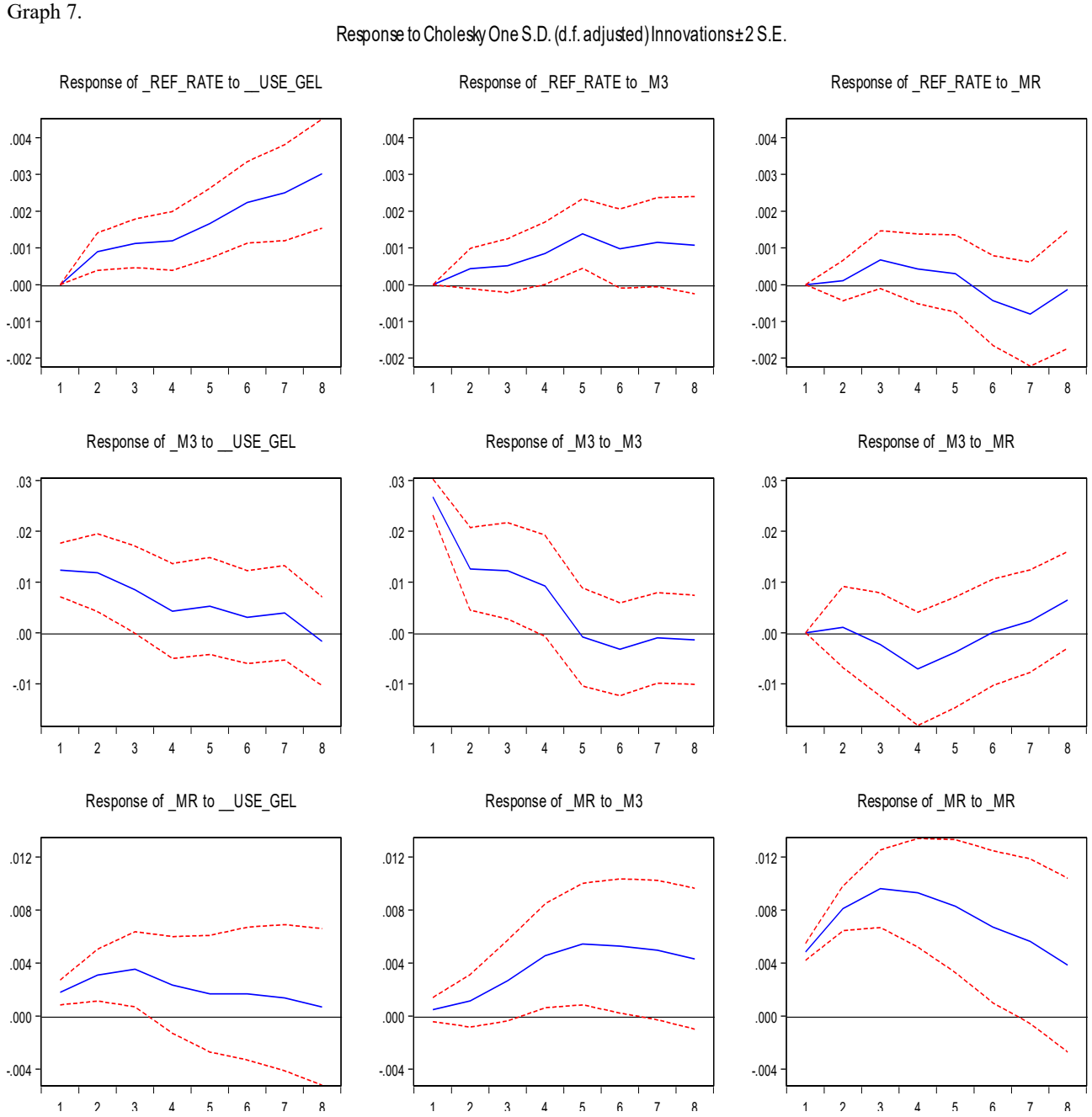
Period	S.E.	_GDP	_INF_	_REF_RATE	__USD_GEL	_M3	_MR
1	0.0328	3.40E-05	0.9233	18.2190	14.2497	66.6079	0.0000
2	0.0406	2.2670	1.1717	25.7915	17.7641	52.9290	0.0770
3	0.0447	4.86678	0.9842	24.2250	18.2965	51.2979	0.3296
4	0.0470	5.2738	1.8413	22.8830	17.3207	50.1040	2.5774
5	0.0476	5.2590	2.0434	22.4348	18.1435	48.9592	3.1600
6	0.0482	5.1479	2.7318	22.8127	18.0848	48.1442	3.0786
7	0.0487	5.0673	2.9715	23.0757	18.3898	47.2543	3.2414
8	0.0493	4.9538	3.3685	22.5319	18.0600	46.1859	4.8998

Variance Decomposition of _MR:

Period	S.E.	_GDP	_INF_	_REF_RATE	__USD_GEL	_M3	_MR
1	0.0053	0.1974	0.6684	2.8578	11.3209	0.8070	84.1485
2	0.0104	0.3352	1.2652	3.4738	11.6119	1.4010	81.9128
3	0.0153	0.5319	0.7849	6.5200	10.724	3.7017	77.7377
4	0.0194	0.5423	0.5096	12.4125	8.0522	7.7251	70.7583
5	0.0231	0.8415	0.3995	18.5483	6.2327	10.9869	62.9911
6	0.0260	1.2431	0.4926	23.7044	5.3399	12.7971	56.4228
7	0.028352	1.443491	0.697125	27.99507	4.719161	13.82132	51.32384
8	0.029907	1.580240	0.910831	30.94373	4.293370	14.49912	47.77272

Cholesky Ordering: _GDP _INF_ _REF_RATE __USD_GEL _M3 _MR

Graph 7.



Graph 8.

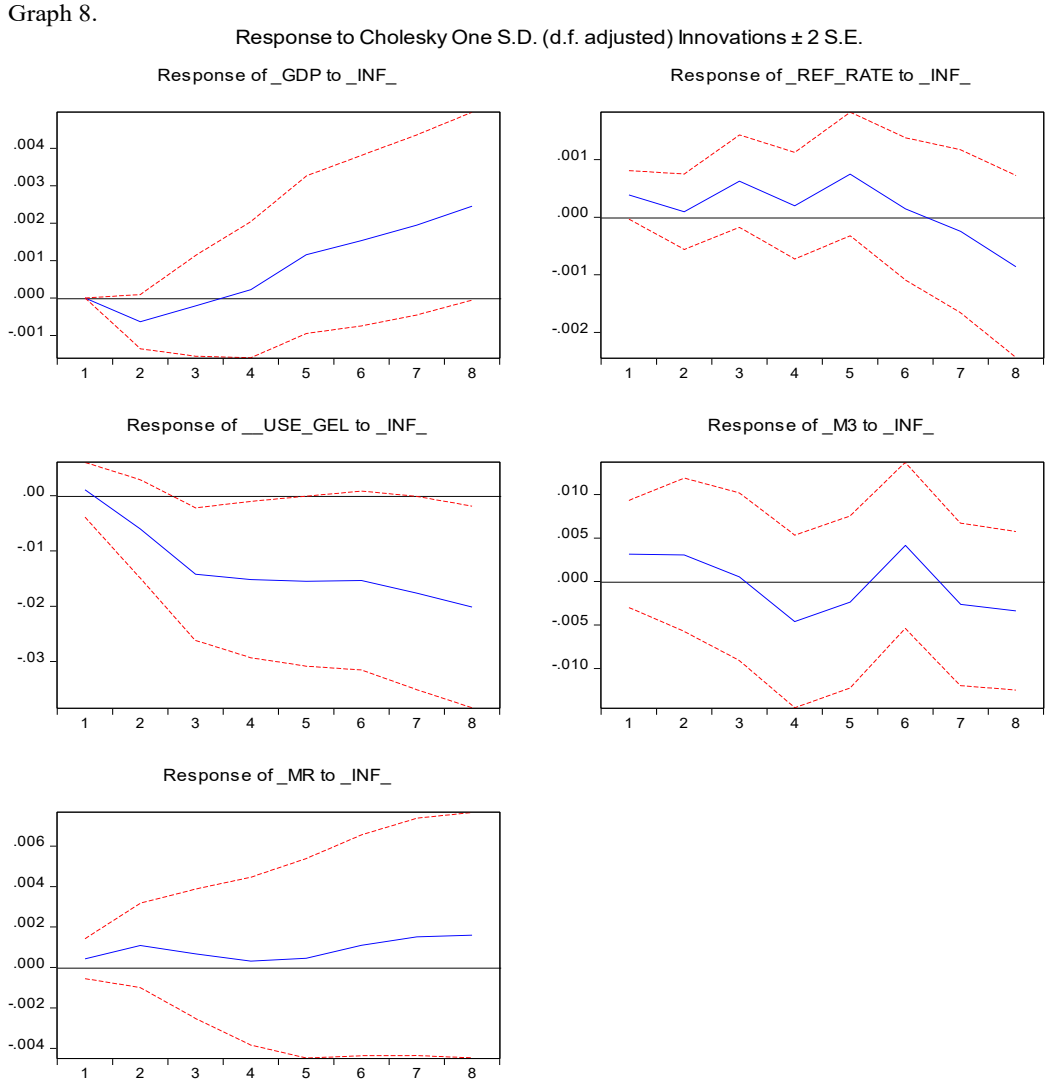


Table 9. *VAR Residual Normality Tests*
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 02/06/20 Time: 23:30
Sample: 2008M12 2018M12
Included observations: 113

Component	Skewness	Chi-sq	Df	Prob.*
1	0.041307	0.032134	1	0.8577
2	0.057996	0.063346	1	0.8013
3	0.038903	0.028503	1	0.8659
4	-0.358232	2.416888	1	0.1200
5	-0.195815	0.722135	1	0.3954
6	-0.054128	0.055180	1	0.8143
Joint		3.318185	6	0.7680

Component	Kurtosis	Chi-sq	Df	Prob.
1	4.635807	12.59887	1	0.0004
2	2.479903	1.273610	1	0.2591
3	3.108690	0.055622	1	0.8136
4	3.645400	1.961212	1	0.1614
5	3.333067	0.522313	1	0.4699
6	2.546416	0.968687	1	0.3250
Joint		17.38031	6	0.0080

Component	Jarque-Bera	Df	Prob.
1	12.63100	2	0.0018
2	1.336956	2	0.5125
3	0.084124	2	0.9588
4	4.378100	2	0.1120
5	1.244448	2	0.5367
6	1.023867	2	0.5993
Joint	20.69850	12	0.0550

*Approximate p-values do not account for coefficient Estimation

Table 10. *VAR Residual Heteroskedasticity Tests (Levels and Squares)*
Date: 02/06/20 Time: 23:32
Sample: 2008M12 2018M12
Included observations: 113

Joint test:

Chi-sq	df	Prob.
2085.981	2079	0.4528

Individual components:

Dependent	R-squared	F(99,13)	Prob.	Chi-sq(99)	Prob.
res1*res1	0.873213	0.904388	0.6367	98.67311	0.4904
res2*res2	0.909176	1.314482	0.3011	102.7369	0.3785
res3*res3	0.905782	1.262395	0.3332	102.3533	0.3886
res4*res4	0.770752	0.441487	0.9882	87.09499	0.7980
res5*res5	0.885107	1.011606	0.5318	100.0171	0.4525
res6*res6	0.937103	1.956427	0.0870	105.8926	0.2994
res2*res1	0.861711	0.818240	0.7248	97.37329	0.5274
res3*res1	0.889757	1.059807	0.4881	100.5425	0.4379
res3*res2	0.889784	1.060108	0.4878	100.5456	0.4378
res4*res1	0.889426	1.056245	0.4912	100.5051	0.4389
res4*res2	0.965741	3.701597	0.0055	109.1287	0.2285
res4*res3	0.845171	0.716804	0.8248	95.50433	0.5808
res5*res1	0.863658	0.831804	0.7109	97.59337	0.5211
res5*res2	0.797531	0.517245	0.9650	90.12098	0.7268
res5*res3	0.854243	0.769589	0.7739	96.52942	0.5515
res5*res4	0.801412	0.529920	0.9595	90.55953	0.7157
res6*res1	0.882446	0.985731	0.5563	99.71639	0.4609
res6*res2	0.855321	0.776304	0.7672	96.65127	0.5481
res6*res3	0.960868	3.224362	0.0107	108.5781	0.2398
res6*res4	0.914594	1.406203	0.2516	103.3491	0.3625
res6*res5	0.920330	1.516905	0.2024	103.9973	0.3459