

Relationship between Inflation and Economic Growth in the Kyrgyz Republic

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Kırgızistan’da Enflasyon ve Ekonomik Büyüme İlişkisi

Abstract

Most fundamental macroeconomic objective of the most other countries, as well as the Kyrgyz Republic, is to sustain low inflation rates together with high economic growth. Recently, the relationships between inflation and economic growth have been hotly debated. These works investigate relationship between inflation and economic growth. Ultimately, it has been tested whether a meaningful relationship is held in the Kyrgyz Republic. The considered period consists of 10 years (1995-2005). Regression for economic growth has been used with Kumtor and without Kumtor, because influence of activities of the gold mining company is significant and can “wipe off” influences of other macroeconomic factors.

Key Words : Monetary Policy, Inflation, Economic Growth, Economic Policy.

JEL Classification Codes : E52, E31, O47, O53.

Özet

Diğer birçok ülkenin en temel makro ekonomi politikalarından biri olan düşük oranlı enflasyon ile yüksek oranlı ekonomik büyümeyi gerçekleştirme, Kırgızistan’ın da temel makro ekonomi politikalarından birisidir. Son zamanlarda araştırmacıların yoğun olarak çalıştıkları alanların başında enflasyon ve ekonomik büyüme gelmektedir. Bu araştırmanın amacı enflasyon ve ekonomik büyüme arasındaki ilişkiyi Kırgızistan temelinde analiz etmektir. Araştırma 1995–2005 dönemindeki on yıllık süreyi kapsamaktadır. Ülkenin altın firması olan Kumtor’un faaliyetlerinin diğer ekonomik değişkenleri önemli derecede etkilemesi durumu göz önünde bulundurularak, analiz iki türlü (Kumtor’lu ve Kumtor’suz) gerçekleştirilmiştir.

Anahtar Sözcükler : Para Politikası, Enflasyon, Ekonomik Büyüme, Ekonomi Politikası.

1. Introduction

All countries aim to reach economic growth and high standards of living. Traditionally it was considered that inflation negatively influences economic development of the country. Until recently, such opinion had not been put in a doubt. However, discussion on this theme has not still reached a common opinion. It is known that hyperinflation significantly and negatively influences economic growth of the country. Thus, hotly debated question is not whether inflation should or should not be, but what level it should be to ensure favorable growth of the country. For reaching targeted level of inflation, authorized bodies of the country can resort monetary or/and fiscal tools. Each country decides itself which tool to use and what macroeconomic policy to stick to. It's not a secret that central banks and governments of many countries use these tools to hold and/or decrease inflation rates.

The purpose of this work is to investigate how inflation influences economic growth in the Kyrgyz Republic.

Reasoning from the purpose, we solved the following tasks:

- examined policies of NBKR (National Bank of the Kyrgyz Republic);
- disclosed determinants of the economic growth;
- disclosed GDP as the main measurement of economic growth;
- designed model “Inflation and economic growth”; and
- conducted empirical analysis of relationship between inflation and economic growth.

2. Policies of National Bank to Monitor Inflation in Kyrgyzstan

Main goals of monetary policy of the most central banks in the world are sustainable economic growth and low inflation rates. Supporting low inflation, they make favorable conditions for economic growth, lowering unemployment rate, and increase population's standard of living (Uliukaev, 2006: 3). Even establishing inflation as target goal, monetary institutions, in fact, consider the need for promoting economic growth and employment (Polterovich, 2006). “In the year 2000 Federal Reserve System Deflation for the first time in the last forty years refused to counteract further increase in inflation”, said Reinheart, member of the board of Fed's governors. Such step was undertaken because United States understood that deflation, as well as inflation, does not bring anything positive for the economy of the country. In 2000 country faced possible occurrence of deflation and, as the result of it, possible slow down of the economy. Therefore, the situation required sufficient changes in the Fed's monetary policy (Pishik, 2006: 34).

Independence is the key principle of the National Bank of the Kyrgyz Republic. It does not belong to the structure of state bodies and stands as separate institute that possess exclusive right for money emission and organization of circulation of notes. NBKR realizes monetary policy to support macroeconomic stabilization. The goal of this policy is to endure price stability. In order to reach the goal National Bank uses monetary tools and favors general development of the banking system and assists smooth functioning of the payment system (NBKR, 2005: 5).

3. Historical Background of the Model: “Inflation and Economic Growth”

The model “Inflation and Economic Growth” was implemented in the Kyrgyz Republic, when in 1996 government policy intentionally provoked high rate of inflation. Deliberate devaluation of som (unit of currency in the Republic of Kyrgyzstan) in autumn 1996 lowered costs of domestic producers and increased their competitiveness on the markets of our main trade partners. That led to the increase in export, decrease in import, and therefore to the improvement balance of payments and to the increase in savings. Indeed, in 1997 the deficit of on-going operations decreased from 25% of GDP in 1996 to 11% of GDP. Growth rate of real GDP in 1996 was 7,1%, and in 1997 – 9,9%. However, this 9.9 percent increase in real GDP is partially due to the establishment of “Kumtor” gold mining company. In 1997 real GDP growth without “Kumtor” was only 5.3 percent, which is lower than it was in 1996 (Akaev, 2000). As Askar Akaev wrote in his book, for strengthening the achieved results the decisive measures were undertaken to fight against inflation by toughening budget policy and anti-monopolistic measures. Yes, in spite of the high rate of inflation in 1996, GDP even without “Kumtor” company had growth. But the fact that it was lower than in 1996 made us doubt whether such inflation was necessary at all.

Evaluation of multivariate regressions, which were based on large populations of countries, quite often showed absence of significant influence of moderate inflation on economic growth. High inflation may be a common symptom of irresponsibility of governments in the developing countries. Trying to reach social tense and to obtain popularity, state authorities start printing money to increase salaries of state employees, pensions, social benefits and subsidiaries. Therefore, it is not strange why popular articles and elementary books especially stress destructive influence of inflation on economic growth (Polterovich, 2006).

Inflation can lead to uncertainty about the future profitability of investment projects, especially when high inflation is also associated with increased price variability. This leads to more conservative investment strategies than would otherwise be the case, ultimately leading to lower levels of investment and economic growth (Gokal and Hanif, 2004).

Inflation may also reduce a country's international competitiveness, by making its exports relatively more expensive, thus impacting on the balance of payments. Moreover, inflation can interact with the tax system to distort borrowing and lending decisions. Firms may have to devote more resources to dealing with the effects of inflation. For example, more vigilant monitoring of their competitors' prices to see if any increases are part of a general inflationary trend in the economy or due to more industry specific causes.

Given all negative effects of inflation on economic growth described above, even economists that consider inflation as a bad phenomenon, can't hide that this question requires further deeper investigation and that under certain circumstances its influence may have positive effect (Polterovich, 2006).

Most of the countries (including Kyrgyzstan, Donald's own comment) use Laspeyres formula that tends to overestimate "true" rate of inflation. It was estimated that such overstate for United States varies from 0.2 to 2 percents with a bias of 1.1 percent. This was demonstrated in the research conducted by a group chaired by Michael Boskin, on behalf of the US Senate Finance Committee. Therefore, central bank should not decrease inflation rate lower than 1%, otherwise it would lead to deflation (Brash, 2006). Deflation, as well as inflation, is undesirable since it distorts prices. As the practice shows, once prices have increased, they hardly decrease even during deflation. Thus, consumer pays for the same goods and services more than their actual prices are.

Robert Barro also applied econometrics in his research and ran a regression that in line with quantitative variables included qualitative ones. This was done in order to improve reliability of the model, after inclusion of qualitative variables; the model more fully portrayed the reality. Robert's regression analysis showed that 10% inflation increase decreases real GDP per capita by 0.2-0.3%, and weight of investment to total decreases by 0.4-0.6%. The low level of GDP sacrifice can seem insignificant (Barro, 2007). However, in the long-run that may considerably affect population's standard of living.

However, Barro didn't find significant influence of inflation on economic growth, if inflation is lower than 15%. Hence, we may conclude that the lower inflation rate is the lower is benefit from its further decrease (if there is any benefit) (Polterovich, 2006).

4. Methodology

All data on Kyrgyz Republic was taken from official reliable sources such as annual reports of the National Bank of the Kyrgyz Republic and periodicals of National Statistical Committee. GDP without “Kumtor” gold mining company was provided by National Statistical Committee.

In this work we used quantitative Descriptive Statistics and thus all data is quantitative.

As a base we chose model used by Richard C.K. Burdekin (Burdekin, 2000) in his research “When Does Inflation Hurt Economic Growth?” In turn, Burdekin had implied Sarel’s econometric procedures.

We imported data for the Kyrgyz Republic for 10-year period with comparatively moderate and low levels of inflation and ran a regression. From a regression analysis we chose least squares method, because its results are interpreted in the most obvious way.

Before inclusion of the explanatory variables, we conducted test on variability. Variability of GDP is quite high itself. Therefore, most likely this was caused by variations in other variables. If we compare variability of GDP with Kumtor with variability of GDP without Kumtor, we can see that GDP without Kumtor incurred fewer changes. However, increase in GDP with Kumtor was not caused by the factors we consider in our model.

The basic index we will consider is R Square, which is the multiple coefficient of determination and is the measure of proportion of the variation in the dependent variable that is explained by the combination of independent variables in the multiple regression models. Hence, R Square is an important measurement of how well the regression model fits the data.

Time period in this work is 10 years: from 1995 till 2005. We chose this period because recession has stopped in 1995 (decrease in real GDP was 5.4 percent) and appeared a tendency towards the growth (see diagram 1 in Appendix). Evident economic growth was shown in 1996 – 7.1% increase in real GDP and 9.9 percentage increase in 1997 (Akaev, 2000) (without “Kumtor” – 5.3%).

5. Model: “Inflation and Economic Growth”, General Trends

Following figures show the trends of inflation and GDP growth rates since 1993 to 2005. Period of hyperinflation coincide with period of severe decrease in GDP. When deviation of inflation is comparatively high, deviation of GDP growth rate is high, as well;

when inflation is “calm”, GDP growth rate is also “calm”. Therefore, we may conclude that deviations in inflation do influence economic growth of the Kyrgyz Republic.

For trend analysis we used method of sliding average on 3 bases, i.e. value for each year is an average of the previous two periods and value of the current period. This is useful for visual identification of the correlation.

Diagram: 1
Inflation and Economic Growth

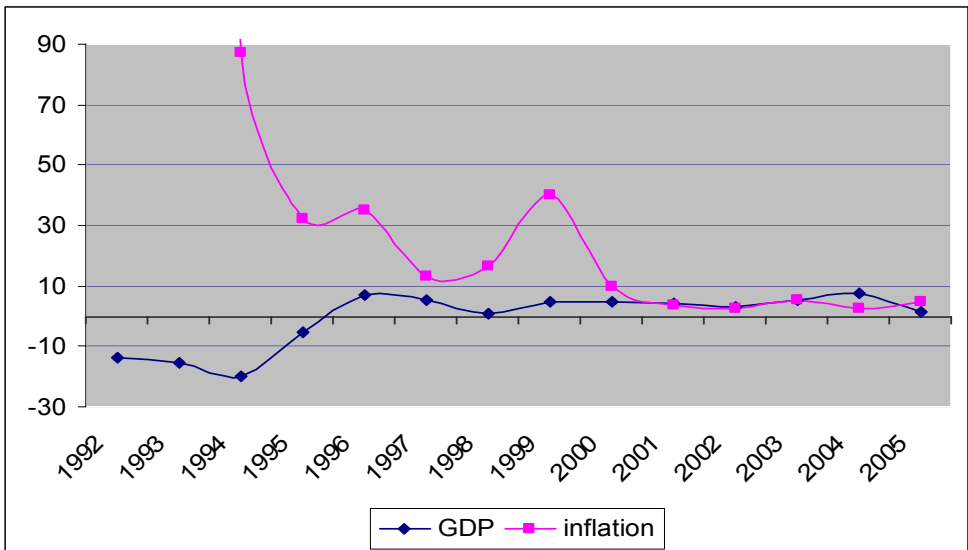


Diagram 2 shows trend analysis for inflation and GDP with Kumtor Gold Mining Company.

Diagram: 2
Inflation and GDP Growth Trend Analysis

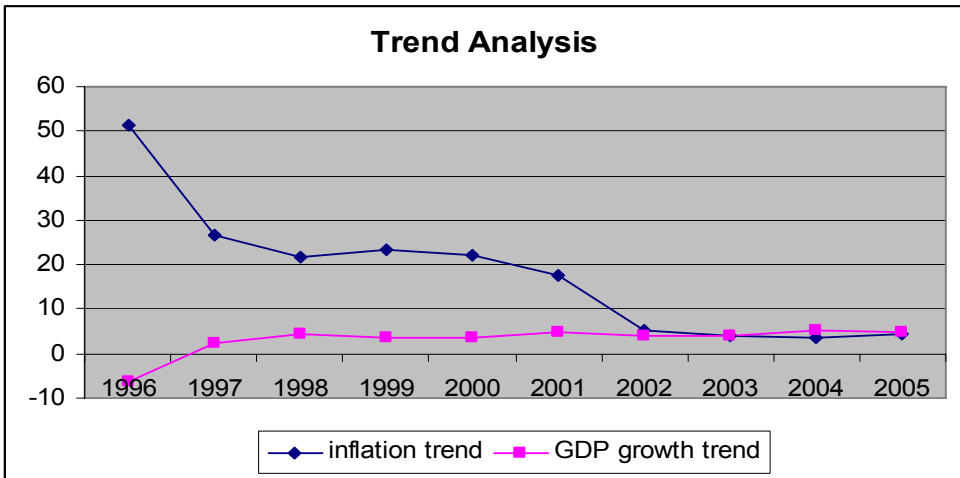
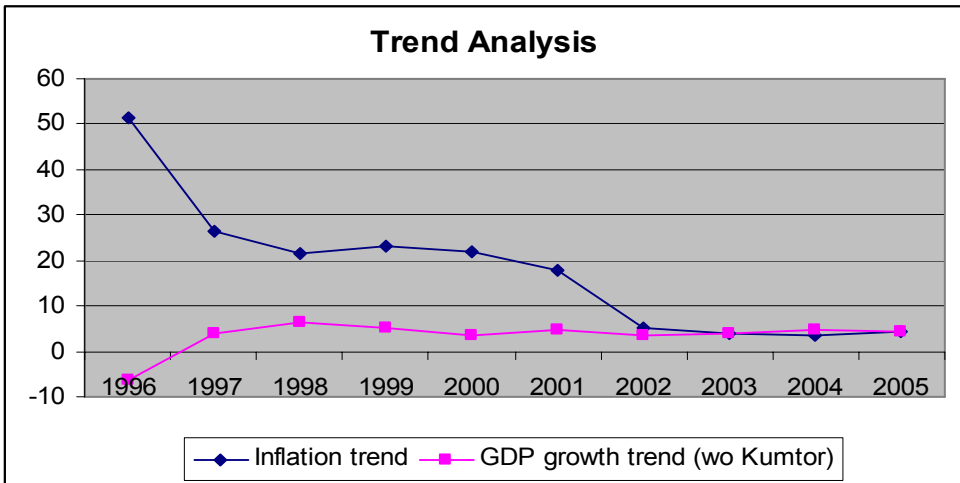


Diagram 3 shows trends for inflation and GDP without Kumtor Gold Mining Company trends.

Diagram: 3
Inflation and GDP Growth Trend Analysis (without Kumtor)



Not surprisingly, trends are similar. Difference is that GDP without Kumtor growth is a bit lower than GDP with Kumtor growth.

6. Choosing Explanatory Variables

For developing countries Richard Burdekin (Burdekin, 2000) identified 3 thresholds:

- first structural break occurs when inflation exceeds 8%;
- second structural break occurs when inflation exceeds 50%; and
- third structural break occurs when inflation exceeds 100%.

However, luckily, since 1994 Kyrgyzstan hasn't experienced the inflation rate higher than 100% level. In 1993 we still had hyperinflation of 1366%. By the results of year 1994 it was.

Our model considers 11 year period (from 1995 to 2005) with comparatively moderate levels of inflation in the first half, and low inflation in the second half. Therefore, in our model we include only one threshold of 8%.

Burdekin's model in our case is more simplified as we removed two structural breaks and left only one with the inflation threshold of 8%.

Implementing threshold is almost similar to division of the period into two periods. First one will include levels of inflation higher than 8%, the other one will be grounded. First period contains moderate inflation: from 35 to 13%; second – 2-6%.

Unfortunately, statistics of the population in the considered period was made only once in 1999. Therefore, we are not able to include population growth in the model. We assume that population growth is stable without sharp changes; or variability of the population growth should be insignificant.

There is no black market for currency exchange in the Kyrgyz Republic. Hence, this variable is inapplicable, as well.

All other explanatory variables are relevant:

- Inflation,
- Change in inflation,

- Inflation rate where the structural break occurs,
- Logarithm of previous period of GDP,
- Ratio of government expenditures to GDP, and
- Percentage change in terms of trade.

Trade is the sum of exports and imports as sum of these two variables represents volume of trade transactions with other countries.

7. Test of Variability

It has been tested the variability of the included variables (see table 3 in Appendix). It was supportive to include only those factors that vary throughout the period and, therefore, indeed may influence economic growth.

A measure of statistical variability is a real number that is zero if all the data are identical and increases as the data becomes more and more diverse.

The variability of factors is given in the Table 1.

Table: 1
Variability of Factors

	GDP	GDP without Kumtor	Inflation	▲ in inflation	Log (GDP)	G/Y	%▲ in Trade
Variability	1.12	0.98	0.88	(5.11)	0.05	0.14	2.12

The variability of Logarithm of GDP of the previous year shows the lowest variability 0.05. Standard deviation of this variable is only 0.25 (see table 3 in Appendix).

The variability of government expenditure's weight to total GDP is also very low, 0.14. Indeed, 9 years of 10 its weight was about 20%.

Percentage change in the volume of trade has the highest variability. In absolute values, highest variability belongs to percentage change of the inflation rate.

It was excluded the influence of previous years' GDP and government purchases from further consideration.

8. Correlation of Variables

Correlation Matrixes

	<i>GDP with Kumtor</i>	<i>Inflation</i>	<i>% ▲ in Trade</i>
<i>GDP with Kumtor</i>	1		
<i>Inflation</i>	0.150995	1	
<i>% ▲ in Trade</i>	0.157251	-0.1481	1

Correlation coefficients in the correlation matrix indicate the strength and direction of a relationship between two variables. In general, statistical correlation refers to the departure of two variables from independence.

Correlation between GDP with Kumtor and inflation is small.

Table: 2
Correlation between GDP with Kumtor and Inflation

<i>Correlation</i>	<i>Negative</i>	<i>Positive</i>
<i>Small</i>	<i>-0.29 to -0.10</i>	<i>0.10 to 0.29</i>
<i>Medium</i>	<i>-0.49 to -0.30</i>	<i>0.30 to 0.49</i>
<i>Large</i>	<i>-1.00 to -0.50</i>	<i>0.50 to 1.00</i>

Correlation with percentage change in the volume of trade is also small.

	<i>GDP</i>	<i>Inflation</i>	<i>% ▲ in Trade</i>
<i>GDP</i>	1		
<i>Inflation</i>	0.209117	1	
<i>% ▲ in Trade</i>	0.391319	-0.1481	1

Second matrix shows stronger correlation between GDP without Kumtor and inflation than correlation between GDP with Kumtor and inflation, even though it's still small. Correlation between GDP and percentage increase in trade is medium and positive.

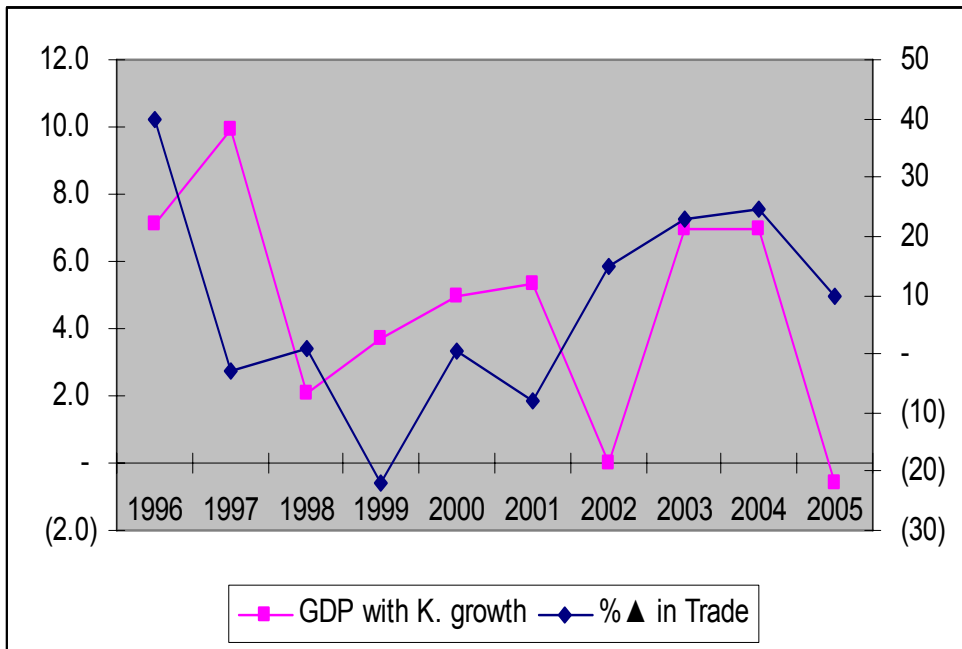
Correlation of GDP without Kumtor and other variables is higher than the similar correlations with GDP with Kumtor. This may imply that activities of Kumtor somehow “wipe off” influences of other variables. As it was mentioned earlier, influence of Kumtor on GDP of the Kyrgyz Republic is quite significant and its weight to total GDP varied in different years from 0.1 to 4.6%.

9. Graphical Correlation of the Variables

The impact of Kumtor Company on GDP growth can be seen simply in the following diagrams.

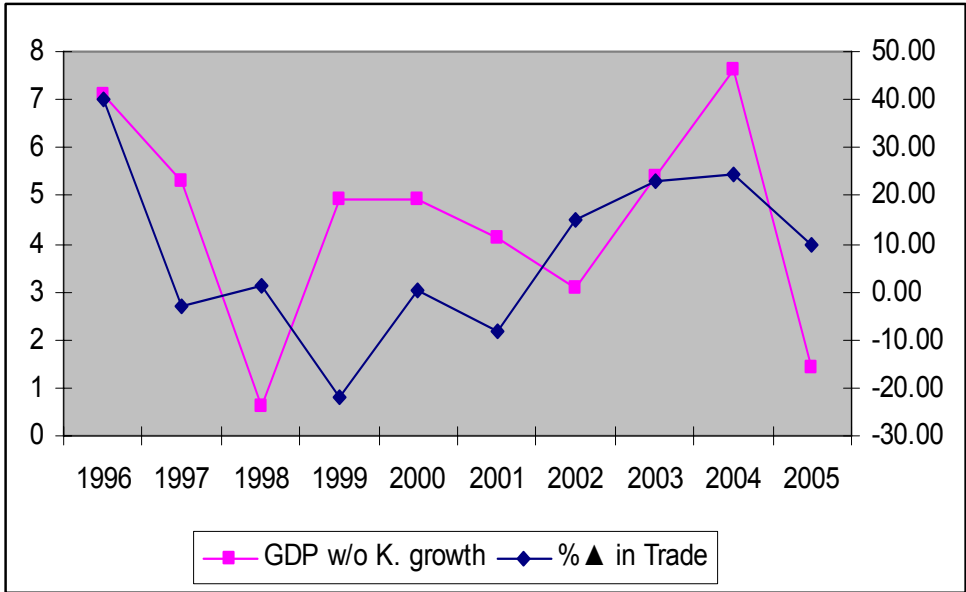
(a) GDP with Kumtor Growth Rate

Diagram: 4
GDP with Kumtor Growth Rate



b) GDP without Kumtor Growth Rate

Diagram: 5
GDP without Kumtor Growth Rate



Growth rates of both GDPs (with and without Kumtor) tend to move in similar directions as the growth rates in the volume of trade.

10. Regression

Based on the above selected variables, we ran non-linear multivariate regression using Ordinary Least Squares Method. As usually, we obtained two regressions: first for GDP with Kumtor, second for GDP without Kumtor.

Results differ from each other. R square for the second model without influence of Kumtor Gold Mining Company 0.49 is higher than for the first one 0.30 that is affected by the entity (see Summary Outputs in the Appendix).

Regressions:

(a) GDP with Kumtor Growth Rate:

$$Y = 2.54 + 0.10 * Infl - 0.02 (inf-inf1)*break - 0.13 * \blacktriangle infl - 0.04 * \% \blacktriangle in Trade \quad (1)$$

(b) GDP without Kumtor Growth Rate:

$$Y = 5.80 - 0.60 * Infl + 0.8 (inf-inf1)*break - 0.12 * \blacktriangle infl - 0.04 * \% \blacktriangle in Trade \quad (2)$$

In the first regression, inflation is positively correlated with the economic growth; however, the coefficient is very smaller and may just demonstrate weak correlation. Moreover, GDP regardless of the inflation rose because of Kumtor.

Inflation above the threshold of 8 percent has negative effect on the growth. However, the magnitude of the influence is also weak. Therefore, we may conclude that in the model with Kumtor Gold Mining Company, influence of the inflation is insignificant. Taking into consideration weight of Kumtor to the total GDP, this does not seem to be strange.

In the second regression, inflation is negatively correlated with the economic growth, which shows that 1 percent increase in inflation leads to 0.6% decrease of GDP. Interestingly, inflation above 8% is positively correlated to the GDP growth rate.

11. Evaluation of Results

In fact, our results once more support findings of Michael Bruno and Williams Easterly, who also ran nonlinear regression. According to their findings, economic growth speeds up when inflation above 40% is decreased. For inflation lower than 40% the relationship is insignificant and ambiguous (Bruno and Easterly, 1995).

Significant results are achieved when number of observations is higher than 25. In our case we had only 10-year period. Therefore, based on the results, we can only talk about general trends in the Kyrgyz Republic.

It has been identified that in general inflation influences economic growth negatively. And when the inflation is higher than 8% it starts influencing economic growth positively.

Surely we cannot say with 100% confidence that if economic policy would target 10% inflation rate (or from 10 to 40), economic growth would increase. Besides, inflation in the Kyrgyz Republic is uneven and is characterized with changeability.

Although we can say that inflation should not be targeted in the prejudice of other important macroeconomic and social factors.

Remarkable thing for the Kyrgyz Republic is that its population has very strong potential to contribute further development of the country. About 98% of the total population has secondary education. In the meantime, many econometric models include enrollment in the secondary education among factors that positively influence economic growth (Bruno and Easterly, 1995).

Human capital has significant role in economic growth of the country. Physical capital is progressing very intensively and if it is accompanied with high level of literacy, then achieving growth is easier. We can economize time, which leading countries required for development of these technology. We can just accept those technologies and any other innovations by simply adopting them into conditions of the Kyrgyz Republic.

Having such conditions a country with low level of GDP has an opportunity to grow faster than countries with high GDP levels. However, government should design an appropriate favorable policy for such growth.

Deciding which instrument to use to counteract inflation, policy makers should keep in mind other factors. The conducted policy should not blindly follow only one target. Instead, it should be targeted to stable balanced growth (Chernov, 2007).

12. Conclusions

After analysis of the inflation, growth and “Inflation and Economic Growth” models, we resulted that inflation can be caused by monetary (emission of money) and non-monetary factors (monopolization, economical reforms, increase in energy prices). In the Kyrgyz Republic inflation in the period that we consider was, most likely, mainly caused by changes in the energy prices, in particular price of oil.

Two regressions were ran for data of the Kyrgyz Republic using methodology of Richard C.K. Burdekin in his work “When Does Inflation Hurt Economic Growth?” First regression included as independent variable growth rate of GDP with Kumtor, second – without Kumtor. First regression showed that GDP is almost irresponsive to the inflation. However, it responds to the increase in inflation. An increase of inflation by 12 % would increase GDP by 1%. Such irresponsiveness is due to high weight of Kumtor’s activities to total GDP of the Kyrgyz Republic. Second regression showed different results. In overall, inflation negatively affects GDP growth rate; and an increase of inflation by 11% would increase GDP by 1%. However, inflation that is higher than the eight percent threshold showed positive influence on the economic growth.

Based on the results of the model “Inflation and Economic Growth” for the Kyrgyz Republic and views of the famous economists, we believe that inflation should be monitored but it shouldn’t be the main goal of the economic policy.

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Appendix

Table: 3
Test of Variability of Explanatory Variables

	GDP	GDP without Kumtor	Inflation	▲ inflation	Log (GDP)	G/Y	%▲ inTrade
Measure	%	%	%	%		ratio	
1995	-5.4	-5.4	32.1		4.21	0.29	
1996	7.1	7.1	34.8	3	4.37	0.22	39.8276
1997	9.9	5.3	13	(22)	4.49	0.22	-2.83844
1998	2.1	0.6	16.8	4	4.53	0.21	1.09649
1999	3.7	4.9	39.9	23	4.69	0.19	-21.7927
2000	5	4.9	9.6	(30)	4.79	0.18	0.34671
2001	5.3	4.1	3.7	(6)	4.87	0.17	-8.18361
2002	0	3.1	2.3	(1)	4.88	0.20	15.0521
2003	7	5.4	5.6	3	4.92	0.20	22.7923
2004	7	7.6	2.8	(3)	4.97	0.20	24.6271
2005	-0.6	1.4	4.9	2	5.00	0.20	9.69712
Average	3.73636	3.54545	15.0455	-2.72	4.70221	0.20694	8.06247
StandardDeviation	4	3	13	14	0.25	0	17
Variability¹	1.12	0.98	0.88	(5.11)	0.05	0.14	2.12

¹ The variability is found dividing standard deviation by the average values.

SUMMARY OUTPUT for the Regression with Kumtor

<i>Regression Statistics</i>	
Multiple R	0.55
R Square	0.30
Adjusted R Square	-0.25
Standard Error	3.76
Observations	10.00

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	30.93	7.73	0.55	0.71
Residual	5	70.82	14.16		
Total	9	101.75			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	2.54	4.31	0.59	0.58	-8.53	13.61
Infl	0.10	0.87	0.11	0.92	-2.14	2.33
(inf-inf1)*break	0.02	1.04	0.02	0.98	-2.64	2.68
▲inf	-0.13	0.13	-1.00	0.36	-0.47	0.21
%▲in Trade	0.04	0.07	0.53	0.62	-0.15	0.22

SUMMARY OUTPUT for the Regression without Kumtor

<i>Regression Statistics</i>	
Multiple R	0.70
R Square	0.49
Adjusted R Square	0.09
Standard Error	2.14
Observations	10.00

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	22.24	5.56	1.22	0.41
Residual	5	22.81	4.56		
Total	9	45.04			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	5.80	2.44	2.37	0.06	-0.48	12.08
Infl	-0.60	0.49	-1.21	0.28	-1.87	0.67
(inf-inf1)*break	0.80	0.59	1.36	0.23	-0.71	2.31
▲inf	-0.12	0.08	-1.57	0.18	-0.31	0.07
%▲in Trade	0.04	0.04	1.02	0.35	-0.06	0.15