

Appendix The exchange rate and international price comparisons

The impact of the exchange rate of the króna permeates the whole Icelandic economy. It directly affects the prices of imported and exported goods and services, the combined value of which amounts to 80% of GDP. Besides its direct impact on prices of imported goods, the exchange rate also has a secondary effect on prices of domestic goods which use imported inputs in their production. The exchange rate and nominal prices determine how high or low prices in Iceland are, relative to those elsewhere. The ratio of prices in Iceland to other countries is termed the real exchange rate (relative to unit prices). Real exchange rate is also measured in terms of unit wage costs. Although both these measurements are known as real exchange rates and are used to gauge whether the króna is over- or undervalued in terms of its exchange rate (real exchange rate), they differ in many ways.

Equilibrium real exchange rate – equilibrium exchange rate

Discussions of whether a currency is overvalued or undervalued are based on some kind of notional equilibrium exchange rate. Two references are most commonly used. One is macroeconomic balance, especially the current account balance. The exchange rate would be termed overvalued if it leads to a persistent current account deficit and accumulation of debt by the economy.¹ The other reference is relative prices: the exchange rate is overvalued if the price of similar goods is much higher in Iceland than abroad, measured in the same currency and after adjustment for transportation costs, business costs, trade barriers, differences in taxation of goods and services between countries, measurement errors connected with differing composition of baskets of goods between countries and other factors that explain “normal” international price differences. This definition of the equilibrium exchange rate is linked to the

hypothesis of purchasing power parity (PPP). Besides providing this definition, the hypothesis implies that since international trade competition will eventually eliminate “abnormal” differences between the prices of comparable goods, the equilibrium exchange rate will quite soon trend towards the equilibrium real exchange rate. Otherwise, enterprising individuals would buy goods where they are inexpensive and sell them at a profit where they are expensive. The difference in prices – the equilibrium real exchange rate – is then determined by trade barriers, differences in taxation and “normal” transportation and business costs.

In addition to this measurement of the equilibrium real exchange rate, which takes account of conditions in markets for goods and services, there are others based on financial market conditions. The most common is uncovered interest rate parity. This assumes that equilibrium in a financial market is based on the spread between domestic and foreign interest rates being equal to expected changes in the exchange rate, so that investors expect the same return in their own country as abroad after allowance for risk. If investors foresee much higher domestic than foreign interest rates in the years to come, this should cause a capital inflow into the country which will lead to lower interest rates and a stronger home currency. Equilibrium is established when interest rates have fallen and/or the currency has appreciated sufficiently for an expected weakening of the currency to level out the spread between domestic and foreign returns.

Price differences

Based on the PPP hypothesis, the Economist publishes an index of the price of a Big Mac in different countries to give some idea of relative prices and thereby whether a country’s currency is undervalued or overvalued. From the perspective of the PPP hypothesis, however, the Economist has not chosen a particularly suitable reference. Hamburgers cannot be transported between countries without loss of quality, and there are widespread barriers to trading in major inputs such as meat and labour.

Everyday experience teaches us that the price of

1. The equilibrium real exchange rate is commonly defined as the (real) exchange rate that maintains a country’s external and internal balance, i.e. there is no unsustainable external debt accumulation and the factors of production are reasonably utilized. A detailed study of real exchange rate theories is given in Arnór Sighvatsson, “Jafnvægisraungengi krónunnar – Er það til?” in *Fjármálatíðindi*, vol. 47, 2000.

identical goods depends on where they are bought. Important considerations are the location of the vendor (for reasons including transportation cost), the scope of business, wage costs, level of service, etc. These factors affect measurements of prices and price changes. The real exchange rate of the króna, for example, would probably be valued higher in regional Iceland than in Reykjavík.

No direct measurements are available for relative prices of an identical basket of goods and services along the lines of the Economist's Big Mac index. However, some efforts have been made to produce an international index for prices. The accompanying table shows prices in Iceland relative to those in 15 European Union countries.

Comparative price levels for Iceland

15 EU countries = 100	1995	1999	2000
Private consumption.....	122	123	131
Food.....	145	154	166
Meat.....	154	164	168
Fish.....	87	91	104
Clothing, shoes.....	127	130	146
Heating and electricity.....	83	91	92

Source: Statistics Iceland.

Relative prices of individual categories of goods vary widely. Fish is cheap in Iceland, but meat relatively expensive. A different outcome would be obtained if another reference was used instead of the 15 EU countries in the table. In 1999, private consumption prices measured 124 in Sweden, 127 in Norway and 133 in Switzerland. Comparable figures for 2000 are 128, 129 and 135 respectively. As the chart shows, the real exchange rate of the króna was relatively strong over these years.

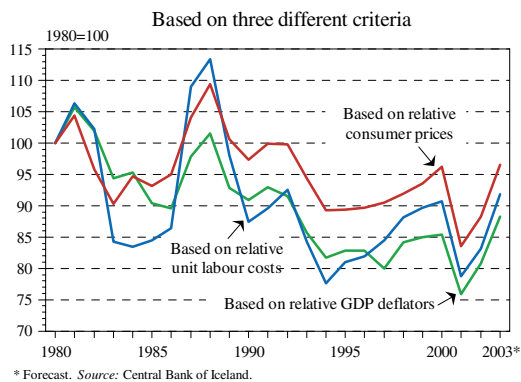
Development of relative prices

Trade barriers and different levels of wages and productivity affect prices in individual countries. An array of trade barriers create marked differences in prices of agricultural products. Prices of goods and services which are not determined by international competition, e.g. because of transportation costs, will also differ. Housing and hairdressing are examples of such products. Countries where productivity is high

in competing industries and wages are relatively high will also have high prices for goods and labour-intensive services. For this reason there is a positive correlation between productivity (GDP per capita) and relative prices. Additional factors in the Nordic countries and Switzerland are typically high transportation costs and substantial barriers to trading with agricultural products, despite the fact that most of them are fairly unsuitable for producing such goods.

Because of the difficulty of comparing relative prices, the equilibrium exchange rate is often measured in terms of relative price changes rather than direct price measurements. The drawback to this approach is that it forgoes the direct measurement of equilibrium real exchange rate according to the PPP hypothesis. Indices measure changes. The index value of the real exchange rate at any time therefore says nothing about whether it is close to equilibrium. Any conclusions drawn from real exchange rate indices have to be based on the average over a given period, in the hope that this will reflect the equilibrium rate. Thus the real exchange rate is strong when it is higher than its average over a specific period. It cannot be ruled out that a given index average will deviate considerably from the equilibrium value in the sense used by PPP. The real exchange rate may also change because of a change in the equilibrium rate rather than by appreciating against it, for example due to changes in transportation costs or increased weight of a good when competition is not at hand and technological development is slow (e.g.

The real exchange rate of króna 1980-2003



The chart shows the development of three different real exchange rate indices for the króna over the period 1980-2003. All of them show sharper swings than could normally be expected on the basis of the PPP hypothesis. (Other currencies would show even more marked deviations if their real exchange rates were examined on the same principle). Nonetheless, most economists agree that the hypothesis holds “in the long run”, despite deviations caused both because the equilibrium real exchange rate has changed and also because the real exchange rate fluctuates from its equilibrium value. The chart shows that the real exchange rate (based on relative consumer prices) has appreciated since 2001 but is not high from a historical perspective. In 1981, for example, the real exchange rate was 10% above the estimate for 2003 and in 1987 it was 15%. The real exchange rate this year is 5% higher than the average over the past 10 years but 1% higher than over the past 20 years.

The first index in the chart maps the real exchange rate trend against consumer prices. Probably the best reference for the real exchange rate would be producer prices (or wholesale prices) since these are least prone to changes in transportation and distribution costs. Regrettably, data are still not available for calculating the real exchange rate of the króna relative to producer prices.

The second index maps the real exchange rate against GDP prices. This reflects relative prices of all goods and services produced in Iceland better than the CPI (and also prices of imported goods). However, it is less suitable for evaluating the equilibrium real exchange rate because it contains a larger proportion of goods and services that depend on specific conditions in individual countries. As a yardstick of competitive position it can also be misleading. For example, a rise in fish prices pushes up GDP prices and thereby the real exchange rate. The competitive position would appear to have worsened although that of fisheries companies, at least, has improved. According to the chart, GDP prices and consumer prices produced similar results for the real exchange rate. The estimated real exchange rate in 2003 is 3% higher than over the past 10 years and 3% lower than over the past 20 years.

Development of wage costs

The third index on the chart is relative to wages and shows the development of unit wage costs in Iceland and abroad. Besides changes in wages and the exchange rate, this index is also affected by productivity. It differs from price-based indices of the real exchange rate insofar as it is independent from the PPP hypothesis.² Thus the equilibrium real exchange rate based on relative wages cannot be explained in terms of that hypothesis. This real exchange rate index gives an indication of relative wage cost developments and thereby also of the profitability and competitive position of businesses. Based on wage levels in 2003, the estimated real exchange rate is almost the same as in 1999 and 2000, but 8% higher than over the past 10 years and 3% higher than over the past 20 years.

All in all, the three indices for the real exchange rate of the króna yield similar results. So does a comparison of the real exchange rate for 2003 with the averages over the past 10 or 20 years. Also, the chart shows that on all three indices the real exchange rate of the króna was considerably lower in 2001 and 2002 than at any time over the period since 1980. Obvious as it may seem to compare the real exchange rate today with historical averages, it is uncertain whether the latter provides a true picture of the equilibrium rate. Conceivably, the economic outlook in Iceland has driven the equilibrium real exchange rate up.³ Likewise, expectations of continuing high interest rates in Iceland may cause the exchange rate to appreciate in order to maintain balance in the financial markets. The relativity of these three indices is also demonstrated by the way that they all show the real exchange rate for 2003 as being equal to that for 2000. However, the current account deficit then was equivalent to 10% of GDP but is forecast to be 1% this year. Thus external macroeconomic balance can vary widely at the same real exchange rate.

2. The indices are still closely related since wage cost developments should, in the long run, reflect price and productivity trends.

3. A study by Arnór Sighvatsson, Már Gudmundsson and Thórarinn G. Pétursson suggests that fluctuations in the terms of trade and real exchange rate are quite important for the economic cycle in Iceland. See *Fjármálatíðindi*, vol. 48, 2001.