

Sweden / FX / Inflation

The krona has weakened, but it is not particularly weak

As the krona plunged to its weakest since the financial crisis, the exchange rate debate quickly spiralled. Media stories discussed the role of the Riksbank's monetary policy, how general risk aversion is hitting small open economies and how global uncertainty is high. But the debate has not stopped there: hypotheses are being treated as truths and remain unchallenged. What if the krona has weakened but should not be regarded to be particularly weak? After revisiting the fundamentals behind exchange rate trends and discussing the statistical pitfalls of comparing price data in different countries, we conclude that a significant part of the trend-weakening of the krona over the past decade can be explained by inflation rising faster in Sweden. As a consequence, the krona's undervaluation is not as sizeable as many have argued and our new fair value assessments are for a weaker krona than we previously estimated.

Is the krona undervalued?¹

There is a widespread consensus that the krona is deeply undervalued and the depreciation of recent years is connected to the Riksbank's expansionary monetary policy. The fact that the krona weakened against the dollar is not so strange, considering that interest rates are higher in the US. But that the krona has weakened as much as it has done against the euro is more difficult to explain by the Riksbank's monetary policy. The ECB has a lower policy rate than Sweden and sends softer signals about future monetary policy than the Riksbank does. Other explanations for the weakening of the krona are that small open economies, such as Sweden, usually see their currencies weaken when global uncertainty is high. That can probably explain part of the weakening of the krona this year, but it cannot explain the trend-weakening of the krona over the past decade.

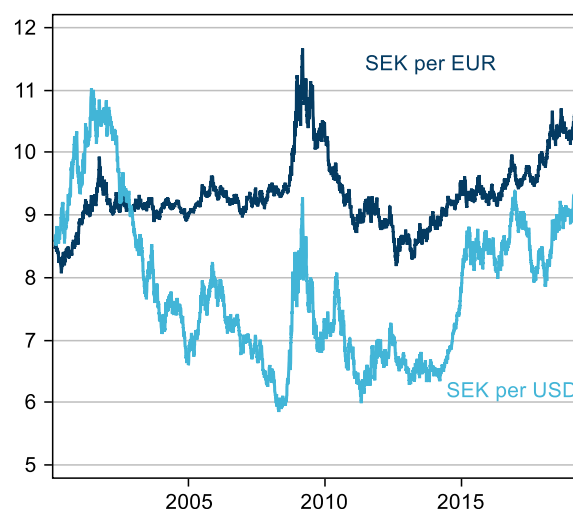
Or is the strength of SEK overestimated?

The current debate about the weak krona is not unique. The Riksbank and most economists have concluded that the krona has been consistently undervalued over the past 20 years. For example, in the early 2000s, when the krona was stable at just over SEK 9 per euro for several years, the consensus was that krona was undervalued and that the krona accession rate would have been around SEK 8.60-8.80 per euro if Swedes had voted to join the euro. Even after the krona strengthened sharply against the euro during the debt crisis of 2012–2013, the Riksbank and most economists estimated that the krona was somewhat undervalued.

¹ A currency is considered undervalued when its value is less than it "should" be, based on long-term economic

Overall, it indicates that the underlying strength of the krona has been overestimated and that a significant part of the trend-weakening of the krona over the past decade is likely to be due to structural factors. Consequently, the krona's undervaluation is not as sizeable as many have thought.

Structural factors behind weaker SEK?



Source: Macrobond

The drivers of exchange rates

The exchange rate is a relative price and is influenced by basic supply and demand factors. In the short term, the exchange rate tends to be driven primarily by capital flows and cyclical factors, such as relative economic cycles and differences in interest rates. In the long run, the exchange rate is anchored

conditions. In such a case, the currency should strengthen when temporary factors, such as interest rate differentials and global uncertainty, blow off.

by more sluggish trends, determined by 1) structural factors, such as relative productivity, the terms of trade and current account, and 2) average inflation relative to trading partners.

Box I: Framework of exchange rate determinants

Short term

- Interest rate differentials
- Relative business cycle
- Uncertainty

Long term (equilibrium, five years ahead)

- Structural factors such as relative productivity, current account and terms of trade
- Average inflation relative to trading partners

The weakening of the krona in recent years is difficult to explain with structural factors, such as productivity and the current account. The consensus view has therefore been that the weakening of the krona in recent years is due to the krona being undervalued. For example, based on an approach in which the real equilibrium exchange rate is determined by relative productivity, the terms of trade and the current account, we estimated in January that the SEK was undervalued and that fair value estimates were 7.5 for USD/SEK and 9.5 for EUR/SEK.²

But what about the last of the determinants in our exchange rate analysis framework, relative inflation? Is the mainstream practice of using consumer price indices (CPIs) straightforward or are the conclusions in the above analysis sensitive to the choice of inflation measure?³

Mainstream real exchange rate estimates flawed

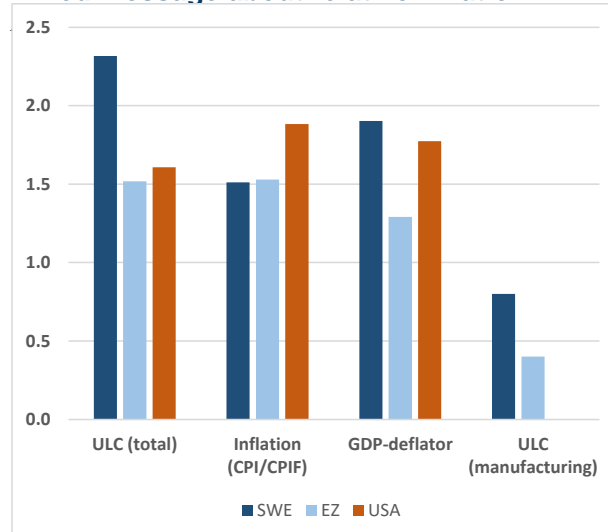
Over time, the nominal exchange rate tends to be affected by changes in the relative inflation between countries (see Box II: The A-B-C of PPP). In recent years, headline inflation in Sweden has been broadly similar compared to its important trading partners, such as the eurozone economies. It therefore appears that the weakening of the nominal exchange rate has gone hand-in-hand with a weakening real rate (i.e. the nominal exchange rate adjusted for the relative price level in one country compared with other countries). However, using a broader range of inflation data, we conclude that the real exchange rate has not been as weak as generally judged by

economists applying the standard CPI-based calculation. That in turn helps explain the recurring pattern of analysts, including ourselves, saying the krona is undervalued and will strengthen, only for those predictions to turn out to be wrong, again and again.⁴

As we will show, the calculation of the real rate is actually more of an estimation, because we do not exactly know the price level nor inflation rate of countries.

In the case of Sweden, the mainstream CPI-based real rate appears to have given biased results for several years now, thereby causing, rather than curbing, the misinterpretation of exchange rates. To illustrate, we look at the developments of recent years. After increasing at the same rate in Sweden and the eurozone, CPIs are an exception. In contrast, GDP deflators and unit labour costs (ULC) indicate relatively fast inflation in Sweden (see graph). Finally, PPP statistics signal faster inflation and a higher price level than in the eurozone.

Mixed message about relative inflation



Note: . ULC refers to unit labour costs

Source: Macrobond.

Weakened, but not as weak as thought

So what do we know about the price measures to help us better pin down the real exchange rate? Maybe not enough to pick one gold standard. Instead, a broad-based approach is preferable, we conclude. Given the mixed messages about relative inflation in recent years, the ranges of real exchange

rate, such as real interest rates, are also affected. This, in turn, can affect, for example, consumption and investment decisions and the Riksbank's ability to assess the efficiency of monetary policy.

² See Handelsbanken (2019).

³ Throughout this analysis, CPI refers to CPIF in the case of Sweden, i.e. headline CPI with fixed interest rate.

⁴ If there is great uncertainty about the true inflation trend, other macroeconomic variables than the exchange

rate estimates are wide (see graphs). In general, the krona has weakened over the past couple of years, but, compared to the euro, it is unclear whether the krona is particularly weak.

Box II: The A-B-C of PPP

According to the economic theory of purchasing power parity (PPP), the nominal exchange rate should, to some extent, mirror the relative price level between countries.

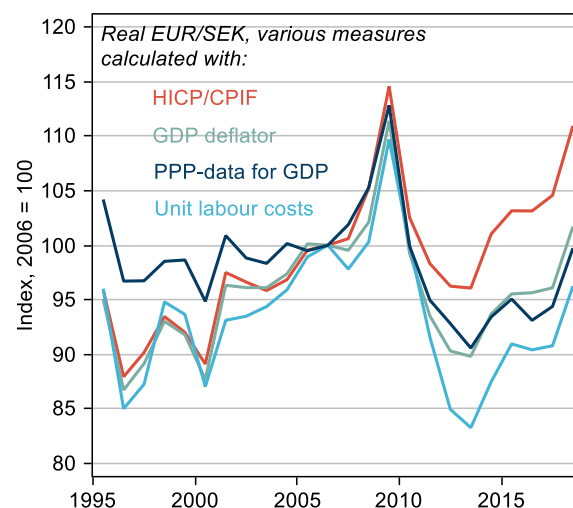
- **Absolute PPP**, the stronger theory prediction, says the price for a basket of products (e.g. one unit of GDP) will be the same, regardless if it is purchased at home, in domestic currency, or abroad, via the exchange rate. This *law of one price* means the real exchange rate will be equal to one.
- **Relative PPP** is a weaker, more realistic statement of the theory that says *changes* in the relative prices of goods and services between countries can be expected to lead to adjustments in the nominal exchange rate. That is, the real exchange rate will be constant over time if none of the structural drivers cause changes.
- Relative PPP means that if two countries have different inflation targets (or average inflation), the nominal exchange rate should compensate by weakening in the country with higher inflation. In Sweden, the trend-weakening of the krona during the 1970s and 1980s can mainly be explained by inflation being higher than in many European countries.
- In practice, adjustments in the nominal exchange rate do not necessarily happen instantaneously.

More on PPP in Obstfeld and Rogoff (1996), pp. 200-202.

Why is it so hard to choose one price measure to rely on? And why play down CPI-based real rates? After all, they have been mainstream practice for a long time. Consider the following arguments.

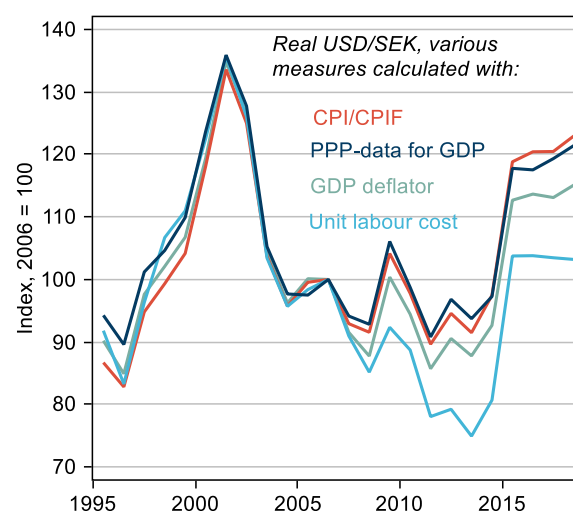
- **CPI:s** 1) cover only part of the economy (i.e. households), 2) are not very suitable for comparisons between countries (see Annex A: Why is it so tricky to compare CPIs in different countries?) and 3) are not actual levels denominated in currency, such as krona, euro or pounds, that can be directly matched against the exchange rate. A positive is that CPIs are important statistics in their own right, not least because of the regimes of inflation-targeting central banks, and are therefore prioritised by statistics bureaus.

Weakened, but not weak?



Sources: Handelsbanken, OECD, Eurostat and Macrobond

Krona has suffered against the dollar

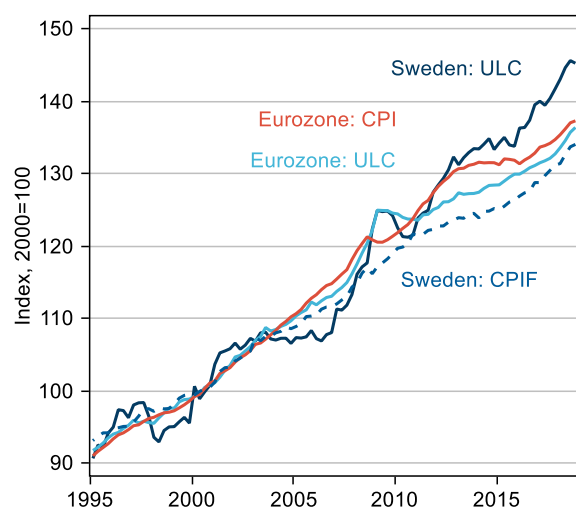


Sources: Handelsbanken, OECD, Eurostat and Macrobond

- **GDP deflators** are broader price measures than CPIs, but are partly based on uncertain “prices”, such as approximations for non-market products comprising costs such as wages. Similarly to CPI, the GDP deflator does not show the price level.
- **Unit labour costs (ULC)** is another variable from the national accounts, sharing many characteristics with the GDP deflator. ULC is a good indicator of firms’ marginal costs and tends to coincide with the general price trend in the economy over the long term. But in recent years, ULC has risen faster than consumer prices in Sweden, and considerably faster than ULC in the eurozone and the US (see graph). Higher ULC inflation for the entire economy and

the manufacturing industry is driven by labour costs increasing faster in Sweden while productivity growth is the same as in the eurozone.

ULC in Sweden outpacing the eurozone



Source: Macrobond

- Finally, **PPP statistics** may appear to offer the ultimate solution to the problem of flawed price level measures in real rate estimation. But the name deceives: PPPs are constructed as suggested by the economic theory described in Box II, by measuring the prices for a wide range of identical goods and services in different countries.⁵ The result is a measure of the relative price level. For example, in 2018, the equivalent quantity of one euro's worth of eurozone GDP cost SEK 12.26 when those goods and services were purchased from Swedish GDP instead.⁶ But responsible institutions Eurostat and OECD warn that PPPs are still not perfectly suited to analyse currency valuation, because many included prices come from domestically-traded products, as markets are not fully open to the outside world.⁷ Apart from that caveat, there are also practical problems: most prices are collected only every third year, so, for the years in between, PPPs are simply interpolations. That

⁵ See Bournot et al (2011) and OECD (2012).

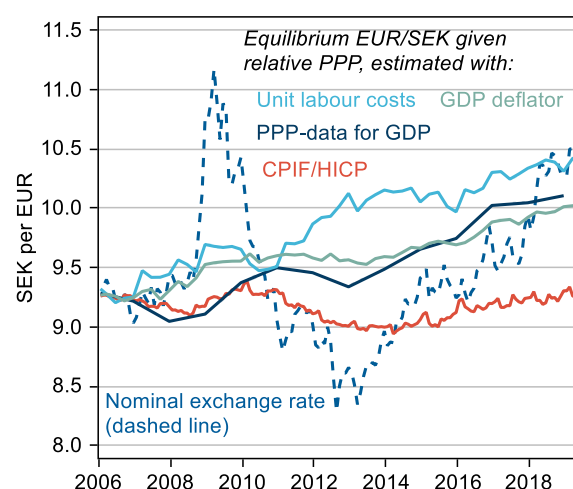
⁶ Or, put another way, if a) absolute PPP holds and b) the available PPP data gave a correct measure of relative price levels, then the krona is overvalued and should be expected to weaken to 12.26 against the euro. However, it is well established that absolute PPP does not hold (Obstfeld and Rogoff, 1996). Still, the line of thought sometimes shows up in analysis, likely decreasing the accuracy of the conclusions. Bloomberg (2019) risks underestimating the long-term strength in the USD and

hampers exchange rate analysis (e.g. estimation of the equilibrium and real-time interpretation of developments).

Equilibrium krona level has weakened

The trend-weakening of the krona, from SEK 9 per euro before the financial crisis to today's level of around SEK 10.7 per euro, can be largely explained by prices rising faster in Sweden. The real exchange rate in terms of ULC or PPP data, are now at the same level as before the financial crisis, which indicates that undervaluation is not as sizeable as we have previously believed.

Weaker equilibrium level



Note: Base year for equilibrium is 2006, with EUR/SEK at 9.25.
Sources: Handelsbanken, OECD, Eurostat and Macrobond

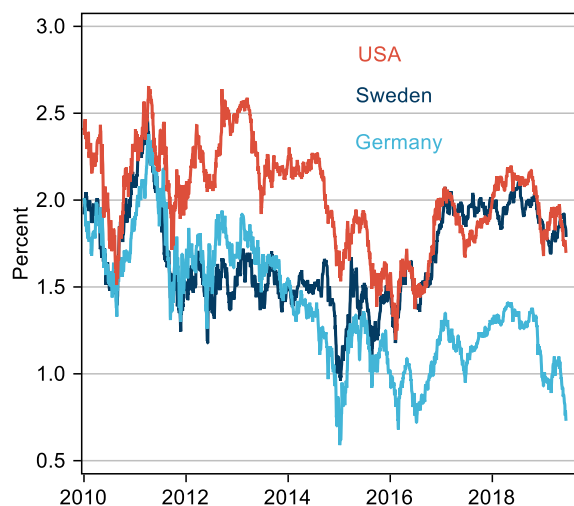
Our previous estimate of the krona's equilibrium rate indicated that the krona was close to equilibrium in 2005-07. Furthermore, most structural factors indicate that the real exchange rate has been relatively stable in recent years. Among other things, productivity has increased in line with the eurozone and terms of trade have been relatively stable. However, a large current account surplus indicates that the real exchange rate would strengthen. Our previous estimate, based on the real exchange rate in CPI terms, indicates that the real krona has weakened somewhat against the euro in the past decade. Thus, it

even uses the absolute PPP valuation estimate in its headline. Capital Economics (2019) raises the question of how weak the krona really is by referring to a few indicators. Among them, PPP data, which it uses for valuation through (without acknowledging it) the absolute PPP theory.

⁷ See OECD (2017), which also discusses how PPP statistics compare to the Economist's Big Mac Index.

implies that the krona equilibrium should be somewhat weaker than the relative PPP estimates. Overall, it indicates that the krona equilibrium is now around 9.5–10.7 against the euro, depending on which price measure is used, compared to just over 9 before the financial crisis.⁸

Low inflation expectations in Germany



Source: Macrobond

Our overall assessment is that the EUR/SEK equilibrium is now around 10. Moreover, consumer price inflation (inflation expectations) and unit labour costs are projected to continue to increase more rapidly in Sweden compared to the eurozone over the next few years. We therefore judge that the krona equilibrium will continue to weaken against the euro somewhat in the next few years.

EUR/SEK equilibrium rate

Estimate	2018
Handelsbanken, old estimate	9.5
Consumer prices*	9.2
ULC*	10.4
PPP data for GDP*	10.1
GDP deflator*	10.0
Handelsbanken, new estimate	10.0

Note: *Equilibrium EUR/SEK given relative PPP. Base year for equilibrium is 2006, with EUR/SEK at 9.25
Source: Handelsbanken.

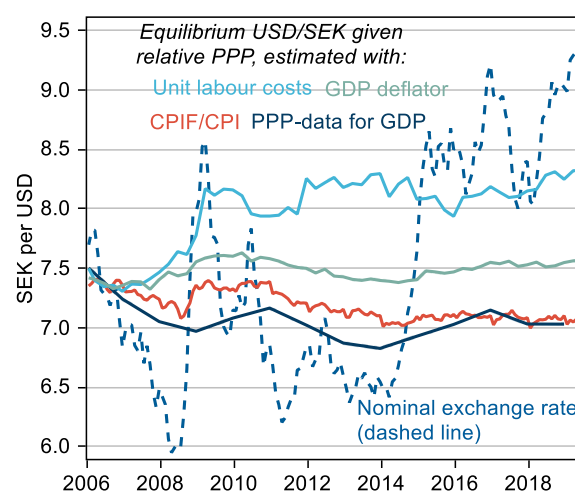
We still believe that the krona is more clearly undervalued against the dollar. The krona's trend weakening against the dollar cannot be explained by higher inflation in Sweden according to most price measures (except relative ULC data). But our previous estimate, based on the real exchange rate in CPI terms, suggests that the real krona has weakened against the dollar somewhat in the past decade. Thus, it implies that the krona equilibrium should be somewhat weaker against the dollar than the relative PPP estimates indicate. *Our overall assessment is that the USD/SEK equilibrium is now around 8.0.*

USD/SEK equilibrium rate

Estimate	2018
Handelsbanken, old estimate	7.5
Consumer prices*	7.1
Unit labour cost (total)*	8.2
PPP data for GDP*	7.0
GDP deflator*	7.5
Handelsbanken, new estimate	8.0

Note: *Equilibrium USD/SEK given relative PPP. Base year for equilibrium is 2006, with EUR/SEK at 7.37
Source: Handelsbanken.

USD/SEK equilibrium estimates mixed



Note: Base year for equilibrium is 2006, with USD/SEK at 7.37.
Sources: Handelsbanken, OECD, Eurostat and Macrobond

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⁸ Note that we have used PPP data for GDP. Using PPPs for private consumption or actual individual consumption would give similar results. If anything, the alternative PPPs signal a marginally weaker krona.

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Annex A: Why is it so tricky to compare CPIs in different countries?

CPIs are known mostly as inflation measures (i.e. for gauging the change in the general price level in a country). But CPIs actually give the consumer's perspective, rather than being general.⁹

The first obstacle for international comparisons of CPIs arise because households' consumption baskets differ widely between countries. One explanation is of course preferences. Another is variations in the institutional set up (e.g. Sweden's model means that households hardly purchase any healthcare, because it is paid for via taxes).

A second obstacle is domestic considerations (e.g. Sweden's tradition of setting up its CPI as a cost-of-living index), resulting in a different index formula than for some other CPIs. Also, Swedish CPI includes a somewhat unorthodox component of owner-occupied housing costs, based on housing prices and mortgage rates.

Finally, the third obstacle is down to under-the-radar methodology differences. Even using Eurostat's Harmonised Indices of Consumer Prices (HICP), one does not escape the domestic considerations fully. The standardisation of definitions is greater than among domestic CPIs and is increasing over time, but there is still ample room for statistics bureaus to pick among methods, decide on sampling, etc. In Sweden, quality adjustment (QA) has on-and-off been getting a lot of attention. In fact, ever since the Riksbank last year noted that PPPs indicate relatively faster Swedish price level rises than CPI or HICP comparisons do, a dominant hypothesis among economists has been that QA is to blame.¹⁰

So what is QA and why does it matter? When a new product is introduced and is to be included in CPI measurements, the question arises if it is comparable to previous products in its category. If it is, then any potential price difference is to be considered a change in price. If not, then some of the price difference should be considered as compensation for a change in quality, rather than price, and not affect aggregated CPI inflation.

Consider a stylised example that underscores the need for QA in inflation measurement: A cereal brand changes its packaging, thereby decreasing the net weight in the packet from 500 to 450 grams.

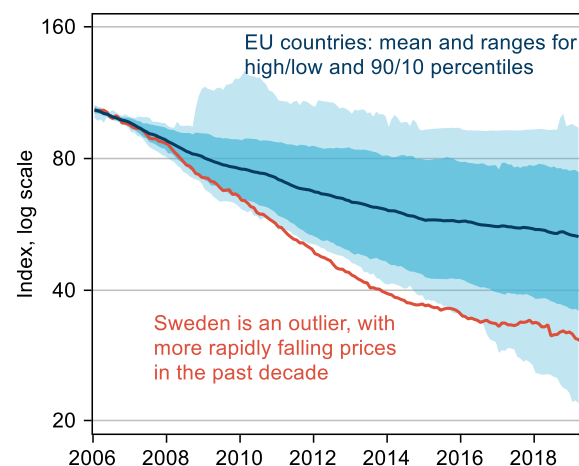
⁹ See Eurostat (2019).

¹⁰ In an exchange rate analysis, the Riksbank highlighted the alternative signal from PPPs, but refrained from drawing far-reaching conclusions about the krona. See Riksbank (2018), pp. 36-39. An analyst meeting at the

The price per package remains the same, implying a price increase of more than 10 percent, adjusted for quality (decrease in packet weight).

In reality, a couple of CPI components have attracted extra attention in Sweden, not least consumer electronics. Price trends for such goods in Sweden have been among the weakest in Europe, raising many questions. Typically, users of statistics are suspicious about the choice of QA methods, as the same brands of laptops and TVs are sold all over the world. How can the price falls be so fast in Sweden if not for overly large QA? Naturally, there are many potential economic explanations for diverging prices, such as changing competition in the local market, swings in the exchange rate, etc. The fact of the matter appears to be that we do not fully know which countries are using QA in the best way. So what do we know?

Consumer electronics fall in price



Note: Consumer electronics refers to the HICP component "Audio-visual, photographic & info processing equipment".
Sources: Eurostat and Macrobond

There is no comprehensive overview of current QA problems in CPIs, but there are signs that QA can cause international comparison problems and inflation bias. First, a Eurostat working group has showed that the choice of QA method (and other methodological differences) appears to have resulted in falsely diverging HICP car price indices in the EU.¹¹ Second, ECB staff have suggested that sub-optimal choices of QA methods may have resulted in a downward bias in EU inflation, adding to the so-called "missing inflation puzzle" after the GFC.¹²

Riksbank in May, discussed if QA is a source of potential downward bias in Swedish relative CPI inflation

¹¹ See European Commission (2017).

¹² See Goldhammer, B. et al (2019).

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