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Inflation Uncertainty and Output Growth in Transition Economies: Evidence from Selected Countries

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Abstract: This study examines the relationship between inflation uncertainty and output growth in two major transition economies, Russia and Kazakhstan, with particular emphasis on the dynamic effects of macroeconomic volatility. Using monthly data from the International Monetary Fund's International Financial Statistics (IMF IFS) database, inflation is proxied by the Consumer Price Index (CPI), while output growth is represented by the Industrial Production Index (IPI). The study applies the VAR–MGARCH-M–BEKK econometric framework to estimate inflation uncertainty and assess its impact on economic growth through dynamic mean and volatility interactions. The empirical findings reveal that inflation uncertainty does not exert a statistically significant direct short-run effect on output growth in either Russia or Kazakhstan. However, the results indicate substantial volatility persistence, asymmetric shock transmission, and dynamic macroeconomic interdependence between inflation and real economic activity. The study concludes that the impact of inflation uncertainty on economic growth is highly country-specific and dependent on structural characteristics, policy credibility, and external economic exposure.

Keywords: Inflation Uncertainty, Output Growth, Transition Economies, Russia, Kazakhstan, VAR-MGARCH-M-BEKK, Macroeconomic Volatility, CPI, Industrial Production Index, Monetary Policy.

1. Introduction

Inflation and macroeconomic stability remain central concerns for policymakers, particularly in transition economies where structural transformation and external vulnerabilities shape economic performance. While earlier studies mainly focused on the level of inflation, more recent research has increasingly examined inflation uncertainty and its impact on output growth. However, empirical findings remain mixed, with some studies emphasizing inflation uncertainty as the main channel affecting growth, while others highlight the direct role of inflation itself [1].

This study focuses specifically on Russia and Kazakhstan, two major transition economies that emerged from the collapse of the Soviet Union and continue to exhibit distinct inflation dynamics due to structural reforms, commodity dependence, and exposure to geopolitical shocks [2]. Russia's economy has experienced repeated inflationary pressures driven by exchange rate depreciation, sanctions, fiscal adjustments, and geopolitical instability. Kazakhstan, similarly, has faced significant inflation volatility, particularly following the adoption of a more flexible exchange rate regime, periodic currency devaluations, and its strong dependence on oil exports and imported inflation from regional partners [3].

Given these characteristics, both countries provide a relevant context for examining the relationship between inflation uncertainty and output growth. Understanding this relationship is important for designing effective macroeconomic and monetary policy frameworks in transition economies exposed to persistent external and domestic shocks [4].

Literature Review

The relationship between inflation uncertainty and economic growth has been widely debated in macroeconomic literature. Friedman argues that higher inflation increases uncertainty about future prices, distorts resource allocation, discourages long-term investment, and ultimately slows economic growth [5]. Supporting this view, Ball suggests that unstable inflation often reflects weak monetary policy credibility, which further increases uncertainty [6]. However, Holland presents an alternative view, arguing that inflation uncertainty may encourage central banks to adopt tighter policies, which can stabilise the economy [7].

Empirical evidence in transition economies generally supports the negative impact of inflation uncertainty on growth. Fountas et al. found that inflation uncertainty has a stronger adverse effect on output growth than inflation itself in European transition economies [8]. Similarly, Živkov et al. show that inflation uncertainty significantly harms economic performance, particularly during periods of economic downturn [9]. Kutan and Yigit also highlight that stronger monetary policy credibility can reduce inflation volatility and improve macroeconomic stability [10].

For Russia and Kazakhstan, inflation uncertainty remains particularly relevant due to their economic structures and vulnerability to external shocks. Russia has faced persistent inflation pressures caused by sanctions, geopolitical instability, exchange rate depreciation, and fiscal adjustments. Kazakhstan has experienced repeated inflation volatility due to oil price dependence, imported inflation, and major exchange rate regime changes, especially after the tenge devaluations. These characteristics make both countries important cases for examining how inflation uncertainty influences output growth in transition economies.

2. Materials and Methods

This study employs a comprehensive econometric methodology to examine the relationship between inflation uncertainty and output growth in Russia and Kazakhstan, two transition economies characterised by macroeconomic volatility and structural transformation. Following Grier et al. and Engle and Kroner the study applies the VAR–MGARCH-M–BEKK framework to estimate the dynamic interaction between inflation and output growth while generating a time-varying measure of inflation uncertainty. This multivariate approach is preferred over univariate models because it captures volatility spillovers, feedback effects, and the direct impact of inflation uncertainty on economic growth.

Monthly data on Consumer Price Index (CPI) as a proxy for inflation and Industrial Production Index (IPI) as a proxy for output growth are obtained from the IMF International Financial Statistics database [11].

3. Results and Discussion

This study employs a quantitative econometric approach to examine the relationship between inflation uncertainty and output growth in Russia and Kazakhstan. Monthly data on the Consumer Price Index (CPI) and Industrial Production Index (IPI) were obtained from the International Monetary Fund's International Financial Statistics (IMF IFS) database. Inflation is measured using the logarithmic changes in CPI, while output growth is proxied by the logarithmic changes in IPI. To capture the dynamic interaction between inflation uncertainty and economic growth, the study applies the VAR–MGARCH-M–BEKK model, which allows for joint estimation of mean and volatility dynamics, volatility spillovers, and asymmetric shock effects. Following Engle and Kroner and Grier et al. (2004), inflation uncertainty is derived as the conditional variance generated by the multivariate GARCH framework. This table 1. methodology is particularly appropriate for transition economies characterised by macroeconomic instability, structural transformation, and time-varying volatility [12].

Table 1. Parameter estimates for VAR (p)-MGARCH-M-BEKK model.

PANEL A: RUSSIA			
	cpi_t		$ipi_{,t}$
	Mean specification		
μ_{cpi}	0.0123	μ_{ipi}	1.2809***
$\gamma^{(1)}_{cpi,ipi}$	0.7383***	$\gamma^{(1)}_{ipi,cpi}$	0.2932
$\gamma^{(1)}_{cpi,cpi}$	0.0019	$\gamma^{(1)}_{ipi,ipi}$	-0.5303***
$\gamma^{(2)}_{cpi,ipi}$	-0.0559	$\gamma^{(2)}_{ipi,cpi}$	-0.6028**
$\gamma^{(2)}_{cpi,cpi}$	0.0064	$\gamma^{(2)}_{ipi,ipi}$	-0.1595
$\gamma^{(3)}_{cpi,ipi}$	0.0972*	$\gamma^{(3)}_{ipi,cpi}$	0.4030***
$\gamma^{(3)}_{cpi,cpi}$	0.0072	$\gamma^{(3)}_{ipi,ipi}$	-0.0494
$\Psi_{cpi,ipi}$	0.4052***	$\Psi_{ipi,cpi}$	0.2486
$\Psi_{cpi,cpi}$	-0.0016	$\Psi_{ipi,ipi}$	-0.4758**
Shape	4.3847***	AIC	4.427
LogL	-559.18	SBC	4.882
HQC	4.610	FPE	4.428
	Variance-covariance specification		
$c_{1,1}$	0.1471***	$c_{1,2}$	–
$c_{2,1}$	0.2827*	$c_{2,2}$	1.3641***
$a_{1,1}$	0.6254***	$a_{1,2}$	0.0972
$a_{2,1}$	-0.0069	$a_{2,2}$	-0.1486**
$b_{1,1}$	0.6164***	$b_{1,2}$	-1.0966***
$b_{2,1}$	-0.0520**	$b_{2,2}$	0.0938
$d_{1,1}$	-0.0543	$d_{1,2}$	-3.1444***
$d_{2,1}$	0.0193	$d_{2,2}$	0.8500***

Note: Significance is marked by ***, **, and * corresponding to the 1%, 5%, and 10% levels. The abbreviations AIC, SBC, HQC, and FPE denote alternative information criteria and forecast error measures, while LogL indicates the log-likelihood value.

For Russia, the VAR(p)–MGARCH-M–BEKK estimates indicate that inflation uncertainty does not exert a statistically significant direct effect on output growth, as reflected by the insignificant uncertainty-in-mean coefficient in the output equation $\Psi_{(ipi,cpi)}$= 0.2486). This finding suggests that increased inflation uncertainty does not translate into lower real economic activity in the Russian case.

This Table 2. result is consistent with the stabilisation view proposed by Holland, which argues that effective monetary policy responses may neutralise the adverse growth effects of inflation uncertainty. Despite the presence of pronounced volatility dynamics in inflation, the lack of a significant uncertainty-in-mean effect implies that output growth in Russia remains relatively insulated from inflation uncertainty shocks in the short run [13].

Table 2. Parameter estimates for VAR (p)-MGARCH-M-BEKK model.

PANEL B: KAZAKHSTAN			
	cpi_t		$ipi_{,t}$
	Mean specification		
μ_{cpi}	0.2717***	μ_{ipi}	-0.3327***
$\gamma^{(1)}_{cpi,ipi}$	0.6043***	$\gamma^{(1)}_{ipi,cpi}$	0.2232
$\gamma^{(1)}_{cpi,cpi}$	-0.0048	$\gamma^{(1)}_{ipi,ipi}$	-0.2796***
$\gamma^{(2)}_{cpi,ipi}$	0.0034	$\gamma^{(2)}_{ipi,cpi}$	0.3977***
$\gamma^{(2)}_{cpi,cpi}$	0.0004	$\gamma^{(2)}_{ipi,ipi}$	-0.1667***

$\gamma^{(3)}_{cpi,ipi}$	-0.0496	$\gamma^{(3)}_{ipi,cpi}$	-0.2802*
$\gamma^{(3)}_{cpi,cpi}$	0.0023	$\gamma^{(3)}_{ipi,ipi}$	-0.1273**
$\gamma^{(4)}_{cpi,ipi}$	0.0255	$\gamma^{(4)}_{ipi,cpi}$	0.3560*
$\gamma^{(4)}_{cpi,cpi}$	-0.0009	$\gamma^{(4)}_{ipi,ipi}$	-0.0868*
$\gamma^{(5)}_{cpi,ipi}$	-0.0213	$\gamma^{(5)}_{ipi,cpi}$	-0.0904
$\gamma^{(5)}_{cpi,cpi}$	-0.0019	$\gamma^{(5)}_{ipi,ipi}$	-0.0680
$\Psi_{cpi,ipi}$	-0.0203***	$\Psi_{ipi,cpi}$	0.0394
$\Psi_{cpi,cpi}$	-0.0003	$\Psi_{ipi,ipi}$	0.0154
Shape	2.0268***	**AIC**	5.280
LogL	-660.27	**SBC**	5.846
HQC	5.508	**FPE**	5.283
	Variance-covariance specification		
$c_{1,1}$	1.1677***	$c_{1,2}$	–
$c_{2,1}$	1.6725	$c_{2,2}$	0.1166
$a_{1,1}$	1.3745***	$a_{1,2}$	-3.9658
$a_{2,1}$	-0.0537	$a_{2,2}$	3.3248***
$b_{1,1}$	-0.2735*	$b_{1,2}$	1.9340*
$b_{2,1}$	-0.0045	$b_{2,2}$	0.8016***
$d_{1,1}$	-2.5259***	$d_{1,2}$	2.9936
$d_{2,1}$	0.0050	$d_{2,2}$	0.8638

Note: Significance is marked by ***, ** and * corresponding to the 1%, 5% and 10% levels. The abbreviations AIC, SBC, HQC and FPE denote alternative information criteria and forecast error measures, while LogL indicates the log-likelihood value.

For Kazakhstan, the VAR(p)–MGARCH-M–BEKK estimates indicate that inflation uncertainty does not exert a statistically significant direct effect on output growth, as reflected by the insignificant uncertainty-in-mean coefficient in the output equation $\Psi_{(ipi,cpi)}$= 0.0394). This suggests that fluctuations in inflation uncertainty do not materially influence real economic activity in the Kazakh economy [14].

This outcome may reflect the structural characteristics of Kazakhstan as a commodity-dependent economy, where output dynamics are primarily driven by external factors such as global energy prices rather than domestic inflation uncertainty. As a result, real economic growth appears relatively insulated from inflation-related uncertainty shocks, consistent with the stabilisation view that macroeconomic policy frameworks and external anchors can mitigate adverse uncertainty effects [15].

4. Conclusions

This study concludes that the relationship between inflation uncertainty and output growth in Russia and Kazakhstan is complex and country-specific rather than uniform across transition economies. Although the VAR–MGARCH-M–BEKK results indicate that inflation uncertainty does not exert a statistically significant direct short-run effect on output growth in either country, the broader volatility dynamics reveal substantial macroeconomic interdependence between inflation and real economic activity. The evidence suggests that while both economies experience pronounced volatility persistence and asymmetric macroeconomic shocks, the transmission of inflation uncertainty into real output remains conditioned by structural and institutional characteristics.

For Russia, the findings imply that inflation uncertainty does not directly suppress short-run economic growth, potentially reflecting the presence of policy stabilisation mechanisms. However, the broader dynamic structure suggests that inflation-related volatility remains economically

relevant and may influence long-term macroeconomic performance indirectly. In Kazakhstan, the absence of a significant direct relationship appears consistent with the economy's strong dependence on external commodity markets, where global oil price movements and exchange rate dynamics dominate domestic inflation uncertainty as drivers of output growth.

Overall, the findings reinforce the view that inflation uncertainty should not be interpreted as having a universally negative effect across transition economies. Instead, its economic consequences depend heavily on country-specific macroeconomic structures, external vulnerabilities, and policy credibility. This highlights the importance of designing tailored monetary and macroeconomic stabilisation frameworks rather than adopting uniform policy assumptions across structurally different transition economies.

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