

Terminology: Nominal vs. Real

- ✧ Economists use **nominal** for values that are expressed in the ordinary way, in terms of the prices in which transactions actually take place
- ✧ They use the term **real** for values that are adjusted for inflation
- ✧ *Example: Your boss gives you a raise from \$10 an hour to \$12 per hour, but inflation raises the price of things you buy by 20 percent. Your **nominal wage** has gone up but your **real wage** is no higher*
- ✧ This tutorial explains how to apply the real vs. nominal distinction to exchange rates



Nominal Exchange Rates

- ✧ The exchange rates that we see on display in a bank or at an airport exchange kiosk are **nominal exchange rates**
- ✧ They can be expressed in two ways, for example:
 - ✧ \$.02 per Russian ruble
 - ✧ 50 rubles per US dollar

Currency	Buying		Selling
	Notes	T/C	
USA USD	35.03	35.60	36.10
EURO EUR	45.72	45.97	46.88
ENGLAND GBP	68.98	69.68	70.90
JAPAN JPY	0.2878	0.2912	0.2971
SINGAPORE SGD	22.89	22.99	23.59
HONG KONG HKD	4.47	4.50	4.65
AUSTRALIA AUD	27.08	27.38	27.97
NEW ZEALAND NZD	24.18	24.32	25.31
SWITZERLAND CHF	27.99	28.32	28.81
SWEDEN SEK	4.89	5.03	5.19
DENMARK DKK	5.94	6.13	6.29
CANADA CAD	29.65	29.98	30.65
NORWAY NOK	5.43	5.60	5.76
BRUNEI BND	22.10	-	23.50
INDONESIA IDR	0.0025	-	0.005
MALAYSIA MYR	8.53	-	10.75
CHINA CNY	3.70	-	4.97
KOREA KRW	0.029	-	0.049
TAIWAN TWD	0.88	-	1.19
U A E AED	7.75	-	10.20
BAHRAIN BHD	59.63	-	96.33
OMAN OMR	59.41	-	94.21
QATAR QAR	7.67	-	10.22
SAUDI ARAB SAR	7.58	-	10.19
SOUTH AFRIC ZAR	3.65	-	5.45

http://upload.wikimedia.org/wikipedia/commons/archive/2/2c/200708060856331Exchange_rates_display.jpg

Appreciation and depreciation

- ✧ If the purchasing power of a currency increases relative to a foreign currency, we say that it **appreciates**
- ✧ If its purchasing power decreases, we say that it **depreciates**
- ✧ *Example: Suppose the exchange rate for the Russian ruble was 40 rubles per dollar yesterday. Today it is 50 rubles per dollar*
 - ✧ *We say the ruble has **depreciated***
 - ✧ *The dollar has **appreciated***
- ✧ *Note: Instead we could say the ruble depreciated from \$.025 per ruble to \$.02 per ruble*



Real appreciation

- ✧ We say that a currency appreciates in real terms if the exchange value of goods or services that are priced in that currency increase relative to those priced in foreign currency, after taking both inflation and nominal exchange rates into account
- ✧ For example, suppose you grow potatoes and sell them for rubles in a local market in Moscow, and you want to buy coffee, which is priced in dollars in a world-wide market.
- ✧ To understand real exchange rates, we need to ask, how many kilos of coffee can you get for a kilo of potatoes?



Real appreciation without inflation

- ✧ Suppose the local price of potatoes is 20 rubles per kilo and the world price of coffee is \$10 per kilo
- ✧ If the nominal exchange rate is initially 25 rubles per dollar, it takes 12.5 kilos of potatoes to buy one kilo of coffee
- ✧ If the prices don't change but the nominal exchange rate appreciates to 20 rubles per dollar, it now takes just 10 kilos of potatoes to buy one kilo of coffee
- ✧ We say that the ruble appreciates in *both* nominal and real terms



How inflation can cause real appreciation

- ✧ Again, suppose that initially the local price of potatoes is 20 rubles per kilo, the world price of coffee is \$10 per kilo, and the nominal exchange rate is 25 rubles per dollar
- ✧ Now suppose the nominal exchange rate does not change and the price of coffee stays \$10, but Russian inflation raises the price of potatoes to 25 rubles per kilo
- ✧ Now it takes only 10 kilos of potatoes to buy a kilo of coffee
- ✧ We say the ruble has appreciated in real terms even though there is no change in the nominal exchange rate



How nominal depreciation can cancel the effects of inflation

- ✧ Again, suppose that the local price of potatoes is 20 rubles per kilo, the world price of coffee is \$10 per pound, and the nominal exchange rate is 20 rubles per dollar. It takes 10 kilos of potatoes to buy a kilo of coffee
- ✧ Now the nominal exchange rate depreciates to 25 rubles per dollar but at the same time inflation raises the price of potatoes to 25 rubles per kilo. It still takes 10 kilos of potatoes to buy a kilo of coffee
- ✧ Now there has been a nominal depreciation of the ruble but no change in the real exchange rate





Real appreciation and inflation: Summary

- ✧ If local and world prices remain unchanged, a change in the nominal exchange rate means an equal change in the real exchange rate
- ✧ If nominal exchange rates and world prices remain unchanged, inflation causes a country's real exchange rate to appreciate
- ✧ If world prices remain unchanged, a country's nominal exchange rate depreciates, and inflation raises local prices at the same rate, the real exchange rate is unchanged

Interpretation:

- ✧ If the ruble *appreciates* in real terms relative to the dollar, a trader who sells Russian goods for rubles and exchanges the rubles for dollars will have enough dollars to buy *more* US goods than before
- ✧ At the same time, the dollar *depreciates* in real terms. A trader who sells US goods for dollars and uses the dollars to buy rubles will not be able to buy as many Russian goods as before



A Simple Real Exchange Rate Formula

- ✧ A complete formula for the real exchange rate between two currencies needs to take into account the possibility of price changes in both countries
- ✧ This slide shows the simplest way to express the real exchange rate of a currency
- ✧ *Note: when the real exchange rate is expressed as in this formula, a decrease in h indicates an appreciation of the domestic currency*

Let

H = nominal exchange rate stated in units of domestic currency per unit of foreign currency*

✧ h = real exchange rate

✧ P_d = domestic price level

✧ P_f = foreign price level

then

$$h = H (P_f/P_d)$$

**Note: If the exchange rate is stated in units of foreign currency per unit of domestic currency, then the P_d and P_f in the formula need to be reversed*



Exchange rate as an index

- ✧ The real exchange rate is often expressed as an index relative to some base year
- ✧ Both the price levels and the real exchange rate are arbitrarily given the value of 100 for the base year
- ✧ In the formula shown here, the subscript 0 refer to values in the base year and the subscript t refers to the value in some other year, t
- ✧ *Note: when the real exchange rate is expressed as in this formula, a decrease in h indicates an appreciation of the domestic currency*

Let

H = the nominal exchange rate stated in units of domestic currency per unit of foreign currency*

✧ h = the real exchange rate

✧ Pd = domestic price level

✧ Pf = foreign price level

Then

$$h_t = 100 (H_t/H_0) (P_f/P_d)$$

Note: If the exchange rate is stated in units of foreign currency per unit of domestic currency, then the **Pd and **Pf** in the formula need to be reversed*



Example: Exchange rate as an index

- ✧ Suppose in year 0 the nominal exchange rate is 40 rubles per dollar. It depreciates to 50 rubles per dollar in year t
- ✧ The price level in Russia rises from 100 to 120 while the US price level does not change
- ✧ In this case, the real exchange rate index for the ruble relative to the dollar does not change:
- ✧ $100 = 100 \cdot (50/40) \cdot (100/120)$

Be alert! Exchange rate charts are sometimes drawn with appreciation shown upward and sometimes downward depending on which currency is put on top in stating the rate

Let

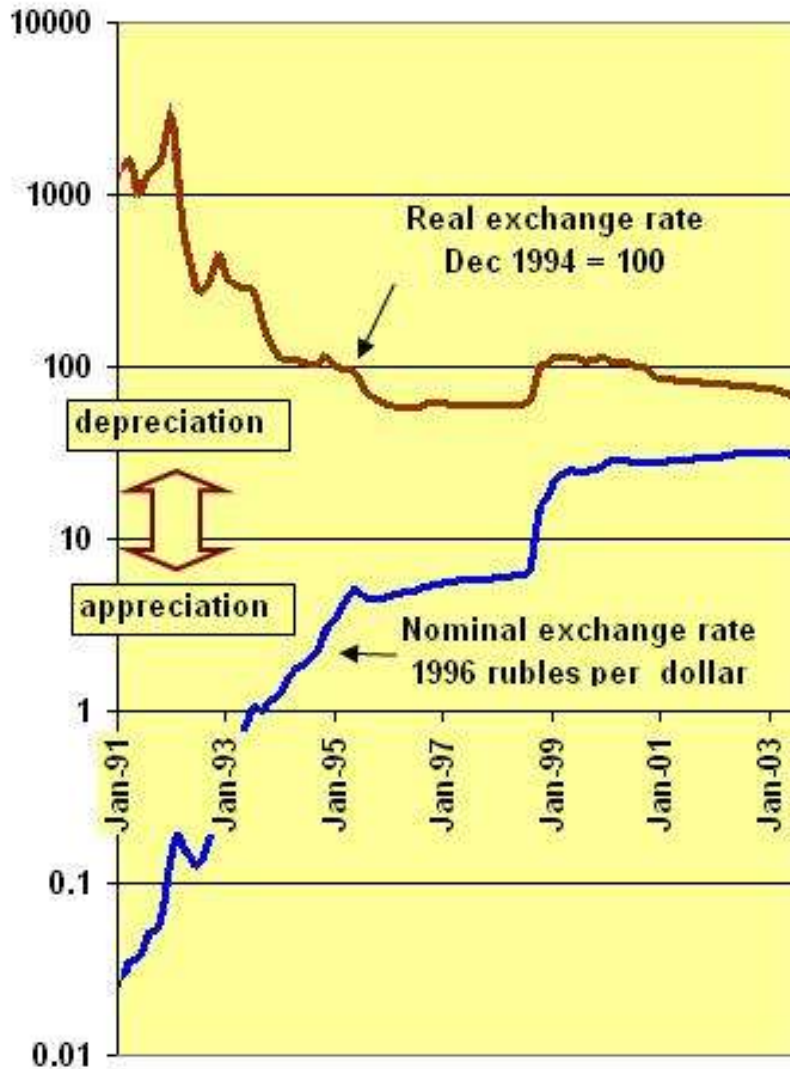
H = the nominal exchange rate stated in units of domestic currency per unit of foreign currency

- ✧ h = the real exchange rate
- ✧ Pd = domestic price level
- ✧ Pf = foreign price level

then

$$h_t = 100 (H_t/H_0) (P_{f_t}/P_{d_t})$$

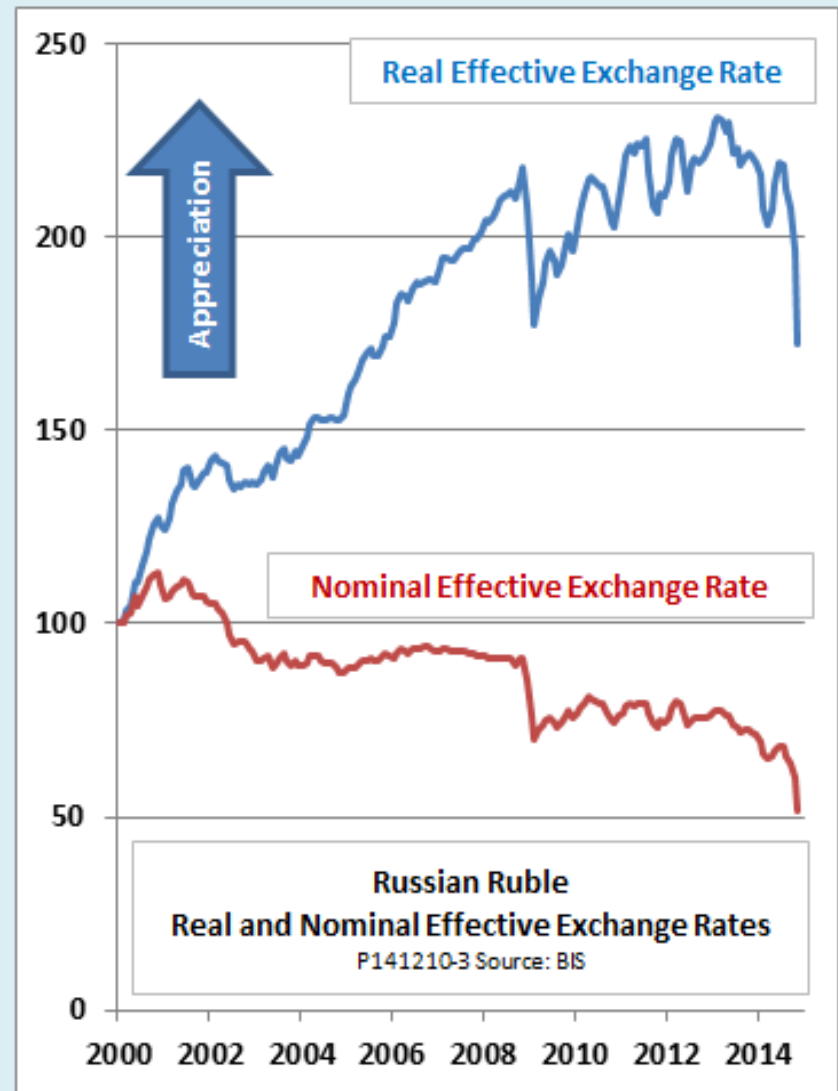
Examples: Russia 1991-2003



- ✧ In 1992-1995, Russian inflation exceeded the rate of nominal depreciation relative to the dollar so the ruble *appreciated* in real terms
- ✧ In 1995-1998, nominal depreciation matched the rate of inflation so that the real rate was *constant*
- ✧ After 1998, the ruble depreciated about 400% in nominal terms while prices roughly doubled, so the ruble *depreciated* in real terms
- ✧ From 1999 to 2003, Russian inflation continued while the nominal exchange rate stabilized so the ruble again *appreciated* in real terms

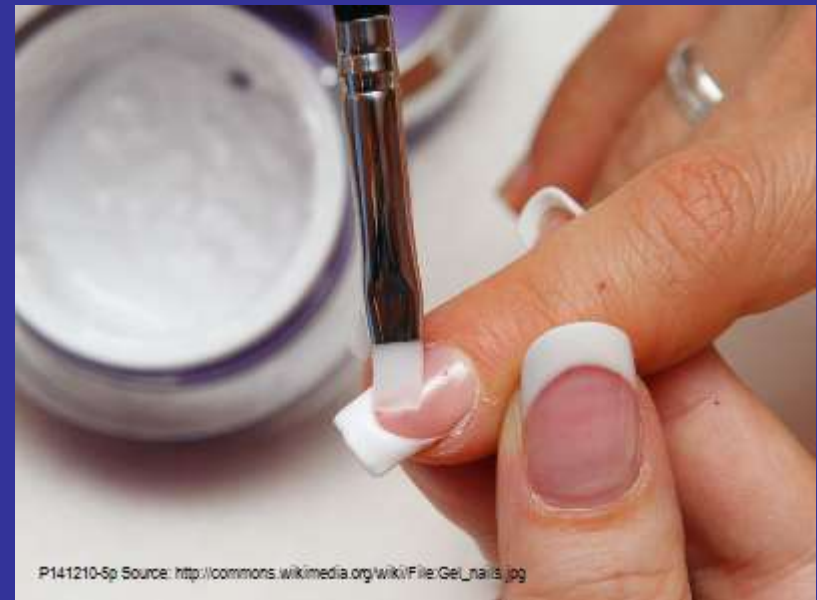
Real Effective Exchange Rate

- ✧ Exchange rates based on a single currency pair are called *bilateral* exchange rates
- ✧ A weighted average of bilateral rates, with the weights proportional to the shares of trade of various partners, is called an **effective exchange rate**
- ✧ Both real effective exchange rates and nominal effective exchange rates are typically expressed as an index that increases as the currency appreciates
- ✧ *You can find data on effective exchange rates on the website of the [Bank for International Settlements](http://www.bis.org)*



Traded and Nontraded Goods

- ✧ **Traded goods** are those whose prices are set in international markets: imports, exports, and goods that are produced and used at home but are close substitutes for imported goods. Their prices do not vary much from one country to another (except for factors like transportation and taxes)
- ✧ **Non-traded goods** are those that do not enter into trade: services (education, finance, healthcare, personal services), a few kinds of goods (fresh food for local use, etc.) Prices of nontraded goods can vary widely from one country to another



Appreciation, depreciation, and relative prices



- ✧ When a country's currency *appreciates* in real terms, its consumers can more easily afford to buy traded goods produced in abroad. The prices of traded goods tend to fall relative to the prices of nontraded goods.
- ✧ When a country's currency *depreciates* in real terms, it is harder for its consumers to buy traded goods produced abroad. The prices of traded goods then rise relative to the price of nontraded goods

