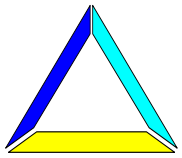
INSTITUTE FOR ECONOMIC RESEARCH AND POLICY CONSULTING IN UKRAINE
GERMAN ADVISORY GROUP ON ECONOMIC REFORM

Reytarska 8/5-A, 01034 Kyiv, Tel. (+38044) 228-6342, 228-6360, Fax 228-6336
E-mail: institute@ier.kiev.ua, http://www.ier.kiev.ua



S7

TECHNICAL NOTE

on the methodology for calculation of a real effective exchange rate index

in response to the requirement of Minister of Economy
during the meeting on July 16, 2002

There was a request to discuss technical details in three areas concerning real effective exchange rate (REER) index:

- Explanations on methodology of calculation of the REER index;
- Answer to concrete questions about the calculation of the REER index;
- Developing proposals for new tasks.

I. METHODOLOGY OF CALCULATION OF THE REER INDEX

REER index is defined as index of weighted average exchange rates of national currency against the currencies of trade partners corrected with the changes in price levels. The formula, with the use of geometric averaging technique, looks as following:

$$REER = \frac{1}{P} \cdot \prod_{i=1}^{m} \left[E_i P_i^* \right]^{w_i} \qquad i = 1,\ldots, m$$

where $REER$ ...real effective exchange rate index

E_i .....nominal exchange rate, defined as the units of domestic currency per one unit of foreign currency *i*;

P .....domestic price index;

P_i^* .....price index corresponding to the currency *i*;

w_i .....weight of currency *i*, $0 < w_i < 1, \sum_{i=1}^{m} w_i = 1$;

m .....number of currencies which make up the currency basket of a country's trade flows

Construction of real effective exchange rate requires:

1. Choosing of the weighting system to represent the structure of currencies that are most important for country's trade (*effective* exchange rate);

2. Selection of the most indicative price index (*real* exchange rate).

Weighting system *(effective* aspect)

Economic theory proposes to include the currencies of all trading partners that take a significant share in the country's trade flows.

We use equal weights for three selected currencies (US dollar, Russian ruble, and euro) and keep the weights constant throughout the time.

Choice of currencies

Since we present the index which could be easy calculated involving a large set of currencies would be not convenient. While deciding on the currency choices, we make the following suggestions:

- Russian rouble should be taken as a representative currency for the CIS countries, since exchange rate of Ruble to a large extent defines the position of other currencies in the region, and thus determines the trade development between the countries;

- Euro should be taken as a representative currency for the countries of Western Europe and the EU candidates, since the Euro exchange rate mostly reflects the European currencies fluctuations;

- US Dollar should represent all other trading partners (the rest of the world), since USD is quite significant currency for determining Ukraine's trade with the other world countries. Besides, we take USD since all official trade statistics in Ukraine is denominated in dollars.

Although about 90% of all trade contracts in Ukraine are denominated in US dollars, we cannot ignore the movements of currencies of Ukraine's major trade partners since the dollar denominated trade contracts ensure only execution of current contracts, but movement of a currency of trade partner will inevitably influence the bilateral trade amount between countries for future contracts.

Choice of currency weights

1. As can be seen from the Table below, all three currencies take roughly equal shares in Ukraine's trade flows[1].

Currency weights (as for 2001, merchandise trade figures).

	Exports	Imports	Total trade turnover	Effective weights
Russian rouble	29%	56%	42%	1/3
US dollar	37%	14%	26%	1/3
euro	34%	30%	32%	1/3

Source: Derzhkomstat, own calculations

2. Weights equalising is acceptable from the theoretical point of view, and is applied in numerous researches. For example: Bahmani-Oskooee, M. (1995) Real and nominal effective exchange rates for 22 LDCs: 1971:1-1990:4, Appliend Economics, 27, pp. 591-604; or Hinkle, Lawrence, and Peter Montiel (editors, 1999). Exchange Rate Misalignment: Concepts and Measurement for Developing Countries. World Bank publication, Oxford University Press.

[1] Here we should take into account that a large part of Ukraine's imports from CIS countries are energy imports, the price for which is set far in advance and is denominated in US dollars; what is also important, this part of trade flows is executed by barter transactions since Ukraine does not pay cash for energy resources (in particular, for gas from Russia) but gets them for pipeline transit services.

3. Weights equalising makes the index easy to apply in practice. We emphasise the convenience of keeping the formula as simple as possible, so that it would not require periodic changes in parameters and/or wide data augmenting.

4. Non-changing formula for index calculations would guarantee continuity and prevent manipulation. Since we aim to make the index applied during development of political decisions we should make it not vulnerable for political pressure. Potential manipulations each period would weak the possibility to use the index in independent way.

Choice of the inflation index (*real* aspect)

Economic theory proposes various alternative price indices for estimating REER indices, such as the consumer price index (CPI), the producer price index (PPI), the wholesale price index (WPI), the GDP deflator, and unit labour costs.

We use PPI for all currencies in the formula for REER calculations.

In seek for consistency – choice of the same index for all currencies

As our REER index will comprise only three foreign currencies, euro, Russian rouble and US dollar, we next needed to select price indices to reflect the inflation rates of the Eurozone, Russia, the USA, and Ukraine. We select the same price indices for all currencies in order to make our estimations consistent.

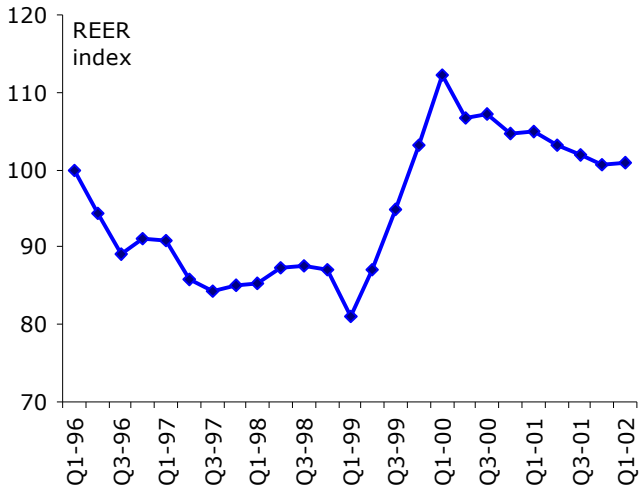
Choice of the price index

We decided to base our estimations on the PPI, as it seemed the most appropriate taking Ukrainian conditions into account. We would stay the following arguments:

1. The advantage of PPI vis-à-vis CPI (consumer price index) is that it more accurately reflects the prices of intermediate goods. This argument is important as intermediate (or primary) products represent a significant part of Ukrainian trade.

2. Consumer prices are more regulated in almost all countries. Thus, usage of CPI would not accurately reflect the prices relevant for international trade.

Chart: REER index calculated according to the proposed methodology for the period Q1-1996 to Q1-2002



Note: an increase in the index means a real effective depreciation of the hryvnia

II. ANSWER TO CONCRETE QUESTIONS ABOUT THE CALCULATION OF THE REER INDEX

Here we want to explain in more detail and in a less technical manner than in part I., how we took important decisions concerning the construction of the REER index. This part should be seen as a complement to part I. and could be used in discussion that are not supposed to become too technical, as is often the case in broad political discussions.

Question 1: There are 7 indicators applied in calculation of the REER index: three exchange rates and four inflation indexes. Is this list complete enough for calculation of really workable REER index?

Answer: A REER index can be built for different purposes. It can be constructed for purely scientific purposes, in order to analyse the past. Or it can be constructed for political decision making, in order to forecast and influence the future. Our aim was to construct an index for political decision making.

A good REER index for policy making should feature two properties: first, it should accurately depict the trading reality of a country. Second, it should be simple and quick to calculate. Increasing the number of currencies in the currency basket has a positive and a negative effect. The positive effect is that reality is better depicted. The negative effect is that the calculation of the index becomes rather complex, because the necessary data might not be readily available or difficult to get. This could also delay the calculation of the index and thus make decision making more difficult.

Thus, the optimal number of currencies lie between one and say ten currencies. In our view, the optimal number of currencies in the case of Ukraine is three. We think that including the USD, EUR and RUR depicts quite accurately trading reality in Ukraine, without making the calculation too difficult. Including more currencies would not improve significantly the depiction of reality, but it would make the calculation much more difficult.

Question 2: Each of three currencies – USD, EURO and RUBLE – has equal weight (one third). Is it correct to use equal weights, while shares of these currencies in trade are unequal?

Answer: The choice of the currencies weights is a complex task. Do you take the trading shares of 1996, 1997, or 2001? Or should an average of the last 5 years be used? Or would it be better the take the expected trading shares in the next 2 or 3 years? Furthermore, do you include only exports, or only imports, or a combination of both? Should it only include merchandise trade, or also trade in services? To put it short, it is almost impossible to objectively validate the choise of the currency basket.

After deciding on the inclusion of three currencies in the index, it became evident to us that the weights for each of them would be around one third. We realised that using 1/3 for each of the chosen currencies would have many advantages, and still depict reality accurately. In our view, the decision for equal weighting of USD, EUR and RUR has three advantages. First, there is no room for manipulation of the REER index. Let`s assume a decision maker wants to devalue the national currency against the US dollar for some reason. This person could then "experiment" with different currency weights, until he finally finds some weighting scheme that shows the necessity to devalue. Afterwards, he could tell his staff to "legitimise" this choice. Our approach leaves no room for such manipulation and is thus appropiate especially for political decision taking. Second, this decision makes clear that we not claim and do not want to depict reality one to one. We have a practical goal, which is assessing policy making. Complicate constructions do not work in practice, that is why simple solutions are needed. Third, there is no need to adapt the weighting scheme every year to new developments. This is complicated, requires new decisions and takes time.

Question 3: How are inflation indexes included? Is it correct to apply equal weights also for inflation indexes, while these countries have completely different trade turnover with Ukraine?

Answer: The weights of the inflation indexes must be equal to the weights of the correspondent currencies in the basket. So this was not a separate decision, but an implication of the decision about the make up of the currency basket.

III. PROPOSALS FOR NEW TASKS

Proposal 1: Is it possible to forecast a development of REER index on the basis of forecasted indicators of exchange rate and inflation for respective countries? We are interested in forecast till the end of 2002 and further.

The development of the REER index depends to a high degree on monetary and exchange rate policy in Ukraine. We think that the NBU is able to determine the REER, at least in the short term. So forecasting the development of the REER means forecasting monetary and exchange rate policy in Ukraine. If the NBU and the government follow our recommendations, then the REER should stay rather constant in the next 12 months or so. In particular, a significant real effective appreciation should be avoided.

Proposal 2: We know several other models of the REER calculation, mainly from France. It would be interesting if your experts evaluate these models, and choose one, the most appropriate, or several equally good. These models could be used in practice of the Ministry of Economy for monitoring of the REER.

We would like to evaluate these models, once we have got them.

Kyiv, July 2002

R.G., N.M.