Memorandum

DATE:	18 September 2023
DEPARTMENT:	Markets Department, Financial Stability Department and Monetary Policy Department
DOCUMENT CLASSIFICATION:	RB PUBLIC

SVERIGES RIKSBANK
SE-103 37 Stockholm
(Brunkebergstorg 11)

Tel +46 8 787 00 00
Fax +46 8 21 05 31
registratorn@riksbank.se
www.riksbank.se

DNR 2023-00863

Inquiry into how currency risk can be reduced

Summary

On 28 June 2023, the Executive Board decided that the Riksbank should investigate the conditions for reducing currency risk within the framework of asset management, with one possible measure being to hedge part of the foreign exchange (FX) reserves on the market.

The matter has since been investigated and this work has resulted in a proposal that, briefly, is based on the Riksbank reducing currency risk by hedging the FX reserves by selling USD 8 billion and EUR 2 billion against SEK. This corresponds to about one-quarter of the FX reserves. The sale of foreign exchange will be financed by the Riksbank rolling FX swaps forward by the same amount so that the size of the FX reserves is maintained.

The Markets Department has operational readiness to conduct hedging, which should be initiated as soon as possible. The inquiry has resulted in a main proposal that the sale of dollars and euro should be spread over a period of four to six months. The sale should take market conditions into account and without counteracting the Riksbank's objectives and other tasks.

Introduction

The Riksbank, like most other central banks, holds FX reserves to be able to perform its statutory tasks. The FX reserves shall be used to provide temporary liquidity support to banks operating in Sweden, to intervene in the FX market and fulfil Sweden's part in the IMF's international lending. As per 31 August 2023, the value of the FX reserves amounted to just over SEK 430 billion.

To ensure the Riksbank has ample preparedness to use the FX reserves, it consists mainly of assets in such currencies required to be able to be used for the purposes above. The FX reserves further consist of assets that can be rapidly converted into liquid funds, mainly government bonds in US dollars and euro.

According to Chapter 9, Section 1 of the Sveriges Riksbank Act (2022:1568), the Riksbank shall manage its assets in order to fulfil its tasks and powers and generate sufficient income to finance its activities. The assets in the FX reserves shall be managed at low risk, taking into account the Riksbank's status as a central bank and the purpose of the asset holdings. Within this level of risk, the Riksbank should strive to achieve a reasonable return on its investments. It is up to the Riksbank to make an independent assessment of how the strategy for the management of the FX reserves is to be designed and how it can be changed without violating the purpose and principles of asset management.[1]

The Riksbank should reduce currency risk

The value of the FX reserves in Swedish kronor is affected by changes in market prices such as exchange rates and interest rates. A depreciation of the krona causes the FX reserves to increase in value while an appreciation of the krona instead leads to a reduction in the value of the reserves. The latter exposes the Riksbank to currency risk. Currency risk constitutes a large share of the Riksbank's total financial risks.

To manage its financial risks, the Riksbank needs to have sufficient loss-absorbing capital to form a buffer against future losses. However, the Riksbank's buffer capital has decreased significantly since the Riksbank reported a large loss in 2022 due to its holdings of bonds in both the Swedish bond portfolio and the FX reserves having decreased in value when bond yields increased substantially. To maintain sound risk management, the Riksbank should reduce currency risk within the framework of asset management. This is particularly the case in light of the Riksbank's assessment that the krona will appreciate in the period ahead.

Hedging should be conducted on the market

One condition of the investigation has been that the size of the FX reserves should be unchanged and that returning to funding part of the FX reserves via the Swedish National Debt Office is not an option. This means that the currency risk should be reduced by hedging on the market or via the Swedish National Debt Office. However, the inquiry has shown that hedging with the Swedish National Debt Office as counterparty can be ruled out as the legal conditions are unclear at present. In other words, currency risk should be reduced through currency hedging on the market.

Currency hedging involves selling foreign exchange and buying kronor, and then rolling FX swaps forward

Currency hedging on the market is achieved by the Riksbank first selling foreign exchange and purchasing kronor. This can take place on a spot or forward basis with maturity date a number of months in the future. Then, when the foreign exchange is to

[1] Compare Chapter 9, Sections 13 and 15 of the Instrument of Government, which states that the Riksbank is responsible for holding and managing FX reserves, and that no authority may determine how the Riksbank shall decide in the management of the FX reserves and that the Riksbank may neither seek nor take instructions from anyone in such issues.

be delivered[2], the Riksbank enters FX swaps. This means that foreign exchange is purchased spot in the amount to be delivered at the same time as the foreign exchange is sold forward. Continually selling foreign exchange forward locks in a certain exchange rate for a certain length of time. This means that the future development of the exchange rate will not affect the return on the currency hedged parts of the FX reserves.

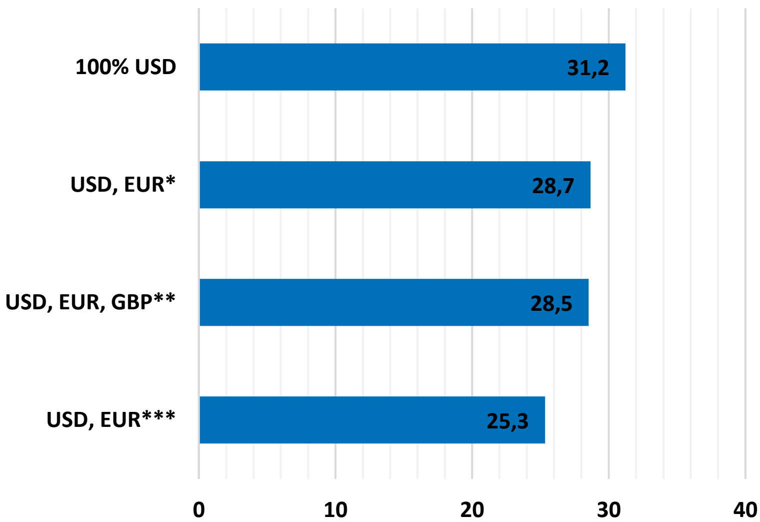
The sale of foreign exchange will be timed so that delivery is focused on a specific date, at which point FX swaps will be used to meet maturities. An FX swap allows the Riksbank to borrow foreign exchange and invest in Swedish kronor. The FX swaps will have a maturity of a number of months and, upon maturity, they will be rolled over with new FX swaps. This brings about matching with the maturity date of the forwards so that the size of the FX reserves does not decrease.

The Riksbank should sell US dollars and euro

The Riksbank needs to decide which currency or currencies will be sold when the FX reserves are hedged. A natural starting point may be to sell all foreign currencies represented in the FX reserves in proportion to their share of the FX reserves. However, there are operational disadvantages to this approach, partly because it will result in transactions in many different currencies and, in several cases, for relatively small amounts. It is therefore more effective to conduct currency hedging by only selling the two currencies in which the Riksbank has the largest holdings: US dollars and euro.

Figure 1 below shows how much risk falls according to the Economic Capital (EC) measure if currency hedging takes place in dollars or in a combination of other currencies. Put simply, EC can be said to measure the maximum loss (Value-at-Risk) that can be expected to occur within a year, given a certain level of confidence.[3]

Figure 1. Risk reduction depending on the currency or currencies sold
SEK billion



[2] In a spot transaction, delivery day takes place two banking days after trade date, while in a forward transaction, it takes place further in the future, on the maturity date of the forward.
[3] The EC measure is based on a probability distribution estimated using historical variances and correlations for financial prices.

*** 78.7% USD, 21.3% EUR (USD 8 bn, EUR 2 bn)**

**** 76% USD, 21% EUR, 3% GBP**

***** 50% USD, 50% EUR**

Note. The figure shows how much risk decreases in SEK billion depending on which currency or currencies hedging takes place in. The measure used is Economic Capital. The calculation was made on 31 August 2023 with a 99.9 per cent confidence level and a one-year time horizon.

If only US dollars are sold, risk in terms of EC decreases by SEK 31.2 billion. If other currencies are also sold, the risk decreases to a lesser extent. This suggests that currency hedging should primarily take place by the Riksbank selling US dollars.

The starting point in this inquiry has been that currency hedging shall cover about one-quarter of the FX reserves or just over SEK 430 billion. On this basis, the proposal is that the Riksbank hedges the FX reserves by selling USD 8 billion and EUR 2 billion. According to exchange rates as per 31 August 2023, this corresponds to 25.6 per cent of the FX reserves, which is to say one-quarter.

Pace of exchange

Average daily turnover on the FX market (spot and forward) in Swedish kronor is reported as about SEK 600 billion according to BIS Triennial Survey.[4] From this perspective, the approaching exchanges from the Riksbank seem very small. However, there is great uncertainty over how turnover statistics should be interpreted and related to the exchanges the Riksbank plans to carry out.

In 2021–2022, the Riksbank carried out purchases of foreign exchange ahead of transitioning to self-financed FX reserves. In the first year, purchases of foreign exchange were made in an amount corresponding to SEK 250 million per day. After this, the Riksbank decided to bring forward the date for when the exchanges were to be finished and the pace was raised to about SEK 650 million per day. This concerned daily amounts that the market was able to manage and the exchanges were carried out according to plan.

Based on previous experiences from foreign exchange purchases, it is deemed possible to turn over a volume corresponding to USD 8 billion and EUR 2 billion over a period of six months on the market.

Flexibility to increase the pace of exchange should be available if possible

The exchanges conducted in 2021–2022 followed a linear pace of exchange with transparent communication, which left little scope for adjustments to the prevailing market situation. As the aim of reducing currency risk differs from that of self-financing the FX reserves, a certain amount of flexibility in both implementation and external communication is appropriate. Before these exchanges are conducted, it would therefore be desirable to have some extra flexibility over the amount and frequency so

[4] Bank for International Settlements (2022), "BIS Triennial Central Bank Survey of Foreign Exchange and Over-the-counter (OTC) Derivatives Markets in 2022".

that market fluctuations can be better met and greater account can be taken of liquidity, depth, sentiment and exchange rate level.

EU payments

Sweden's EU membership entails monthly contributions to the EU budget. These are made by the Swedish National Debt Office in Swedish kronor to a central bank within the euro system. The recipient central bank needs to exchange Swedish kronor into euro and primarily the Riksbank is offered to exchange the amount and then buy kronor via a bilateral FX transaction. The Riksbank can choose to exchange the EU payment to avoid unnecessarily large exchange rate fluctuations.

Sweden's contribution to the EU budget is calculated to amount to SEK 45.9 billion for 2023 and SEK 46.2 billion for 2024. The Riksbank has previously exchanged individual larger EU payments in amounts exceeding SEK 3 billion. When the Riksbank plans to hedge a part of the FX reserves, one possibility could be for the Riksbank to exchange significantly more or perhaps all of these EU payments. This means that the Riksbank buys Swedish kronor against euro corresponding to the EU payment of a central bank within the EU. The Riksbank can thus use EU payments to achieve part of the currency hedge. This allows the hedging to occur more quickly, lowers the transaction costs and, all else equal, the volatility in the krona exchange rate should be reduced.

Proposal for implementation

Riksbank staff have investigated various alternatives and propose that the exchanges take place over a period of four to six months to allow flexibility and utilise EU payments. However, the Riksbank must always take account of prevailing market conditions to avoid risking both disrupting market function and counteracting the Riksbank's objectives and other tasks.

Cost of currency hedging

The currency hedging will entail an increase in the number of transactions in the management of the FX reserves. First, foreign exchange will be sold spot or forward and subsequently, when foreign exchange is to be delivered, FX swaps will be entered into. When the FX swaps mature, they will be rolled over with new swaps and so on.

With each transaction, a transaction cost arises. This cost cannot be observed directly but can be expressed as how good a price was received in the transaction in relation to the bid-ask spread at the time of the transaction. This cost is hard to estimate but the Riksbank generally trades at good prices close to mid (in the middle of the spread), meaning low transaction costs. The size of the transaction cost over time also depends on how the currency hedging will be implemented, for example how often FX swaps will be rolled over, which, in turn, depends on the duration of the swaps.

The effect of currency hedging on return

It is not possible to know in advance how the currency hedging will affect the return on the FX reserves in the long term, other than that the return will become less volatile, meaning that the risk will decrease. However, in the short term, we know that the interest return will be lower as a result of the currency hedging. If the krona then appreciates by more than the interest return decreases, the currency hedging will have had a positive effect on the total return for the FX reserves.[5]

The effect of interest return on the currency hedging

The effect of the currency hedging on interest return is determined by what is known as the forward premium (if positive) or discount (if negative), which is to say the difference between the forward price at which the foreign exchange is sold and the spot rate prevailing at sale date. The forward premium/discount can be divided into two parts:

1. **The interest rate differential**: The difference between the short-term rates in the domestic and foreign currency. If the Riksbank conducts currency hedging, the implicit effect will be that foreign exchange is borrowed at a foreign interest rate and kronor are invested at a Swedish interest rate.
2. **The cross-currency basis**[6]: This is another component that affects the forward premium/discount in addition to the interest differential. The cross-currency basis is primarily caused by imbalances between supply and demand on the market between different currencies.

The difference between the forward exchange rate and the spot exchange rate can be both positive (premium) and negative (discount). If there is a discount, this implies that interest income is becoming lower and vice-versa.

In the short term, interest income will be lower

It is not possible to know how interest income will be affected by the currency hedging in the long term as this depends on the future development of the interest differential and the cross-currency basis. However, we can say that interest income will decrease in the short run, given current pricing on the FX market.

On 31 August, the forward rate for selling dollars for kronor 12 months ahead was about 1.5 per cent below the spot rate.[7] On this basis, interest income would decrease by about SEK 1.3 billion per year with currency hedging in dollars. This is because interest in the US is higher than in Sweden and because the cross-currency basis (which is negative) reduces interest income by about 0.35 per cent.[8]

On the same occasion, the forward rate for selling euro against kronor 12 months ahead was about 0.4 per cent higher than the spot rate.[9] This means that, with currency hedging in euro, interest income would increase by about SEK 80 million per year. This is

---

[5] This can be linked to the uncovered interest rate parity (UIP), which implies that, given certain assumptions, the interest rate spread for a certain maturity period between two countries corresponds to the expected change in the exchange rate over the same period. This means that, according to the UIP, the currency hedging will not affect the return on the FX reserves over time.
[6] The cross-currency basis corresponds to the deviation of the forward exchange rate from CIP (covered interest rate parity).
[7] This is based on a spot rate of 10.95 and a forward discount of –1,617, meaning that the forward rate was 10.7883. The discount is expressed multiplied by 10,000.
[8] The cross-currency basis varies over time but is usually negative between kronor and dollars. So far in 2023, the average has been –29 basis points.
[9] This applies on the basis of a spot rate of 11.87 and a forward premium of 422, which gives a forward rate of 11.9122. The premium is expressed multiplied by 10,000.

due to lower foreign interest compared with Sweden. The cross-currency basis for the euro is only faintly negative (–0.01 per cent) at present.[10]

In total, over the short term, the currency hedging, given current pricing on the FX market, will thus lead to reduced interest income for the FX reserves of about SEK 1.2 billion per year. This applies at present, but how interest income will be affected by the currency hedging in the long term is unknown, partly as this depends on the future development of interest rates.[11]

The total return is then determined by the development of the krona

The effect of the currency hedging on the total return for the FX reserves depends not only on interest income but also on the return on foreign exchange, meaning the development of the krona exchange rate against the US dollar and euro. If the krona appreciates by more than interest income decreases, the currency hedging will make a positive contribution to the return. If the reverse is true and the krona depreciates, the return will be negative due to the currency hedging. The Riksbank's current forecast is that the krona will appreciate in the period ahead. The currency hedging will therefore help mitigate the loss. For example, if the krona were to appreciate to the same level as in early 2022, the FX reserves would decline in value by around SEK 65 billion. In this case, the currency hedging would restrict that loss by about one-quarter.

Accounting result effects

Below follows a review of the effect in the accounts of the transactions made to hedge part of the FX reserves. The calculations have been made using current market prices and may change in the future.

Foreign exchange forward

Following the sale of foreign exchange forward, the reported result will be divided into a currency component and an interest component.

The currency component is reported the same month as the sale takes place and is calculated by multiplying the sale amount by the difference between the market rate upon sale and the average acquisition rate of the sold currency. This means that, if we were to sell the entire amount to be hedged of USD 8 billion and EUR 2 billion in one go, on a day where the USD/SEK rate was 10.95 and the EUR/SEK rate was 11.87, a realised exchange rate gain of about SEK 16 billion would be reported.[12] With a linear exchange pace of six months, this would be a realised gain of about SEK 8.6 billion for the financial result for 2023.

The interest component will be reported linearly, on a daily basis, from sale date to settlement date. The total interest gain from the sale is calculated by multiplying the sale amount by the difference between the market rate at sale and the agreed forward rate. This means that, if we were to sell the entire amount to be hedged of USD 8 billion

[10] In 2023, it has averaged –2 basis points.
[11] The actual maturity periods used in the currency hedging as regards forwards and FX swaps are also significant.
[12] The exchange rate gain is calculated by comparing the rate at which foreign exchange is sold with the average rate at which dollars and euro were acquired. For dollars, that rate is now 9.22 and, for euro, it is 10.76.

and EUR 2 billion in one go, on a day when the USD/SEK rate was 10.95 and the EUR/SEK rate was 11.87, and the agreed forward rate 12 months ahead as per the earlier section was 10.79 and 11.91 respectively, a total of about SEK 1.2 billion would be reported linearly as an interest cost until the maturity date of the forward.

In the balance sheet, an amount corresponding to the realised currency result would reduce the unrealised gains reported in the revaluation account. To this can be added an amount reported under the item Derivative instruments, either on the asset side or on the liability side, which corresponds to the sale amount multiplied by the exchange rate on closing date and the market rate on sale date. This amount is reported using the inverse sign in the revaluation account. When the foreign exchange forward matures, the balance on the dollar and euro account and the liability in Swedish kronor to the banks will decrease, which will be met the same day by an FX swap transaction generating flows in the opposite direction.

FX swap

An FX swap is an agreement to swap one currency for another for a certain period of time and consists of two transactions, a spot transaction and a forward transaction. In an FX swap, therefore, no exchange rate result is reported as the transaction does not involve any actual sale of currency. On the other hand, an interest component is reported linearly, on a daily basis, during the contract's term. The total interest gain is calculated in the same way described for a currency forward above.

In the balance sheet, the spot transaction will increase the balance of the dollar and euro account and, at the same time, the liability in Swedish kronor to the banks will increase, which will be met by the currency forwards maturing. The forward leg of the FX swap is reported under the item Derivative instruments, either on the asset side or on the liability side, in the same way as a currency forward. This amount is reported using the inverse sign in the revaluation account.

Currency hedging in relation to the Riksbank's main tasks

Consequences for the Riksbank's preparedness

Spot transactions, currency forwards and FX swaps commit the Riksbank to supply foreign exchange to their counterparties upon maturity. As long as the swaps can be renewed this is not a problem. However, under serious market conditions, the risk exists that it will be expensive to renew FX swaps or that there will be a lack of counterparties and opportunity to renew them. The Riksbank may then be forced to find other ways of repaying foreign exchange to its counterparties. One possibility would be to sell assets from the FX reserves, meaning that the FX reserves would decrease. Another way would be to purchase foreign exchange against Swedish kronor on the spot market. However, it is not certain that this would be optimal in a strained market scenario.[13] A third way would be for the Riksbank to borrow foreign exchange from the Swedish National Debt

[13] When exchanging on the spot market, the Riksbank sells kronor for foreign exchange. The foreign exchange is used to repay the counterparty in the swap. The consequences of this are (i) that the Swedish krona depreciates, all else being equal, and (ii) the Riksbank's exchange rate risk increases in that a larger part of the FX reserves is again being funded in kronor.

Office.[14] However, this may take longer and lead to an increased central government debt. Overall, currency hedging leads to reduced preparedness in foreign currencies.

A further consequence of currency hedging would be that, all else being equal, it would need to be funded by market participants who would have to raise loans in foreign exchange. The natural market participants for this are the major Swedish banks. In a static impact analysis, it is thus reasonable to assume that the major Swedish banks' liabilities in foreign exchange would increase by an amount corresponding to the Riksbank's currency hedging. The maturity of the liability can be assumed to be the same as the maturity of the FX swaps, which is to say is short-term. The Swedish banks' short-term refinancing needs in foreign exchange would thereby increase.

Currency hedging calculated in kronor corresponds to about SEK 111 billion, which can be compared with the major Swedish banks' short-term wholesale funding in dollars, which amounts to about SEK 1,200 billion for maturities of up to one year and about SEK 500 billion for maturities of up to three months. The maturity of the FX swaps is therefore significant. It may seem like a limited increase of refinancing risk for the banks to have to roll over about SEK 1,300 billion instead of SEK 1,200 billion for a maturity of one year. In contrast, it can be considered a greater increase of refinancing risk if the banks have to roll over SEK 600 billion instead of SEK 500 billion for a maturity of three months.

Marginal impact on monetary policy

The currency hedging serves no monetary policy purpose. Its aim is to reduce the risk on the Riksbank's balance sheet. However, the currency hedging involves the Riksbank entering an agreement to exchange dollars and euro against kronor. This could affect the exchange rate.

Our assessment is that the exchange rate effect of the currency hedging will be marginal. As described above, the exchange concerns relatively small amounts compared with the daily turnover of the FX market in Swedish kronor. At the same time, the exchanges will be spread over time and partly managed via EU payments. In addition, the measures have already been announced to an extent in the press release on this inquiry from 29 June of this year.

The currency hedging will not impede monetary policy. Any exchange rate effects will involve the krona appreciating, which would be an advantage at present in monetary policy terms.

Changes to the financial regulatory framework

In conjunction with the Riksbank starting to hedge the FX reserves, amendments need to be made to the Riksbank's financial risk and investment policy, as well as a few of the underlying regulations. More precisely, this entails amending these documents:

[14] Pursuant to Chapter 10, Section 2 of the Sveriges Riksbank Act, the Riksbank may decide to borrow in foreign exchange for the FX reserves. Total borrowing at the time of a borrowing decision may not exceed five per cent of gross domestic product. Pursuant to Chapter 10, Section 4, the Swedish National Debt Office shall raise loans for the government for this purpose.

- Financial risk and investment policy,
- Regulation for the gold and FX reserves, and
- Regulation for foreign exchange transactions outside of the monetary policy operational framework

There are some central banks that are hedging

The major central banks do not hedge their FX reserves. But there are a few smaller ones that do. The ones we are aware of are Estonia, the Netherlands and New Zealand. Slovenia has also previously hedged its exposure in dollars, but has in the past three years discontinued the currency hedge.

For the euro area countries Estonia and the Netherlands, currency hedging does not apply to the portfolios managed on behalf of the ECB. The ECB's guidelines apply to this administration, and then it is without currency hedging. Eesti Pank hedges some of its FX reserves available for non-monetary policy purposes. The Netherlands hedges most of the currency risk regarding its holdings of government and semi-government bonds in its FX reserves.

New Zealand hedges a certain portion of its FX reserves to strike a balance between the advantages and disadvantages of hedging, given the purpose of the foreign exchange reserve, which for their part is primarily to be able to intervene in the FX market. According to them, the advantage of currency hedging is that in normal times it contributes to a higher return due to the market dynamics in the New Zealand dollar cross-currency basis swap market. Currency hedging thus usually contributes to an increased interest income for them. Hedging also results in lower volatility in returns. However, the disadvantage is that there are potentially large refinancing risks with currency hedging if the currency-hedged part of the foreign exchange reserve needs to be sold in an intervention. In such a situation, it can be difficult to deliver foreign currency in the swaps.