“Effectiveness of anti-inflation policy that ensures economic growth: Evidence from post-Soviet countries”

AUTHORS	Atik Kerimov Azer Babayev Nigar Ashurbayli-Huseynova Aybaniz Gubadova

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Atik Kerimov (Azerbaijan), **Azer Babayev** (Azerbaijan),
Nigar Ashurbayli-Huseynova (Azerbaijan), **Aybaniz Gubadova** (Azerbaijan)

EFFECTIVENESS OF ANTI-INFLATION POLICY THAT ENSURES ECONOMIC GROWTH: EVIDENCE FROM POST-SOVIET COUNTRIES

Abstract

There are active debates on the scale of inflation-economic growth causality in the short- and long-term perspectives and factors affecting the correlation and effectiveness of anti-inflationary measures depending on initial economic conditions. These scientific debates result in controversial results. This study aims to explore short- and long-run relationships in the inflation-economic growth chain of 12 post-Soviet countries (Azerbaijan, Estonia, Latvia, Lithuania, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Belarus, Moldova, Ukraine, and Georgia) to determine the most effective system of anti-inflationary policy. The paper employed statistical analysis and trend line extrapolation (analysis of inflationary trends in 2000–2021 and forecast for 2022–2024), pooled mean group of the autoregressive distributed lag model in the Stata 14.2/SE software (identification of the short and long-run coefficients characterizing relationships between inflation and economic growth), and ordinary least squares regression (country-specific modeling results). Statistical analysis showed that Latvia, Lithuania, and Estonia have the most effective anti-inflationary policy; Azerbaijan, Kazakhstan, Kyrgyzstan, and Moldova demonstrate moderate effectiveness, and the other countries have low effectiveness. It is also established that in the long run, a 1% increase in inflation results in a 0.195% decrease in GDP growth with a 99% confidence probability, while in the short run, this causal relationship is insignificant. Country-specific modeling results revealed that within 12 post-Soviet countries, economic growth in Kazakhstan, Lithuania, and Ukraine in a short-term perspective depends on inflation dynamics. According to the modeling results, Lithuania has the most effective anti-inflationary policy to ensure sustainable economic growth.

Keywords inflation, economic growth, anti-inflationary policy, post-Soviet countries

JEL Classification C23, E31, O47

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Atik Kerimov, Doctor in Economics, Professor, Department of Applied Economics, Azerbaijan State University of Economics (UNEC), Azerbaijan. (Corresponding author)

Azer Babayev, Ph.D. in Economics, Associate Professor, Department of Applied Economics, Azerbaijan State University of Economics (UNEC), Azerbaijan.

Nigar Ashurbayli-Huseynova, Ph.D. in Economics, Associate Professor, Department of Applied Economics, Azerbaijan State University of Economics (UNEC), Azerbaijan.

Aybaniz Gubadova, Ph.D. in Economics, Associate Professor, Department of Applied Economics, Azerbaijan State University of Economics (UNEC), Azerbaijan.

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INTRODUCTION

The impact of inflation on economic dynamics has been the focus of scientists' attention for the past several decades. During this period, new theoretical models were developed to explain the relationships in the "inflation-economic growth" chain and the nature of these relationships was empirically substantiated. It is traditionally considered that there is an inverse relationship between economic growth and inflation because excessive inflation leads to a rapid deterioration of economic dynamics and "absorbs" GDP growth. Even intense economic growth can act as a trigger for unwinding an inflationary spiral due to the inability of supply to meet rapidly growing consumer demands, rising wages, and consumer expectations for price increases.

At the same time, it is possible to have both low inflation and positive economic growth. In some cases, moderate inflation can even act as

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a driver of economic growth. The stimulating effect of inflation can be achieved only in conditions of sustainable economic growth and a permanent increase in production capacity, which is synchronized with the growth of aggregate demand. Despite an established theoretical paradigm for identifying relationships in the "inflation-economic growth" chain, many empirical studies testify to rather ambiguous and atypical causal patterns between these variables. This proves that critical determinants of the vector of causality between the components of the described chain are historical prerequisites, institutional capacity, and geographical conditioning.

Thus, evaluating the effectiveness of the state's anti-inflationary policy in the context of ensuring economic growth looks like a rather complex task. It should be empirically determined in the short and long run with consideration of the concomitant influence of other externalities as well as within a limited geographical sample, characterized by the convergence of historical prerequisites and institutional development. Considering all the parameters mentioned above, studying the effectiveness of the anti-inflationary policy will not only empirically reveal the relationships between the variables of the model but also substantiate the country-specific pattern, which will allow choosing anti-inflationary measures on a more scientifically-ground basis.

1. LITERATURE REVIEW

The effectiveness of the anti-inflation policy and the prerequisites for choosing tools to overcome the destructive impact of inflation depends on several vital prerequisites. In particular, Bardy and Rubens (2022) note that policy goals can be achieved if each has its own instrument and the overall goal of the policy is agreed upon in both the short and long term. This approach determines the need to differentiate between anti-inflationary measures of operational intervention and strategic management. That is why it is crucial to consider this causality separately in the short and long run when conducting empirical research on determining the relationship in the inflation-economic growth chain.

Solow (1956), Sala-i-Martin (1994), and Barro (1995) laid the foundations of the relationship between economic growth and the intensity of inflationary processes based on a time-differentiated approach. All studies found a negative impact of inflation on economic dynamics in the long run if the rate of economic growth lags behind the rate of capital accumulation and the growth of production productivity. The investigations were conducted on panel data for different groups of countries, making a generalized result possible. Specifically, Barro (1995) sampled 120 units and found the negative impact of inflation on the economic growth rate.

Nevertheless, empirical results eventually demonstrate controversial evidence regarding temporal patterns of inflation influence on macroeconomic indicators. Using the autoregressive distributed lag model, the absence of a statistically significant effect of inflation on investment activity was confirmed in the long run. However, there is an inverse relationship between inflation and the outcome variable in the short run (Olonila et al., 2023). In contrast, Bouyacoub (2022) investigated the relationship between inflation and economic growth in 20 countries in the Middle East and North Africa (MENA) for 2000–2020. The same econometric instrument did not reveal a statistically significant relationship between the variables in the short run but confirmed this relationship in the long run. In turn, the case of Sri Lanka confirmed the negative impact of the inflation increase both in short- and long-run perspectives: a 1% increase in inflation stagnated economic growth by 3,427.94 mln USD in the short run and 107,263.8 mln USD in the long run (Atigala et al., 2022). These controversial modeling results might be explained not only by temporal patterns but also by geographical patterns and specific features of macroeconomic situation.

Khan and Senhadji (2001) researched the inflation-economic growth causality chain in 140 countries during 1960–1998. They revealed different thresholds of acceptable inflation levels, which do not enormously damage the economic growth rate. Specifically, up to 3% inflation is not a severe obstacle to economic well-being in developed countries and 11-12% in developing countries,

while the average indicator for the whole country sample is up to 9%. Kremer et al. (2013) revealed different inflation thresholds for industrialized and non-industrialized countries. It is empirically confirmed that inflation of up to 2.5% and 17.3% does not harm economic growth.

The consequences of inflation are more dramatic for economic growth if the initial level of inflation is high (Barro, 1995). Thus, regarding inflation-economic growth causality, not just temporal patterns but also historical inflationary trends do matter. It is also substantiated that economics, including monetary policy, largely depends on the historical prerequisites of developing socio-economic systems, the state of development of markets, and the institutional environment (Gentle, 2022, 2023). In addition, slight and moderate inflation does not harm economic growth, while there is still a threshold after which economic growth becomes damaged (Bruno & Easterly, 1995). These empirical findings provide an assumption about the non-linear character of inflation-economic growth causality for some countries.

Sala-i-Martin (1994) considered a shortcoming in the predictive quality of cross-country research on inflation-economic growth coherence because of the high level of convergence between macroeconomic trends in countries with common socio-economic history. This drawback might be eliminated in case of the realization of separate models for the specific country and country sample and its comparison.

The country-specific approach in inflation-economic growth causality is also strongly supported by Mallik and Chowdhury (2001). They examined relationships between economic growth and inflation in four South Asian countries (Bangladesh, India, Pakistan, and Sri Lanka). The study revealed that in contrast to international monetary organizations' recommendations, reducing inflation to a low or zero level in these countries might harm the economic growth rate. Basically, economic growth and inflation are positively correlated in this country-specific case, and inflation is more affected by the volatility of the economic growth rate than vice versa. Therefore, the recommendation for this group of countries is to support moderate inflation instead of its complete elimination.

Besides historical and geographic conditionality, these factors can affect the effectiveness of the anti-inflation policy scientists:

- initial economic conditions – price stability and economic sustainability depend on the country's involvement in foreign trade; they are determined by capital market development and structural changes (Ilmas et al., 2022);
- social conditions – the severity of inflation's negative consequences depends on social determinants (employment policy, migration policy) (Eggoh & Khan, 2014; Tenzin, 2019);
- monetary conditions – price stability and economic well-being strongly rely on the development and stability of the banking sector, exchange rate, and accounting policy of the central bank (Njegovanović, 2023; Tiutiunyk et al., 2022; Nasir et al., 2022; Vasylyeva et al., 2014);
- institutional conditions – anti-inflation policy and economic growth rates are largely determined by political stability, the state of the regulatory environment, and the absence of corruption (Tahat, 2022; Lyeonov et al., 2021);
- industrial conditions – price stability depends on the sustainability of strategic industries development and the effectiveness of privatization processes (Aliyeva, 2022; Kremer et al., 2013).

It is also possible that the approach to inflation management changed after some crisis. Therefore, the attention of academicians increases to the inflation-economic growth causality after some crisis. Specifically, Sinaga (2022) examines the impact of inflationary processes on the dynamics of economic growth in the context of the unfolding of the COVID-19 pandemic in Indonesia. The study established that a 1% increase in the level of consumer prices during this period led to an intensification of economic growth rates by 0.187%. Thus, there is a direct relationship between the dependent and explanatory variables.

Moreover, Jałtuszyk (2023) developed a comparison of inflationary trends after the 2007–2008

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global financial crisis and 2020–2021 COVID-19 pandemic. The global financial crisis significantly lower contributed to the price instability than the global pandemic. The reason for such a situation might lie in the field of supply chain break that stimulated enormous consumer price increases.

Izvorski et al. (2023) pointed out the consequences of war in Ukraine on the inflationary trends in Europe and Central Asia. They declared that the region's inflation level reached its 20-years-old level. According to the evaluation of the World Bank experts, economic growth in developing countries of Europe and Central Asia in 2023 continued to decrease because of economic, political, social, and monetary instability in the region. It was also noticed that "median annual inflation in the emerging markets and developing economies of Europe and Central Asia in September 2022 was 15.9 %." It is a dramatic level of inflation that has not been recorded since 1999.

Therefore, based on the literature review, the inflation and economic growth causal relationship has been in the focus of scientific attention for a long time, but the research results are often controversial. These relationships also depend on numerous country-specific institutional, social, and industrial factors. However, it is advisable to carry out a more detailed and in-depth empirical analysis of the specified issue to determine a more specific set of relevant drivers and inhibitors for ensuring the effectiveness of anti-inflationary policy in post-Soviet countries.

Thus, the main task of this study is to explore short- and long-run relationships in the inflation-economic growth chain in post-Soviet countries to determine the most effective system of anti-inflationary policy.

2. METHODOLOGY

This study follows several stages to achieve set research tasks. Stage 1 is the analysis of general trends in the dynamics of inflationary processes in the studied countries for 2000–2022, formalization of the functional form of the dependence of the change in the indicator (consumer price index) over time (trend line function), and forecasting the level of inflation in the studied post-Soviet countries for 2023–2024.

Stage 2 is the determination of the relationship between the dynamics of inflationary processes (consumer price index, explanatory variable) and parameters of economic growth (GDP growth, dependent variable) using autoregression modeling tools, in particular, the pooled mean group (PMG) method in the Stata 14.2/SE software product. Pooled mean group estimator allows clarifying long-run coefficients for the whole country sample. Therefore, all beta coefficients are equal across all panels. Nevertheless, PMG estimators allow obtaining short-run coefficients for the whole panel and for each country separately. The appropriateness of choosing GDP growth as a key indicator of economic dynamics is confirmed by numerous studies (Tahat, 2023; Maris, 2022; Shafizada & Aslanova, 2022; Bilan et al., 2020; Vasilyeva et al., 2021).

To improve the accuracy of modeling, control variables are integrated into the model, including agricultural land (% of land area), general government final consumption expenditure (% of GDP), gross fixed capital formation (% of GDP), and trade (% of GDP). The rationality of choosing such a set of control variables is confirmed by Lyulyov et al. (2021) and Zolkover et al. (2022). The modeling results allow formalizing the impact of the inflation rate on the economic growth indicator in the short and long term for the entire panel of post-Soviet countries.

Stage 3 is a determination of individual coefficients characterizing the relationship between the dynamics of inflationary processes and parameters of economic growth using least squares regression modeling in the Stata 14.2/SE software product. Each of these models is also supplemented with the control variables mentioned in the previous step.

All variable models were formed according to data from the World Bank Group. This paper is focused on the specific geographic sample of the emerging market and developing economies of Europe and Central Asia considered by the World Bank experts (Izvorski et al., 2023). Thus, the geographic structure of the sample is represented by 12 post-

Table 1. Descriptive statistics

Variable	Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
GDPg	264	4.9423	5.3932	–15.1365	34.5
Infl	264	8.7982	13.5933	–1.1343	168.6202
AgrL	264	50.6116	17,889	16.4709	80.4392
GGFC	264	15.7867	3.5222	8.1188	23.7639
GFCF	264	24.4889	6.5515	6.2957	57.7103
Trade	264	102.5212	30.2858	29.1923	175.3512

Note: GDPg – GDP growth (annual %); *Infl* – Inflation, consumer prices (annual %); *AgrL* – Agricultural land (% of land area); *GGFC* – General government final consumption expenditure (% of GDP); *GFCF* – Gross fixed capital formation (% of GDP); *Trade* – Trade (% of GDP).

Soviet countries, including Azerbaijan, Estonia, Latvia, Lithuania, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Belarus, Moldova, Ukraine, and Georgia. The time horizon of the study covers 2000–2021 (or the latest available period).

Summary descriptive statistics for all variables used in the study are presented in Table 1. According to the results of the preliminary analysis of the model variables, the sample is strongly balanced, and there are no missed observations. This allows for asserting the satisfactory quality of the data set for modeling.

3. RESULTS

In order to realize the main research goal, it is necessary to carry out the sequential implementation of several stages. The first stage involves the analysis of general trends in the dynamics of inflationary processes in the studied countries for 2000–2022, as well as forecasting the levels of the consumer price index for 2023–2024. To implement this stage, the dynamics of the inflation level for 2000–2022 for every 12 post-Soviet countries were formalized using a trend line. For each of the 12 cases available in the MS Excel package, trend lines were constructed – exponential, linear, logarithmic, polynomial, and power. In the next step, the most effective functional form of the trend line was chosen. The choice was made based on the coefficient of determination (R^2) value. The coefficient of determination demonstrates the predictive quality of the trend line equations; that is, it reflects the probability of variation of the resulting variable as a result of variation of the factor variable. The coefficient of determination varies in the range [0; 1]; a higher coefficient value confirms the better quality of the model. Table 2 shows the forecasting results.

According to the analysis of inflation for 2000–2022 in 12 studied post-Soviet countries Latvia, Lithuania, and Estonia implement the most effective anti-inflation management. The average annual growth rate of consumer prices in these countries for 2000–2022 did not exceed 3.5%. The countries with an average effectiveness of anti-inflation policy include Azerbaijan, Kazakhstan, Kyrgyzstan, and Moldova. The average annual inflation rate in these countries is not higher than 8.6%. In the rest of the countries, anti-inflationary management is characterized by low efficiency.

According to Table 2, the trend lines of the inflationary processes of Belarus, Kyrgyzstan, Moldova, and Uzbekistan are characterized by the highest quality of predictiveness. The high value of the coefficient of determination proves that in the mentioned countries, the dynamics of inflationary processes are determined by the internal patterns of changes in the consumer price index. At the same time, for the rest of the countries for which the value of the coefficient of determination is less than 0.5, inflationary processes are determined not only by trend patterns but also by the influence of external factors. Therefore, it is advisable to use more complex modeling tools to forecast their volatility.

At the same time, in 2022, compared to 2021, the situation in the field of price stability worsened in almost all countries. A decrease in the rate of inflation was observed only in Estonia. In addition, in the studied countries, an increase in the level of inflation is also predicted in 2023–2024. Thus, the lowest inflation in 2024, according to forecast data, will be in Estonia – 6.64%, and the highest in

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Table 2. Consumer price index forecasted value for 2023–2024

Country	2000	2010	2021	AVR 2000–2021	2022	2023	2024	Trend line equation	R^2
Azerbaijan	1.81	5.73	6.65	6.10	13.85	10.03	12.62	$y = 0.0087x^3 - 0.346x^2 + 3.8829x - 4.1365$	0.2007
Belarus	168.62	7.74	9.46	26.63	10.40	7.20	6.96	$y = 96.915x^{-0.818}$	0.7711
Estonia	4.02	2.97	4.65	3.21	4.12	5.25	6.64	$y = 0.0036x^3 - 0.1258x^2 + 1.075x + 2.1418$	0.2035
Georgia	4.06	7.11	9.57	5.04	11.90	14.68	18.74	$y = 0.0091x^3 - 0.3083x^2 + 2.7791x - 0.2392$	0.3314
Kazakhstan	13.18	7.40	6.95	8.15	8.55	10.53	13.42	$y = 0.0006x^4 - 0.0288x^3 + 0.45x^2 - 2.602x + 12.848$	0.1142
Kyrgyzstan	18.70	7.97	11.91	7.22	12.70 p.m	11.62	13.76	$y = 0.0022x^3 - 0.0814x^2 + 0.6619x + 7.3715$	0.5169
Latvia	2.65	–1.08	3.28	3.49	17.30	8.75	12.11	$y = 0.0049x^3 - 0.1635x^2 + 1.3288x + 6.1687$	0.3985
Lithuania	0.98	1.32	4.68	2.48	18.50	9.85	15.56	$y = 0.0007x^4 - 0.0271x^3 + 0.2796x^2 - 0.3774x + 0.245$	0.3482
Moldova	31.30	7.48	5.11	8.60	28.70	19.22	23.16	$y = 0.0047x^3 - 0.0729x^2 - 0.9493x + 19.016$	0.5290
Tajikistan	–	6.45	6.47	10.01	8.60	11.52	13.04	$y = 0.0834x^2 - 2.5676x + 25.107$	0.4778
Ukraine	28.20	9.37	9.36	12.25	26.60	20.07	29.12	$y = 0.0023x^4 - 0.1169x^3 + 1.9683x^2 - 12.21x + 32.309$	0.1061
Uzbekistan	–	–	10.85	12.24	12.80 p.m	14.19	14.83	$y = 0.0377x^2 - 0.3735x + 12.671$	0.5480

Note: AVR 2000-2021 – average value of inflation, consumer prices for 2000-2021; *R^2* – coefficient of determination.

Ukraine – 29.12%. Such dynamics of inflationary processes are connected with the socio-economic instability in the region.

In order to determine the relationship between the dynamics of inflationary processes and economic growth, regression modeling is performed on panel data using the pooled mean group (PMG) method in the Stata 14.2/SE software product. The modeling results allow for determining the relationships between variables for the entire sample of countries in both the short (Table 3) and the long run (Table 4).

Table 3. Short-run dependency coefficients

GDPg	Coef.	Std.Err.	Z	P>z	95% Conf. Interval	
Infl	–0.055	0.184	–0.300	0.763	–0.415	0.304
AgrL	–0.249	0.610	–0.410	0.682	–1.444	0.945
GGFC	–1.608 ***	0.318	–5.060	0.000	–2.231	–0.986
GFCF	0.412 **	0.185	2.230	0.026	0.050	0.774
Trade	0.093	0.062	1,500	0.133	–0.028	0.213

*Note: **** – significance at a 1% level; ** – significance at a 5% level.

The analysis of relationships between variables in the short-term perspective proved the absence of a statistically significant effect of changes in the inflation rate on GDP growth rates for the entire panel of 12 post-Soviet countries for 2000–2022. Nevertheless, statistically significant relationships were established between the dependent variable and some independent control variables, namely:

- a 1% increase in total government final consumption expenditure leads to a 1.61% reduction in economic growth with a 99% confidence probability; such a result indicates the elasticity of economic growth to changes in current government expenditures and, therefore, an excessive increase of this item of expenditures in post-Soviet countries is ineffective;
- a 1% increase in gross fixed capital formation leads to a 0.41% increase in GDP with a 95% confidence probability.

Table 4. Long-run dependency coefficients

GDPg	Coef.	Std.Err.	Z	P>z	95% Conf. Interval	
Infl	–0.195 ***	0.070	–2.780	0.005	–0.333	–0.057
AgrL	–0.150	0.134	–1.120	0.263	–0.414	0.113
GGFC	0.259	0.170	1.520	0.128	–0.075	0.593
GFCF	0.348 ***	0.076	4.590	0.000	0.199	0.497
Trade	0.026 *	0.016	1,650	0.099	–0.005	0.057

*Note: **** – significance at a 1% level; * – significance at a 10% level.

However, the relationships between the variables of the model are somewhat transformed in the long run, namely:

- an increase in the level of consumer prices by 1% leads to a reduction in GDP by 0.2% in the long run in the studied post-Soviet countries with a 99% confidence probability, i.e., inflation reduces the level of economic dynamics, but this effect is not large-scale;
- long-term drivers of economic growth in the studied countries are also the growth of the gross fixed capital formation and trade openness: a 1% increase in independent variables leads to an increase in GDP by 0.35% and 0.03%, respectively.

Table 5. Regression results for Azerbaijan

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.2451	.3583	–0.68	.5036	–1.0046	.5143	
AgrL	–34.9334	11.3645	–3.07	.0073	–59.0249	–10.8418	***
GGFC	–1.3188	.8706	–1.51	.1493	–3.1643	.5268	
GFCF	–.4429	.2735	–1.62	.125	–1.0228	.137	
Trade	.506	.2115	2.39	.0293	.0577	.9543	**
Constant	2006.3717	657.7572	3.05	.0076	611.9887	3400.7546	***
R-squared	0.6559						

Note: *** – significance at a 1% level; ** – significance at a 5% level.

Therefore, in 12 post-Soviet countries, inflation is an inhibitor of the economic dynamics of the average power of influence. At the same time, it is advisable to conduct regression modeling for each country of the sample separately to identify more country-specific tendencies. The simulation results are presented in Tables 5-16.

The simulation results for Azerbaijan (Table 5) show the absence of a statistically significant effect of inflation on economic growth. At the same time, a statistically significant influence of the control variables on the dynamics of GDP growth was found: a 1% share of agricultural land leads to a reduction of GDP by 34.93% with a confidence probability of 99%; an increase in trade turnover by 1% determines the growth of GDP by 0.51% with a 95% confidence probability.

Similarly to the previous country, no statistically significant relationship between inflation rates and economic growth has been established for Belarus (Table 6). At the same time, a statistically significant effect of almost all control variables was found: a 1% increase in government expenditures, gross fixed capital formation, and trade turnover led to an increase in GDP by 1.83%, 0.69%, and 0.15%, respectively.

Modeling results for Estonia (Table 7) and Georgia (Table 8) showed no statistically significant relationships between all model variables.

Table 9 shows that the variation of the independent variables explains 81.72% of the variation of the dependent variable. In addition, it was established that a 1% increase in the level of the consumer

Table 6. Regression results for Belarus

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.0265	.0256	–1.03	.3171	–.0808	.0279	
AgrL	–.0888	1.1681	–0.08	.9403	–2.5652	2.3875	
GGFC	1.8296	.6277	2.91	.0101	.4988	3.1603	**
GFCF	.6906	.2784	2.48	.0246	.1003	1.2808	**
Trade	.1488	.0477	3.12	.0066	.0477	.2499	***
Constant	–61.9788	34.0671	–1.82	.0876	–134.1978	10.2401	*
R-squared	0.7580						

Note: *** – significance at a 1% level; ** – significance at a 5% level; * – significance at a 10% level.

Table 7. Regression results for Estonia

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.119	.5122	–0.23	.8192	–1.2049	.9668	
AgrL	.1057	.9147	0.12	.9094	–1.8333	2.0447	
GGFC	–2.0215	1.633	–1.24	.2336	–5.4833	1.4402	
GFCF	.1967	.4714	0.42	.682	–.8025	1.196	
Trade	.0603	.0933	0.65	.5274	–.1375	.258	
Constant	25.5948	42.4846	0.60	.5553	–64.4686	115.6583	
R-squared	0.3154						

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Table 8. Regression results for Georgia

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	.5252	.3207	1.64	.1211	–.1548	1.2051	
AgrL	.0488	.6608	0.07	.942	–1.3521	1.4497	
GGFC	–.4908	.5324	–0.92	.3703	–1.6195	.6378	
GFCF	.2719	.3455	0.79	.4428	–.4605	1.0043	
Trade	.0676	.1265	0.53	.6004	–.2005	.3357	
Constant	–5.1984	38.2426	–0.14	.8936	–86.269	75.8722	
R-squared	0.3110						

Table 9. Regression results for Kazakhstan

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.3253	.1457	–2.23	.0402	–.6343	–.0164	**
AgrL	3.1718	1.0143	3.13	.0065	1.0216	5.322	***
GGFC	–.2924	.3897	–0.75	.464	–1.1185	.5338	
GFCF	.3598	.2255	1.60	.1301	–.1182	.8378	
Trade	.2805	.0344	8.16	0	.2076	.3534	***
Constant	–270.4289	86.4193	–3.13	.0065	–453.6295	–87.2283	***
R-squared	0.8172						

Note: *** – significance at a 1% level; ** – significance at a 5% level.

Table 10. Regression results for Kyrgyzstan

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	.1742	.1539	1.13	.2744	–.1521	.5006	
AgrL	2.0875	1.7485	1.19	.2499	–1.6192	5.7941	
GGFC	–2.0502	.826	–2.48	.0245	–3.8013	–.2992	**
GFCF	.0702	.2516	0.28	.7838	–.4631	.6035	
Trade	.0339	.056	0.61	.5533	–.0847	.1525	
Constant	–81.6373	100.7032	–0.81	.4294	–295.1185	131.8439	
R-squared	0.4318						

Note: ** – significance at a 5% level.

price index in Kazakhstan causes a decrease in GDP by 0.33% with a 95% confidence probability. In contrast to Azerbaijan, an increase in the area of agricultural land by 1% leads to an increase in GDP by 3.17%. For Kazakhstan, the driver of economic growth is also the increase in turnover (a 1% increase in the independent variable causes a 0.28% increase in the dependent variable).

The simulation results for Kyrgyzstan (Table 10) also did not reveal a statistically significant impact of rising inflation on economic growth. At the same time, excessive growth of public spending is a significant inhibitor of economic dynamics in the country: a 1% increase in gross government final expenditure leads to a 2.05% reduction in GDP with a 95% confidence probability.

Table 11. Regression results for Latvia

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.6068	.4313	–1.41	.1786	–1.5212	.3076	
AgrL	–2.0187	.7704	–2.62	.0186	–3.652	–.3855	**
GGFC	.7784	.9448	0.82	.4221	–1.2245	2.7814	
GFCF	1.3555	.3748	3.62	.0023	.561	2.15	***
Trade	.3156	.105	3.00	.0084	.0929	.5382	***
Constant	–18.3492	34.3258	–0.53	.6003	–91.1167	54.4182	
R-squared	0.6354						

Note: *** – significance at a 1% level; ** – significance at a 5% level.

Table 12. Regression results for Lithuania

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.9998	.533	–1.88	.0791	–2.1297	.1302	*
AgrL	.0716	.3621	0.20	.8457	–.696	.8393	
GGFC	–.0586	1.4283	–0.04	.9678	–3.0863	2.9692	
GFCF	1.3476	.5393	2.50	.0237	.2043	2.4909	**
Trade	.0453	.1206	0.38	.712	–.2104	.301	
Constant	–29.6725	50.5373	–0.59	.5653	–136.8067	77.4618	
R-squared	0.4289						

Note: ** – significance at a 5% level; * – significance at a 10% level.

According to Table 11, there is no statistically significant impact of the inflation level on economic growth for Latvia. At the same time, the expansion of the area of agricultural land acts as an inhibitor of economic growth in the country (a 1% increase in the independent indicator leads to a reduction in economic growth by 2.01%). Instead, a 1% increase in the gross accumulation of fixed capital and trade turnover increases GDP growth rates by 1.36% and 0.32%, respectively.

Analysis of the results of regression modeling for Lithuania (Table 12) confirms the negative impact of the increase in the level of consumer prices, which is statistically significant at a 10% confidence interval – an increase in the independent variable by 1% leads to a decrease in GDP by 0.99%. Thus, Lithuania has a unit elasticity between inflation and economic growth. Among the control variables, the positive impact of the growth of the gross accumulation of fixed capital on economic growth was confirmed (a 1% increase in the independent variable leads to a 1.35% increase in the dependent variable with a 95% confidence probability).

The results of the regression modeling for Moldova (Table 13) did not prove the existence of a statistically significant relationship between the variables. It is also worth noting that the quality of this model is the worst among 12 countries since the variation of the selected variables explains only 19.4% of the variation in GDP growth.

For Tajikistan (Table 14), a statistically significant impact of changes in inflation rates on the dynamics of GDP changes has yet to be empirically confirmed. However, among the control variables, a statistically significant inhibitor of economic

Table 13. Regression results for Moldova

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.199	.242	–0.82	.4231	–.712	.3141	
AgrL	–.007	.6734	–0.01	.9918	–1.4347	1.4206	
GGFC	–.8833	.5707	–1.55	.1412	–2.093	.3265	
GFCF	.0033	.2839	0.01	.9908	–.5985	.6052	
Trade	.123	.0957	1.29	.2171	–.0799	.3259	
Constant	8.1882	43.9602	0.19	.8546	–85.0034	101.3797	
R-squared	0.1940						

Table 14. Regression results for Tajikistan

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–.0238	.0506	–0.47	.6471	–.1351	.0875	
AgrL	–.3314	1.8206	–0.18	.8589	–4.3386	3.6758	
GGFC	–.5245	.2538	–2.07	.0631	–1.0831	.0341	*
GFCF	–.142	.1246	–1.14	.2787	–.4162	.1322	
Trade	–.0261	.0213	–1.22	.2462	–.073	.0208	
Constant	30.7804	58.6507	0.52	.6101	–98.309	159.8699	
R-squared	0.6417						

Note: * – significance at a 10% level.

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Table 15. Regression results for Ukraine

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	**–.278**	**.1204**	**–2.31**	**.0346**	**–.5332**	**–.0229**	**
AgrL	–2.1309	10.6303	–0.20	.8437	–24.6662	20.4044	
GGFC	–1.1706	1.399	–0.84	.4151	–4.1362	1.7951	
GFCF	.607	.4703	1.29	.2151	–.39	1.604	
Trade	.2773	.158	1.75	.0984	–.0577	.6123	*
Constant	141.0148	762.2757	0.18	.8556	–1474.9375	1756.9671	
R-squared	0.4976						

Note: ** – significance at a 5% level; * – significance at a 10% level.

Table 16. Regression results for Uzbekistan

GDPg	Coef.	St. Err.	t-value	p-value	95% Confidence Interval		Sig
Infl	–1.2491	.7418	–1.68	.153	–3.1559	.6578	
AgrL	–.9591	1.3165	–0.73	.499	–4.3434	2.4251	
GGFC	–.9722	2.0797	–0.47	.6598	–6.3181	4.3737	
GFCF	–.345	.5485	–0.63	.5569	–1.755	1.0649	
Trade	.3214	.1529	2.10	.0896	–.0717	.7146	*
Constant	83.7181	92.5361	0.90	.4071	–154.1534	321.5896	
R-squared	0.7334						

Note: * – significance at a 10% level.

growth is the growth of gross government spending on consumption, which causes a decrease in GDP by 0.52%.

The simulation results for Ukraine (Table 15) prove the existence of an inverse relationship between inflation rates and GDP growth rates; namely: a 1% increase in consumer prices leads to a loss of economic growth rates by 0.28% with a 95% confidence probability. In addition, for Ukraine, the relevance of the contribution of the increase in trade turnover to economic growth was established: a 1% increase in the independent variable leads to an improvement in the dependent variable by 0.28% with a 90% confidence probability.

For Uzbekistan (Table 16), a statistically significant relationship between inflationary processes and economic growth has not been empirically confirmed; however, a 1% increase in trade turnover leads to an increase in the economic growth rate by 0.32%.

4. DISCUSSION

The analysis of the dynamics of changes in the consumer price index during 2000–2022 showed that Latvia, Lithuania, and Estonia are the most effective in overcoming inflation. This is quite natural because these states are members of the EU and form the flagship block among the 12 post-Soviet countries included in the sample. The average efficiency of anti-inflation management characterizes Azerbaijan, Kazakhstan, Kyrgyzstan, and Moldova. The rest of the countries in the sample show low anti-inflation efficiency.

These research results correlate with Khan and Senhadji (2001) in differentiating the destructive impact of inflation on economic growth with consideration of the level of economic development: economic growth in developed countries is more resistant to inflationary damages. Barro (1995) also went to a familiar conclusion that a higher initial level of inflation contributes to a more harmful influence on economic growth. Thus, Latvia, Lithuania, and Estonia have the most effective anti-inflationary policies within the whole country sample. This also supports the assumption that initial levels of economic development (developed countries with stable economic dynamics) and inflationary trends (low or moderate inflation levels in the long run) are significant determinants of anti-inflationary effectiveness.

The results of modeling the relationship between the inflation rate and economic growth for a panel

of 12 post-Soviet countries in the short- and long-term perspective showed that in a time horizon of up to 1 year, inflation growth does not have a statistically significant impact on economic growth. These results contrast Olonila et al. (2023) and Atigala et al. (2022), who confirmed the inverse relationship between inflation and the outcome variable in the short run. Bouyacoub (2022) also did not reveal a short-run causality between the variables. Variation of the research results in this perspective only highlights the assumption about the significance of country-specific determinants and historical, socio-economic prerequisites in the inflation-economic growth chain. At the same time, even in the short term, the economic growth rate is increased by the gross fixed capital formation growth. It is depressed with the increase in general government consumption expenditures.

Instead, in the long run, inflation's statistically significant negative effect on economic growth is confirmed, although the scale of such an effect is moderate across the panel. In the long term, the positive impact on economic growth of gross fixed capital formation and trade turnover has also been empirically confirmed. Vysochyna et al. (2022) empirically proved the positive impact of gross fixed capital formation on economic growth. In turn, Huseynova and Huseynov (2023) also confirmed the positive impact of international trade (trade openness) on macroeconomic indicators. It is worth noting that in the empirical studies of other scientists, similar results were achieved – the existence of an inverse relationship between inflation and economic growth (Bouyacoub, 2022; Maria & Suresh, 2023; Aden, 2021; Fakhrunnas et al., 2022; Msomi & Olarewaju, 2022) and opposite results – moderate inflation even stimulates economic growth (Sinaga, 2022).

Olonila et al. (2023), on the contrary, empirically confirmed a statistically significant negative impact of inflation on the performance indicator in the short term, while in the long term, this relationship turned out to be statistically insignificant. Therefore, in terms of clarification of the long-run inflation-economic growth causality, geographical and historical determinants lose their relevance because most of the analyzed empirical research confirmed the negative impact of inflation on economic growth rate in a long-term perspective despite the differentiation of the research data sample.

Regression modeling for each of the 12 post-Soviet countries separately proved that the economic growth of such countries as Kazakhstan (coefficient value – 0.33%), Lithuania (–0.99%), and Ukraine (–0.28%) depends inversely on the dynamics of inflationary processes. The positive impact of foreign trade on economic dynamics has been empirically confirmed in Azerbaijan, Belarus, Kazakhstan, Latvia, Ukraine, and Uzbekistan; gross fixed capital formation – Belarus, Latvia, and Lithuania; public expenditure on final consumption – Belarus; shares of agricultural land – Kazakhstan. At the same time, the increase in the share of agricultural land is an inhibitor of economic growth in Latvia and Azerbaijan, and the growth of public expenditures on final consumption is in Kyrgyzstan and Tajikistan.

Taking into account the sensitivity of the rates of economic growth to an increase in the level of inflation even in the short term, as well as taking into account the value of the actual and forecasted values of inflation, the anti-inflationary management system in Lithuania is the most effective among the 12 studied countries (despite the unit elasticity between the indicators, the country is characterized by a low level of inflation). In contrast, Kazakhstan and Ukraine are characterized by low efficiency (the economic growth sensitivity to price fluctuations determines the criticality of this state of affairs).

CONCLUSION

The aim of the study is to explore short- and long-run relationships in the inflation-economic growth chain in post-Soviet countries and determine the most effective system of anti-inflationary policy. The empirical results proved a moderate-scale inverse relationship between inflation and economic growth in the long run while rejected the assumption of the same causality in the short run for the 12 post-Soviet countries.

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Country-specific modeling results revealed that economic growth in Kazakhstan, Lithuania, and Ukraine is, even in the short run, quite sensitive to inflation growth. These results show that long-term inflation targeting is a unique goal to contribute to economic growth sustainability. It depends on geographical, social, economic, political, institutional, industrial, and other determinants but only to some extent. Specifically, all these factors identify the scale of these causalities (high, moderate, or low) but not their reliability. Nevertheless, the operational choice of anti-inflationary measures and instruments strongly relies on country-specific and historical proxies because, in the short run for the whole panel, there is no statistical significance of the inflation-economic growth causality.

At the same time, country-by-country modeling results allow for revealing these cases. Short- and long-run economic growth sensitivity to inflation fluctuations stipulates governors build even more severe anti-inflation policies. Moreover, a combination of short-run economic growth to inflation sensitivity and low historical, actual, and forecasted inflation levels (case of Lithuania) indicates the effectiveness of anti-inflationary policy in the country. The Lithuanian model might be considered a benchmark for the whole country sample and can be used to improve anti-inflationary policy in other 11 post-Soviet countries.

The research results are helpful for both academicians and practitioners. The study can be further developed by implementing time lags to test a specific period of GDP growth delay in response to consumer price index volatility in a long-run perspective.

AUTHOR CONTRIBUTIONS

Conceptualization: Atic Kerimov, Azer Babayev, Nigar Ashurbayli-Huseynova, Aybaniz Gubadova.
Data curation: Nigar Ashurbayli-Huseynova, Aybaniz Gubadova.
Formal analysis: Atic Kerimov, Nigar Ashurbayli-Huseynova.
Funding acquisition: Azer Babayev, Aybaniz Gubadova.
Investigation: Nigar Ashurbayli-Huseynova, Aybaniz Gubadova.
Methodology: Atic Kerimov, Azer Babayev.
Project administration: Azer Babayev.
Resources: Aybaniz Gubadova.
Software: Nigar Ashurbayli-Huseynova.
Supervision: Atic Kerimov.
Validation: Nigar Ashurbayli-Huseynova, Aybaniz Gubadova.
Visualization: Aybaniz Gubadova.
Writing – original draft: Azer Babayev, Nigar Ashurbayli-Huseynova.
Writing – review & editing draft: Atic Kerimov.

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