Norges Bank

4 | 2026

Norges Bank Papers

Input to the evaluation of the Regulation on Monetary Policy

Contents

Part 1

Economic developments and experience with the Regulation

1. Introduction

In *Financial Markets Report* 2025 (Report to the Storting No. 26 (2024–2025)), the Ministry of Finance announced that it would conduct an evaluation of the Regulation on Monetary Policy. A review of the Regulation is scheduled to take place every eight years. The previous review of the mandate was conducted in 2017 and resulted in an adjustment implemented in March 2018.[1]

In connection with the evaluation, the Ministry has asked Norges Bank to submit a written assessment of its experience with the current Regulation on Monetary Policy, together with an assessment of international experience, including experience from supply-side shocks, and recent international research on monetary policy.

This *Paper* presents Norges Bank's input to the evaluation and is structured as follows: Section 2 describes economic developments between 2018 and 2025, emphasising the shocks to the Norwegian economy and the conduct of monetary policy. Developments in main macroeconomic aggregates since 2018 are also examined, and the attainment of objectives and the stability of key variables in this period are compared with the period between 2001 and 2017 when the previous mandate applied. Building on this review of economic developments, Section 3 assesses Norges Bank's experience with the Regulation itself. Part 2 of this *Paper* discusses international research and practice on issues relevant to monetary policy mandates.

1 For Norges Bank's input to the previous review, see Norges Bank (2016) and Norges Bank (2017).

Experience with the Regulation on Monetary Policy: Main points

- **Experience with flexible inflation targeting has been positive both in Norway and internationally. The framework provides a nominal anchor, while also providing room to respond appropriately to unexpected shocks.**
- **Norges Bank's experience with the Regulation on Monetary Policy is also positive. Low and stable inflation is a natural overarching objective of monetary policy. The Regulation translates the overarching objective into a numerical target for consumer price inflation (CPI). It also stipulates other monetary policy considerations: promoting high and stable output and employment and mitigating the build-up of financial imbalances.**
- **The CPI functions well as the target variable for the inflation target. Under a flexible and forwardlooking inflation targeting regime, in order to avoid unnecessary fluctuations in the real economy, monetary policy looks through shocks that are expected to have a short-term effect on CPI inflation.**
- **Central banks with inflation targets that have reviewed their monetary policy frameworks in recent years have given little consideration to the actual level of the inflation target. This reflects the fact that inflation has been high and that there has been a need to ensure wellanchored inflation expectations. There are no compelling reasons for Norway's inflation target to differ from those of Norway's trading partners.**
- **Sustaining employment at the highest possible level is a primary objective of economic policy. While monetary policy shall contribute to high and stable output and employment, there is no evidence to suggest that an expansionary monetary policy can achieve higher employment over time by permitting higher inflation. Norges Bank therefore understands "high" to mean the highest sustainable level.**
- **The build-up of financial imbalances increases the risk of a sharp economic downturn in the future. Norges Bank interprets this consideration to be derived from the objective of high and stable output and employment. Financial stability considerations would therefore have been given weight even in the absence of an explicit reference in the Regulation.**
- **Transparency around the assessments and tradeoffs in monetary policy is essential for democratic control and compensates for the difficulty of verifying objective attainment under flexible inflation targeting. The challenges associated with verifying objective attainment may nevertheless become excessive if monetary policy must strike a balance between a wide range of objectives and considerations or if the monetary policy instruments are not well suited to attaining the objectives.**

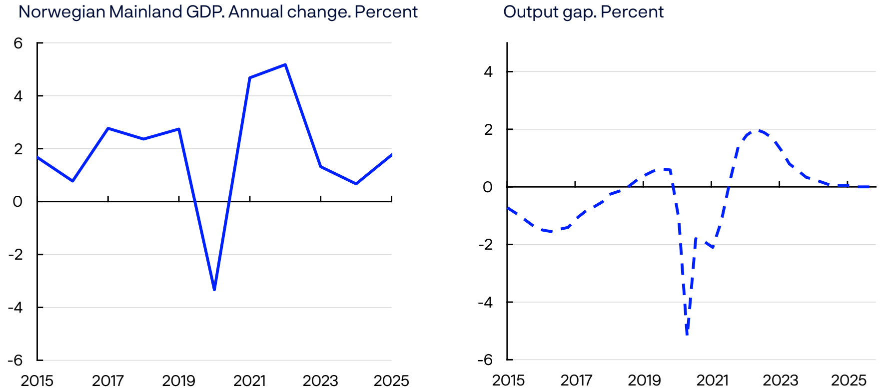
2. Economic developments in Norway since 2018

2.1 Economic shocks

Since 2018, the pandemic in 2020 and the inflation shock of 2021–2022 have affected both the Norwegian and the international economy. In setting the policy rate, the Monetary Policy and Financial Stability Committee has given weight to both low and stable inflation over time and high and stable output and employment. At the start of the pandemic, when unemployment rose sharply, the policy rate was rapidly lowered. As inflation picked up markedly, monetary policy was tightened.

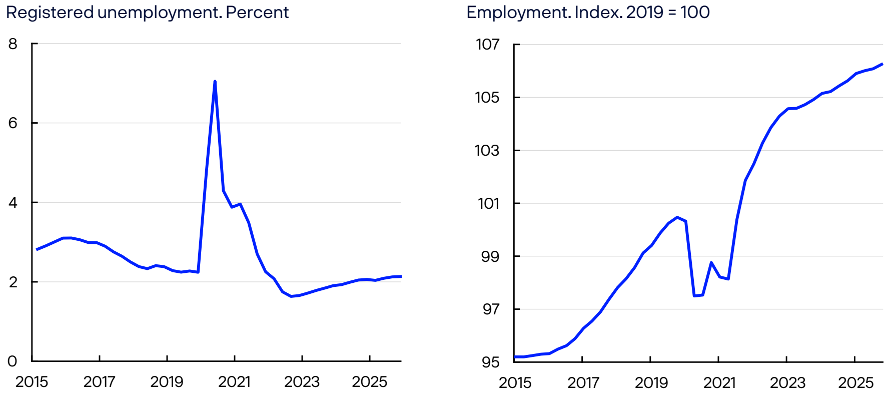
2018–2020: Stable economic developments and inflation close to target
At the beginning of 2018, the Norwegian economy was recovering from the fall in oil prices a few years earlier (Chart 2.1). Registered unemployment had fallen to a moderate level (Chart 2.2) and unemployment measured by Statistics Norway's Labour Force Survey had also declined. Inflation was slightly below, but close to, the new 2% target (Chart 2.3). The policy rate stood at 0.5% and had been unchanged since summer 2016.

Chart 2.1 Norwegian Mainland GDP and output gap



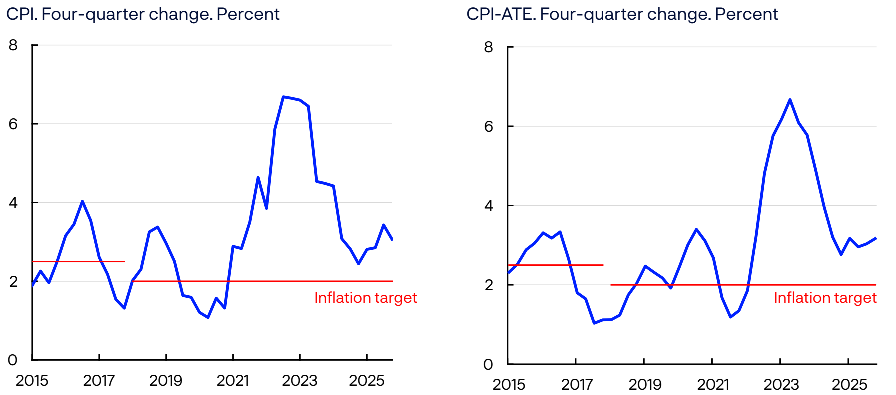
Sources: Statistics Norway and Norges Bank

Chart 2.2 Unemployment and employment



Sources: Statistics Norway and Norges Bank

Chart 2.3 CPI and CPI-ATE



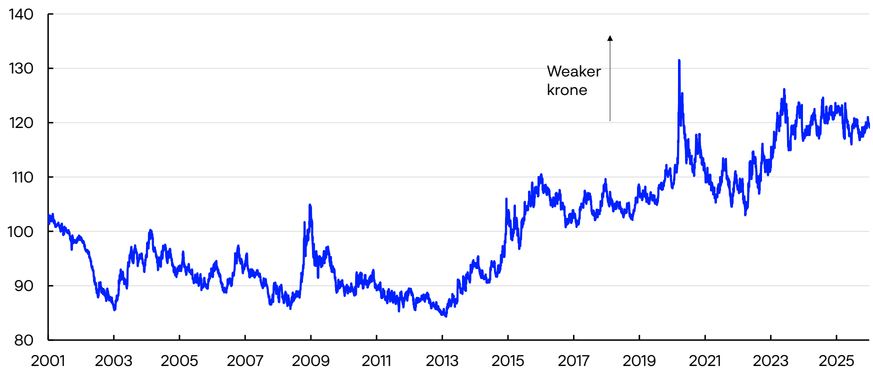
Sources: Statistics Norway and Norges Bank

Internationally, policy rates were low, with negative policy rates in both the euro area and Sweden. Underlying inflation among trading partners was just under 1.5% and market expectations indicated that international interest rates would remain low.

After weakening in response to the oil price fall in 2014, the krone exchange rate measured by the I44 index had remained relatively stable in the few years preceding 2018 (Chart 2.4).

Chart 2.4 Krone exchange rate

Import-weighted exchange rate index (I-44)

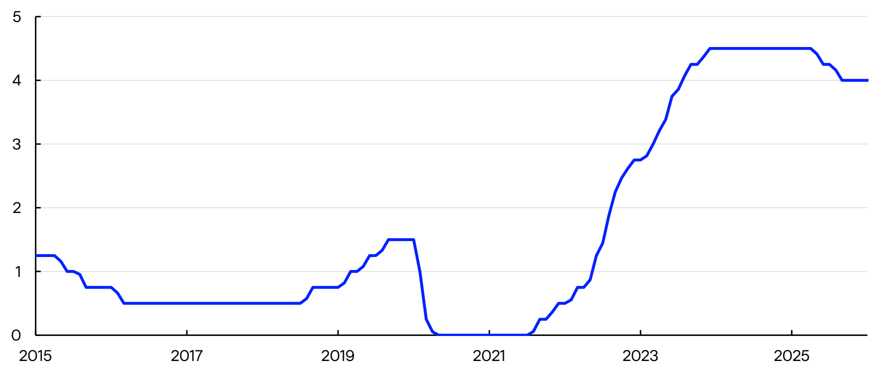


Source: Norges Bank

Following a period of rapidly rising prices, house price inflation had moderated. Credit growth remained elevated but was moderating (see Chart 2.24 in Section 2.2.3). In Norges Bank's assessment, persistently high debt growth over a prolonged period had increased household vulnerability.

In September 2018, Norges Bank began a gradual normalisation of the policy rate (Chart 2.5).[2] Underlying inflation was then close to target, and capacity utilisation appeared to be close to a normal level. Weight was given to the risk that persistently low interest rates could push up price and wage inflation and contribute to a further buildup of financial imbalances, thereby increasing the risk of a sharp economic downturn further ahead. At the same time, the long period of low interest rates and rising debt ratios had added to the uncertainty surrounding the effects of higher interest rates, suggesting a cautious approach to policy rate setting. The projections indicated that inflation would move up to the target, at the same time as a positive output gap would gradually close.

Chart 2.5 Policy rate
Percent



Source: Norges Bank

Towards the end of 2019, the Bank assessed capacity utilisation to be somewhat above a normal level. Wage growth had risen from a moderate level but was expected to remain low compared with previous cyclical upturns. The outlook suggested that underlying inflation, as measured by the CPI adjusted for tax changes and excluding energy products (CPI-ATE), would remain close to target.

There were signs that financial imbalances were receding. Household debt growth had slowed further, and house price inflation was moderate.

The policy rate was gradually raised further, to 1.5% in September 2019. At that level, the outlook suggested that inflation would remain close to target, while unemployment would remain low.

2 The policy rate had last been adjusted in March 2016, down to 0.5%.

2020–2021: The pandemic and substantial easing – followed by a gradual reversal

In spring 2020, the pandemic triggered a sharp economic downturn in Norway and abroad. As lockdowns were implemented, activity in contactintensive sectors dropped sharply, and registered unemployment rose abruptly (Chart 2.2). Developments in Norway differed little from those abroad.

At the start of the pandemic, uncertainty was unusually high, and the risk of a marked economic downturn was substantial. Norges Bank responded by rapidly lowering the policy rate, and the rate reached 0% in May 2020 (Chart 2.5). Monetary policy trade-offs emphasised that while low interest rates could not prevent the substantial economic consequences of the outbreak, they could mitigate the impact and reduce the risk of more persistent effects on output and employment. According to the Bank's projections in spring 2020, inflation was expected to rise over the coming year on the back of higher electricity prices and a weaker krone, before declining again.

The Bank also implemented a range of measures to improve liquidity in the money and FX markets. International financial markets were marked by considerable turbulence, with a sharp fall in equity prices, alongside a marked decline in oil prices. In Norwegian money and credit markets, risk premiums rose and liquidity conditions weakened. As often observed in periods of elevated uncertainty and falling oil prices, the Norwegian krone depreciated. The depreciation was amplified by currency hedge rebalancing by Norwegian asset managers with large foreign asset exposures, leading to substantial NOK sales.[3] The NOK market functioned very poorly, with unusually large exchange rate movements. Against a number of currencies, the import-weighted krone exchange rate (I-44) hit record lows. A more detailed discussion of the factors affecting the NOK exchange rate is provided in Section 8.

To support a well-functioning NOK market, Norges Bank made extraordinary NOK purchases totalling NOK 3.5bn in the FX market in March 2020. Moreover, a temporary swap line with the Federal Reserve helped bolster dollar liquidity in the Norwegian market. The balance in the NOK market improved, and the krone gradually appreciated. The appreciation coincided with rising oil prices and reduced uncertainty in global financial markets.

The measures targeting the FX market complemented other liquidity measures aimed at Norwegian banks in the form of extraordinary loans that were also at longer maturities than normally offered, and the easing of collateral requirements.

On the advice of Norges Bank, the countercyclical capital buffer was reduced from 2.5% to 1.0% in order to mitigate the risk of tighter bank lending that could amplify a downturn.

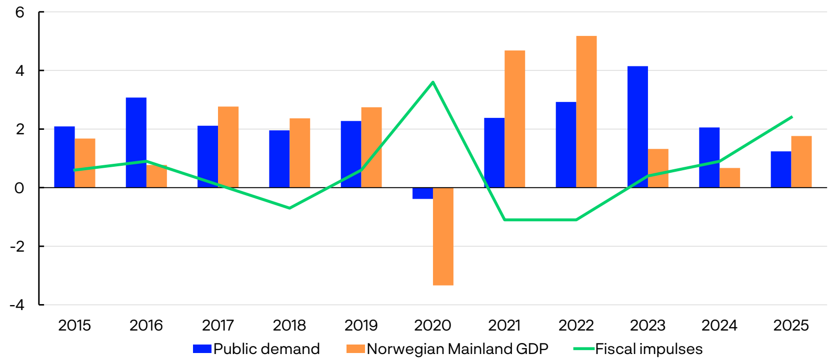
3 See Alstadheim et al (2021).

At the same time, the authorities introduced comprehensive fiscal support measures targeting the most severely affected parts of the economy. These included compensation schemes for firms, adjustments to layoff and unemployment benefit arrangements and deferrals of direct and indirect taxes (Chart 2.6). The measures helped limit income loss and bankruptcies, preserve employer–employee relationships and maintain production capacity.

Overall, the combined use of policy instruments by Norges Bank and the authorities resulted in a clearly expansionary policy stance.

Chart 2.6 Fiscal impulses, public demand and Norwegian Mainland GDP

Annual change. Percent

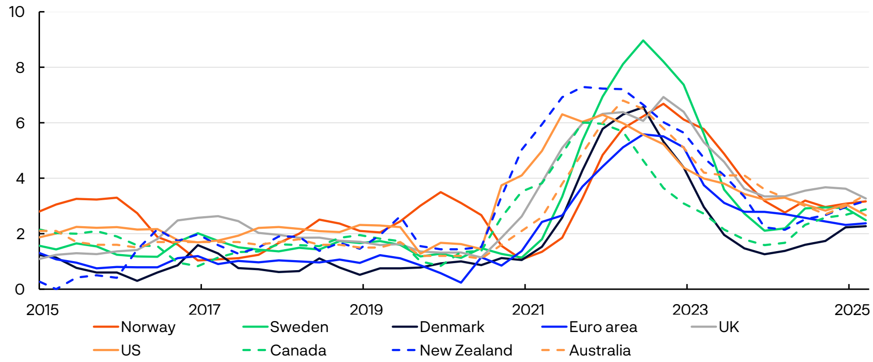


Sources: Ministry of Finance, Statistics Norway and Norges Bank

The economic disturbances during the pandemic were a combination of demand and supply shocks (see box "What kind of shocks were the main drivers of inflation?"). Containment measures triggered substantial activity swings in certain sectors. Low interest rates and income support schemes helped sustain household disposable income, while containment measures placed significant restrictions on household consumption. Services consumption decreased markedly, while demand for goods increased, albeit less than the decline in services consumption, resulting in households saving more than usual. Similar shifts in household demand towards goods were observed internationally.

On the other hand, Covid infections and containment measures led to production and distribution delays for internationally traded goods. Together, these factors led to a sharp rise in freight rates and significant price increases for commodities and some other goods. Towards the end of 2021, inflation among a number of Norway's trading partners picked up markedly (Chart 2.7). In Europe, higher gas prices also fuelled inflation.

Chart 2.7 Inflation across countries
Core inflation. Four-quarter change. Percent



Sources: Statistics Norway, LSEG Datastream and Norges Bank

The Norwegian economy recovered more rapidly than initially feared. As vaccination progressed and the economy reopened, activity picked up, with household consumption in particular increasing markedly. By June 2021, mainland GDP had returned to its prepandemic level. Unemployment had fallen sharply, and capacity utilisation had increased to a normal level.

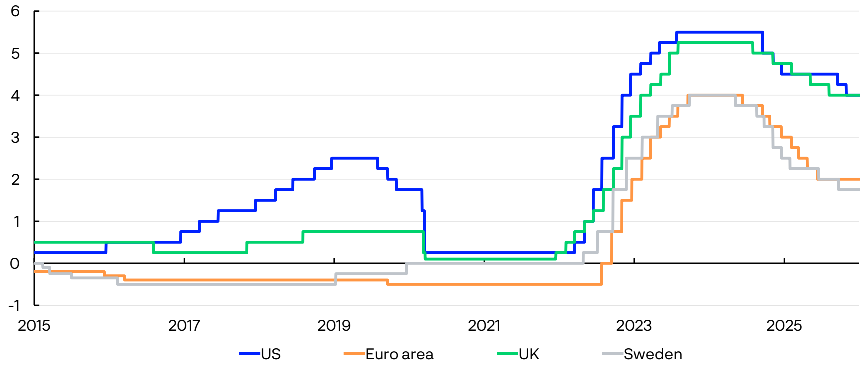
Inflation rose markedly and moved well above the target in the course of 2021, driven by a sharp rise in electricity prices. Underlying inflation remained below target, but towards the end of the year higher freight rates and higher imported consumer and intermediate goods inflation indicated an increase also in underlying inflation ahead.

As economic activity picked up, Norges Bank repeatedly revised the policy rate path up further out in the forecast horizon. From September 2021, the Bank also initiated a gradual normalisation of the rate (Chart 2.5). The assessment was that monetary policy no longer needed to be as expansionary. Concerns about the buildup of financial imbalances also supported higher interest rates, while uncertainty about the effects of higher interest rates suggested gradual hikes. The countercyclical capital buffer requirement was also raised.

2022: Russia's invasion of Ukraine. Higher energy prices
Russia's full-scale invasion of Ukraine in February 2022 led to a further increase in energy and other commodity prices. The global rise in prices was amplified, and trading partner central banks raised policy rates in several rounds (Chart 2.8).[4]

4 This was the most synchronised tightening of monetary policy in at least 50 years. See Forbes et al (2024).

Chart 2.8 Policy rates across countries
Policy rates. Percent



Sources: Bloomberg, LSEG Datastream and Norges Bank

In Norway, economic activity was high with little spare capacity. Wage growth picked up, and inflation continued to rise rapidly (Chart 2.3). The rise in prices of both imported goods and domestically produced goods and services picked up, and both headline and core CPI inflation rose markedly above target. According to Norges Bank's Expectations Survey, long-term inflation expectations increased (see box "Inflation expectations during the high-inflation period".

The krone exchange rate depreciated sharply through 2022 and in the period to summer 2023 (Chart 2.4). The depreciation likely reflected a number of factors including policy rates among a number of Norway's main trading partner countries eventually rising above the Norwegian rate. Periods of heightened uncertainty in financial markets and a fall in oil prices may also have contributed. The depreciation pushed up imported goods inflation and made monetary policy trade-offs more difficult. The interaction between the exchange rate and monetary policy is discussed in detail in Section 8.

The monetary policy trade-offs suggested tighter monetary policy, and Norges Bank raised the policy rate more rapidly and in larger increments than usual. There was a need for a higher policy rate to bring inflation down towards target. In addition, had Norges Bank not raised the policy rate, the krone could have depreciated further and contributed to a continued rise in inflation. By raising the rate quickly, the Bank also sought to reduce the risk of inflation becoming entrenched at a high level, for example by feeding into higher inflation expectations.

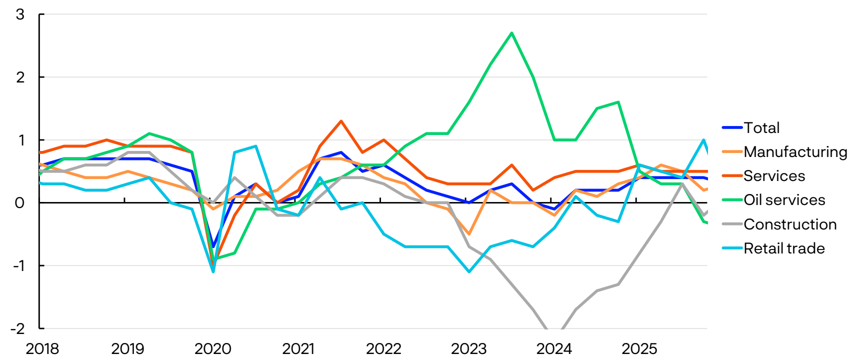
Through 2022, the Bank's inflation projections and forecasts for the output gap were revised up a number of times (see box "How accurate have Norges Bank's forecasts been, and what has the Bank learned?" As a result, the policy rate path was also revised up several times.

2023–2024: Broad-based inflation, high wage growth and a weak krone
The policy rate cooled the Norwegian economy, which reached a cyclical peak towards the end of 2022 before growth subsequently slowed (Chart 2.1). Unemployment increased a little, but the rise then levelled off and,

according to registered unemployment figures, unemployment was still below pre-pandemic levels at the end of 2024 (Chart 2.2). Capacity utilisation in the economy then appeared to be close to a normal level.

Chart 2.9 Output growth in different sectors

Expected output growth current quarter. Percent

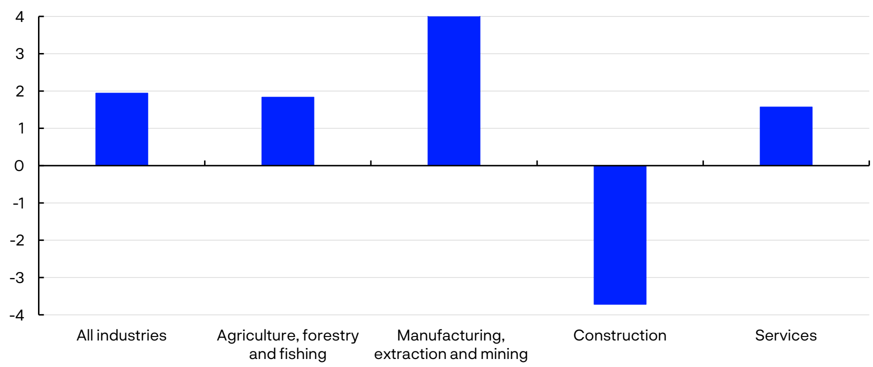


Source: Norges Bank Regional Network

At the same time, there were large differences between sectors, as evidenced by Norges Bank's Regional Network contacts (Chart 2.9). In sectors that deliver to more interest rate sensitive demand components, particularly housing investment, investment in real estate development and private consumption, contacts reported a decline in activity. Construction was particularly hard hit. While overall employment increased over the period between 2022 and 2024, employment in construction fell (Chart 2.10). Retail trade contacts also reported somewhat lower demand. At the same time, high petroleum investment in response to the petroleum tax package from 2020 resulted in strong growth in oil services, while the NOK depreciation improved profitability and resulted in higher activity among exporters. Public demand also helped sustain economic activity. See Section 9 for a more detailed discussion of how the effect of monetary policy differs across industries and sectors and potential implications for monetary policy.

Chart 2.10 Employment

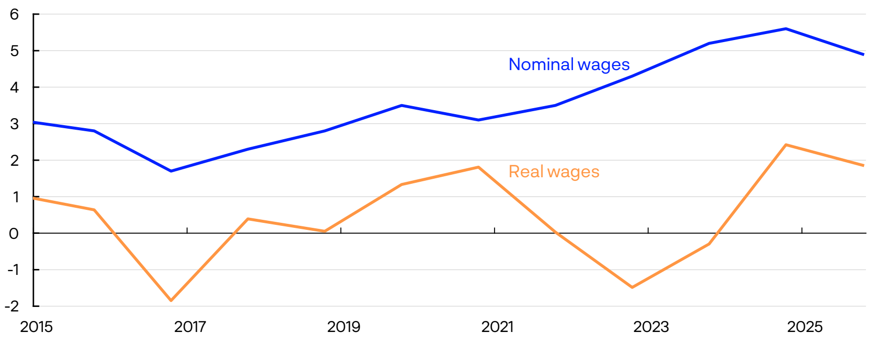
Selected industries. Percentage change from 2022 Q4 to 2025 Q4



Source: Statistics Norway. Services exclude public administration, education and health and social services

Continued low unemployment, high inflation and sound profitability in large segments of manufacturing resulted in high wage growth. In 2023, nominal wage growth was the highest seen in 15 years and picked up further in 2024. In 2024, real wages rose after falling for two years (Chart 2.11).

Chart 2.11 Wage growth
Annual change. Percent

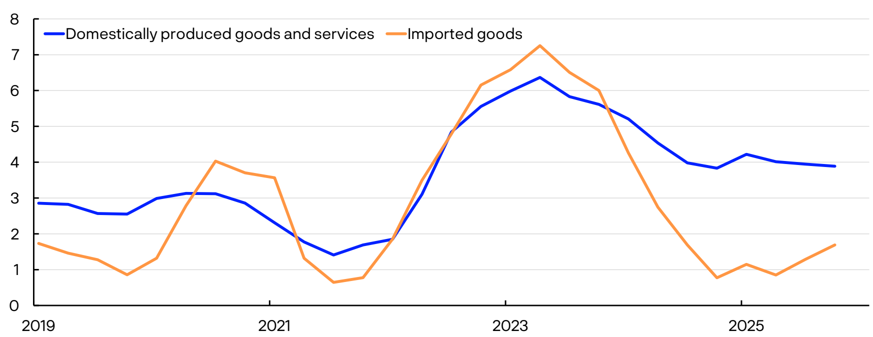


Sources: Statistics Norway and Norges Bank

Inflation continued to rise faster than expected into 2023 before declining through autumn and further through 2024 (Chart 2.3) as a number of the factors that had triggered inflation normalised. Cross-border goods trade, for example, flowed more normally again. In addition, a higher policy rate had helped ease the pressures in the economy.

Inflation fell more rapidly than anticipated in 2024, but underlying inflation remained clearly above target at yearend. While imported goods inflation declined rapidly further out, overall inflation was underpinned by rapidly rising prices for domestically produced goods and services (Chart 2.12).

Chart 2.12 Inflation. Domestically produced goods and services and imported goods
CPI-ATE. Four-quarter change. Percent



Sources: Statistics Norway and Norges Bank

Inflation among Norway's main trading partners also quickly declined further out. In a number of economies, inflation was expected to continue to fall, and more rapidly than in Norway. From mid2024, a number of central banks began a gradual easing of policy rates.

Higherthanestimated capacity utilisation and higher inflation projections led Norges Bank to revise the policy rate path up somewhat towards summer 2023. The policy rate was increased further to 4.5% in December 2023 (Chart 2.5) and kept unchanged thereafter throughout 2024. The assessment was that premature easing could result in inflation remaining above target for too long, while an excessively tight monetary policy stance could restrain economic activity more than warranted.

2025: Gradual normalisation amid renewed global trade uncertainty
In 2025, the global economy was marked by trade policy uncertainty, and tariffs on imports to the US increased markedly for many countries. At times, uncertainty about the outlook was heightened and resulted in pronounced financial market fluctuations. The uncertainty moderated further out but was still pronounced at the end of the year. Nevertheless, economic activity proved resilient both in Norway and among trading partners. In Norway, mainland economic growth was somewhat stronger than in 2024.

Unemployment increased somewhat through 2025, and registered unemployment was approximately at pre-pandemic levels in December. Capacity utilisation in the economy appeared to be below, albeit close to a normal level. Demand conditions shifted in 2025. Household consumption growth strengthened, while housing investment rose slightly from a low level. Construction activity nevertheless remained at a very low level. Wage growth eased somewhat compared with 2024 but remained high.

After falling markedly in 2023 and 2024, inflation changed little in 2025. Domestically produced goods and services inflation remained elevated, while imported goods inflation remained low (Chart 2.12). Inflation was still above the target at year-end. According to Norges Bank's Expectations Survey, long-term inflation expectations remained slightly above 2% (see box "Inflation expectations during the high-inflation period").

In June 2025, the policy rate was lowered to 4.25% (Chart 2.5). The Monetary Policy and Financial Stability Committee judged that a cautious policy rate normalisation would pave the way for inflation to return to target further out without restricting the economy more than warranted. The policy rate was reduced further to 4% in September and was then kept unchanged to yearend. At the end of 2025, the Bank's estimate of the expected real interest rate was in the upper half of the interval for the estimated neutral real interest rate (see box "Neutral real interest rate").

What kind of shocks were the main drivers of inflation?

This box explores the drivers of inflation following the pandemic and Russia's invasion of Ukraine. The analysis distinguishes between domestic and foreign supply and demand shocks and compares the inflation path in Norway with developments in other countries.

A number of studies have pointed to supply-chain disruptions, higher energy prices and other pandemic-related disruptions (Dao et al 2024). In addition, a strong labour market and expansionary monetary and fiscal policies have contributed to boost aggregate demand and have also being highlighted as a factor behind the inflation surge.

Identifying in real time which shocks are impacting the economy can be difficult. Nevertheless, it is important to attempt to distinguish between different explanations, as the appropriate monetary policy response will depend on the extent to which developments are driven by demand or supply shocks. Supply shocks often entail a trade-off between dampening the decline in economic activity and bringing inflation quickly back down towards the target.

For a small open economy such as Norway, it is also important to assess the role of global shocks and how they affect the economy. Aastveit et al (2026) show that global shocks played a key role during the inflation surge. It is, however, an open question whether impulses from abroad spill over to the Norwegian economy primarily as demand or supply shocks.

A natural way to separate demand and supply shocks is to use flexible time series models such as vector-autoregressive (VAR) models. Bernanke and Blanchard (2025) is a key paper in the literature that assesses the contribution of product market shocks and labour market shocks to US inflation after the pandemic. They find that food and energy prices have had a considerable impact on overall inflation but treat food and energy prices, as well as supply shortages, as exogenous variables, thus variables that are not explained by the model. This makes it difficult to translate the results into a demand/supply decomposition that is useful for monetary policy analysis. When an explicit distinction is made between demand-side and supply-side forces, most studies find that demand shocks play a prominent role (see for example Giannone and Primicer, 2024, and Bergholt et al , 2025). These demand shocks capture a number of underlying driving forces. More recent papers identify multiple demand shocks and find an important role for expansionary monetary policy (Gagliardone and Gertler, 2025), fiscal policy measures (Mori, 2025), and the depletion of excess savings built up during the pandemic (Bardoczy et al, 2025).

While most studies focus on large economies such as the US and the euro area, a recent research project also examines small open economies (Friis et al 2025). The same type of time series model that are used in other studies, are estimated for Norway, Sweden, the UK and the US.[5] The approach distinguishes between domestic and foreign supply and demand shocks and uses variables such as domestic and imported prices, as well as domestic output and output among each country's main trading partners.

Chart 2.A presents a decomposition of the inflation surge in the US (upper left panel), Norway (upper right panel), the UK (lower left panel) and Sweden (lower right panel), based on the estimated model in Friis et al (2025). Inflation in Norway follows a path that is five to six quarters behind developments in the US, while the lag is shorter for Sweden and the UK. The model delivers three main results:

1. Although supply factors played an important role, demand forces – both domestic and international – emerge as the main drivers of the inflation surge in all countries except Sweden. Domestic demand forces are prevalent in in the US and Norway, while international demand side conditions play a larger role in the UK and Sweden.

2. Foreign factors are important in all countries, including the US, but international demand factors are more prevalent than international supply, with the exception of Sweden. Although high commodity prices have been attributed to supply-side factors, they may also reflect strong demand, which the model finds stronger support for.

3. The decomposition for Norway is more closely aligned with the US than with Sweden. One possible explanation for the stronger role of demand forces in Norway than in Sweden is that fiscal policy has been less expansionary in Sweden. In addition, Sweden's pandemic-related containment measures were comparatively less extensive (Ingves, 2024).

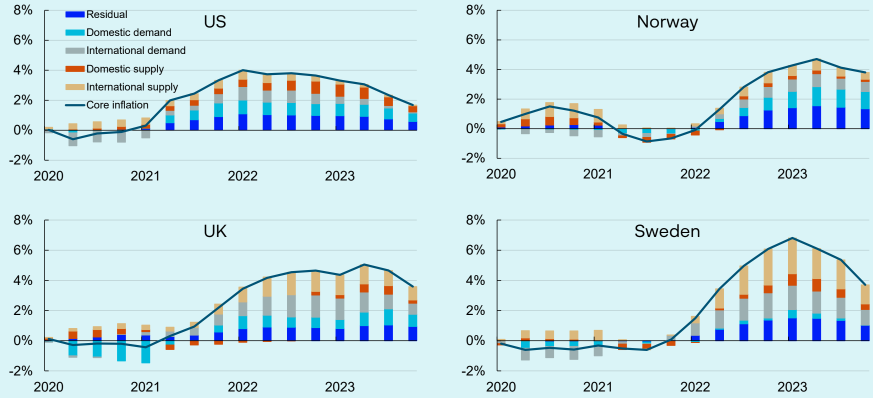
In summary, Friis et al (2025) indicate that the inflation surge was driven by *both* domestic and foreign factors and that international *demand shocks* were somewhat more prominent than international supply shocks in Norway, the UK and the US. The results are consistent with other analyses of the inflation surge in Sweden (Löf and Stockhammar, 2024), the UK (Brignone and Piffer, 2025) and the US (Giannone and Primiceri, 2024).

The model presented in this box provides a simple decomposition of inflation developments. A more complete description of the economy and the drivers of the inflation surge requires a more complex model framework. In addition, the model exercise is based on historical relationships and assumes that the functioning of the economy is unchanged over time, also when interpreting recent developments.

5 The model is identified using sign and magnitude restrictions on the shocks' effect on macroeconomic variables.

Chart 2.A Historical decomposition of core CPI inflation

Percentage deviation from the level in 2019 Q4



Source: Friis et al (2025)

2.2 Developments in key macroeconomic aggregates and objective attainment

Economic developments are shaped by a wide range of factors in addition to monetary policy. The economy is regularly exposed to supply-side and demand-side shocks that affect both inflation and output, and, in addition, structural changes that may alter how such shocks propagate through the economy. The contributions from other economic policy areas will also vary over time. This complicates the task of isolating and assessing the role of monetary policy in overall economic developments. The role of monetary policy is to strike a balance between the objectives of maintaining low and stable inflation and high and stable output and employment given the shocks that occur, informed by analyses and assessments of the nature of the shocks and the functioning of the economy.

2.2.1 Developments in inflation and inflation expectations

After inflation targeting was introduced in 2001, inflation remained low and stable for a long period (Chart 2.13). The first period, up until 2018, was marked by deflationary impulses, with inflation averaging approximately 0.5 percentage point below the then-target of 2.5%.[6]

In the period between 2018 and 2025, consumer prices, as measured by the CPI, rose on average by around 3.5% annually, substantially higher than the 2.0% target. Unlike in the preceding years, the economy has been marked by shocks that have primarily exerted upward pressure on inflation (Chart 2.14). The deviation from target primarily reflects the major shocks described in Section 2.1 but also to some extent Norges Bank's emphasis on avoiding employment falling more than needed. Tighter monetary policy would have dampened inflation but would have also

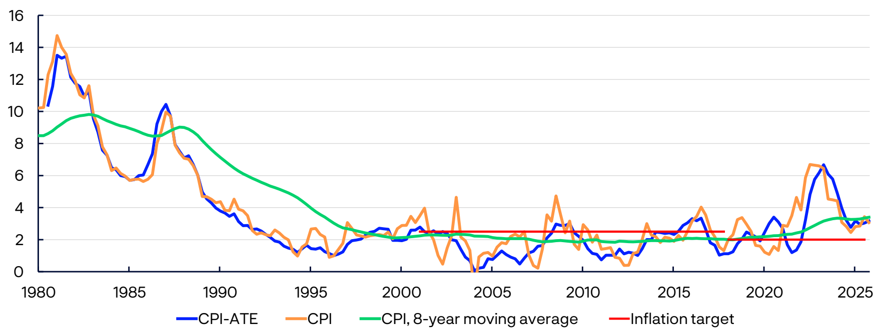
6 Norges Bank (2017).

resulted in lower output and employment. The monetary policy tradeoffs are discussed further in Section 6.

Inflation expectations, including longerterm expectations, have increased but show signs of a reversal towards the end of the period (see box "Inflation expectations during the high-inflation period").

Chart 2.13 Consumer prices

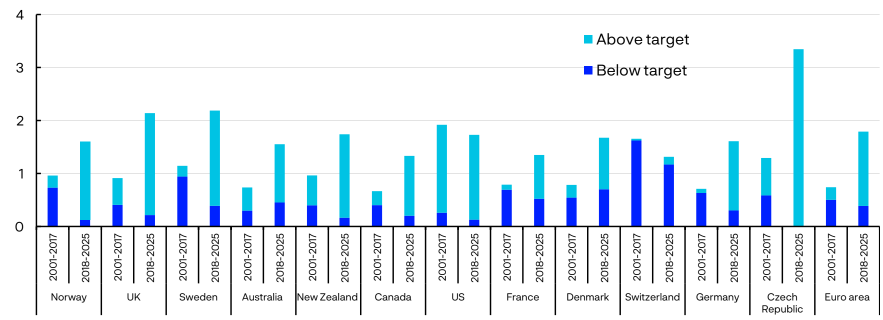
Four-quarter change. Percent



Source: Statistics Norway and Norges Bank

Chart 2.14 Average absolute deviation from the inflation target, decomposed into contributions to deviations above and below target

Percentage points

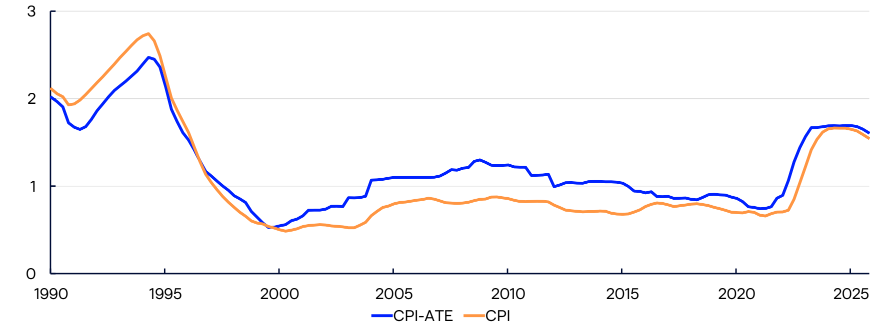


Sources: LSEG Datastream, Statistics Norway and Norges Bank

Empirically, there is a strong co-movement between fluctuations in the CPI and the level of inflation. High inflation tends to be associated with more variable inflation, as also observed by Norges Bank in recent years. Since 2022, inflation volatility has increased considerably (Chart 2.15), in parallel with the rise in inflation. More variable inflation leads to greater uncertainty about the future purchasing power of money.

Chart 2.15 Variation in consumer prices. Measured by the moving eight-year average of the standard deviation of four-quarter inflation

Percentage points

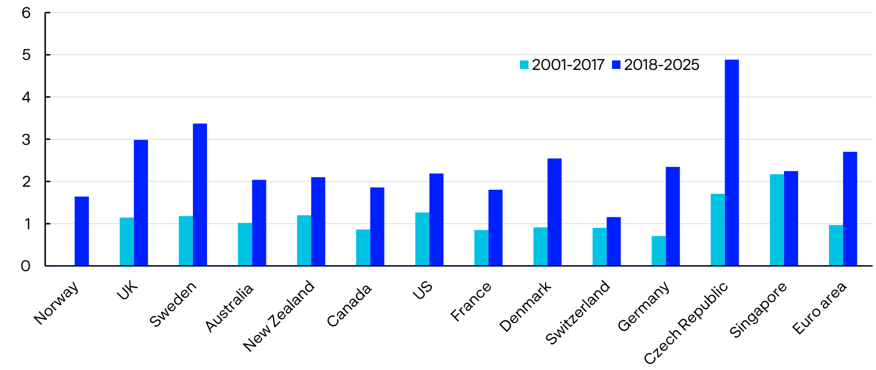


Sources: Statistics Norway and Norges Bank

In other comparable countries, inflation has also been more volatile in recent years than in earlier post1990 periods (Chart 2.16). However, while average inflation in Norway has been broadly similar to inflation in other countries, inflation variability has been relatively low when assessed over the period 2018–2025 as a whole.

Chart 2.16 Variation in CPI. Measured by the standard deviation of the four-quarter rise in inflation

Percentage points



Sources: LSEG Datastream, Statistics Norway and Norges Bank

In summary, average inflation in Norway over the period covered in this *Paper* has been markedly above target but does not stand out from inflation in comparable countries. Inflation volatility has increased in step with the level of inflation, but the movements have, if anything, been somewhat less pronounced than in a number of other countries. Towards the end of the period, developments in inflation expectations point to confidence that inflation will gradually approach target.

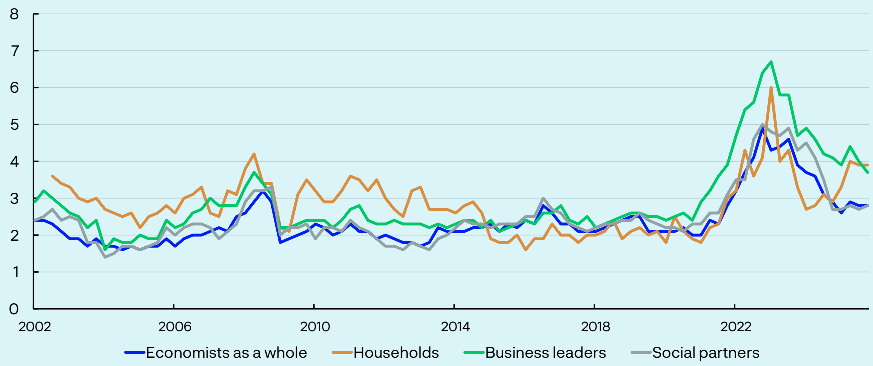
Both the average deviation from the 2% target and inflation volatility have contributed to reduced inflation targeting performance. Inflation targeting performance could probably have been somewhat better had the policy rate been increased at a faster pace or set higher when inflation picked up, but this would have negatively affected the objective of high and stable output and employment.

Inflation expectations during the high-inflation period

Central banks monitor inflation expectations because they help shape actual inflation and determine the effectiveness of monetary policy. When households and firms are confident that the central bank will keep inflation close to target, they are less inclined to demand higher wages or raise prices.[7] This helps stabilise wage and price formation and reduces the risk of self-reinforcing inflationary spirals. Inflation expectations that are not anchored may amplify the pass-through of various shocks to inflation.[8] Since the early 2000s, Norges Bank has monitored inflation expectations over various horizons in the Expectations Survey. The survey comprises four groups – households, business leaders, economists (in the financial industry and academia) and representatives of the social partners (the main employer and employee organisations).[9] The respondents are asked about their inflation expectations in the short, medium and long term. The survey data therefore provide a basis for assessing whether inflation expectations have remained anchored during the period of high inflation in recent years. The assessment is that although inflation expectations, including long-term expectations, have increased over the period, recent developments may suggest confidence that inflation will gradually approach the target.

Chart 2.B Developments in inflation expectations 12-months ahead

Expectations refer to 12-month change in the CPI 12 months ahead. Average



Sources: Epinion, Ipsos, Opinion, TNS Gallup and Norges Bank

Near-term inflation expectations

Near-term inflation expectations may to a greater extent than more long-term expectations be influenced by the current economic situation. Insofar as they deviate from target, this is not necessarily due to a lack of anchoring. The deviation may be consistent with monetary policy being deliberately geared towards gradually bringing inflation back to target after a deviation to avoid pronounced effects on output and employment.

7 Weber et al (2025).
8 Aastveit et al. (2026), and references cited therein.
9 Ipsos has conducted Norges Bank's Expectations Survey since 2020 Q3. It has previously been conducted by Epinion, Opinion and TNS Gallup.

It is nevertheless useful to monitor near-term expectations as they can provide an indication of firms' price-setting and wage expectations among the social partners and households.[10] In the years prior to the high-inflation period, near-term expectations in all groups (households, firms, economists and the social partners) fluctuated around low and stable levels (Chart 2.B). Economists and the social partners generally reported the lowest expectations and had the highest forecasting accuracy.[11] When inflation surged, expectations among all respondents increased before they gradually fell back, in line with declining inflation.

Contrary to the Bank's previous observations, the expectations of business leaders were considerably higher than households' expectations. The persistent gap between these two groups may reflect differences in exposure to higher electricity prices. Households received electricity support from the government, which largely compensated for higher electricity costs, while firms' energy costs increased and they may have based their expectations on observations of their own prices and cost conditions.[12] In 2025, near-term inflation expectations among households and firms were higher than actual inflation but gradually approached the actual level. Expectations among the social partners and economists were more stable and lower than actual inflation.

Anchoring inflation expectations

To assess whether inflation expectations are anchored at the target, medium and long-term expectations must be examined. There is no definitive way of measuring whether inflation expectations are anchored, but the literature proposes several possible criteria. Broadly, these can be grouped into three categories: Inflation expectations are anchored if 1) medium and long-term inflation expectations are stable and close to the inflation target,[13] 2) medium and long-term inflation expectations show little response to new information about actual inflation[14] and 3) the dispersion of inflation expectations is low.[15] Norges Bank has examined more closely the extent to which these criteria have been met.[16]

Norges Bank has measured long-term inflation expectations among the social partners and economists since 2002 Q1, and among households and firms since 2023 Q1. For the time being, the household and firm series are too short for assessing whether expectations are anchored over time.[17] However, it is noted that movements in long-term inflation expectations among these groups have been larger than for the social partners and economists (Chart 2.C). For the latter two groups, long-term

10 An analysis in *Monetary Policy Report* 1/2026 focuses on the inflation expectations of business leaders. See also Coibion and Gorodnichencho (2025) and Gautier et al (2025).

11 Granziera et al (2025).

12 Granziera et al (2025).

13 See Ball and Mazumder (2019) and Kumar et al (2015).

14 Bernanke (2007) and Ehrmann (2015).

15 Reis (2021.

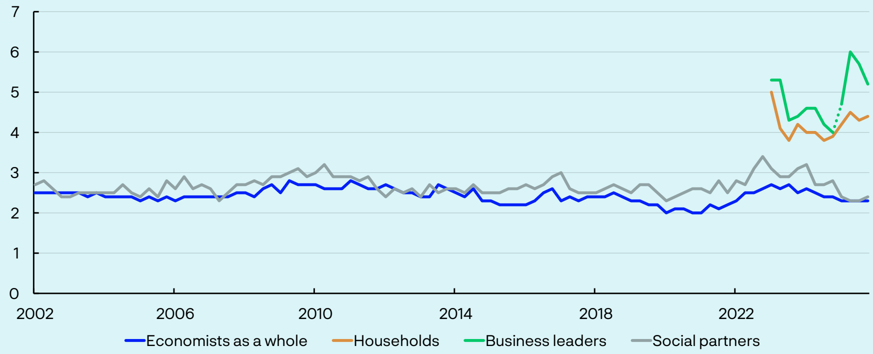
16 See box "Inflation expectations in a period of high inflation" from *Monetary Policy Report* 4/2023.

17 It is conceivable that households misunderstand questions in surveys about long-term expectations by confusing cumulative inflation with the annual inflation rate five years ahead. Prior to the recent increase in inflation, this appeared plausible since expected inflation increased with longer time horizons. However, this pattern has reversed over the past four years: short-term inflation expectations now exceed five-year-ahead expectations – which contradicts the original explanation.

inflation expectations have over time remained stable within the 2–3% range at the five-year horizon. Inflation expectations increased somewhat in 2022 and 2023 as inflation surged but have since returned to target. Chart 2.C nonetheless shows that after the revision of the inflation target in 2018, economists revised down their long-term inflation expectations, while the social partners' five-year-ahead expectations remained closer to 2.5%. In the most recent surveys, long-term expectations have moved closer to the central bank's new target, and the expectations of the social partners coincide with those of economists.

Chart 2.C Developments in inflation expectations five years ahead

Expected twelve-month CPI inflation five years ahead*. Average



Sources: Epinion, Ipsos, Opinion, TNS Gallup and Norges Bank. * The 2025 Q1 observation for households is omitted due to a different question being asked in that round.

The inflation environment at the time might affect how expectations are formed. A number of studies suggest that more attention is paid to price developments when inflation is high.[18] Heightened focus on current inflation developments may, in theory, influence long-term inflation expectations.

To test this hypothesis, the impact from changes in actual inflation on long-term inflation expectations has been estimated.[19] When looking at inflation expectations five years ahead for the entire sample, inflation expectations are found to be relatively insensitive to actual inflation. The correlation between inflation expectations five years ahead and actual inflation is very low (0.07).[20] Correlation increases have also been found to increase somewhat (to 0.27) in the period 2022–2024 but have declined slightly over the past year (to 0.23). In other countries, the correlation is also stronger when inflation is high.[21] Even though the correlation is higher when inflation is high, it is still relatively low. This may indicate that the respondents expect that inflation will eventually return to target, albeit more slowly than when inflation is low.

18 Weber et al (2025).

19 The following regression is estimated: $E_t\pi_{t+n} = c + \beta\pi_{t-1} + \varepsilon_t$. Where $E_t\pi_{t+n}$ is average expectations in period t for inflation in period $t+n$, π_{t-1} is actual inflation measured as the last available CPI measure, and β denotes how much inflation expectations change if inflation changes by one percentage point. If inflation expectations are anchored, then β will be close to zero.

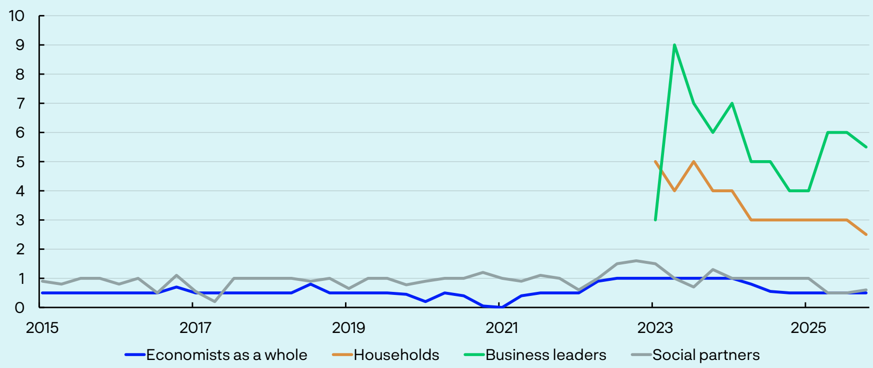
20 This is consistent with the findings in Erlandsen and Ulvedal (2017).

21 Bracha and Tang (2019).

The dispersion of long-term inflation expectations is an indication of the "agreement" among respondents. A number of studies have found that high dispersion may indicate rising inflation expectations.[22] Among economists and the social partners, the dispersion[23] has generally been very low but increased when inflation began to rise sharply. Dispersion has since decreased, and the distribution of long-run inflation expectations has again become more tightly concentrated around the inflation target (Chart 2.D). Among households, dispersion has generally been higher than among economists and the social partners, but also here, dispersion has decreased slightly towards the end of the period.

Chart 2.D Dispersion of inflation expectations five years ahead

Difference between the 75th percentile and the 25th percentile. Percent



Sources: Epinion, Ipsos, Opinion, TNS Gallup and Norges Bank

Overall, Norges Bank's analyses suggest that inflation expectations have been well anchored during periods of low inflation. In the recent period of high inflation, respondents' long-term inflation expectations have[24] increased somewhat and remained above the target. In the same period, both the share of respondents expecting higher inflation and the degree of disagreement among respondents have increased. However, there are signs of a reversal, which may suggest that the risk of higher inflation expectations contributing to persistently high inflation has diminished.

22 Glover (2022) and Reis (2021).

23 Here, dispersion is measured as the interquartile range: the difference between the 75th and 25th percentiles in the cross-sectional distribution of individual survey responses.

24 Measured as the median value of respondents in the different groups.

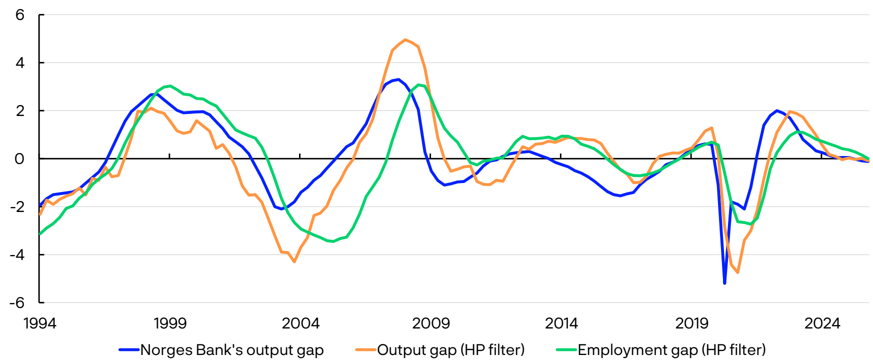
2.2.2 Developments in output and employment

The conduct of monetary policy seeks to stabilise output and employment around the highest sustainable level consistent with stable wage and price inflation. These levels are referred to as *potential output* and *trend employment*. They cannot be observed directly and are determined by structural conditions such as wage formation, the tax and social security system and demographic composition. As an overall indicator of how Norges Bank assesses output and employment in relation to the maximum sustainable level, the Bank estimates an *output gap*. The box "Norges Bank's estimates of the output gap" examines how this variable is calculated.

As shown in Chart 2.17, movements around zero were relatively small in the years between the financial crisis and the pandemic, but the movements have been more pronounced since 2020. Containment measures at the outbreak of the pandemic in 2020 led to a historically significant decline in the output gap, while the rapid recovery that followed resulted in a clearly positive gap. Subsequent policy rate increases between 2021 and 2023 dampened economic activity, and based on Norges Bank's estimates, the output gap has been close to zero since 2024. Output gap and employment gap estimates based on a simple statistical method present a similar picture of capacity utilisation in recent years. At the same time, the period has been characterised by wide differences across sectors, as described in Section 2.1

Chart 2.17 Output gap and employment gap

Percent deviation from trend*

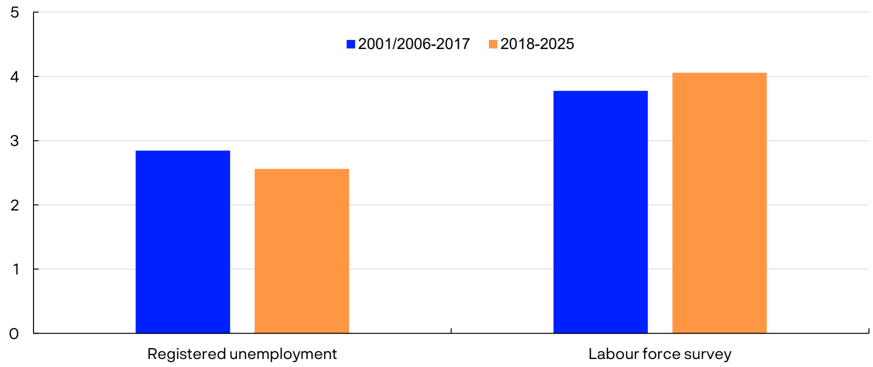


Sources: Norges Bank and Statistics Norway.
* For the HP filter, lambda is set at 40 000 and a three-quarter moving average is used.

Over the period 2018–2025 as a whole, registered unemployment averaged around 2½%, somewhat lower than in the preceding period (Chart 2.18). According to the Labour Force Survey (LFS), unemployment has been somewhat higher. LFS unemployment has increased particularly among those aged less than 25, reflecting a rise in the number of young registered job seekers. Unemployment in Norway has remained at a low level compared with a number of other countries, and developments in unemployment in recent years have broadly mirrored trends observed in other countries (Chart 2.19).

Chart 2.18 Unemployment[1]

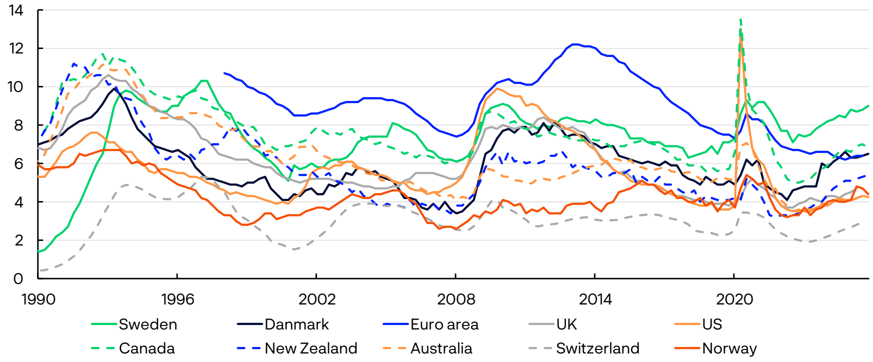
Average. Percent



Sources: Norwegian Labour and Welfare Administration (NAV) and Statistics Norway.
1) For the Labour Force Survey (LFS), a break-adjusted series from 2006 is used.

Chart 2.19 Unemployment across countries

Unemployment as a share of the labour force. Percent

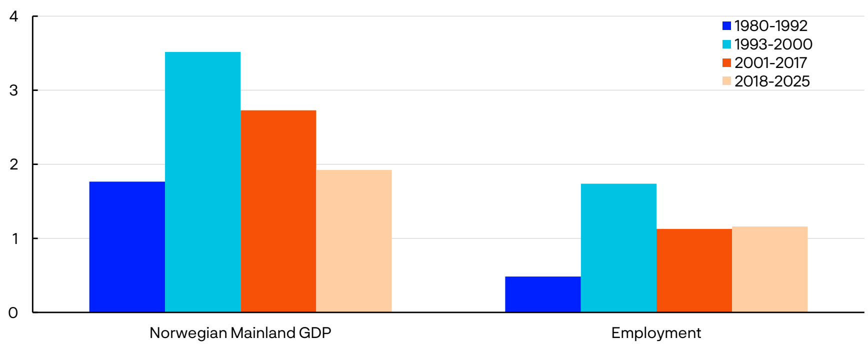


Sources: OECD and LSEG Datastream

Overall, growth in the mainland economy has been relatively weak since 2018 (Chart 2.20), reflecting declining trend growth in the Norwegian economy over recent decades, which in turn reflects slower productivity growth. This has been mirrored in a number of other advanced economies.[25] Employment growth has remained at the same level as in preceding years.

Chart 2.20 Norwegian Mainland GDP and employment

Average annual change



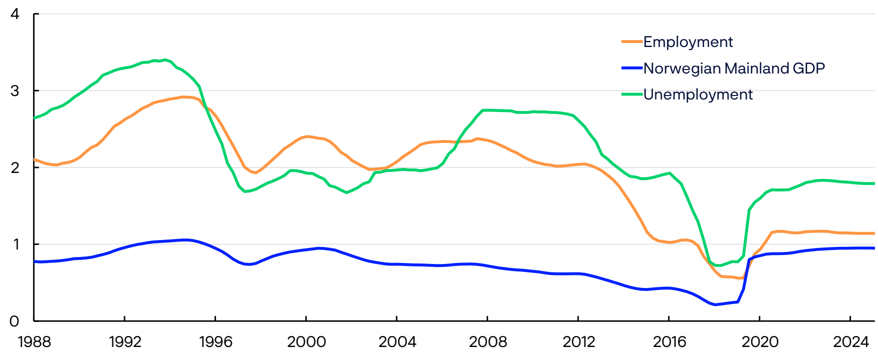
Source: Statistics Norway and Norges Bank

25 See box on this topic and additional references in *Monetary Policy Report* 4/2024

Measured as the deviation from trend, the variation in employment, output and unemployment declined in the years following the financial crisis and up to 2020 (Chart 2.21), before stabilising at a higher level after the outbreak of the pandemic. For employment and output, the variation measured as deviation from trend is still at a low level compared with previous periods.

Chart 2.21 Variation in deviations from trend[1]

Measured by a ten-year moving average of the standard deviation[2]

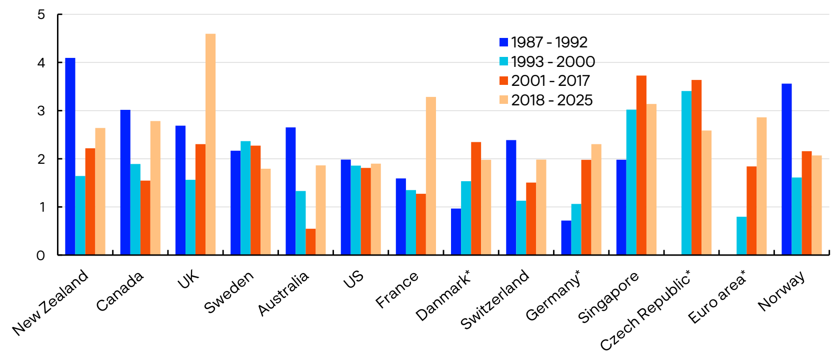


Sources: Norwegian Welfare Administration (NAV), Statistics Norway and Norges Bank.
1) Trends are estimated using an HP filter with lambda = 40 000. 2) The moving average is centred on the last quarter.

In recent years, the variation in capacity utilisation has been at the same level as in the period 2001–2017 (Chart 2.22) and does not significantly stand out from the variation in comparable countries.

Chart 2.22 Variation in the output gap across countries[1]

Measured by standard deviation. Percentage points



Sources: LSEG Datastream and Norges Bank. 1) The trend in GDP is estimated using an HP filter with lambda = 40 000.
* No observations for the euro area 1987–1994.

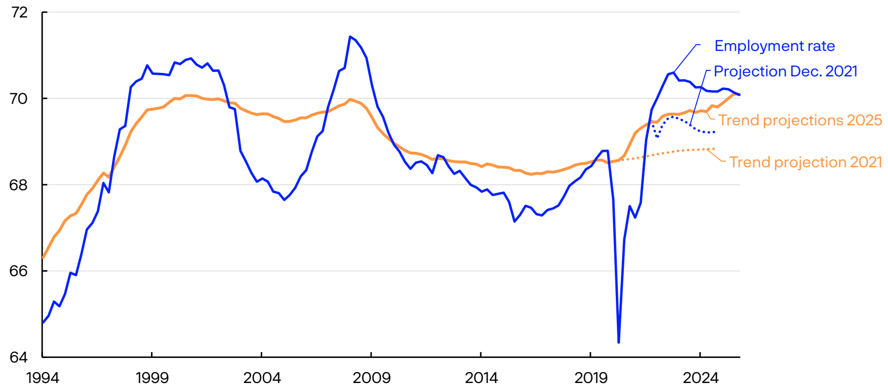
The employment to population ratio has risen through the period, particularly when economic activity picked up following the pandemic (Chart 2.23). The ratio has declined somewhat in recent years but is still at a historically high level. According to Norges Bank's analyses, employment has increased among groups that have historically had a weaker attachment to the labour market. partly reflecting structural factors, which may indicate a more persistent increase in employment.[26]

26 An analysis in *Monetary Policy Report* 1/2024 examined the higher employment ratio among immigrants and the implications for Norges Bank's employment projections, while an analysis in *Monetary Policy Report* 3/2025, examined the increase in the labour supply and employment among younger and older age groups in recent years. For further information on how Norges Bank forecasts the highest sustainable level of employment, see box "Norges Bank's estimates of the output gap".

Based on these analyses and other analyses of developments in the labour market and capacity utilisation, Norges Bank has gradually revised up its forecast for the highest sustainable level of employment (see trend employment in Chart 2.23).

Chart 2.23 Employment as a share of the population

Percent



Sources: NAV, Statistics Norway and Norges Bank

In recent years, developments in output and employment have been marked by the shutdowns during the pandemic, the subsequent recovery and the ensuing period of high inflation and a need for monetary policy tightening. Despite pronounced swings in economic activity through the period, average unemployment has remained at the same level as in the preceding period, and the employment ratio is higher than at the start of the period. This reflects the fact that while Norges Bank has given weight to bringing inflation down towards target, it has also given weight to stable output and employment.

Norges Bank's estimates of the output gap[27]

Norges Bank's output gap is a measure of the assessment of the overall cyclical conditions in the Norwegian economy. When setting the policy rate, the output gap is an important part of the assessments. This box explores how Norges Bank estimates the output gap. The output gap is defined as the percentage difference between actual output and potential mainland output. By potential output, Norges Bank means the highest level of output and employment consistent with price stability over time. As the output gap cannot be observed, it must be estimated. To do this, a broad set of information sources and indicators is used, and the estimate is based on an overall assessment.

When estimating the output gap, particular weight is given to labour market developments. Developments in labour supply and demand are

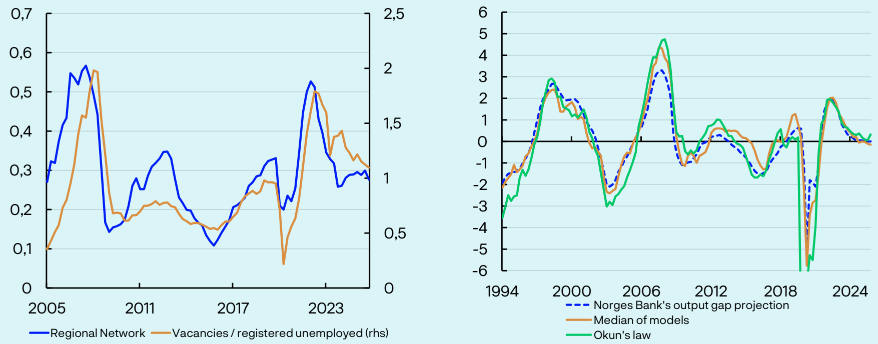
27 This box is primarily based on Norges Bank (2024b).

analysed to assess the extent of slack in the labour market. The Bank seeks to monitor all available statistics, such as the Labour Force Survey (LFS), the national accounts and data from the Norwegian Labour and Welfare Administration (Nav). Norges Bank's Regional Network Survey and more detailed register-based data also provide useful information.

Indicators that have sound *real-time properties* and *forecasting properties are given weight when estimating the output gap.* Indicators with sound real-time properties provide precise information about current economic developments and are subject to little revision. When demand is strong and output exceeds the sustainable level (a positive output gap), wage and price pressures tend to increase. Sound forecasting properties are thus understood as indicators that provide information about future developments in wage and price inflation.[28]

Chart 2.E Output gap indicators[1]

Share (left panel) and percent (right panel)



Sources: Statistics Norway, NAV and Norges Bank 1) Regional Network is the mean of the indicators for capacity utilisation and labour supply constraints. Share of contacts.

Norges Bank's Regional Network contacts' assessment of capacity utilisation and labour supply is an example of one such indicator. Another example is demand for labour relative to potential employees currently unemployed. This is typically measured as the number of vacancies relative to the number of unemployed (Chart 2.E). The chart also shows a simple indicator of what the level of unemployment in isolation suggests about the output gap, called Okun's law.[29]

The set of indicators also consists of a number of models. The models combine data with some simple economic relationships to interpret economic developments and estimate the output gap. *Okun's law*, described above, is an example of such a relationship. The models use information about output, the labour market, investment, wage and price inflation, credit growth and house prices.[30] Such models have proved to

28 Another criterion is that a output gap estimate should provide information about future GDP growth. See Norges Bank (2024b) and Furlanetto et al (2023) for an in-depth discussion of criteria for output gap estimates.

29 According to Okun's law, there is a close relationship between unemployment and output. In the chart, the indicator shows what an estimated deviation from trend in registered unemployment as a percentage of the labour force indicates about the output gap.

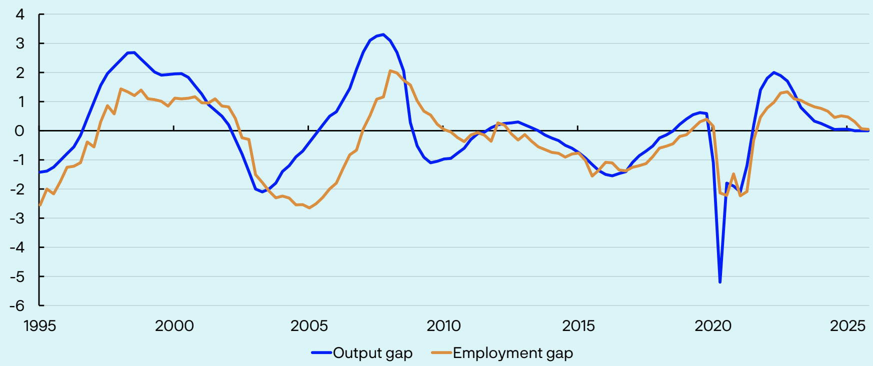
30 The data included in the modelling system are mainly limited to variables for which relatively long historical time series are available.

have much better real-time and forecasting properties compared with simpler indicators.[31]

Norges Bank also analyses variables that impact potential output. It is assumed that potential output is primarily determined by structural conditions such as wage formation, the tax and social security system and demographic composition. Norges Bank's analyses typically focus on estimating long-term productivity growth trends and the highest sustainable level of employment consistent with stable wage and price inflation (*trend employment*). This entails eg assessing how structural changes, such as shifts in demographic composition and technological advances such as artificial intelligence, may impact these trends over time.

When employment is estimated to be above trend, capacity utilisation will normally also be above a normal level. When employment is estimated to be below trend, this allows employment to rise without the risk of accelerating price and wage inflation. To estimate trend employment, Norges Bank uses a model that applies detailed information about employment rate trends across different parts of the population.[32] In addition, ongoing assessments are made of other factors, such as the flow of non-resident workers or major changes in immigration, such as the arrival of refugees from Ukraine in recent years. Chart 2.F shows the employment gap, measured as a percentage deviation from estimated trend employment, and the output gap. The gaps develop broadly in line with each other, reflecting the fact that the Bank normally looks through short-term fluctuations in labour productivity when estimating the output gap and that the output gap is based to a large extent on labour market information.

Chart 2.F Output gap and employment gap
Percent deviation from trend



Sources: Statistics Norway and Norges Bank

The methods used to estimate the output gap are based on assumptions that cyclical fluctuations are symmetrical and do not impact potential

31 This applies in particular to so-called univariate statistical filters used to estimate output gaps. See Norges Bank (2024b) and Furlanetto et al (2023) for more information.

32 In the model, the population is grouped by age, sex, education level and immigrant status. The model estimates long-term trends in employment rates for each of the groups and aggregates them into an indicator for trend employment. A previous version of the model is documented in Ellingsen et al (2024). This framework has been used to assess some labour market developments in recent years.

output. Research and experience suggest that cyclical downturns can be more pronounced and more protracted than upturns. In addition, deep downturns can impact potential output through hysteresis effects, eg by unemployment becoming entrenched at a high level and jobseekers eventually becoming detached from the labour market.[33] However, there are few established methods for estimating measures of potential output that take into account asymmetrical cyclical fluctuations and hysteresis, but this is an area that Norges Bank is currently exploring.[34] Norges Bank seeks to take this into account in the conduct of monetary policy. By preventing downturns from becoming deep and protracted, monetary policy can contribute to keeping the average level of employment over time as high as possible. If there are signs that hysteresis effects may have occurred following a downturn, it may be appropriate to accept that inflation will temporarily overshoot the target while labour market conditions normalise.[35]

33 See Section 6 for a more in-depth discussion of hysteresis and relevant academic literature.

34 In Norges Bank's suite of models for the output gap, a model has been introduced that seeks to estimate and take account of hysteresis effects in an output gap estimate, see Furlanetto et al (2023). Ellingsen and Galaasen (2021) explore long-term consequences of economic downturns for the Norwegian labour market.

35 See Norges Bank's monetary policy strategy.

2.2.3 Financial imbalances

According to the Regulation, monetary policy shall contribute to countering the build-up of financial imbalances.

Financial imbalances increase the risk of a severe downturn further ahead. The absence of a clear definition, however, makes such imbalances difficult to measure. In practice, an assessment of the imbalances will be based on a number of indicators, notably developments in asset prices and credit. High debt-to-income (DTI) ratios make households vulnerable to income loss and may amplify an economic downturn. Rapidly rising property prices increase the risk of abrupt price corrections and, when combined with high loan-to-value ratios, may lead to a marked fall in consumption and investment demand.

In the years after the financial crisis, the increased use of macroprudential tools has strengthened the framework to limit the buildup of financial imbalances, for example through the introduction of the residential mortgage lending regulations, the countercyclical capital buffer and the systemic risk buffer.[36] These tools can mitigate the risk of financial imbalances building up in a lowinterestrate environment. Time-varying capital buffers are intended to strengthen banks' solvency and

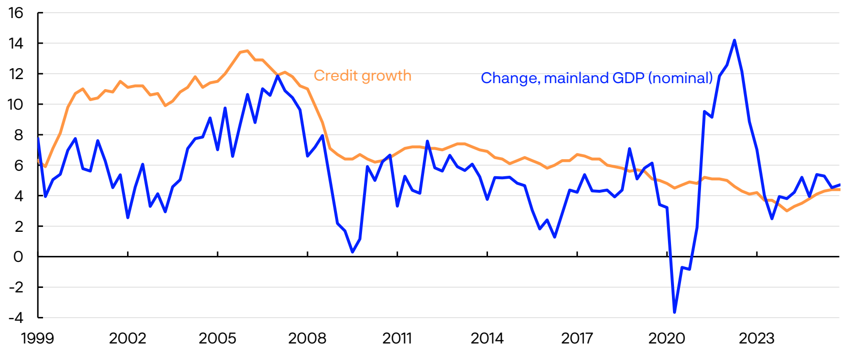
36 Norges Bank has been delegated responsibility for setting the countercyclical capital buffer and for providing advice to the Government on the level of the systemic risk buffer. The Bank also acts as a consultative body in connection with the residential mortgage lending regulations. The *Financial Stability Report* includes analyses and assessments that provide the basis for the Bank's macroprudential decisions and recommendations. The *Report* also provides a starting point for evaluating whether financial imbalances should be given particular weight in policy rate setting.

mitigate the risk that banks' lending standards amplify an economic downturn.

According to Norges Bank's assessments, financial imbalances gradually built up in the period to 2018. The Bank gave particular weight to household's high and rising DTI ratios, house prices that had increased over several years and commercial property prices that continued to increase from elevated levels.

Chart 2.24 Nominal mainland GDP and credit

Twelve-month change. Percent

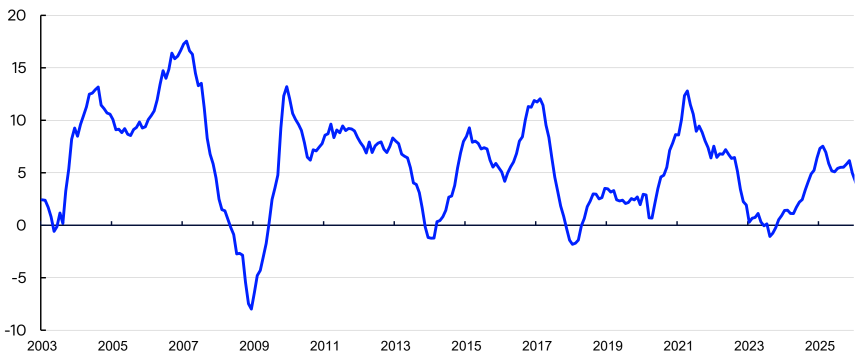


Sources: Statistics Norway and Norges Bank

Since 2018, overall credit growth has slowed and is more closely in line with nominal GDP growth (Chart 2.24). House price inflation rose temporarily in connection with the pandemic but has since subsided (Chart 2.25).

Chart 2.25 House prices

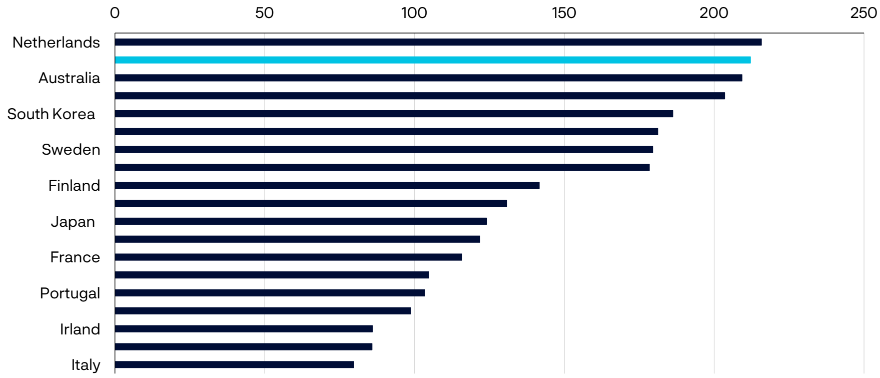
Twelve –month change. Percent



Sources: Real Estate Norway and Norges Bank

Chart 2.26 Household debt burdens

Debt as a share of disposable income. Percent. 2024

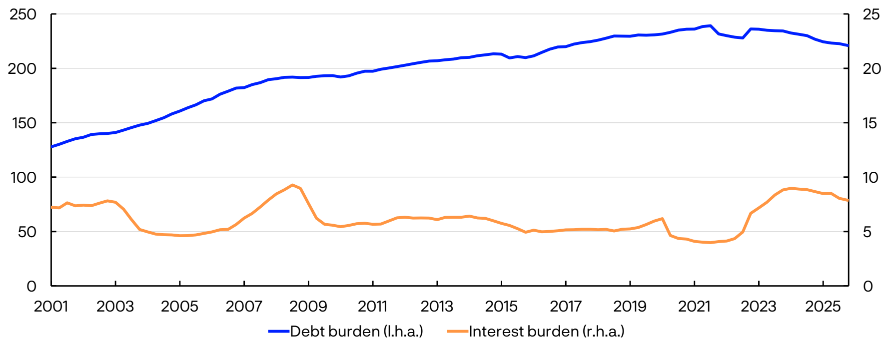


Sources: OECD, Statistics Norway and Norges Bank

Compared with other countries, Norwegian households still exhibit high debt levels relative to disposable income (Chart 2.26)[37], but following a prolonged period in which debt growth outpaced income growth, household DTI ratios have declined in recent years (Chart 2.27). DTI ratios have declined broadly across households and most for those with the highest debt burdens. Vulnerabilities associated with high indebtedness have been reduced somewhat owing to lower DTI ratios.

Chart 2.27 Debt and interest burden

Debt as a share of disposable income and interest expenses as a share of post-tax income. Percent



Sources: Statistics Norway and Norges Bank

As also shown in Chart 2.27, the interest rate increases from the end of 2021 led to a significant rise in households' overall interest burden. Based on Norges Bank's analyses, households are assessed to have ample capacity to service debt, and the same applies to firms.

An overall assessment of developments since 2018 indicates that financial imbalances have not continued to build up and have, if anything, receded.

37 Some of these differences may reflect crosscountry variation in tax rules, including interest deductibility and macroprudential regulations, such as repayment requirements.

How accurate have Norges Bank's forecasts been, and what has the Bank learned?

Norges Bank publishes forecasts for a broad range of macroeconomic variables four times a year in the *Monetary Policy Report* (MPR). The forecasts cover the current and the three subsequent years and are important premises included in the Committee for Monetary Policy and Financial Stability's policy rate discussions.

Together with forecasts of variables such as inflation, output and unemployment, the Bank publishes a policy rate forecast. The forecasts for the different variables are not independent of each other, and if the economy does not evolve as envisaged, the policy rate path will also be adjusted. This box examines how accurate Norges Bank's forecasts have been in recent years. The conclusion is that the Bank underestimated the strength of the post-pandemic upturn in the real economy. The inflation that followed was also underestimated, likely reflecting an underestimation of the inflationary pressures caused by the economic upturn combined with supply-side shocks. Given that developments differed from the Bank's expectations, forecasts were, in part, substantially revised during the forecast horizon.

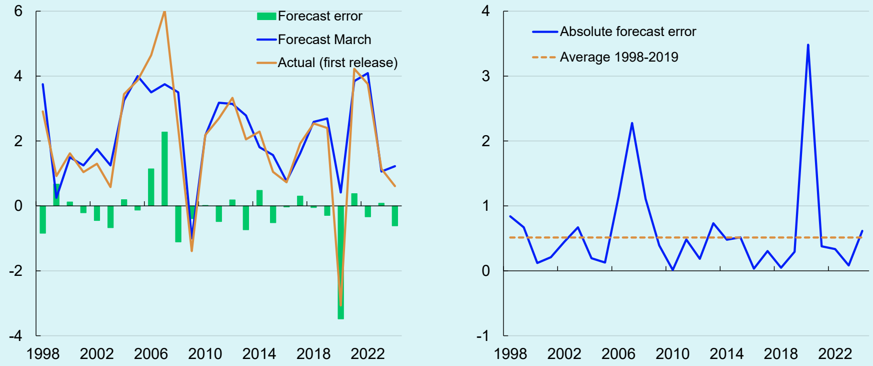
The Bank's assessment of the current situation and developments in the coming quarters form the basis for forecasts further ahead. Charts 2.G, 2.H, 2.J and 2.K examine the accuracy of the Bank's short-term forecasts for four key variables – mainland GDP growth, registered unemployment, CPI and CPI-ATE. The charts on the left show Norges Bank's forecasts for the current year, published in the March *Monetary Policy Report,* and the actual figures from official statistics. For GDP growth, the Bank's forecast is compared with preliminary figures from Statistics Norway's national accounts, published early in the subsequent year. The charts on the right show absolute forecast errors together with the average over the period 1998–2019.

As new information about the economic situation and factors that may influence developments ahead becomes available, Norges Bank revises its forecasts accordingly. Charts 2.I and 2.L show changes between different monetary policy reports in the Bank's long-term forecasts.

Measured against the historical average, Norges Bank's forecast errors for short-term forecasts have been larger than normal in recent years. Forecasts prepared before the lockdown in Norway were naturally unable to capture the consequences of the lockdown for the real economy (Charts 2.G and 2.H). Through 2021 and 2022, the economy recovered faster than expected, and the Bank's unemployment forecast errors were above the historical average.

Chart 2.G Forecast error. Mainland GDP

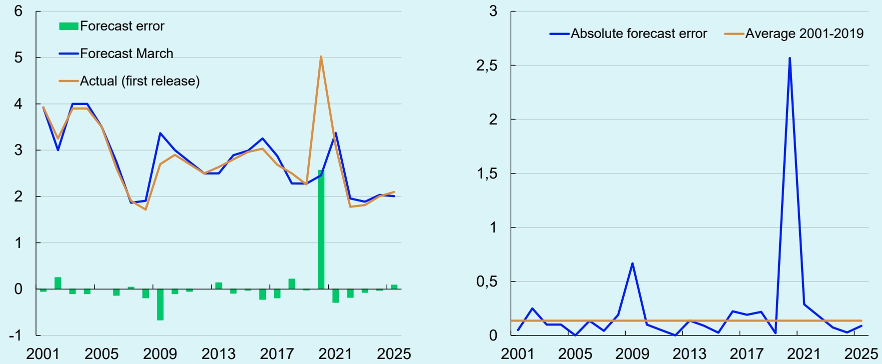
Annual growth. Forecast and actual outcome. Percent. Forecast error. Percentage points



Sources: Statistics Norway and Norges Bank

Chart 2.H Forecast error. Registered unemployment

Annual growth. Forecast and actual outcome. Percent. Forecast error. Percentage points

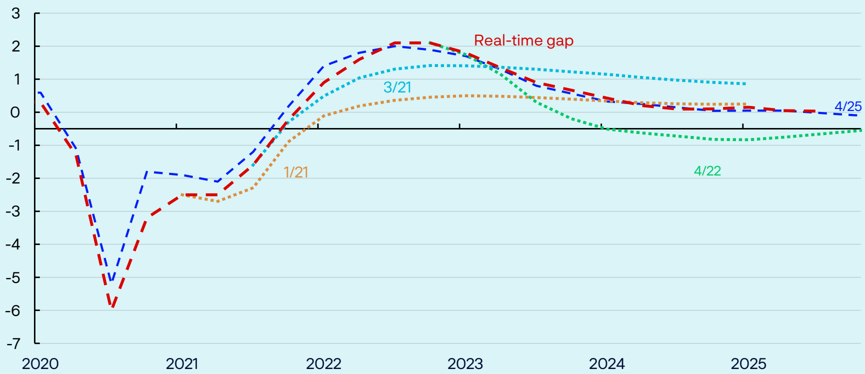


Sources: Statistics Norway and Norges Bank

In light of higher activity and signs of input shortages, the Bank gradually revised up its forecast of overall capacity utilisation in the economy (illustrated in Chart 2.I by the Bank's output gap estimate). Towards the end of 2022, capacity utilisation, assessed in real time, was somewhat higher than the Bank had estimated at the beginning of 2021.

Chart 2.I Output gap

Forecasts from different monetary policy reports. Four-quarter change. Percent. 2018 Q1–2028 Q4

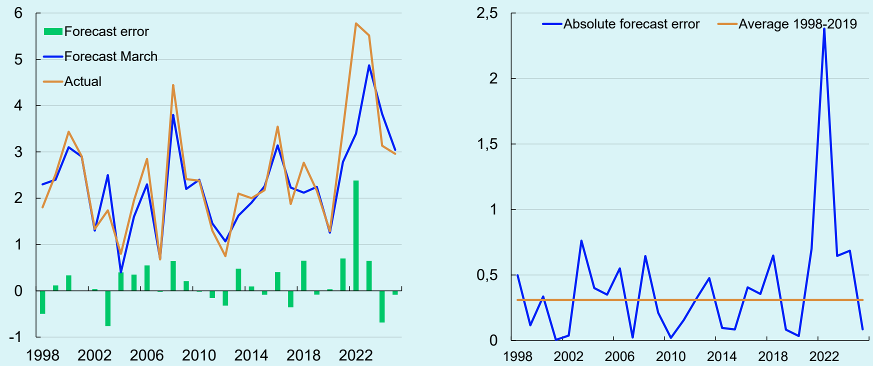


Sources: Statistics Norway and Norges Bank

As regards nominal developments, forecast errors have been substantial in recent years. When inflation picked up internationally and in Norway in the period 2021–2023, the Bank's short-term forecasts were too low (Charts 2.J and 2.K), and when inflation started to slow, the Bank underestimated the decline. In Chart 2.L the Bank's inflation long-term forecasts are at times revised substantially.

Chart 2.J Forecast error. CPI

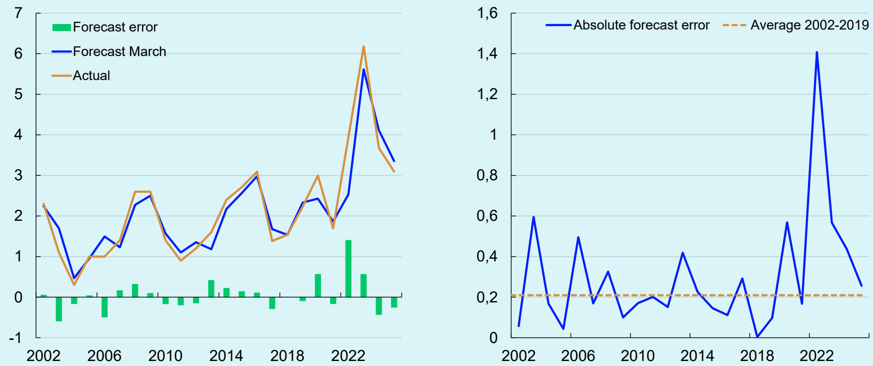
Annual growth. Forecast and actual outcome. Percent. Forecast error. Percentage points



Sources: Statistics Norway and Norges Bank

Chart 2.K Forecast error. CPI-ATE

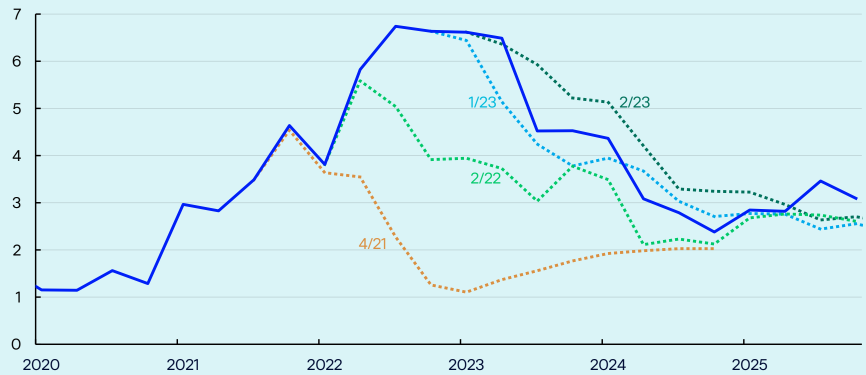
Annual growth. Forecast and actual outcome. Percent. Forecast error. Percentage points



Sources: Statistics Norway and Norges Bank

Chart 2.L CPI

Forecasts from different monetary policy reports. Four-quarter change. Percent

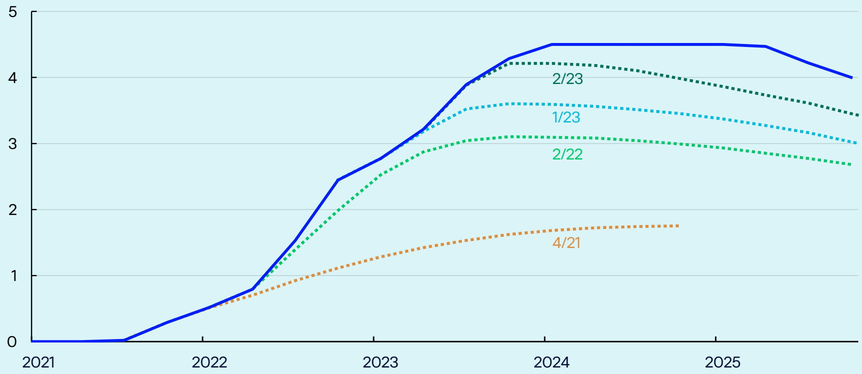


Sources: Statistics Norway and Norges Bank

In light of developments differing from initial forecasts and as the Bank's view of the inflation path changed, the Bank's policy rate forecast was also raised over the period (Chart 2.M).

Chart 2.M Policy rate with forecasts

Forecasts from MPR 1/2021 and ahead. Four-quarter change. Percent



Sources: Statistics Norway and Norges Bank

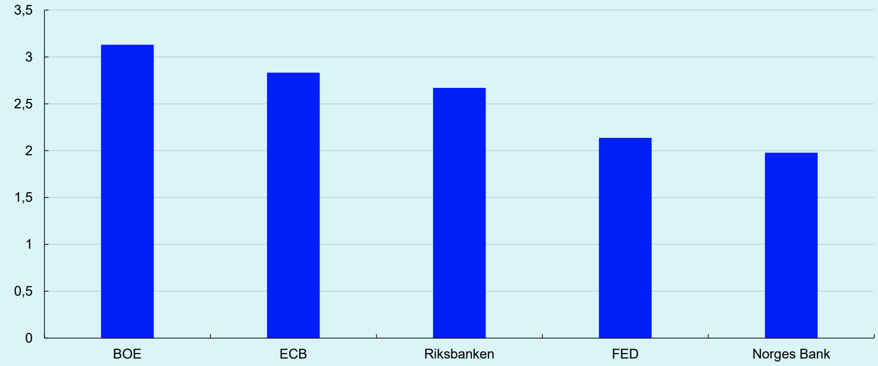
When the economy evolves differently than initially assumed, it must be considered whether the forecast errors are due to temporary and unexpected shocks to the economy or whether developments provide new information about economic drivers and relationships. The pandemic and the lockdown of the economy are examples of unexpected events that had considerable economic consequences. At the same time, Norges Bank underestimated how quickly economic activity would pick up again after the pandemic.

Like many other central banks and forecasters, Norges Bank underestimated the strength of the inflation impulses that emerged from the interaction between pandemic-related supply shocks and a very expansive economic policy (Chart 2.N).[38] This contributed to substantial forecast deviations. Norges Bank's deviations were smaller than those of several other central banks, likely also reflecting the introduction of the electricity bill support scheme. The scheme contributed to consumer prices increasing less in Norway than among a number of its trading partners.

38 A report from the Bank of England compares the forecast errors of different central banks in the period 2015–2023, see Bernanke (2024). The report compares the central banks of Canada, the UK, the euro area, New Zealand, Norway, Sweden and the US. According to the report, Norges Bank's forecast errors do not differ substantially from those of the other central banks, neither as regards the decline in activity in 2020 nor the rise in inflation through 2021 and 2022.

Chart 2.N Forecast errors. Consumer price inflation 2020-2025*

RMSE. Percentage points

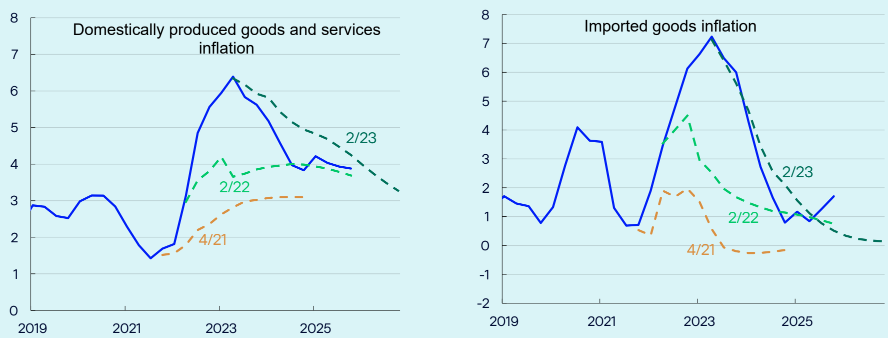


Source: Norges Bank. *Respective target variables. PCE for FED

The rise in prices was underestimated for both imported goods and domestically produced goods and services (Chart 2.O). The Bank's assessments and modelling system may have been influenced by the very long period of low and stable inflation prior to the surge in inflation. This may have resulted in Norges Bank being insufficiently alert to the inflation impulses from imported intermediate goods and thus underestimating their propagation through domestic value chains. In addition, Russia's invasion of Ukraine inflicted new shocks on the economy, and the effects on energy prices in particular boosted inflation more than the Bank had expected.

Chart 2.O Imported goods inflation and domestically produced goods and services inflation

CPI-ATE-I and CPI-ATE-IMP. Forecasts from last 5 years. Four-quarter change. Percent



Sources: Statistics Norway and Norges Bank

Forecast errors are unavoidable, but the goal is to limit sources of forecast errors that are due to inadequate use of available information or a lack of understanding of how the economy functions. Norges Bank therefore works continuously to further develop the analytical framework by gathering new insights into economic mechanisms and by using new data sources.

In recent years, it has been particularly important to shed light on the causes of the rise in inflation, both the effect of the original shocks and the strength of the second-round effects.[39] Various analyses have shed light on the contributions to inflation in recent years from international and domestic supply and demand conditions, respectively.[40] The results indicate that both domestic and international demand conditions boosted inflation after the pandemic, while supply conditions, including changes related to firms' price margins, played a somewhat smaller role individually. The pass-through from changes in wages and other costs to consumer prices has also been analysed. Here, Norges Bank found that increased labour costs contribute to a significant increase in consumer services prices over time, while consumer goods prices are affected less. Higher intermediate input prices, however, become evident relatively quickly in both goods and consumer services prices. As a consequence of increased supply-side shocks in the international economy, Norges Bank has also developed a new indicator of international price impulses to intermediate goods.

Other analyses have provided more insight into the interest rate sensitivity of different parts of the economy, both in different industries[41] and in the household sector. The results show that private services, together with construction, are among the most interest rate sensitive sectors of the economy. Sectors that supply goods and services for public consumption and export are among the least interest rate sensitive.

An analysis of how interest rate changes affect household disposable income and consumption has used a new data set that combines information about wealth, debt and income with actual consumption data and payments at the individual level.[42] The analysis provides new knowledge about the strength of the cash flow channel in monetary policy, and shows that households with high debt-to-income ratios in particular tighten consumption following a rate hike. This knowledge is useful in the Bank's forecast work.

A number of new data sources have been applied, both microdata and real-time data. These sources are used in price dynamic and labour market analyses. As they become available, new results are entered into SMART,[43] which is a recently developed forecasting system for inflation and GDP based on a broad range of models and data sources and applied in the Bank's forecasting work.

39 See a number of boxes in *Monetary Policy Reports* 1/2023, 2/2023, 3/2023, 2/2024 and 2/2025.

40 See eg Friis et al (2025).

41 See box "How sensitive are sectors in the Norwegian economy to interest rates?", *Monetary Policy Report* 4/2025.

42 Se Ahn et al (2024).

43 See Bowe et al (2023).

Neutral real interest rate

The neutral real interest rate[44] (r*) is the real interest rate level consistent with output close to potential and stable inflation around target. r* provides an important basis for assessing the monetary policy stance. When the real interest rate is above r*, monetary policy dampens activity in the economy, while a real interest rate below r* stimulates the economy. As a reference point, r* can be interpreted as the level the real interest rate will approach when the economy is not affected by temporary shocks. r* cannot be directly observed and must be estimated, and forecasts are therefore subject to considerable uncertainty.

Developments in r* are to a large extent determined by structural factors that affect the balance between saving and investment. In a small open economy like Norway, with free capital movements, developments in r* will largely follow global developments.[45]

The estimates of r* have varied over the last 20 years in line with global developments. Following the 2008 financial crisis, r* estimates fell markedly in many countries. The academic literature highlights a number of possible explanations, including lower productivity growth, demographic changes and rising inequality. In addition, the recovery following the financial crisis, with lower risk appetite and deleveraging, dampened investment demand. Overall, these factors pushed up saving and weakened investment demand, which may help explain why r* estimates declined during this period.

After 2020, however, this trend has reversed and r* estimates have risen. Several of the global factors that previously helped keep r* down persist, but the dampening effect appears to have weakened. The Bank for International Settlements (BIS) points out that a rising dependency burden and higher pension liabilities may contribute to higher need for investment and lending over time. A number of central banks also point out that expansionary fiscal policies have increased governments' borrowing requirements. Furthermore, higher investment related to the green transition, infrastructure and defence spending may have boosted demand for capital. Looking ahead, technological advances, including artificial intelligence, may contribute to higher productivity growth and consequently higher return on investment.

r* cannot be observed directly and must be estimated. The relationship between underlying drivers and r* estimates is uncertain and difficult to identify empirically. A number of central banks have published neutral real interest rate estimates (Chart 2.P).[46] The Bank of England (BoE) has previously assumed an r* interval of between 0% and 1% but revised this up to between 0.25% and 1.75% in 2025. Sveriges Riksbank assumes a

44 In this box, the term neutral real interest rate refers to the neutral *real policy rate*.
45 For a more detailed review of r* and the literature this box builds on, see Almlid and Asshoff (2025).
46 In the chart, the estimates for the euro area, the US, Sweden and the UK are from Brand et al (2025), Federal Open Market Committee (2025), Seim (2024) and Bank of England (2025), respectively.

neutral real interest rate with an interval of between −0.5% and 1%. The European Central Bank (ECB) has estimated a level at around 0%, with an interval of between −0.5% and 0.5%. In its most recent estimate from December 2025, the Federal Reserve (Fed) has indicated an interval of between 0.6% and 1.9%. Overall, estimates indicate that the r* interval among trading partners is between -0.2% and 1%.[47] Market-based measures of expected real interest rates have risen somewhat both internationally and in Norway in recent years (Chart 2.Q).

Chart 2.P Trading partner r* estimates
Percent

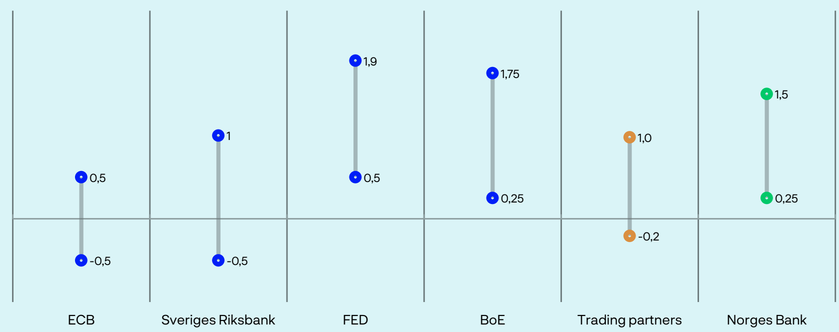
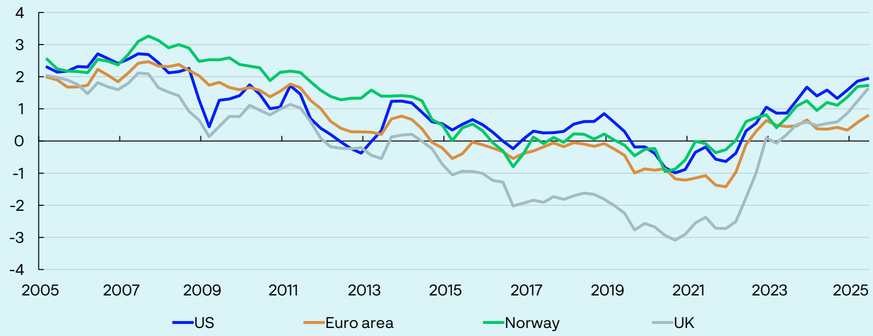


Chart 2.Q Market-based real money market rate expectations
Implicit five-year forward rates five years ahead, adjusted for inflation expectations. Percent



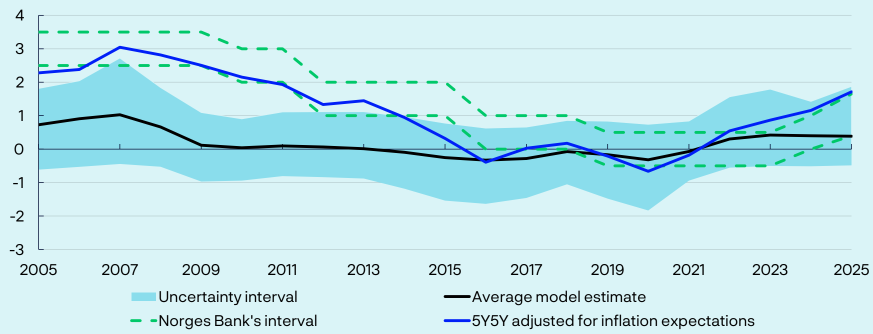
Norges Bank examines both market interest rates and model-based estimates when assessing r*. Chart 2.Q shows that five-year rates, five years ahead, adjusted for inflation expectations, were around 1.75% in Norway in 2025. The measure is not necessarily a direct indication of future market policy rate expectations, partly because long-term rates reflect more than just expectations – they are also influenced by term premiums that can vary over time. Term premiums are an interest rate premium that compensates investors for uncertainty about future interest rates and the risk associated with tying up capital over time.

47 The average is import-weighted, using the four countries' relative I-44 weights. Relative weights for the four trading partners are calculated based on each country's share of the combined I-44 weights of the four countries. This results in relative weights whose combined total is 1. The most recent weights available: Euro area (0.58), Sweden (0.11), US (0.26), UK (0.05).

In *Monetary Policy Report* 2/2025, Norges Bank expanded the model portfolio for r* estimates by including models that seek to control for term premiums. The models indicated that the term premium had increased in recent years, in line with developments in other countries.[48] Chart 2.R shows the average of Norges Bank's model-based estimates together with an associated uncertainty interval.[49]

In the *Report*, r* was assumed to lie in the interval between 0.25% and 1.5%. With an inflation target of 2%, this corresponds to an approximate nominal policy rate of between 2.25% and 3.5% when the economy is not affected by temporary shocks.[50] The broken green lines represent Norges Bank's interval for the neutral real money market rate.

Chart 2.R Neutral real money market rate estimate
Percent



48 See OECD (2025) and Deutsche Bundesbank (2023).

49 The models provide an estimate of the neutral real money market rate. Deducting the long-term money market premium provides r* estimate. The uncertainty interval reflects the models' confidence interval endpoints and provides a measure of total model uncertainty. The models' confidence intervals are estimated based on one standard deviation.

50 In practice, the time it takes for the effect of different shocks to fade will vary. See Norges Bank (2024).

3. Experience with the Regulation on Monetary Policy

3.1 Monetary policy framework

In most countries, responsibility for monetary policy is delegated to the central bank, which is assigned operational independence in the conduct of monetary policy. The main reason for delegating the conduct of monetary policy is that it is difficult for elected representatives to commit to pursuing a policy aimed at low and stable inflation, which may at times require unpopular policy rate decisions, when they also have to take into account electoral support. (See box "Criteria for a good mandate" for a more detailed discussion.)

In most countries, the delegation of monetary policy and the establishment of its overarching framework are anchored in central bank legislation which defines, *inter alia*, the purpose of central banking activities, democratic control requirements and the degree of independence. However, the objectives formulated in such legislation are often relatively broadly framed and of limited operational relevance. For example, central bank legislation normally does not specify an operational objective, such as a numerical inflation target.

The purpose of central banking activities is defined in the Norwegian Central Bank Act as follows:

Section 1-2. Purpose of the central banking activities
(1) The purpose of the central banking activities is to maintain monetary stability and to promote the stability of the financial system and an efficient and secure payment system.

(2) The central bank shall contribute to high and stable output and employment.

Operational independence in the conduct of monetary policy is laid down in Section 1-4 of the Central Bank Act, which stipulates that Norges Bank shall perform its tasks independently without instruction from political authorities in individual matters. Moreover, the Act (Section 1-7) stipulates that Norges Bank shall inform the public of the basis for its decisions.

In addition to the overarching mandate set out in central bank legislation, many central banks have an *operational mandate* that specifies the operational objective (such as an inflation target) and other considerations and may provide guidelines for the use of policy instruments and reporting.

Table 3.1 Responsibility for determining the operational target

The central bank	The central bank and government	The government
US Euro area Japan Switzerland Sweden* Iceland**	Canada Australia	Norway UK New Zealand

* Requires approval by the Riksdag
** Requires approval by the government

Internationally, three main models can be identified for the allocation of responsibility for setting the operational mandate (Table 3.1). Some central banks, such as the Federal Reserve (Fed) and the European Central Bank (ECB), do not have their own operational mandates. Instead, these central banks themselves operationalise the overarching objectives laid down in central bank legislation in the form of *monetary policy strategies*, including a numerical inflation target.[51] Both the Fed and the ECB have scheduled reviews of their strategies every five years.

In Canada and Australia, the operational mandate is set in a timelimited agreement between the government and the central bank. After a process involving analysis and evaluation, the parties agree on the content of the mandate. In both Canada and Australia, the operational mandate is typically reviewed every five years.

In the third model, applied in Norway, the UK and New Zealand, the government sets the operational mandate. In Norway, the Ministry of Finance has established an eightyear review cycle for the operational mandate, with input from Norges Bank and other stakeholders. In New Zealand, the central bank is legally required to submit a "Remit Review" to the Minister of Finance at least every five years. In the UK, the operational mandate is not regularly reviewed but is set annually by the Chancellor of the Exchequer in a remit letter to the central bank.[52]

Mandates are commonly divided into two categories: hierarchical and dual (equalranking). See box "Hierarchical versus dual mandates" for a more detailed description of these two mandate types.

As mentioned, the operational mandate for monetary policy in Norway is laid down in the *Regulation on Monetary Policy*, which defines the task of monetary policy as follows:

51 n some countries, including Sweden and Iceland, the central bank also specifies the inflation target, albeit with approval from the political authorities.

52 n practice, the remit letters are normally stable over time and as a rule do not entail substantial changes to the operational mandate. The letters are usually issued following dialogue between HM Treasury and the central bank.

Section 1. *Monetary policy shall maintain monetary stability by keeping inflation low and stable.*

Section 2. *Norges Bank is responsible for the implementation of monetary policy.*

Section 3. *The operational target of monetary policy shall be annual consumer price inflation of close to 2% over time. Inflation targeting shall be forward-looking and flexible so that it can contribute to high and stable output and employment and to counteracting the build-up of financial imbalances.*

Section 4. *Norges Bank shall regularly publish the assessments that form the basis of the implementation of monetary policy.*

Section 5. *This Regulation enters into force with immediate effect. Upon its entry into force, Regulation of 29 March 2001 No. 278 on Monetary Policy is repealed.*

Table 3.2 summarises the Norwegian monetary policy framework. The overarching mandate is laid down in the Central Bank Act, while the operational mandate is laid down in the Regulation on Monetary Policy. In addition, Norges Bank prepares a monetary policy strategy, which includes the Bank's interpretation of the Regulation and outlines how monetary policy will normally respond to different shocks in order to achieve the regulatory objectives.

Table 3.2 Framework for monetary policy in Norway

Framework for monetary policy in Norway				
Framework and delegation			**Reporting and evaluation**	
Central Bank Act		*Stortinget (Norwegian parliament)*		
Regulation on Monetary Policy	↓	*Government*	↑	Financial Markets Report to the Storting, evaluation of the Regulation
Monetary policy strategy		*Norges Bank*		Committee assessments, *Monetary Policy Report*, press conferences, annual reports, parliamentary hearings, speeches
Conduct of monetary policy				

The monetary policy strategy serves an internal and an external purpose. Internally, it provides a framework for the Committee for Monetary Policy and Financial Stability's deliberations on the conduct of monetary policy. Externally, the strategy communicates to the authorities, market participants and the public how Norges Bank interprets the Regulation on Monetary Policy and seeks to fulfil its mission, and clarifies the monetary policy reaction pattern.

Norges Bank has not established scheduled revisions of the monetary policy strategy. However, the strategy is dynamic and is adjusted when new experience and insight so warrant. Moreover, it is natural to reassess the strategy in the event of changes to the Regulation on Monetary Policy.

The monetary policy strategy was revised in May 2024. The adjustments reflect somewhat different monetary policy challenges in 2024 than when the strategy was first published in 2021. The years following the global financial crisis in 2007/8 and up to 2021 were marked by low inflation internationally, on average below most central banks' targets, and a decline in the neutral real interest rate.[53] These two conditions created monetary policy challenges for example as the effective lower bound for the policy rate could constrain monetary policy. The lower bound could make it more difficult for monetary policy to lift inflation towards target and increase the risk of deflationary downturns.

In the revision of the monetary policy strategy in 2024, the challenges associated with the lower bound for the policy rate and low inflation were considerably toned down and replaced by a greater focus on the monetary policy response to different types of shocks, such as various supplyside shocks. The revised strategy clarified that monetary policy reactions do not depend on whether monetary policy can influence the *source* of changes in inflation but by whether the shock is expected to lead to a broadbased change in consumer price inflation. The revised strategy also explained more clearly how the Committee for Monetary Policy and Financial Stability gives weight to output and employment. The Committee's interpretation of the mandate is that Norges Bank shall give considerable weight to employment – also when inflation deviates substantially from the target.

53 See box "Neutral real interest rate".

Hierarchical versus dual mandates

Under flexible inflation targeting, the central bank should not solely give weight to bringing inflation back to target as quickly as possible after a deviation but also take the real economy into account. See Section 6 for a more detailed discussion of the weight given to the real economy.

How the real economy is taken into account in central banks' mandates varies across jurisdictions. Mandates are commonly classified as either hierarchical or dual (equalranking).

Hierarchical mandates are often characterised by low and stable inflation being a clear primary objective, while the objective of real economic stability is often conditional on meeting the primary objective before the central bank can also take the real economy into account. This can therefore be interpreted as a lexicographic ordering of objectives.

The mandates of the ECB, the Reserve Bank of New Zealand and Sveriges Riksbank are examples of hierarchical mandates.

Under dual mandates, the objectives of low and stable inflation and high and stable employment are equally ranked. Central banks operating under dual mandates include the Federal Reserve (Fed) and the Reserve Bank of Australia. New Zealand operated under a dual mandate in the period between 2018 and 2023. In addition to the equal ranking of the two objectives, dual mandates generally have a more ambitious formulation of the employment objective. While hierarchical mandates most often give weight to stability in the real economy or to avoiding unnecessary fluctuations, dual mandates contain formulations about maximum employment. However, central banks with dual mandates have interpreted "maximum" as "maximum sustainable employment", ie the highest level of employment consistent with low and stable inflation over time.

Norway's Regulation on Monetary Policy incorporates elements from the two types of mandate and like purely hierarchical mandates, low and stable inflation is the primary objective. At the same time, the formulation "high" output and employment has clear similarities with corresponding formulations in dual mandates.

It is not evident that hierarchical mandates result in a materially different monetary policy compared with dual mandates. Under both types of mandates, central banks must make ongoing tradeoffs between inflation and employment. The common condition in hierarchical mandates that the primary objective must be fulfilled is not clearly defined in practice. Central banks often interpret this condition to mean that inflation expectations must be anchored. At the same time, central banks with dual mandates also give considerable weight to anchored inflation expectations as it allows inflation to stabilise with less variation in employment.

In the literature, monetary policy tradeoffs are often represented using a loss function using inflation and an output gap:

$$L = \pi^2 + \lambda y^2$$

where L is the loss, π is inflation as a deviation from target and y is the output gap. λ is the weight given to the output gap relative to inflation. A common interpretation of dual mandates is that they require the central bank to give the same weight to the objective of high employment as to low and stable inflation. However, it is not selfevident what equal weighting means in purely operational terms.

A common interpretation of the Fed's dual mandate is that inflation and unemployment are weighted equally in a loss function, as assumed by former Fed Chair Janet Yellen and others in monetary policy analyses.[54] Using Okun's law for the US, which states that a 1 percentage point increase in the output gap corresponds to a reduction in the unemployment rate of about 0.5 percentage point, a dual mandate would

54 See Yellen (2012) and Debortoli et al (2019).

imply λ=0.25 in the loss function above, since y is included quadratically. In the US, labour supply is not particularly cyclical, so that changes in unemployment broadly mirror changes in employment. In other countries, such as Norway, labour supply is more cyclical, therefore there is not a onetoone relationship between unemployment and employment.

In general, the value of λ will depend on whether the real economy is represented by unemployment, employment or the output gap. Inflation and indicators for the real economy are different types of variables with different intrinsic variation. Consequently, the fact that a dual mandate states that the two objectives are to be given equal weight does not necessarily imply that λ=1. A less rigid, but perhaps more reasonable interpretation of a dual mandate is therefore that both variables must be given considerable weight. Although the Regulation on Monetary Policy in Norway cannot be considered a dual mandate, Norges Bank's interpretation is that the Bank is to give considerable weight to employment – also when inflation deviates substantially from target.

3.2 Interaction with other policy areas

Fiscal policy, wage formation and monetary policy are three key elements in the Norwegian economy, and together influence inflation, employment and competitiveness. At the same time, these policy areas are institutionally organised so that decisions are largely taken independently of each other. Although closer coordination could, in principle, enhance overall attainment of policy objectives there are both benefits of and a long tradition of independent wage formation and independent monetary policy. For example, close coordination between fiscal and monetary policy could create challenges for central bank independence.

The fiscal policy stance and wage growth influence inflation and economic activity and therefore have an impact on policy rate setting. Norges Bank takes decisions in these policy areas as given and sets the policy rate on the basis of its assessments of economic developments, where the effects of fiscal policy and wage growth are included as key premises. All else equal, more expansionary fiscal stance or higher wage growth will normally result in higher inflation and thus a higher policy rate to curb inflationary pressures and stabilise output and employment around their highest sustainable levels.

Norges Bank aims to be transparent about its monetary policy reaction pattern, enabling other policy areas to take potential policy rate implications of their decisions into account. In a gametheoretic analysis, the interaction between fiscal policy or wage formation and monetary policy could be viewed as a form of "Stackelberg equilibrium", where monetary policy is the Stackelberg follower and fiscal policy and wage formation are Stackelberg leaders that internalise the monetary policy reaction function.

Wage formation in Norway

Wage formation in Norway is coordinated through the leading sector wage-bargaining model (the frontfag model), whereby wage growth in trade-exposed manufacturing serves as a norm for overall wage growth in the economy. The manufacturing industry is first to conduct negotiations in collective bargaining rounds, and the outcome from these negotiations provides a framework for the subsequent settlements in the other collective bargaining areas. The role of coordinated wage formation and the norm-setting role of manufacturing have been examined in a number of official reports.[55]

Coordinated wage formation can reduce the risk of wage–price spirals. Moreover, international comparisons suggest that countries with coordinated wage formation generally have higher employment and lower unemployment than countries with decentralised wage formation.[56]

A central objective of the frontfag model is to help ensure that wage growth in the economy over time is consistent with the ability to pay wages in manufacturing, thereby preventing sheltered sectors from outcompeting manufacturing in the labour market. The model shares similarities with the maincourse theory, which builds on the work of Odd Aukrust.[57] The main course for wage growth is wage developments that ensure that the share of value added allocated to employees in the trade-exposed sector is constant over time.

The fact that the wage norm in trade-exposed manufacturing guides wage growth in other bargaining areas has implications for how different shocks affect wage and price inflation.[58] Compared with a wagesetting system where the trade-exposed sector is given less weight, the impact of domestic price shocks on overall wage and price inflation could be weaker. For example, an increase in the price of sheltered goods resulting from temporarily higher costs in the sheltered sector will have limited spillover to wage growth as wages are determined primarily on the basis of the ability of trade-exposed manufacturing to pay wages.

However, the effects of foreign price shocks and changes in the exchange rate could be stronger as a result of the leading sector mechanism. For example, a depreciation of the exchange rate will increase profitability in trade-exposed manufacturing and thereby reduce the wage share. To restore the wage share to its normal level, wage growth must rise.[59] In the sheltered sector, higher wages are largely passed through to prices, pushing up overall inflation.

The extent to which the leading sector mechanism helps dampen or amplify the effects of different shocks on wage and price inflation may have implications for the extent to which monetary policy should respond to the different shocks.

55 *Official Norwegian Reports* (NOU) 2000:21, (NOU) 2003:13, (NOU) 2013:13 and (NOU) 2023:30.

56 OECD (2018).

57 Aukrust (1977).

58 For a more detailed analysis, see Røisland (2023a and 2023b).

59 Empirically, the mechanism for restoring the wage share appears to be relatively slow (see Statistics Norway, 2023). A lasting depreciation of the exchange rate does not necessarily lead to a sharp increase in short-term wage growth, but rather to somewhat higherthannormal wage growth over a long period.

3.3 Overall experience with the Regulation on Monetary Policy

The Regulation on Monetary Policy establishes a monetary policy framework referred to as *flexible inflation targeting*. Within this framework, the objective of maintaining inflation close to target is balanced against the objective of stability in the real economy. Today, more than 40 jurisdictions operate under a flexible inflation-targeting regime, although the design and practice differ somewhat.

International experience with flexible inflation targeting has generally been positive. With the exception of a few countries that have joined a monetary union, no country that has introduced inflation targeting has abandoned it. A central feature of flexible inflation targeting is that the framework, alongside providing the economy with a nominal anchor, gives central banks scope to respond appropriately to economic shocks.

Norges Bank's experience with the Regulation on Monetary Policy has been positive. The Regulation translates the primary objective of low and stable inflation into a numerical target for consumer price inflation (CPI). It also describes the other objectives monetary policy is expected to take into account and thereby provides guidelines on how flexibility in inflation targeting is to be used.

Flexibility in inflation targeting implies a considerable degree of discretion. A consequence of discretionary tradeoffs between two considerations is that objective attainment becomes more difficult to verify directly. (See box "Criteria for a good mandate" for a more detailed discussion.)

Transparency surrounding monetary policy assessments is important for democratic control, as required by the Central Bank Act and the Regulation on Monetary Policy. Transparency is even more important when objective attainment cannot easily be directly verified. Sufficient insight into the assessments underlying the conduct of monetary policy allows the principal and the public to verify whether the Bank's judgments have been well founded and whether the tradeoffs between the different objectives have been reasonable and in line with the intention of the Regulation.

Norges Bank communicates the monetary policy tradeoffs through a number of channels (see Table 3.2). The Monetary Policy and Financial Stability Committee reports on the conduct of monetary policy in the *Annual Report*[60], while the assessments on which policy rate setting is based are communicated regularly in the *Monetary Policy Reports*. From March 2026, a *Summary of the Committee's Deliberations* is published at the same time as the policy rate decision. Norges Bank also communicates its assessments and tradeoffs through press conferences in connection with monetary policy meetings and through speeches and presentations. Since 2021, the Bank has also published its monetary

60 The Committee's annual report forms part of Norges Bank's *Annual Report*.

policy strategy, as noted in Section 3.1 above. Norges Bank seeks to continually develop its communication with the Bank's principal, market participants and the general public. The government also reports to the Storting (Norwegian parliament) on the conduct of monetary policy in the *Financial Market Report,* and the Governor appears in a public hearing before the Standing Committee on Finance and Economic Affairs in connection with the parliamentary debate on the *Report*.

3.4 Specific elements of the Regulation

Norges Bank interprets Section 1 of the Regulation as the overarching objective of monetary policy. Low and stable inflation is a natural primary objective of monetary policy for two reasons. First, maintaining low and stable inflation over time is a condition for a wellfunctioning economy and provides the best possible foundation for high output and employment in the long term.[61] Second, monetary policy can influence the level of inflation in both the short and long term. The policy rate also influences the real economy, but in the long term, factors other than monetary policy, such as wage formation, tax and social security systems, technological developments and demographic composition determine the level of output and employment. As monetary policy can influence inflation over time, the central bank can also be assigned a numerical inflation target, unlike for output and employment.

Even though low and stable inflation is an overarching objective, this does not imply that inflation should always take precedence over the objective of high and stable output and employment in the conduct of monetary policy. As mentioned above, the Committee's interpretation of its mandate is that considerable weight shall be given to employment – also when inflation deviates significantly from the target. See Section 6.2 for a more detailed discussion of the academic literature and international practice regarding the tradeoff between inflation and the real economy.

The first sentence of Section 3 in the Regulation specifies the actual inflation target. The target variable for inflation is CPI, and the numerical target is 2%. Norges Bank interprets the formulations "over time" and "close to" in light of the fact that inflation cannot be perfectly controlled and that, in the short term, the Bank must weigh the objective of stabilising inflation against other objectives. The Bank does not interpret "Over time" to mean that previous deviations from target should be corrected, for example by aiming for inflation to fall below 2% for a period if it has been above target previously. Following a deviation from target, the policy rate should normally be set with a view to bringing inflation gradually back to the 2% target.[62]

Central banks with inflation targets that have reviewed their monetary policy frameworks in recent years have to little extent assessed the

61 This nevertheless assumes that fiscal policy is sustainable, entailing that the central bank must not finance public deficits.

62 See Section 4 for a discussion of targets for average inflation and pricelevel targeting.

actual level of the inflation target, reflecting the fact that inflation has been high and that it has been necessary to ensure wellanchored inflation expectations. Similarly, there are good reasons not to change the inflation target in Norway any time soon.

There are alternatives to the CPI as a target variable (see Section 4 for a further description). Overall, the CPI is considered to be the most appropriate price index for an inflation target because it is well known to the public and is the most commonly used index in contracts and wage negotiations. The choice of price index is of limited importance for monetary policy when inflation targeting is flexible and forwardlooking. Almost all other inflationtargeting countries use the CPI as a target variable.[63]

While the CPI is the target variable, Norges Bank uses a number of underlying inflation indicators that adjust for short-term changes in individual prices in the monetary policy assessments. In Norway, energy prices often contribute to substantial short-term fluctuations in the CPI. The CPI adjusted for tax changes and excluding energy products (CPI-ATE) is therefore an important indicator used to assess inflation.

The second sentence of Section 3 is interpreted to mean that Norges Bank must strike a balance between the objective of stabilising inflation around the target and two other objectives: supporting high and stable output and employment and mitigating the build-up of financial imbalances.

Norges Bank assumes that keeping employment as high as possible is an overarching objective of economic policy. Contributing to sustaining the level of economic activity so that as many people as possible can find work without having to search for too long is therefore also an important consideration for monetary policy.

Even though high and stable employment is crucial for societal welfare, monetary policy must take into account that if the level of activity in the economy becomes too high, prices and wages may accelerate and conflict with the objective of low and stable inflation. If Norges Bank does not tighten monetary policy in response to inflationary pressure, a period of even tighter monetary policy and higher unemployment may be required at a later stage to restore price stability. There is no evidence to suggest that higher employment can be achieved over time by accepting higher inflation through a more expansionary monetary policy. Norges Bank therefore interprets “high” to mean the highest sustainable level. This interpretation is also consistent with that of other central banks with similar wording in their mandates.[64]

63 Some countries have made adjustments to the CPI as a target variable. In Sweden, for example, the target variable is the CPIF, which is the CPI with a fixed interest rate. The reason is that residential mortgage rates are directly included in Sweden’s CPI as a measure of housing costs, meaning that an increase in the policy rate directly contributes to higher CPI inflation. This effect is, however, temporary and provides a misleading picture of inflation. In Norway, mortgage rates are not directly included as a measure of housing costs. Instead, rents are used, which are affected more slowly and more indirectly by changes in interest rates.

64 For example, the Federal Reserve Act states that the central bank shall promote “maximum employment”. The Fed has interpreted this objective as referring to “maximum *sustainable* employment”.

Such an interpretation of “high” implies a realistic level of ambition for monetary policy’s contribution to the objective of keeping employment as high as possible. A more ambitious interpretation would risk introducing an inflation bias into monetary policy, whereby inflation would on average be too high without the average level of economic activity becoming higher.

The maximum sustainable level of output and employment is subject to uncertainty and may vary over time. As an indicator of how Norges Bank assesses output and employment in relation to the maximum sustainable level, an *output gap* is estimated. When estimating the output gap, particular weight is given to labour market developments, while short-term fluctuations in labour productivity are normally disregarded. There is therefore normally no conflict between high and stable output and high and stable employment in the operational interpretation of the Regulation. See box “Norges Bank’s estimates of the output gap” in Section 2.2 for a more detailed description of how Norges Bank estimates the output gap.

Norges Bank interprets the consideration of mitigating the build-up of financial imbalances as being derived from the consideration of high and stable output and employment. Financial imbalances increase the risk of a severe downturn further ahead. A persistently low interest rate level can sow the seeds of increased risk-taking and rapid debt accumulation. High debt makes households and firms more vulnerable to income loss, which could amplify downturns. If there are signs that financial imbalances are building up, the consideration of long-term stability may warrant maintaining a somewhat higher policy rate than the consideration of inflation and employment in the near term may suggest. The extent of monetary policy tightening depends in part on macroprudential instruments and other regulations and their effects.

Tightening monetary policy to mitigate the build-up of financial imbalances may involve costs in the form of lower demand in the near term. The monetary policy assessments weigh the consideration of reducing the risk of a severe downturn in the long term against maintaining high and stable employment in the near term.

Often, there will be no conflict between the consideration of stability in the real economy and the consideration of limiting the buildup of financial imbalances. In an economic upturn, property prices and debt, for example, typically rise rapidly. A tighter monetary policy stance could then contribute to both easing pressures in the economy in the near term and to reducing the risk of severe downturns further out. Likewise, in situations when the economy faces an acute risk of a pronounced downturn, both real economic and financial stability considerations may suggest a rapid easing of monetary policy as this counteracts abrupt falls in asset prices that could have otherwise triggered or amplified the downturn.

In other situations, tensions may arise between short-term and long-term stability considerations. In a downturn, the policy rate will normally be lowered to dampen the decline in economic activity. Even though weaker activity also dampens the rise in house prices and debt growth, lower interest rates will in isolation stimulate the housing market. This is often desirable and helps to stabilise the economy, but in some cases, such stimulus may become so strong that the build-up of debt and the rise in house prices conflict with the objective of stability over time. In such cases, there may be grounds for a smaller policy rate reduction than would otherwise have been the case, or for a gradual normalisation of the rate to commence earlier than implied by shortterm stabilisation considerations alone.

When financial imbalances have already built up, the tradeoff between shortterm and longterm stability can become particularly challenging. While a higher rate will in isolation help to reduce debt-to-income (DTI) ratios and vulnerability ahead, this must also be weighed against the increased near-term vulnerability of households and firms to interest rate increases and income loss.

Since there is often no conflict between considerations of financial stability and stability in the real economy, the objective of counteracting the buildup of financial imbalances will at times have no bearing on the tradeoffs in the practical conduct of monetary policy. This objective thus differs from the objective of high and stable output and employment, which will always be part of the Bank's assessments.

Financial imbalances are difficult to measure, particularly in real time, but also in retrospect. In practice, assessments must therefore rely on a number of indicators and a considerable degree of judgement in order to determine whether such imbalances are building up. The fact that financial imbalances are difficult to measure and that financial stability considerations only intermittently conflict with the consideration of inflation and real economic stability in the near term makes it difficult for the principal and the public to verify this part of the mandate.

As described in Section 7, research and international practice appear to have shifted somewhat towards the view that financial stability should not be a standalone objective of monetary policy but rather only be considered insofar as it bears on inflation and employment stability. In international practice, financial stability considerations appear to have been most prominent in monetary policy frameworks around 2018, but to subsequently have declined in importance. There is now a certain international consensus that macroprudential supervision and regulation are the first line of defence for financial stability.

In addition to providing guidelines for how flexible inflation targeting shall be conducted, the Regulation also includes two sections, Sections 2 and 4, which establish what is laid down in the Central Bank Act concerning instrument independence and reporting requirements, respectively. As interpreted by Norges Bank, these sections do not contain any substantive specification beyond what follows from the wording of the Act.

Criteria for a good mandate

Many public tasks are delegated to specialised institutions, for which there may be several reasons. In general, this may reflect the fact that the task requires specialised information, professional expertise or operational capacity that is best concentrated in one institution. Delegation may also be justified by the need to insulate decisionmaking from political short-termism, for example because political authorities face to a greater extent timeinconsistency problems.

Given that the authorities have decided to delegate a task to a (partly) independent expert institution, the mandate of that institution must be defined. In principal–agent theory, a mandate may be regarded as a contract between the principal — here normally the authorities or society — and the agent (the institution) that has been delegated a task.

There is a substantial body of literature in political science, economics and law that examines how principals can design good mandates. Monetary policy is a key instrument in economic policy, and the monetary policy mandate should reflect its role given the division of responsibilities in economic policy. A natural overarching criterion is that the mandate should ensure that monetary policy contributes as effectively as possible to achieving the objectives of economic policy.

Primary criterion:
The mandate should facilitate policy that aligns with the overriding economic policy objectives.

The primary objectives of economic policy in Norway are to ensure high employment, contribute to economic growth and prosperity, strengthen fair distribution and a robust welfare state, and facilitate sustainable development and the transition to a lowcarbon economy.[65] In principle, it is conceivable that the monetary policy mandate could be designed whereby the central bank is tasked to deploy policy instruments to best contribute towards achieving these primary objectives. From a delegation perspective, however, such a mandate would have a number of weaknesses. First, there would be a large number of objectives relative to the number of policy instruments, making the necessary tradeoff between all the objectives highly discretionary and potentially dependent on individual judgement. Second, the various objectives are not very precise, making it difficult to assess whether they have been attained. Third, monetary policy is not well suited for advancing some of these objectives.

Sufficient verifiability is important for the democratic control of operationally independent central banks. An extensive body of literature examines how mandates should generally be designed from a delegation

65 See Report to the Storting No. 1 (2024–2025) National Budget.

perspective. Drawing on this literature, there is a relatively broad consensus as regards the criteria for a good mandate:

1. **Clear objectives, without overly detailed constraints on the use of instruments**[66]
   The mandate must clarify *what* the institution is expected to achieve but should not provide strict guidelines for *how.* Clear objectives provide predictability and verifiability, while freedom in the use of instruments allows for professional effectiveness. A clearly defined purpose and clear objectives also delimit institutions' authority, thereby reducing the risk of mission creep.

   For monetary policy, this criterion implies that the overarching objective, which in most countries is to maintain a stable monetary value (or similar formulations), is clearly defined and that sufficient instrument independence is provided for in central bank legislation.

2. **Consistency between objectives and instruments**[67]
   Consistency between objectives and instruments has two dimensions. First, the instruments must have sufficient effect on the target variables for the objectives to be achievable. Objectives cannot be set for variables that the institution can only influence to a limited extent. Second, the relationship between the number of objectives and the number of instruments must be taken into account. According to the Tinbergen rule, the number of achievable policy objectives cannot exceed the number of policy instruments. If there are more objectives than instruments, it is usually necessary to make tradeoffs between the various objectives without being able to fully achieve them. In such cases, the tradeoff between various objectives can be regarded as the target variable, and the Tinbergen rule will in principle be satisfied. However, for many public missions, it is difficult for the principal to specify how the institution should balance different objectives.

   For monetary policy, this criterion implies, first that the mandate must not specify objectives that monetary policy does not have instruments to achieve. For example, if the central bank does not have effective instruments to influence climate emissions or the green transition, it is not appropriate to include such considerations in the mandate. However, even though the policy rate can influence a broad set of economic variables, compliance with the criterion will weaken as the number of objectives and considerations the central bank must balance increases.

3. **Operational criteria for assessing objective attainment**[68]
   Without measurable indicators, the institution is *de facto* given political power to define its own success. Verifiability requires that society can assess the quality of the decisions made. Target variables

66 Majone (1996), Epstein and O'Halloran (1999), Huber and Shipan (2002) and Reis (2013).
67 Tinbergen (1952), Laffont and Tirole (1993) and Reis (2013).
68 Bovens (2007), Alesina and Tabellini (2007a and 2007b) and Reis (2013).

and associated objectives should therefore be sufficiently observable. In cases where the actual objective is a given tradeoff between different objectives and considerations, assessing objective attainment will, as a rule, be more challenging than if the number of instruments and separate objectives are the same.

Under a flexible inflationtargeting regime, the actual inflation target is readily operationalised. The objective of high and stable output and employment is less readily operationalised, albeit sufficiently precise to allow for verification. The objective of counteracting financial imbalances is difficult to operationalise as there is a lack of academic consensus on how such imbalances can be measured. If some of the objectives are difficult to operationalise, verifying objective attainment becomes more difficult.

4. **Accountability**[69]
   Independence must be balanced by democratic accountability. Reporting to the principal ensures that the institution does not operate in a vacuum. This criterion is not independent of Criterion 3. The less operational objective attainment is, the more important accountability through reporting and transparency about the assessments will be. For democratic control, transparency can therefore serve to some extent as a substitute when the mandate does not fully satisfy Criterion 3.

   For monetary policy, accountability is ensured through different institutional arrangements (see Table 3.2 in Section 3.1). Both the Central Bank Act and the Regulation on Monetary Policy (Section 4) place responsibility for the conduct of monetary policy with the central bank and require the Bank to report on policy implementation. In addition to democratic accountability, central banks have recognised over the past two decades that transparency also contributes to more effective monetary policy.[70]

5. **Protection against political short-termism**[71]
   Independence is especially valuable when politicians have incentives for opportunism or when task-related timeinconsistency problems arise. The institution must be able to carry out its mandate free from undue pressure. (This does not mean that the institution should not be subject to criticism as to how it performs its tasks *within* the framework of the mandate (cf. Criteria 3 and 4).

   For monetary policy, this criterion primarily concerns the extent to which, and under what circumstances, political authorities can influence the central bank's decisions, whether through various forms of directive authority or by replacing the monetary policy decisionmakers. However, this criterion is more relevant for the overarching mandate (the Central Bank Act) than for the operational

69 McCubbins and Schwartz (1984), McCubbins et al (1987), Bovens (2007) and Reis (2013).
70 See eg Qvigstad (2010).
71 Kydland and Prescott (1977), Rogoff (1985), Lohmann (1992), Gilardi (2002) and Reis (2013).

mandate (the Regulation on Monetary Policy), since it is the Central Bank Act that determines the degree of central bank independence.

6. **Democratic legitimacy and scope for revision**[72]
   The mandate must have democratic legitimacy. It must be amendable by elected representatives if societal preferences evolve or if new information and experience warrant a revision.

   In Norway, the democratic legitimacy of the Regulation is established by being set by the Government, which is accountable to the Storting (Norwegian parliament). Broad participation in the evaluation of the Regulation on Monetary Policy by inviting economists and the public to provide input, further strengthens democratic legitimacy.

From a delegation perspective, the tension between the overarching criterion for monetary policy and the six criteria for a good mandate is the core of the institutional design of monetary policy frameworks. When formulating the mandate, the authorities must strike a balance between different considerations. On the one hand, the mandate should be flexible and broadly framed to allow monetary policy to promote the overarching economic policy objectives. On the other hand, the design should enable sufficient democratic control of the central bank by the authorities and the public.

Flexible inflation targeting, where the central bank has a numerical inflation target but must also give weight to output and employment, can be viewed as a compromise between the six criteria and the overarching criterion for a good mandate. In isolation, the fact that monetary policy under traditional flexible inflation targeting must weigh two considerations against each other weakens verifiability. At the same time, central banks that conduct flexible inflation targeting are generally transparent about their assessments and policy tradeoffs. This transparency, which is partly imposed and partly voluntary, ensures scope for sufficient democratic control.

72 Majone (1999). Huber and Shipan (2002), Bovens (2007) and Reis (2013).

Appendix

Monetary policy across countries

Australia	"… contribute to: - the stability of the currency of Australia. - the maintenance of full employment in Australia; and - the economic prosperity and welfare of the people of Australia." Reserve Bank of Australia Act (1959)	The monetary policy objective is defined in collaboration between the government and the central bank and documented in the joint agreement "Statement on the Conduct of Monetary Policy".	The 2025 joint agreement reads: "They agree that an appropriate goal is consumer price inflation between 2 and 3 per cent." The central bank shall also focus on achieving sustained full employment, "which is the current maximum level of employment that is consistent with low and stable inflation." In addition, the central bank will "continue to contribute to financial stability by setting monetary policy to achieve its inflation and full employment objectives."
Canada	"…to promote the economic and financial welfare of Canada."[1] Bank of Canada Act (1934)	The operational inflation target is defined in collaboration between the federal government and the central bank in a joint agreement. The inflation target is evaluated and the agreement renewed every five years.	The current agreement dates from December 2021 and renewed the inflation target of 2%, measured as the mid-point of the 1–3% inflation control range. The agreement will be renewed by the end of 2026.
The euro area	"… to maintain price stability. Without prejudice to the objective of price stability, it shall support the general economic policies in the Union with a view to contributing to the objectives of the Union as laid down in Article 3 of the TEU[2]".	The European Central Bank (ECB) defines the inflation target. The current strategy was adopted in 2025.[3] The next assessment of the strategy is scheduled for 2030.	A symmetric inflation target of 2%. A medium-term orientation "… also allows the Governing Council in its monetary policy decisions to cater for other considerations relevant to the pursuit of price stability." The ECB also takes into account the implications of climate change and nature degradation for monetary policy and central banking.
Iceland	"… shall promote price stability, financial stability and sound and secure financial activities."Act on the Central Bank of 2Iceland (2019)	With the approval of the government, the central bank can issue a declaration on a quantitative inflation target.	The target is defined as a 12-month change in the consumer price index of 2½%.
Japan	"…aimed at price stability, thereby contributing to the sound development of the national economy." Bank of Japan Act (1997)	The BoJ specified a price stability target in January 2013.	The inflation target is an annual rise in the CPI of 2%.
New Zealand	"- the economic objective of achieving and maintaining stability in the general level of prices over the medium term; and - the financial objective of protecting and promoting the stability of New Zealand's financial system …". Reserve Bank of New Zealand Act (2021)	The finance minister issues an operational definition of the mandate in the form of a remit for the central bank, normally every five years.	The current remit was issued in 2023. The inflation target was renewed at between 1% and 3% over the medium term, with a focus on keeping future inflation near the 2% mid-point.
Norway	"… to maintain monetary stability and to promote the stability of the financial system and an efficient and secure payment system. … to promote high and stable output and employment." Central Bank Act (2019)	The operationalisation of a stable value of money is laid down in a separate Regulation on Monetary Policy dated March 2018.	The operational target of monetary policy shall be annual consumer price inflation of close to 2% over time. Inflation targeting shall be forward-looking and flexible so that it can contribute to high and stable output and employment and to counteracting the build-up of financial imbalances.

The UK	"- to maintain price stability, and - subject to that, support the economic policy of her Majesty's Government, including its objectives for growth and employment." Bank of England Act (1998)	The price stability objective and the government's economic policy are defined in more detail in an annual remit from the Chancellor of the Exchequer.	The current remit is from November 2025[KB1.1][IS1.2]. The inflation target was reconfirmed as 2%. The remit also confirmed that "the government's economic policy is to restore broad-based and resilient growth built on strong and secure foundations. Price and financial stability are essential pre-requisites to achieve this objective, providing the stability required for investment and reform to help businesses to thrive and to help keep the cost of living low for families."
Switzerland	"…shall ensure price stability. In so doing, it shall take due account of economic developments." Nationalbankgesetz (2003)	The price stability target is set by the Swiss National Bank (SNB).	The SNB laid down its monetary policy strategy in December 1999. The price stability target is annual CPI inflation of less than 2%.
Sweden	"The principal objective of the Riksbank is to maintain permanently low and stable inflation (the price stability objective). Without neglecting the price stability objective, the Riksbank shall also contribute to a balanced development of output and employment (real economy considerations). The Riksbank shall also promote a safe and efficient payments system." The Sveriges Riksbank Act (2022)	The Riksbank decides how the formulations in the central bank act should be interpreted.	The Riksbank has defined the inflation target as an annual change in the consumer price index with a fixed interest rate (CPIF) of 2%.
USA	"…so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rate." Federal Reserve Act (1977)	The Federal Reserve defines its dual mandate. The first time was in 2012.[4] The FOMC stated then that they judged a long-term target of 2% inflation as consistent with the price stability objective. The FOMC plans to conduct a review of the framework roughly every five years. The most recent review was conducted in 2025.	Strategy updates since 2025 have confirmed the long-term target of 2% inflation. The FOMC views maximum employment as the highest level of employment that can be achieved on a sustained basis in a context of price stability but also recognises that employment may at times run above this level without necessarily creating risks to price stability.

1 The Bank of Canada Act contains an introductory section about how the central bank was established, but the Act has no objects clause.

2 See Treaty on European Union

3 See ECB (2025) The ECB's monetary policy strategy statement (2025).

4 Statement on Longer-Run Goals and Monetary Policy Strategy. Federal Open Market Committee (FOMC). Updated at the FOMC meeting in January each year. In most cases, the statement has been reaffirmed each year in January with only minor revisions, but substantial changes were made in 2020 and 2024. The change made in 2024 was partly a reassessment of the changes made in 2020.

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Part 2

International experiences and research results

4. Developments in monetary policy frameworks

Key takeaways

- **Inflation targeting has proven to be a robust monetary policy framework. No country that has retained an independent monetary policy has chosen to switch to alternative targets, such as price-level targeting or nominal GDP targeting.**
- **The practice of inflation targeting internationally has become more flexible over time, with greater emphasis on the real economy. Among other things, this has reduced the need for escape clauses in the formulation of inflation targets.**
- **Although research points to some factors that could argue in favor of higher inflation targets, changing the target level has not been on the agenda among central banks that have reviewed, or are reviewing, their frameworks in recent years. Confidence in the existing nominal anchor is considered particularly important in light of the high inflation seen in recent years.**
- **Most countries have retained the CPI as the target variable, but various measures of underlying inflation form part of central banks' analytical toolkit.**

4.1 Introduction

Inflation targeting for monetary policy was first introduced in New Zealand in 1990. The framework, commonly referred to as flexible inflation targeting, has since become highly widespread, and more than 40 countries have adopted such a framework. Today, the main alternatives in monetary policy are inflation targeting and various forms of exchange rate targeting, ranging from managed floating exchange rates ("managed float") to monetary union. There are, however, also some countries with hybrid forms of the two main frameworks, such as Singapore.

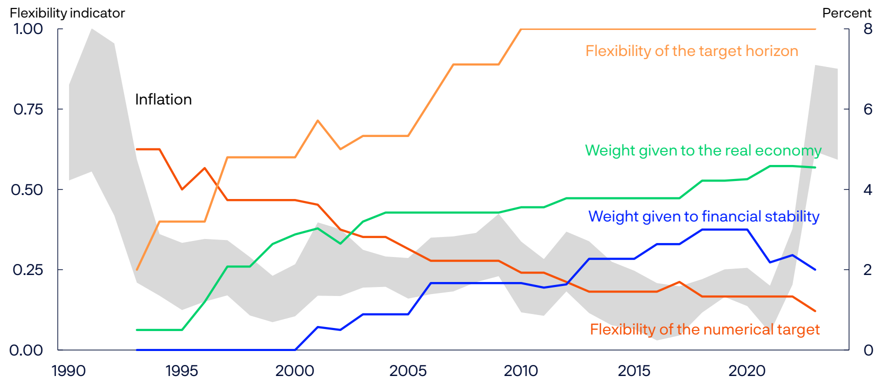
Alternatives to, and further developments of, inflation targeting have been proposed in the academic literature, including price-level targeting, average inflation targeting, and nominal GDP targeting. However, as discussed further in Section 4.2, these alternatives do not currently appear to be particularly realistic candidates for monetary policy frameworks.

The design and implementation of flexible inflation targeting have evolved over time. Broadly speaking, in the early years of inflation targeting, central banks were concerned with establishing credibility for the framework and placed relatively strong emphasis on bringing inflation back to target. In practice, this was reflected in a relatively rigid planned horizon for returning inflation to target following a deviation, most often two years. As the framework matured and central banks gained experience, inflation targeting gradually became more flexible in the sense that greater weight was placed on the real economy and other considerations. In recent years, however, this trend may have stalled, and perhaps even reversed, as the experience of high inflation has led many central banks to place renewed emphasis on anchoring inflation expectations.

Claudio Borio and Mathias Chavaz (2025) have examined developments in monetary policy frameworks using a dataset based on information provided by central banks regarding their frameworks and monetary policy strategies. The figure below from their article provides a good summary of how flexible inflation targeting has evolved. The horizon for returning inflation to target has become more flexible, while the weight placed on the real economy has increased. As noted above, these developments are related. Conversely, flexibility in the target itself has diminished. This reflects the fact that several central banks have moved away from target ranges and toward point targets. Considerations related to financial stability gained greater prominence in the period following the Global Financial Crisis, but this trend appears to have reversed in recent years. This must be seen in light of, among other things, improvements in macroprudential policy frameworks. See Section 7 for a more detailed discussion of monetary policy and financial stability.

Chart 4.1 Inflation targeting has gradually become more flexible

Advanced economies. Flexibility indicator (LHS) and inflation (RHS)



Source: Source: Borio & Chavaz. "Moving targets? Inflation targeting frameworks, 1990–2025." *BIS Quarterly Review* (2025): 31-52

Internationally, the use of quantitative easing (QE) and the experience with such measures have been an important part of the discussion on monetary policy and a key topic in reviews of monetary policy frameworks. Experiences from the period following the financial crisis and during the pandemic suggest that QE contributed to better achievement of monetary policy objectives in situations where policy rates were at or near their effective lower bound. Asset purchases helped reduce long-term interest rates and create more expansionary financial conditions, thereby supporting economic activity and inflation. At the same time, experience has shown that scaling back and unwinding such measures can be challenging and may at times generate turbulence in financial markets. The prevailing assessment today is that QE is a useful supplement in the monetary policy toolkit, but primarily a tool for exceptional situations in which conventional monetary policy has limited room for maneuver.[1] In Norway, QE has not been used, and such measures are not included as part of the central bank's monetary policy toolkit or strategy.

4.2 Alternative targets

Internationally, particularly in connection with reviews of monetary policy frameworks, the following alternatives to a traditional inflation target have been discussed:

- Price-level targeting
- Average inflation targeting
- Nominal GDP targeting

Ahead of the previous review of the monetary policy mandate, Norges Bank conducted a comprehensive assessment of alternative policy targets in the Review of Flexible Inflation Targeting (ReFIT) project.[2] More recent research since that review has not altered the main conclusions regarding the properties — both positive and negative — of the various policy targets. We therefore limit ourselves here to a brief and general discussion of the key characteristics of the alternative policy targets, including more recent experiences and assessments by other central banks.

The difference between a price-level target and an inflation target is that if inflation rises above target for a period, the central bank under a price-level target must subsequently ensure that inflation falls below target, so that the price level over time is unaffected by the inflation shock. In other words, it is a form of "bygones are not bygones" policy, in which the central bank aims to return the price level to a predetermined path. Under inflation targeting, by contrast, the central bank only aims to return inflation to target — not to push it below target afterward. A target for average inflation, for example a rolling three-year average, can be viewed

1 For overviews of research and experience with quantitative easing and other unconventional monetary policy instruments, see, for example, Kuttner (2018), Dell'Ariccia et al. (2018), and Bernanke (2020).

2 Norges Bank (2017).

as an intermediate regime between inflation targeting and price-level targeting. The central bank must bring inflation below target following a positive deviation, but not so far or for so long that the price level returns fully to its previous path.

In theory, price-level targeting and average inflation targeting provide a stronger anchoring of inflation expectations, allowing inflation to be stabilized more efficiently.[3] The reason is that firms will raise prices less in response to a cost shock if they expect the central bank to ensure that inflation will subsequently be below target for a period after the shock has dissipated.

A nominal GDP target also shares some of these properties. A target for the level of nominal GDP has much in common with a price-level target. The main difference is that under nominal GDP targeting, concern for the real economy is effectively "hard-coded" into the target itself, reducing the need for flexible implementation in order to take output and employment into account. A target for nominal GDP growth does not have as strong "bygones are not bygones" properties as a level target, but it nevertheless shares some of the same characteristics.

Much of the more recent research on the properties of these policy targets has been conducted by researchers at the Bank of Canada in connection with its previous five-year review of the monetary policy framework, in which the choice of policy target was one of the main themes.[4] The following disadvantages of the alternatives were emphasized:

- The "bygones are not bygones" elements would likely result in greater fluctuations in the real economy.
- The beneficial properties related to inflation stabilization are not robust to alternative assumptions regarding expectation formation.
- The alternative policy targets are more difficult to communicate and for the public to understand. This could weaken confidence in monetary policy.
- The gains were considered relatively small compared with the risks.
- The backward-looking element ("bygones are not bygones" element) would make the framework less flexible if policymakers needed to respond rapidly to new disturbances.

In its framework agreement of December 2021, the Bank of Canada and the Department of Finance Canada therefore concluded that conventional inflation targeting was, overall, the most robust framework.

One risk associated with introducing any of these alternative frameworks is that they have been tested only to a very limited extent in practice.

3 See, for example, Vestin (2006).
4 Bank of Canada (2021).

Sveriges Riksbank operated under a price-level target in the 1930s, but researchers disagree on whether the Riksbank in practice pursued a price-level target or a fixed/stable exchange rate target.

More recently, the Federal Reserve implemented a form of average inflation targeting referred to as Flexible Average Inflation Targeting (FAIT). This was announced in August 2020 following the conclusion of a strategy review. The introduction of FAIT must be seen in light of the monetary policy challenges at the time, which were characterized by persistently low inflation, a low neutral real interest rate, and the risk that the effective lower bound on interest rates would become binding. An average inflation target implied that following periods in which inflation had been below 2 percent, the Fed would aim for inflation to run moderately above 2 percent for some time. The intention was to strengthen the credibility of forward guidance and make monetary policy more effective in raising inflation and anchoring inflation expectations.

However, the Fed did not specify the time window over which the average was to be calculated, how far above 2 percent inflation should rise, or when any compensatory phase could be considered complete. Moreover, the strategy was asymmetric in the sense that it explicitly referred to aiming for “overshooting” — inflation above target — following periods of below-target inflation, but did not specify a corresponding “undershooting” after periods of above-target inflation.

In the subsequent strategic review in 2025, the Federal Reserve abandoned the wording related to average inflation targeting and returned to a more explicitly symmetric 2 percent formulation. The change must be viewed in light of the sharp increase in inflation beginning in 2021. In an environment characterized by persistently high inflation and the need for significant monetary policy tightening, it became less relevant to emphasize a strategy designed for a low-inflation, near-zero interest rate environment. A simpler and more symmetric formulation contributed to clearer communication of the commitment to price stability.

4.3 Specification of the inflation target

The main dimensions of an inflation target are the target level itself (or possibly a target range) and the choice of price index to which the target applies. In most industrialized countries with inflation targeting, the target level is 2 percent and the consumer price index (CPI) is the target variable.

4.3.1 Target level

There is an extensive body of literature seeking to estimate the optimal rate of inflation. Research on optimal inflation was reviewed in the ReFIT project mentioned above, and subsequent contributions have largely confirmed the key trade-offs, although some new mechanisms have been highlighted. A recent survey by Adam and Weber (2024) provides a comprehensive overview of the literature and shows how different considerations pull the optimal inflation rate in different directions. They find that traditional costs of inflation, related to price rigidities, inefficient relative prices, planning costs, and the taxation of liquidity, in isolation point toward very low or zero inflation. At the same time, downward nominal wage rigidity and challenges associated with the effective lower bound (ELB) point toward a positive inflation target.

A concrete recent contribution is Adam and Weber (2023), who analyze optimal inflation in a model featuring systematic trends in relative prices combined with price rigidities. Empirically, they document that many product prices decline over the life cycle of the product. In combination with price rigidities, this implies that a moderately positive inflation rate can reduce the degree of inefficient relative prices. Based on microdata for the United Kingdom, they estimate optimal inflation at around 2.6 percent in their baseline specification.

Andrade et al. (2019) estimate a New Keynesian model with positive average inflation (trend inflation) and an effective lower bound on nominal interest rates, and find that the optimal inflation rate lies in the range of 2–2.5 percent in their baseline specification, and somewhat higher when parameter uncertainty is taken into account. They also show that a lower neutral real interest rate points toward a higher optimal inflation target because the risk of hitting the lower bound increases.

Blanco (2021), however, shows that estimates of optimal inflation are sensitive to how price rigidities are modeled. In a model with menu costs, which generates a more realistic distribution of price changes than standard models of price rigidity, he finds that the costs of trend inflation are lower than in traditional models, while the benefits of reducing the probability of hitting the effective lower bound are substantial. In his quantitative analysis, the optimal inflation target may therefore lie around 3–4 percent.

A more recent contribution by Cho et al. (2025) further shows that optimal inflation also depends on the openness of the economy and the exchange rate regime. In their open-economy model, the optimal inflation target is somewhat lower than in a corresponding closed economy because international risk-sharing and real exchange rate adjustments partly reduce the need for higher trend inflation as a buffer against the ELB. This illustrates that optimal inflation is not universal, but depends on the structure of the economy and institutional arrangements.

Overall, the literature shows that the optimal inflation rate is model-dependent and sensitive to assumptions regarding price-setting behavior, wage rigidities, the level of the neutral real interest rate, and the degree of openness. Although many studies point toward a moderately positive inflation target, there is considerable uncertainty regarding the precise level.

With regard to international practice, a possible change in the target level itself has been less prominent on the agenda of central banks and governments in recent years than previously. This must be viewed in light of the experience with the inflation surge in 2021–2023. Raising the inflation target in a situation where inflation is above target could be perceived as opportunistic and weaken confidence in the nominal anchor. It could create the impression that the target is adjusted when it proves difficult to achieve. At the same time, lowering the target in a situation where inflation is, or has recently been, substantially above target could appear lacking in credibility and entail significant real economic costs if the target were not achieved quickly.

A recurring theme in central banks' evaluations of the inflation shock experience has been the importance of preserving confidence in the inflation target as the nominal anchor. This suggests that the threshold for changing the target level should be high, particularly during periods of large deviations in inflation.

4.3.2 Choice of price index

The choice of index or indicator for inflation can be divided into three questions:

1. Which price index the inflation target should be linked to.
2. How the components of the price index should be measured.
3. Which inflation indicators the central bank should emphasize in its strategy, forecasting work, and communication.

With respect to the first question, the consumer price index is by far the most common price index to which inflation targets are linked. In the early period after inflation targeting became widespread, explicit escape clauses in the target formulation were relatively common. These specified which types of disturbances the central bank should look through. Typically, this included certain supply-side shocks, changes in indirect taxes and duties, and direct effects of interest rate changes on the consumer price index.

In the early phases of inflation targeting, the horizon for achieving the target was often shorter and less flexible. In such a regime, escape clauses could be important in preventing the central bank from responding mechanically to temporary disturbances in a way that created unnecessary volatility in output and employment.

Over time, such escape clauses have become less common. An important explanation is that inflation targeting has gradually become more flexible and forward-looking. When the target is to be achieved in the medium term, and monetary policy also places weight on stability in the real economy, the central bank will normally look through temporary disturbances in inflation even without explicit escape clauses. The increased flexibility in the implementation of inflation targeting has therefore reduced the need for such provisions.

The increased flexibility of inflation targeting has also made the choice of price index less important than previously, although it may still matter to some extent. The ReFIT report (Section 3.1) contains a description and discussion of various types of price indices proposed in the literature.[5]

In simple New Keynesian models for small open economies, such as Galí and Monacelli (2005), it is optimal for monetary policy to stabilize domestic inflation rather than consumer price inflation. The result follows from the assumption of complete and immediate pass-through from changes in foreign prices and exchange rates to consumer prices, combined with price rigidities only in domestic prices. When import prices are flexible while domestic prices are rigid, optimal policy implies stabilizing domestic inflation, because this is what gives rise to inefficient relative prices in such models.

In practice, pass-through from exchange rates and foreign prices to consumer prices is neither complete nor immediate. There are rigidities and frictions also at the import stage, related among other things to distribution margins and price-setting in domestic markets. This weakens the theoretical argument for stabilizing domestic inflation alone.

With sufficiently flexible and forward-looking monetary policy, it is also not obvious that the choice between CPI inflation and domestic inflation is decisive for the practical conduct of policy. A central bank that stabilizes domestic inflation will respond to shocks to import prices insofar as they are expected to spill over into domestic prices and wages. Similarly, a central bank targeting CPI inflation, while also taking stability in the real economy into account, will largely look through temporary import price shocks if they are not expected to spill over into domestic inflation and wage growth.

An issue that has received increased attention in recent years — primarily relating to question 2, namely how the components of the price index should best be measured, but also potentially affecting the choice of target index for the inflation target — concerns how housing costs should be included in the price index that monetary policy aims to stabilize. The discussion mainly concerns the treatment of owner-occupied housing and how best to measure the flow of housing services from housing consumption. In most countries, including Norway, owner-occupied housing costs are measured indirectly, typically based on rental prices for equivalent housing (so-called imputed rent). This is based on the principle that the consumer price index should measure current consumption, not asset prices.

In some countries, such as Sweden, mortgage interest costs are included directly or indirectly in the consumer price index. This implies that an interest rate increase may, in isolation, contribute to higher measured inflation in the short run — that is, with the opposite sign of monetary policy's intended effect on inflation. To address this, Sveriges Riksbank

5 Norges Bank (2017).

targets inflation adjusted for the effects of interest rate changes (CPIF — CPI with a fixed interest rate).

How housing consumption is measured and the weight it receives in the price index may matter for monetary policy if the housing component evolves significantly differently from other CPI prices over time, either through persistent deviations or differing trend growth. As shown in the box “The Importance of rent in the CPI” , there do not appear to be such systematic differences between CPI and CPI excluding rent in Norway.

It may also matter if monetary policy affects rents substantially differently from the rest of the CPI. An interest rate increase may have conflicting effects on rents in the short run (1–2 years): higher financing costs may push rents upward, while lower house prices and lower general inflation resulting from the rate increase may pull them downward. Over a somewhat longer horizon, there are reasons to expect nominal rents to decline following an interest rate increase, so that the real rent level (rent deflated by CPI) does not remain permanently higher. Since the short-run effect of interest rate changes on rents is ambiguous, and rents in existing contracts can only be indexed to CPI once a year, the rent component of the CPI may contribute to somewhat slower pass-through from interest rate changes to CPI inflation.

Even though the inflation target is linked to CPI inflation, different indicators of price developments are an important element of monetary policy strategy, forecasting work, and communication, cf. question 3 above. Norges Bank uses a range of indicators of underlying inflation, which adjust for short-term movements in individual prices, in its monetary policy assessments. In Norway, energy prices often contribute to large short-term fluctuations in the CPI. CPI adjusted for tax changes and excluding energy products (CPI-ATE) is therefore an important indicator in the ongoing assessment of inflation developments. Assessments and development of different indicators of price developments form part of the Bank’s ongoing analytical work.

The Importance of rent in the CPI

The consumer price index (CPI) is intended to reflect developments in the cost of living for Norwegian households and therefore also includes housing consumption. For tenants, housing costs correspond to the rent actually paid. For homeowners, the purchase of a dwelling is regarded as an investment in housing capital, which in turn provides a continuous flow of housing services. In the CPI, owner-occupiers’ housing services are estimated on the basis of developments in actual rents paid and are referred to as “imputed rent.”

In the latest comprehensive revision of the national accounts, published in 2025, a new and improved method for estimating the value of owner-occupied housing services was introduced. The methodological change led to a significant upward revision of household housing consumption figures. As a result, the weight of rent in the CPI increased from 18 percent in 2025 to 26 percent in 2026. Previously, this weight had been relatively stable.

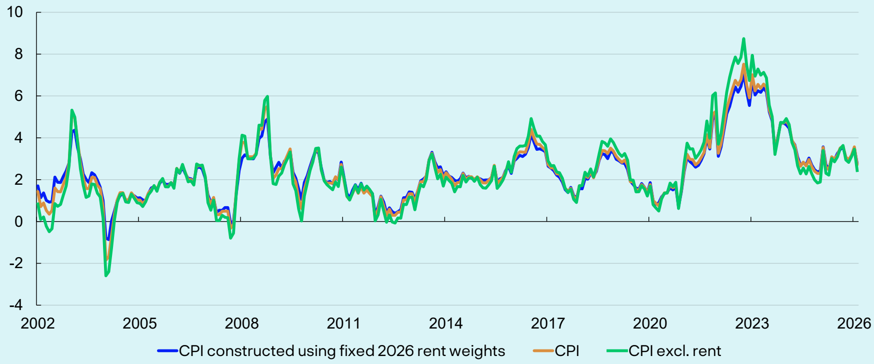
Unlike the national accounts, the consumer price index is not revised retrospectively. To illustrate the isolated effect of the change in weights, Norges Bank has therefore calculated how the CPI would historically have evolved if the rent component had had the same weight as today. In addition, the Bank has calculated the CPI excluding rent; see Figure 4.A. As shown in Table 4.A, the average inflation rate for the three indices is approximately the same. However, fluctuations in rents have been somewhat smaller than fluctuations in the other components of the index, implying that overall index volatility would have been slightly lower with today's weight.

Table 4.A

Index	Weight	Average (2003–2026)	Standard deviation
CPI with 2026 rent weight	26%	2.4	1.4
CPI	**14–26%**	**2.4**	**1.5**
CPI excluding rent	0%	2.4	1.8

Chart 4.A Counterfactual CPI series

Counterfactual series constructed using fixed rent weights. Twelve-month change. Percent



Sources: Statistics Norway and Norges Bank

Lower volatility in rents may reflect restrictions on how much rents in existing tenancy agreements can be increased. Rents in existing tenancy agreements may only be indexed to the CPI once a year, and no earlier than one year after the rent was last adjusted. After three years, rents may be adjusted to prevailing market rent (the average rent for comparable dwellings).

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5. Supply shocks

Key takeaways

- **Supply shocks have been an important source of business cycle fluctuations in recent years. Negative supply shocks may become more frequent going forward, partly as a result of more extreme weather events.**
- **Research suggests that central banks cannot simply "look through" supply shocks. If the shocks are large or persistent, monetary policy should respond sufficiently to prevent inflation from becoming entrenched at a high level, for example through rising inflation expectations.**
- **A higher frequency of negative supply shocks does not necessarily imply that central banks must accept higher average inflation.**
- **In recent years, central banks have become more attentive to supply-side shocks and are focused on keeping inflation expectations well anchored.**

5.1 Introduction

Economic disturbances (shocks) are commonly divided into shocks originating on the demand side and the supply side of the economy, respectively. Supply shocks have received increased attention in recent years, both because the global economy has been hit by major supply shocks — such as the shutdowns during the pandemic and the rise in energy prices following Russia's invasion of Ukraine — and because more extreme weather events and geopolitical tensions may increase the frequency of supply shocks in the future.

Within standard economic theory, most supply shocks create a trade-off between stabilizing inflation and stabilizing the real economy. The reason is that, for example, a negative supply shock contributes to higher inflation and lower economic activity. An increase in the policy rate will help dampen inflation, but at the same time contributes to an even deeper downturn in the real economy.

How large this trade-off becomes — or whether there is any trade-off at all — depends, however, on the type of supply shock involved. Under certain assumptions, productivity shocks, for example, need not create any trade-off. A temporary decline in productivity leads to higher inflation if monetary policy is not tightened. But by reducing demand through higher interest rates, the central bank can bring output down to the level implied by productivity. By ensuring that aggregate demand is consistent with production capacity, monetary policy can prevent both positive and negative inflationary pressures while simultaneously stabilizing employment.

That productivity shocks need not create a trade-off does not hold in general, however. For example, real wage rigidities[6] and asymmetries between different sectors[7] will also generate a trade-off in the case of productivity shocks. In practice, therefore, almost all supply shocks will to some extent create a trade-off. Supply shocks that generate such a trade-off are often referred to in the literature as cost-push shocks.

In contrast to supply shocks, demand shocks do not, in principle, create any trade-off. A negative demand shock, which in isolation leads to both lower activity and lower inflation, can be counteracted by expansionary monetary policy. In principle, this allows activity to be maintained while inflation remains at target.

In practice, however, demand shocks may also give rise to some degree of trade-off. Central banks will often not fully neutralize a demand shock, both because monetary policy operates with lags and because in many situations it is not desirable to raise or lower interest rates as much as would be required to fully offset the shock.[8] In practice, a positive demand shock will therefore to some extent lead to higher inflation. Once inflation has risen, it may be necessary to conduct a tight monetary policy — bringing employment below its potential — in order to return inflation to target within a reasonable time frame.[9] A demand shock that has not been fully neutralized by monetary policy may therefore create some of the same trade-offs as a cost-push shock.

In addition, the monetary policy response to a demand shock will affect consumer price inflation in open economies through the exchange rate channel. A sufficiently tight monetary policy that fully neutralized a positive demand shock would normally lead to an appreciation of the exchange rate. In that case, it would not be possible to keep the level of activity unchanged without inflation becoming too low.[10] However, even though demand shocks may also give rise to a short-run trade-off, the trade-off will normally be substantially greater when supply shocks occur.

6 Blanchard and Galí (2007).

7 Chung et al. (2025).

8 Reasons why it is often undesirable to change interest rates sharply may include concerns for financial stability and uncertainty regarding the effects of interest rate changes, which argues for a more cautious use of policy instruments (Brainard, 1967).

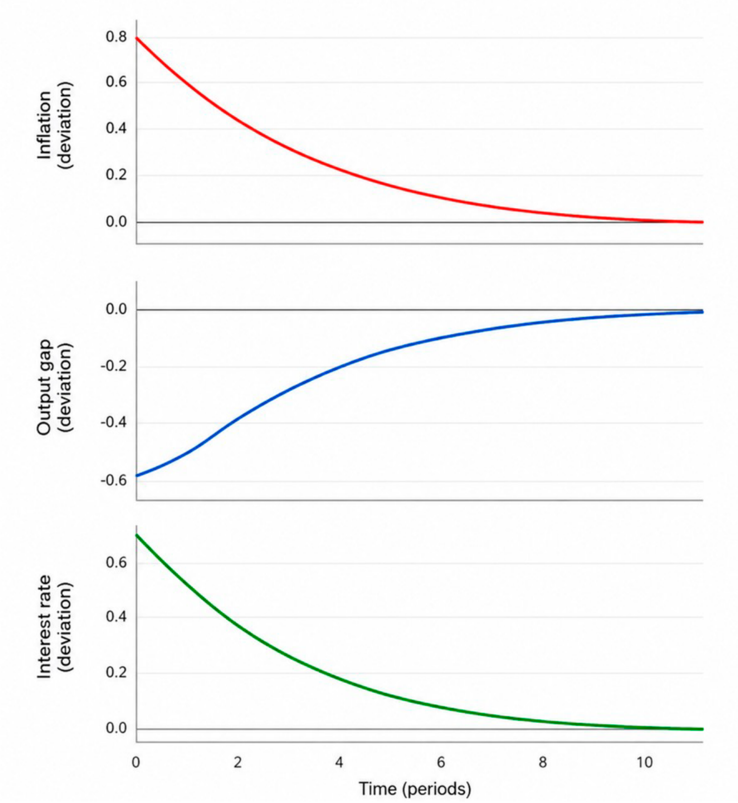
9 If the Phillips curve is purely forward-looking, monetary policy does not necessarily need to be tightened to bring inflation down once the demand shock has dissipated. In practice, however, there are often rigidities in the inflation process (inflation persistence) that may make it necessary to conduct a tight monetary policy for a period in order to bring inflation back down.

10 See eg Røisland and Sveen (2017).

5.2 Trade-offs following a standard cost-push shock

As discussed above, most supply shocks will create a trade-off and therefore have the characteristics of cost-push shocks. Because such shocks give rise to a trade-off, the central bank must balance the objective of stable inflation against the objective of stability in the real economy. Figure 5.1 illustrates a standard cost-push shock, as it is typically analyzed in the monetary policy literature.

Figure 5.1 Optimal monetary policy response to a cost-push shock
A New Keynesian model. Discretionary policy.



The shock leads to higher inflation for a given level of output and employment. In such a situation, the central bank must balance the objective of keeping inflation close to target against the objective of avoiding a decline in economic activity. Giving weight to both objectives implies that inflation rises above target for a period, though not by as much as it would have if the central bank had not responded by raising interest rates. At the same time, output and employment temporarily fall below their long-run equilibrium levels.

The optimal degree of monetary tightening depends on how much weight the central bank places on stability in the real economy relative to stability in inflation ("lambda" in the loss function), and on how interest rates affect inflation and aggregate demand, respectively. The higher the value of lambda, the higher the inflation the central bank is willing to tolerate in exchange for a smaller decline in output and employment.

Similarly, according to theory, it is optimal — for a given lambda — to tolerate higher inflation the more strongly interest rates affect the real economy relative to inflation. The reason is that stabilizing inflation becomes more costly in terms of higher unemployment when monetary policy has a stronger effect on the real economy.

Not all negative supply shocks imply that interest rates should be increased, even though this is the result in standard models. A negative supply shock may reduce aggregate demand through income effects. Even if permanent income does not necessarily decline much when the shock is temporary, imperfect credit markets imply that demand nevertheless tends to fall when current income is reduced.[11] Guerrieri et al. (2022) show that under certain conditions demand may fall more than potential output, implying a need for expansionary monetary policy. Because the supply shock generates such large demand effects, this case is referred to as a "Keynesian supply shock." Chan et al. (2024) likewise find, within a New Keynesian model with heterogeneous agents and imperfect credit markets (a so-called HANK model), that a negative energy price shock that increases inflation may in some cases imply that monetary policy should respond expansively.[12]

5.3 Looking through versus responding

One of the most important questions central banks face when a supply shock occurs is whether to "look through" the shock — that is, not respond and allow inflation to rise temporarily — or whether to respond in order to dampen inflation. This depends to a large extent on the expected persistence of the shock and the degree to which the initial price increase is expected to spill over into other prices and wages.

Many supply shocks are short-lived. Fluctuations in electricity prices due to variations in rainfall, or increases in the prices of certain agricultural products due to poor harvests, are examples of such shocks. In simple textbook models, monetary policy should also respond to such shocks and make a trade-off as illustrated in Figure 5.1. In practice, however, central banks normally choose to look through short-lived supply shocks of this kind. The main reason is related to the dynamics of the monetary policy transmission mechanism, which the simplest theoretical models abstract from. In reality, it takes time for interest rate changes to affect inflation and economic activity. By tightening monetary policy in response to temporary shocks, there is a risk that both activity and inflation become too low after the shock has dissipated. A forward-looking monetary policy will therefore look through such shocks.

11 This is an important feature of so-called HANK models (Heterogeneous Agent New Keynesian models). In this respect, HANK models are more closely related to the old Keynesian models of the 1960s and 1970s ("IS-LM" models).

12 The increase in inflation following a cost-push shock, taken in isolation, implies that monetary policy becomes more expansionary because the real interest rate declines for a given nominal interest rate. In some cases, an appropriately calibrated expansionary monetary policy response may therefore imply that the central bank raises the policy rate somewhat in order to prevent the real interest rate from falling too much as a result of higher inflation expectations.

Many supply shocks involve changes in relative prices. For example, stricter environmental requirements for the production of certain goods will imply a permanent increase in the relative price of those goods. It is neither desirable nor possible for monetary policy to counteract such changes in relative prices. Changes in relative prices may therefore represent an example of temporary supply shocks to which monetary policy should not respond.[13] However, an increase in the price of one group of goods may spill over into other prices and wages, giving rise to a wage-price spiral.[14] In that case, the economy faces a traditional cost-push shock in which the central bank must make trade-offs as illustrated in Figure 5.1.

A major challenge associated with the "look-through" strategy in the face of temporary supply shocks is that, in practice, there is often uncertainty regarding:

(i) the persistence of the shock itself,

(ii) whether it is a pure supply shock,

(iii) the extent to which changes in individual prices spill over into other prices and wages, and

(iv) how inflation expectations are affected.

Nelson (2025) shows that the concept of "looking through" gained prominence already during the oil shocks of the 1970s in the United States, and that the approach was further developed in several countries through the early 1990s. He explicitly links the strategy to the degree of anchoring of inflation expectations: if expectations are well anchored, the central bank has greater scope to ignore temporary supply shocks without inflation and expectations drifting away from target. At the same time, experience shows that if expectations begin to de-anchor, a passive stance may amplify the problem. In this context Erceg et al. (2024) analyze the phenomenon of "inflation scares," in which households and market participants begin to doubt the central bank's willingness or ability to bring inflation back to target. They show that even moderate supply shocks may have substantial and persistent effects if they trigger such expectation-driven dynamics. In such a situation, a more forceful policy response may be optimal in order to prevent inflation expectations from becoming de-anchored.

Beaudry et al. (2023) consider a model in which agents do not form fully rational expectations. They show that it may be appropriate to "look through" shocks up to a certain inflation threshold, and then respond aggressively in order to prevent inflation expectations from losing their anchor once that threshold has been crossed.

13 Even though the change in the relative price level is permanent, its effect on inflation will often be temporary.

14 A wage-price spiral does not necessarily have to be a permanent or self-reinforcing process. It may dissipate over time, either with the help of monetary policy or through other mechanisms in wage and price formation.

Bocola et al. (2025) analyze monetary policy when private agents are uncertain about the weight the central bank places on price stability. They show that the central bank has an incentive to respond more aggressively to inflationary pressures — including those stemming from supply shocks — in order to signal that it places a high weight on price stability. Such a response may improve the anchoring of inflation expectations and thereby improve the trade-off between price stability and stability in output and employment.

Forbes et al. (2026) empirically examine the role of global shocks and how central banks have responded to them. They find that global shocks, and especially global supply shocks, have become increasingly dominant. They also find that central banks have largely "looked through" domestic supply shocks, while responding to a greater extent to global supply shocks.

5.4 Implications of an asymmetric distribution of supply shocks

In the standard model, shocks have an expected value of zero, meaning that, on average over time, the frequency and magnitude of negative shocks are the same as those of positive shocks. In practice, however, supply shocks may occur more often in a negative than in a positive direction, especially in the case of large or extreme disturbances such as pandemics, financial crises, and wars.[15]

An extreme version of such an asymmetry is represented by the so-called "plucking" model introduced by Milton Friedman (1964) and further developed by Dupraz et al. (2025). Within this framework, all shocks are negative and push economic activity below potential. The task of economic policy, including monetary policy, is to counteract declines in activity so that output remains as close as possible to potential.

Looking ahead, many observers argue that the frequency of negative supply shocks may increase. One possible source is climate change, which may lead to more frequent extreme weather events and natural disasters. Another source is the transition to a low-emissions economy (see Section 10 for a more detailed discussion of monetary policy and climate). Increased geopolitical risk and changes in the framework for international trade and cooperation may also lead to more frequent supply shocks.

A higher frequency of large negative supply shocks may create more difficult trade-offs for monetary policy. When the central bank balances the objectives of inflation stabilization and real economic stability, an optimal trade-off will imply that inflation rises above target while the output gap becomes negative. If negative shocks occur more frequently, or if they are more persistent than positive shocks, inflation may on

15 For an analysis of asymmetric climate shocks, see Kara and Thakoor (2023).

average remain above target while output on average becomes lower than it would otherwise have been.

Several authors have argued that structural changes leading to more frequent negative supply shocks should imply greater flexibility in monetary policy and/or that central banks should accept somewhat higher inflation, for example through an (implicit or explicit) increase in the inflation target.[16]

Such a strategy may be appropriate if inflation expectations remain anchored at target. In that case, somewhat higher inflation may be a cost worth accepting in order to avoid a large decline in employment. With inflation expectations anchored at target, inflation will eventually return to target without monetary policy having to become overly contractionary.

The danger of such a strategy — which implies that average inflation becomes higher than target as a result of more frequent negative shocks — is that inflation expectations may rise correspondingly. If agents in the economy take into account that negative shocks may occur and that inflation will then be higher, they are also likely to incorporate this risk into price- and wage-setting even in normal times. Inflation may then remain above target even in periods without supply shocks. A potential increase in the indexation of wages and contracts after a prolonged period of high inflation would produce many of the same effects. Negative supply shocks could then push inflation even higher from a level that is already above target.

Nuño et al. (2024) study how monetary policy is affected when the economy may be exposed to different types of supply shocks: temporary shocks and more persistent shocks. The authors assume that temporary shocks may be both positive and negative, whereas the more persistent shocks can generate only two states: a normal state or a negative state. The economy is assumed to switch between these states over time, thereby creating asymmetry in the economy. Under discretionary monetary policy, the authors show that this asymmetry may lead to a systematic tendency toward higher inflation. The reason is that the central bank attempts to offset the negative effects of persistent supply shocks on output and employment. The result may be higher inflation than would otherwise have occurred.

The challenge of anchoring inflation expectations at target when negative supply shocks occur more frequently is discussed by Bandera et al. (2023). They argue that monetary policy may then have to become more aggressive in order to bring inflation back to target. As the authors point out, there is no necessity that average inflation must rise when negative shocks become more frequent. More frequent negative supply shocks may instead be viewed as a decline in trend growth or potential output. Over time, aggregate demand is likely to adjust to lower productive capacity, but economic agents may fail to sufficiently

16 See, for example, Barmes et al. (2024), who propose increasing the upper bound of the inflation tolerance band, implying an implicit increase in the inflation target.

recognize that trend growth may have declined. In such a situation, it may be appropriate to maintain sufficiently tight monetary policy to bring aggregate demand down to trend. In that case, there would, in isolation, be no forces pushing inflation upward.

To avoid excessively high average inflation, monetary policy must take into account that a higher frequency of negative supply shocks implies that potential output is, on average, lower. If the central bank attempts to maintain activity at the same level as before the structural change occurred, the classic time inconsistency problem may arise (see box "Asymmetric supply shocks and inflation bias" for an analysis of this issue).

Optimal flexible inflation targeting under commitment, within a standard New Keynesian framework, implies that the central bank should conduct monetary policy so that the price level eventually returns to the level it would have reached had no supply shock occurred.[17] In that case, average inflation will also equal the inflation target. Optimal inflation targeting under commitment therefore shares similarities with a price-level target for monetary policy (see Section 4.2). In theory, this may provide better anchoring of inflation expectations, but it may also entail costs in the form of high unemployment if the expectations channel does not operate as in simple theoretical models.

Another, and less extreme, strategy to prevent average inflation from rising — and thereby reduce the risk that inflation expectations also rise — is to aim for somewhat lower inflation than the target during periods without major disturbances. With inflation somewhat below target in normal times and higher inflation during periods of negative supply shocks, average inflation may remain close to target.

De Polis et al. (2024) analyze such a strategy, which they call "Risk-Adjusted Inflation Targeting" (RAIT), and argue that this strategy would have implied that interest rates should have been raised earlier at the onset of the so-called "Inflation Surge,"[18] and could likewise have been normalized earlier.

The strategy of taking into account the higher frequency of negative supply shocks by aiming for inflation somewhat below target in the absence of shocks is related to Lars Svensson's concept of a "conservative inflation target."[19] However, whereas the RAIT strategy is implemented by the central bank itself within a conventional mandate, Svensson's solution was that the authorities should mandate an inflation target below the optimal rate of inflation. In Svensson's framework, the inflation bias arising from the time inconsistency problem would cause

17 "Commitment" implies that the central bank is able to commit credibly to a future pattern of policy responses, even if that pattern is time-inconsistent in the sense that the central bank would have an incentive to deviate from the commitment once economic agents had formed expectations based on it. See, for example, Kydland and Prescott (1977) for an analysis of the time inconsistency problem.

18 The years of high inflation following the pandemic are often referred to in the international literature as "the Inflation Surge." The prolonged period of high inflation during the 1970s and the first half of the 1980s is commonly referred to as "the Great Inflation."

19 Svensson (1997). In Svensson's analysis, the inflation bias arises because policymakers attempt to stabilize output and employment around a level that is, on average, higher than what is feasible. Asymmetric supply shocks give rise to a similar bias.

average inflation to exceed the target, while still equaling the optimal inflation rate.

5.5 Lasting effects of supply shocks

In the discussion above, as is most common in the literature, it has been assumed that supply shocks do not affect productive capacity in the long run. There may, however, be mechanisms through which supply shocks leave lasting scars on the economy. Earlier literature has focused on hysteresis effects in the labor market. Deep and prolonged recessions may cause unemployment to remain persistently high, with many job seekers eventually becoming detached from the labor market. An important consideration for monetary policy is therefore to maintain a sufficiently expansionary stance to prevent such adverse hysteresis mechanisms from taking hold.[20] If the recession is caused by a cost-push shock that also raises inflation, the objective of preventing a permanent decline in employment may imply that the central bank has to accept elevated inflation for a period.

Negative shocks may also generate hysteresis effects through channels other than the labor market. Fornaro and Wolf (2023) show that temporary supply shocks may leave permanent scars because they reduce investment and weaken productivity growth. In such a setting, tight monetary policy may be counterproductive, since it reinforces the decline in investment and thereby lowers potential output further, making inflation more persistent. The authors therefore argue that monetary tightening should be combined with fiscal measures that stimulate investment and innovation, allowing inflation to return to target without damaging long-run productive capacity.

20 See, for example, Acharya et al. (2022).

Asymmetric supply shocks and inflation bias

Asymmetric supply shocks, where negative shocks (positive cost-push shocks) occur with a higher probability than positive shocks, may generate an inflation bias resembling that in the classic literature on monetary policy and time inconsistency Kydland and Prescott, 1977; Barro and Gordon, 1983). As shown by Clarida et al. (1999), the results from the classical literature also apply in New Keynesian models. To illustrate the mechanism in a simple way, we start from a standard Barro–Gordon-type model. The Phillips curve can be written as

$$\pi_t = E_{t-1}\pi_t + \kappa y_t + u_t$$

Here, π_t denotes inflation, $E_{t-1}\pi_t$ expected inflation based on information available in period $t-1$, y_t the output gap, defined as the deviation of output from potential, $\kappa > 0$ the slope of the Phillips curve, and u_t a cost-push shock.

The central bank conducts flexible inflation targeting and minimizes the following loss function:

$$L_t = (\pi_t - \pi^*)^2 + \lambda y_t^2$$

where π^* is the inflation target and λ the weight placed on output stabilization. The first-order condition under optimal discretionary monetary policy is

$$\kappa(\pi_t - \pi^*) + \lambda y_t = 0$$

Taking expectations of the first-order condition conditional on information available at time (t-1) yields

$$E_{t-1}(\pi) = \pi^* - (\lambda/\kappa)\, E_{t-1}(y_t) = \pi^* - (\lambda/\kappa^2)\, E_{t-1}(u_t),$$

where the last equality follows from taking expectations of the Phillips curve and solving for $E_{t-1}(y_t)$.

In the standard literature, it is typically assumed that $E_{t-1}(u_t) = 0$, implying that the expected output gap does not systematically deviate from zero. In that case, no inflation bias arises unless the central bank targets an excessively high level of output or employment.

If, however, negative supply shocks occur more frequently, then $E_{t-1}(u_t) > 0$. It follows from the Phillips curve that $E_{t-1}(y_t) < 0$. The level of output consistent with neither inflationary nor deflationary pressure in the absence of shocks is therefore higher than the expected (average) level of output that takes into account the asymmetry of shocks.[21] It further follows that $E_{t-1}(\pi_t) > \pi^*$. Asymmetric supply shocks therefore create an inflation bias parallel to the classic time inconsistency problem: even if the central bank's target for output and employment is not overly ambitious in the absence of shocks, discretionary monetary policy will still generate an inflation bias unless the central bank adjusts downward the "star values" for output and employment around which it seeks to stabilize the economy.

The literature points to various institutional solutions to the inflation bias problem. Kenneth Rogoff (1985) proposed delegating monetary policy to a "conservative" central bank that places greater weight on inflation stabilization than society as a whole. An alternative, proposed by Lars Svensson (1997), is to assign the central bank an inflation target below the socially optimal inflation rate — a "conservative" target that compensates for the inflation bias.

21 Technically, this implies that the stochastic steady state level of output is lower than the deterministic steady state.

5.6 International practice and experience

In recent years, challenges related to the increasing importance of supply-side shocks have frequently been highlighted in central bank communication and in reviews of monetary policy frameworks. Most central banks emphasize the dilemma between the need for flexibility when trade-offs arise and the need to avoid a de-anchoring of inflation expectations. Central banks' communication and practice are largely consistent with the findings in the research literature described above.

The European Central Bank (ECB, 2025), in its monetary policy strategy, points to structural changes that may lead to more volatile inflation:

"Ongoing structural shifts related to geopolitics, digitalisation, artificial intelligence, demography, the threat to environmental sustainability and changes in the international financial system suggest that the inflation environment will remain uncertain and potentially more volatile, with larger target deviations in both directions, posing challenges for the conduct of monetary policy."

The ECB does not propose specific monetary policy strategies designed to address these developments, but emphasizes, among other things, the importance of robust financial institutions.

In its review of the monetary policy strategy last year, the Federal Reserve focused, among other things, on challenges related to supply shocks. The conclusion in one of the background papers for the strategy review likely reflects the Fed's broader assessment:[22]

"We find that monetary policy may allow inflation to depart from the target in response to certain supply shocks or in cases when sectoral dynamics are relevant, but that it should be ready to respond forcefully and expeditiously to large inflationary shocks or if inflation expectations are at risk of becoming unanchored."

The Bank of England (BoE) has, in several speeches, emphasized that monetary policy must distinguish between relative price changes and more persistent inflationary impulses. The Bank has stressed that it may "look through" certain supply shocks, but must respond if such shocks spread to broader wage and price dynamics or threaten the anchoring of inflation expectations.[23] Governor Andrew Bailey has emphasized that although monetary policy cannot influence the source of a supply-side shock, it can affect its consequences:[24]

"[…] when shocks drive inflation away from target in the way we have seen, monetary policy responds by steering demand to a level – relative to supply – that ensures that inflation returns to target sustainably.

22 Chung et al. (2025).
23 Bandera et al. (2025).
24 Bailey (2023).

Monetary policy cannot affect this level of supply. But the level of supply will affect the appropriate setting of monetary policy."

In the review of the monetary policy framework in Australia, the report pointed out that a more shock-prone and uncertain economy places greater demands on clear communication regarding the policy reaction function and the trade-offs between inflation and the real economy.[25] The review concluded that the model used by the central bank for forecasting and analysis was not well suited for supply-side disturbances. One recommendation — which has subsequently been implemented — was that the central bank should establish a research program that would contribute to:

"[...] an understanding of more frequent supply shocks and financial market crises, and how they should be approached by monetary and fiscal policy."

Both the Bank of Canada (BoC) and the Reserve Bank of New Zealand (RBNZ) are currently conducting reviews of their operational mandates. The RBNZ has not publicly disclosed the topics under consideration, but the BoC has communicated the main issues being examined.[26] One of the themes is directly related to supply shocks:

"Considering the impact of ongoing structural forces on our economy and the likelihood of more supply shocks on the horizon, do we need a richer playbook for monetary policy to keep inflation on target?"

In a speech at the conference on the monetary policy regulation at Norges Bank on 2 March, Deputy Governor Sharon Kozicki emphasized that monetary policy can "look through" temporary supply shocks that are not too large, but that policy must respond to large and/or persistent shocks.[27]

In its monetary policy strategy, Norges Bank discusses how it responds to different types of shocks, including supply shocks. Normally, the Bank will largely look through temporary supply shocks, but more persistent shocks have a greater impact on inflation and create a larger conflict between competing objectives. An increase in firms' costs resulting from higher input prices or lower productivity will normally lead to higher inflation. In addition, it may reduce output, both because investment declines when profitability falls and because households reduce consumption as prices rise. The increase in inflation argues for a higher policy rate, but a higher interest rate will simultaneously reinforce the decline in demand. Nevertheless, such a shock will normally imply some increase in the policy rate in order to ensure that inflation returns to target within a reasonable time horizon. The appropriate increase in the policy rate depends on the extent to which the shock itself is expected to reduce activity. Similarly, lower costs for firms would normally imply some

25 de Brouwer et al. (2023).

26 Bank of Canada (n.d.).

27 Kozicky (2026).

reduction in the policy rate in order to bring inflation gradually back up to target.

One type of supply shock that does not create the same degree of conflict between the inflation target and the objective of high and stable employment is an increase in wage growth beyond what would normally be implied by the cyclical situation. Higher wage growth contributes to higher inflation, but may simultaneously increase demand because higher real wages raise household income in the short run. In such cases, it will normally be appropriate to raise the policy rate somewhat more than in situations where non-labor costs increase. However, it will not be possible through interest rate policy to prevent higher wage growth from leading to higher inflation without employment temporarily declining somewhat. In assessing how much the policy rate should be increased, Norges Bank balances the objective of bringing inflation rapidly back to target against the objective of sustaining employment. This assessment also includes an evaluation of the risk that higher wage growth may become self-reinforcing through wage-price spirals. Similar trade-offs, but with opposite signs, apply if wage growth becomes lower than normal.

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6. Weight on the real economy

Key takeaways

- **It is well documented that fluctuations in the real economy are associated with welfare costs and should be dampened by means of economic policy. However, the literature does not provide an unambiguous answer as to how much weight monetary policy should give to the real economy.**
- **More recent research based on more realistic models typically finds that monetary policy should give more weight to stabilising real economic fluctuations, compared to what follows from older standard models.**
- **How the consideration of the real economy is formulated in monetary policy mandates varies across countries. Most central banks have a mandate with price stability as the overriding objective, a so-called hierarchical mandate, but where the consideration of real economic stability is also included.**
- **All central banks with inflation targets practise a form of flexible inflation targeting, where the aim of stability in output and employment is also given weight. How much weight the central bank gives to the consideration of real economic stability relative to the aim of inflation stability cannot be observed directly. Compared with other similar central banks, it nevertheless appears that Norges Bank has given considerable weight to the aim of the real economy in recent years.**

6.1 Introduction

Flexible inflation targeting implies that the central bank should weigh the consideration of keeping inflation close to the target against the consideration of stability in the real economy. How the consideration of real economic stability is formulated in the mandate varies across countries. The central banks in the US and Australia have a so-called dual mandate, where the consideration of employment is of equal standing with that of price stablity. Most central banks have a hierarchical mandate, where price stability is the overriding objective, but where the mandate also contains the consideration of real economic stability. The distinction between dual and hierarchical mandates is not entirely clear, and it is not obvious that this distinction has a significant bearing on how much weight is given to the real economy in practice. In Norway, the Monetary Policy Regulation contains elements of both types. Low and stable inflation is stated to be an overriding objective, which has features in common with hierarchical mandates. At the same time, the phrasing that monetary policy shall contribute to high and stable output and employment has similarities with the language in dual mandates. See the box "Hierarchical versus dual mandates" for a more detailed discussion.

Economic theory provides a solid basis for the view that business cycle fluctuations entail welfare costs and should be dampened by means of economic policy. This is because consumers prefer stable consumption, and because fluctuations lead, among other things, to inefficient use of resources. Traditional theoretical models generally assume that there is a representative household. These models do not capture all the costs attached to variations in output and employment. For example, the models may not account for the normally substantial costs for individuals and households, if one becomes unemployed. In models with a representative household, a downturn only entails that the household spends slightly less time working. In more realistic models, the welfare costs of fluctuations in the real economy are considerably larger. Monetary policy should then stabilise employment and unemployment in addition to inflation.[28]

It is also common to assume that monetary policy can only influence output and employment in the short term, but cannot permanently raise their level. Attempting to keep employment permanently above the maximum sustainable level of employment will only lead to high wage and price growth.[29] Among central banks, it is common to assume that the level of ambition for monetary policy is to stabilise employment around the highest level that is consistent with stable price growth over time.

In the following sections, the welfare costs of fluctuations in output and employment are discussed first, followed by the welfare costs of inflation. These two sub-chapters provide the basis for the discussion of how much weight monetary policy should give to the real economy relative to inflation. That is, the size of "lambda" in the monetary policy loss function. Finally, the final section gives an overview of how other central banks weigh the real economy in their mandates and strategies.

6.2 Welfare costs of fluctuations in output and employment

How much weight monetary policy should give to the stabilisation of output and employment depends, among other things, on how large the welfare costs of business cycle fluctuations are. In economic theory, such

28 See Galí et al. (2007). In certain models, fluctuations in the real economy are efficient and should not be counteracted, but such models rest on strict and partly unrealistic assumptions, eg that all prices and wages are flexible.

29 Clarida et al. (1999).

costs are often measured by how much consumption households are willing to forgo to avoid business cycle fluctuations.

In simple macroeconomic models, these costs are small. The classical reference is Lucas (1987), who calculated the welfare costs of business cycle fluctuations in a model with a representative household, full access to capital markets and where business cycle fluctuations are assumed to be symmetrical around a trend. Under reasonable assumptions about risk aversion and consumption smoothing, Lucas found that US business cycle fluctuations gave rise to very low welfare costs. The intuition is that if households can smooth consumption over time, and variations in aggregate consumption are moderate, the utility loss from fluctuations is limited. In such models, the welfare loss primarily arises from fluctuations in consumption.

However, this conclusion relies on strong assumptions. First, the model assumes complete markets, such that households can fully insure themselves against income risk. Second, the economy is represented by a single representative household with preferences limited to consumption and leisure, such that distributional effects and non-material costs of unemployment play no role. Third, business cycle fluctuations are assumed to be symmetrical and temporary, without permanent effects on the economy's long-term growth potential. More recent research has shown that when these assumptions are relaxed, welfare costs can be much larger.

An important insight is that business cycle fluctuations often involve increased individual risk. Studies that take into account incomplete markets and liquidity constraints show that households that cannot fully insure themselves against income loss are more impacted by fluctuations in employment and wages. Storesletten et al. (2001) show that if income uncertainty increases in downturns, as the empirical evidence suggests, the welfare costs can be several times higher than Lucas' original estimates. For households with limited savings, this can give rise to significant losses.

Traditional macroeconomic models also fail to capture the costs of unemployment beyond the loss of income. These models typically assume that utility is determined by consumption and leisure, and that unemployment primarily entails reduced income and increased leisure. However, a rich empirical literature within labour and health economics shows that unemployment is associated with psychological, social and health, also when income changes are controlled for.[30] Studies based on panel data from several countries find that unemployment reduces self-reported life satisfaction, and that the effect cannot be fully explained by lower income.[31] Increased risk of mental illness and poorer health outcomes among the unemployed has also been documented. Also in Norway, with relatively comprehensive income security schemes,

30 See Paul and Moser (2009) for a meta-analysis.

31 See for example Clark and Oswald (1994) and Winkelmann and Winkelmann (1998).

register- and survey-based research suggests that unemployment and job loss are associated with non-material costs. These costs include impaired mental health, lower subjective well-being and increased risk of permanent exclusion from the labour market.[32] This indicates that purely consumption-based welfare measures may underestimate the welfare costs of unemployment.

Another mechanism that may increase the costs of output instability is that business cycle fluctuations can have more permanent effects on the economy. If prolonged unemployment weakens human capital, or if low demand reduces investment and productivity growth, temporary shocks can have permanent consequences.[33] Such mechanisms strengthen the argument for active stabilisation policy.[34] Empirically, there is support for the view that deep and prolonged downturns can have persistent effects on employment and output.[35] Permanent effects of supply shocks are discussed in more detail in Section 5.5.

Another common assumption is that economic disturbances are symmetrical around a trend. Under this assumption, business cycle fluctuations sum to zero over time. Hence, welfare losses in downturns would be offset by gains in expansions. However, historical experience suggests that business cycle fluctuations can be asymmetric: downturns are often deeper and more prolonged than expansions, partly owing to hysteresis effects or financial crises.[36] If business cycle fluctuations are asymmetric, active stabilisation in downturns can not only reduce the variation in output and employment, but also contribute to a higher average level over time.[37] This supports giving weight to bringing employment back after severe setbacks and accepting that inflation will be higher than the target for a period of time.

Even though simple representative agent models typically yield low estimates of the welfare costs of business cycle fluctuations, a broader literature suggests that the costs can be significant, particularly in periods with deep and prolonged downturns.

32 See Heggebø (2022) and Østhus (2012) for Norwegian studies. For the relationship between job loss and transition to disability pension, see Rege et al. (2009) and Bratsberg et al. (2013).

33 See Cerra et al. (2023) for an overview of the hysteresis literature and Malmendier and Shen (2024) for permanent effects on expectations and consumption.

34 See Garga and Singh (2021) and Acharya et al. (2022) for formal analyses of optimal monetary policy under hysteresis.

35 See Cerra and Saxena (2008), Blanchard et al. (2015) and Furlanetto et al. (2025). For Norway, see Ellingsen and Galaasen (2021) and Furlanetto et al. (2021).

36 See Neftçi (1984) and Morley and Piger (2012). See also the discussion of the “plucking” model and supply shocks in Section 5.

37 Some empirical studies suggest that a tight labour market particularly improves outcomes for groups with weak labour market attachment, see Aaronson et al. (2019). For the US, there is a debate about whether this is primarily driven by more people being drawn into the labour force, or by the probability of dropping out being lower when the labour market is tight (Eusepi and Şahin, 2025, Hobijn and Şahin, 2021). For Norway, Fevang et al. (2020) show that there is a considerable labour reserve among the non-employed, and that increased demand for labour can contribute to more people in this group finding employment.

6.3 Welfare costs of inflation and variation in inflation

In modern macroeconomic theory, the welfare costs of inflation are closely linked to the gradual adjustment of prices and wages. When inflation is high, comparable goods will be priced differently, as firms adjust their prices at different points in time. Such price differences can lead to an inefficent allocation of resources in the economy. Low and stable inflation limits such distortions and contributes to more efficient resource allocation.[38]

Inflation can also have distributional effects. Many contracts, including loans, pensions and wage agreements, are set in nominal terms. Unexpected inflation can thus redistribute purchasing power between different groups, such as borrowers and lenders, or employers and employees. When households and firms have limited opportunities to insure themselves against such changes, the redistribution can be arbitrary and welfare-reducing.[39] If inflation is also difficult to predict, it further increases uncertainty about the real value of existing contracts.

Inflation can also affect the real economy through its interaction with the tax system. Many tax systems are designed in nominal terms, and even moderate inflation rates can then lead to distortions in economic decision-making.

The mechanisms mentioned above concern the current costs of inflation. In addition, there is a more long-term cost of high inflation related to the loss of credibility of monetary policy and weaker anchoring of inflation expectations. Once inflation has become entrenched at a high level, bringing it back down can be associated with significant real economic costs.

Even though inflation entails welfare costs, the research does not suggest that optimal inflation is zero. Both nominal wage rigidities and the effective lower bound of the policy rate indicate a moderate positive inflation rate, see Section 4.3 for more on the literature on the optimal inflation target.

Overall, the research suggests that low and stable inflation reduces welfare losses attached to inefficient resource allocation, arbitrary redistribution and increased uncertainty. However, if rapidly stabilising inflation requires large effects on output and unemployment, monetary policy must weigh the costs of high inflation against the costs attached to

38 An older literature emphasised the direct costs of inflation, such as the use of resources related to reducing cash holdings when inflation is high and administrative costs of frequent price changes. Such costs are normally small at moderate inflation rates. Menu costs (costs related to changing prices) nevertheless play an important role in modern theory as microfoundations for nominal rigidities (see among others Nakamura and Steinsson, 2010). It is the indirect consequences for resource allocation that constitute the central welfare mechanism. The recent surge in inflation has renewed interest in menu cost models (see among others Blanco et al. 2024).

39 Doepke and Schneider (2006) quantify the redistribution of nominal wealth from unexpected inflation using US household data.

rapid stabilisation of inflation. It is precisely this trade-off that underlies the theory of flexible inflation targeting.

6.4 The size of "lambda"

In the theoretical literature, the objectives and trade-offs in monetary policy are often represented by the following loss function:

(1) $L = (\pi - \pi^*)^2 + \lambda y^2$

where L is the loss, π is inflation, π^* is the inflation target and y is the output gap. Lambda (λ) indicates how much weight the central bank places on output stability compared to inflation stability.

In the literature, it is common to assume that lambda is constant. In practice, however, the central bank's weighting of the real economy versus inflation may be state-dependent. For example, as described in Section 5, the weighting may depend on the anchoring of inflation expectations. In situations where there is a high risk that inflation expectations will become de-anchored, a central bank may wish to give more weight to inflation and correspondingly less weight to the real economy to ensure that expectations remain anchored. Moreover, in deep downturns or crises, there may be a risk of prolonged effects on the real economy.[40] In such situations, this may suggest that the central bank should give more weight to stabilising the real economy to limit the more lasting costs.

There are two interpretations of the loss function in the literature. One is from a theoretic welfare perspective, where the loss function represents the welfare costs of fluctuations in inflation and the output gap. In that case, the loss function is typically derived from a specific model. The other interpretation is that the loss function represents the mandate of the central bank, or alternatively that it represents the central bank's preferences with regard to price stability versus real economic stability. Under the latter interpretation, the loss function is often referred to as an *ad hoc* loss function, since it is not derived directly from a model.

Woodford (2003) showed that the simple loss function above can be derived from a standard New Keynesian model, where imperfect competition and sticky product prices are the only important imperfections. In more realistic models with features such as labour marketd rigidities and imperfect capital markets, the welfare loss function becomes more complicated and contains more variables than inflation and the output gap.

There are nevertheless several reasons why the central banks' mandates should be simpler than what follows from a more realistic welfare loss function. The consideration of democratic accountability, which is discussed in the box "Criteria for a good mandate", and that the policy

40 See Garga and Singh (2021) for an analysis of optimal monetary policy under hysteresis. Fornaro and Wolf (2023) show that supply shocks can also give rise to permanent output losses through reduced investment and productivity growth, which changes the optimal monetary policy response. See also Section 5 on supply shocks.

should be easy to communicate suggest that the mandate should not be overly complicated. Moreover, Svensson (2010) argues that a simple loss function is more robust to uncertainty about which model is correct than a fully theoretically consistent, welfare-optimal monetary policy.

Debortoli et al. (2019) take as their starting point the simple loss function, which they interpret as a representation of the Fed's dual mandate. They analyse whether the simple loss function can represent much of the welfare loss that follows from models with more realistic assumptions, and if so, what a reasonable estimate of lambda would be. They find that the output gap in the simple loss function is correlated with other dimensions of welfare-optimal policy that are not captured in the loss function above, and that a simple loss function with a sufficiently high lambda can provide a good approximation to actual (model-based) welfare-optimal policy.[41]

Debortoli et al. (2019) take as their starting point a common interpretation of the Fed's dual mandate, where inflation and unemployment are given equal weight. However, they find that the welfare-optimal lambda is higher. An additional consideration is that this type of analysis does not capture all costs associated with unemployment discussed above, such as, such as reduced life satisfaction and health-related burdens. If such costs had been included, the optimal value of lambda could be even higher than what Debortoli et al. (2019) estimate.

More recent research has extended the analysis of optimal monetary policy to models where, among other things, households are heterogeneous and cannot fully insure themselves against income and unemployment risk. What this implies for monetary policy depends, among other things, on how monetary policy affects the distribution between households and on how differently households are affected by business cycle fluctuations. This research also emphasises the importance of redistribution through taxes and transfers and other institutional features. This literature is discussed in more detail in Section 9.

Even though the theoretically "correct" value of lambda may be greater than 1, it is not obvious that the central bank should minimise a loss function with a lambda as large as the welfare-optimal lambda. Rogoff (1985) showed in an influential paper that it may be optimal for society to delegate monetary policy to a central bank governor who weights inflation relative to the real economy higher than society. According to Rogoff, this would reduce the inflation bias that arises from market imperfections that make the maximum sustainable level of output and employment lower than the socially optimal level. As shown by Clarida et al. (1999), in a New Keynesian model without average inflation bias it could also be advantageous for the central bank to give less weight to the real economy (lower lambda) than society. With higher weight on inflation,

41 See Section 9 on distribution for a description of how consumption inequality will enter a welfare loss function with heterogeneous households.

inflation expectations will be better anchored, and the central bank can stabilise inflation with lower costs to the real economy.

According to standard theory, it is not only the value of lambda that determines the trade-off between inflation and the real economy, but also how the economy functions. If inflation responds weakly to changes in demand, the interest rate must be changed more to achieve the desired effect on inflation. The cost in the form of lower activity and higher unemployment then becomes larger, and this may suggest acceptance of larger temporary inflation deviations.

Overall, the research suggests that the welfare costs associated with fluctuations in output and employment are significant, and probably larger than the direct costs of inflation deviations. At the same time, there are reasons why the central bank should give somewhat more weight to inflation than the relative welfare costs in isolation would suggest.

More generally, monetary policy is only one of several instruments that affect the welfare costs of business cycle fluctuations. The level of employment in the long run is primarily determined by structural factors and can to a greater extent be influenced by other areas of economic policy. As discussed in the next section, it is common to assume that monetary policy can contribute to stabilising employment around the highest level that is consistent with price stability over time, but not permanently raise this level. The costs of fluctuations in employment and unemployment also depend on how welfare schemes are designed. Social safety nets can alleviate risk for the individual and dampen the burdens of unemployment.

6.5 International practice

Different central banks' weighting of the real economy cannot be observed directly. Normally, there is a relationship between lambda and how long the central bank aims to take to bring inflation back to the target after a deviation. But this time horizon also depends on the size of the shock that caused the deviation and the nature of the shock.

Some central banks pulish forecasts for inflation and the real economy based on an interest rate path that is consistent with the bank's own interest rate forecast. In this case, the relationship between the forecast for inflation and the forecast for the real economy can provide an indication of the central bank's weighting of real economic stability relative to price stability. See the box "A comparison of three central banks' trade-offs between inflation stability and real economic stability" for a more detailed analysis.

Internationally, it is only central banks with dual objectives that have explicit objectives for high employment. For the Federal Reserve (the Fed) in the US, the objectives of high employment and price stability are of equal standing. In the US, the objective is formulated as "maximum employment[42], stable prices and moderate long-term interest rates". In connection with the strategy review in 2020 (see Section 4), the Fed also changed the formulation regarding employment. Whereas the bank had previously reacted to deviations in employment from the bank's estimated maximum level, it would now only react to "shortfalls" from this level. The consequence was that the Fed would not tighten monetary policy solely to reduce labour market tightness.

In the subsequent strategy review in 2025, the Fed departed from this approach, see also Section 4.2. The specification that monetary policy should only react to "shortfalls" in employment was removed. The strategy instead defines maximum employment as the highest level of employment that can be sustained over time and is consistent with low and stable inflation.

Similarly to the Fed, the Reserve Bank of Australia (RBA) has a dual mandate where price stability and full employment are objectives of equal standing. The RBA assumes that low and stable inflation is a precondition for sustainably high employment, but also underscores that in certain periods, trade-offs may arise between the consideration of price stability and full employment. Full employment is defined as "the current maximum level of employment that is consistent with low and stable inflation".[43] In the event of deviations from the inflation target, the time frame for bringing inflation back shall be weighed against the consideration of full employment. After the period of high inflation in 2022 and 2023, the bank has emphasised that monetary policy shall bring inflation back to the target range without imposing unnecessarily large losses in output and employment on the economy.

In 2018, the central bank of New Zealand received a new operational objective, whereby it should also "contribute to supporting maximum sustainable employment (MSE)" in addition to price stability.[44] The bank itself defined "maximum sustainable employment" as the highest level the labour market can sustain without inflation accelerating. The objective was given equal standing with price stability, and the bank thus received a formal dual mandate.[45]

Legislative amendments were adopted in December 2023 that removed the MSE, after a new government raised concerns that such an objective would increase the risk of errors in monetary policy. New Zealand thus reverted to a pure inflation target for monetary policy.[46]

The Riksbank received a new central bank act in 2022, effective from 1 January 2023.[47] As before, price stability is the overriding objective, and without placing it on equal footing, the Riksbank shall take into account

42 "Maximum employment' is specified as the highest level of employment that is sustainable over time, see Williams (2012).

43 Reserve Bank of Australia (2025).

44 Reserve Bank of New Zealand (2018).

45 Reserve Bank of New Zealand (2024).

46 See "Reserve Bank of New Zealand (Economic Objective) Amendment Act 2023".

47 The Riksbank (2023).

developments in the real economy. The bank shall also contribute to a stable and efficient financial system and ensure that payments can be made by the general public.

Similarly to the Riksbank, the European Central Bank (ECB), has price stability as an overriding objective, while support for the European Union's economic policy is a secondary objective. The consideration of employment is included as part of this secondary objective. The ECB published its review of the monetary policy strategy in 2025. The bank maintained the symmetric inflation target of 2 percent, and specified that large and persistent deviations from the target, in either directions, may require forceful or prolonged measures. Moreover, it was underscored that a medium-term approach opens for taking real economic considerations into account, provided that inflation expectations remain anchored.

A comparison of three central banks' trade-offs between inflation stability and real economic stability

All central banks with inflation targets practise a form of flexible inflation targeting, where the consideration of stability in output and employment is also given weight. This applies regardless of whether the central banks' mandates can be classified as hierarchical or dual (of equal standing), see the box "Hierarchical versus dual mandates". In this box, we compare Norges Bank's trade-offs with two other central banks, the Riksbank and the Reserve Bank of New Zealand (RBNZ). Compared with these central banks, it appears that Norges Bank has given relatively high weight to real economic stability, such that it takes longer to bring inflation down to the target.

The central bank's trade-offs, represented by a loss function (see equation 1), cannot be observed directly. Only the actual policy choices can be observed. It is common to model monetary policy by means of a Taylor rule, where the policy rate responds to inflation and the output gap. However, there is no unambiguous relationship between lambda in the loss function and the coefficients on inflation and the output gap in the Taylor rule, because the coefficients also depend on how monetary policy affects inflation and the output gap.[48]

A more direct way of analysing central banks' trade-offs is to take as a starting point the central banks' forecasts for inflation and the output gap. The forecasts are conditional on a given interest rate path. Some central banks, including Norges Bank, the Riksbank and RBNZ, publish

48 In addition, research shows that it is not obvious that, for example, the coefficient on inflation reflects the true monetary policy reaction to increased inflation, see Jensen (2011) and Nakamura et al. (2025).

interest rate paths that can be interpreted as the bank's own forecast for the policy rate. Forecasts for inflation and the output gap that are conditional on the central bank's own interest rate forecast will reflect the trade-offs between inflation and the output gap that the central bank makes. If there had been an unreasonable balance between the developments in inflation and the developments in the output gap in the forecasts, the central bank would have preferred a different interest rate path. In that case, the published interest rate path would not have been the bank's preferred forecast. Because Norges Bank, the Riksbank and RBNZ have forecasts for the economy based on their forecast for the policy rate, and because Norway, Sweden and New Zealand are all small, open economies with flexible inflation targeting, it is interesting to compare the trade-offs across the three central banks.

We focus on the period since the end of 2021, when the three countries experienced an approximately equally large increase in inflation. During this period, the central banks have had to weigh the consideration of the real economy against the consideration of bringing inflation down towards the target. Earlier analyses have suggested that Norges Bank during this period oriented monetary policy towards taking longer to bring inflation back to the target than other comparable central banks.[49]

We take as our starting point the first-order condition for optimal policy based on the loss function (1). Disregarding dynamics, the condition for optimal policy will be

(2) $$(\pi - \pi^*)\frac{\delta\pi}{\delta i} + \lambda y \frac{\delta y}{\delta i} = 0$$

where the terms $\frac{\delta\pi}{\delta i}$ and $\frac{\delta y}{\delta i}$ represent the effect on inflation and the output gap of a change in the policy rate. Normally, both will be negative. The condition states that monetary policy should be oriented such that the inflation gap and the output gap have opposite signs (unless there are no shocks, in which case both are zero). The relationship between them depends on how the interest rate affects the respective target variables and on lambda (the weight on the output gap relative to inflation in the loss function).

Such a static first-order condition, which is common in simple models, does not take into account that monetary policy operates with a time lag. In models with more realistic dynamics, the first-order condition becomes more complicated and dependent on how the specification of the model. Central banks do not, however, base their policy on a specific model, but on a set of models and extensive use of judgement. The simple optimality criterion represented by (2) is therefore a simplification. It is nevertheless a useful starting point for the analysis.

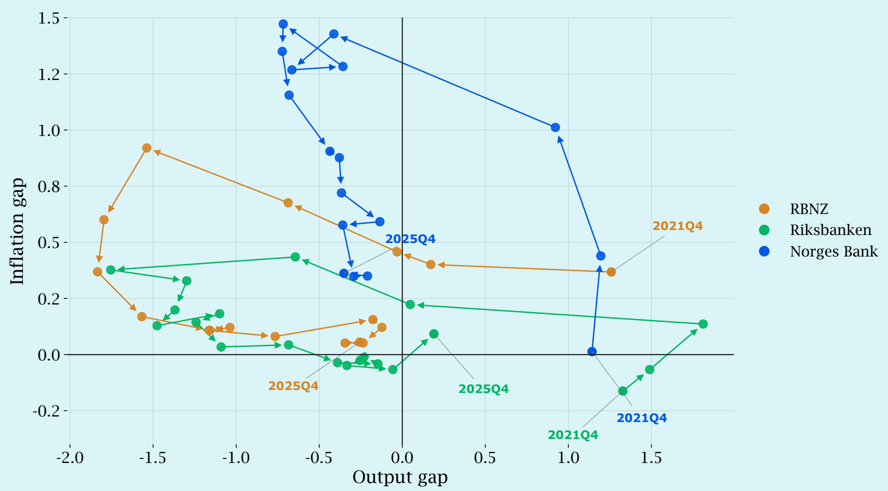
In Norges Bank's *Monetary Policy Reports*, the trade-offs in monetary policy are illustrated by a chart showing the average of the estimates for

49 Hunter (2026) examines the forecasts of a number of central banks that experienced a similar increase in inflation in recent years, and compares how long they estimate it will take before inflation is back at the target.

the inflation gap and the output gap over the period from one year ahead and to the end of the forecast horizon of three years.[50] This is based on an assumption that it takes approximately one year before the interest rate has any significant effect on inflation and output. For Norway, this is a reasonable approximation of how the interest rate is estimated to affect inflation and output.[51] We first apply the same assumption for Sweden and New Zealand. In Chart 6.A, we compare the three countries. Each point in the chart represents the forecasts from a monetary policy report. At the end of 2021, the forecasts were fairly similar, with positive output gaps and inflation close to the target.[52] Focusing on the north-western quadrant of the chart, it appears that the trade-offs have been somewhat different. While the picture for RBNZ and the Riksbank is quite similar, the forecasts reflect that Norges Bank oriented monetary policy towards a smaller decline in the output gap, where inflation would remain higher for longer. This may indicate that Norges Bank has given higher weight to real economic stability (lambda) and accepted that it takes longer to bring inflation down towards the target.

Chart 6.A Comparison of forecasts and trade-offs

Inflation gap and output gap. Average of forecasts 1–3 years ahead



1) Inflation gap: deviation between inflation and inflation target. Measured by the central banks' forecast for CPI (RBNZ), CPIF-XE (the Riksbank) and CPI-ATE (Norges Bank). Output gap: percentage deviation between GDP and trend. The central banks' own estimates. Sources: Reserve Bank of New Zealand, the Riksbank and Norges Bank

We examine this more closely and change the assumption about how the forecasts are weighted. In RBNZ's and the Riksbank's models, the interest rate has a faster effect on inflation and the output gap.[53] Hence, not accounting for the effect on inflation and the output gap during the first year could give a skewed picture of the trade-offs

50 See eg *Monetary Policy Report 4/2025*, Chart 3.4.

51 See Kravik and Mimir (2019).

52 Inflation gap is measured as percentage point deviations from the inflation target. Output gap is the central banks' own estimates of this quantity and is measured as percentage deviation from production potential or trend GDP.

53 For the Riksbank, we use Andersson and Lundvall (2024). For RBNZ, we use their main model NZSIM. An earlier version is documented in Kamber et al. (2015).

To account for this, we use the optimality criterion (2) as our starting point, but modify it so that it takes into account the dynamic dimension of the transmission mechanism. A relatively simple modified criterion can be written as

$$(3)\quad \sum_{k=1}^{H}\left((\pi_{t+k}^{f}-\pi^{*})\frac{\delta\pi_{t+k}^{f}}{\delta i_t}+\lambda y_{t+k}^{f}\frac{\delta y_{t+k}^{f}}{\delta i_t}\right)=0$$

where $\frac{\delta\pi_{t+k}^{f}}{\delta i_t}$ denote the effect of a change in the interest rate today on inflation *k* quarters ahead. *H* is the last quarter of the forecast horizon, and with forecasts three years ahead, *H*=12.

Criterion (3) is a simplification for two reasons. First, as mentioned above, the theoretically consistent optimality criterion in a dynamic model will be considerably more complicated than (3). Second, even a theoretically consistent optimality criterion will only be a rough approximation to the monetary policy trade-offs in practice. There are more considerations that enter into central banks' trade-offs than what follows from this simple model framework. Risk that is not fully incorporated in the point estimates, challenges in communicating different interest rate paths, the consideration of stability in financial markets are examples of considerations that are often taken into account in practice, but that are not well captured in theoretical models. We believe condition (3) can nevertheless be a reasonable apporximation of the trade-offs that are made in most situations.

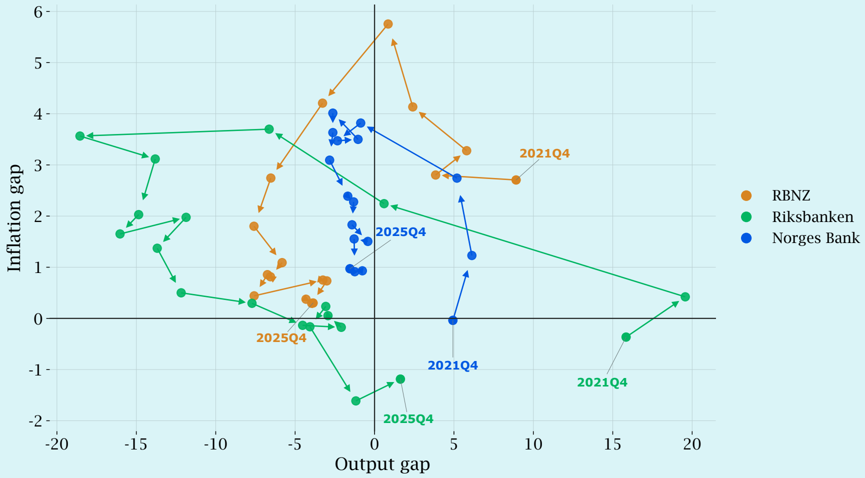
To the extent that the central bank sets an interest rate and chooses an interest rate path that satisfies (3), we can calculate the following to obtain an alternative approximation to the central banks' trade-offs:

$$(4)\quad \tilde{\pi}_t^{f}=\sum_{k=1}^{H}(\pi_{t+k}^{f}-\pi^{*})\frac{\delta\pi_{t+k}^{f}}{\delta i_t}\ \text{and}\ \tilde{y}_t^{f}=\sum_{k=1}^{H}y_{t+k}^{f}\frac{\delta y_{t+k}^{f}}{\delta i_t}\ .$$

We have calculated $\tilde{\pi}_t^{f}$ and $\tilde{y}_t^{f}$ for the three central banks by using the impulse response functions of interest rate changes in the models that are central to each bank's forecasts and scenario analyses. In principle, one could calculate $\tilde{\pi}_t^{f}$ and $\tilde{y}_t^{f}$ by conducting an empirical analysis for the different countries. But because such estimates are uncertain, and different models and methods yield somewhat different results, the estimates of $\tilde{\pi}_t^{f}$ and $\tilde{y}_t^{f}$ should ideally be based on the transmission of monetary policy that the respective central banks (monetary policy committees) themselves assume when making trade-offs and setting the interest rate. It is therefore natural to use the effects of the interest rate in the main macroeconomic models used by the respective central banks.

Chart 6.B Alternative weighting of forecasts

Forecasts weighted by the effect of monetary policy in the central banks' main models



1) Inflation gap: deviation between inflation and inflation target. Measured by the central banks' forecast for CPI (RBNZ), CPIF-XE (the Riksbank) and CPI-ATE (Norges Bank). Output gap: percentage deviation between GDP and trend. The central banks' own estimates. Sources: Reserve Bank of New Zealand, the Riksbank and Norges Bank

Chart 6.B shows points with combinations of and for the different central banks. As in the first chart, each point represents the forecasts from a monetary policy report. The placement of the points in the chart changes somewhat, but the qualitative picture is largely the same as in Chart 6.A. Norges Bank appears to have oriented monetary policy towards a smaller decline in the output gap and an inflation gap that remains positive for longer.

If the central banks make trade-offs that satisfy (3), the points in the chart will have a negative slope that is equal to lambda.[54] In addition, the optimality criterion implies that the points should lie in either the north-western or the south-eastern quadrant of the charts. Most of the points lie in the north-western quadrant. In the first part of the period, when inflation began to increase markedly, both the estimates for the inflation gap and for the output gap were positive. This is in principle not optimal, as a higher interest rate path would have given better overall goal attainment in the forecasts.

One interpretation of why the first forecasts lay in the north-eastern quadrant is that there were other considerations not captured in the model framework, such as uncertainty about the effects of large interest rate increases and the consideration of stability in financial markets. It may also be the case that the central banks did not wish to set an interest rate and an interest rate path that would have implied forecasts in the "correct" quadrant immediately. Each individual interest rate path usually contain a certain degree of interest rate smoothing. In addition, the central banks may also be reluctant to make very large changes to the interest rate path from one monetary policy report to the next. Interest

54 See Barnichon and Mesters (2026, section 8) for a similar, but more general, condition for deriving λ from observed policy decisions.

rate smoothing cannot explain why several forecasts lay in the “wrong” quadrant at the outset, but “interest rate path smoothing”, on the other hand, could imply that it takes a few reports to reach the “correct” quadrant in Chart 6.A when inflation increases markedly.

Focusing on the period where the central banks have oriented monetary policy to give forecasts for the inflation gap and the output gap in the north-western quadrant, the results suggest that Norges Bank has given relatively greater weight to the output gap. Visually, it appears that the lambda for Norges Bank has been higher. This is consistent with what Seim (2026) finds in a similar comparison of monetary policy in Norway and Sweden over recent years.[55]

Another observation is that the results indicates that Norges Bank’s lambda was higher than RBNZ’s also when the RBNZ had a dual mandate (until the end of 2023). One hypothesis may be that the central bank’s (the committee’s) discretionary judgement is more important for the trade-offs than the actual design of the mandate for flexible inflation targeting.[56] It is, however, difficult to draw strong conclusions based on a few observations and a small sample of central banks. From an international perspective, it nevertheless appears that Norges Bank has given relatively high weight to real economic stability in recent years.

55 Seim (2026) compares monetary policy in Norway and Sweden after the inflation surge in recent years.
56 See also the discussion in the box “Hierarchical versus dual mandates”.

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7. Financial Stability

Key takeaways

- **After the global financial crisis, two main directions emerged in the financial stability literature. The first looks at long historical datasets to identify variables that can signal increased risk of financial crises. The second studies the relationship between monetary policy and financial stability, including whether central banks should “lean against the wind”.**
- **Empirical studies show that rapid credit growth, especially when it coincides with rising asset prices, can signal increased risk of financial crises.**
- **Model-based analyses of “leaning against the wind” yield mixed conclusions. In some models, tighter monetary policy can reduce the probability of financial crises. But such a policy can also have real economic costs. The overall assessment depends largely on model assumptions, including how financial frictions are defined.**
- **Recent empirical work suggests that the relationship between monetary policy and financial crises depends on how interest rates have developed over time and the degree of financial imbalances. Prolonged periods of expansionary monetary policy can contribute to the build-up of imbalances. Tightening when the financial system is already under pressure can at the same time increase financial stress.**
- **Internationally, macroprudential policy is the primary tool for addressing financial imbalances. Monetary policy mainly takes financial imbalances into account when they may affect inflation and the real economy. Most central banks recognize that prolonged periods of low interest rates can contribute to the build-up of financial imbalances. However, the literature does not give a clear answer on how strong this effect is.**

7.1 Introduction

Before the global financial crisis of 2007–08, it was a common view that price stability in itself would largely contribute to financial stability. Based on this, it was often assumed that central banks should primarily focus on inflation targeting (Bernanke and Gertler, 1999). The financial crisis challenged this view and raised the question of whether monetary policy should also be used to limit the build-up of financial imbalances. In this context, the term leaning against the wind (LAW) is often used. LAW means that the policy rate is set somewhat higher than inflation and the output gap alone would suggest. This issue has also been relevant in Norway. In a speech in 2015, then governor Øystein Olsen stated that Norges Bank had at times held the policy rate somewhat higher out of concern for financial stability (Olsen, 2015). In 2018, the monetary policy mandate was adjusted, and the objective of counteracting the build-up of financial imbalances was included in the monetary policy regulation.

Following the global financial crisis, a substantial literature on financial stability has emerged. This literature can broadly be divided into two directions. The first is mainly empirical and examines whether it is possible to predict financial crises and identify financial imbalances at an early stage. The second analyzes how monetary policy affects financial stability, and discusses the role LAW can play, often using structural macroeconomic models. Over the past decade, these two directions have increasingly converged, partly through the use of long historical datasets to empirically study how monetary policy affects the probability of financial crises. In parallel, empirical studies have explored non-linear and state-dependent relationships between monetary policy and financial stability.

This chapter first provides an overview of the key literature and then examines how central banks have addressed these questions in practice and within their mandates.

7.2 How can financial crises be detected early?

Financial crises are rare events. Researchers have therefore used long historical datasets covering multiple countries and spanning more than a hundred years to identify indicators of financial crisis risk. A consistent finding in the literature is that credit growth is the single best predictor of financial crises (Reinhart and Rogoff, 2011; Schularick and Taylor, 2012). Jordà et al. (2016) distinguish between private and public sector debt, and show that rapid growth in credit to the private sector has often preceded banking crises in advanced economies over the period 1870–2012. Public debt is, however, a weaker indicator. High public debt can nonetheless amplify the economic costs of private debt repayment when a crisis does occur. If households and firms reduce borrowing and spending in the aftermath of a crisis, governments with limited fiscal policy space have less room to counteract the subsequent negative effects on output and employment.

Jordà et al. (2015) study housing and equity bubbles in 17 countries over 140 years, and find that credit-driven house price booms are particularly closely linked to increased risk of financial crises. Richter et al. (2021) similarly find that credit booms are more likely to end in systemic banking crises when accompanied by strong house price growth and rising loans relative to deposits in banks. These findings are relevant for the discussion of leaning against the wind, as they suggest that monetary policy measures can be directed at particularly risky booms rather than reacting mechanically to all credit growth. This would avoid slowing credit growth that stems from productivity growth or increased use of financial services in the economy rather than the build-up of financial imbalances.

7.3 Model-based analyses of "leaning against the wind"

The second part of the literature uses macroeconomic models to assess the costs and benefits of LAW. On the one hand, LAW can help reduce the probability of a financial crisis occurring, and at the same time result in a less severe crisis if one does occur. On the other hand, a higher policy rate can dampen economic activity and cause output to fall below potential.

There is no clear consensus in the literature on whether monetary policy should lean against the wind. Svensson (2014) analyzes the experience from Sweden, which began LAW in 2010. The study concludes that the costs of this policy were substantial, including too-low inflation and increased risk of higher unemployment. At the same time, the gains from reducing household debt burdens were limited. Svensson (2017) extends the analysis by also accounting for the fact that tighter monetary policy can weaken the economy, making the costs of a potential financial crisis even larger. Here, the costs of LAW are judged to be clearly greater than the benefits. Similarly, Ajello et al. (2019), within a New Keynesian framework, find that the optimal interest rate response to credit conditions is very small. Pescatori and Laséen (2016) reach comparable conclusions for Canada. In a more recent contribution, Kockerols et al. (2026) find that the macroeconomic costs of leaning against the wind are substantial. In the model, systematic LAW leads to average inflation below target and higher inflation volatility. This reduces the average level of the nominal interest rate and thus increases the probability that the policy rate becomes constrained by the effective lower bound.[57] They therefore conclude that stricter capital requirements are generally better suited to address risks that threaten financial stability.

At the same time, other studies find that the benefits of LAW can exceed the costs under certain conditions. This is particularly the case when the probability of a financial crisis is high (Gourio et al., 2016), highly uncertain

57 ELB (effective lower bound) refers to the lower limit on how low the policy rate can be set.

(Ajello et al., 2019), or endogenous, meaning that the probability of a crisis depends on the build-up of financial imbalances in the model (Gerdrup et al., 2016). In addition, Kockerols et al. (2026) show that LAW may be appropriate if the central bank places greater weight on stabilizing output in the medium term, and less on the short term. It may also be appropriate to lean against the wind if variables such as credit and house price growth turn out to respond faster than expected to changes in the policy rate.

Views among international institutions are also divided on LAW. The Bank for International Settlements (BIS) has often emphasized that monetary policy should help dampen the build-up of financial imbalances (Borio, 2014, 2016; Juselius et al., 2016; Filardo and Rungcharoenkitkul, 2016), while the IMF has generally expressed greater skepticism (IMF, 2015; Brandao-Marques et al., 2020). These different conclusions largely reflect differences in the frameworks they use, including the degree to which monetary policy can affect financial vulnerabilities and the severity of future crises.

7.4 Historical evidence on the relationship between monetary policy and financial crises

Over the past five years, it has become increasingly common to use long historical datasets on financial crises to empirically study how monetary policy can affect financial stability. The first analyses yielded apparently contradictory findings, suggesting that both expansionary and contractionary monetary policy could increase the probability of financial crises. As analyses began to account for the historical path of the policy rate rather than focusing solely on isolated changes in monetary policy, the results have become more aligned.

Grimm et al. (2023) provide causal evidence that a loose monetary policy stance — that is, interest rates remaining below the natural rate for an extended period — increases the probability of entering a high-risk "red-zone" and, ultimately, of financial turmoil. Risk zones, as defined by Greenwood et al. (2022), are shown to be highly predictive of financial crises. A country is considered to be in a corporate risk zone when credit growth to non-financial firms and stock market returns exceed certain threshold values. Similarly, a country is in a household risk zone when credit growth and house price growth exceed relevant threshold values. Countries in the corporate risk zone (household risk zone) have a 45 percent (37 percent) probability of experiencing a financial crisis within three years. Greenwood et al. (2022) therefore conclude that LAW should be considered when the economy approaches a risk zone.

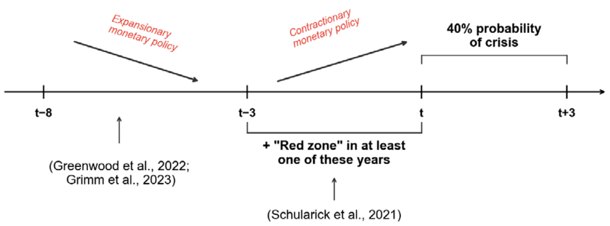
According to Schularick et al. (2021), however, LAW measures based on discretionary judgement may trigger financial crises rather than prevent them, particularly in periods of strong credit and asset price growth. On average, they estimate that a one percentage point increase in the policy rate raises the probability of a financial crisis by about two percentage points, but by around eight percentage points in periods of strong credit and asset price growth.

The apparently contradictory findings are reconciled by Jiménez et al. (2026). Their analysis shows that monetary policy tightening increases the risk of financial crises only if interest rates have been kept low for a prolonged period and when the economy is already in a risk zone. The key lesson is that LAW should be deployed before the economy enters a risk zone if it is to be used at all. The authors explain the results through the following mechanism: prolonged periods of expansionary monetary policy lead to a build-up of financial imbalances in the banking sector, while a subsequent tightening can trigger a financial crisis. They point to a U-shaped interest rate path over time.

Figure 7.1 illustrates how this sequence of events unfolds. It shows how a U-shaped interest rate path, first easing and then tightening while the economy enters a “red risk zone”, increases the probability of financial stress. The figure also illustrates that when the apparently different conclusions from the literature are placed together into a single sequence, they complement each other.

Chart 7.1 Stylised relationship between monetary policy and financial stress

Based on Greenwood et al. (2022), Grimm et al. (2023), Schularick et al. (2021), Jiménez et al. (2026)



This mechanism is also highlighted by Boissay et al. (2022). Using a New Keynesian model, this study shows that monetary policy affects the risk of financial crises both in the short term through aggregate demand, and in the medium term through the effects on investment and the build-up of financial imbalances. A key insight is that prolonged periods of expansionary monetary policy can lead to increased risk taking and growth in bank balance sheets, while a subsequent abrupt tightening can trigger stress and crises in the financial sector.

7.5 Recent empirical evidence

Alongside a growing literature based on long historical datasets on financial crises, other empirical studies examine how monetary policy affects financial stability. Using monthly data for the US over the period

1990 to 2019, Boissay et al. (2025) look at the effect of monetary policy shocks on a range of indicators of financial stress. An important contribution is that they distinguish between periods where inflation is driven by supply shocks and periods where it is driven by demand shocks. The results show that financial stress increases following a monetary policy tightening when inflation is supply-driven, while it remains unchanged, or even declines, when inflation is demand-driven.

Chavleishvili et al. (2023) and Boyarchenko et al. (2024) study the relationship between monetary policy, financial stability and macroeconomic outcomes. While Chavleishvili et al. (2023) estimate a model on the euro area using data from 1990 to 2022, Boyarchenko et al. (2024) apply machine learning methods to capture non-linear and time-varying relationships. The conclusions are contradictory. Chavleishvili et al. (2023) find that LAW prior to the global financial crisis, with the benefit of hindsight, would have been beneficial because a milder downturn would have outweighed the short-term costs of tighter monetary policy. Boyarchenko et al. (2024), on the other hand, find that a tighter interest rate path in 2003–05 would have increased downside risks to the US real economy three to four years ahead. The fact that two such similar frameworks yield opposite results illustrates that the cost-benefit assessment of LAW is highly sensitive to the underlying assumptions.

7.6 Summary of the literature

Ajello et al. (2022) and Boyarchenko et al. (2022) review the theoretical and empirical literature, respectively, on the relationship between monetary policy and financial stability, and emphasize, in line with the overview above, how challenging it is to map out the mechanisms.

The theoretical literature review by Ajello et al. (2022) highlights three key points. First, financial imbalances, such as high debt ratios, maturity mismatches and liquidity risk, are natural features of modern financial systems and typically intensify during economic upturns. Second, these imbalances can amplify negative shocks through self-reinforcing mechanisms between asset prices, balance sheets and credit supply, and in this way trigger crises even after relatively small shocks. Third, monetary policy affects the build-up of financial imbalances through several channels, including asset prices, borrowers' and lenders' balance sheets, bank lending, the search for yield and expectations. However, the direction and strength of these effects are often theoretically ambiguous and state-dependent. Overall, the review concludes that while expansionary monetary policy over a prolonged period can contribute to a gradual build-up of financial imbalances, the size of this effect depends on financial regulation, macroprudential policy and the macroeconomic situation.

Boyarchenko et al. (2022) approach the relationship between monetary policy and financial stability from an empirical angle. They emphasize that financial imbalances build up gradually over long financial cycles, which do not necessarily align well with the shorter horizons typically used for monetary policy decisions (see for example Kockerols et al., 2026, on how the duration of financial cycles increases the costs of LAW). Although it is well documented that monetary policy affects asset prices and risk taking, the empirical relationship between monetary policy and the build-up of financial imbalances or the risk of financial crises is difficult to establish with certainty. The authors therefore conclude that monetary policy can affect financial stability over time, but that there remains substantial uncertainty about the strength and importance of this channel, which means that financial stability considerations must be carefully weighed against traditional macroeconomic objectives.

Overall, the literature finds that monetary policy matters for financial stability: prolonged expansionary monetary policy can build up financial imbalances, while a subsequent tightening can trigger risks when financial imbalances are already high. This means that if monetary policy is to lean against the wind, it should do so early, before vulnerabilities become severe and the economy enters a risk zone. When vulnerabilities are already large, it may be necessary to tighten more gradually to limit financial stress, particularly if inflation is driven by supply-side conditions in the economy. At the same time, the estimated costs and benefits of LAW remain uncertain, as they depend largely on modelling assumptions and the state of the economy.

7.7 International practise

Central banks in advanced economies generally recognize that financial stability is relevant to the conduct of monetary policy. It is uncommon for central banks to systematically lean against the wind, but several central banks have nonetheless at times communicated that they have kept the policy rate higher than inflation and the output gap would suggest. The Riksbank in the early 2010s is one example of this.

From mid-2010, Sveriges Riksbank kept the policy rate somewhat higher than inflation and real economic conditions alone would suggest, due to concerns about the persistent increase in household debt ratios and house prices. When inflation did not develop as projected and inflation expectations began to fall, the Riksbank abandoned this approach in order to maintain the credibility of the inflation target (Ingves, 2019).

Today, the Riksbank's mandate states that the central bank is responsible for conducting monetary policy aimed at maintaining low and stable inflation over time. In addition, it is required to contribute to stability and efficiency in the financial system, including ensuring that the payment system functions effectively. This responsibility covers monitoring of the financial system, managing systemic risk and the ability to provide temporary liquidity support to banks and other financial institutions in the event of serious disruptions. The Riksbank also cooperates closely with Finansinspektionen and the Swedish Riksgälden on financial stability. Unlike the situation in the early 2010s, the current framework does not involve a systematic LAW policy.

The ECB has a primary mandate of price stability, but shall also support the broader economic policies of the EU insofar as this does not compromise price stability. The ECB emphasizes in its strategy documents (ECB, 2025) that micro and macroprudential policy constitute the first line of defense against financial imbalances. The Governing Council makes clear that it does not pursue a systematic LAW policy. Instead, the ECB adopts a flexible approach in which financial stability considerations are incorporated into monetary policy decisions. As set out in the strategy document, any monetary policy decision based on financial stability concerns will depend on circumstances and be grounded in medium-term price stability considerations. The committee therefore regularly assesses the links between monetary policy and financial stability (ECB, 2025).

The Federal Reserve (Fed) has expressed skepticism toward using the policy rate to counteract financial imbalances, except as a last resort if other tools are insufficient (Yellen, 2014; Brainard, 2017; Quarles, 2019). The Fed's statutory dual mandate of maximum employment and stable prices does not list financial stability as a separate monetary policy objective. The monetary policy strategy nonetheless recognizes that a stable financial system is essential for achieving its dual mandate. In January 2026, the Federal Open Market Committee (FOMC) unanimously adopted its strategy, noting that lasting achievement of maximum employment and price stability requires a stable financial system, and that the committee's decisions reflect its longer-run goals, the medium-term outlook and assessments of the balance of risks, including risks to the financial system that could impede the achievement of its goals.

A similar view is reflected in the Bank of Canada's approach. In its regular reviews of the monetary policy framework, the bank has emphasized that monetary policy should only respond to financial imbalances under exceptional circumstances, and that effective use of macroprudential policy will make it easier to balance monetary policy objectives of low and stable inflation with financial stability considerations (Bank of Canada, 2016). This assessment was maintained in the December 2021 review. The bank stated that it will continue to monitor financial stability, and acknowledged that periods of particularly low policy rates can contribute to the build-up of financial imbalances. At the same time, it emphasized that macroprudential policy is better suited than monetary policy to address such imbalances (Bank of Canada, 2021). At the time of writing, the Bank of Canada had not yet published the outcome of its 2026 framework review.

The institutional framework of the Bank of England similarly reflects a clear separation between monetary policy and financial stability. The bank operates under a two-part structure where the Monetary Policy Committee (MPC) is responsible for price stability, defined by the government's inflation target, while the Financial Policy Committee (FPC) has a statutory objective to protect and strengthen the resilience of the UK financial system (Bank of England, 1998). Within this framework, macroprudential policy is the primary tool for managing systemic risk, including excessive credit growth and imbalances in the housing market. The FPC has actively used tools such as countercyclical capital buffers and loan-to-income caps (Bank of England, 2025). The MPC has not pursued a systematic LAW policy. Financial stability considerations enter into monetary policy deliberations only to the extent that they affect the outlook for inflation and economic activity.

Overall, international practice suggests that while central banks widely recognize the importance of financial stability, none of the central banks in advanced economies currently pursue a systematic LAW policy through interest rate setting. In most countries, macroprudential policy is the primary tool for addressing financial imbalances, and monetary policy only takes such risks into account to the extent that they affect the outlook for inflation and economic activity. At the same time, strategy documents increasingly recognize that prolonged periods of low interest rates can contribute to the build-up of imbalances, and that financial stability considerations must be included in the assessment of risks. International experience reflects a cautious and flexible approach: financial stability is important, but is safeguarded within, rather than as an addition to, existing price stability mandates.

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8. The exchange rate

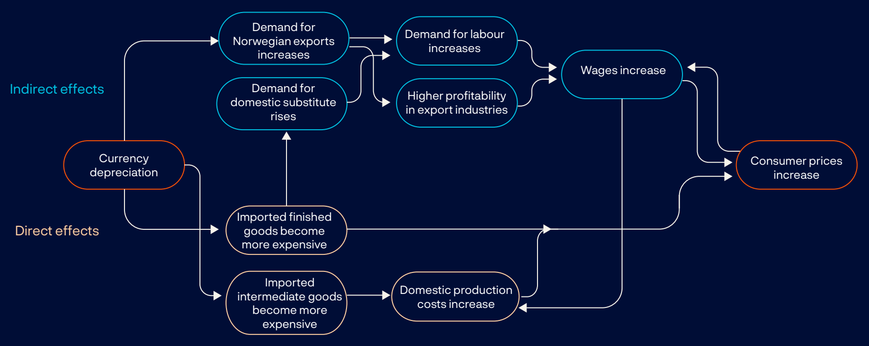
Key takeaways

- **There is strong empirical evidence that a higher interest rate differential relative to abroad leads to a stronger exchange rate.**
- **Short-term movements in the exchange rate are empirically difficult to explain because the exchange rate is affected by monetary policy surprises, financial shocks and changes in global risk appetite.**
- **Over the longer term, the exchange rate may also be influenced by more fundamental factors such as productivity differentials, terms of trade and net foreign asset positions.**
- **Although the exchange rate does not enter the loss function as an independent objective, it will typically be part of the optimal reaction function because it affects future inflation and economic activity. Responding to exchange rate movements is therefore consistent with flexible inflation targeting, without necessarily implying a separate exchange rate target.**
- **Sterilized interventions have, on average, measurable but often short-lived effects on the exchange rate in advanced economies. The effects appear to be largest during periods of substantial market turmoil and weakened liquidity.**
- **Among OECD countries with inflation targeting, the exchange rate is treated as an important transmission channel, but it rarely enters the mandate as an independent objective.**

8.1 The importance of the exchange rate for the Norwegian economy

The exchange rate plays a key role in small, open economies such as Norway. The Norwegian krone affects inflation, wage growth and economic activity through several channels. Although the exchange rate is not an explicit objective of monetary policy, it is a key variable in the monetary policy transmission mechanism and therefore important for how interest rate setting affects the economy. Chart 8.1 illustrates how the exchange rate affects key macroeconomic aggregates.

Chart 8.1 Direct and indirect depreciation effects



The exchange rate affects inflation both directly through import prices and indirectly through demand for domestically produced goods and profitability in the export sector.

A depreciation of the krone increases the price of foreign currency measured in Norwegian kroner and contributes directly to higher inflation through higher prices for imported consumer goods. In addition, prices for imported intermediate goods rise, which over time may lead to higher inflation for domestically produced goods and services.

A weaker krone improves the competitiveness of Norwegian firms and contributes to higher economic activity. This occurs both through higher activity in export-oriented industries and through a shift in domestic demand towards domestically produced goods and services.

In addition to higher sales volumes, a weaker krone increases the NOK value of export revenues for some firms, thereby improving profitability in tradable industries. This improves profitability and supports higher wage growth in manufacturing. In the Norwegian wage formation system, wage growth in manufacturing serves as a norm for wage growth in the rest of the economy. Changes in the exchange rate may therefore feed through to overall wage growth and contribute to more persistent domestic inflation. See the box "Wage formation in Norway" in Section 3 for a more detailed discussion of Norwegian wage formation.

Empirical studies from Norges Bank indicate that a sustained 1 percent depreciation of the krone increases consumer prices (CPI-ATE) by around 0.1 percentage point after slightly more than one year, and by around 0.2 percent in the longer run.[58]

58 See Ulvedal and Vonen (2016).

8.2 What determines the exchange rate?

To assess how monetary policy should respond to exchange rate movements, it is first necessary to understand what determines the exchange rate. The exchange rate is a relative price between two currencies and is determined in a market where expectations about future developments play an important role. The exchange rate is influenced by interest rate differentials relative to abroad, risk premiums, global financial conditions and underlying macroeconomic factors, both domestically and among trading partners. The interaction between these driving forces can lead to substantial fluctuations in the exchange rate over time, also independently of domestic monetary policy. At a given point in time, it may therefore be difficult to distinguish between temporary fluctuations and more persistent shifts in the exchange rate.

8.2.1 Interest rate differentials

A standard approach in the literature is the theory of uncovered interest rate parity (UIP), which can be written as:

(1) $i_t - i_t^* = E_t(\Delta s_{t+1}) + \rho_t$

where

i_t = domestic interest rate
i_t^* = foreign interest rate
s_t = log nominal exchange rate
ρ_t = risk premium

In a well-functioning capital market, different currencies cannot yield substantially different risk-adjusted returns over time, as arbitrage opportunities would quickly be exploited. The theory of uncovered interest rate parity (UIP) formalizes this idea: the interest rate differential between the domestic interest rate, i_t, and the foreign interest rate i_t^* reflects the expected change in the nominal exchange rate s_t, such that the expected returns are equalized across domestic and foreign interest-bearing assets. In addition, agents may require compensation for bearing exchange rate risk, represented by the risk premium, ρ_t.

Empirically, there is limited support for the UIP theory (Fama, 1984; Hansen and Hodrick, 1980). Currencies with a positive interest rate differential vis-à-vis other countries tend to appreciate further rather than depreciate, contrary to the predictions of UIP (Engel, 1996). This suggests that UIP has limited explanatory power for short-term exchange rate movements, even though it remains a useful theoretical benchmark. As discussed further in Section 8.3, however, there is strong empirical evidence that interest rates affect the exchange rate.[59] In standard open-economy models, an unexpected increase in interest rates leads to an immediate appreciation of the exchange rate. In Dornbusch's (1976) overshooting model, goods prices adjust sluggishly, while the exchange

59 See eg Eichenbaum and Evans (1995), Zettelmeyer (2004), Scholl and Uhlig (2008), Schmitt-Grohé and Uribe (2022).

rate can adjust rapidly. When interest rates increase unexpectedly, assets denominated in the domestic currency become more attractive, leading to an immediate appreciation of the currency. Initially, the exchange rate appreciates beyond its long-run equilibrium level, ie it overshoots.[60] As prices gradually adjust, the currency depreciates back towards equilibrium over time.

Empirically, the weak support for UIP does not imply that monetary policy is unimportant for the exchange rate, but rather that observed interest rate differentials alone explain little of the large and persistent movements in exchange rates. This suggests that other factors, such as time-varying risk premiums, play an important role in explaining exchange rate fluctuations.

8.2.2 Risk premiums and global financial conditions

For small, open economies, time-varying risk premiums are an important driver of exchange rate movements. Changes in global risk appetite, capital flows and commodity prices can have substantial effects on the exchange rate independently of domestic macroeconomic conditions.

Financial conditions and international capital flows are increasingly highlighted as important drivers of exchange rate movements. Gabaix and Maggiori (2015) show that capital flows and portfolio shifts can affect exchange rates when financial intermediaries in foreign exchange markets have limited risk-bearing capacity. Similarly, Itskhoki and Mukhin (2021) show that financial shocks can generate large exchange rate movements even when macroeconomic fundamentals change little. Such financial factors can help explain why exchange rates often move relatively independently of macroeconomic fundamentals.

For Norway, Benedictow and Hammersland (2022) show that the depreciation of the krone since 2016 can largely be attributed to increased risk premiums, ie factors driving the exchange rate beyond what can be explained by the interest rate differentials alone. The study suggests that these premiums partly reflect the declining importance of oil and gas in the Norwegian economy, a relative reduction in foreign direct investment in Norway compared with the euro area and declining valuations of oil-related equities.

Similar patterns have also been documented in Sweden. Ravn and Wilkins (2026) evaluate Swedish monetary policy over the period 2015–2024 and show that the Swedish krona depreciated against the euro over time despite solid underlying economic conditions and inflation developments and interest rate paths broadly in line with those in the euro area. Their evaluation attributes this development largely to time-varying risk premiums rather than to real economic factors.

60 This follows from uncovered interest parity: a higher domestic interest rate must be matched by an expected future depreciation of the exchange rate. At the same time, tighter monetary policy implies a lower domestic price level over time, which raises the long-run equilibrium exchange rate. Since prices adjust only gradually, the exchange rate initially overshoots its long-run equilibrium.

8.2.3 Expectations

The exchange rate is an asset price largely determined by market participants' expectations about future developments affecting the exchange rate. This can be illustrated by solving the UIP condition, equation (1), forward for the exchange rate:

$$(2)\quad s_t = E_t q_{t+\infty} + (p_t - p_t^*) - \sum_{j=0}^{\infty} E_t\left(r_{t+j} - r_{t+j}^*\right) - \sum_{j=0}^{\infty} E_t \rho_{t+j}$$

where

p_t = domestic price level
p_t^* = foreign price level
$q_{t+\infty}$ = the real exchange rate
r_t = real interest rate

The real exchange rate, q, is the nominal exchange rate adjusted for the difference in price levels between the home country and abroad. The real interest rate, r, is the nominal interest rate adjusted for expected inflation. Equation (2) implies that changes in expectations regarding the long-run real exchange rate affect the exchange rate today. Such expectations may arise from a range of factors, including structural changes in the terms of trade, productivity differentials across countries or changes in net foreign asset positions. For example, a substantial and persistent decline in oil prices may lead to expectations that the real exchange rate will have to depreciate over time to maintain external balance. All else equal, this would contribute to a weaker krone exchange rate already today. Expectations regarding future monetary policy, represented by the interest rate differential, are also important for the current exchange rate according to equation (2). In other words, the current policy rate is likely to have only a limited effect on the exchange rate. Rather, it is expectations regarding the entire future policy rate path relative to abroad that matter.[61] This may help explain why empirical studies often find that macroeconomic fundamentals have limited explanatory power for short-term exchange rate movements (Meese and Rogoff, 1983).

If the price level in Norway rises relative to other countries, this will, in isolation, lead to a depreciation of the krone for a given long-run equilibrium real exchange rate. This is because higher domestic inflation appreciates the real exchange rate, implying that the nominal exchange rate must depreciate to restore the real exchange rate to equilibrium. With a credible inflation target, however, an unexpectedly high inflation reading will normally lead to expectations of tighter monetary policy ahead, and thereby a wider interest rate differential, which pulls in the opposite direction. Empirical studies (see for example Clarida and Waldman, 2008) suggest that the latter effect dominates on impact. In inflation-targeting economies, inflation surprises on the upside are therefore often associated with an appreciation of the exchange rate owing to expectations of tighter monetary policy.

61 This is consistent with Mæhlum (2025), who finds that revisions to the policy rate path further out in time have a stronger effect on the krone exchange rate than short-term revisions.

8.2.4 Real economic conditions

Over the longer term, the real exchange rate may be influenced by underlying economic factors that evolve gradually over time, even though the relationships are often less apparent in the short run.[62] The literature particularly highlights several long-term drivers of the real exchange rate, including productivity differentials, terms of trade, net foreign asset positions and demographic developments.

The first factor is productivity differentials across countries. According to the Balassa–Samuelson effect, countries with high productivity growth in the tradable sector will typically experience an appreciation of the real exchange rate. The mechanism is that higher productivity in the export sector pushes up wages across the economy, which in turn raises prices for non-tradable goods and services. This results in a higher domestic price level and thereby a stronger real exchange rate (Balassa, 1964; Samuelson, 1964).

The second is the terms of trade, which measures the relative price of a country's export to its imports. An improvement in the terms of trade, for example because of higher prices for important export goods, implies that the country receives more import goods in exchange for each unit it exports. This strengthens purchasing power vis-à-vis abroad and, in isolation, pulls in the direction of a stronger real exchange rate, as the country's goods and services become relatively more valuable in international trade.[63] In resource-rich economies, this mechanism can be particularly important, because exports are often concentrated in commodities with substantial price volatility. Changes in commodity prices may therefore lead to large movements in the terms of trade and thereby the exchange rate. For Norway, this implies that developments in the petroleum sector may affect the krone exchange rate both through foreign exchange flows related to oil and gas export revenues and through expectations regarding future income from the petroleum sector. Large net foreign asset positions operate through a related mechanism. Returns on foreign assets help finance imports without corresponding export revenues implying that countries with large net foreign asset positions may sustain a stronger real exchange rate over time than countries with net foreign debt.[64]

Demographic conditions are also highlighted as an underlying driver of the real exchange rate. The age composition of the population affects national saving and investment patterns, and thereby capital flows across countries. Economies with ageing populations often exhibit higher savings and lower investment, which may affect the real exchange rate through changes in net capital flows (Ferrero, 2010).

62 See eg Itskhoki and Mukhin (2021).

63 For example, Bergvall (2004) finds that an improvement in the terms of trade is associated with a stronger real exchange rate over the long run, and that exogenous terms-of-trade shocks, particularly through oil prices, are important drivers of long-run movements in the Norwegian real exchange rate.

64 See eg Gourinchas and Rey (2007).

For resource-rich economies such as Norway, Bjørnland et al. (2024) show that long-run movements in the real exchange rate may be related to developments in several such fundamental factors. The authors find that weaker productivity growth in Norway relative to trading partners, combined with structural changes in petroleum activity in the years following the global financial crisis, may together help explain the weak krone developments over the past decade. Klovland et al. (2021) also point to structural explanations for the depreciation of the krone over the past decade, arguing that it can be understood in light of higher price and cost growth in Norway than among trading partners.

8.3 How does the interest rate affect the exchange rate?

Central banks operating under flexible inflation targeting place considerable emphasis on conducting predictable monetary policy. Market participants form expectations about future interest rates based on central bank communication and incoming information about economic developments. Changes in the policy rate that are in line with these expectations are therefore often already priced into the exchange rate. This is consistent with seminal contributions to the literature showing that exchange rates are only to a limited extent explained by observable variables such as interest rate differentials (Meese and Rogoff, 1983; Engel and West, 2005). This does not imply that monetary policy has no effect on the exchange rate, but rather that the clearest effects stem from the unexpected component of monetary policy. To isolate the causal effect of monetary policy, the literature has increasingly focused on monetary policy surprises, ie policy rate changes that are not priced into financial markets. Such shocks are identified using, among other approaches: (i) so-called narrative approaches, which purge interest rate changes of the central bank's own forecasts (Romer and Romer, 2004), (ii) structural VAR models with identifying restrictions (Sims, 1992; Blanchard and Quah, 1989), and (iii) high-frequency measures around monetary policy announcements (Gürkaynak et al., 2005; Gertler and Karadi, 2015).

Empirical studies using these methods find that unexpected interest rate increases in advanced economies lead to an immediate appreciation of the exchange rate, followed by a gradual depreciation back towards its long-run equilibrium, consistent with Dornbusch's (1976) overshooting hypothesis. For example, Bjørnland (2009) finds that a contractionary monetary policy shock of 1 percentage point leads to an immediate appreciation of the exchange rate of 1.5–4 percent in four small, open economies. The effect peaks within one to two quarters before gradually reversing towards long-run equilibrium. A comprehensive IMF study also finds that monetary policy surprises in advanced economies are associated with an immediate appreciation of the exchange rate (Bolhuis et al., 2024).

Studies focusing specifically on Norway find similar results. Although the estimated effects vary across studies, the findings suggest that the krone typically appreciates by around 1–3 percent following an unexpected interest rate increase of 1 percentage point (Bjørnland, 2008; Holm et al., 2021). Mæhlum (2025) also finds an immediate appreciation of the krone of a similar magnitude but estimates that the effect fades more rapidly than in the other studies.

Evidence from Norway also suggests that central bank communication about the future policy rate path can affect the exchange rate, even when the policy rate is left unchanged. Several analyses suggest that the exchange rate response depends on how markets interpret signals about the future policy path. Some studies find that revisions to the policy rate path mainly affect short-term market rates, with limited effects on the krone exchange rate (Brubakk et al., 2021). Mæhlum (2025), however, finds that upward revisions to the policy rate path contribute to an appreciation of the krone, particularly when the revisions concern interest rate expectations further ahead and are interpreted as signals of more persistent changes in monetary policy. Consistent with this, Brubakk et al. (2022), who distinguish between different types of communication shocks, find that signals of higher future interest rates may lead to a gradual appreciation of the exchange rate, with the effect typically peaking after around one to two years.

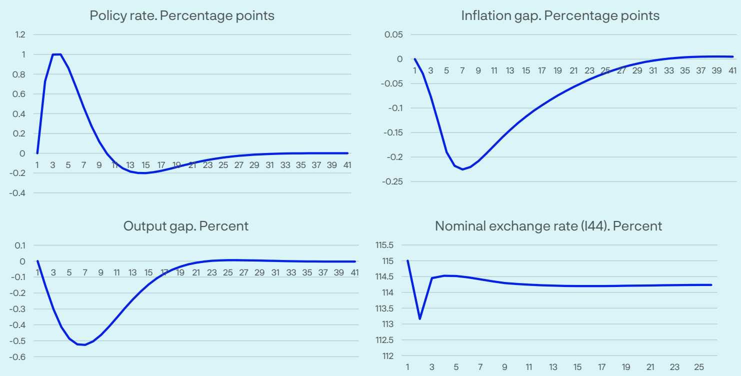
The exchange rate in NEMO

To illustrate the interaction between monetary policy and the krone exchange rate, we use Norges Bank's structural macroeconomic model NEMO.[65] In this box, the interaction is illustrated using two types of shocks: a monetary policy shock and an exchange rate shock. The impulse responses illustrate how interest rate changes affect the krone exchange rate and how exchange rate movements affect inflation and the real economy.

Chart 8.A shows the impulse responses for a selection of macroeconomic variables: inflation, output, the nominal exchange rate and the policy rate. The shock is normalized such that the policy rate increases by 1 percentage point at its peak on an annualized basis.

65 For a more detailed description of the model, see Kravik and Mimir (2019).

Chart 8.A Monetary policy shocks in NEMO

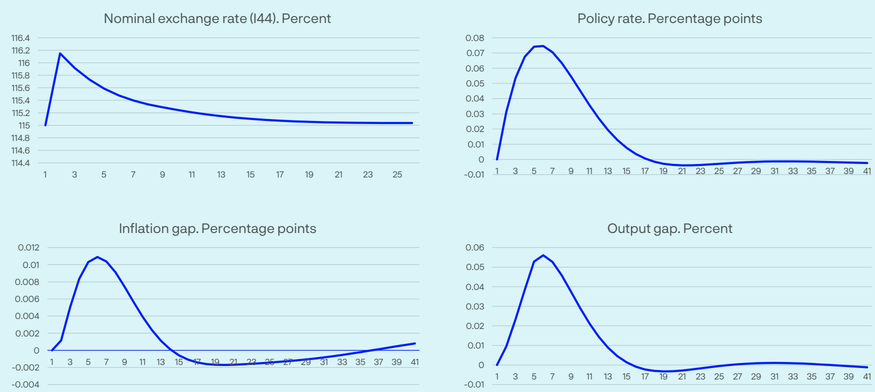


Source: Norges Bank

An unexpected interest rate hike leads to an immediate appreciation of the krone through uncovered interest parity. Higher domestic interest rates make Norwegian assets more attractive, causing the exchange rate to strengthen rapidly. Since the exchange rate can adjust freely while prices and wages are sluggish, the krone appreciates more in the short run than is consistent with long-run equilibrium. This overshooting gradually reverses as the interest rate differential vis-à-vis abroad narrows.

The exchange rate is also affected indirectly through the risk premium in the interest parity condition. Higher interest rates dampen domestic demand and imports, leading to an improvement in the trade balance. This reduces the risk premium and contributes to a somewhat stronger krone.

Chart 8.B Risk premium shocks in NEMO



Source: Norges Bank

To illustrate how the exchange rate affects the Norwegian economy, we examine a shock to the risk premium in the UIP condition. Chart 8.B shows the impulse responses to such a shock. An increase in the risk premium implies lower demand for Norwegian kroner, resulting in an immediate depreciation of the krone exchange rate.

The depreciation quickly leads to higher import prices and thereby higher inflation. At the same time, a weaker krone has an expansionary effect on the real economy, as Norwegian exporters can lower prices in foreign currency and thereby increase demand for Norwegian goods. To dampen the effects on inflation and the output gap, the central bank raises the policy rate. In the model, this contributes to gradually bringing inflation back towards target. Without such a policy rate response, the krone would have depreciated further, consistent with the mechanisms described in Kravik and Mimir (2019).

Overall, both the empirical literature and model-based analysis suggest that the krone exchange rate is influenced by monetary policy. The effects vary in both magnitude and persistence across studies. The exchange rate responds to developments in interest rate differentials vis-à-vis abroad, to central bank communication regarding the future policy rate path and to changes in the outlook for the Norwegian economy.

8.4 The role of the exchange rate in the flexible inflation targeting framework

Flexible inflation targeting implies that the central bank must balance the objectives of keeping inflation close to the inflation target against the objective of stabilizing the real economy. This is often formalized in the literature using the following *loss function*:

(3) $L_t = \pi_t^2 + \lambda y_t^2$

where

π_t =deviation from the inflation target
y_t = output gap
λ = relative weight on the stabilization of the real economy

The exchange rate does not enter the loss function explicitly. However, the exchange rate affects both inflation and the output gap. When the central bank minimizes the loss function, given the structural relationships in the economy, the optimal reaction function can generally be written as:

(4) $i_t = \phi_\pi \pi_t + \phi_y y_{t+} + \phi_v v_t + \bar{x}$

where v_t represents the exchange rate or exchange rate-related shocks and $\bar{x}$ represents other variables that may affect the central bank's interest rate setting.

Although the exchange rate is not an explicit objective in the loss function, the coefficient on the exchange rate in the reaction function, ϕ_v, will generally differ from zero because the exchange rate affects future inflation and economic activity. Responding to exchange rate movements may therefore be consistent with flexible inflation targeting, without implying a separate exchange rate objective. Norges Bank's monetary policy rule GEORG illustrates this.[66] In the rule, the exchange rate enters alongside other macroeconomic variables relevant for interest rate setting. The coefficient, ϕ_v, will normally be positive, implying that a depreciation of the exchange rate contributes to a higher policy rate. This dampens the effects on the exchange rate of, for example, shocks to the risk premium.

Empirical evidence suggests that central banks respond to exchange rate movements. Lubik and Schorfheide (2007) estimate small open-economy DSGE models for four countries and test whether the exchange rate enters explicitly into central banks' reaction functions. They find that some central banks respond directly to exchange rate movements in addition to inflation and output, while others respond only to the latter variables. For small, open economies, Bjørnland (2009) finds that monetary policy responds systematically to exchange rate movements. This reflects the role of the exchange rate in the monetary policy reaction pattern under flexible inflation targeting. Similarly, Alstadheim et al. (2021) find that central banks in commodity-exporting economies, including Norges Bank, have at times responded to exchange rate movements. This may have contributed to stabilizing the exchange rate, although the response primarily reflected concerns about inflation and economic activity. A more recent evaluation of the Riksbank suggests that Sweden also took exchange rate movements into account as part of its flexible inflation targeting framework, even though exchange rate stability was not specified as an explicit objective in the mandate (Ravn and Wilkins, 2026).

Overall, the literature suggests that central banks in open economies often respond to exchange rate movements, but that such responses can be understood as part of an implicitly optimal policy response aimed at stabilizing inflation and economic activity.

8.5 Should the exchange rate play an explicit role in the central bank's mandate?

That central banks, particularly in small open economies, respond to exchange rate movements in order to stabilize inflation and the real economy follows naturally from optimal monetary policy under flexible inflation targeting. A more fundamental question is whether exchange rate stability should constitute a separate objective in the central bank's mandate, beyond its effects on inflation and the real economy. In the loss function illustrated by equation (3), this would imply an additional term for the exchange rate:

(5) $L_t = \pi_t^2 + \lambda y_t^2 + \gamma v_t^2$

66 The rule is constructed such that it produces a policy rate path that is close to identical to the one implied by the NEMO model with a loss function, see Almlid et al. (2025).

There may be arguments for including exchange rate stability as a separate policy objective if exchange rate volatility gives rise to welfare costs beyond its effects on inflation and output.

8.5.1 Welfare costs of exchange rate volatility

In standard open-economy macroeconomic models, the exchange rate acts as a relative price that helps absorb economic shocks. When the exchange rate is flexible, it can adjust to changes in demand, trade or capital flows. In such models, stabilizing inflation and output will normally be sufficient to ensure an efficient allocation of resources.

Arguments for assigning exchange rate stability an independent weight in the loss function ($\gamma > 0$) are primarily related to financial frictions. These include currency mismatch, where households or firms hold debt denominated in foreign currency while their income is denominated in domestic currency, and balance sheet effects, whereby exchange rate movements affect the domestic-currency value of such debt.
A depreciation of the domestic currency therefore increases the value of debt measured in domestic currency and may amplify economic downturns. For Norway, where private-sector foreign currency debt is limited and the financial system is robust, such mechanisms appear less important.

Nevertheless, financial frictions may give rise to welfare losses associated with exchange rate volatility through other channels. One possible mechanism is that investors require compensation for bearing exchange rate risk. If a currency typically depreciates during periods of elevated global risk, investors may demand higher risk premiums to hold assets denominated in that currency, increasing the cost of capital and affecting domestic investment (Hassan et al., 2023). Financial frictions may also imply that exchange rates move more in response to shifts in investors' demand for assets denominated in different currencies than to changes in underlying macroeconomic conditions. In such cases, policies that reduce these frictions may in principle improve welfare (Itskhoki and Mukhin, 2025). From a capital market and portfolio perspective, this may be reflected in a weaker krone exchange rate because international investors require greater compensation for holding krone-denominated assets.

For commodity-exporting economies, financial frictions may also arise endogenously following oil price shocks. In a model of a small open oil-exporting economy, Aktuğ and Rezghi (2026) show that oil price shocks can generate movements in net foreign asset positions and exchange rate risk premiums that lead to inefficient exchange rate volatility. The study suggests that measures aimed at dampening financial frictions in foreign exchange markets may, in such situations, be welfare-improving.[67]

67 The study explicitly highlights foreign exchange interventions as a possible measure to reduce financial frictions in foreign exchange markets.

Even in the absence of large financial frictions, exchange rate volatility can entail welfare costs in small open economies. When a substantial share of consumption and production depends on imported goods and intermediate inputs, exchange rate fluctuations may generate inefficient volatility in inflation and output relative to the socially efficient allocation. In De Paoli (2009), the real exchange rate enters directly into the welfare-based loss function alongside domestic inflation and the output gap. Fluctuations in the real exchange rate may therefore affect welfare through distortions in relative prices between domestic and foreign goods. Such mechanisms may be particularly important in economies with a high import share or extensive use of imported intermediate inputs (Lombardo and Ravenna, 2014). In these economies, exchange rate developments may play a larger role in macroeconomic adjustment, raising the question of whether additional policy instruments should be used to influence the exchange rate more directly.

8.5.2 Other monetary policy instruments

Including exchange rate stability as a separate objective alongside price stability and real economic stability would make the mandate less transparent and more difficult to evaluate. As discussed in Section 3, the complexity of monetary policy increases when the number of objectives and considerations exceeds the number of instruments. This may make it more difficult to assess target attainment and hold policy decisions accountable. This raises the question of whether other policy instruments may be better suited to addressing exchange rate fluctuations.

Foreign exchange interventions

In addition to influencing the exchange rate through the policy rate, monetary authorities may intervene directly in foreign exchange markets. This typically involves the central bank purchasing or selling foreign currency to affect exchange rate movements. Some central banks use foreign exchange interventions to support the achievement of their inflation targets, either by counteracting an overly strong exchange rate that contributes to excessively low inflation or an overly weak exchange rate that contributes to higher inflation. Under floating exchange rate regimes, such measures have typically been used as a complement to, rather than a substitute for, the policy rate, consistent with recommendations in the literature.[68] In some cases, interventions have also been used when the policy rate is close to its effective lower bound and conventional monetary policy space is limited.

Foreign exchange interventions involve central banks purchasing or selling foreign currency with the aim of dampening exchange rate fluctuations or influencing the level of the exchange rate. In this subsection, we review research and experiences with sterilized interventions, that is, interventions where the central bank counteracts the liquidity effect of the foreign exchange transactions through separate

68 See Cavallino (2019) and IMF (2023).

operations in the money market, so that short-term money market rates remain unaffected.

The empirical evidence on the effects of foreign exchange interventions is mixed, partly owing to methodological challenges. Central banks typically intervene when the exchange rate moves in an undesired direction, creating an endogeneity problem that makes it difficult to identify the causal effects of intervention. Data availability is also limited. Only around 16 percent of central banks in emerging market economies publish intervention data, and even where such data are available, changes in foreign exchange reserves are often used as an imperfect proxy (Adler et al., 2021). In advanced economies with floating exchange rates, interventions occur much less frequently, resulting in a relatively limited empirical basis for assessment (Fratzscher et al., 2019).

Several empirical studies find that foreign exchange interventions have, on average, a measurable effect on the exchange rate, although the effects are often relatively short-lived, particularly in advanced economies (Cwik and Winter, 2024; Cavallino, 2019; Fratzscher et al., 2019; Pontines, 2018). For example, a meta-analysis by Arango-Lozano et al. (2024) finds that foreign exchange interventions in economies with free capital mobility and a high degree of monetary policy autonomy tend to have relatively short-lived effects on the exchange rate level. Many studies find that the effects fade within days or weeks, although some analyses document more persistent effects. Because the exchange rate effects are often modest, sizeable interventions are typically required to achieve measurable effects. Cwik and Winter (2024), for example, find that interventions of around USD 1 billion typically change the exchange rate by less than 1 percent. Estimated exchange rate effects from interventions are therefore generally small and broadly comparable to those associated with a 0.25 percentage point interest rate change, which is typically estimated to move the exchange rate by around 0.25–1 percent.[69] These findings are supported by more recent evidence from Sweden, where the Riksbank's foreign exchange purchases and sales during the period 2021–2024 generated measurable, but short-lived, exchange rate effects (Artta et al., 2025).

The short-lived effect of foreign exchange interventions in advanced economies may partly reflect factors related to market structure. In economies with high capital mobility and deep foreign exchange markets, even large-scale interventions often account for only a small share of daily market turnover. This limits the central bank's ability to influence currency supply and demand over time. In less developed economies, foreign exchange market turnover is often lower, making the central bank a relatively larger market participant. Interventions may therefore have larger and more measurable effects on the exchange rate

69 The estimates, as discussed in Bache (2023), are based on an instrumental variables regression for the period 2001–2023, where changes in the krone exchange rate against the euro around monetary policy decisions are explained by changes in the policy rate. Changes in the first four FRA contracts for the three-month money market rate, measured from 10 minutes before to 20 minutes after the policy announcement, are used as instruments. The narrow time window reduces the likelihood that the estimates are contaminated by changes in expectations regarding foreign interest rates.

(Daude et al., 2014). There is also an asymmetry between interventions aimed at weakening the domestic currency and those aimed at strengthening it. Interventions aimed at weakening the domestic currency are, in principle, unconstrained because the central bank issues the currency itself. By contrast, interventions aimed at strengthening the currency are constrained by the size of foreign exchange reserves. Market participants are aware of this limitation, which may weaken both the credibility and effectiveness of interventions aimed at strengthening the exchange rate.

Although many studies find that the effects of foreign exchange interventions are relatively short-lived, some analyses document more persistent effects on the exchange rate. Adler et al. (2019) find that the effects of interventions fade only gradually over time, with a half-life of around 15–17 months, broadly in line with the estimates in Blanchard et al. (2015). Filardo et al. (2022) find that the effects of interventions may be more persistent in cases where interventions help correct temporary exchange rate deviations that cannot be explained by macroeconomic fundamentals.[70] A challenge, however, is that it is difficult in practice to determine the extent to which the exchange rate deviates from fundamental values.

Some evidence suggests that foreign exchange interventions may help dampen short-term exchange rate volatility and improve market liquidity, rather than influence the level of the exchange rate over time. The effects appear to be greatest during periods of significant market stress, when reduced liquidity and abrupt shifts in capital flows generate large exchange rate fluctuations. In such situations, liquidity in foreign exchange markets is often lower than normal. When the central bank enters the market, interventions may therefore have a greater impact than under normal market conditions while also signaling increased liquidity provision. For foreign exchange interventions to have a stabilizing effect, however, it is important that they operate in conjunction with other monetary policy instruments and are perceived as consistent with underlying macroeconomic conditions.[71]

The experience from Norway in March 2020 illustrates how foreign exchange interventions may help ensure adequate liquidity in foreign exchange markets during periods of acute market stress. The turmoil associated with the Covid-19 pandemic led to extraordinary market disruptions, and over the course of two weeks the krone depreciated by around 25 percent against the US dollar (Alstadheim et al., 2021). The period was characterized by severe market turbulence, reduced risk appetite and impaired liquidity in foreign exchange markets.

70 Exchange rate deviations that cannot be explained by macroeconomic fundamentals may partly reflect financial frictions in foreign exchange markets. In models where, for example, financial intermediaries have limited risk-bearing capacity, capital flows may generate imbalances in currency demand and thereby lead to exchange rates that deviate from levels consistent with underlying fundamentals. In such contexts, foreign exchange interventions may be effective because they influence the balance of supply and demand in foreign exchange markets (Gabaix and Maggiori, 2015; Fanelli and Straub, 2021).

71 See, eg, Adler and Tovar (2014).

Norges Bank intervened by purchasing Norwegian kroner, and together with increased liquidity provision to banks, the interventions contributed to stabilizing the market for Norwegian kroner.[72]

A framework published by the IMF in 2023 provides a systematic discussion of situations in which foreign exchange interventions may serve as an appropriate complement to the policy rate.[73] The framework forms part of the IMF's Integrated Policy Framework (IPF), which summarizes insights from a broad theoretical and empirical literature on optimal policy in small open economies.

The framework suggests that foreign exchange interventions may be particularly relevant for small open economies operating under flexible inflation targeting when shocks are sufficiently large to pose substantial risks to the central bank's objectives. At the same time, such measures should not substitute for necessary adjustments in monetary and fiscal policy. The framework highlights three situations in which foreign exchange interventions may be useful:

1. **Destabilizing risk premiums in shallow foreign exchange markets.** In markets with limited depth and liquidity, speculative trading and abrupt capital outflows may push the exchange rate away from fundamental values and transmit volatility to import prices and asset prices (Basu et al., 2025). Foreign exchange interventions may help dampen such deviations and support macroeconomic and financial stability.

2. **Financial risk related to foreign currency loans.** If households or firms hold substantial foreign currency debt without adequate hedging, a large and unexpected depreciation of the exchange rate may trigger defaults and amplify financial instability through credit markets.

3. **Risk of weakened anchoring of inflation expectations.** Large exchange rate depreciations may feed strongly into inflation and weaken the anchoring of inflation expectations. Persistent exchange rate appreciations may also create challenges if prolonged low inflation requires the central bank to keep interest rates so low that the economy overheats.

8.6 International practice regarding the role of the exchange rate in monetary policy

Following the Second World War, Western economies established the Bretton Woods system, an international arrangement of fixed exchange rates anchored to the US dollar. After the collapse of the system in the 1970s, countries adopted different monetary policy frameworks, and

72 The announcement alone that Norges Bank was considering foreign exchange intervention contributed to an immediate appreciation of the krone of more than NOK 0.70 against the euro.

73 See *Integrated Policy Framework (2023) — Principles for the Use of Foreign Exchange Intervention*, IMF Policy Paper, for a more detailed discussion of the framework.

international experience shows substantial variation in the role assigned to the exchange rate. Based on a comprehensive survey of monetary policy frameworks in more than 180 countries over the period 1974–2023, Cobham (2025) identifies several common trends over time. The use of fixed exchange rates and explicit exchange rate targets has gradually declined, while inflation targeting and more discretionary frameworks have become more widespread. In advanced economies, particularly among OECD countries, inflation targeting combined with floating exchange rates has become the dominant monetary policy framework. At the same time, experience shows that even countries operating under inflation targeting have at times given the exchange rate a more direct role in the conduct of monetary policy. In emerging market economies, by contrast, the exchange rate often plays a more prominent role in the monetary policy framework. This partly reflects that exchange rate pass-through to inflation tends to be stronger in developing economies, and that exchange rate movements may affect capital flows, risk premiums and foreign currency debt burdens more directly than in advanced economies.

8.6.1 Practice among OECD countries with inflation targeting

Among OECD countries, central bank mandates are generally anchored in an overarching objective of price stability, typically operationalized through an explicit inflation target. Within these frameworks, the exchange rate rarely serves as an independent objective. Instead, it is treated as an important transmission channel for monetary policy, as exchange rate movements affect inflation, output and employment. Monetary policy is normally conducted through the policy rate under floating exchange rate regimes.

A common feature of inflation-targeting regimes in OECD countries is a high degree of instrument independence. This implies that the central bank, within the boundaries of its mandate, is free to choose the instruments used to achieve price stability. Although the policy rate is generally the primary instrument for achieving the inflation target, central bank mandates often allow for the use of additional instruments when needed. This creates scope for supplementary tools, particularly in situations where the policy rate alone is considered insufficient.

The experiences of countries such as Switzerland, the Czech Republic and Japan show that monetary policy has at times relied on instruments other than the policy rate. These have included interventions in foreign exchange markets. Such measures have often been justified by the objective of stabilizing foreign exchange markets and supporting price stability and economic stability, although the institutional framework and allocation of responsibilities have differed across countries.

Switzerland

The mandate of the Swiss National Bank is set out in the Swiss National Bank Act and assigns the central bank responsibility for ensuring price stability while taking economic developments into account. The mandate provides broad instrument flexibility and does not restrict monetary policy to the use of the policy rate alone. This has allowed the central bank to use foreign exchange interventions in situations where exchange rate developments were considered likely to hinder the achievement of price stability.

The use of instruments other than the policy rate became particularly prominent in Switzerland during the euro area crisis. Strong capital inflows led to a marked appreciation of the Swiss franc, increasing the risk of persistently low inflation and deflation. In September 2011, the policy rate in Switzerland was close to its effective lower bound, and the Swiss National Bank stated that the strong exchange rate represented "an acute threat to the Swiss economy and carries the risk of a deflationary development". Against this background, the central bank introduced a minimum exchange rate for the EUR/CHF exchange rate, enforced through large-scale foreign exchange interventions. The exchange rate floor helped stabilize the exchange rate and reduce appreciation pressures on the Swiss franc (IMF, 2015).

The measure represented a clear departure from a standard inflation-targeting regime with a freely floating exchange rate. Although price stability remained the overriding objective, the central bank during this period placed explicit emphasis on exchange rate developments as a policy tool to counter deflationary pressures and bring inflation back towards target.

Czech Republic
In the Czech Republic, monetary policy is anchored by an explicit inflation target of 2 percent. The policy rate is the primary instrument in the conduct of monetary policy. The exchange rate floats freely and is not an independent objective, but it is regarded as an important channel for achieving price stability.

During the period 2013–2017, the policy rate in the Czech Republic was close to its effective lower bound, while the risk of deflation was elevated. Against this backdrop, the central bank used foreign exchange interventions as a supplementary monetary policy instrument aimed at influencing inflation through the exchange rate channel. In November 2013, the central bank introduced a minimum exchange rate against the euro and committed to enforcing it through large-scale foreign exchange interventions. The measure was explicitly presented as temporary and conditional on the inflation outlook. When inflation in 2017 began to move closer to target, the exchange rate floor against the euro was discontinued, and the exchange rate was once again allowed to float without an explicit commitment from the central bank. Subsequent assessments of the policy suggest that the temporary exchange rate floor contributed to reducing the risk of deflation (Caselli, 2017).

Japan
The mandate of the Bank of Japan is set out in the Bank of Japan Act, where the primary objective is to ensure price stability over time. Monetary policy is conducted with the aim of achieving an inflation target. Compared with most OECD countries, however, responsibility for policy instruments in Japan is more extensively shared with the fiscal authorities. In particular, responsibility for exchange rate policy is explicitly defined in law. Authority over foreign exchange interventions rests with the Ministry of Finance, while the Bank of Japan acts as the operational agent in implementing any interventions. This means that the central bank does not have independent authority to intervene in foreign exchange markets and that the use of such measures requires close coordination between the two institutions.

Over the past four years, the Japanese authorities have used foreign exchange interventions to counter sharp depreciations of the yen. This became particularly evident in autumn 2022, when the yen depreciated to historically weak levels against the US dollar. Prior to the interventions, the finance minister stated that "excessive volatility in exchange rates is undesirable" and referred to possible adverse consequences for economic and financial stability. Against this background, foreign exchange interventions were carried out for the first time in several decades.

In the period that followed, official communication frequently referred to specific yen-US dollar exchange rate levels as indicators of heightened readiness to intervene. Over time, particularly during 2025, this practice became less prominent. Communication instead placed greater emphasis on policy flexibility rather than on fixed thresholds that could encourage speculative behavior.

Experience with the interventions in Japan suggests that they contributed to strengthening the yen for a period following the interventions, although the effects were often relatively short-lived (Esaka and Fujii, 2025). That the yen has subsequently depreciated to levels substantially weaker than those observed in 2022 likely reflects that Japan maintained very low policy rates over a prolonged period while most other central banks tightened policy sharply. The experience illustrates that foreign exchange interventions alone cannot offset exchange rate pressures stemming from a persistently negative interest rate differentials vis-à-vis other countries.

8.6.2 Practice in countries with alternative monetary policy frameworks
In emerging market economies, monetary policy is increasingly organized around inflation targeting, with price stability as the overarching objective. At the same time, the exchange rate plays a much larger role for both inflation and financial stability than in advanced economies. Exchange rate pass-through to inflation is substantially stronger, and exchange rate movements may affect risk premiums and

the transmission of monetary policy more directly.[74] As a result, monetary policy often needs to respond more directly to exchange rate developments, even when the exchange rate is not an explicit objective of the mandate. Against this background, the IMF has emphasized that foreign exchange interventions may serve as an appropriate complement during periods of significant market stress, provided that they are used to address disorderly market conditions rather than to target a specific exchange rate level (Gopinath, 2025).

Denmark
International practice shows considerable variation in the role of the exchange rate in monetary policy. This can be illustrated by considering economies where the exchange rate plays a direct role in monetary policy, either as a fixed nominal anchor or as an operational policy instrument. Danmarks Nationalbank conducts monetary policy under a fixed exchange rate regime against the euro, where the primary objective is to keep the krone stable. The central bank does not operate with an independent inflation target, but instead seeks to achieve price stability indirectly through the fixed exchange rate. In practice, monetary policy is implemented through interest rate adjustments broadly in line with those in the euro area, supplemented by foreign exchange interventions when needed.

The fixed exchange rate regime has helped keep inflation in Denmark close to inflation in the euro area over time (IMF Annual Report, 2025). Low and relatively stable inflation in Denmark is often viewed as a result of the credibility of the fixed exchange rate regime, where the exchange rate serves as the nominal anchor for monetary policy (Rohde, 2022). An additional prerequisite is that fiscal policy assumes responsibility for macroeconomic stabilization. In Denmark, fiscal policy has traditionally been conducted in a manner that supports the fixed exchange rate objective, and the interaction between the two policy areas is regarded as an important reason for the long-term credibility of the regime.

Singapore
The monetary policy framework of Monetary Authority of Singapore (MAS) represents a different form of exchange rate-based monetary policy regime. The objective is medium-term price stability, operationalized through exchange rate management. Unlike most central banks, MAS does not use an explicit policy rate as its main operational instrument. Instead, MAS sets a desired path for the nominal effective exchange rate (NEER) of the Singapore dollar, defined by a policy band with a given slope, width and center, which is reviewed semi-annually. The exchange rate is kept within this band primarily through foreign exchange interventions. At the same time, domestic money market rates are influenced indirectly through liquidity management and capital flows, such that interest rates in practice adjust to the exchange rate objective and international interest rates.

74 For example, Brandão-Marques et al. (2023) find that a 10 percent depreciation of an emerging market economy's currency against the US dollar increases the price level by around 2 percent, which is several times larger than the effect of a comparable exchange rate movement in advanced economies.

The experience of Singapore suggests that an exchange rate-based regime may contribute to maintaining low and stable inflation (IMF Annual Report, 2025). This may partly reflect the strong pass-through from the exchange rate to domestic prices given the country's high import share, combined with a high degree of credibility regarding monetary policy and the use of the exchange rate as the operational instrument.

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9. Inequality

Key takeaways

- **Monetary policy has limited effect on income and consumption inequality between households. The effect is larger on inequality between households with different debt levels, since interest rates strongly affect net interest payments.**
- **Inequality can in principle affect how monetary policy works and how it should be designed. In Norway, analyses suggest this effect is limited due to high redistribution through the tax system and other institutional features.**
- **Monetary policy affects sectors differently. These differences are not large but can matter for individual sectors.**
- **The uneven sectoral impact of monetary policy can have implications for the choice of the inflation target. Theoretical arguments support that prices in interest rate sensitive sectors should be weighted more heavily in the price index used as a target than they are in the CPI. However, the potential gain from a theoretically optimal target variable must be weighed against the advantages of using the CPI.**

9.1 Introduction

In recent years, there has been growing attention to how monetary policy affects inequality. A central question is whether changes in the policy rate affect different households and sectors unevenly. Another is to what extent differences between households or firms can influence the transmission of monetary policy. A third is whether distributional effects should matter for the design of optimal monetary policy.

Distributional aspects are potentially important for monetary policy. Even in countries where household inequality is relatively stable over time, short term distributional effects of economic policy can matter for macroeconomic stability. Compared to many other high-income countries, Norway has not experienced the same sustained increase in income inequality. This can be linked to a progressive tax and transfer system, public services, and how natural resource revenues are managed (see Bennett and Salvanes, 2024). However, households still experience fluctuations in income, wealth, and labor market attachment. These fluctuations can have significant distributional consequences in downturns and upturns, making them relevant for policy even when inequality over time is relatively stable.

The sectoral structure is also relevant for how inequality in a country evolves over time. The Norwegian economy has several distinct features, including a large petroleum and energy sector, few but strong industrial clusters, and a large public sector. Monetary policy impulses affect sectors differently through prices, demand, and financing conditions. Such differences can imply that costs are distributed unevenly across regions, worker groups, and firm types. An analysis based solely on aggregate data may therefore miss important dynamics.

This chapter examines these questions with a particular focus on Norway. The goal is first to discuss whether there is a link between monetary policy and household inequality, and if so, how this link operates. It then discusses whether monetary policy affects sectors differently and how such differences can matter for optimal monetary policy.

9.2 The effect of monetary policy on household inequality

This section reviews the empirical literature on how interest rate changes affect inequality between households. We first give a brief overview of international findings and then look more closely at Norway. Inequality can be measured in several ways. We mainly focus on consumption inequality, as consumption is a direct measure of household welfare and the most studied measure in this literature. We also refer to income and wealth inequality where relevant.

9.2.1 International findings

An interest rate increase hits households through several channels. It directly affects saving and consumption decisions by raising interest costs on debt and returns on savings. Households are also indirectly affected by macroeconomic changes following a rate increase, such as weaker labor markets, falling wages and prices, and declining asset values. Looking at any single channel in isolation, the distributional effects of higher rates can appear very uneven. But when all channels are considered together, the costs may be far more evenly distributed. As summarized by McKay and Wolf (2023), different channels hit different household groups. Weak labor markets mainly affect low-income households. Middle-income households, who on average feature high debt relative to income, are primarily affected through higher mortgage rates. The wealthiest households, with high net wealth, are mainly hit through lower capital income when asset prices fall. Most studies find that pre-tax labor income inequality increases somewhat when rates rise, reflecting the importance of labor income at the bottom of the income distribution. For consumption inequality, which is shaped by both labor and capital income as well as tax redistribution, findings are more mixed (see Coibion et al., 2017, and Chang and Schorfheide, 2024).

The differences become clearer when households are ranked in terms of debt burden rather than consumption or income. Cloyne et al. (2020) examine homeownership in the US and show that mortgagors and renters reduce nondurable consumption by about one percent after a one percentage point rate increase. Outright homeowners show no clear change. The differences are even larger for durable consumption goods. Similar findings have been documented in the UK. Household consumption is an important part of the monetary policy transmission mechanism, and these findings reflect that the interest rate affects private disposable income.

9.2.2 Norwegian findings

The Norwegian findings are consistent with the international evidence. Holm et al. (2021) find that contractionary monetary policy has no significant effect on consumption inequality, nor on wealth or income inequality. However, larger differences emerge here too when households are ranked in terms of debt burden. Norway stands out by being near the top globally in both household debt as a share of disposable income and the share of debt at floating rates. Using transaction data, Ahn et al. (2024) document how highly indebted households reduce consumption more, and faster, after interest rate increases than households with little or no debt. They find that households with debt at the 90th percentile of the distribution cut consumption by roughly 1 to 1.5 percent of income within a year after a one percentage point rate increase, while households without debt hardly respond at all. The consumption response to an income change increases approximately linearly in the debt burden, holding other factors constant.

All in all, the effects of changes in interest rates are rather homogenous when households are ranked in terms of consumption or income while differences are larger when considering household debt. These findings are not in contrast since the most indebted households have not necessarily lower income. As documented in Fagereng et al. (2021), household debt is not necessarily correlated with income. If anything, households with more debt tend to have slightly higher income on average.

9.3 Monetary policy and differences between households

So far, we have looked at the effects of monetary policy on inequality. We now discuss whether inequality affects how monetary policy transmits and how it should be designed. First, we examine whether inequality affects the aggregate impact of monetary policy. Then, we consider whether distributional concerns should be part of monetary policy design. We build on an extensive recent literature that has expanded the standard New Keynesian model traditionally used in monetary policy analysis (Galí, 2015) by accounting for differences between households.

In standard New Keynesian models, households are often represented by a single representative household. To capture distributional effects, more recent models include two types of households: those that live hand to mouth and those that can save and borrow instead. Other models account for the full distribution of households and are considerably more complex.[75]

9.3.1 Differences between households and the aggregate effects of monetary policy

One way to include household heterogeneity in models is to let a share of households be "hand-to-mouth" households. These households have no savings and spend all their disposable income each period. When income falls, they cut consumption accordingly. This is a simple way to capture households that cannot borrow or draw on savings and therefore cannot smooth consumption when income varies. In the model, hand-to-mouth households coexist with households that can borrow or save. This variation in saving and consumption behavior creates distributional effects of monetary policy.

In these models, monetary policy affects household consumption both directly and indirectly. Direct channels are those linked to a change in the short-term policy rate, such as consumers postponing purchases when rates rise. Indirect channels arise through the policy rate's effect on other rates (such as mortgage rates), asset prices (such as housing and equities), and various forms of income.

The relative importance of indirect and direct channels depends mainly on how much of an increase in income is consumed. This share is called the marginal propensity to consume (MPC). In standard New Keynesian models, the aggregate MPC is low, meaning that an income increase translates into higher consumption only to a limited extent. The indirect channels therefore have relatively little importance. In models with household heterogeneity, the MPC is considerably higher. This is because hand-to-mouth households adjust consumption faster when income changes, making the indirect effects of monetary policy more important. Although monetary policy works differently in models with household heterogeneity, the aggregate effect on GDP is not necessarily larger than in the standard New Keynesian model. The effects are amplified if households with high MPC are also the most exposed to cyclical fluctuations in aggregate income. In a situation where monetary policy is already expansionary and households spend a large share of income increases on consumption, the initial impulse is amplified through a Keynesian multiplier. If high MPC households are instead shielded from cyclical fluctuations, for example through tax redistribution, monetary

75 Models with two agents within New Keynesian theory are often referred to as TANK models (see Galí et al., 2007, and Bilbiie, 2025). New Keynesian models that include the full distribution of agents are called HANK models following the original contribution by Kaplan et al. (2018).

policy will have a lower effect on GDP than in a standard New Keynesian model.

Patterson (2023) examines this multiplier effect empirically for the US and finds it to be significant. Bilbiie et al. (2025) conduct a similar analysis using data on disposable income and consumption for Norwegian households. They find that households with high and low MPC are roughly equally exposed to cyclical fluctuations. This is mainly due to two factors. First, capital income, which is particularly sensitive to economic fluctuations, largely accrues to households with low MPC. Second, Norway's tax and transfer system is progressive and provides households with high MPC substantial income protection. The combined effects of these two factors suggest that household heterogeneity has limited impact on the overall effects of monetary policy shocks, and more generally of various demand shocks.

9.3.2 Household heterogeneity and optimal monetary policy

In the standard New Keynesian model, the central bank's goal is to stabilize inflation around the target and output around its potential level. In models with household heterogeneity, the central bank's objective function should include a third concern: stabilizing consumption inequality. This is because the central bank weighs all agents' welfare equally. A welfare optimal monetary policy would seek to distribute the costs of fluctuations evenly across all agents, which implies that consumption inequality should be stabilized.[76]

A common finding in part of the literature (Bilbiie, 2025; Debortoli and Galí, 2017; McKay and Wolf, 2025) is that optimal monetary policy is only marginally affected by distributional concerns. The central bank tolerates somewhat larger inflation fluctuations than in models without household heterogeneity, but the differences are small. This is because consumption responds fairly similarly across households to rate changes, even in a complex model reflecting multiple dimensions of heterogeneity for the US (McKay and Wolf, 2025). Distributional concerns would weigh more heavily if rate changes had very different effects across households.

Monetary policy is a blunt tool for redistribution. Using the interest rate for distributional purposes would therefore require large rate swings, which could entail significant costs in terms of greater fluctuations in inflation and output. By comparison, research shows that fiscal policy is far more effective at dampening the distributional effects of shocks.

Other studies find that distributional concerns play a more important role (among others Acharya et al., 2023). This is the case when the central bank is concerned not only with macroeconomic stabilization but also with stabilization at the household level. In several models with household heterogeneity, households face both aggregate shocks, such as monetary policy shocks or energy price shocks, and individual

76 Inequality in the long run is obviously an important concern, but in these models the central bank has a more limited ambition, namely to dampen the cyclical fluctuations in inequality.

(idiosyncratic) household-specific shocks. Such household-specific shocks can mean, for example, that some households experience unusually high labor income due to high productivity, while others experience unusually low income because they lose their job or have reduced hours. If income risk is on average higher in downturns, for example because job loss is more likely, monetary policy can provide a form of insurance by stabilizing output. Acharya et al. (2023) show that if risk is countercyclical (greater in downturns), optimal monetary policy reduces the relative weight on inflation in favor of stabilizing aggregate output. In this way the central bank dampens the largest swings in individual income and consumption risk. The central bank operates a more expansionary policy in downturns than in a standard New Keynesian model. In response to a negative supply shock, a central bank that weighs inequality would raise rates less aggressively, accepting higher inflation in the short term to dampen the fall in output and stabilize consumption inequality.

Under certain conditions, the literature thus points to distributional concerns playing a role in the design of monetary policy. Essentially, inequality matters if macroeconomic shocks have very uneven effects across households, or if income and consumption risk are higher in bad times. However, fiscal policy and the tax and transfer system can be very effective at making sure that these conditions are not met. If the government supports the households most exposed to macroeconomic shocks, for example through taxes and transfers, and provides insurance against cyclical risk, for example through unemployment benefits, the research literature suggests monetary policy should give little or no weight to distributional concerns.

For Norway, it is therefore natural to view the link between monetary policy and distributional concerns in light of the tax and transfer system and the institutional framework of the labor market, including a centralized wage system (Mogstad et al., 2025). Bergholt et al. (2025) find that consumption of low- and middle-income households is largely shielded from macroeconomic downturns, while high income households are exposed. The fall in aggregate consumption during a recession is largely driven by high-income households, in practice only the top ten percent. The effects of macroeconomic fluctuations are thus fairly evenly distributed across households. In addition, recent estimates suggest that income and consumption risk in Norway are only weakly linked to the business cycle. Norwegian households face risk, but it is largely acyclical, and compared to the US, the risk is considerably lower in level. Both findings suggest that monetary policy should primarily focus on macroeconomic stabilization.

These results imply that, based on state-of-the-art New Keynesian models with household inequality, inequality likely has limited importance for monetary policy. The reason is that monetary policy has little effect on income and consumption inequality. However, monetary policy may have larger effects along other dimensions of inequality, such as differences in wealth and debt (see discussion below by Olivi et al., 2026). The results should therefore be interpreted with some caution.

9.4 The effect of monetary policy across sectors

Monetary policy does not only have distributional effects on households. It also affects different sectors on the production side of the economy differently. We first review the empirical literature on the effects of monetary policy across various consumption and investment categories before discussing sectoral differences.

9.4.1 International findings

Several studies find that demand for durable goods is more sensitive to rate changes, partly because such purchases are often financed with debt. Gareis and Minasian (2025) provide the most recent empirical basis for assessing how different consumption categories in ten euro area countries respond to monetary policy changes. They classify consumption along two dimensions: whether goods are durable or non-durable, and how essential they are. The analysis shows that durable goods, such as cars and appliances, are clearly more sensitive to rate changes than non-durable goods. Similarly, non-essential goods such as luxury items respond far more strongly to monetary policy than necessities like groceries and electricity. Demand for necessities is relatively stable regardless of the interest rate level. The two dimensions are largely independent of each other. Some durable goods can be necessities, like a phone, while some non-durable goods can be luxuries, like gourmet food or expensive cosmetics. The strongest sensitivity to monetary policy is found in goods that are both durable and non-essential, such as camper vans and boats.

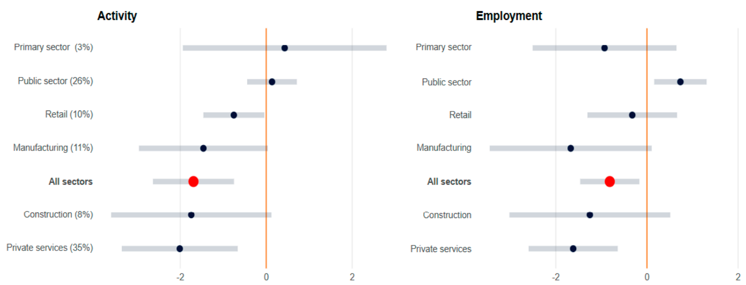
Andreolli et al. (2025) find that industries producing non-essential goods and services are not only more exposed to demand changes but also employ a higher share of hand-to-mouth workers. This can amplify the initial shock through second round effects on aggregate demand.

9.4.2 Norwegian findings

Norwegian analyses point broadly in the same direction as the international literature. Bowe et al. (2025) examine how monetary policy changes affect different components of consumption and investment in Norway. They find that total private consumption falls by about one percent after roughly 14 quarters in response to a rate increase peaking at one percentage point. The overall decline, however, masks significant differences between consumption components. The drop is largest for services and durable goods, with the latter falling by nearly 5 percent. Non-durable consumption does not appear to be affected. Monetary policy thus seems to affect not only the level but also the composition of consumption. Investment shows even greater sensitivity and variation than consumption. Total business investment falls by about 7.5 percent at its through. Housing investment responds faster, falling by 3.5 percent within five quarters, which can be linked to housing being a durable good often financed with loans. For business investment, the decline is driven almost entirely by lower investment in physical capital, such as buildings and machinery.

The sectoral effects of rate changes are discussed in Hallerud et al. (2026). Figure 9.1 shows the average effect of rate changes 8 to 16 quarters after a rate shock, for both output and employment. The sectors analyzed include private services, construction, retail trade, manufacturing, the public sector, and primary industries. Effects vary somewhat across sectors. In private services and construction, a higher policy rate leads to a somewhat larger fall in output and employment than the average. These sectors are closely tied to demand for new housing and investment and are therefore more directly affected by changes in borrowing costs for households and firms. Construction largely supplies goods and services for investment purposes, while private services often include industries like retail, restaurants, and accommodation, where household disposable income and credit access are particularly important. The public sector and primary industries like agriculture and fishing are far less affected by rate changes, as demand in these sectors is more driven by public budgets or exports.

Chart 9.1 The effect of monetary policy differs across sectors
Average effect on sectors of policy rate changes (8-16 quarters). Share of mainland GDP in parentheses



Sources: Statistics Norway and Norges Bank

9.5 Monetary policy in light of sectoral differences

This section discusses how the sectoral structure of the economy can matter for the design of monetary policy. Differences between sectors, including how often prices adjust, the degree of input-output linkages, and household consumption patterns, can affect which price index it is optimal to target. Accounting for sectoral structure can have implications for the monetary policy framework, for example by changing the optimal price index to which the inflation target is linked.

In an influential contribution, Aoki (2001) analyzes an economy with two sectors, one with flexible prices and one with more rigid prices. Rigid prices mean prices that adjust infrequently or slowly. The analysis suggests that the optimal monetary policy response is to disregard inflation in the flexible price sector and instead target inflation in the rigid price sector. This approach is close to the practical use of measures of core inflation and in the model is sufficient to control inflation. By stabilizing the sector with rigidity, the central bank avoids adjustments that would otherwise be needed to stabilize a broader price index.

Erceg and Levin (2006) extend the understanding of monetary policy in light of sectoral differences by examining the differences between durable and non-durable goods. As already noted, they document that the durable goods sector is considerably more interest rate sensitive than the non-durable goods sector. Optimal monetary policy should therefore give greater weight to inflation in the durable goods sector. Kreamer (2022) extends the analysis to a large number of sectors. Since sectors respond differently to rate changes, monetary policy can create unnecessary fluctuations in some sectors. By focusing on the most interest rate sensitive sectors, these fluctuations can be dampened. The main result is that policymakers should weight sectors proportionally to their interest rate sensitivity, not just by the degree of price rigidity or GDP share.

A more detailed and comprehensive picture of sectoral interactions is given by Rubbo (2023), who embeds a full input-output network in the New Keynesian framework. In this networked economy productivity shocks propagate through supply chains and create a trade-off between inflation and the output gap that does not appear in simple one-sector models. Rubbo (2023) shows that an inflation target that weights sectors by their role in supply chains and price-adjustment frequency delivers more real economic stability than targeting a more standard inflation measure.

Olivi et al. (2026) extend a model with detailed sectoral structure by adding that households' consumption baskets vary with income. Wealthy households spend a far larger share of income on luxury goods than less wealthy households. In such a model, households mainly adjust consumption of luxury goods in response to income changes. Consumption of necessities is less responsive. Therefore, the marginal CPI (MCPI) is highlighted as relevant for macroeconomic tradeoffs. MCPI weights sectors by what households spend money on at the margin. In other words, what matters is which goods and services households adjust consumption of when income changes. Luxury goods thus receive relatively greater weight than in standard CPI, while necessities receive relatively less. Olivi et al. (2026) highlight one dimension of choosing an optimal target variable. The potential gain from a theoretically optimal target variable must, however, be weighed against the advantages of a transparent and recognizable index like the CPI. These trade-offs are discussed further in section 4.3.2.

Since households mainly adjust consumption of luxury goods, a productivity shock will have different effects on inflation and the output gap depending on whether it hits necessities or luxury goods. Specifically, Olivi et al. (2026) show that a negative shock in a sector producing necessities, such as food and energy, typically raises CPI but reduces the output gap. Conversely, a negative shock in the luxury sector produces the opposite pattern. The implication for central bank monetary policy is that not all price increases can be treated alike; mechanically tightening monetary policy to keep CPI down after a price shock in necessities would amplify the demand decline. The optimal rate response is therefore less contractionary and more gradual for price shocks in necessities, and relatively tighter for price shocks in luxury goods. After a negative supply shock in sectors producing necessities, optimal monetary policy should avoid aggressive tightening, as this would produce a large negative output gap. Distributional concerns further strengthen the argument for less contractionary monetary policy, since lower rates redistribute in favor of poorer households, who are hit hardest by the shock.

Within this framework, Olivi et al. (2026) include a study of the 2022 inflation shock, modeled as a negative productivity shock in the food and energy sector. Under optimal monetary policy, the model produces small and gradual changes in the policy rate. Due to large differences in wealth, variation in interest payments has large distributional effects, which optimal monetary policy in this framework seeks to avoid.

9.6 International practice

Accounting for inequality is not normally part of the monetary policy mandate. Monetary policy is a stabilization tool designed to support a stable inflation target and contribute to stable developments in output and employment. Inequality has primarily been attributed to structural factors such as technology, education, fiscal policy, and globalization, factors largely outside central banks' control and best addressed through fiscal and structural policy. Bernanke (2015) argued strongly for this traditional view, defining monetary policy as a fundamentally blunt tool: rate changes and balance sheet operations have distributional side effects, but the net effects on inequality are theoretically ambiguous, and monetary policy cannot be targeted at specific income groups without large macroeconomic costs.

The rise of extensive unconventional monetary policy, such as asset purchases, after the global financial crisis opened a debate. Critics argued that quantitative easing inflated asset prices and thus disproportionately benefited wealthy households. Proponents, including Draghi (2016), emphasized the employment channel, arguing that reducing unemployment, the single most important driver of inequality in downturns, meant unconventional monetary policy benefited low-income households. More recent contributions, particularly Schnabel (2021), add a further insight: high and persistent inequality can weaken monetary policy transmission. If a large share of income accrues to agents with low MPC, conventional rate cuts lose their effectiveness, meaning that inequality affects monetary policy's efficacy.

This intellectual development led to operational changes at some central banks. The Fed's 2020 strategy review described the goal of maximum employment as "broad based and inclusive" employment, explicitly acknowledging that aggregate labor market indicators can mask large differences across demographic groups and regions. This language was somewhat toned down in the 2025 review, which states that maximum employment "fosters broad based economic opportunities and benefits for all Americans."

Sectoral differences have always been central to monetary policy, and especially during the latest inflation wave, which had a clear sectoral dimension (Bailey, 2023). Shelter, non-housing services and goods prices have evolved very differently in recent years, meaning that headline inflation and the distance to the inflation target alone give an incomplete picture of the underlying price drivers.

Sectoral shocks can also matter for monetary policy because they force reallocation of labor and capital across industries. The speed and cost of this reallocation affect unemployment, output, and the degree to which inflation is persistent. Such compositional shifts, whether caused by supply disruptions, trade policy, or structural changes like the green transition, can therefore affect the conduct of monetary policy (Lane, 2024).

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10. Climate

Key takeaways

- **Climate-related factors increasingly affect the Norwegian and international economy, both through more frequent extreme weather events and through the transition to a low-carbon economy driven by political, technological and market-based changes.**
- **Climate-related factors therefore have implications for monetary policy. Monetary policy trade-offs may become more demanding, particularly if more frequent and overlapping extreme weather events increase inflation and dampen output. At the same time, transition measures can also affect prices and output and, over time, the structure of the economy. Monetary policy transmission and the neutral real interest rate may also be affected by climate-related factors.**
- **Whether monetary policy should contribute to mitigating climate change is a separate question. If and to what extent central banks take climate considerations into account depends on their mandate and which instruments form part of their monetary policy framework.**

10.1 Introduction

Climate change and the transition to a low-carbon economy affect the macroeconomy, and these effects have become more apparent in recent years. More extreme weather, changing weather patterns, and climate policy can affect aggregates that are important for monetary policy, such as inflation, output and long-term interest rates. As such there is broad consensus that central banks should consider the macroeconomic effects of climate change and the low-carbon transition when assessing the economic outlook in their monetary policy considerations (see NGFS, 2024a, and Talbot, 2026). This falls within the scope of the central bank's core mandate, namely ensuring low and stable inflation and supporting high and stable employment.

A separate question, which has been widely discussed internationally in recent years, is whether monetary policy should take climate considerations into account, that is, whether it should contribute to the green transition. Several central banks currently take such considerations into account. If and to what extent central banks take climate considerations depends on their mandates and the instruments they employ in their monetary policy framework. Several central banks also incorporate climate risk as a financial risk in their portfolio risk management.

In Norway, climate considerations are not part of the monetary policy mandate. As in many other countries, the political authorities bear the responsibility – and the most effective instruments – for reducing greenhouse gas emissions. The policy rate is a general instrument that has a broad impact on the economy and lacks the precision to contribute to the climate transition (Bache, 2025).

Norges Bank's assessment is that monetary policy's most important contribution to the green transition is to fulfil its core tasks, see Norges Bank's monetary policy strategy statement (Norges Bank, 2025). Low and stable inflation over time makes it safer to undertake the investments required in the green transition. When inflation is low, it is also easier to distinguish price changes for individual goods from general price inflation. Signals from, for example, higher carbon levies becomes clearer.

However, when climate change and the green transition affect economic developments, they are relevant for monetary policy trade-offs, on a par with other changes that affect the outlook for inflation and output. In recent years, Norges Bank has focused on enhancing its expertise and integrating climate-related factors into the analytical framework for monetary policy (see Norges Bank, 2026). To better our understanding about the effects of climate-related changes on the Norwegian economy, Norges Bank conducts annual surveys on how enterprises in our Regional Network are affected by climate change and the climate transition (Brekke et al. 2023).

Norges Bank also draws on insights from the experiences of others and participates actively in international cooperation. Since 2018, Norges Bank has been a member of the Network for Greening the Financial System (NGFS), a network for central banks and supervisory authorities. The network shares experiences and best practices, conducts analyses, and proposes methods for addressing environmental and climate risk relevant to financial authorities and the financial sector. The Bank also participates in the International Banking Research Network (IBRN) and cooperates with other institutions and researchers to enhance expertise on the economic effects of climate-related changes.

The following chapter summarizes international research on how climate change and the climate transition affect the macroeconomy and describes current practice among central banks. The chapter highlights which channels are relevant for monetary policy and how different central banks operate within their mandates.

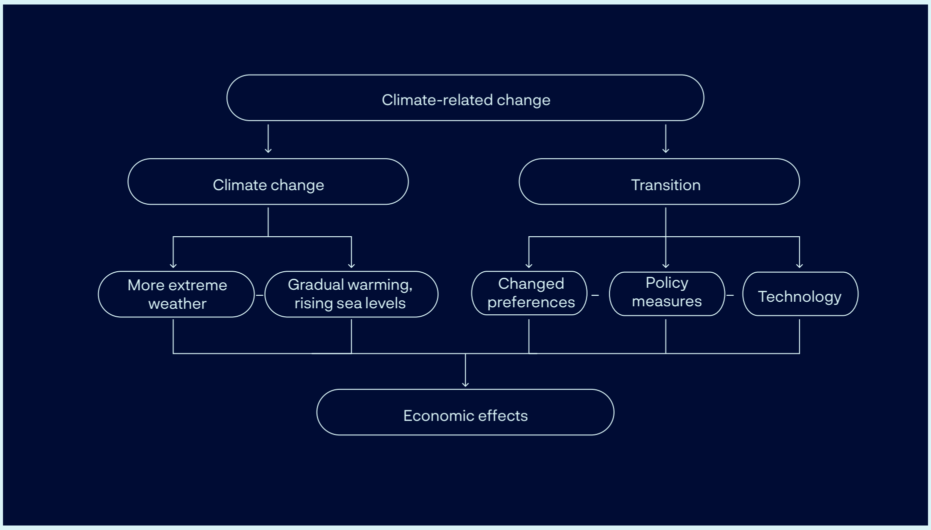
Key concepts: Climate change, green transition and climate risk

We can distinguish between the macroeconomic effects of climate change and of the transition to a low-carbon economy, see Chart 10.1. Climate change refers to changes in the climate system itself and encompasses both increases in acute events such as extreme weather and natural disasters, as well as more gradual and permanent changes such as sea-level rise and changes in temperature and precipitation patterns. The economic effects include damage to crops, buildings and infrastructure, as well as those investments intended to prevent such damage. The green transition encompasses economic and financial consequences of the shift to a low-carbon economy. These effects may result from political measures, such as regulations, carbon pricing and support schemes. They may also result from technological developments or changes in preferences among households, investors and enterprises.

In the finance literature, uncertainty about future climate-related factors is often referred to as climate risk, or more specifically physical risk or transition risk when referring to uncertainty related to the future effects of climate change and the green transition, respectively (Carney, 2015). For market participants and, for example, in central banks' assessments of financial stability over the longer term, it is important to understand how climate risk affects the pricing of financial assets and banks' loss risk.

This chapter looks at how climate change and the green transition affect the economy. The term climate risk is used when discussing uncertainty and risk pricing in financial markets, such as changes in risk premiums or the repricing of assets.

Chart 10.1 Climate-related changes



At the same time, there is a growing attention on nature-related factors and the interplay between nature and climate. Nature-related factors may also have implications for economic and financial developments. However, in this chapter, we limit our scope to climate change and the green transition.

10.2 How climate-related factors affect the macroeconomy

International research is providing an increasingly solid foundation for assessing how climate-related factors affect the macroeconomy.

Several studies find that extreme weather events and higher temperatures affect inflation. By analyzing the macroeconomic effects of extreme weather events in a total of 151 countries between 2000 and 2024, Ehlers et al. (2025) conclude that the effects on overall inflation are relatively small and short-lived, whereas the effects on food prices can persist for a longer period. Several studies show that different extreme weather events have varying effects on inflation and that the effects differ across economies (see Cevik and Jalles, 2023). For example, Peersman (2022) finds that exogenous shocks to international food commodity prices account for a substantial share of inflation fluctuations in the euro area. The study uses unexpected harvest shocks for major commodities such as maize, wheat, rice and soya to isolate such price shocks and estimates that they account for close to 30 percent of the variation in consumer price inflation in the euro area over a horizon of around two years. Similarly, Kotz et al. (2023) show that unusually high summer temperatures have measurable effects on inflation in Europe, particularly through higher food price inflation. The effect lasts around a year, and the study predicts that such effects could become stronger in a warmer climate.

Empirical studies generally find that GDP falls in the short to medium term following a severe extreme weather event. Costa and Hooley (2025), who examine how extreme weather events affect GDP in 31 OECD countries between 2000 and 2018, find that GDP is 0.5 percent lower after a moderate extreme weather event and 1.7 percent lower after a severe event, several years after the event. Effects generally vary by type of extreme weather event. Ehlers et al. (2025) estimate, for example, that an average drought episode could result in a 2 percent decline in GDP over a four-year period, while wildfires result in a decline of 0.4 percent over the same period.

The effect of extreme weather events and natural disasters on GDP is more uncertain over the longer term. The literature generally points to four different reasons for this (Hsiang and Jina, 2014). One hypothesis is that natural disasters lead to a temporary upswing in economic activity through increased demand for goods and services, international aid and innovation. Another is that output falls initially owing to loss of life and capital but is later lifted by reconstruction and the replacement of older capital with more modern solutions. A third possibility is that output first falls but eventually returns to pre-disaster levels. The fourth, and most pessimistic, hypothesis implies permanent output losses resulting from the destruction of productive capital and durable consumer goods. Based on an empirical analysis of tropical cyclones across countries, Hsiang and Jina (2014) find that GDP per capita falls relative to trend and that the economy on average remains below its previous trend for at least two decades. The negative effects are greatest in countries that have historically been less exposed to such events.

Changes in weather patterns and higher average temperatures can also affect economic activity. Bilal and Känzig (2026) estimate that a permanent increase in global average temperature of one degree could reduce global GDP by more than 20 percent in the long term. This estimate is substantially higher than in much of the other literature, where effects have often been estimated at 1–3 percent. The authors explain this discrepancy by highlighting how their analysis better captures how higher global temperatures increase the risk and costs of extreme weather. It is these mechanisms that in their analysis contribute to larger real economic effects than in much of the previous literature. More generally, an increasing number of analyses highlight the importance of the cumulative effects of climate change; analyses focusing only on individual events may underestimate total losses. The effects have also been shown to be non-linear, so that economic growth declines more from a temperature increase in a country that is already warm (Burke et al. 2015).

Extreme weather can also affect the economy indirectly through changes in risk pricing and financial conditions, particularly via insurance markets. Increasing claim frequency and more correlated losses have in several cases contributed to higher insurance premiums and reduced availability of coverage in exposed areas in other countries.[77] Keys and Mulder (2024) show, for example, that US home insurance prices increased by 33 percent between 2020 and 2023 (17 percent in real terms), mainly owing to higher reinsurance prices, ie the market where insurance companies insure themselves. This can spill over to housing and credit markets through higher housing costs and weaker collateral. When insurance coverage becomes more expensive or less available in the market, this can affect banks' lending practices, since mortgage loans generally require that the property is insured. If properties cannot be insured on acceptable terms, financing may become unavailable, turnover in the housing market may decline, and house prices in the most exposed areas may fall. Households may then be left with loans exceeding their home's value, while banks' risk on mortgage-backed loans may increase. International literature suggests that in an adverse scenario, this could amplify vulnerabilities and contribute to increased stress in the financial system (see eg Clark, 2025).

There are also many empirical studies examining the effects of the transition to a low-carbon economy, for example how climate policy affects energy prices and the real economy in the short to medium term. Känzig (2023) shows that tightening of the EU's emissions trading system that raises the quota price leads to higher energy prices and reduced

77 In Norway, households are protected through the natural perils insurance scheme. Weather-related water damage is covered by private water damage insurance.

economic activity. Kapfhammer (2023) similarly finds that higher effective carbon levies can dampen real economic activity and that the effects are heterogeneous. The effects are typically largest in emissions-intensive industries and in industries using carbon-intensive inputs. At the firm level, Martinsson et al. (2024) document that carbon levies lead to a clear reduction in emissions intensity. The response is weaker among firms that are financially constrained or have higher costs associated with emissions reductions. Other analyses, such as Acemoglu et al. (2012) and Bistline et al. (2023), find that direct subsidies for green inputs can increase output and reduce inflation. Overall, this suggests that climate policy to facilitate the green transition can affect both activity levels and sectoral structure through different channels and adjustment capacities.

Research on financial markets indicates that climate risk is increasingly reflected in both capital costs and credit risk pricing. Seltzer et al. (2022) find that companies with high carbon intensity have faced higher risk premiums and lower credit ratings since the Paris Agreement. This suggests that expectations of stricter climate policy can affect assessments of future earnings and default risk. At the same time, it is important to distinguish between realized and expected returns in a transition period. The observed outperformance of green equities over the past decade may reflect a repricing driven by capital flows into sustainable investment funds (NBIM, 2026). Such repricing will, in isolation, reduce the expected future return on green equities relative to brown equities and does not necessarily imply a permanent equilibrium premium. To the extent that green companies have had a cost advantage in capital markets during this phase, this advantage may diminish as the transition period draws to a close.

Other empirical studies meanwhile point to differences in financing conditions between green and brown companies. Gormsen et al. (2024) find that green and brown companies perceived their cost of capital as roughly equal before 2016, but that green companies perceived it as lower after 2016. They also note that some large energy and utility companies apply lower internal costs of capital for green projects than for fossil projects. This may indicate that transition risk can materialize both through the repricing of carbon-intensive assets and through gradual adjustments in investment and capital allocation. For banks, such adjustments over time may have implications for the valuation of collateral, loss risk and credit supply.

At the same time, there are grounds for caution in assessing how well financial markets price climate risk. Carbon intensity is not a precise measure of overall climate risk exposure, and emissions variables alone appear to explain a limited share of the variation in equity returns (NBIM, 2026). This may suggest that pricing is partial and uneven rather than systematic and complete.

Climate change and the transition may also affect the neutral real interest rate, which is important for assessing the monetary policy stance over time. It is not clear-cut in which direction the neutral real interest rate is affected. Several studies suggest that while extreme weather events are likely to contribute to reducing the neutral real interest rate, including through destruction of productive capital and increased uncertainty, factors related to the green transition pull in different directions (Mongelli et al. 2022, Gjerde, 2025). On the one hand, higher green investment, productivity gains from green innovation and higher public debt related to subsidies or increased public investment could contribute to raising the neutral real interest rate. On the other hand, the neutral real interest rate could fall if, for example, the new “green” capital is less productive or if risk premiums rise.

In macroeconomic modelling, recent contributions have started integrating climate-related factors into broader economic frameworks (see NGFS, 2024b for an overview). Sahuc et al. (2024), for example, develop a New Keynesian model that extends the framework with an explicit carbon and climate block. The model is used to distinguish between inflationary pressures from physical climate damage and from the green transition, and to discuss how monetary policy can affect inflation and activity on the path towards net zero greenhouse gas emissions. In this model, the natural real interest rate rises in a scenario consistent with the Paris Agreement where the transition entails higher investment. In the model, monetary policy can dampen inflationary pressures by considering the rise in the natural real interest rate, but this may simultaneously result in lower activity during the transition phase.[78] Other studies integrating climate-related factors into macroeconomic models are Annicchiarico and Di Dio (2015) and Del Negro et al. (2025).

Central banks have always had to manage risk and uncertainty. However, climate-related factors may be particularly challenging because uncertainty about developments and economic effects is substantial, the effects can be non-linear, and many consequences materialize over long time horizons. This may challenge central banks’ analytical and modelling frameworks. Amaral et al. (2025) suggest that alternative scenarios may be useful for illustrating uncertainty, and BIS (2025) emphasizes that a better climate-related data foundation can strengthen the decision basis.

Uncertainty related to climate change and climate policy can also in itself affect macroeconomic developments. One possible channel is that households and enterprises postpone consumption and investment decisions when uncertainty increases. Dixit and Pindyck (1994) show that investment is sensitive to volatility and uncertainty about economic developments. For consumption, Manou and Papapetrou (2025) find that higher uncertainty is associated with weaker consumption growth, while Oh and Rogantini Picco (2025) find that increased macroeconomic uncertainty can dampen consumption through higher unemployment

78 Several models now also integrate aspects related to nature risk and ecosystems. Ceglar et al. (2023) show that a large share of euro area economic activity, and thus banks’ portfolios, depends on ecosystem services, both directly and through value chains. Benmir et al. (2025) go a step further by integrating global natural capital, such as forests, agricultural land, minerals and energy, climate and the economy in a DSGE model with uncertainty, and find that when nature degradation is included, the implicit social costs of emissions and climate risk are substantially higher than in models that exclude nature.

risk. For the US, Gavriilidis et al. (2026) show that increased uncertainty related to climate policy leads to lower investment, higher unemployment and reduced GDP.

10.3 The interaction between monetary policy and climate

As the review above shows, climate change and the transition affect macroeconomic aggregates. Climate-related factors are therefore relevant for monetary policy, see NGFS (2024a-d). If natural disasters and extreme weather occur more frequently, affect larger geographical areas or have more extensive economic consequences, such events may more often become relevant within the monetary policy horizon. This could result in more frequent demanding trade-offs between inflation and output and place greater demands on monetary policy communication. During the transition to a low-carbon economy, there may be extensive changes in relative prices. At the same time, uncertainty about future policy, technology, and behavior can affect both investment and savings.

Natural disasters and extreme weather can act as negative supply-side shocks by disrupting production and value chains. The effects may come through destruction of capital and infrastructure, lower labor supply and weaker productivity, particularly in affected industries and geographical areas, as well as rising prices. For a more detailed discussion of monetary policy challenges in connection with supply-side shocks, see Section 5.

In a standard textbook approach, a central bank with inflation targeting will normally look through first-round effects on inflation from temporary supply shocks, particularly if inflation expectations are well anchored and the shock is not expected to give rise to more generalized price pressures. If climate-related events become more frequent and more extensive, this trade-off may become less straightforward. This is not necessarily because the effect of each individual event lasts longer, but because more frequent shocks can produce overlapping price impulses and disruptions. This can contribute to higher volatility of inflation and greater uncertainty in economic projections. It may then also become more demanding to assess when it is appropriate to look through temporary effects.

Model results suggest that if such mechanisms become important, there may be grounds for a more gradual monetary policy response and greater emphasis on stabilizing output than under strict inflation targeting (Kara and Thakoor, 2023). A related argument is also put forward in Barmes et al. (2024), which proposes a more adaptive form of inflation targeting. The analysis places particular emphasis on greater flexibility when inflation is above target owing to repeated climate-related supply shocks. This entails, among other things, greater tolerance for deviations from the target over time and a longer time horizon for bringing inflation back to target.

At the same time, empirical results from major natural disasters suggest that inflation targeting can have a stabilizing effect also when the economy is hit by large negative supply shocks. Countries with inflation targeting appear on average to have had lower inflation, higher output growth and lower volatility in both output and prices than countries with other monetary policy regimes after such events (Fratzscher et al. 2020).

The transition to a low-emission society involves structural changes. Climate policy measures can, for example, lead to changes in relative prices. For a central bank, it will be important to distinguish between such relative price changes and more broad-based price pressures that could affect inflation expectations and wage and price formation. At the same time, the macroeconomic effects will depend on which instruments are used and how they are designed. Carbon pricing can, in the short term, have characteristics of a negative supply shock by lifting inflation and dampening activity. Subsidies and other investment measures can, on the other hand, stimulate demand more in the short term and can, over time, also contribute to increased capacity on the supply side that dampens price pressures.

Climate-related factors can also affect the neutral real interest rate, which is important for assessing the monetary policy stance over time. As shown above, it is not clear-cut in which direction the neutral real interest rate is affected. When such structural factors are changing, uncertainty about the level of the neutral real interest rate may also increase. This may result in greater risk of monetary policy becoming tighter or more expansionary than intended.

The transmission mechanism of monetary policy may also be affected (NGFS, 2020, ECB, 2021). Extreme weather and natural disasters can, for example, weaken collateral values, increase credit risk and contribute to tighter lending practices. Credit demand may also be dampened if there are disruptions in the labor market or if desired savings increase. This can dampen the effects of interest rate changes through credit and investment channels. The climate transition may simultaneously give rise to larger differences between sectors. Changes in risk premiums, credit access and investment needs can make monetary policy transmission more uneven across industries and over time.

Uncertainty makes communication more important and may mean that communication strategies need to change. When climate-related factors affect inflation, activity, and transmission, it may become more demanding to explain monetary policy trade-offs. This suggests that central banks should be clear about how such factors are included in their analyses and about the associated uncertainties. A survey by BIS among several central banks on communication under high uncertainty suggests that forward guidance is less effective in such periods (Amaral et al. 2025). The survey also shows that many central banks then adapt their communication, including through more frequent updates or by changing how they present projections and alternative scenarios.

Campiglio et al. (2025) find that central banks' climate-related communication appears to be driven more by institutional factors than by exposure to climate risk. The study also finds that such communication can affect the equity market.

10.4 Increased focus on climate among central banks

An important turning point for increased attention on climate came in 2015 when Mark Carney, then Governor of the Bank of England, gave the speech "Breaking the tragedy of the horizon – climate change and financial stability" at Lloyd's of London. Carney pointed out that the most serious consequences of climate change largely lie beyond the time horizon of many authorities and market participants. This may contribute to climate risk not being fully priced in financial markets, with possible implications for financial stability. He also called for better reporting and more transparency on climate-related factors. In other countries, some central banks, particularly in Southeast Asia and southern Europe, had begun to address climate in their communication even before this (see Campiglio et al. 2025 and Bank of Greece, 2011).

Over the past decade, several central banks and supervisory authorities have gradually integrated climate into their analyses and communication. The work initially focused on supervisory and financial stability perspectives. In recent years, there has increasingly been emphasis on how climate change and the transition can affect macroeconomic aggregates relevant to monetary policy (see NGFS, 2024a, c and d). The European Central Bank (ECB), for example, has in recent years increased analytical capacity in this field within macroeconomic modelling, research and statistics, while the Bank of Canada is seeking to develop new models and methods to enhance understanding of how climate-related changes affect the economy. The central banks in the UK, Japan, New Zealand, Sweden and Denmark are other central banks that have signaled that they are devoting greater attention to how climate-related changes affect their countries' economies.

10.5 Central banks have different mandates

Some central banks have a monetary policy mandate that requires them – as long as it does not compromise the primary objective – to take climate considerations into account.

An analysis based on the IMF's database of central bank legislation shows that 12 percent of 135 central banks had an explicit sustainability objective in their mandate, while just under 40 percent were required to support the government' policy objectives, where sustainability is often included (Dikau and Volz, 2021). Most central banks thus do not have a direct climate or sustainability mandate but can contribute indirectly through support for overarching policy objectives. Tamez et al. (2024)

similarly point out that explicit references to climate or environmental policy are unusual in central banks' objectives, while broader references to the authorities' economic policy or to sustainable development are more common.

The European Central Bank (ECB) has price stability as its primary objective, but the treaty establishing the ECB's mandate also stipulates that the central bank shall support the Union's general economic policies. The treaty states that this includes contributing to balanced economic growth and a high level of protection and improvement of the environment. As climate has been a stated priority of the EU in recent years, it has been natural for the ECB to emphasize this topic. DiLeo et al. (2025) explain the ECB's more pronounced climate engagement by noting that EU institutions and policy guidance have provided legitimacy to incorporate climate considerations into monetary policy.

One way the ECB has done this is by gradually reducing the carbon intensity of its corporate bond holdings in the monetary policy portfolios in a direction consistent with the Paris Agreement's objectives. The rationale has mainly been to reduce the Eurosystem's exposure to climate risk, but also to support the transition in line with the EU's climate objectives. This has been operationalised by tilting purchases and reinvestments towards issuers with better "climate performance", measured based on emission levels, emission reduction targets and quality of climate risk reporting. In addition, the ECB has integrated climate considerations into the operational implementation of monetary policy, particularly through the rules for collateral in lending operations (ECB, 2026).

For countries that are not part of the Euro area but are EU members and part of the European System of Central Banks (ESCB), monetary policy regimes vary, and thus also the operational scope for action. At the same time, the overarching mandate framework is common to all countries except Denmark: in addition to national legislation, these countries are also covered by the EU Treaty's provisions, where price stability is the main objective, but where central banks, without compromising price stability, shall also support the Union's general economic policies.

Sweden is an appropriate example of a country outside the euro area but within the EU. The Riksbank's objectives and tasks are enshrined in the Riksbank Act. Within this framework, the Riksbank, following approval by the Riksdag, specifies the price stability objective. A new Riksbank Act entered into force on 1 January 2023, and it identifies two explicit areas where the Riksbank shall take sustainability into account. In the management of its assets, the bank shall give particular weight to how sustainable development can be promoted, without compromising purpose, adequate return, and low risk. At the same time, the central bank shall identify threats to sustainable development that may affect the prerequisites for the bank's statutory activities.

In an elaboration on the new act and how the Riksbank works with climate-related factors within its mandate (Riksbanken, 2023), reference is made to the fact that real economic considerations and support for general economic policy must be understood in light of the EU's overarching objectives including sustainable development. The elaboration also refers to Sweden's ratification of the Paris Agreement, which states that financial flows shall be consistent with low greenhouse gas emissions and sustainable development, and that the Riksdag has endorsed the government's proposal for how climate policy in the country should be oriented. Against this background, the Riksbank specifies that this climate policy is part of Sweden's general economic policy, which the bank, without setting aside the price stability objective, shall support within the framework of its mandate. For example, in purchases of corporate bonds, the Riksbank will take climate risk into account.

The Bank of England (BoE) has price stability as its main objective but shall at the same time support the government's economic policy. In the most recent formal remit that the BoE received from the UK government in 2025 (Bank of England, 2025), it is specified that this includes contributing to long-term growth, as well as supporting and accelerating the transition to a "climate-resilient, nature-positive and net zero economy".

The Swiss National Bank (SNB) has price stability as its overarching objective and has been clear that the bank does not have a mandate to take climate considerations into account through monetary policy (Reuters, 2025). The SNB has nevertheless pointed out that climate change can affect the economy and the financial system and is addressed within the framework of the bank's core tasks (SNB, 2026).

The US Federal Reserve (Fed) has communicated that while climate change is an important issue for society, it is not a core task of the central bank's mandate. Fed Chair Jerome Powell has emphasized that climate change may be relevant for economic developments and the risk picture, but that it is not the Fed's role to formulate climate policy or establish regulations in this area (Powell, 2023a and b).

10.6 Central banks have various instruments

Central banks differ not only in mandate but also in which instruments they employ. Many central banks use the policy rate as their only monetary policy tool, while others, for example, also use quantitative easing, that is, purchases of government and corporate bonds. In addition, the central bank can take climate considerations into account in liquidity management and in the management of its foreign exchange reserves. The conclusions below draw particularly on NGFS (2024e), NGFS (2026) and Sjøblom (2022).

Many central banks use quantitative easing ("QE") as an unconventional and extraordinary monetary policy instrument. This instrument has been adjusted by some central banks to also take climate considerations into account ("green QE"). This is because the central bank can choose the composition of portfolios through such asset purchase programs. Criteria can be designed to determine which securities can be purchased and how purchases are allocated among sectors and issuers. Possible adjustments include excluding certain securities or adjusting purchase weights towards issuers with lower emissions intensity. Such measures can among other things affect capital flows and price signals between sectors.

Most asset purchase programs have traditionally been oriented according to a principle of market neutrality, where purchases mirror the market's composition. Since sectors with high emissions often also account for a large share of bond issuance, a market-neutral program can result in a portfolio with a relatively high emissions profile (Matikainen et al. 2017). This topic has been widely discussed, particularly in Europe, and has led to central banks in some countries setting targets for the emissions profile of their portfolios. When this is done, it is important that there are sufficient securities in circulation so that the central bank can achieve the primary, monetary policy objective of the purchases.

The central bank can also take climate considerations into account in other operational activities. When the central bank supplies reserves to the banking system through secured loans, banks pledge assets as collateral, and the central bank can then determine which collateral it will accept and which haircuts shall apply. For example, the central bank can reduce haircuts on green-labelled securities or accept securities that do not meet other collateral requirements. This can help shift incentives, but if current haircuts and other collateral requirements already appropriately reflect risk, such adjustments will in isolation increase risk for the central bank.

Climate considerations can also be incorporated into the management of foreign exchange reserves.[79] This can for example be done by tilting investments towards green alternatives or through active ownership, including setting expectations and engaging in dialogue. How this is done in practice varies between central banks. Climate considerations in foreign exchange reserves often need to be balanced against requirements for liquidity and contingency capacity.

10.7 Increased discussion on climate considerations in monetary policy

The question of what role central banks should play in addressing climate-related factors has been the subject of discussion in recent years. To clarify the central bank's role in climate policy, Landau and Brunnermeier (2020) have referred to Musgrave's classic division of public policy into three main tasks: resource allocation, income

79 In Norway, the equity portfolio of the foreign exchange reserves, which accounts for 20 percent, is managed according to the same responsible investment principles and strategies as the equity investments in the GPFG, including a long-term goal that the companies in the equity portfolio align their activities to be consistent with global net zero emissions in line with the Paris Agreement.

distribution and stabilization. In democratic societies, the responsibility for resource allocation and income distribution lies with elected authorities, and climate measures in principle fall within these areas. Independent central banks instead have a limited mandate related to macroeconomic and financial stability. In this understanding, monetary policy measures that in practice involve targeted support for specific industries or technologies could more easily be perceived as going beyond core tasks. See also the elaboration "Criteria for a good mandate" in Section 3.4.

A key consideration in the debate is that too narrow a delineation of climate-related factors may also entail costs. If the central bank to a limited extent integrates climate into relevant analysis and risk management, this could weaken understanding of drivers of inflation, real economic developments and financial stability. Honohan (2019) points out that ignoring major societal challenges that affect the economy can challenge the central bank's legitimacy and emphasizes the importance of strengthening the knowledge base and communicating clearly about relevant effects.

The literature also proposes frameworks that distinguish between different types of contributions from central banks. Boneva et al. (2021) group central banks' approaches into three main categories: (i) measures to ensure target attainment and the maintenance of risk management and balance, (ii) knowledge development and communication, and (iii) more proactive operational adjustments, to the extent this is anchored in the mandate and instrument framework. This framework can be read as an operationalization of the positions in the debate: Landau and Brunnermeier (2020) particularly provide rationales for restraint regarding category (iii), while Honohan (2019) to a greater extent emphasizes the importance of work in categories (i) and (ii). In practice, it is often category (iii) that triggers the most discussion about mandate delineation and role understanding.

The debate in recent years has largely revolved around precisely this boundary between risk management within the mandate and a more normative role, where central banks through operational choices in practice contribute to driving climate policy. In addition, there is also a discussion of whether conventional monetary policy can affect the climate transition indirectly, for example if interest rate changes affect green investments differently than other investments. If green investments have different interest rate sensitivity than other investments, monetary policy will affect the composition of total investment and could thereby indirectly affect the climate transition. So far, there is no consensus in the literature on this (Fornaro et al. 2025; Bauer et al. 2025).

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Address: Bankplassen 2
Post: P.O.Box 1179 Sentrum, NO-0107 Oslo
Phone: +47 22316000
E-mail: post@norges-bank.no
www.norges-bank.no

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