

Annex IV: Real Effective Exchange Rate Calculation Methodology

The exchange rate, which is a weighted average of nominal exchange rates of a national currency excluding tendencies for change in prices of a country under consideration with respect to prices in countries-partners in trading, is called a **nominal effective exchange rate** (NEER). The NEER does not reflect the price changes in the observed country relatively to price changes in the trading partners.

The nominal effective exchange rate allows to define the extent by which the exchange rate of the national currency changed relatively to exchange rates of the trading countries compared to a base year. However, the change in the nominal effective exchange rate does not reflect changes in the purchasing power of the currency, nor to what extent the competitiveness of goods produced in this country and showing an export potential changed during a specific period of time. In order to define the extent by which the purchasing power of the currency changed during some period of time, a real effective exchange rate (REER) is calculated.

The nominal effective exchange rate adjusted to the change in price levels corresponding to a relative change in prices in countries – partners in trading is called the **real effective exchange rate**.

The real effective exchange rate is calculated as a weighted average of real exchange rates of the national currency to the currencies of its main trading partners. For example, if the exchange rate of one country appreciates relative to the currency of the neighboring country with the higher inflation rate and depreciates at the same time relative to the currency of another country-partner with the lower inflation rate, the real effective exchange rate will reflect the exchange rate of the national currency of the country as a weighted average of these changes.

The most widely-spread formula for the nominal and real effective exchange rate calculations is a formula for deriving a weighted average of the two exchange rate changes for a certain time period relative to the base period.

Weights of countries in total foreign trade of the country under consideration are defined in order to calculate effective exchange rate indices. The weights reflect a relative importance of this or that currency for the other particular country. The effective exchange rate indices are calculated on the basis of the weights of bilateral trade (weights of export and import could be also used or their total average index). When calculating the real effective exchange rate of the som, the total weighted average on export and import is used.

The formula for calculating the weights is the following:

$$W_i = \frac{M_i + X_i}{\sum_{i=1}^n X_i + \sum_{i=1}^n M_i} \quad (1)$$

Where

W_i — Weight of country i in the overall trade volume of the country, $\sum_{i=1}^n W_i = 1$.

M_i — Import of the Kyrgyz Republic from country i

X_i — Export of the Kyrgyz Republic to country i

$\sum_{i=1}^n X_i$ — Exports of the Kyrgyz Republic to 17 main trading partners (n=11)

$\sum_{i=1}^n M_{zz}$ — Imports of the Kyrgyz Republic from 17 main trading partners

17 countries are considered as trade partners for the largest shares in the total volume of foreign trade with the Kyrgyz Republic (Russia, Kazakhstan, Uzbekistan, Ukraine, Belarus, Turkmenistan, Tajikistan, USA, Germany, Great Britain, China, Turkey, Switzerland, France, Italy, Japan, and Czechia). It should be noted that some of exported and imported goods, which are not traded on the principle of comparative advantages, are excluded from the calculation of weights.

May 1993 (the date of introduction of the national currency – Kyrgyz som) was used as a base period before 2001 and, starting from this issue that covers the year of 2000, it was changed to the year of 1997. It was connected with the fact that high rates of inflation and the depreciation in 1993 to 1995 were the reason for significant fluctuations in indices, while in recent years these fluctuations in indices turned out to be relatively smooth. The indices are calculated on a monthly basis and for the analytic purposes the indices are calculated separately for a group of seven CIS countries and a group of 10 non-FSU countries.

The index of the bilateral nominal exchange rate is calculated in the following way (for example, to the US dollar):

$$NBER_{US_t} = 100 * (ER_{US_t} / ER_{US_0}) \quad (2)$$

Where ER_{US_t} — nominal exchange rate of the som to the US dollar for period t

ER_{US_0} — relevant nominal exchange rate for the base period

The formula for calculation of the bilateral real exchange is as follows:

$$RBER_{US_t} = 100 * (ER_{US_t} / ER_{US_0}) * (CPI_{US_t} / CPI_{KYR_t}) \quad (3)$$

Where ER_{US_t} — nominal exchange rate of the som to the US dollar for period t

ER_{US_0} — relevant nominal exchange rate for the base period

CPI_{US_t} , CPI_{KYR_t} — changes in the CPI index in the US and Kyrgyzstan, correspondingly, for a period t relative to base period 0.

Average weighted nominal bilateral exchange rates of 17 major countries - partners in trade constitute the nominal effective exchange rate of the som. For period t it is calculated the following way:

$$NEER_t = (NBER_{1t})^{W_{1t}} * (NBER_{2t})^{W_{2t}} \dots * (NBER_{17t})^{W_{17t}} \quad (4)$$

Where $NBER_{it}$ — nominal bilateral exchange rate index of country i for month t, calculated on the basis of the formula (2)

W_{it} — the relevant weight

Average weighted real bilateral exchange rates of 17 major countries - partners in trade constitute the real effective exchange rate of the som. For period t it is calculated the following way:

$$REER_t = (RBER_{1t})^{W_{1t}} * (RBER_{2t})^{W_{2t}} \dots * (RBER_{17t})^{W_{17t}} \quad (5)$$

Where $RBER_{it}$ — real bilateral exchange rate of the som to the US dollar for period t

W_{it} — the weight of the country, calculated on the basis of the formula (1)

Developments of the nominal and real effective exchange rates depend on the following factors, which influence either appreciation or depreciation of effective exchange rates. The first factor is the nominal exchange rate. The depreciation (appreciation) of the som relative to other currencies entails an increase (decrease) in indices of both nominal and real effective exchange rates. The second factor is the price level in the country under consideration and in countries – partners in trade. The outreaching rate of inflation in the Kyrgyz Republic compared to the inflation rate in countries-trading partners leads to the depreciation of the real effective exchange rate and vice versa. The consumer price index is used only when calculating the real effective exchange rate. The third factor shows the weights of the major countries-trading partners in the total foreign trade turnover of the Kyrgyz Republic. The greater the weight of the country in the total foreign trade turnover of Kyrgyzstan, the greater the impact of the exchange rate of the som to the currency of that country is, as well as the impact of price developments on indices of effective exchange rates of the som.

The analysis of these results is based on the estimate of the nominal and real effective exchange rates for the reporting period. The main conclusion which is formulated based on application of this methodology is as follows: *when the index of the real effective exchange rate is increasing, one could say that the national currency depreciates in real terms relative to the currencies of major countries-trading partners, though the competitiveness of domestic goods increases at the same time, and vice versa.*