A long-term perspective on the krona

Figure A23. Nominal and real exchange rate, 1913-2012
SEK per USD and index, 1913 = 100

— Nominal exchange rate (left scale)
— Real exchange rate (right scale)
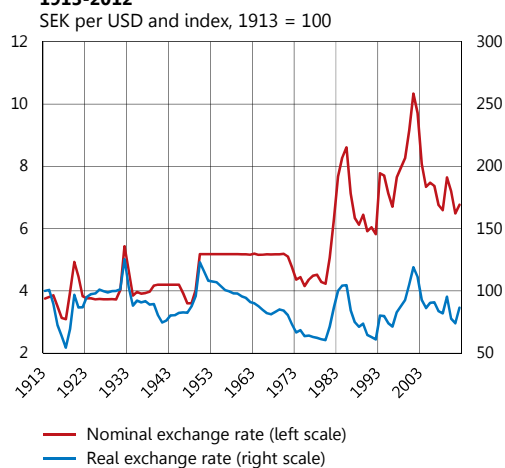
Note. The real exchange rate has been calculated using the CPI for Sweden and the United States.

Sources: Bureau of Labour Statistics, Statistics Sweden and the Riksbank

Although the Riksbank does not have a target for the exchange rate, the development of the krona is constantly of interest as it affects inflation and developments in the real economy. This article aims to explain the driving forces behind the long-term development of the krona.

In recent years, the krona has strengthened in trade-weighted terms, but in a historical perspective the krona is not particularly strong. The Riksbank's assessment is that the real value of the krona is now in the weaker part of a reasonable long-term interval and it will therefore probably strengthen somewhat in the coming years.

The Riksbank does not have a target for the exchange rate, but the exchange rate affects inflation and developments in the real economy. A strengthening of the exchange rate will contribute to lower import prices and thus lower inflation, at the same time as resource utilisation decreases. A weakening instead tends to push up the inflation rate and resource utilisation. Monetary policy therefore reacts to changes in the exchange rate to the extent that these affect the forecasts for economic developments.

The future development of the exchange rate is thus an important factor in the Riksbank's forecasting work. It is necessary in this context to distinguish between the nominal and real exchange rates, that is, the nominal exchange rate adjusted for the relative price level in Sweden compared with other countries. Like other real quantities, the real exchange rate is determined in the long run by real factors, such as households' preferences and the development of productivity in the economy, and is not affected by monetary policy. The Riksbank's forecasts therefore need to be based on an assessment of how the real exchange rate can be expected to develop in the long run and how this level relates to the current level.

Purchasing power parity and the very long run

Although the krona has strengthened in recent years, it is not markedly strong in real terms in relation to the most important currencies. Figure A23 gives a very long-run perspective of 100 years of the bilateral krona exchange rate with regard to the US dollar. In nominal terms, the krona has weakened against the dollar, but this has been counteracted by the fact that inflation has been higher in Sweden than in the United States, so that the real exchange rate is in principle the same today as it was 100 years ago. This observation is compatible with the theory of relative purchasing power parity, which means that the relative price of a basket of goods should remain constant over time between countries and that the real exchange rate should not show any particular trend.[36]

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[36] The concept of purchasing power parity was introduced by the Swedish economist Gustav Cassel almost one hundred years ago. G. Cassel, *The World's Money Problems*, E.P. Dutton and Co., 1921 and G. Cassel, *Money and Foreign Exchange after 1914*, MacMillan, 1922. For a review of the research into purchasing power parity, see for instance K. A. Froot and K. Rogoff "Perspectives on PPP and Long-run Real Exchange Rates" in G.M. Grossman and K. Rogoff (ed), *Handbook of International Economics Vol. 3*, Elsevier, 1995.

To capture how the Swedish economy is affected by the rest of the world as a whole, the Riksbank's exchange rate analyses focus on trade-weighted exchange rate indices rather than individual currencies. Figure A24 shows the real and nominal exchange rates according to two different indices, KIX and TCW, since 1993, that is, during the period with a floating exchange rate. The difference between the two indices is that the KIX weights are updated regularly, so that KIX captures, for instance, the increased significance of the emerging markets. For example, the BRIC countries (Brazil, Russia, India and China) together now have a weight of just over 10 per cent in KIX, while they are not included in the TCW-weighted index.[37]

The theory of relative purchasing power parity appears to describe the krona exchange rate fairly well, even with regard to the trade-weighted indices; neither the real KIX nor the TCW show any clear trend, and the most recent outcomes are close to their respective averages since 1993. Although the nominal KIX-weighted exchange rate index has been volatile, it has nevertheless showed a strengthening trend since the start of 1993. According to KIX, the krona is therefore only slightly weaker today than before it began to float. During the same period, however, the krona has weakened in nominal terms against several large currencies. For example, the krona is currently weaker both in relation to the US dollar and the euro/ecu, compared with November 1992. The reason for the strengthening trend in the nominal KIX since 1993 is that some smaller currencies have weakened substantially against the krona. This applies, for instance, to the currencies of Brazil, Turkey and Mexico. These countries had very high inflation in the 1990s. As these currencies are not included in the TCW index, the nominal TCW-weighted index does not show the same strengthening trend.

Lasting changes in the long-term real exchange rate

Although the theory of relative purchasing power parity appears to hold for the bilateral exchange rate against the dollar, and also in trade-weighted terms, the real exchange rate may show trends in the long run. A common theme for theories that try to explain this phenomenon is that the real exchange rate is stronger in "rich" countries. An example of such a theory is the Balassa–Samuelson effect, according to which the real exchange rate strengthens in economies that show a faster growth in productivity.[38] Economic growth is often driven by productivity growth in the goods sector. As productivity normally develops more slowly in the services sector, wages can only rise as much in that sector if prices of services rise. This means that prices in the whole economy rise, and the real exchange rate strengthens.

Empirical models that estimate the long-term real exchange rate are often based on this theory, and often use relative GDP developments, the net external position (a country's assets minus liabilities in relation to

Figure A24. Nominal and real competition-weighted exchange rate
Index, 18 November 1992 = 100

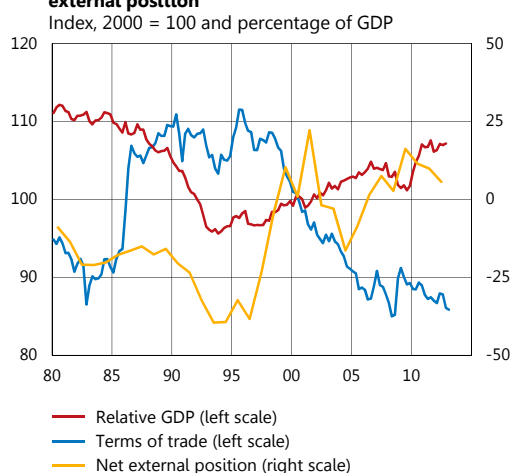Nominal KIX
Real KIX
Nominal TCW
Real TCW
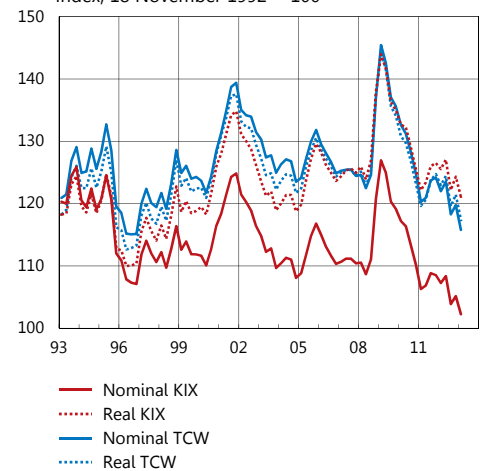
Note. The real TCW has been calculated using Swedish and TCW-weighted CPI for the period 1970-1980, after that Swedish CPIF and TCW-weighted CPI have been used. Real KIX has been calculated using KIX-weighted CPI and Swedish CPIF. Real KIX has been normalised to the same level as real TCW in Q1 1993.

Sources: Statistics Sweden and the Riksbank

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[37] See KIX index better reflects Sweden's international dependence. Article in *Monetary Policy Report*, October 2012. Sveriges Riksbank.
[38] This is also sometimes called the Harrod-Balassa-Samuelson effect. See R. Harrod, *International Economics*, Cambridge University Press, 1933, B. Balassa, "The Purchasing Power Parity Doctrine: a Reappraisal", *Journal of Political Economy* 72 (6), pp. 584-596, 1964 and P.A. Samuelson, "Theoretical Notes on Trade Problems", *Review of Economics and Statistics* 46 (2), pp. 145-154, 1964.
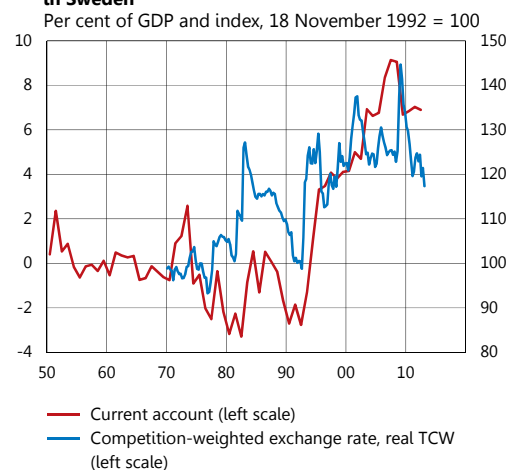
Figure A25. Relative GDP, terms of trade and net external position
Index, 2000 = 100 and percentage of GDP

- Relative GDP (left scale)
- Terms of trade (left scale)
- Net external position (right scale)

Note. International GDP refers to KIX-weighted GDP.
Sources: Statistics Sweden and the Riksbank

Figure A26. Current account and real exchange rate in Sweden
Per cent of GDP and index, 18 November 1992 = 100

- Current account (left scale)
- Competition-weighted exchange rate, real TCW (left scale)

Source: Reuters EcoWin

other countries) and terms of trade (the relationship between export prices and import prices expressed in Swedish krona) as measures of how rich the various countries are.[39] An increase in any of these variables would, according to the theory, lead to a strengthening of the real exchange rate.[40] Figure A25 shows developments in these three variables for Sweden since 1980. The Swedish terms of trade have shown a downward trend since the turn of the millennium. The reason is that prices of imported oil products have risen, at the same time as prices of, for instance, exported telecom goods have fallen. According to the theory, this should lead to a weaker real exchange rate. On the other hand, Swedish GDP during the same period has increased faster than GDP abroad, which should lead to a stronger real exchange rate. The net external position has been relatively stable. These three measures thus do not give any clear signals regarding the long-run development of the krona exchange rate.

Exchange rate and current account surplus

The balance on the current account is another important variable that is used to understand the long-term development of the real exchange rate. Since the changeover to a floating exchange rate, the surplus on the Swedish current account has corresponded on average to 5 per cent of GDP (see Figure A26). This is a large surplus in international terms and stands in sharp contrast to the small surpluses and deficits in the current account during the fixed exchange rate regime of the 1970s and 1980s. The large surplus under the floating exchange rate regime is connected to a real exchange rate that is in TCW-weighted terms on average 17 per cent weaker than in the 1970s and 1980s (see Figure A26).

The long-lasting surplus on the current account may indicate that the krona will strengthen going forward. However, the current account balance need not necessarily be at zero in a long-term equilibrium. This is because it reflects the difference between domestic saving and investment. Investment has been low for a number of years. Several reforms in Sweden, such as the introduction of the surplus target for public finances and the reform of the pension system, have caused saving to increase. This indicates that Sweden may have a current account surplus even in the longer run.

Different views of the long-term real exchange rate level

The Riksbank's assessment of the long-term level for the real exchange rate is based on models relating the real exchange rate to four macro variables, relative GDP, the terms of trade, the net external position and the current account balance. Similar methods are used by the International Monetary Fund (IMF), the European Central Bank (ECB) and the European Commission.[41]

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[39]See, for instance, Lagerwall, Björn and Nessén, Marianne, The long-term developments of the krona. *Economic Commentary* no. 6, 2009. Sveriges Riksbank and Sellin, Peter (2007), Using a New Open Economy Macroeconomics model to make real and nominal exchange rate forecasts, *Working Paper* no. 213, Sveriges Riksbank.
[40] See P. R. Lane and G. M. Milesi-Ferretti, "The Transfer Problem Revisited: Net Foreign Assets and Real Exchange Rates", *Review of Economics and Statistics* 86 (4), pp. 841-857, 2004.
[41] Lee, J, Milesi-Ferretti, G.M., Ostry, J., Prato, A. and L Ricci, "Exchange Rate Assessments: CGER Methodologies", Occasional Paper no. 261, IMF, 2008, Bussière, M., Ca'Zorzi, M., Chudik, A. and A. Dieppe, "Methodological Advancements in the Assessment of Equilibrium Exchange Rates", Working Paper no. 1151, ECB, 2010 and Salto, M and A Turrini, "Comparing Alternative Methodologies for Real Exchange Rate

Table A3 shows some different estimates of the Swedish real exchange rate's long-term level made by different analysts.[42]

Table A3. Long-term competition-weighted real exchange rate according to different estimates
KIX, Index, 18 November 1992 = 100

Date	Assessor/method	Long-term real exchange rate.
Autumn 2011	IMF	102-117
Spring 2012	IMF	95-109
April 2012	IMF	95-131
March 2012	National Institute of Economic Research (NIER)	111
March 2013	Sveriges Riksbank's model estimate (according to Sellin, 2007)	122
March 2013	Purchasing power parity (average 1993 Q1 – 2013 Q1)	124

Note. The estimates concerning the IMF and the NIER are calculated on the basis of their published deviations and the real KIX-weighted exchange rate level on the date of publication.

Sources: The IMF, Statistics Sweden and the Riksbank.

The table shows that there is considerable uncertainty over the long-term level of the real exchange rate. For example, the IMF's various model estimates are between 95 and 131, thus much stronger and somewhat weaker than the current level. However, most estimates indicate that the long-term level is somewhat stronger than the current level. On the basis of these estimates, the Riksbank assesses that a reasonable interval for the long-term level of the real exchange rate is currently between 110 and 125 in terms of KIX. The krona is currently in the weaker part of this interval and therefore close to its long-term level, but will probably strengthen somewhat in the coming period. This assessment is also in line with the IMF, which recently drew the conclusion that the krona is still slightly under-valued, but close to its long-term level.[43]

The future development of the krona

The Riksbank's assessment is thus that the krona will strengthen marginally in real terms over the coming years (see Figure A27). As inflation during the same period is expected to be higher in the KIX-weighted rest of the world than in Sweden (measured in terms of the CPIF), the nominal exchange rate will strengthen somewhat more than the real exchange rate (see Figure 1:12). However, the value of the krona in relation to individual currencies may differ.

Figure A27. KIX-weighted real exchange rate
Index, 18 November 1992 = 100
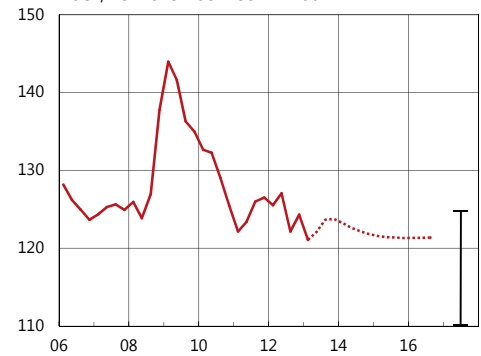
Note. The vertical line marks the interval for the Riksbank's assessment of the real exchange rate's long-run sustainable level. KIX is an aggregate of countries that are important for Sweden's international transactions.

Sources: National sources, Statistics Sweden and the Riksbank

Assessment," Economic Papers no. 427, European Commission, 2010. The IMF's methods are often called CGERs (Consultative Group on Exchange Rate issues) and have recently been replaced by EBA (External Balance Assessment), see "External Balance Assessment (EBA): "Technical Background of the Pilot Methodology", available at http://www.imf.org/external/np/res/eba/
[42] "Swedish Economy: A long-term scenario up to the year 2035" Special study no. 30, National Institute of Economic Research, 2012, "Sweden, 2012 Article IV Consultation", Country Report no. 12/154, IMF, 2012 and Sellin, Peter (2007), "Using a New Open Economy Macroeconomics model to make real and nominal exchange rate forecasts", *Working Paper* no. 213, Sveriges Riksbank.
[43] "Sweden – 2013 Article IV Consultation: Concluding Statement of the Mission", IMF, 31 May 2013.