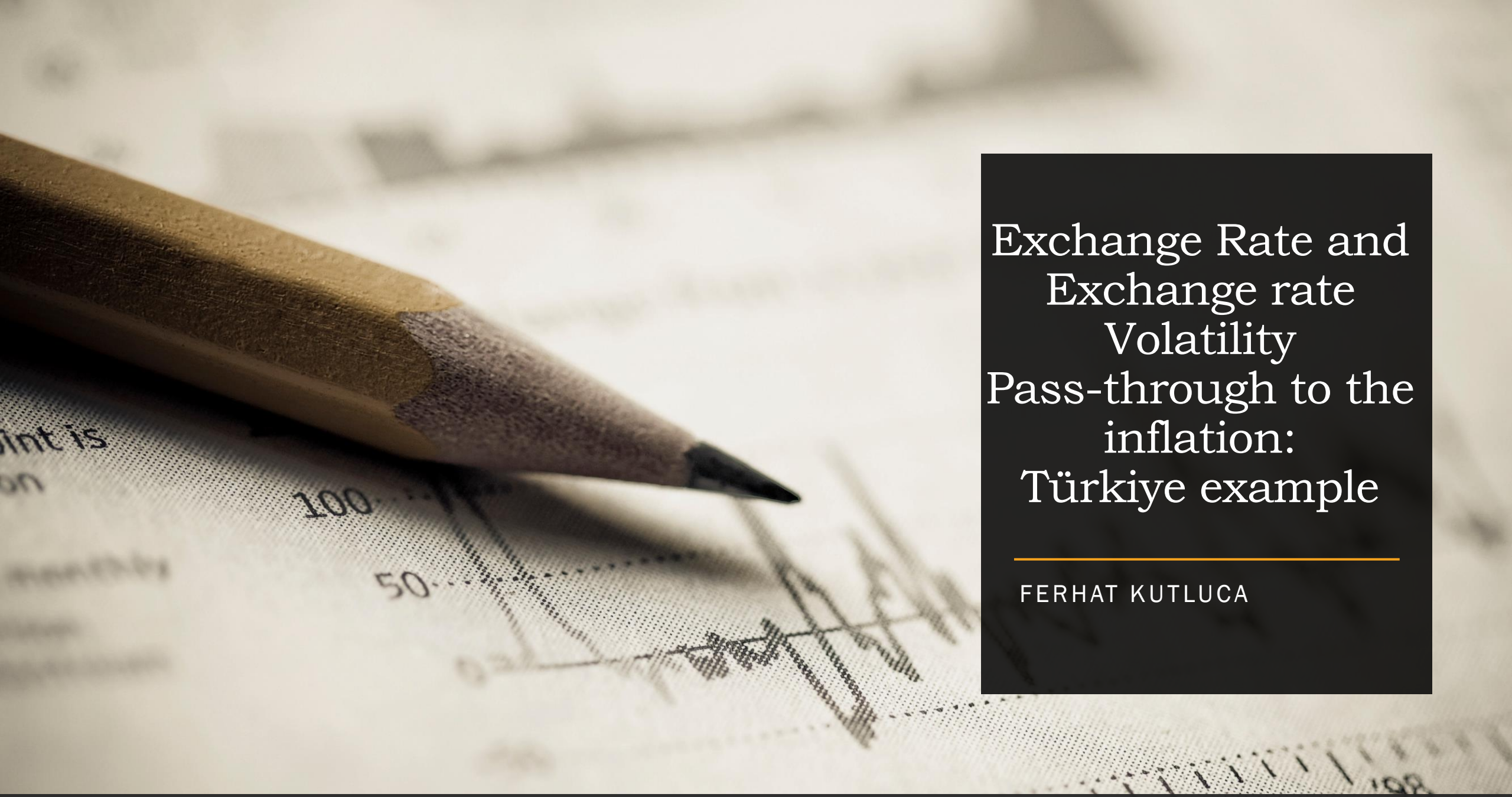
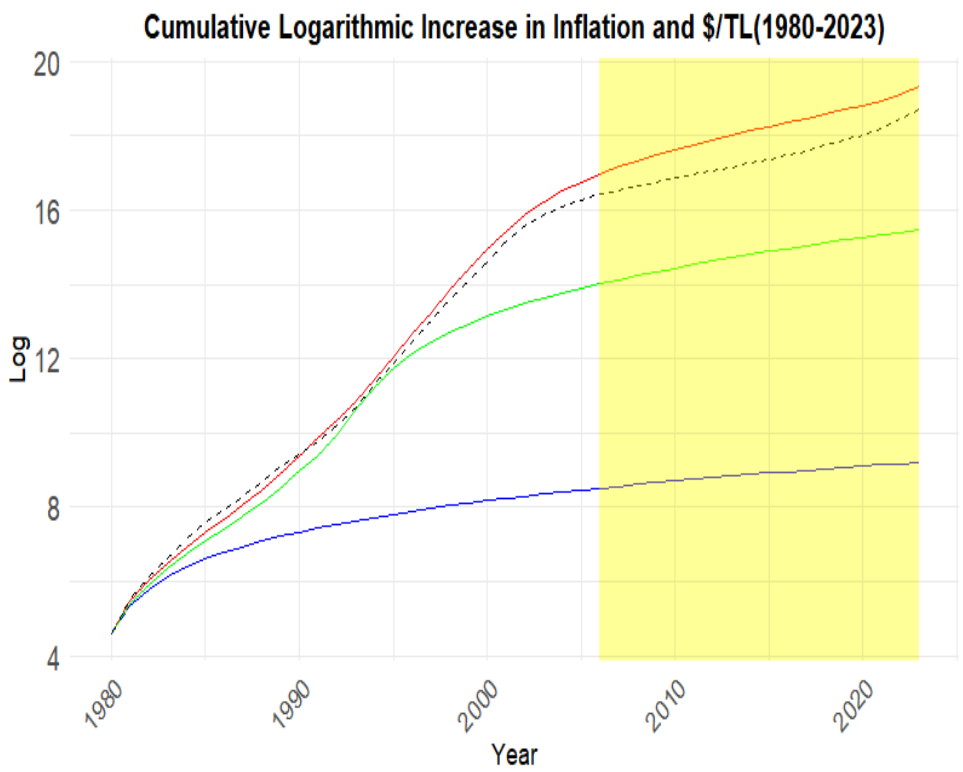


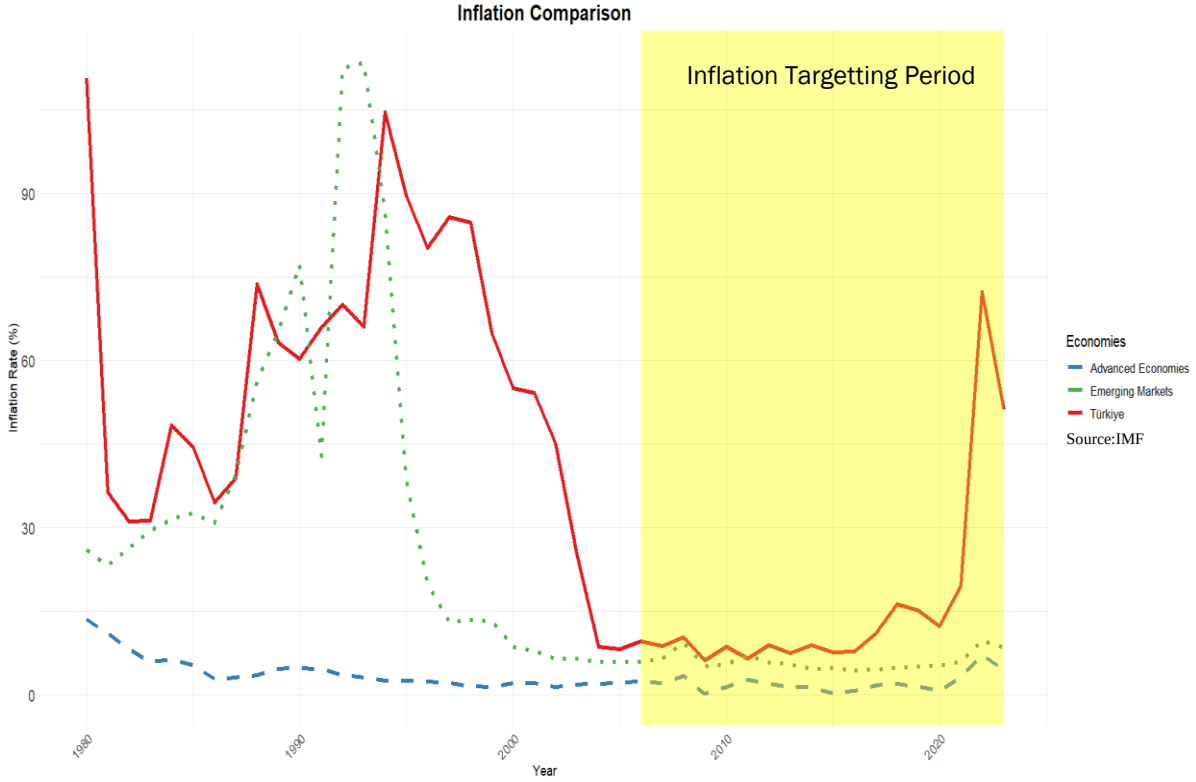
Exchange Rate and Exchange rate Volatility Pass-through to the inflation: Türkiye example

FERHAT KUTLUCA

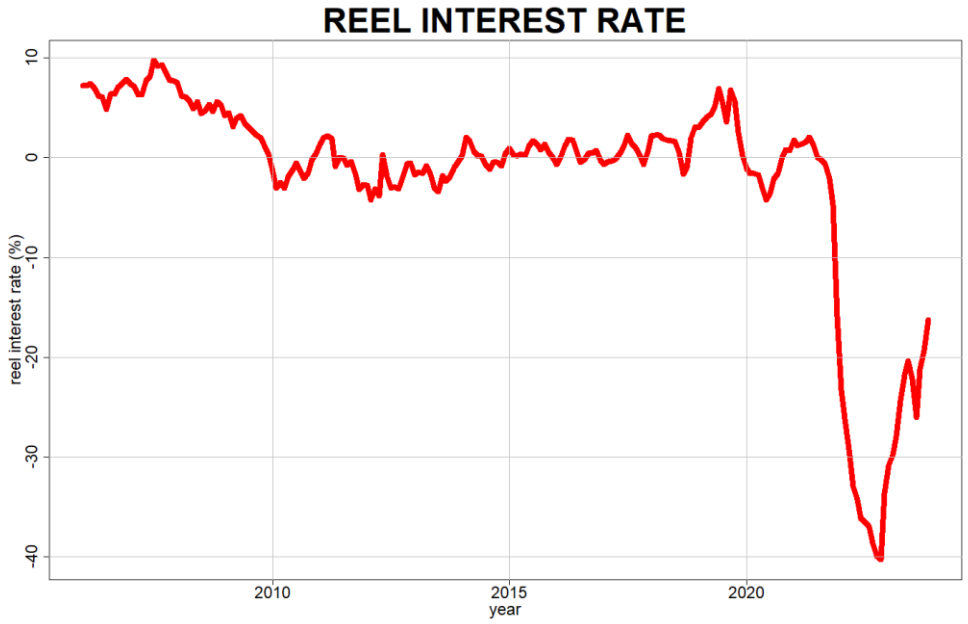
What is ERPT and Why is it Important?

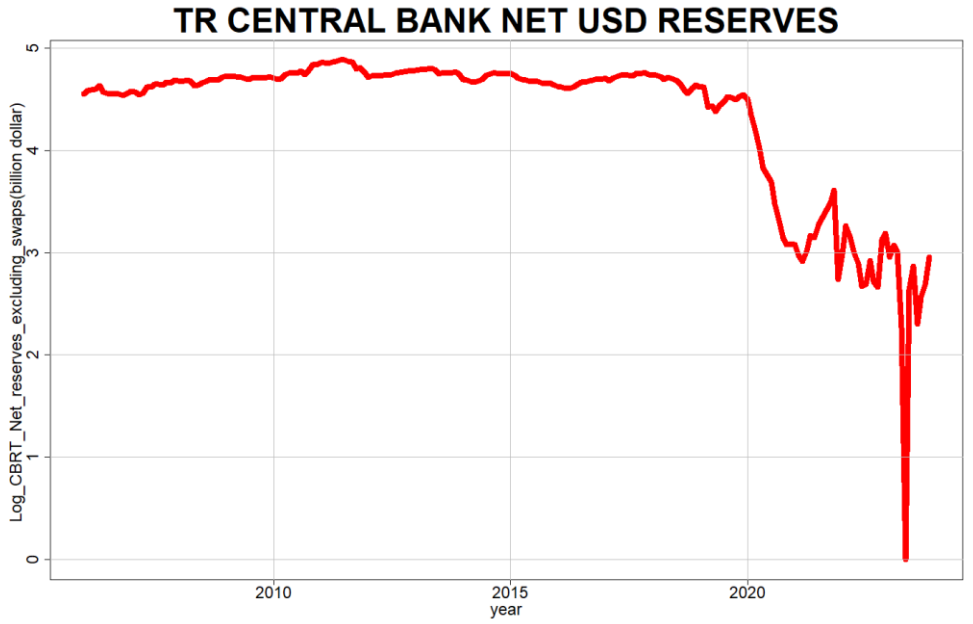
The term Exchange Rate Pass-Through (ERPT) denotes (Osbat et al. 2021) the extent to which changes in exchange rates are transmitted to domestic prices.



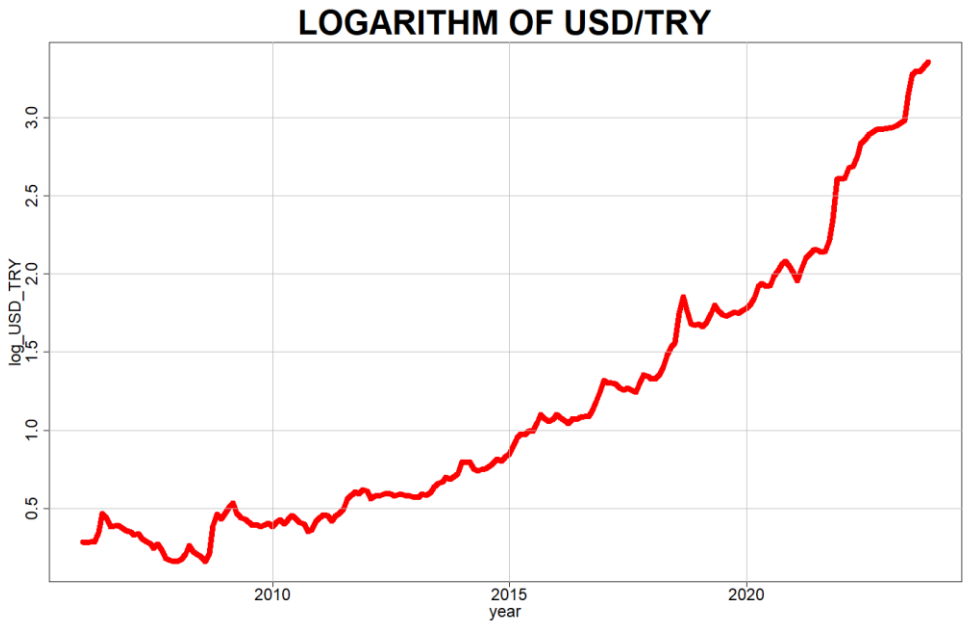


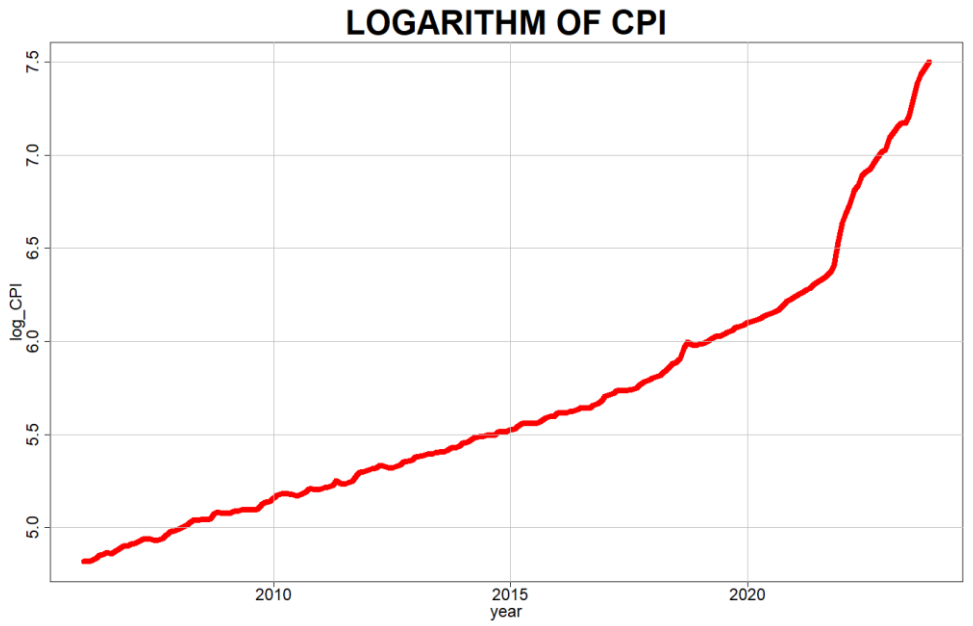
What did happen in last 5 years?



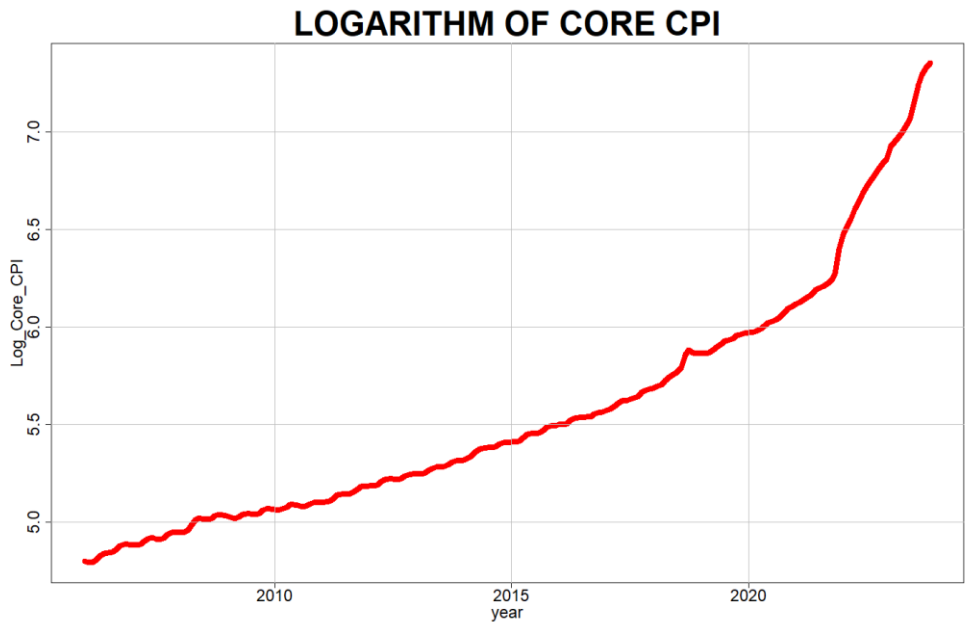


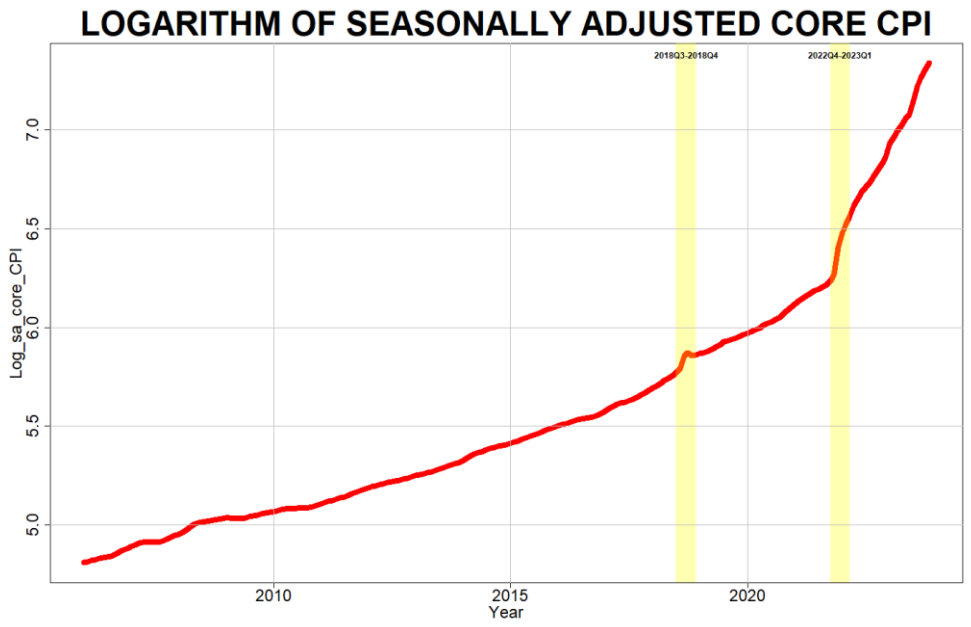
What did they cause?





What are the drivers of Turkish CPI?





CPI Drivers - Philps Equation

$$\log \mathrm{CPI}_t = \alpha_0 + \beta_0 \log \mathrm{CPI}_{t-1} + \sum_{i=1}^{4} \beta_{i+1} \log \mathrm{USD/TRY}_{t-i} + \gamma \log \mathrm{IPI}_t + \delta \log \mathrm{CCI}_t + \theta \log \mathrm{NR}_t + \phi \mathrm{sd\_CR}_t + \lambda_1 D1 + \lambda_2 D2 + \lambda_3 D3 + \epsilon_t$$

	With Dummy Variables												Without 2018Q3, 2018Q4, 2022Q4 Dummy Variables											
	Without 3-months rolling standard devaition of logatihm of USD/TRY						With 3-months rolling standard devaition of logatihm of USD/TRY						Without 3-months rolling standard devaition of logatihm of USD/TRY						With 3-months rolling standard devaition of logatihm of USD/TRY					
	2006Q1-2019Q4			2006Q1-2023Q3			2006Q1-2019Q4			2006Q1-2023Q3			2006Q1-2019Q4			2006Q1-2023Q3			2006Q1-2019Q4			2006Q1-2023Q3		
Variables	Estimate	t value	Significance	Estimate	t value	Significance	Estimate	t value	Significance	Estimate	t value	Significance	Estimate	t value	Significance	Estimate	t value	Significance	Estimate	t value	Significance	Estimate	t value	Significance
(Intercept)	0.007	2.92	**	0.004	1.00		0.008	2.47	*	- 0.003	- 0.61		0.009	3.24	**	0.002	0.51		0.011	4.08	***	- 0.008	- 1.56	
lag_log_sa_core_CPI_1	0.531	4.92	***	0.531	4.45	***	0.499	4.32	***	0.286	2.00	.	0.320	2.51	*	0.510	4.12	***	0.189	1.44		0.293	2.03	*
log_USD_TRY	0.046	2.28	*	0.123	2.53	*	- 0.009	- 0.14		0.334	2.82	**	0.126	5.37	***	0.193	4.54	***	0.077	2.58	*	0.472	4.66	***
lag_log_USD_TRY_1	0.034	1.94	.	0.095	2.27	*	0.030	1.47		0.132	2.95	**	0.027	1.20		0.054	1.35		0.009	0.39		0.108	2.56	*
lag_log_USD_TRY_2	- 0.001	- 0.05		0.000	0.01		0.013	0.88		0.028	0.83		- 0.009	- 0.43		0.018	0.49		- 0.026	- 1.23		0.031	0.93	
lag_log_USD_TRY_3	0.022	1.80	.	0.036	1.14		0.023	1.79	.	0.034	1.10		0.018	1.08		0.032	0.97		0.005	0.33		0.029	0.94	
lag_log_USD_TRY_4	0.010	0.86		0.017	0.46		0.009	0.70		0.021	0.57		0.016	1.00		0.062	1.87	.	0.011	0.68		0.051	1.60	
log_IPI	0.094	3.97	***	0.148	2.56	*	0.099	3.92	***	0.122	2.02	*	0.136	4.19	***	0.149	2.48	*	0.103	3.08	**	0.143	2.43	*
log_CCI	- 0.043	- 1.92	.	- 0.131	- 2.41	*	- 0.052	- 2.20	*	- 0.153	- 2.70	**	- 0.012	- 0.39		- 0.073	- 1.36		- 0.005	- 0.16		- 0.105	- 2.00	.
log_NR	- 0.043	- 1.89	.	- 0.043	- 2.00	.	- 0.062	- 0.93		0.305	2.35	*	- 0.067	- 2.08	*	- 0.013	- 0.66		- 0.069	- 2.27	*	0.385	3.08	**
sd_CR							0.017	0.68		0.010	0.72								0.04	2.49	*	- 0.01	- 0.45	
dummy_2018Q3	0.040	4.58	***	- 0.003	- 0.14		0.033	2.00	.	- 0.000	- 0.02													
dummy_2018Q4	- 0.054	- 4.36	***	- 0.059	- 2.15	*	- 0.062	- 4.23	***	- 0.055	- 1.85	.												
dummy_2022Q4				0.070	2.29	*				0.035	1.22													
R-squared:	0.85			0.78			0.85			0.79			0.68			0.73			0.73			0.77		
Adjusted R-squared:	0.81			0.72			0.80			0.74			0.61			0.69			0.66			0.73		
Short_ERPT:	0.11			0.27			0.07			0.55			0.18			0.36			0.07			0.69		
Long_RPT:	0.24			0.58			0.13			0.77			0.26			0.73			0.09			0.98		

VAR

For each i, where $i = 1, \ldots, 5$ (where 5 is the number of variables, the VAR model can be represented as:

$$Y_{i,t} = \alpha_i + \sum_{j=1}^{5} \sum_{k=1}^{p} \beta_{i,j,k} Y_{j,t-k} + \epsilon_{i,t}$$

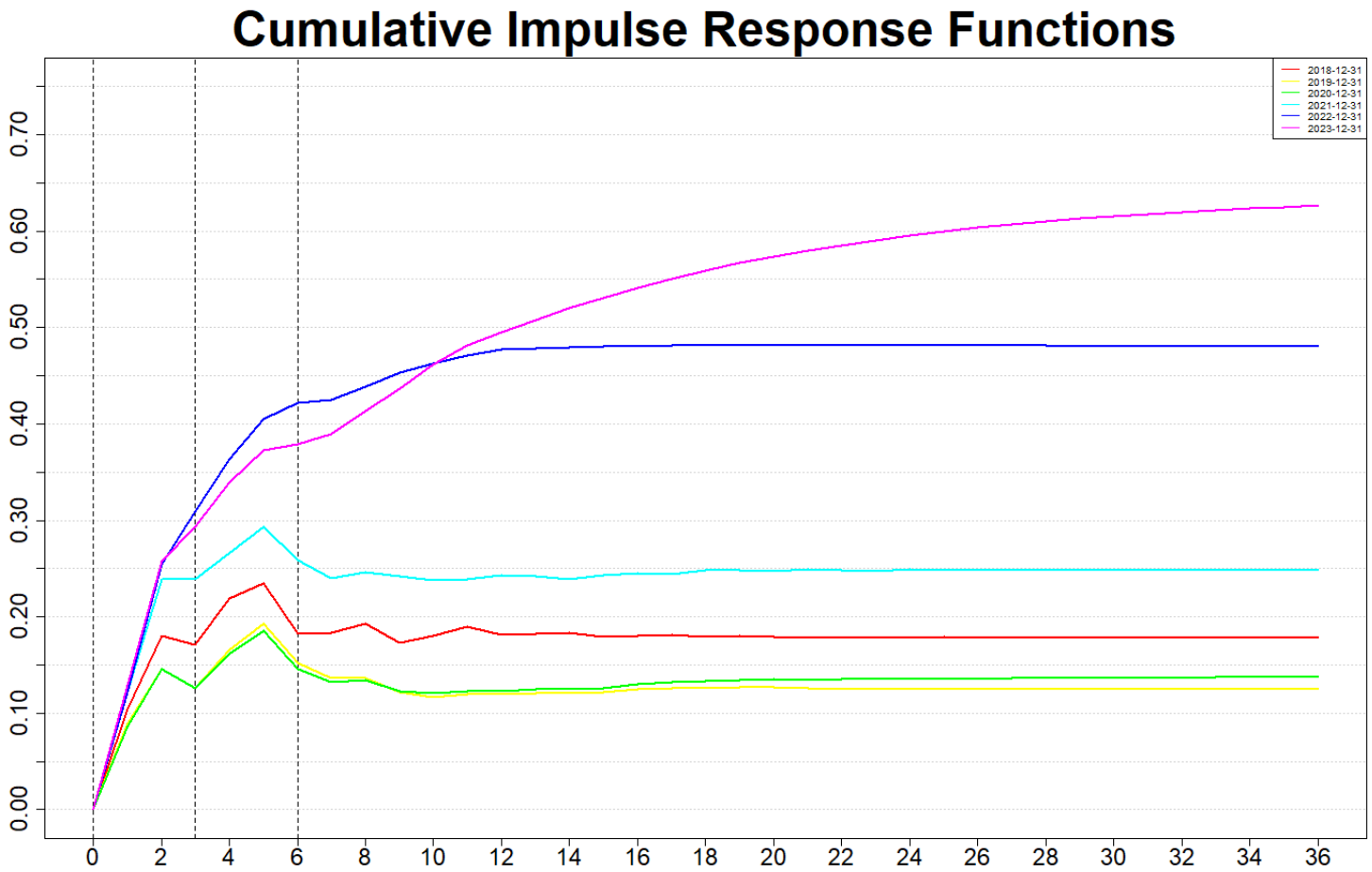
Here:

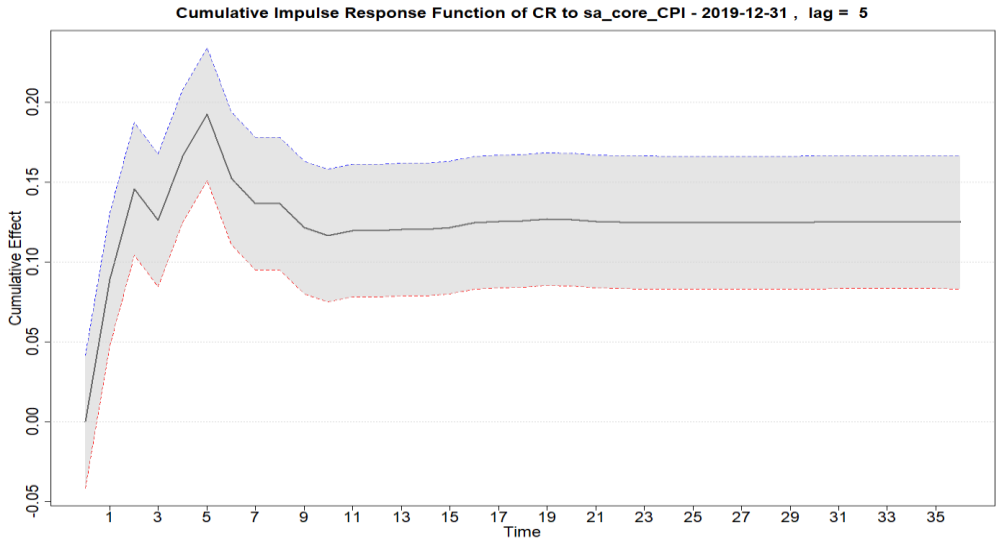
- $Y_{i,t}$ is the value of variable i at time t.
- α_i represents the constant term for variable i.
- $\beta_{i,j,k}$ is the coefficient representing the effect of variable j at time $t - k$ on variable i (autoregressive coefficients and coefficients of other variables).
- $\epsilon_{i,t}$ is the error term representing random shocks to variable i at time t.

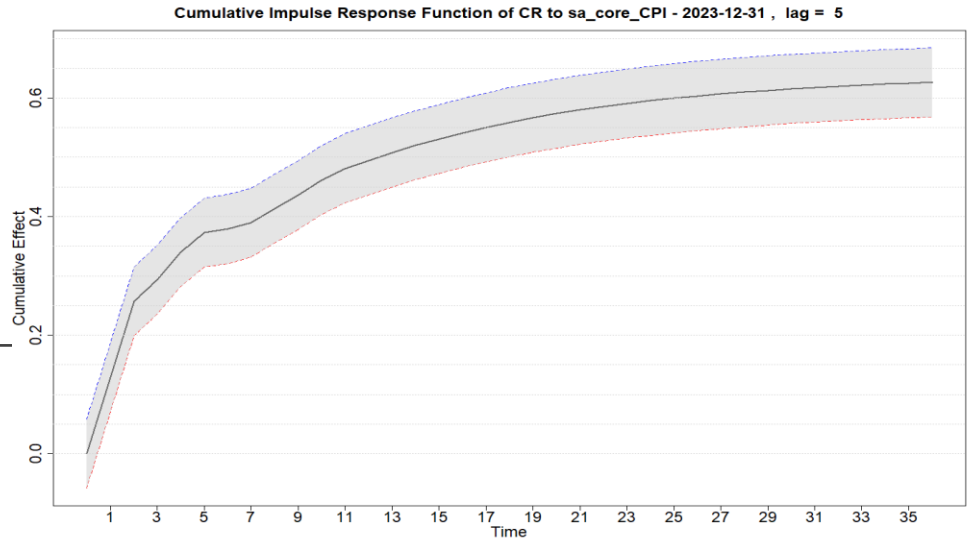
$p = 5$ indicates that the model considers lagged values up to 5 periods for each variable, meaning the current value is predicted using its own past values as well as the past values of other variables up to 5 periods.

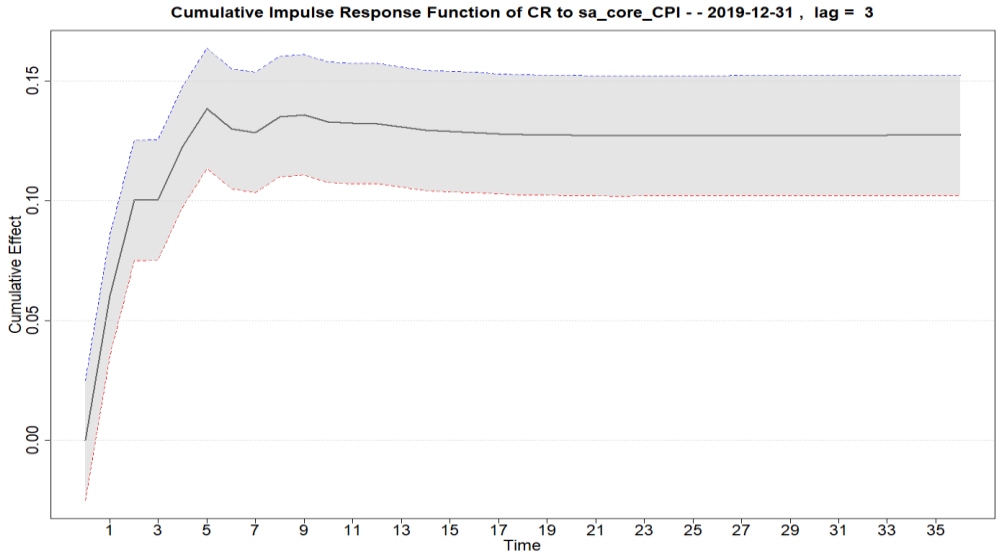
Comparison between Periods

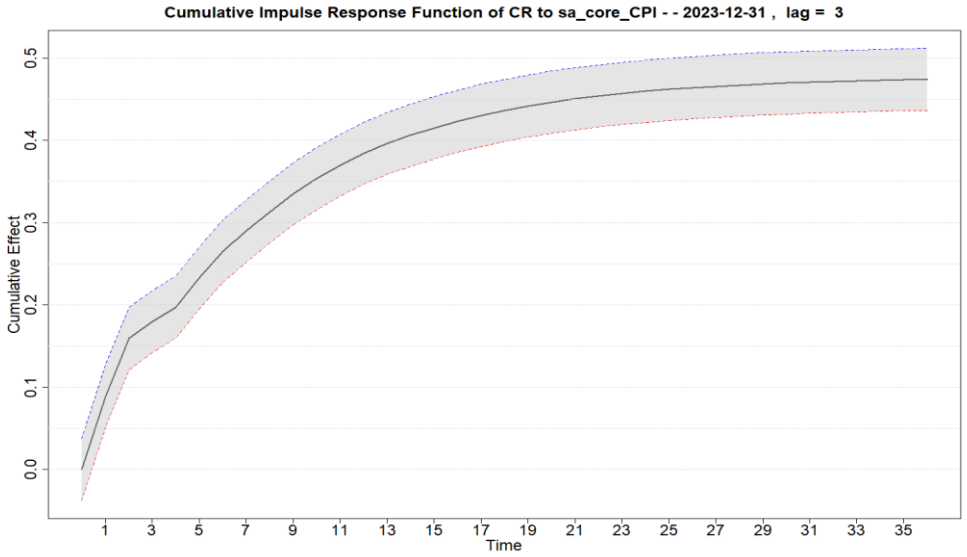
	With Dummies		Without	
Time	2019	2023	2019	2023
Short_ERPT:	11%	27%	18%	36%
Long_RPT:	24%	58%	26%	73%







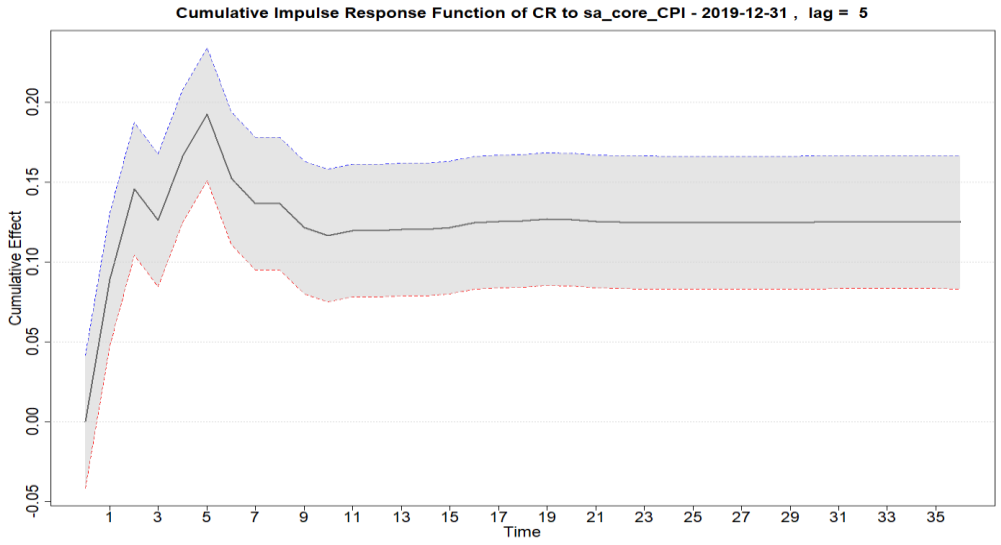




Lag=5

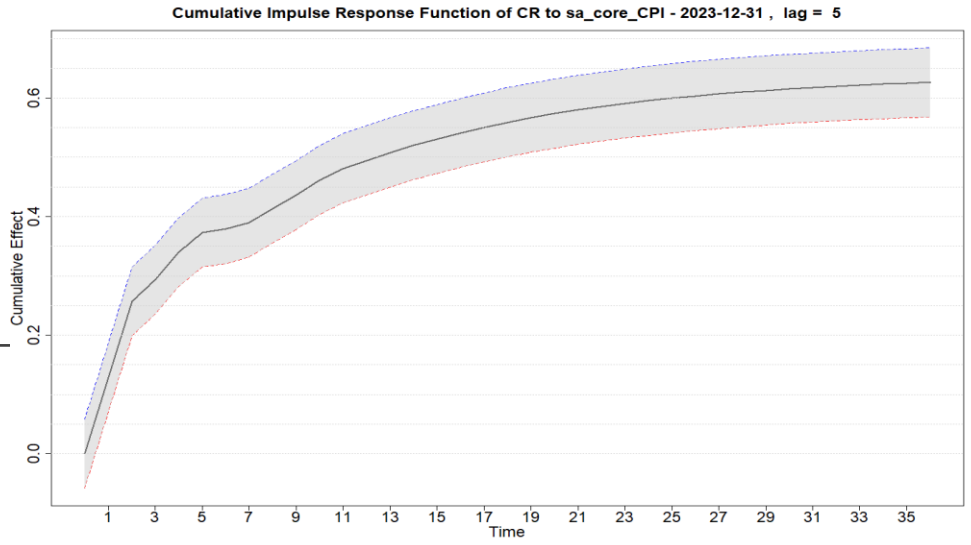
Add CR$std

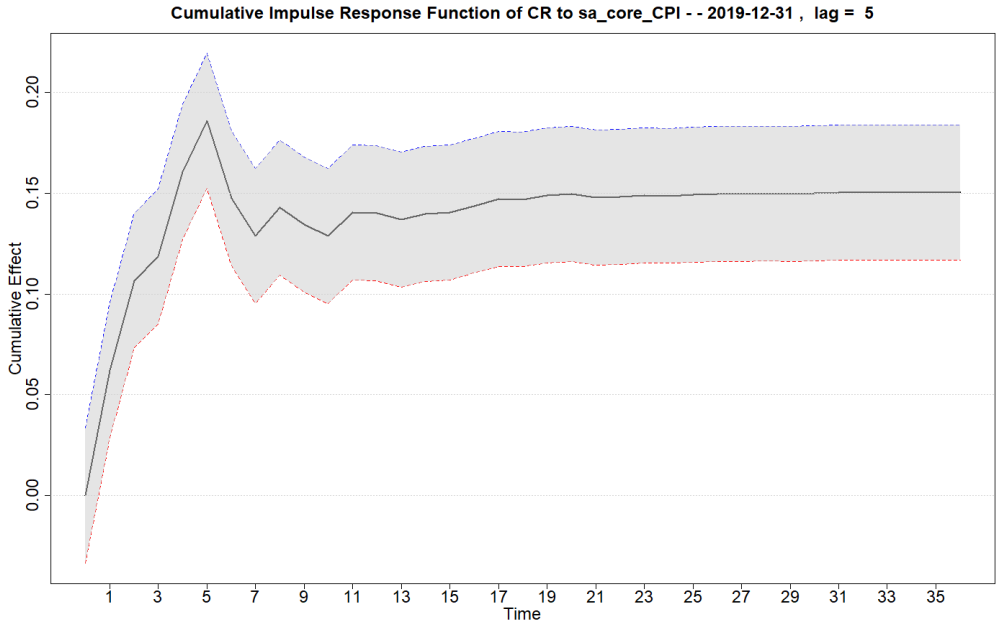
Lag=5



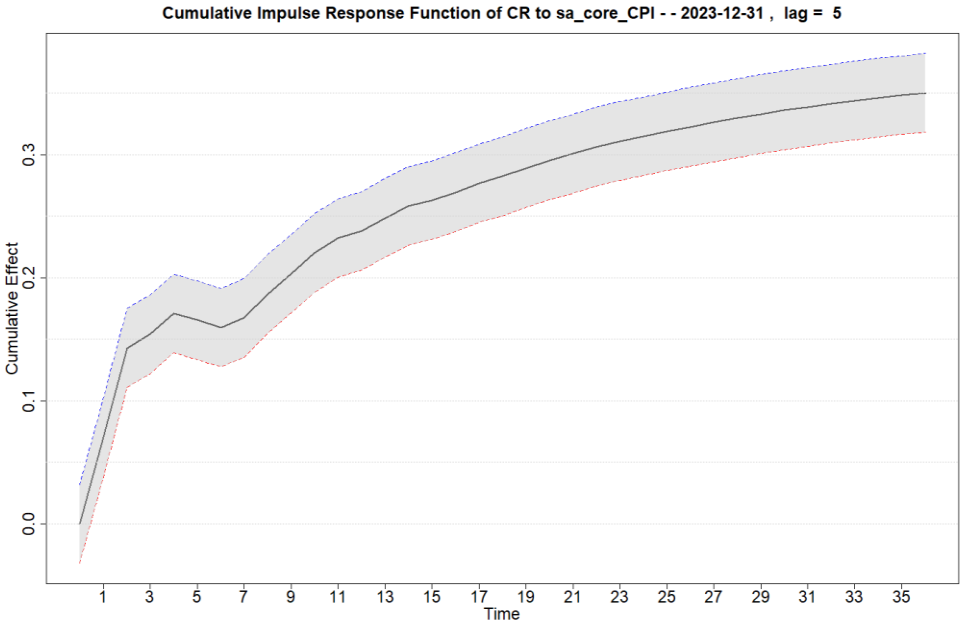
Lag=5

Add CR$Sd



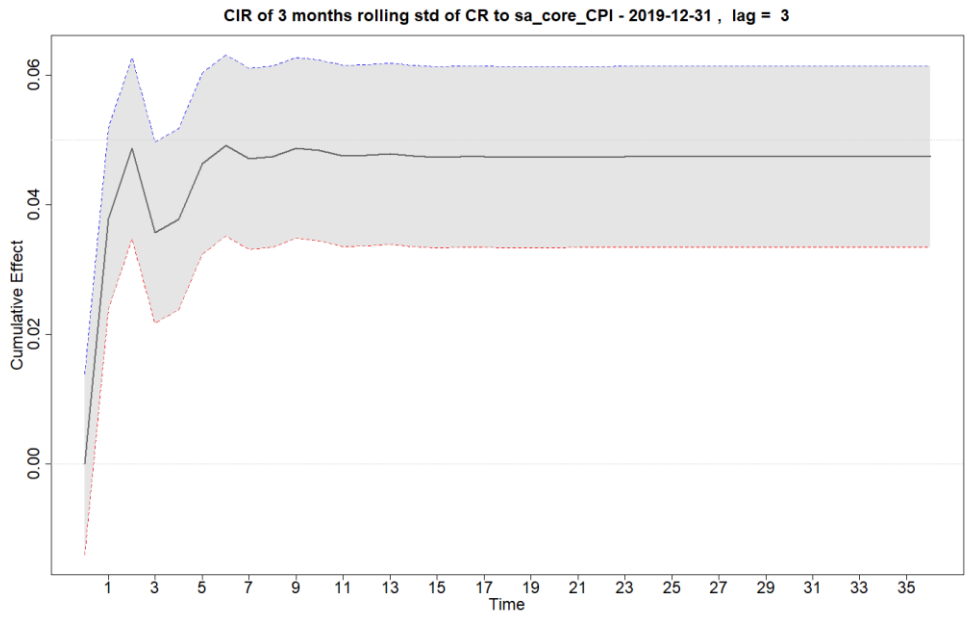


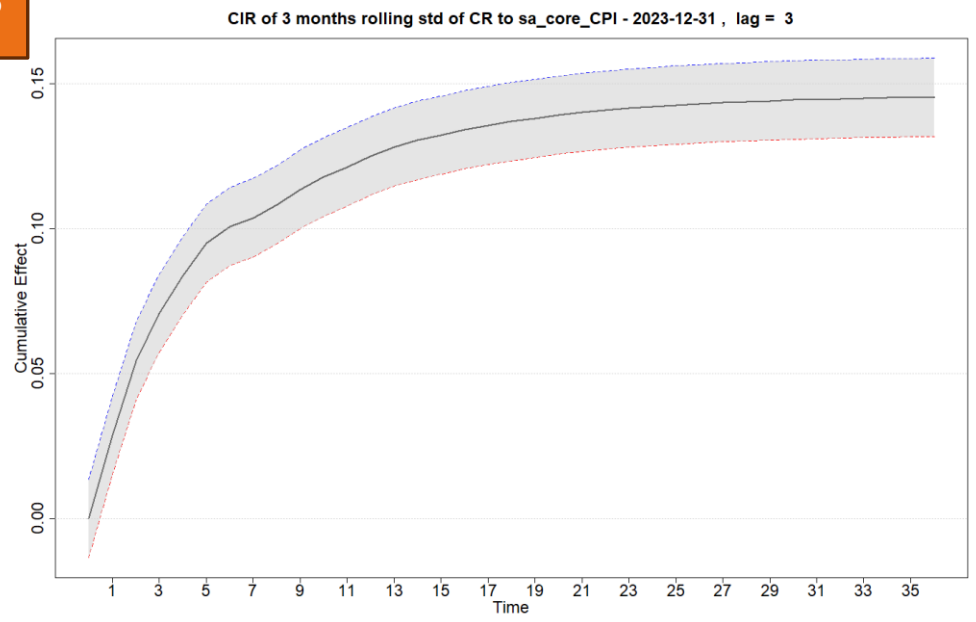
Lag=5



CIR of 3 months rolling standard deviation of seasonally adjusted core consumer price index

Lag=3





Robustness

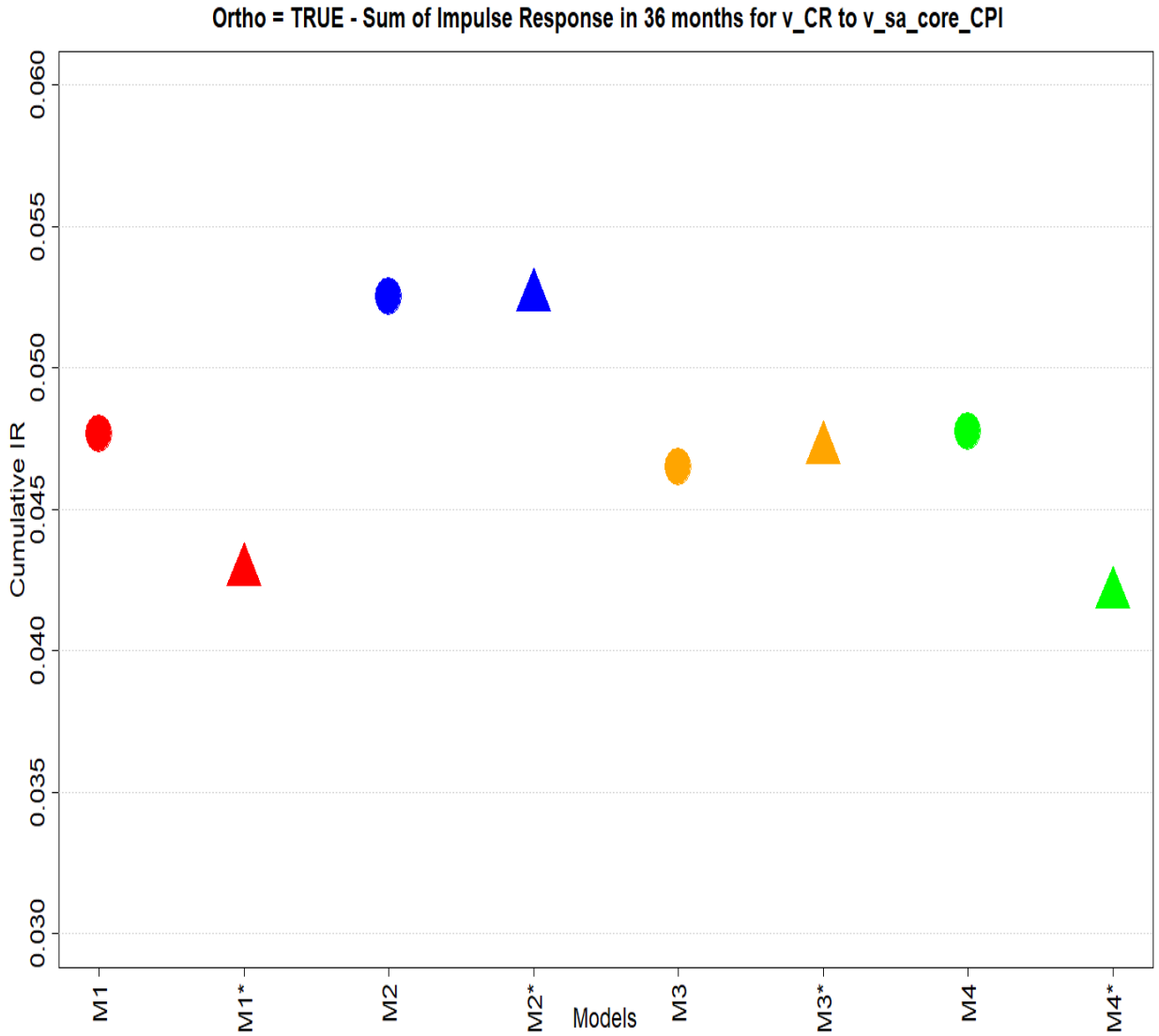
M1: Actual Model

M2: Actual Model + core_rir

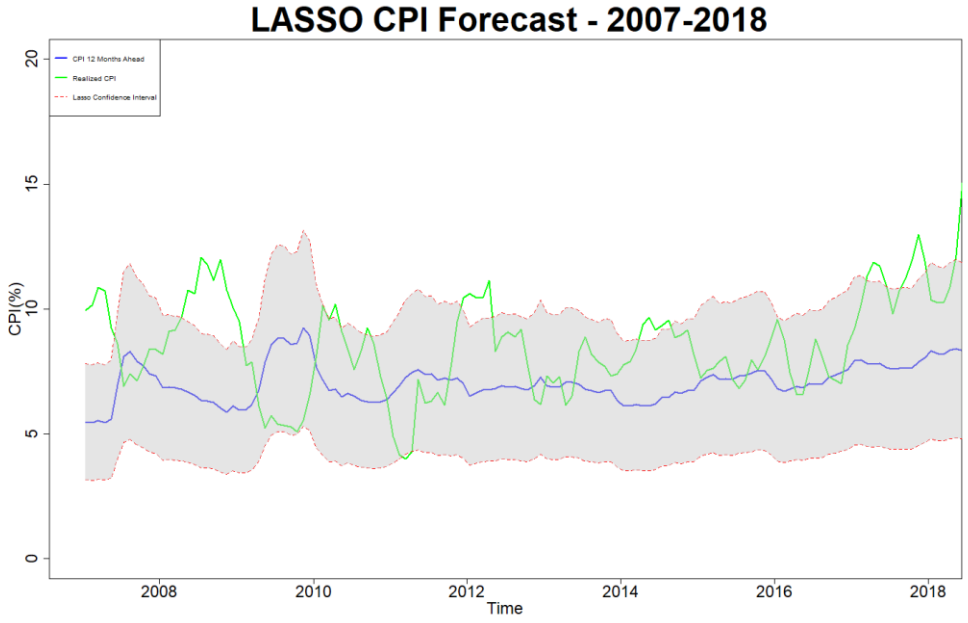
M3: Actual Model + M3

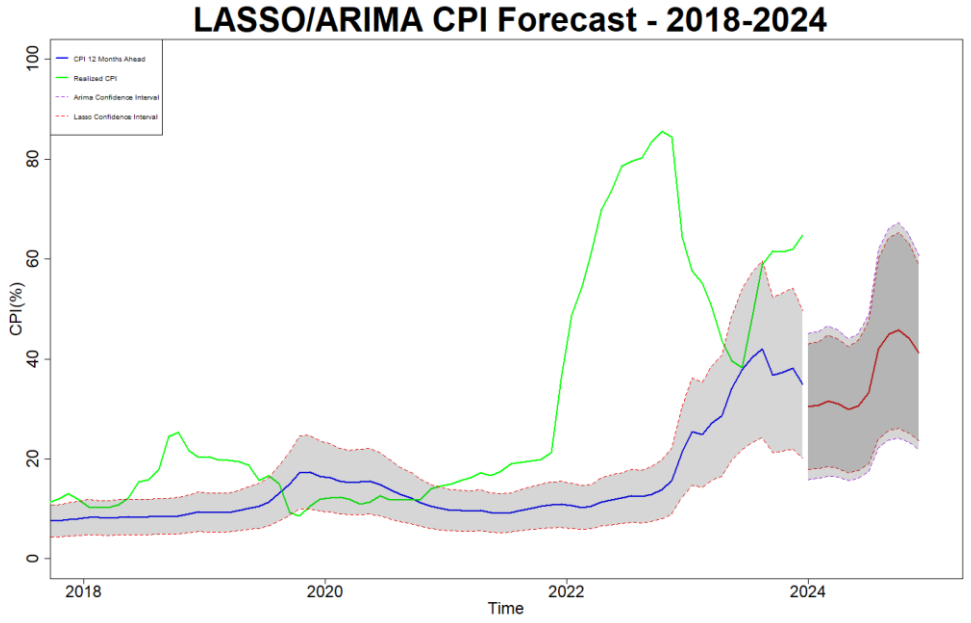
M4: 5 * Actual Model + sd_CR

* means IPI comes before the CR



CPI Forecast





Literature review

Author/s	Period/Country	Method
MacCarthy (2000)	1976-1998/USA, Japan, Germany, France, England, Belgium, Netherlands, Sweden and Switzerland	VAR Analysis
Kara and Öğünç (2005)	1991-2001 and 2001-2004/Türkiye	VAR Analysis
Kara et al. (2007)	1980-2006/Türkiye	Time-Varying Parameter and Regressions
Korhonen and Wachtel (2006)	1999-2004/Kazakhstan, Ukraine, Armenia, Georgia, Russia, Kyrgyzstan and Moldova	VAR Analysis
Dolores (2009)	2000-2007/Bulgaria, Estonia, Cyprus, Hungary, the Czech Republic, Lithuania, Poland, Slovakia, Latvia, Romania, Slovenia, Türkiye	VAR Analysis
Saha and Zhang (2013)	1990-2011/Australia, China and India	VAR Analysis
Arslaner et al. (2014)	1986:01-2013:08/Türkiye	VAR Analysis
Alptekin et al. (2016)	2005:01-2015:04/Türkiye	VAR Analysis
Karamelikli and Korkmaz (2016)	2003:01- 2015:11/Türkiye	NARDL Method
Bozdağlıoğlu and Yılmaz (2017)	1994:01-2014:12/Türkiye	VAR Analysis
Durgun Kaygısız (2018)	2002-2016/Türkiye	VAR Analysis
Benk and Kösekahyaoğlu (2019)	2001:01-2018:12/Türkiye	VAR Analysis and Granger Causality Test
Miyajima (2019)	2005:05-2018:06/South Africa	VAR Analysis and Granger Causality Test
Aisen et al. (2021)	2001-2019/Mozambique	ARDL
Kara and Sarıkaya (2021)	2006:01-2021:09/Türkiye	Time-Series Models and Philips Curve
Yilmazkuday (2022)	2005:01-2021:08/Türkiye	SVAR
Swallow et al. (2023)	1990:01-2022:12/28 Advanced economies, 18 Emerging Markets	Time-Series Models

Thanks & References

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- McCarthy, J. (2000). Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies. FRB of New York Staff Report, 111. New York, NY.
- Schröder, M., & Hüfner, F. P. (2002). Exchange Rate Pass-Through to Consumer Prices: A European Perspective (No. 02-20). ZEW Discussion Papers.
- Osbat, C., Sun, Y., & Wagner, M. (2021). Sectoral Exchange Rate Pass-Through in the Euro Area. ECB Working Paper No. 2021/2634.
- Other references in the Literature Review.