

Speech

The Governor's autumn lecture: Why is the last mile of disinflation taking so long?

Lecture by Governor Ida Wolden Bache at BI Norwegian Business School, 8 October 2026.

Good morning, and thank you for inviting me here today.

The primary objective of monetary policy is to maintain low and stable inflation. Today, I will discuss what drives inflation and why returning it fully to target has taken so long. Part of the explanation lies in the weight the Monetary Policy and Financial Stability Committee has given to striking an appropriate balance between reducing inflation and sustaining employment. More aggressive monetary tightening would have brought inflation down faster. But the story is multifaceted. I will highlight three factors.

- First, the global price shock that hit the economy in the aftermath of the pandemic made imports more expensive. But it also raised the prices of Norway's exports. Higher export prices contributed to stronger wage growth, which is now sustaining inflation.
- Second, price cuts are common for goods but rare for services. The rarity of services price cuts can itself prolong disinflation.
- Third, high inflation can influence expectations of future price increases, which in turn can increase inflation persistence.

Chart: Inflation remains above target

The chart shows inflation over the past decade, measured by the consumer price index, or CPI. Our mandate is to stabilise CPI inflation close to 2 percent.

Inflation accelerated sharply from 2021, peaking at 7.5 percent towards the end of 2022. It then fell rapidly towards 3 percent, where it has hovered for the past two years. The last mile is proving to be a long one.

CPI inflation is a weighted average of changes in a broad range of individual prices. It can be instructive to disaggregate the average to help us understand inflation dynamics.

Chart: Inflation rose and fell at different times across categories

This heatmap traces inflation from early 2021 to the present.^[1] Each row shows the twelve-month rate of price change for a category of goods or services in the CPI.

Categories are ordered by the timing of their inflation peaks, with those that peaked earliest at the top. Red indicates rising prices and blue falling prices. Darker shades represent larger changes.

There is considerable variation across categories. With the rows ordered as shown, however, a red wave emerges, moving from the upper left to the lower right.

Electricity and fuel prices, near the top of the chart, were already rising sharply in 2021. Personal care inflation, roughly midway down, rose later and has declined more gradually. Insurance inflation, near the bottom, remained low for a long time but has recently accelerated sharply.

The factors driving each category will differ. Broadly, though, this pattern probably reflects differences in the timing of cost increases and may also reflect differences in pricing behaviour. Goods tend to feature more prominently towards the top of the chart, while services tend to appear further down.

CPI microdata allow us to examine these differences more closely. Our dataset contains several million price quotes used to compile the CPI, covering the period from 1975 to 2024. Coverage is nevertheless incomplete: many services are missing, and the composition of the dataset has changed over time. We therefore cannot generalise from these observations to all goods and services. Even so, the data offer useful insights.

Services prices are rarely cut

Chart: Petrol prices change more frequently than haircut prices

Consider the price of a women's wash, cut and blow-dry. The left-hand panel follows this service at a single salon over five years, during which the price rose from NOK 440 to around NOK 550. Notice the staircase pattern: long periods with no change, punctuated by moderate increases. Price cuts are rare.

The right-hand panel shows the price of 95-octane unleaded petrol at a single filling station over roughly the same period. Petrol prices change much more frequently, with both increases and reductions.

These contrasting price paths may partly reflect differences in underlying costs. Hairdressing is labour-intensive: we are mainly paying for the hairdresser's time. Petrol prices depend much more heavily on world market prices, although the exchange rate and competition between filling stations also matter.

Differences in firms' pricing behaviour may also play a role. Even the same cost increase can produce different price responses across firms.

Let us now turn to the full sample of goods and services and examine both the frequency of price adjustment and the size of each change.

Chart: Price changes became less frequent, but no smaller^[2]

The left-hand panel shows the frequency of price changes in our sample. For each product, we calculate the proportion of price quotes that rise or fall in an average month. We then combine these frequencies using each product's weight in the CPI. The pattern is clear: this weighted frequency has declined. Changes in the products covered and their weights account for part of the decline. But the decline in adjustment frequency remains even after we control for these composition effects.

The right-hand panel shows the average size of a price change, whether an increase or a reduction. Since 1990, then, prices have adjusted less frequently, but the adjustments themselves have not become smaller.^[3]

Why might firms have come to adjust prices less frequently? One possibility is that weaker cost pressures and more stable inflation expectations reduced the need for price increases. Greater monetary policy credibility, together with increased international trade and competition, may have contributed to this shift.^[4] Firms could respond by making smaller price increases, raising prices less often, or doing both. In

our data, it is mainly the frequency of adjustment that falls. Research on price-adjustment costs offers a possible explanation.^[5] A small price change may require almost as much work as a large one, making it more economical to leave prices unchanged for longer.

Let us now focus on prices in our sample between 2020 and 2024. We will distinguish between price increases and price cuts, looking separately at goods and services.

Chart: Services prices are rarely cut

Goods are shown on the left and services on the right. The blue lines show the weighted proportion of prices raised in a month; the orange lines show the corresponding proportion of prices cut. Both are twelve-month moving averages, which smooth out seasonal variation.

Start with the blue lines. As inflation rose, price increases became more frequent for both goods and services. Their frequency subsequently declined, although for services it remained above its pre-pandemic level at the end of the sample. The orange lines show that the frequency of price cuts changed much less.

Notice how rarely services prices are cut. A large study of euro area consumer prices documents the same pattern.^[6]

One natural explanation is that many services are labour-intensive and wages are rarely cut. Yet the same study finds that differences in cost composition do not fully account for the gap in adjustment frequency between goods and services.

Theory suggests that imperfect consumer information may also weaken service firms' incentives to cut prices. We usually know what our own hairdresser charges but have less information about the prices and quality available elsewhere. A salon may therefore attract few additional customers by cutting its prices, while earning less from all its existing customers. This may lead the salon to keep prices unchanged even when costs fall.^[7]

Chart: Goods prices change in larger steps, both up and down

This chart shows the size of price adjustments. The changes are larger for goods than for services, for both increases and cuts. Yet despite the sharp rise in inflation over this period, the size of individual price changes varied little.

We have examined the frequency and size of price adjustments in both directions.

Chart: Both the frequency and size of price changes determine inflation

This identity brings the two margins together. The blue term is the frequency of price increases multiplied by their average size: the contribution of price increases to inflation. The orange term applies the same calculation to price cuts. Inflation is the first contribution minus the second. In the next chart, we cumulate these monthly contributions over twelve months, separately for goods and services.

Chart: Price cuts reduce goods inflation more than services inflation

The blue bars show the cumulative contribution of price increases over the preceding twelve months. The orange bars show the negative contribution of price cuts. The black line is the net result: inflation in the goods or services covered by our sample.^[8]

Goods disinflation proceeded more quickly than services disinflation. We can also see that price cuts subtract considerably more from goods inflation than from services inflation.

Inflation for many services rose alongside import price inflation and remained elevated even as import price inflation declined. Continued strong wage growth explains part of this persistence. But the pattern may also reflect an asymmetry in service firms' pricing behaviour: they raise prices more frequently when cost pressures intensify than they cut them when those pressures ease.^[9]

What do these microdata tell us about the last mile? The pace of disinflation depends both on how quickly cost pressures ease and on how quickly prices respond. Because services prices are rarely cut, services disinflation must come largely through fewer or smaller price increases. This can slow price adjustment even as cost pressures ease.

Higher export prices have sustained domestic inflation

Let me now turn to another important factor that has contributed to sustaining inflation.

The inflationary impact of more expensive imports is well understood. But Norway also benefited from much higher export prices, not only for oil and gas but for other goods as well. This gave many exporters greater scope to raise wages. Through the wage-setting process, higher export earnings could thus sustain inflation elsewhere in the economy even after import price inflation had subsided. High export prices contributed to prolonging the last mile.

Chart: Higher prices for Norwegian exports

The chart shows national accounts price indices for exports and imports of ‘traditional goods’, a category that includes metals, machinery and chemicals but excludes crude oil and natural gas. The underlying prices are measured in Norwegian kroner. A weaker krone raises import prices while also increasing the prices exporters receive in domestic currency. The left-hand panel shows that export prices rose by 29 percent in 2022, compared with 15 percent for import prices. The right-hand panel shows a lasting improvement in the terms of trade: export prices remained higher relative to import prices than before the pandemic.^[10]

Export prices depend on demand and competitive conditions in overseas markets. When revenues rise faster than costs, firms have more scope to pay higher wages. The global price surge could therefore erode households’ purchasing power while simultaneously strengthening exporters’ ability to raise wages.

Norway’s pattern bargaining system transmits higher manufacturing profitability to wages in other sectors. Internationally exposed manufacturing industries negotiate first, setting a benchmark for wage growth across the economy. Higher export earnings can therefore translate into higher labour costs even at our hair salon, despite no comparable increase in its own revenues.^[11]

Our forecasts in recent years have incorporated these mechanisms. Even so, wage growth has generally exceeded our projections. One possible explanation is that the improvement in exporters’ capacity to pay higher wages was larger and more persistent than we assumed.^[12]

A simple macroeconomic model can help illustrate the mechanism. And since we are here at the Norwegian Business School, I hope you will indulge me in a little lecturing—something I enjoy.

Chart: A simple model of the Norwegian economy

The model is a stylised representation of a small open economy such as Norway. It has a tradable sector and a non-tradable sector serving the domestic market. Both use labour and imported goods as inputs. We assume, for simplicity, that tradable-sector firms are price takers in world markets. Their capacity to pay wages determines the wage-growth benchmark for both sectors. Non-tradable firms pass cost changes through to prices gradually. The central bank follows a simple Taylor rule, adjusting the policy rate in response to inflation and unemployment.^[13]

We use the model to examine how shocks resembling those experienced after the pandemic might propagate through the Norwegian economy.^[14] The purpose is to illustrate mechanisms, not to replicate the historical episode. All responses are shown as deviations from a counterfactual path without the shocks.

Chart: Higher import prices raise inflationary pressure and weaken firms' capacity to pay wages

We begin with a substantial increase in foreign-currency import prices.^[15] The assumed path appears in the upper-left panel: prices rise gradually and remain elevated for several years. Export prices and foreign interest rates are initially held constant. Importers' higher costs are passed through gradually to domestic retail prices.

Exporters also face higher input costs, but their foreign-currency selling prices are unchanged. Their capacity to pay wages therefore weakens. Through pattern bargaining, this restrains wage growth in both sectors. Inflation rises despite the initial moderation in wage growth.

The central bank responds by raising the policy rate, and the krone appreciates. The lower-middle panel shows the exchange rate, with a decline indicating an appreciation.^[16] A stronger krone reduces import costs and export earnings, moderating both wage growth and inflation.

But this was only part of the story. Export prices also rose. Adding that increase changes the results.

Chart: Higher export prices can prolong the last mile

The upper-left panel now includes an increase in foreign-currency export prices that exceeds the rise in import prices. Export earnings rise, creating more room for wage increases. Wage growth strengthens and, through pattern bargaining, labour costs rise in other sectors too. Non-tradable firms gradually pass these higher costs through to prices.

The key effect is on inflation persistence. Compare the blue and grey lines in the upper-right panel. In these simulations, peak inflation differs little. The domestic policy rate is higher than under the import shock alone, and the krone appreciates more, containing the inflationary impact. After the peak, however, the paths diverge. With higher export prices, disinflation takes longer despite tighter monetary policy.

So far, foreign interest rates have been held constant. But the post-pandemic period brought monetary tightening abroad as well as higher international prices. What changes when we incorporate the foreign interest rate path?

Chart: Higher foreign interest rates weaken the disinflationary effect of the krone

Import and export prices follow the same paths as in the previous simulation. Now compare the red and blue exchange rate paths in the lower-middle panel. Once we incorporate the increase in foreign interest rates, the krone appreciates much less. Relative to the previous simulation, import prices rise and export earnings increase in krone terms. The net effect is an increase in firms' capacity to pay wages, stoking both wage and price inflation.

The central bank maintains a higher policy rate than in the previous simulation. This restrains inflation but also raises unemployment. Higher foreign interest rates can therefore increase the cost of domestic disinflation.

How does this relate to Norway's experience? The global price surge was both an adverse cost shock and an income gain. Norway relies heavily on imports, both for consumption and for intermediate inputs. At the same time, commodities and commodity-based products account for a substantial share of export earnings. After the

pandemic, prices rose not only for oil and gas but for other exports too. The krone's depreciation during 2022 and through to the summer of 2023 further boosted export-sector profitability. Through pattern bargaining, exporters' greater scope for wage increases could raise labour costs in other sectors as well. The model illustrates how this transmission mechanism could make inflation more persistent.

Wage bargaining in Norway is highly coordinated. Together with flexible inflation targeting, this coordination can help prevent wage–price spirals from taking hold. Pattern bargaining ties wage growth to what the tradable sector can sustain and helps distribute the gains from improved terms of trade across the economy. Its inflationary implications nevertheless depend on the source of the shock.

A shock that raises profitability in the tradable sector lifts wage growth throughout the economy, increasing firms' costs and thus inflation. By contrast, when inflation originates in higher non-tradable sector costs, pattern bargaining can have a dampening effect. Higher prices for goods and services may prompt demands for wage increases to preserve purchasing power. But wage growth must also be consistent with what the tradable sector can sustain. This can limit further rounds of wage and price increases. Pattern bargaining can thus transmit some inflationary pressures while dampening others.^[17]

Expectations can make inflation more persistent

Finally, high inflation can set in motion mechanisms that make it more persistent. One is contractual indexation. Under some contracts, including rental agreements, prices are adjusted regularly in line with realised inflation. Rents are currently contributing to the persistence of consumer price inflation.

Expectations provide another mechanism. A firm setting a price that will remain in place for some time must anticipate its future costs. Recent price and cost increases offer a natural reference point. Inflation can therefore feed into expectations, which in turn influence subsequent inflation.

Chart: The decline in inflation expectations has stalled

Norges Bank regularly surveys inflation expectations. The chart shows the inflation rate different groups expect two years ahead.

Expectations rose and fell broadly in parallel with actual inflation. They also remain above their levels before the inflation surge.

Our analysis of the expectations survey points to a relationship between business leaders' inflation expectations and actual inflation.^[18]

This is consistent with a growing body of research showing that expectations influence inflation.^{[19],[20],[21],[22]} Findings differ, however, on the size of the effect and suggest that it can vary over time. Evidence from periods of low and stable inflation offers limited guidance on how expectations—and their effect on inflation—may evolve when inflation remains above target for an extended period.

Some have questioned whether we place too much weight on inflation expectations and thus overstate the risk of inflation becoming entrenched.^[23]

Expectations play a central role in our macroeconomic model, NEMO. When a cost shock is expected to persist, expectations of continued high inflation can amplify its effects on wages and prices. At the same time, however, agents in the model trust monetary policy to return inflation to target. This mechanism dampens inflation in the model and helps prevent it from becoming entrenched. The simulations presented today likewise assume that inflation expectations remain anchored over the longer term.

The question is whether expectations are as firmly anchored in practice as our models assume. Returning to the chart, inflation expectations have levelled off above their pre-pandemic levels. If the years of high inflation have left a more lasting imprint on expectations, the return to target may also take longer than the models suggest.

Conclusion

Let me return to the hair salon. The price of a haircut depends on the costs of running the salon, on how the hairdresser sets prices and on expectations of future price and cost increases. All three may help explain why the last mile has proved so long. Through pattern bargaining, the salon's labour costs are also influenced by export-sector profitability. Even if input prices fall, the hairdresser may be reluctant to cut prices. Inflation may persist for longer still if prices are set on the assumption that rapid cost increases will continue.

What does this mean for monetary policy?

As I noted at the outset, stronger monetary tightening would have brought inflation down faster. We have been patient to avoid an excessive rise in unemployment.

Last year, we judged that a cautious normalisation of the policy rate was consistent with returning inflation to target within a reasonable time horizon. The inflation outlook has since changed.

One reason is the new shock that hit the economy this spring, when the closure of the Strait of Hormuz drove up energy and other commodity prices.

Wage growth has also exceeded our forecasts in recent years, contributing to more persistent inflation. The last mile has proved longer than we anticipated.

The expectations channel limits how patient we can afford to be. We do not want to restrict the economy more than needed, but neither can we allow above-target inflation to persist indefinitely. Households and firms must remain confident that high inflation is temporary. That is why we now judge it appropriate to respond more forcefully to signs of rising inflationary pressure than we would with inflation close to target.

At our September meeting, we raised the policy rate to 4.5 percent. A higher policy rate reduces inflation, in part through its effect on the exchange rate. It will likely be necessary to keep the policy rate elevated for a time, and we are prepared to raise it further if warranted by the inflation outlook.

Footnotes

[1] Inflation is measured year on year and reported as quarterly averages.

Categories are ordered by the timing of their inflation peaks during 2021–2024. The diagonal pattern partly reflects this ordering.

[2] Calculations compare regular prices quoted by the same supplier in consecutive months. Food and beverages, transport and rents are excluded. Sample coverage varies, particularly for services.

[3] See also Wulfsberg, F. (2016), 'Inflation and Price Adjustments: Micro Evidence from Norwegian Consumer Prices 1975–2004', *American Economic Journal: Macroeconomics* 8(3), 175–194.

[4] Rogoff, K. S. (2003), 'Globalization and Global Disinflation', *Economic Review* 88(4), 45–78, Federal Reserve Bank of Kansas City.

[5] Nakamura, E., J. Steinsson, P. Sun and D. Villar (2018), 'The Elusive Costs of Inflation: Price Dispersion during the U.S. Great Inflation', *The Quarterly Journal of Economics* 133(4), 1933–1980. US microdata and a model with fixed adjustment costs indicate that changes in inflation are reflected more in the frequency of price adjustment than in its size.

[6] Gautier, E. et al. (2024), 'New Facts on Consumer Price Rigidity in the Euro Area', *American Economic Journal: Macroeconomics* 16(4), 386–431.

[7] Dupraz, S. (2024), 'A Kinked-Demand Theory of Price Rigidity', *Journal of Money, Credit and Banking* 56(2–3), 325–363.

[8] The monthly contributions, f^+s^+ and $-f^-s^-$, use consistent weights and are cumulated over twelve months. Inflation is measured in per cent and refers to the sample used in the analysis.

[9] Seiler, P. (2026), 'How firms set their prices: survey evidence along the stages of price setting', *Swiss Journal of Economics and Statistics* 162, Article 6, Tables 10–11. Swiss service firms assign greater importance to supplier price increases as a reason for raising prices than to supplier price reductions as a reason for cutting them.

[10] The figures show annual growth in the national accounts export and import price indices for traditional goods.

[11] See Brubakk, L. and K. Hagelund (2022), 'Frontfagets betydning for lønnsdannelsen i private tjenestnæringer', *Staff Memo* 5/2022, Norges Bank. Manufacturing wages are the main explanatory variable, although sector-specific capacity to pay also matters in several service industries.

[12] Matsen, K. A. (2025), 'Models for forecasting annual wage growth', *Staff Memo* 4/2025, Norges Bank, describes wage models that include the manufacturing labour share among their explanatory variables.

[13] The model is stylised and calibrated rather than estimated. Some parameters are calibrated approximately to Norwegian data; others are taken from the international literature. The simulations illustrate mechanisms under specified assumptions. They do not estimate the shocks' historical contributions after the pandemic. 'Non-tradable sector' is used broadly to include domestic-market production and the distribution of imported consumer goods. In the code, domestic producers use labour only, while importers use imported consumer goods; both adjust prices gradually. Exporters are assumed to be price takers, although their market power varies in practice.

[14] The effects of international price and interest rate shocks were also examined extensively by Frontfagsmodellutvalget (2023), 'Utfordringer for lønnsdannelsen og norsk økonomi', NOU 2023: 30, Section 5.6 and Box 5.2, with simulations using KVARTS, NORA, NEMO and NAM. See in particular the background analysis by Boug, P. et al. (2023), 'Høyere inflasjon og renter internasjonalt', in *Utfordringer for lønnsdannelsen og norsk økonomi. Utredning for Frontfagsmodellutvalget*, Chapter 5, Reports 2023/47, Statistics Norway. Among other findings, the simulations highlighted the importance of the exchange rate and economic policy for transmission to the Norwegian economy. Energy and commodity prices were held constant in the KVARTS and NORA simulations, and the committee itself noted that the shocks differed from the post-pandemic experience. The exercise in this speech focuses specifically on how higher international prices also increased Norwegian exporters' capacity to pay wages.

[15] For now, we abstract from the rise in consumer price inflation abroad.

[16] In the model discussion, 'exchange rate' denotes the real exchange rate: the nominal krone exchange rate adjusted for domestic and foreign price levels. A decline represents a real appreciation; the nominal exchange rate may follow a different path. 'Foreign interest rates' denotes the ex ante real interest rate: the nominal interest rate adjusted for expected inflation. The policy rate is nominal.

[17] See Røisland, Ø. (2023a), 'Frontfagsmodellen og importert inflasjon', *Samfunnsøkonomen* 137(6), 5–11, and Røisland, Ø. (2023b), 'Når kan lønns-prisspiraler oppstå? Om samspillet mellom pengepolitikken og lønnsdannelsen', *Samfunnsøkonomen* 137(3), 45–56. The model analyses show how pattern bargain-

ing can dampen the effects of domestic cost shocks but amplify those of international price increases that also strengthen the tradable sector's capacity to pay wages.

[18] Lindalen, I. H. and K. Mjølnerød (2026), 'The role of inflation expectations in price setting: the Norwegian experience', *Staff Memo 3/2026*, Norges Bank.

[19] Weber, M. et al. (2025), 'Tell Me Something I Don't Already Know: Learning in Low- and High-Inflation Settings', *Econometrica* 93(1), 229–264, show that information processing depends on the inflation environment. Carvalho, C., S. Eusepi, E. Moench and B. Preston (2023), 'Anchored Inflation Expectations', *American Economic Journal: Macroeconomics* 15(1), 1–47, model how persistent surprises can affect long-term expectations. Greater attention to inflation is not itself evidence of de-anchoring.

[20] Gautier, E., F. Savignac and O. Coibion (2025), 'Firms' Inflation and Wage Expectations during the Inflation Surge', *Working Paper 995*, Banque de France. In French data, the relationship between inflation expectations and firms' wage and price decisions weakened during the inflation surge. Higher expectations need not imply stronger pass-through to prices.

[21] Coibion, O., Y. Gorodnichenko and T. Ropele (2020), 'Inflation Expectations and Firm Decisions: New Causal Evidence', *The Quarterly Journal of Economics* 135(1), 165–219.

[22] See also Coibion, O. and Y. Gorodnichenko (2025), 'Inflation, Expectations and Monetary Policy: What Have We Learned and to What End?', *Working Paper 33858*, National Bureau of Economic Research, for a review of recent research on the relationship between expectations and inflation.

[23] Rudd, J. B. (2021), 'Why Do We Think That Inflation Expectations Matter for Inflation? (And Should We?)', *Finance and Economics Discussion Series 2021-062*, Board of Governors of the Federal Reserve System, critically assesses the empirical evidence for the expectations channel, particularly the identification of an independent causal effect.

