



# SWEDEN

## SELECTED ISSUES

March 2024

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**International Monetary Fund**  
**Washington, D.C.**



# SWEDEN

## SELECTED ISSUES

February 20, 2024

Approved By  
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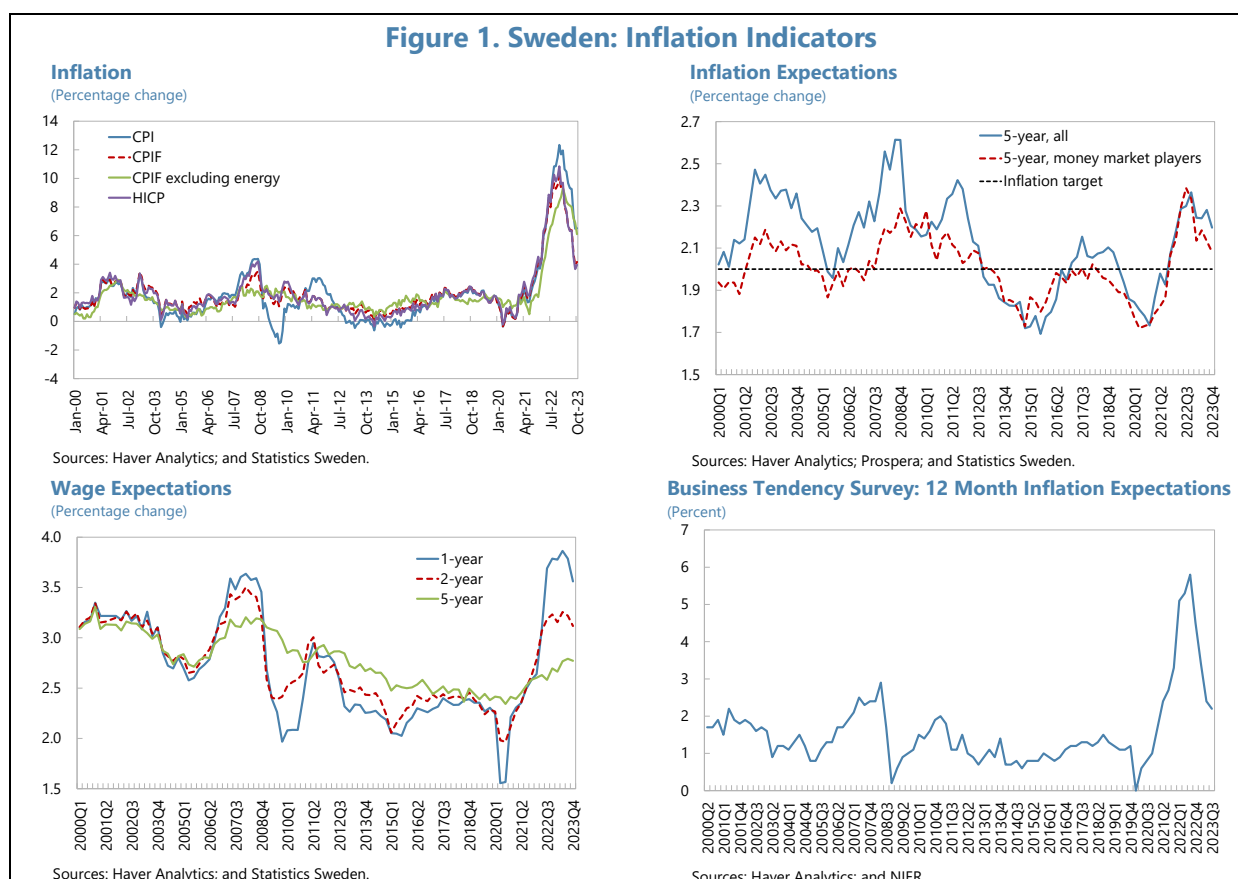
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# INFLATION DEVELOPMENTS, DRIVERS, AND RISKS<sup>1</sup>

**1. Inflation in Sweden started rising sharply from June 2022.** During the global financial crisis, headline inflation (consumer price index with fixed interest rates—CPIF, Box 1) had fallen sharply to just above one percent by September 2009. While inflation rebounded in late 2009, it entered a downward trend again in early 2010, staying below the Riksbank’s 2 percent target until 2021Q1 (Figure 1). Staff projects headline inflation and core inflation to reach target by mid- 2025.

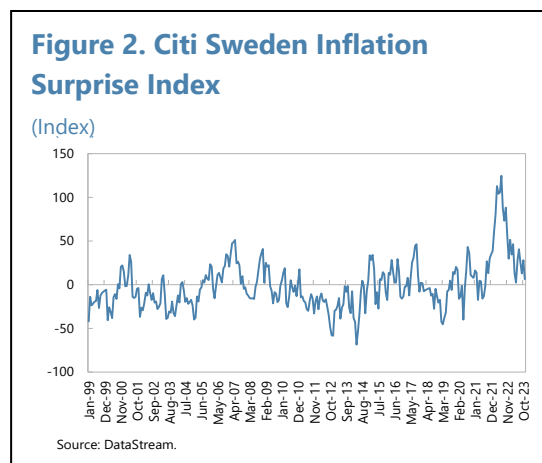


**Box 1. Sweden’s Inflation Measures**

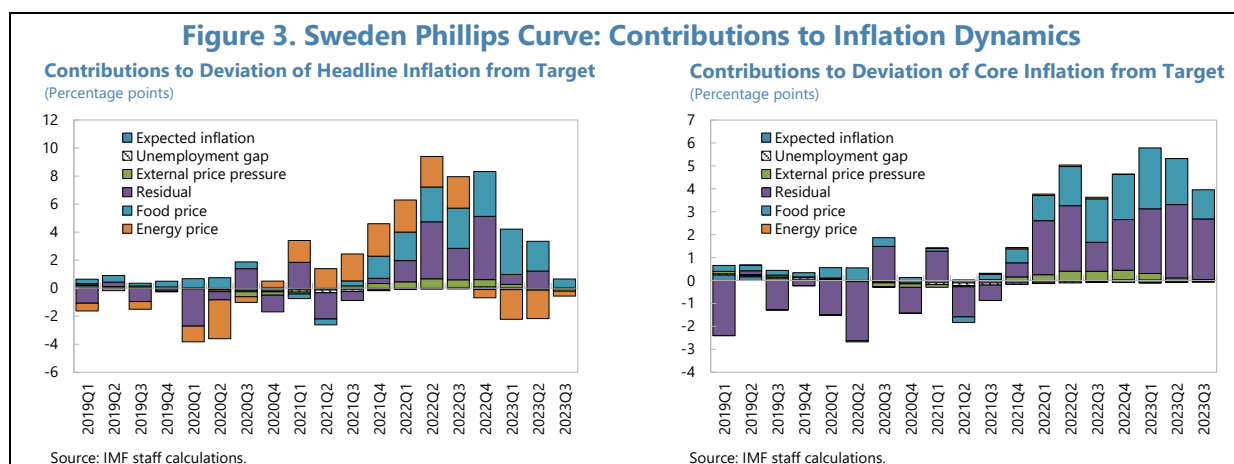
Sweden’s headline Consumer Price Index (CPI) inflation is relatively volatile compared to the Harmonized Index of Consumer Prices (HICP) measure of inflation, which is comparable across EU countries. This volatility stems from the fact that the CPI includes mortgage interest costs in the price index. Since most mortgages have variable interest rates, monetary policy rate changes have a large impact on inflation measured using CPI. Hence, the Swedish authorities have also developed a measure of CPI with a fixed mortgage interest rate (CPIF). The authorities also publish measures of “core” inflation based on the CPIF excluding energy and/or food.

<sup>1</sup> Prepared by Alexandra Fotiou. Data as of October 2023 or 2023Q3. The author thanks Oskar Tysklind for useful comments.

**2. Expectations of market participants, who affect the pricing of financial assets, and the public (e.g., consumers and firms), who affect the price- and wage-setting mechanisms are also important for monetary policy transmission** (see WEO chapter 2, October 2023). In this context, inflation has repeatedly surprised forecasters to the upside since the fall of 2021 (Figure 2) though these surprises have now normalized. In turn, inflation expectations have begun to normalize only since late-2023 and have been stickier for households' inflation expectations on a 12-month basis (Figure 1).



**3. Using dynamic simulations of an estimated Sweden-specific Phillips curve (PC), we assess the role of external factors in driving recent inflation** (see IMF, European Department, REO 2022, chapter 2 for methodological details). The specification relates inflation to its past and expected future values, economic slack, and foreign price developments. The analysis confirms the role played by foreign (especially energy and food) price developments in Sweden's inflation surge since end-2021. However, the model can at most account for 60 percent of the recent surge in inflation (Figure 3), as evidenced by the sizable positive residuals—with inflation exceeding its model-predicted value—in recent quarters, particularly for core inflation.

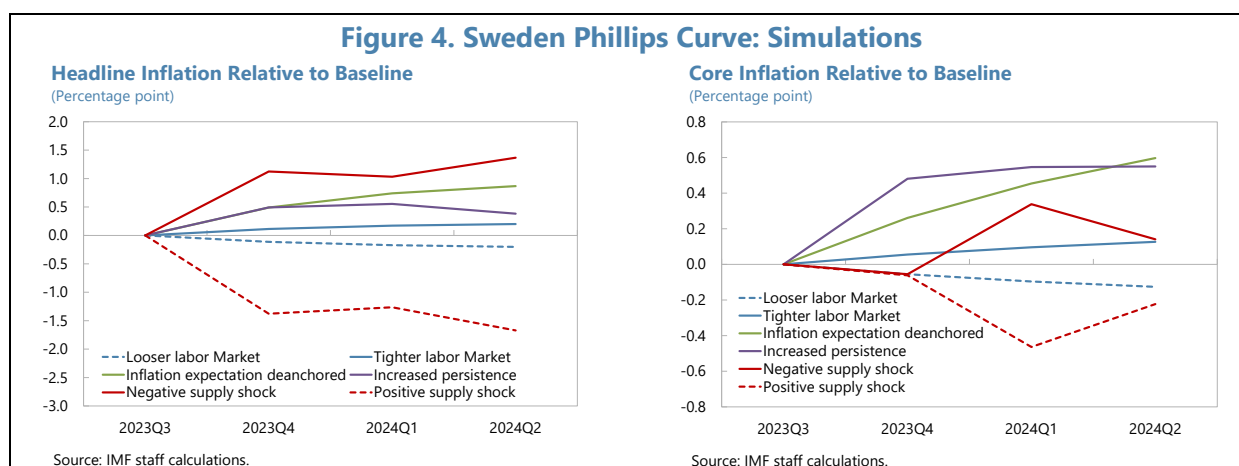


**4. Several factors that are poorly captured in the PC analysis, may account for the rise in unexplained inflation** (see REO 2022, chapter 2). These potentially include among several factors: changes in the structural relationships underpinning the inflation process such as core inflation becoming more backward-looking or the pass-through of global commodity prices to domestic inflation increasing after the pandemic (Gopinath 2022), labor shortages, supply bottlenecks, reallocation of demand between goods and services during and after the pandemic (Celasun and

others 2022), or other discretionary policies.<sup>2</sup> Recognizing these limitations, which the model does not account for, we next consider inflation outcomes under alternative scenarios.

**5. Illustrative risk scenarios confirm a wide range of possible inflation paths on either direction** (Table 1, Figure 4). Renewed commodity price shocks and smaller-than-estimated slack could delay the return of inflation to target. Increasing inflation expectations, including because of renewed exchange rate pressures, would also feed into higher inflation. Core inflation could be stickier if the price setting becomes de-anchored or more backward-looking. These shocks have symmetric effects, implying a faster resolution of supply bottlenecks, or larger-than-projected economic and labor market slack would equally result in a faster than projected decline in inflation.

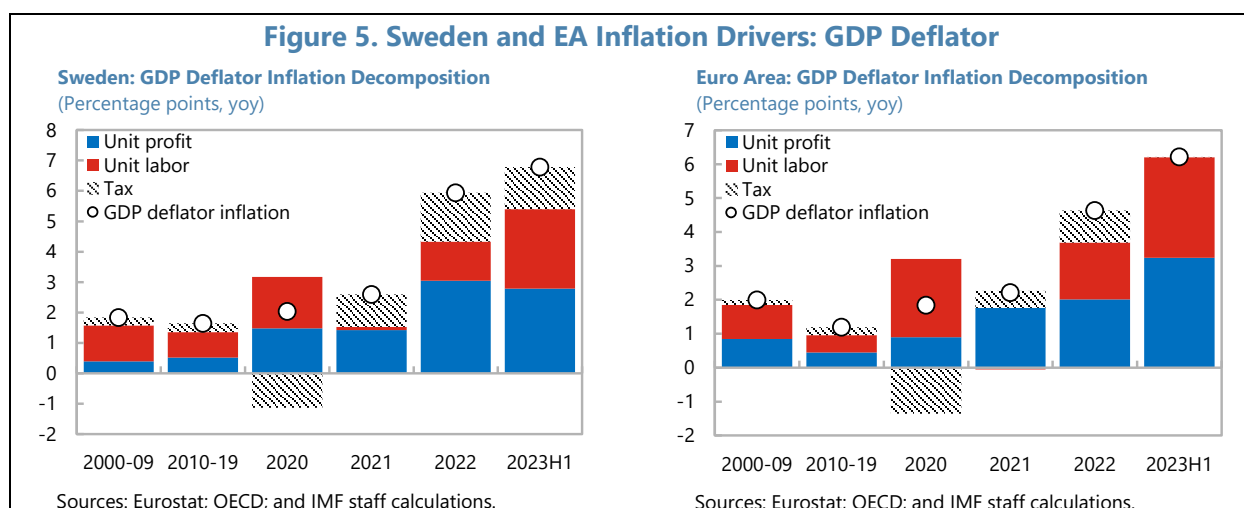
	<b>Shocks</b>	<b>Phillips Curve Simulations</b>
<b>0</b>	Baseline	WEO assumptions
<b>1</b>	Negative Supply Shocks	20 percent rise in energy and food prices
<b>2</b>	Positive Supply Shocks	20 percent fall in energy and food prices
<b>3</b>	Less Slack than Estimated	2 percentage points lower unemployment gap
<b>4</b>	More Slack than Estimated	2 percentage points higher unemployment gap
<b>5</b>	De-anchoring	1 percentage point higher expected inflation
<b>6</b>	More Backward-Looking Price Formation Process	Rise in the coefficient on lagged inflation to 0.8 (average of pre-1990s value)



<sup>2</sup> NIER’s analyses also point out greater sensitivity of Sweden’s food prices to global factors (global food prices, energy prices and exchange rate) in 2022 relative to previous episodes of price shocks (see NIER, December 2023).

## Profit Margins and Wages

**6. Growth in the GDP deflator (as one measure of inflation) can be decomposed into three components—profits, labor costs, and taxes—to assess inflationary pressures in the economy.** Using accounting identities (Hansen, Toscani, and Zhou 2023), we split the GDP deflator (which captures the price increase of all components of domestically produced GDP) into: i) unit profits (gross operating surplus and mixed income per unit of real GDP); ii) unit labor costs (labor compensation per unit of real GDP); and iii) taxes (taxes less subsidies per unit of GDP).<sup>3</sup> While this approach does not allow for any causal interpretation, it shows the relative contribution of these components to (changes in) the GDP deflator.



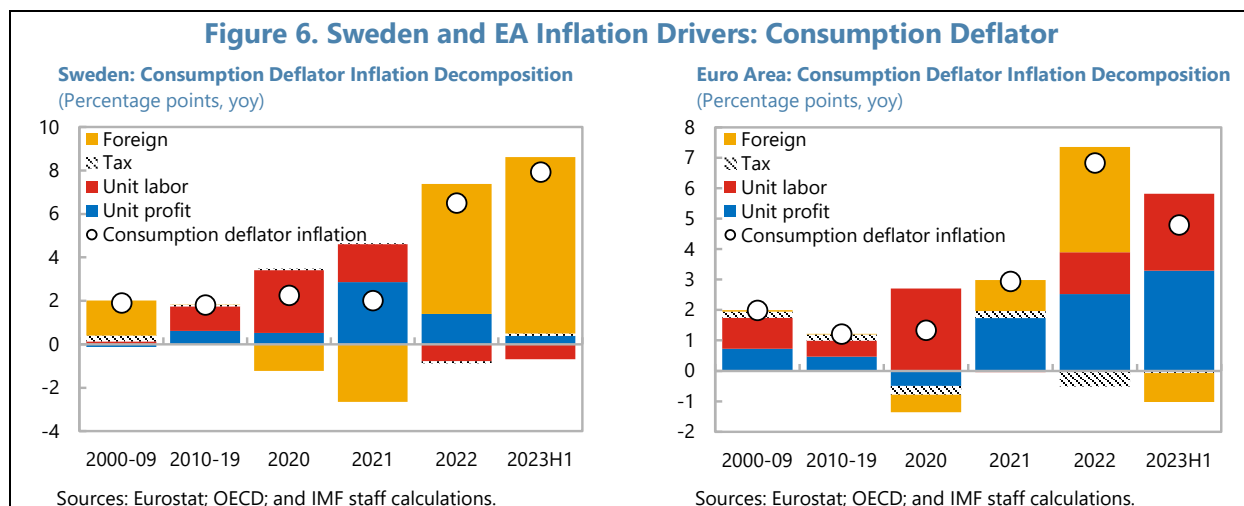
**7. This decomposition suggests that profits made up half of inflation in Sweden in 2022.** The contribution of unit labor cost was very small in 2021 and gradually increased thereafter, reflecting some adjustment of wages to the energy shock. In the first half of 2023, the contribution of profits to the inflation dynamics in Sweden fell slightly (also relative to the euro area, where profit contribution increased), while that of labor costs increased. The role of higher taxes underlying inflation since 2021 is possibly driven by the high ‘revenue buoyancy’ experienced in recent years.

**8. Since domestic consumption accounts for less than one-third of domestic production, we also analyze the consumption deflator.** The decomposition of the latter also confirms the higher share of profits since the pandemic (Figure 6). However, the pattern for Sweden is markedly different from the euro area for 2022–2023H1. In Sweden, inflation is predominantly underpinned by import prices (including effects from exchange rate depreciation), and less so by unit profits, unlike in the EA.<sup>4</sup> The contribution of unit labor costs also became negative in 2022–2023H1 in Sweden,

<sup>3</sup> Lindskog and Loveus (2023) find a similar result.

<sup>4</sup> However, the weaker exchange rate could also induce higher profits for export-oriented companies (given the pricing in USD or euro and income in SEK), without necessarily increasing prices for consumers. See also NIER (2023). However, Lindskog and Loveus (2023), who also decompose the private consumption deflator into domestic and foreign prices and find a larger contribution of the former. The differences could be partly explained by the different indicator used as a proxy of imported inflation.

possibly because of stronger collective bargaining wage setting outcomes. That said, the profit patterns may differ across industries based on their market (export oriented or domestic), and other factors, including business strategy (see NIER, 2023).





## References

Celasun, Oya, Niels-Jakob Hansen, Aiko Mineshima, Mariano Spector, and Jing Zhou. 2022. "Supply Bottlenecks: Where, Why, How Much, and What Next?" IMF Working Paper 22/31, International Monetary Fund, Washington, D.C.

Gopinath, Gita. 2022. "How Will the Pandemic and War Shape Future Monetary Policy." PowerPoint presentation presented at the Jackson Hole Economic Policy Symposium, Jackson Hole, WY, August.

Hansen, Niels-Jakob, Frederik Toscani, and Jing Zhou. 2023. "The Role of Import Prices, Profits and Wages in the Current Inflation Episode in the Euro Area.," IMF Working Paper No. 23/131.

International Monetary Fund, 2022, Regional Economic Outlook, Chapter 2, October 2022.

Lindskog, Magnus and Hanna Loveus. 2023. "Import Prices, Labor Costs and Profits – What Role Have They Played in Inflation Dynamics?" Riksbank Staff Memo.

NIER, December 2023, "Pricing by Swedish Companies in 2023."

# SWEDEN'S MONETARY POLICY TRANSMISSION AND STANCE<sup>1</sup>

*Monetary policy was tightened significantly in Sweden since May 2022, after a long period of zero interest rate. This comprised the fastest tightening in historical context, although in a global environment where all major central banks were also tightening. This analysis empirically compares the current MP tightening episode with past tightening episodes to assess the strength of the transmission mechanism. It then discusses, using a modeling approach, the optimal monetary policy stance under a scenario when agents are characterized with adaptive inflation expectations.*

## Monetary Policy Transmission

- 1. Monetary tightening in a small open economy, all else equal, should reduce inflationary pressures through two main channels—reducing demand pressures and strengthening the exchange rate relative to the rest of the world.** In an environment where other countries are also tightening, the first channel would be strengthened through weaker global growth, but the effect from the second channel would depend on relative MP tightening of the home country compared to the rest of the world.
- 2. Historical shock decomposition for Sweden shows evidence of lags in the transmission of monetary policy to core inflation.** A Bayesian Vector Autoregression (VAR) model with different structural identification techniques (with and without sign restrictions), estimated for the period 2020Q1–2023Q3, Figure 1 (Panel A), shows the historical decompositions for growth and core inflation.<sup>2</sup> Considering the realized policy rate from 2022Q2 until 2023Q3, while allowing the remaining endogenous variables respond according to model predictions from 2022Q2 onwards (Figure 1, Panel B), we compare the quarterly forecasted path under the VAR model to the realized data. Conditional forecasts show that monetary policy transmission has been stronger compared to forecasts for real GDP growth, while much weaker for core inflation.
- 3. To better understand the longer lags in monetary policy transmission to core inflation, we next look at the role for two potential channels, market interest rates faced by agents and the inflation expectations formation process.**

## Pass Through to Market Interest Rates

- 4. We find that monetary policy transmission to market interest rates has been higher in Sweden than other advanced economies, though weaker for some rates compared to**

<sup>1</sup> Prepared by Alexandra Fotiou with support from Robert Beyer and Alan Dizioli. The authors thank Max Bres and Jakob Almerud for useful comments.

<sup>2</sup> The endogenous variables include: real GDP growth (y/y), core inflation (y/y), the policy rate and the exchange rate. Oil prices, VIX, the euro area (EA) shadow rate and a Covid-19 dummy are exogenous variables.

**historical tightening.**<sup>3</sup> Table 1 shows the channels through which monetary policy pass-through works to other interest rates.

- **Pass through to mortgage rates is relatively faster in Sweden.** Sweden has among the highest share of households with mortgages with flexible interest rates and short fixation periods (Figure 2). The prevalence of floating rate mortgages and a higher share of households with mortgages than the European average could explain why the elasticity of interest rate on outstanding mortgages is higher in Sweden (Figure 3, Panel 1).
- **Comparing with an earlier tightening cycle shows that the pass-through was higher in the past ,especially for overnight deposits for both households and firms** (Figure 3, panels 2–6). This finding is in line with the observation that banks had been more eager to obtain deposits/liquidity in the past compared to the current cycle. In contrast, while the pass through to new mortgages was weaker than previous episodes, the pass-through to NFC lending rates has been stronger relative to the comparator cycle (see Beyer and others, 2023 for the methodology).

<b>Table 1. Sweden: Effects of Monetary Policy Pass-through to Bank Interest Rates</b>			
<i>Channels that directionally weaken the effects of monetary policy tightening shown in orange</i>			
Channels of MP transmission	Mechanism of channel during MP tightening	Effects of higher pass-through during MP tightening	
		Effects of higher pass-through to loan rates	Effects of higher pass-through to deposit rates
<b>Interest rate channel</b>	Higher hurdle rate for new investment	Less investment	More saving → Less consumption
<b>Cash flow channel</b>	Higher interest income and debt services cost for existing exposures	Lower cash flow → Less consumption and investment	Higher cash flow → more consumption and investment
<b>Balance sheet channel</b>	Lower value of collateral	Tighter non-price credit conditions → Less investment	
<b>Banking channel</b>	Lower banks' net worth	Tighter bank funding conditions → Less lending	
	Higher cost of bank funding		More supply of deposits → More lending

## Expectations Formation

**5. The previous analysis suggested that sticky core inflation cannot be explained by weaker monetary policy pass through to interest rates.** In fact, the policy rate tightening in the current cycle has resulted in a faster pass-through compared to other AEs, and relative to the past for most lending rates. The weaker pass through—relative to the past—for deposit rates should strengthen the effect of monetary tightening on inflation reduction through greater pressure on

<sup>3</sup> A past tightening cycle with the largest policy rate increase covered by the data is referred as the 'comparator cycle.' For Sweden, the comparator cycle covers the Jan. 2006–Sept. 2008 pre-GFC monetary policy tightening.

incomes, although substitution effects (between savings and consumption due to lower deposit rates) could somewhat weaken the channel.

**6. In this section we look at the implications of a more backward-looking inflation expectations channel.** In the current juncture, while long-term inflation expectations have been well-anchored, short-term expectations (in particular, household expectations) have drifted up and shown more stickiness. This raises questions about whether expectation formation may be prone to risks of becoming more backward looking, influenced by previous high inflation prints (see also October 2023 WEO Chapter 2).

**7. We therefore assume that agents update their beliefs about the underlying economic relations when new data becomes available through a learning mechanism (also known as adaptive learning).** The analysis can be regarded as determining a risk-resilient monetary policy stance that account for potentially adaptive expectations behavior by economic agents. The model assumes that economic agents form their expectations based on a simple statistical model, rather than the standard rational expectations assumption. It extends the standard dynamic stochastic general equilibrium model with expectational learning by Alvarez and Dizioli (2023) and includes price and wage Philips curves (relating price and wage inflation to expectations, the gap between real wages and productivity, and economic slack), an IS curve (relating output to the nominal interest rate and inflation expectations), and a monetary policy function. In addition, it considers heterogeneous agents, a mix of backward- and forward-looking learners with different information sets. Backward-looking learners form their expectations based on recent events, while forward-looking form their expectations rationally based on full information about the economy, including the share of backward-looking learners. As the share of backward-looking learners increases, it means that the forward-looking ones will act more as backward-looking. As a last assumption, the model considers that near-term inflation expectations are influenced by long-term inflation expectations, and vice versa.

### **Optimal Monetary Policy**

**8. In the estimated model, the central bank has three channels to influence inflation.** The standard direct channel in which a tighter policy cools-off demand, lowering the output gap and hence inflation. The other two channels operate through inflation expectations. By tightening policy, the central bank lowers current inflation that enters the forecasting equation, lowering next period expectations. Finally, the central bank can also affect the agents learning, the coefficients in the forecasting equation. By seeing lower-than expected inflation in a given period, households update their model of how past inflation matters for future inflation.

**9. The optimal monetary policy path is defined as the interest rate path, in which the central bank minimizes its loss function.** This is a function of the output gap and inflation deviations from the 2 percent target. Other implicit assumptions are that the central bank has full knowledge of the current shocks hitting the economy, know all the future shocks that will hit the economy and have full knowledge of how their actions impact expectations. Considering staff's projections for GDP and inflation up to 2025Q4, and data outturns until 2023Q4, the model's

conditional forecast suggests that monetary policy should be tightened further in 2024Q1, before reversing slowly from 2024Q2 (Table 2).<sup>4</sup>

**Table 2. Sweden: Optimal Monetary Policy Under Adaptive Expectations**

	2024Q1	2024Q2	2024Q3	2024Q4	2025Q1	2025Q2	2025Q3	2025Q4
Optimal interest rate path	4.7	4.4	3.6	3.1	2.5	2.2	2.0	1.8

**10. The analysis suggests that the optimal monetary policy stance would need to be tighter than assumed in the baseline scenario.** Staff's baseline recommendation (see main report) also takes into account the sharp decline in inflation since October 2023. The increase in the pace of disinflation since October, including for most components and core inflation, suggests the MP transmission process (through lower activity) has strengthened. However, given the appreciable uncertainty in inflation forecasts, a risk management approach would imply maintaining a tight monetary policy stance, with policy rates close to current levels in the first half of 2024 for inflation to return to target by mid-2025. At the same time, monetary policy would therefore need to be data dependent and nimble to act (tighten or cut) sooner, if inflation risks begin to materialize on either side, as shown below.

**Table 3. Sweden: Indicators of Inflation Momentum**

Inflation momentum (3m/3m)	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Processed food	13.9	15.3	18.5	16.5	11.2	4.3	0.9	0.4	0.5	0.3	-0.3	0.5
Non-energy industrial goods	8.5	10.3	10.9	10.4	7.8	5.4	4.8	5.0	6.1	4.7	1.5	-1.8
Services	4.4	4.8	5.7	6.6	7.3	8.9	10.0	8.5	5.6	2.8	1.9	1.4
Energy	7.1	-13.9	-43.6	-44.6	-40.4	-20.7	-25.5	-20.5	-26.7	-15.1	1.1	25.3
Headline	8.2	6.7	4.1	3.4	2.5	3.2	2.9	3.2	2.1	1.8	2.3	2.7

## Scenario Analysis

**11. The alternative upside scenario for inflation shown in Figure 4 (left column) considers a 10 percent depreciation of the exchange rate within two quarters, which would require a tighter MP stance.** This is combined to a proxy for a high-risk premium, associated to a drop of GDP in the first quarter. This means that the depreciation is partially explained by a rise in risk premium and partly by a CIP deviation. Following the depreciation shock, inflation increases more compared to the baseline and is more persistent, while the output gap becomes more negative.<sup>5</sup> The effect on GDP growth in the short-term is immediate, so while it recovers faster in the growth space in the alternative scenario, the GDP level is still lower.

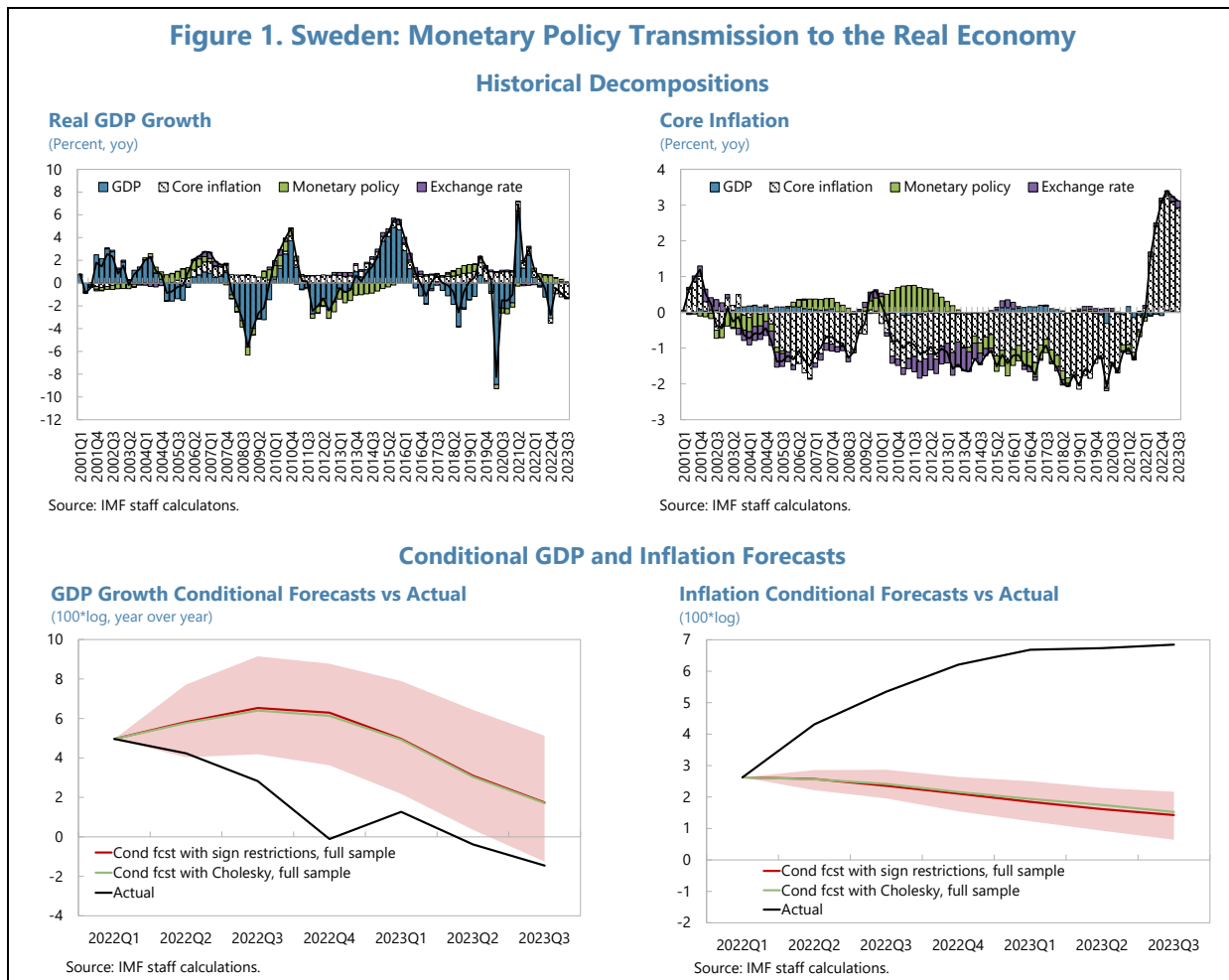
**12. The downside scenario shown in Figure 4 (right column) focuses on a negative demand shock, which would require a looser MP stance.** Following the negative demand shock, GDP falls, output gap turns persistently more negative (compared to both the baseline and upside scenario),

<sup>4</sup> The 2023Q4 GDP is based on the flash estimate.

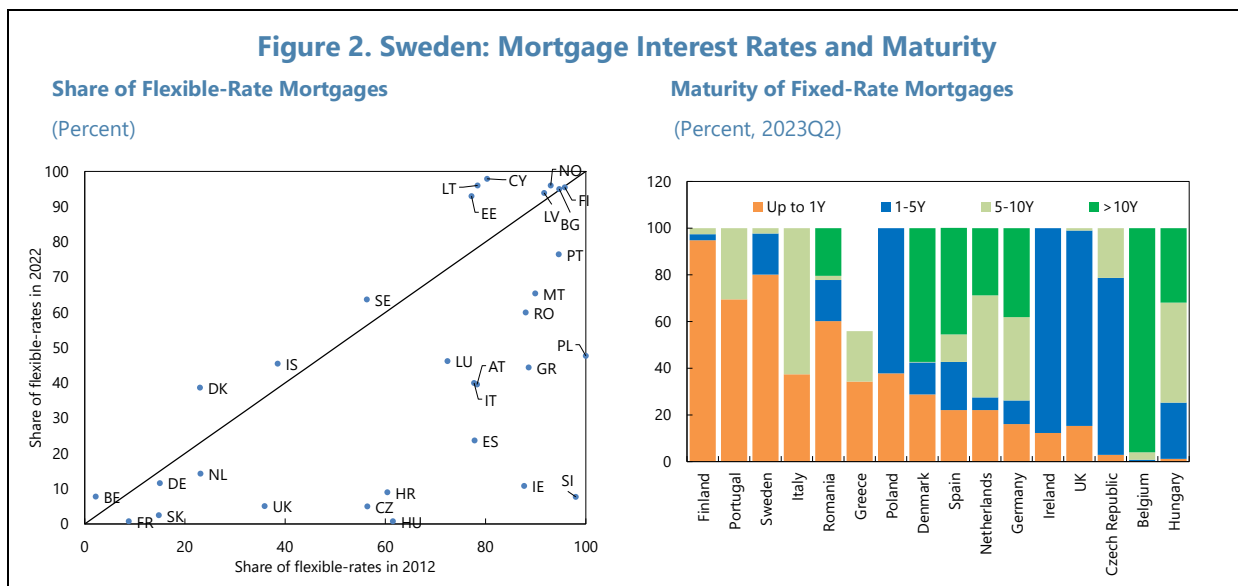
<sup>5</sup> The baseline scenario considers the optimal monetary policy path discussed above, based on staff's projections for GDP and inflation until 2025Q4, which means that these are conditional forecasts with the actual last data point being 2023Q4 (the x-axis are quarters starting from 2024Q1).

and as a result inflation declines as well. This means, that inflation is lower in this case compared to the baseline scenario.

**Figure 1. Sweden: Monetary Policy Transmission to the Real Economy**

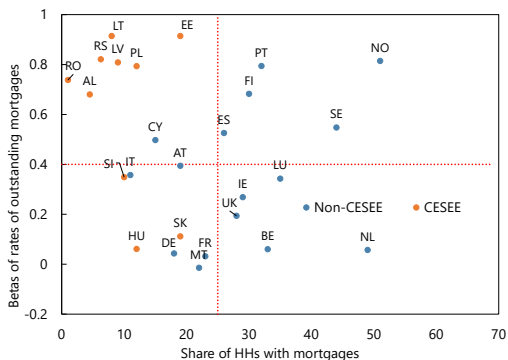


**Figure 2. Sweden: Mortgage Interest Rates and Maturity**

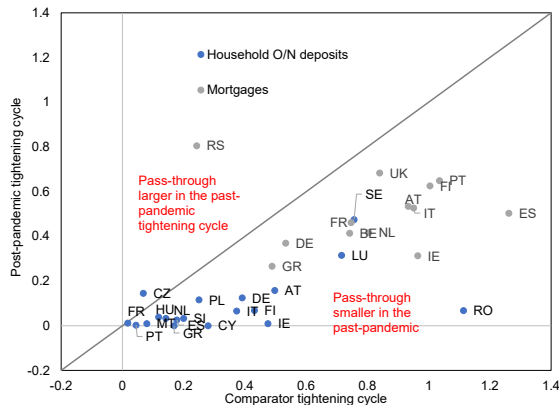


**Figure 3. Sweden: Monetary Policy Transmission to Market Interest Rates**

**Pass-through and share of households with mortgages**



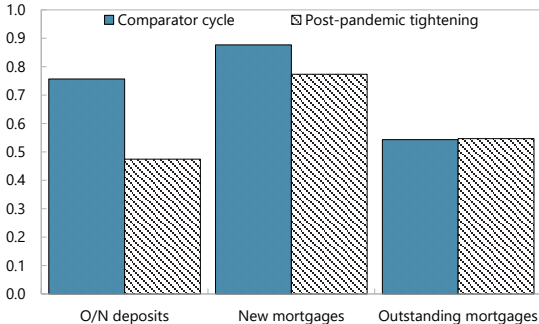
**Pass-through to O/N Deposit/Mortgage Rates**



**Households' Pass-through**

**Change in Policy Rate Pass-through: Households**

( $\Delta$  Interest rate /  $\Delta$  policy rate)

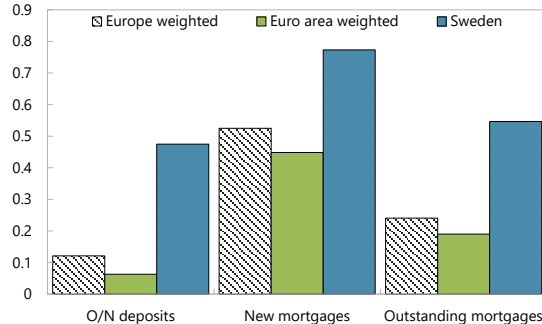


Sources: IMF staff calculations based on Beyer et al. (2024).

**Households' Pass-through**

**Household Pass-through During Post-pandemic Tightening**

( $\Delta$  Deposit rate /  $\Delta$  policy rate)

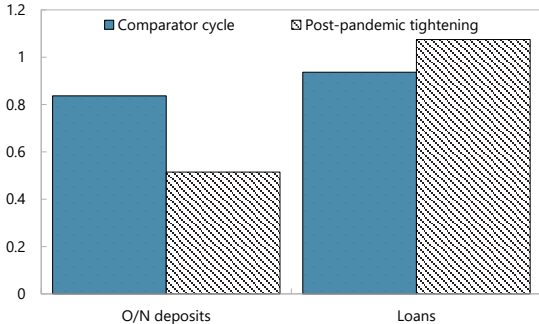


Sources: IMF staff calculations based on Beyer et al. (2024).

**Firms' Pass-through**

**Change in Policy Rate Pass-through: NFCs**

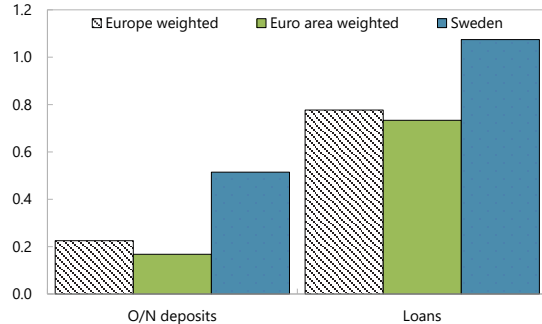
( $\Delta$  Interest rate /  $\Delta$  policy rate)



Sources: IMF staff calculations based on Beyer et al. (2024).

**NFC Pass-through During Post-pandemic Tightening**

( $\Delta$  Interest rate /  $\Delta$  policy rate)



Sources: IMF staff calculations based on Beyer et al. (2024).

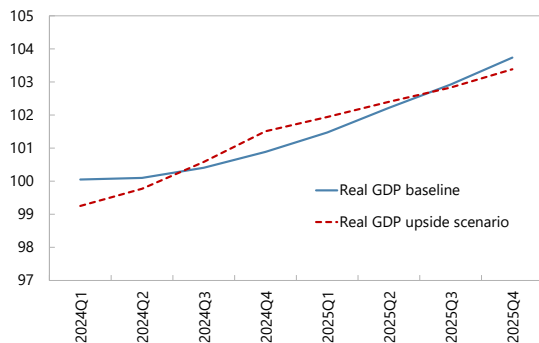
Sources: ECB; National Central Banks; The European Mortgage Federation; and IMF staff calculations.

**Figure 4. Sweden: Scenario Analysis**

**Upside Inflation Scenario: Exchange Rate Depreciation and Higher Risk Premium**

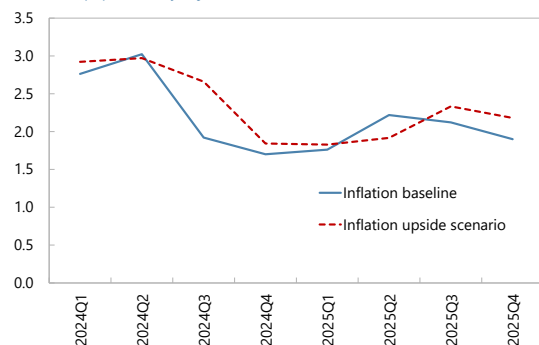
**Real GDP**

(Index, 2023Q4=100)



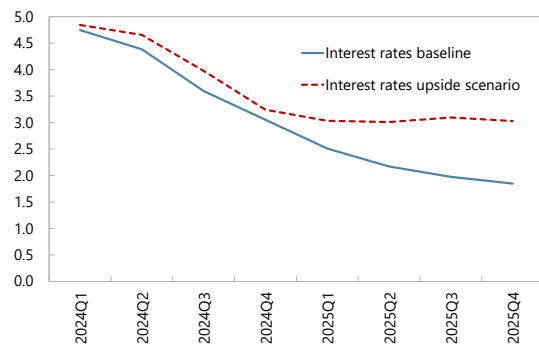
**Inflation**

(Percent; qoq seasonally adjusted annual rate)



**Interest Rates**

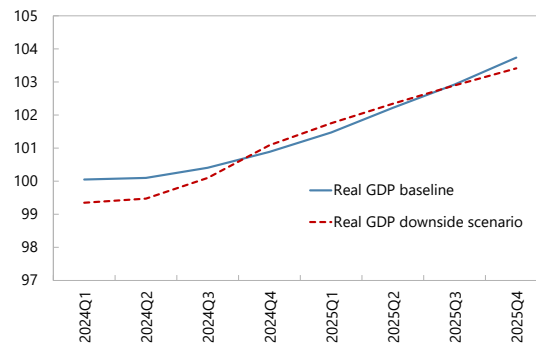
(Percent)



**Downside Inflation Scenario: Negative Demand Shock**

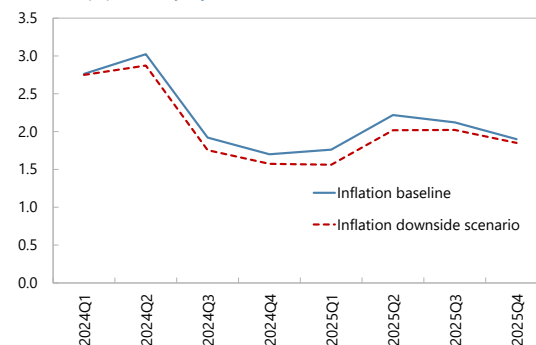
**Real GDP**

(Index, 2023Q4=100)



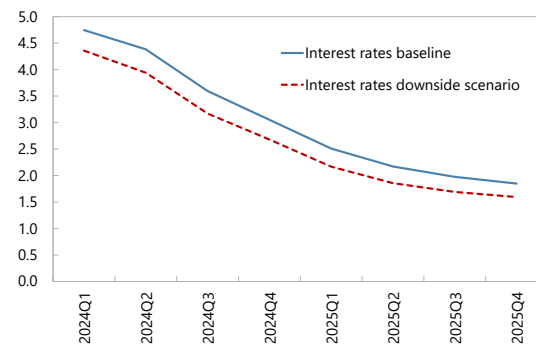
**Inflation**

(Percent; qoq seasonally adjusted annual rate)



**Interest Rates**

(Percent)



Source: IMF staff calculations.

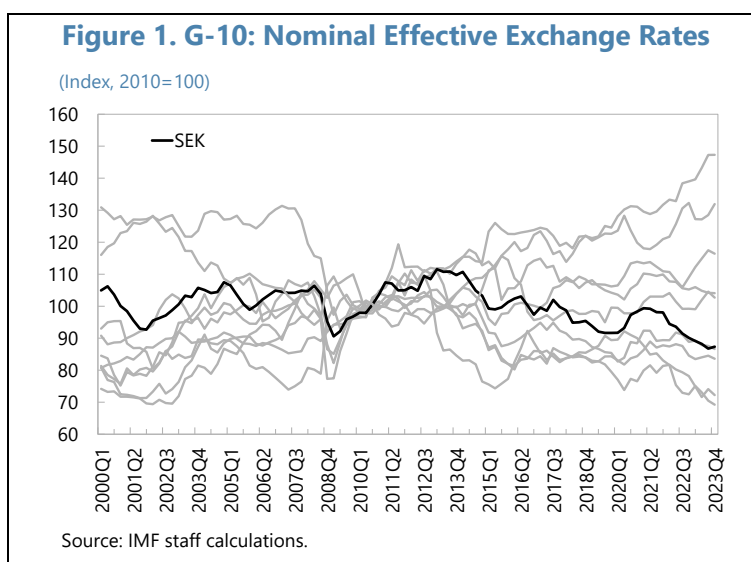
Note: The baseline scenario (blue line) shows staff's projections for real GDP growth and inflation, while the baseline scenario for the interest rate corresponds to the optimal monetary policy path based on these projections.



## EXCHANGE RATE DYNAMICS: A PRINCIPAL COMPONENTS ANALYSIS<sup>1</sup>

The Swedish krona has depreciated on a trend basis since 2014, a development that accelerated during the post-pandemic period. Global factors such as USD multilateral strength (and risk sentiment), trade patterns, and comovements with other Nordic countries also characterized by large current account surpluses and relatively small FX markets help explain exchange rate dynamics over the recent past.

**1. The krona has been depreciating since 2014.** On a nominal basis, the krona (SEK) was broadly stable since the turn of the century. Starting in 2014, the SEK started to exhibit a depreciating trend (Figure 1).<sup>2</sup> After a brief interval during the Covid-19 pandemic, the weakening trend of the krona accelerated and has only recently stabilized. From a cross-country basis, however, the depreciation of the krona does not stand out as particularly large. This note analyzes the potential drivers of the weakness of the krona from two angles, including i) a multilateral and data-driven approach that exploits the large covariation between the cyclical currencies of the G-10 using a Principal Components Analysis (PCA),<sup>3</sup> and ii) a structural and Sweden-specific approach that considers the role of monetary policy settings and other macroeconomic shocks in the determination of the exchange rate.



<sup>1</sup> Prepared by Luisa Charry and Fuda Jiang. The authors wish to thank Carl-Johan Belfrage for useful comments.

<sup>2</sup> Cordella and Gupta (2015) define a “cyclical” currency as one that comoves with the economic cycle, appreciating in times of higher GDP growth and vice versa. Among the G-10 countries, these include the Australian Dollar (AUD), the Canadian Dollar (CAD), the Norwegian Krone (NOK), the New Zealand Dollar (NZD) and the Swedish Krona (SEK). In contrast, “safe haven” currencies tend to appreciate in times of lower GDP growth, and include the US Dollar (USD), the Japanese Yen (JPY), and Swiss Franc (CHF). The British Pound (GBP) is generally considered acyclical.

<sup>3</sup> PCA is a dimensionality reduction technique recommended to extract information from datasets that include several correlated variables.

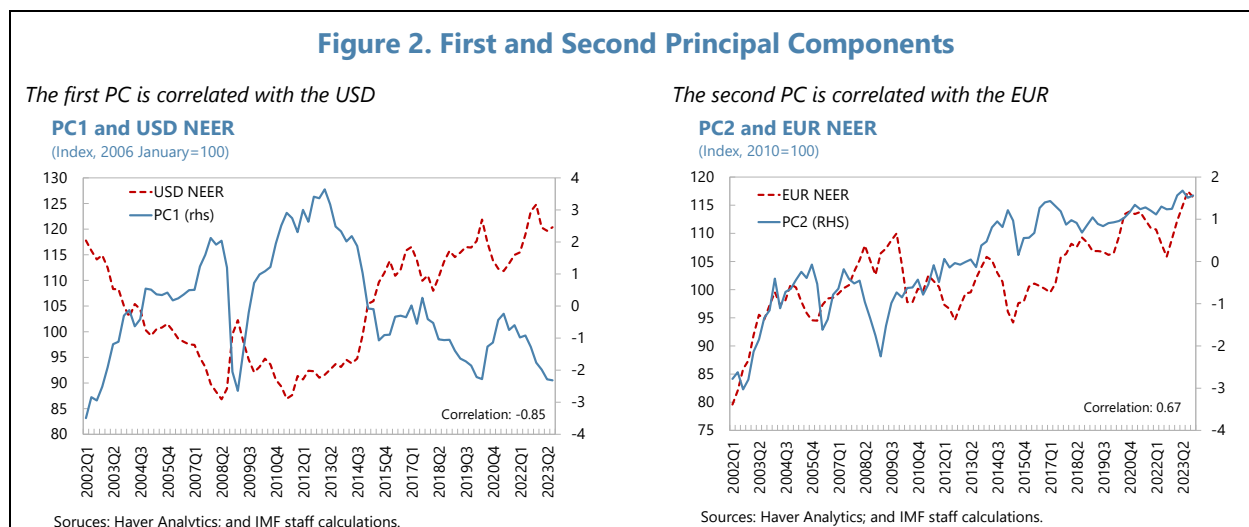
**2. Global factors and commodity prices explain a large fraction of the variance of cyclical exchange rates, including the krona.** The simple PCA of the nominal effective exchange rates of the G-10 cyclical currencies (namely the AUD, CAD, NOK, NZD and SEK) for the 2002–2023 period shows that the first principal component (PC) explains about 60 percent of the variance across the five currencies (Table 1). In turn, the second and third components explain about 27 percent and 10 percent of the variance.

**Table 1. G-10: Cyclical Currencies**  
Principal Components Analysis (2002–23)

	PC1	PC2	PC3	PC4	PC5
AUD	0.54	0.23	-0.27	-0.33	-0.69
CAD	0.52	0.06	-0.58	0.05	0.62
NOK	0.38	<b>-0.63</b>	<b>0.06</b>	0.63	-0.25
NZD	0.28	0.70	<b>0.41</b>	0.52	0.04
SEK	0.48	<b>-0.23</b>	<b>0.64</b>	-0.48	0.27
<b>Proportion of Explained Variance</b>					
...	0.58	0.27	0.11	0.02	0.02
<b>Eigenvalues</b>					
...	2.92	1.34	0.55	0.11	0.08

Source: IMF staff calculations.

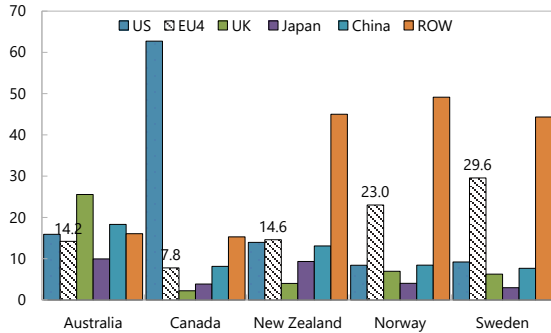
**3. The first principal component (PC1), which exhibits positive loadings for all five currencies,** implying weaker currencies, likely captures the special role of the USD in international transactions (Figure 2, top left). As a stronger multilateral dollar is also associated with global risk-off episodes and differences in monetary policy settings (see Cerruti et al 2022), these were likely relevant drivers of SEK developments.



**Figure 2. First and Second Principal Components (Concluded)**

Higher trade shares with the EA...

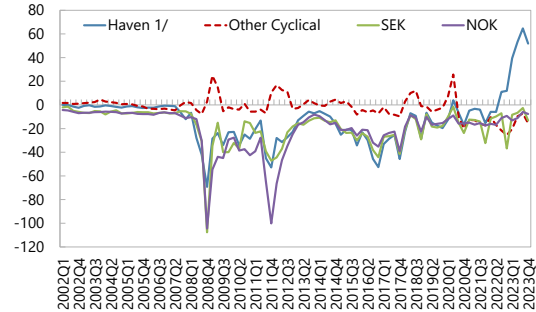
**Average Trade Weights**  
(Percent, 1996-2023)



Source: IMF staff calculations.

...negative currency bases...

**USD Cross-Currency Basis**  
(Basis points)



Sources: Cerruti et al (2019); and IMF staff calculations.

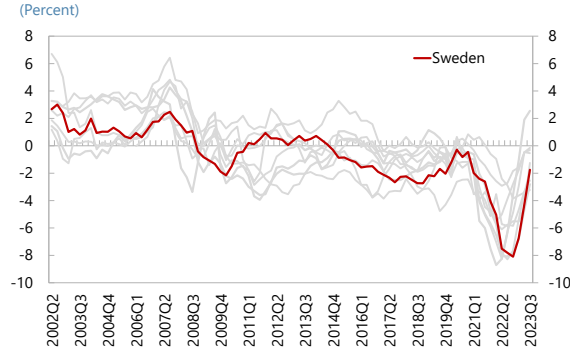
1/ Includes GBP. The large post-pandemic jump is driven exclusively by the CHF.

**4. Indeed, Sweden’s de facto monetary policy setting has been relatively accommodative.**

Sweden’s real ex-post policy rates (deflated with HICP inflation) fell below most G-10 rates during the 2014–2022 period (Figure 3). This partly reflected subdued domestic inflation and growth outlooks (see Selected Issues paper II), and, for the most part, also relative to the US and euro area (EA) economies.

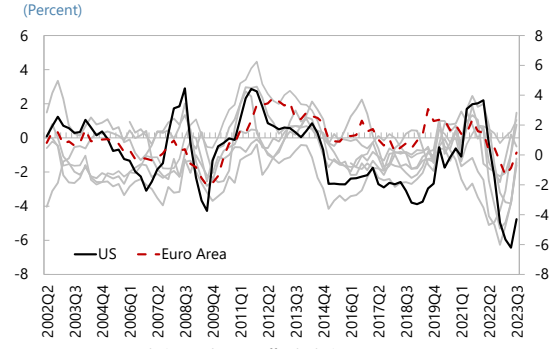
**Figure 3. G-10: Real Policy Rates and Interest Rate, Growth and Inflation Differentials**

**G-10 Real Policy Rates <sup>1/</sup>**



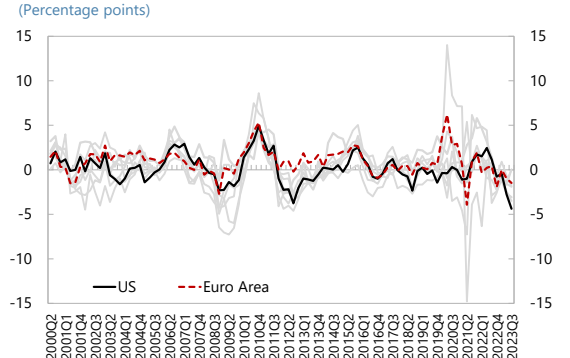
Sources: Haver Analytics; and IMF staff calculations.  
1/ Deflated with headline inflation.

**G-10 Real Policy Rate Differentials <sup>1/</sup>**



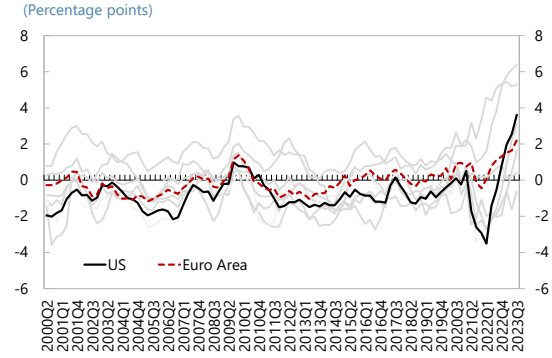
Sources: Haver Analytics; and IMF staff calculations.  
1/ Deflated with headline inflation.

**G-10 Real GDP Growth Differentials**



Sources: Haver Analytics; and IMF staff calculations.

**G-10 Core Inflation Differentials**

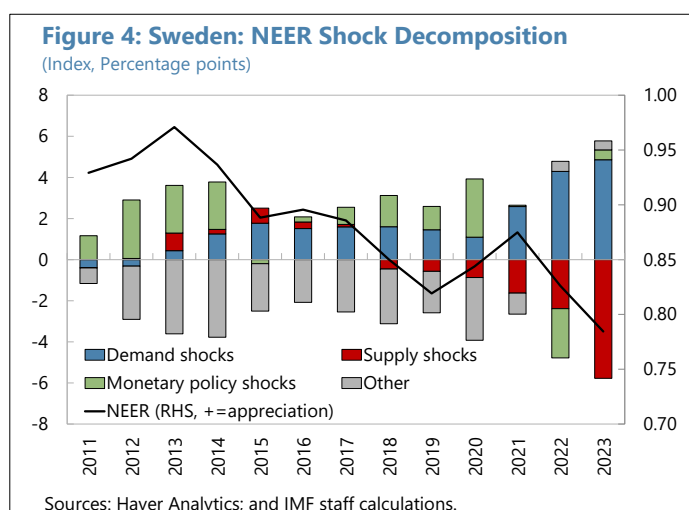


Sources: Haver Analytics; and IMF staff calculations.

**5. The second principal component likely reflects Nordic-specific factors.** The second component has negative loadings both for the SEK and the NOK, and positive loadings for the remaining currencies, and likely capturing the high correlation between both currencies during the sample period (0.7 on a quarterly basis). Possible factors that explain this result include: i) the larger share of trade with the EA of both countries, as confirmed by the high correlation of the component with the EUR nominal effective exchange rate (top right-hand chart in Figure 2); ii) Norway and Sweden’s large and sustained current account surpluses, and iii) market features that make foreign currency synthetic funding in both markets relatively costly (i.e. a breakdown of covered interest parity).

**6. Deviations from covered interest parity set apart the Nordics from other cyclical currencies in the G-10.** In line with other G-10 currencies, deviations from covered interest parity in the Nordics became systematic after the global financial crisis (see Figure 2, bottom right). Accordingly, in both Sweden and Norway the cost of direct funding in USD is lower than the cost of synthetic funding (via FX swaps), as indicated by the negative cross-currency basis. Particularly, and up to 2019, the deviations in the Nordics were like those of defensive currencies, rather than those of the cyclical group. This could be partially explained by Sweden and Norway’s large current account surpluses, which make direct USD funding in local markets relatively more abundant than in the other cyclical markets, which tend to run current account deficits. At the same time, forward markets in both Sweden and Norway are characterized by relatively lower liquidity than the rest of the G-10 as measured by the bid-ask spreads on 3-month contracts,<sup>4</sup> which could result in relatively more expensive synthetic US funding. Other potential factors that could explain the covered interest rate deviations including regulations that limit financial intermediaries’ risk-bearing capacity (see Cerruti et al) or lower liquidity in public debt markets impacting foreign investors’ appetite for SEK-denominated bonds.

**7. A model-based decomposition using a multilateral model confirms the role of covered interest parity deviation and effective differentials in monetary policy in the behavior of the SEK.** A model-based shock decomposition of the exchange rate dynamics from Sweden’s module of the IMF’s EUROMOD system<sup>5</sup> show that during the 2014–21 period covered interest rate parity shocks (category “Other” in Figure 4) were the main drivers of the nominal exchange rate, followed

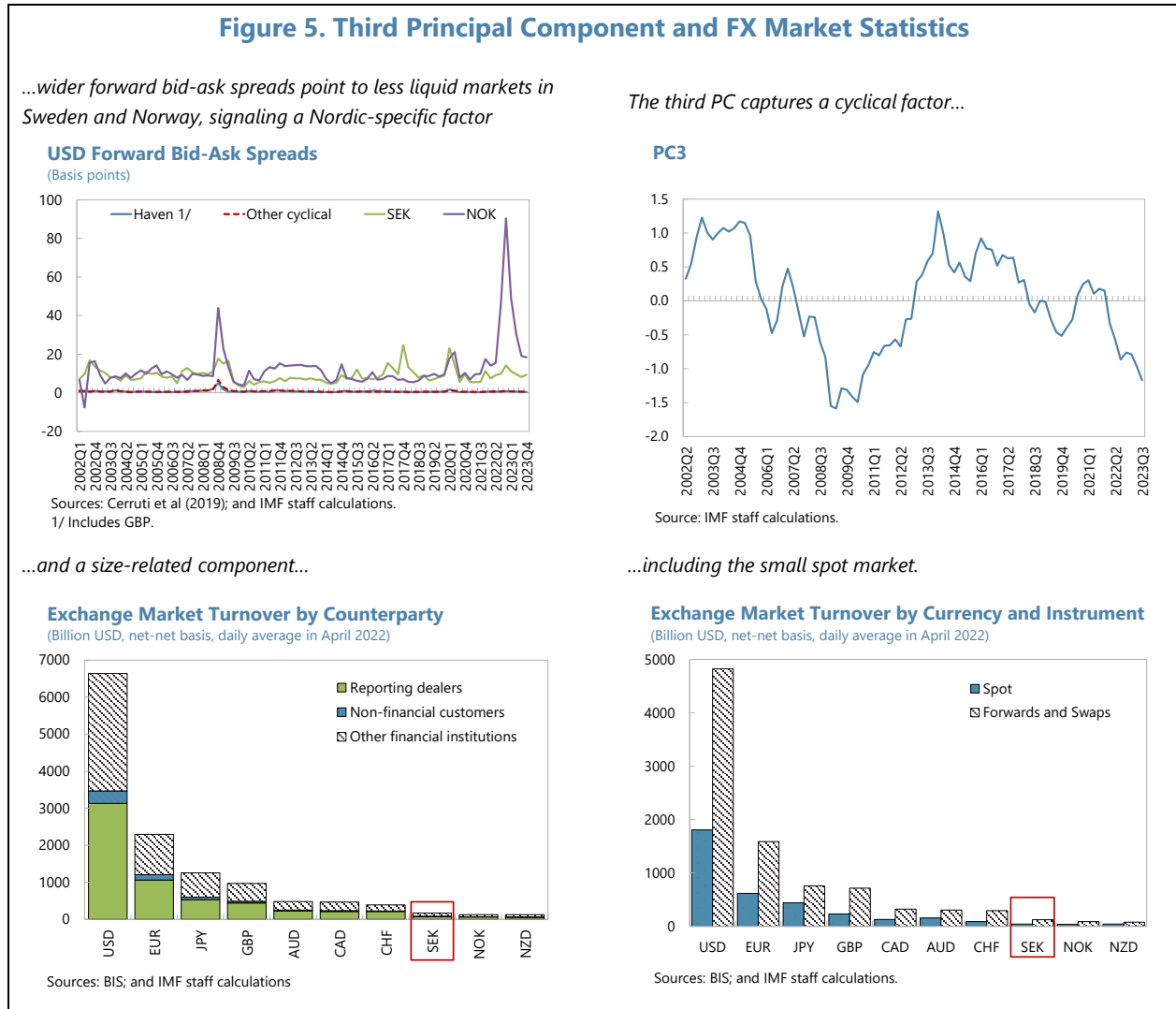


<sup>4</sup> On average, the bid-ask spread for the SEK/USD and NOK/USD pairs are 8 bp and 11 bps wider than that of the “Haven” and other cyclical currencies.

<sup>5</sup> See Andrieu et al (2015).

by monetary policy shocks,<sup>6</sup> and demand shocks.<sup>7</sup> In the latter part of the sample, the Covid-19 related supply<sup>8</sup> and demand shocks appear to have played a more important role.

**8. The third principal component captures a cyclicity layer for the relatively smaller markets, including Sweden.** The third component (PC3) has positive loadings for the SEK, NOK and the NZD, and appears to capture a cyclical and size-related factor (Figure 5) as these currencies have in common their relatively smaller FX markets. The results of the other principal components are not discussed as they mostly represent noise.



<sup>6</sup> Monetary policy shocks are calculated as deviations of policy rates from the marked-based expectations.

<sup>7</sup> Demand shocks are derived as growth surprises calculated from deviations of actual data from IMF staff expectations one year earlier.

<sup>8</sup> Supply shocks are derived as inflation surprises calculated from deviations of actual data and IMF staff expectations.

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## THE ECONOMIC IMPLICATIONS OF QUANTITATIVE EASING DURING COVID<sup>1</sup>

**1. The fiscal impact of unconventional monetary easing, such as large-scale asset purchases (LSAPs), is not as clear cut as conventional monetary easing.** Policy rate cuts stimulate the economy and improve the consolidated government fiscal position, through both, higher GDP (and fiscal revenues), and lower interest expenses. Policy rate changes also carry minor financial implications for central bank balance sheets. However, LSAP operations could lower central bank profits or losses—depending on the differential between the interest rate earned on government securities relative to the rate the central bank pays on its bank reserves. The scope for an adverse impact on central bank balance sheets is amplified when policy rates unexpectedly need to be increased quickly—as observed in 2022 and 2023—and the net fiscal impact would depend on the balance sheet effects on the broader public sector.

**2. The considerations are relevant for Sweden, where the Riksbank, like other major central banks engaged in LSAPs to alleviate the economic downturn during COVID.** The asset purchases made by the Riksbank, some 10 percent of GDP, is estimated to have resulted in balance sheet losses of some SEK 61 billion (around 1 percent of 2021 GDP) for the entire period. These losses, and the perceived small effects of LSAPs on economic activity and inflation, has prompted a recommendation against the future use of LSAPs with the primary purpose of influencing inflation in Sweden (see Swedish National Audit Office, December 2023, “The Riksbank’s Asset Purchase: A Costly Experience”).

**3. We analyze the economic and fiscal effect of Riksbank’s LSAPs during COVID through two exercises.** First, using conservative multiplier estimates from Fabo and others (2021), we calculate the possible economic effects of QE.<sup>2</sup> Second, we use a structural New Keynesian model, calibrated to the Swedish economy for a more informed estimate of the economic gains and a fiscal cost-benefit analysis. Both exercises reveal that the benefits from the programs during COVID, in the form of higher real and nominal GDP, may outweigh the central bank balance sheet losses. If a commensurate stimulus to output and inflation has been engineered with fiscal policy, it would likely be associated with some rise in overall public debt. Some further qualifiers include: 1) we only consider the effects of Riksbank’s purchases during COVID, and hence exclude any activities preceding this episode in our analysis and compare these with the estimated losses made by the central bank for the entire QE period (i.e., 1 percent of GDP). This would imply that the net actual

<sup>1</sup> Prepared by Marcin Kolasa and Jesper Linde (IMF). The authors thank Stefan Laséen, Mattias Erlandsson, and Jens Iversen for their thoughtful comments.

<sup>2</sup> Fabo et al. (2021) contains a survey of 54 studies assessing the effects of QE on output and inflation in the U.S., Euro area and the U.K. They find that the effects of QE in articles published by academic scholars are significantly smaller than articles published by economists employed by central banks. We rely on the smaller (conservative) effects published by academic scholars.

positive effect on the overall public sector balance sheet would be stronger than the conservative findings in our analysis. 2) the Riksbank bought both government and non-government assets during the pandemic, we assume that the effects of QE with the latter are similar to that with government bonds and also do not take into account Sweden specific characteristics, in terms of the predominance of short-term variable rate borrowing rates. That said, QE should still induce increased borrowing and domestic demand through the expectation channel by signaling of an extended period of accommodative monetary policy.<sup>3</sup>

**4. The first exercise, based on conservative empirical estimates of the effects of QE** in Fabo et al. (2021), suggest that the 10 percent of GDP of QE in Sweden during the COVID pandemic increased GDP with 1.1 percent relative to no-QE baseline. According to the same survey, this should have contributed to 0.5 percent higher inflation at the peak relative to a counterfactual without QE. The Riksbank losses from these purchases is still uncertain, but assuming in line with our macroeconomic model that they are a little over one percent of GDP, we obtain a QE multiplier – i.e., peak output increase divided by the loss of QE – of about unity.

**5. A QE output multiplier of unity compares favorably to a fiscal spending multiplier**, which is typically also estimated by the literature of up to around unity, depending on the composition of fiscal spending. However, in a severe economic contraction when the policy rate is expected to be constrained by its effective lower bound for a protracted period, the fiscal government spending multiplier may be significantly larger - possibly as high as 2 - as shown by Coenen et al. (2012) and the Swedish Konjunkturinstitutet (2021).<sup>4</sup> Even so, because QE boosts private demand and net exports exclusively, whereas a large part of the output impetus for fiscal stimulus consists of higher government spending, a QE multiplier of unity is considerable.

**6. We next use a macroeconomic model to make a tentative assessment of the fiscal consequences of the Riksbank QE during the pandemic.** A macroeconomic model allows us to calculate the fiscal revenues QE generates over time. We use the model under two alternative perspectives. First, we study the fiscal implications given the prevailing outlook when the Riksbank launched the purchases, specifically the outlook called for policy and long-term yields to remain low for long. Second, we adopt an ex-post perspective and assessing the fiscal consequences under the actual outturns which featured faster-than-projected increase in policy rates and long-term yields, driven by an unfavorable mix of adverse supply developments (supply bottlenecks and unfavorable cost-push shocks) and stronger-than anticipated demand.

**7. The analysis assesses the fiscal effects of LSAPs in a two-country New Keynesian model with bond market segmentation.** The model is augmented to include an account of fiscal policy and government debt dynamics and is calibrated to reflect the key features and initial conditions

<sup>3</sup> For instance, Beechey Österholm and Gustafsson (2023) find that Riksbank's purchase of government bonds depressed government bond premia significantly during the 2015–21 period.

<sup>4</sup> Models which address the forward guidance puzzle, i.e., that announcements of future interest rate changes have disproportionate effects of current inflation and output when the policy rate is fixed for some time, implies that the fiscal spending multiplier is notably less elevated when the policy rate is at the ELB.



when the Riksbank undertook QE. We use a large, negative demand shock to simulate a severe fall in the global economic activity, which drives the Riksbank policy rate to its effective lower bound for a prolonged period.<sup>5</sup>

**8. By lowering long-term rates and depreciating the exchange rate, LSAPs helped mitigate the contraction in economic activity and deflationary pressures and created room for an earlier policy lift-off** (see Figure 1). Had the economic recovery proceeded as forecasted at the time of the purchases, the impact of LSAP on the fiscal stance would be clearly favorable, implying a reduction in government debt by more than 2 percent of annual GDP in the 8-year horizon. This positive fiscal outcome is mainly due to increased tax revenues and lower debt service costs, which more than offset the adverse impact on central bank profits that cumulate to merely 0.1 percent of annual GDP.<sup>6</sup>

**9. However, as noted above, LSAPs make the central bank balance sheet more vulnerable to earlier policy normalization.** Indeed, this risk materialized as the policy rate needed to be increased much earlier and more sharply than projected during the COVID crisis due to an unexpected sharp rise in inflation. We simulate this scenario in the model by assuming that, about 1.5 years after the LSAPs, positive demand and negative supply shocks trigger a faster global recovery. These shocks are aimed to capture the post-pandemic recovery and sharp increase in energy prices, both contributing to a sharp rise in inflation.

**10. In the scenario with earlier monetary tightening, the cumulative decrease in central bank profits due to LSAPs amounted to a little more than 1 percent of annual GDP** (see Figure 2). In consequence, ex post fiscal gains from LSAPs were significantly reduced, but still unlikely to be negative overall given our conservative approach in comparing the benefits of QE only in the COVID period against the estimated losses bade by the Riksbank for the entire QE period. These outcomes can be contrasted with the consequences of a fiscal stimulus which, if used to provide a similar boost to private demand and net exports to that achieved with LSAPs would likely increase government debt for realistic values of fiscal multipliers.

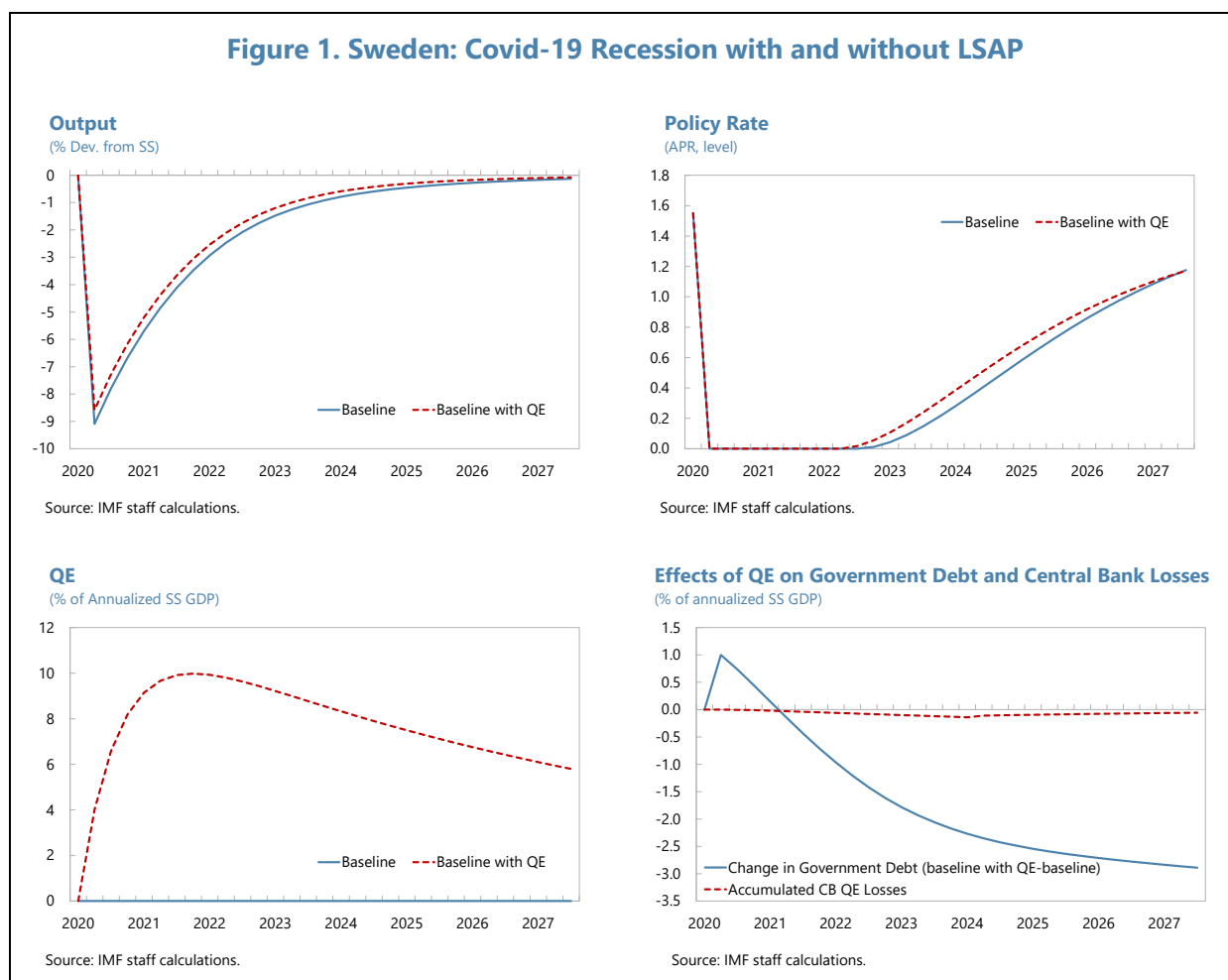
**11. These findings suggest that QE can still be a meaningful part of the policy package under exceptional economic circumstances.**<sup>7</sup> A few caveats are important to emphasize. First, the estimates from both exercises do not account for the appreciable uncertainty about the economic and financial outlook during COVID, and the potential amplification effects of a collapse in confidence and financial market stress. So, the counterfactual of how financial stress may have evolved in the absence of QE is not measured. We also note that the exercise is Sweden specific, and

<sup>5</sup> The model contains cognitive discounting that limits the ability to stimulate the economy with forward guidance when the policy rate is projected to be at the ELB for a protracted period. This implies that LSAPs is one of the few tools the central bank can use to provide stimulus and nudge inflation closer to its target.

<sup>6</sup> Note that output in the model scenario rises less than the conservative estimates in Fabo et al. (2021), so the favorable impact on the consolidated public debt could be even higher is not driven by implausible assumptions on the effectiveness of LSAPs.

<sup>7</sup> Other Sweden specific studies include Andersson and others (2022), and Di Casola and Stockhammar (2021)

does not account for the global environment, whereby other major central banks were also engaged in monetary policy easing with QE. We encourage the authorities to further study the effectiveness of LSAPs as well as a cost-benefit comparative analysis with other fiscal and monetary policy tools.<sup>8</sup>

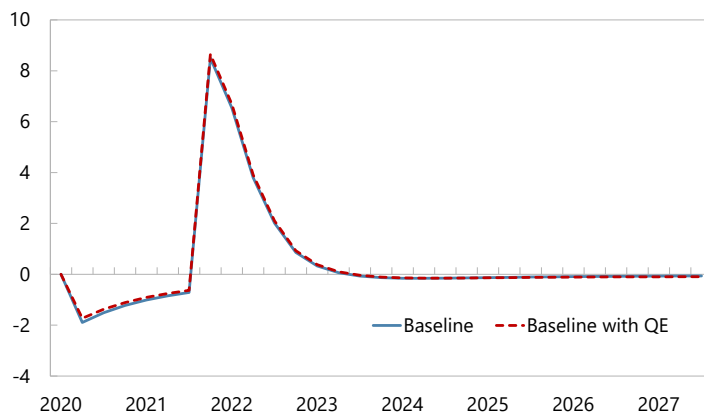


<sup>8</sup> As it comes to monetary policy tools, one could explore, for example, the possibility of even more deeply negative policy interest rates than -0.5 percent.

**Figure 2. Sweden: LSAPs with Unforeseen Strong Recovery and Policy Tightening**

**Inflation**

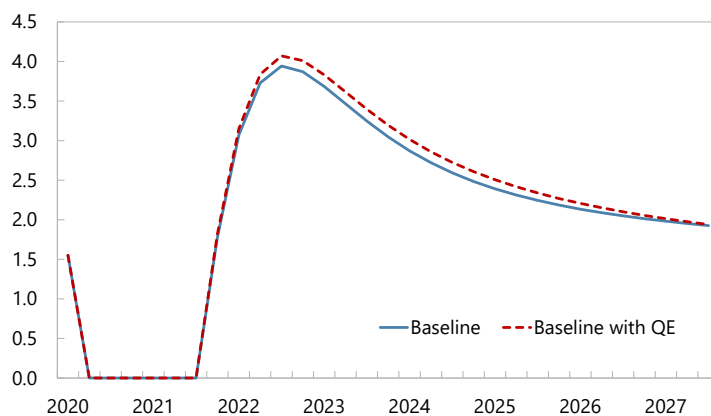
(APR, Dev. from SS)



Source: IMF staff calculations.

**Policy Rate**

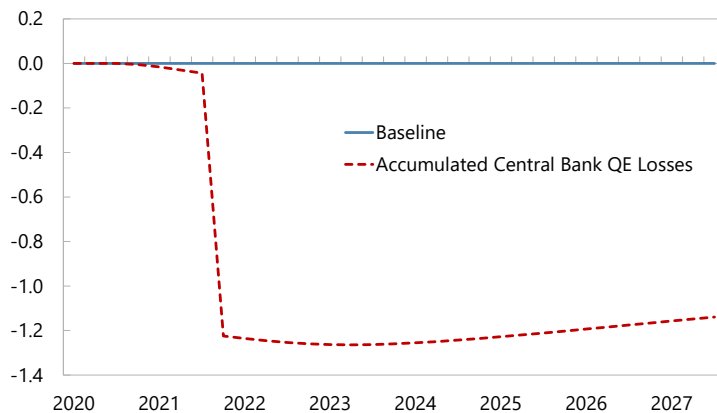
(APR, level)



Source: IMF staff calculations.

**Central Bank Profit**

(% of annualized SS GDP, cumulative)



Source: IMF staff calculations.

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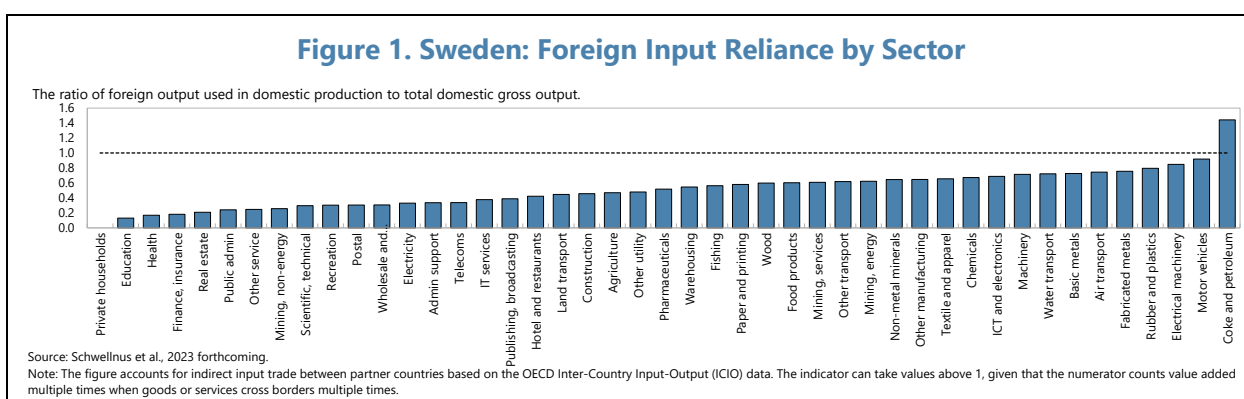
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# SWEDEN'S EXPOSURE TO GEO-ECONOMIC FRAGMENTATION<sup>1</sup>

**1. Sweden's economy is very trade oriented.** Trade openness, as measured by the share of trade in GDP grew from less than 40 percent of GDP in the early 1990s to 70 percent of GDP in 2022 (Figure 2, Panel 1).

**2. Trade is diversified across products and markets and integrated along global value chains** (Figure 2, Panels 2–3). Some three-quarters of exports comprise manufacturing goods—e.g., chemicals and chemical products, machinery and equipment, motor vehicles and electronics—with high import content. Most of the trade is with an “In Favor” group of countries, either intra EU27 or with non-EU27 countries, but the share with others, such as the United States, but also emerging markets such as China has increased markedly.<sup>2</sup>

**3. As a result, growth is vulnerable to shocks in the external economic environment and global supply chains.** A metric that measures trends in trade “Foreign Input Reliance (FIR)”<sup>3</sup> suggest that Sweden's trade exposure to the US-EUR bloc – including the UK, Germany, and France – while still substantial, has flatlined or declined from 1995 to 2020 (Figure 2, Panels 4–5, Figure 2). Intra-Nordic trade has on average also fallen. Instead, trade exposure to China, particularly in manufacturing (which includes direct and indirect Chinese inputs in the manufacturing sector) has increased from about 0.8 percent in 1995 to 9 percent in 2020.<sup>4</sup> The share of domestic inputs in manufacturing has also declined from 77.6 percent in 1995 to 72.7 percent in 2020. Given the exposure to global markets, trade restrictions affecting Sweden have steadily risen since the GFC (Figure 2, Panel 6).



<sup>1</sup> Prepared by Alexandra Fotiou, with contributions from Magali Pinat and Reza Yousefi.

<sup>2</sup> Baba and others (forthcoming) consider the decoupling of the global economy into two blocs, based on their vote in the March 2022 UN Resolution ES-11/1. In Favor and Other (Against/Abstained/Absent).

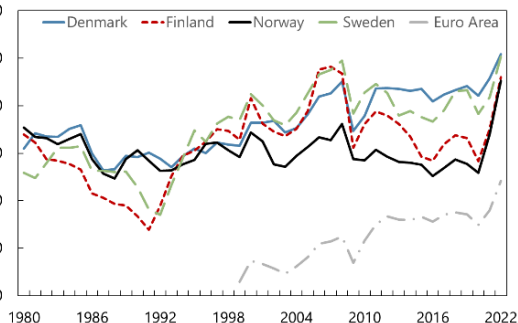
<sup>3</sup> See Vidahazy and others (forthcoming) and OECD (2023). The FIR metric measures the ratio of imported inputs from a country to total inputs.

<sup>4</sup> A similar pattern is also observed for input reliance in high-tech industries.

Figure 2. Sweden: Export Characteristics

Trade in Goods: Imports and Exports

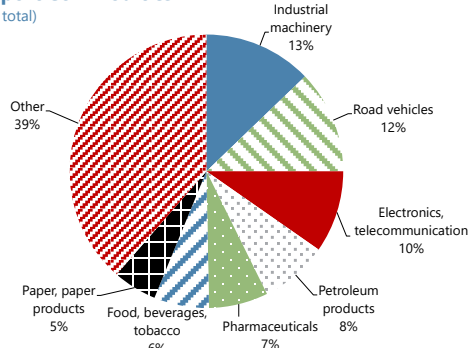
(Percent of Nominal GDP)



Sources: World Economic Outlook; and IMF staff calculations.

Main Export Commodities

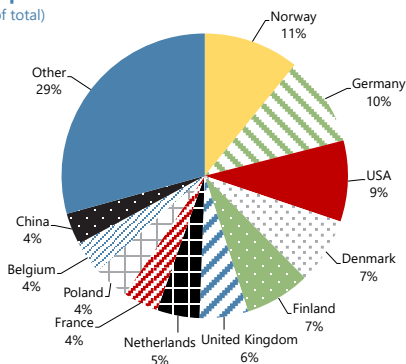
(Percent of total)



Source: OECD.

Main Export Destinations

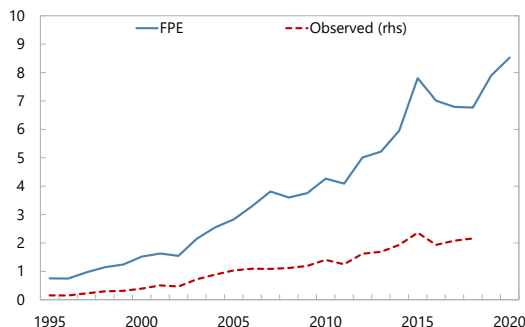
(Percent of total)



Source: OECD.

Sweden Foreign Production Exposure to Chinese Inputs: Manufacturing

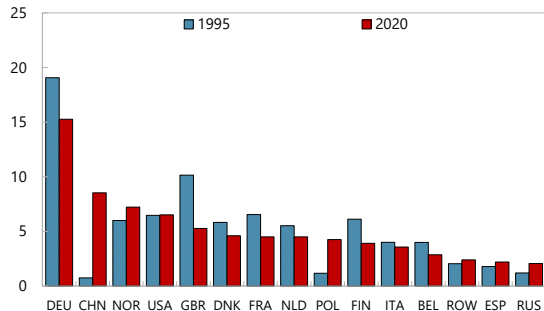
(Percent)



Source: IMF staff calculations.

Foreign Production Exposure - Manufacturing

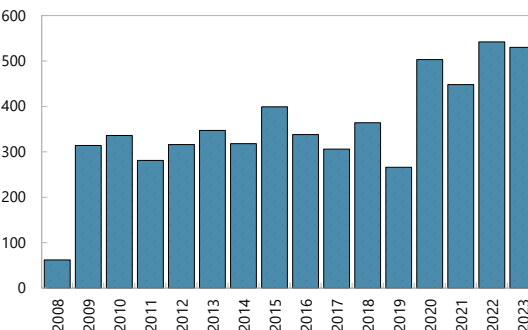
(Percent of total intermediate imports)



Sources: OECD Inter-Country Input-Output (ICIO) Tables 2020; and author's calculations following Baldwin and Freeman (2022).

Restrictions on Trade Affecting Sweden

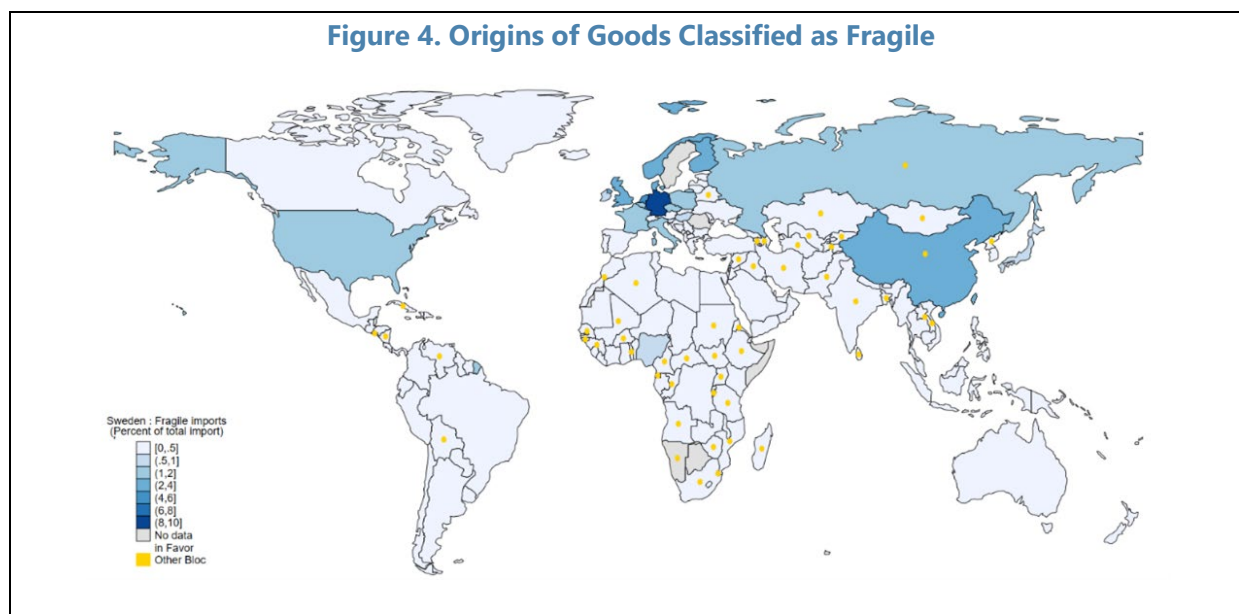
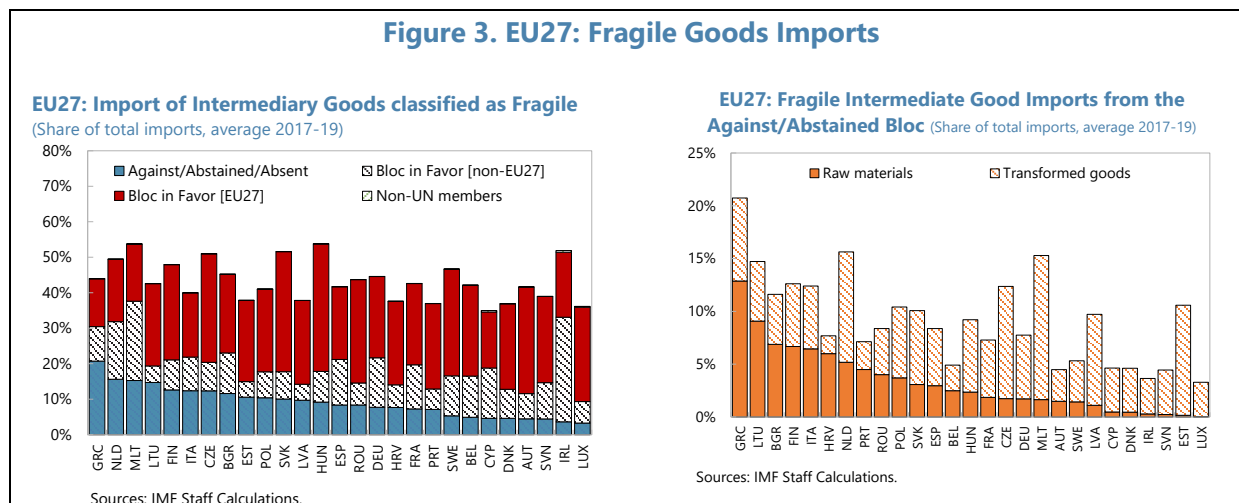
(Number of new restrictions)



Sources: Global Trade Alert; and IMF staff calculations.

4. At the same time, Sweden’s dependance on “fragile” intermediate goods is still relatively low (Figure 3). Goods are identified as fragile based on network characteristics of bilateral goods trade, for instance if they are subject to high centrality of exporters, concentration of imports from a few suppliers, or low potential to substitute a supplier. These “fragile” intermediate goods represent on average 45 percent of total imports by Sweden, of which 5 percent are supplied by countries from the “Other” bloc, compared to the EU average of 20 percent. Most of such fragile

intermediate goods imported from the “Other” bloc are raw materials (e.g., mineral fuels and oils, aluminum, rare-earth minerals).



**5. The external dependence on raw materials for the country’s green transition is even lower.** These inputs of rare earths are essential for electrification and battery production. The recent discovery in northern Sweden of one of the largest rare-earth deposits in Europe will reduce vulnerability to supply-side shocks further. Continued supply chain diversification, if helpful for trade cost efficiency, improving the supply of skilled labor, building strategic reserves, and maintaining risk assessments and early warning systems for crisis preparedness will further strengthen the economy’s resilience against supply chain shocks.<sup>5</sup>

<sup>5</sup> See Also OECD (2023), [Box 1.2](#).

## References

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