Exchange rate

Nominal exchange rate

is relative price of two currencies (or two assets denominated in these currencies – home and foreign).

Quotation:

- direct quotation: the number of foreign currency units per domestic unit
- indirect quotation: the number of domestic currency unit per foreign unit

We will use indirect (Europian) quotation. With this convention, nominal exchange rate (from the point of view of Czech residents) is for example

$$S = \frac{CZK}{EUR} \qquad \text{or} \qquad \frac{CZK}{USD}$$

- *Rise* in exchange rate means *depreciation* (loss of value of Czech Koruna = we have to give more crowns per unit of dollar).
- *Decline* in exchange rate means *appreciation* (increase in its value = we will give less Koruna per unit of dollar).

Effective exchange rate

is computed using a number of partner-countries. Every country receives a weight typically representing its importance in trade (e.g. share of our exports or our imports, or the average of both). The weights sum up to 1. When the geometric average is used, the weights have meaning of elasticities (e.g. one percentage change in S_{DEM} translates into 0.65 percentage change in effective exchange rate).

$$S_{effective} = (S_{DEM})^{0.65} * (S_{USD})^{0.35}$$

Real exchange rate

is relative price of two goods (or baskets of goods) expressed in the same currency

$$Q = \frac{S\,P^*}{P}$$

Numerator is the price of foreign goods expressed in domestic currency. Denominator is the price of domestic goods (also in domestic units).

Inflation rate

is the rate of change of the price level (measured by some price index or deflator). General formula

$$\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}} = \frac{P_t}{P_{t-1}} - 1$$

After taking logarithm (and using logarithmic approximation[1]) it is possible to write

$$\pi_t \approx \log P_t - \log P_{t-1}$$

For comparability, the inflation rate is usually quoted in terms of percentage change *per year*, even if it is measured more frequently, such as every quarter or every month. This adjustment is called *annualization* and is made by multiplication by appropriate number. It is approximation, but widely used. Advantages and disadvantages will be discussed later.

Notation

- Year-on-year changes are changes to the corresponding period (month or quarter) of the previous year (abbreviations: y/y or y-o-y, usually followed by [% p.a.] – per cent, per annum).
- Quarter-on-quarter changes are changes to the previous quarter. Sometimes explicitly written quarter-on-previous-quarter (abbreviations: q/q or q-o-q). To *annualize* it, multiply by 4.
- Similarly for monthly data (m/m, annualized by factor of 12).

Real interest rate

is the difference between the nominal interest rate and the expected inflation rate

$$r_t = i_t - \pi^e_{t+1}$$

Problem: when we contruct time series of the real interest rate, we don't know the expected inflation rate.
Solving: we assume *perfect foresight:* $\pi^e_{t+1} = \pi_{t+1}$ (expected inflation rate is equal to the realized value in period $t + 1$).

[1] $\frac{X_t - X_{t-1}}{X_{t-1}} \approx \Delta \log X_t = \log X_t - \log X_{t-1}$, for small changes (to 15 % or, in decimal expression, to 0.15)