DANMARKS NATIONALBANK

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# High price level contributes to lower inflation in Denmark than in the euro area

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**Time consumption**

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Although inflation in the euro area anchors Danish consumer prices in the long term, they have fallen relative to the euro area since the introduction of the euro and especially in the years after 2013. The analysis argues that this reflects price convergence linked to the higher price level in Denmark and more moderate wage increases than in the euro area after the financial crisis. Inflation differences due to converging price levels are a natural adjustment and are not a symptom of an economic imbalance.

### Danish inflation is often lower than in the euro area

Relative price decreases for goods, energy and food are responsible for the lower average inflation in Denmark than in the euro area. The weaker Danish price increases can thus be attributed to products exposed to global competition. Periods of persistent inflation differentials against the euro area are not a uniquely Danish phenomenon and are seen in several euro area countries.

### High price level is a factor behind lower inflation in Denmark

The fact that Danish inflation is often lower than in the euro area reflects an adjustment of the higher price level. For example, model calculations suggest that price convergence has dampened Danish inflation by around 0.4 percentage points annually compared to the euro area in 2013-2023. More moderate wage increases than in the euro area have also contributed to lower inflation in Denmark.

### It is possible that the trend of lower Danish inflation will continue

Although consumer prices have risen less in Denmark than in the euro area in recent decades, there are still significant differences in price levels, even for internationally traded goods. It is therefore possible that the weaker Danish price development will continue for some time, as long as unforeseen shocks do not boost inflation in Denmark or reduce it in the euro area.

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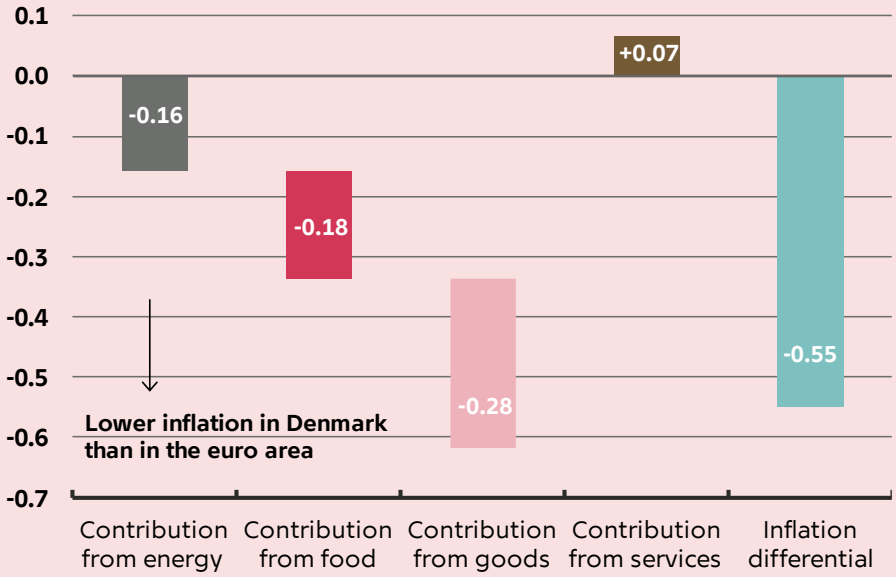
# Why is it important?

As Denmark's central bank, one of Danmarks Nationalbank's most important tasks is to contribute to stable prices. This analysis examines why inflation in Denmark is often lower than in the euro area despite the fixed exchange rate policy.

# Main chart: Several prices contribute to lower inflation in Denmark than in the euro area

*Contribution to average inflation differential , 2013-2024, percentage points*




Note: Contribution to the average difference between annual HICP inflation in Denmark and the euro area from different price categories in 2013-2024.
Source: Macrobond, Eurostat and own calculations.

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## Keywords

Inflation and price developments

01

# Inflation is often lower in Denmark than in the euro area

After many years of low and stable inflation in Denmark, prices rose sharply in 2022 during Russia's invasion of Ukraine, after which high inflation gradually subsided due to monetary policy tightening and falling energy prices. While most foreign central banks aim directly at an inflation target, Danmarks Nationalbank seeks to achieve stable prices through its fixed exchange rate policy. By pegging the Danish krone exchange rate to the euro, the fixed exchange rate policy creates the basis for Denmark to have the same inflation rate as the euro area over time. Danish monetary policy is thus imported from the European Central Bank, ECB, which aims to ensure a medium-term inflation rate in the euro area of 2 per cent.

**Why has there been a long-term trend towards lower inflation in Denmark than in the euro area?**

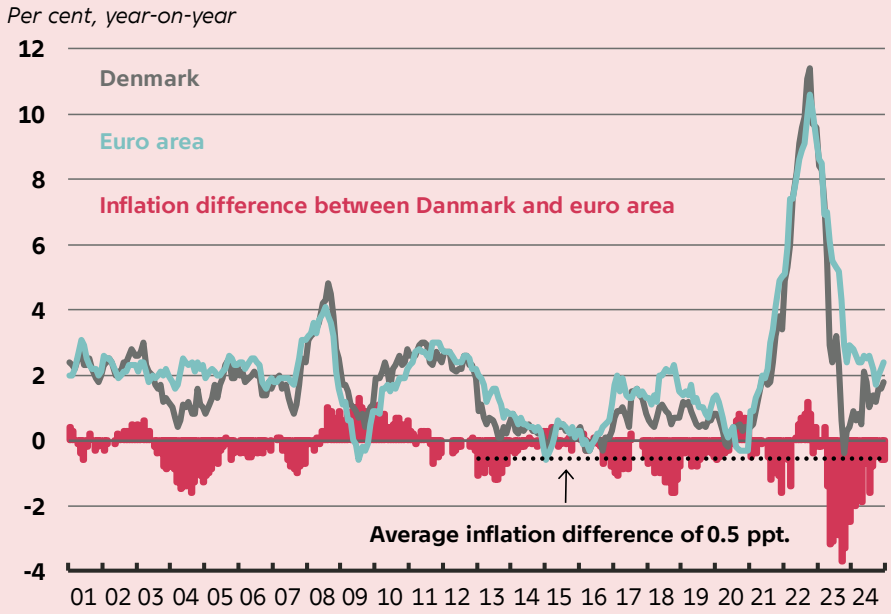
Although the level of inflation in the euro area anchors Danish consumer prices in the long term, there have been some differences between inflation in Denmark and the euro area at times. Consumer prices in Denmark have fallen by 7.4 per cent relative to the euro area since 2001, and especially since 2013, inflation has been lower in Denmark by an average of around 0.5 percentage points per year, see chart 1. Part of the difference reflects that inflation subsided faster in Denmark in 2023-24 than in the euro area, but Danish consumer price increases were also somewhat smaller during the period of low inflation in 2013-2019 and in the mid-2000s, despite a strong boom leading up to the financial crisis.

This analysis focuses on identifying why there has been a trend towards lower inflation in Denmark than in the euro area over a longer period of time. To answer the question, part 1 first takes a look at subcomponents of the consumer price index, while part 2 provides a conceptual overview of possible causes of inflation differences. Part 3 then presents an empirical analysis of the macroeconomic drivers behind the Danish inflation differential against the euro area, before part 4 discusses scenarios for its possible future development.

CHART 1

**Since the introduction of the euro, there has been a trend towards lower inflation in Denmark than in the euro area**

Difference between annual HICP inflation in Denmark and the euro area




Source: Macrobond and Eurostat.

**Danish inflation has on average been 0.5 percentage points lower than in the euro area since 2013**

**Inflation difference between Denmark and the euro area mainly reflects lower price increases on products exposed to global competition**

As a first step towards understanding the driving forces behind the lower Danish inflation than in the euro area, this section focuses on which of the individual price categories are responsible for the overall relative decline in consumer prices in Denmark. However, the starting point is that inflation is a macroeconomic concept that refers to general price increases in society rather than prices in individual markets that are not determined independently of each other. For this reason, part 2 and part 3 of the analysis will later return to a discussion of the more macroeconomic factors behind the inflation differential observed.

The fact that Danish consumer prices in the HICP index have decreased relative to the euro area since 2001, reflects lower relative prices for goods, energy and food, while service prices have increased slightly more in Denmark, see chart 2. This means that it is largely the internationally traded and most competitive products that are responsible for the inflation difference.

Goods in particular play a significant role behind the different consumer price trends in Denmark and the euro area, as they both make up a relatively large share of consumption and have seen significant relative price drops in Denmark over a number of years. The decline in Danish goods prices compared to the euro area is broad-based across sub-products and includes a large drop in the relative prices of consumer durables, such as cars. To a certain extent, tax changes are a contributing factor to the lower relative prices of consumer durables in Denmark, e.g. a number of reductions in the registration tax reduced

car prices in 2015-2018, see the Danish Ministry of Taxation (2018). Changing consumption patterns may also have caused a fall in Danish goods prices compared to the euro area. For example, online shopping accounts for a larger share of total retail sales in Denmark than in the four largest euro countries, see Zhuang (2021). This may have led to an adjustment in the price level of Danish products driven by price transparency and increased international competition. In addition, online purchases from foreign companies are included in the calculation of the HICP index in Denmark if the goods are delivered on Danish soil, see Eurostat (2024). This is also a factor in favour of more uniform prices across countries.

**The HICP index in Denmark has fallen by 7.4 per cent relative to the euro area since 2001**

Although several energy commodity prices are determined on international markets, consumer energy prices are another key reason why the HICP index in Denmark has declined against the euro area. Danish energy prices in the HICP index have fallen by around 19 per cent since 2001 compared to the euro area, mainly due to lower relative consumer prices for electricity, while relative Danish fuel prices have only fallen slightly[1]. It is possible that the expansion of wind energy has contributed to lowering Danish electricity prices[2]. Furthermore, changes in taxes, subsidies, competition, regulation and energy sources may have continuously affected consumer energy prices in euro countries. After the energy crisis in 2022, Danish consumer energy prices fell back faster than in the euro area, contributing to a significant difference in overall inflation, see chart 3. This reflects, among other factors, a relatively fast pass-through from energy commodity prices to consumer prices in Denmark, see Danmarks Nationalbank (2023) for more possible explanations.

Food is another source of slower price increases in Denmark than in the euro area in recent decades. This is partly because the relative consumer prices of food including tobacco and alcohol in Denmark fell in the mid-2000s due to higher tobacco prices in the euro area following tax increases in countries such as Germany, while the prices of actual food have performed rather similarly. Given that relative Danish food prices fell in 2023, it may be related to the fact that energy prices declined faster in Denmark, reducing the cost of food production.

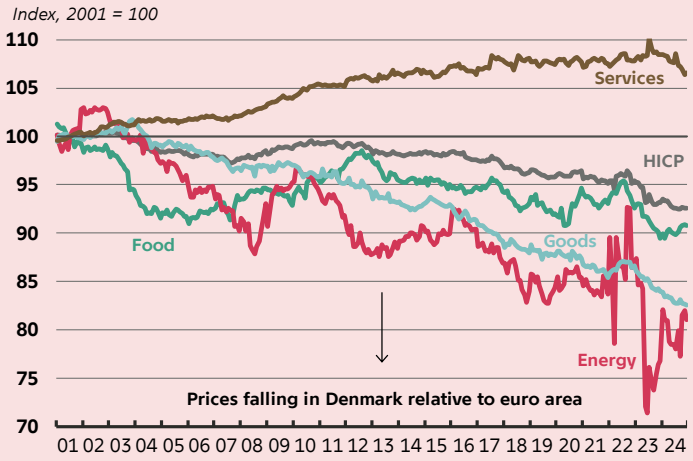
In contrast to overall consumer prices, service prices have increased slightly more in Denmark than in the euro area since 2001. Lower inflation in Denmark is thus not driven by prices, which are traditionally most closely linked to wages and the domestic economic situation. In particular, rent and recreation prices have contributed to higher relative service prices in Denmark in recent decades. Since 2013, however, there has been a flattening of Danish service prices relative to the euro area, partly because the price of communication, including telecoms services, has fallen more in Denmark. In addition, after a few years of reopening following the coronavirus pandemic, prices for holiday travel, restaurants and hotels have softened more in Denmark than in the euro area from summer 2023.

[1] Although Danish HICP energy prices have fallen relative to the euro area, there are signs that energy price levels are still higher in Denmark. Eurostat estimates of electricity, gas and fuel prices show that Danish prices were 14 per cent higher than in the euro area in 2023, compared to 54 per cent in 2003.
[2] Solar and wind power provide electricity with lower marginal costs than coal and gas power plants, and the expansion of renewable energy may therefore have dampened electricity prices, see Branner and Mølbak (2023). This is because the hourly price of electricity is set by the marginal producer, which with the expansion of renewable energy is more often solar or wind. This lowers the average price of electricity.

CHART 2

**The HICP index in Denmark has decreased relative to the euro area over the past decades**

HICP index in Denmark relative to the euro area

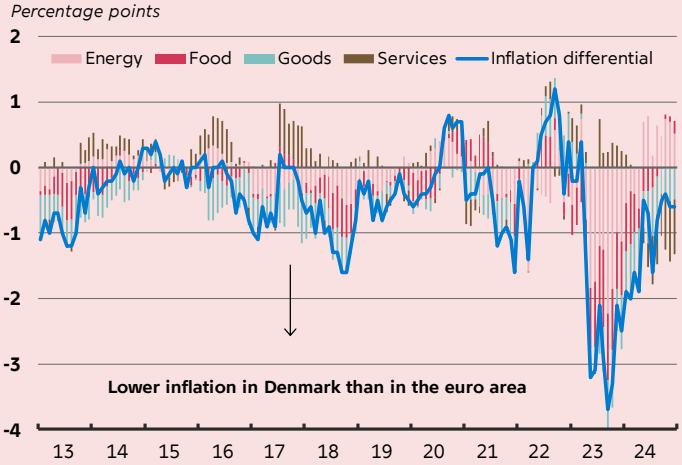



Note: The relative HICP index is seasonally adjusted. Food includes tobacco and alcohol, while goods refers to non-energy industrial goods.
Source: Macrobond, Eurostat and own calculations.

CHART 3

**Energy, food and goods prices led to a large inflation difference between Denmark and the euro area in 2023-24**

Contribution to inflation difference between Denmark and the euro area




Note: Contribution to HICP inflation difference between Denmark and the euro area from different sub-prices.
Source: Macrobond, Eurostat and own calculations.

**Periods of inflation differentials vis-à-vis the euro area are not an independent Danish phenomenon and are also seen in several euro countries**

It is not only in Denmark that consumer price increases sometimes deviate from inflation in the euro area. To gain a further perspective on the extent of the Danish inflation differential in relation to the euro area, it makes sense to compare it to the situation in the individual euro area countries, which, like Denmark, cannot use monetary and exchange rate policy to stabilise national economic fluctuations. The development of headline inflation in the euro area masks significant differences between euro area countries, with several having either lower or higher than average inflation in recent decades, see charts 4 and 5. This shows that even when inflation is 2 per cent in the euro area as a whole, it does not have to be 2 per cent in all euro area countries.

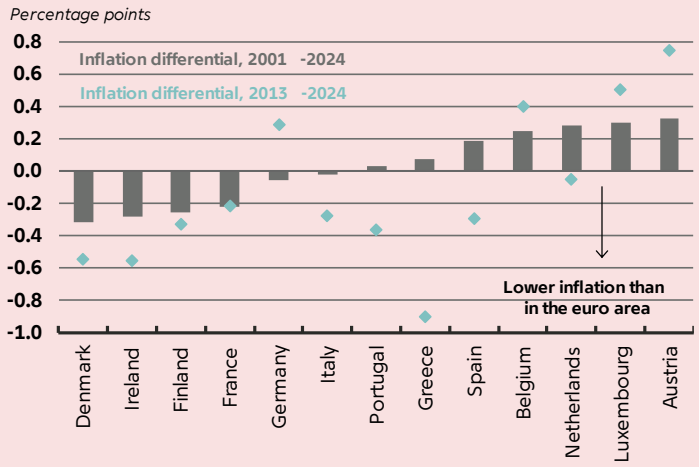
Although the average Danish inflation differential against the euro area in 2013 to 2024 is significant, it does not stand out from all euro area countries. Inflation in Ireland, Finland, Greece, Spain and Portugal, for example, has also been somewhat lower than in the euro area as a whole, while it has been higher in countries such as Austria and the Netherlands. A common feature of several of the euro area countries with relatively low inflation over the past decade or so is that they first built up economic imbalances with associated high inflation until the sovereign debt crisis, after which their economies underwent abrupt adjustments that in turn put downward pressure on consumer prices. The explanation behind the relatively low inflation in the former crisis-hit euro area countries is therefore hardly the same as in Denmark. In contrast, Austria has had significantly higher inflation than the euro area since the early 2010s, partly due to stronger price increases for services driven by high levels of tourism and higher restaurant and hotel prices, see Fritzer et al. (2019). Among the larger euro area countries, Germany stands out with relatively low inflation until the sovereign debt crisis, after which German consumer price growth has been higher than the euro area average.

The comparison of the Danish inflation differential against the euro area with the corresponding deviations in the euro area countries shows that consumer prices sometimes develop differently from country to country despite close trade integration and a common monetary policy anchor. There are several possible reasons for this, and part 2 of this analysis will provide an overview of the common theoretical drivers of inflation differentials in a fixed exchange rate regime.

**CHART 4**

**Denmark is not the only country where inflation sometimes deviates from the euro area**

Average annual inflation differential relative to the euro area

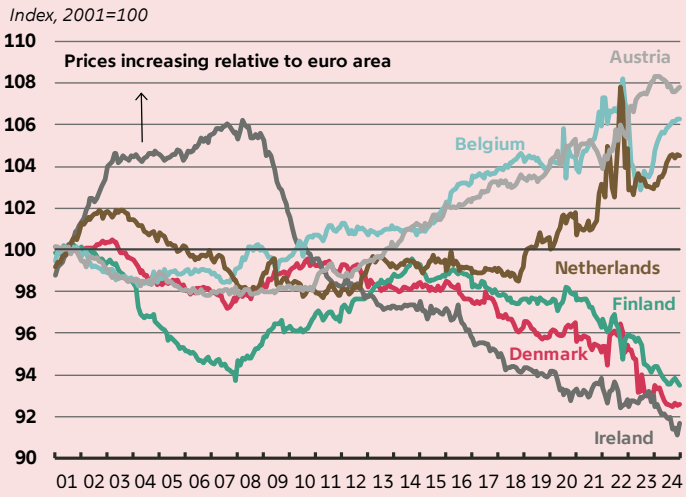



Note: Average annual inflation differential relative to the euro area.
Source: Macrobond, Eurostat and own calculations.

**CHART 5**

**Consumer prices periodically perform differently in smaller euro area countries than in the euro area as a whole**

HICP index relative to the euro area




Note: The relative HICP index is seasonally adjusted.
Source: Macrobond, Eurostat and own calculations.

02

# There are several possible causes of inflation differentials in a fixed exchange rate regime

Whether inflation differentials reflect an unfavourable macroeconomic condition in a fixed exchange rate regime depends on why they occur. After taking a first look at inflation in Denmark compared to the euro area, this part of the analysis will outline possible theoretical reasons for inflation differences and discuss some conceptual considerations to set the framework for the later empirical analysis in part 3. A recurring theme here is that periods of lower inflation due to converging price levels are a natural adjustment. They are therefore not a symptom of an economic imbalance as long as they do not give rise to an independent deflation risk.

**The literature has highlighted several suggestions as to why inflation differentials occur**

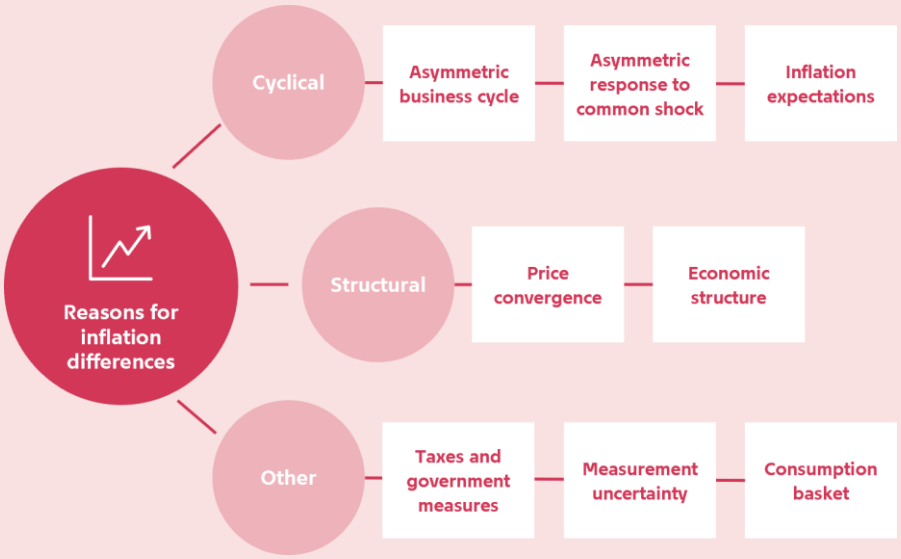
Previous studies have highlighted several different reasons for inflation differences, which can be grouped into structural, cyclical and other explanations, see chart 6 for a graphic illustration[3]. The distinction between structural and cyclical drivers depends partly on how lasting their impact is on consumer prices, with the former usually unfolding over a longer period than the latter. In addition, other explanations cover a variety of conditions that are more transient or technical in nature. Originally, the explanations were conceived within the framework of a monetary union such as the euro area, but the thinking also applies to the Danish fixed exchange rate regime, as monetary and exchange rate policy is not used to stabilise national economic fluctuations in both cases.

[3] See, for example, ECB (2012) or Babic (2003) for a review of why inflation differentials arise in a monetary union such as the euro area. Box 1 in part 3 also provides an overview of empirical studies on the drivers of inflation differentials.

**CHART 6**

**There are several possible reasons for inflation differences**

Illustration of the drivers of inflation differentials




Source: Own illustration.

### Price convergence is a possible structural source of inflation differentials

When two countries have a fixed exchange rate between them, it is possible that inflation differences arise due to converging price levels. For example, one branch of economic theory suggests that the prices of two identical goods should be the same in two countries when they are denominated in the same currency and there are no transport costs or other barriers to trade. If this were not the case, households and businesses could buy the product at the lower price in one country and resell it at the higher price in another country for a risk-free profit. However, such behaviour drives low prices up and high prices down until prices are equal. Based on this logic, a lower Danish inflation rate than in the euro area can be seen as an ongoing adjustment of the higher price level in Denmark. This explanation for price level convergence is based on the assumption that price differences on traded goods are levelling out over time. However, some consumer prices consist of products that are not traded across countries, such as certain services.

Alternatively, price convergence can occur as a consequence of real economic convergence, i.e. a situation where the level of prosperity is converging in two countries. According to the theory of Balassa-Samuelson effects, countries with low income and productivity levels often have higher productivity increases in their traded goods industries and thus catch up with wealthier countries. The productivity growth simultaneously allows for higher wages in the goods-producing industries, which also spills over to other parts of the economy over time as labour would otherwise leave. The result is higher inflation as wages rise in more parts of the economy without corresponding productivity growth. To the extent that some of the euro area countries have grown faster than Denmark, it may be a sign that the lower inflation in Denmark than in the euro area can be attributed to real economic convergence. This is the case in the Baltic countries, for example, which have all experienced higher GDP and consumer price growth than Denmark since joining the euro in 2011-2015.

**Economic structures can influence price formation in a fixed exchange rate regime independent of the euro area situation**

In addition to price convergence, changes in economic structures in product and labour markets can also lead to inflation differentials in a fixed exchange rate regime. For example, a lower unemployment benefit rate will tend to dampen wage increases during an adjustment period as it worsens employees' alternative to being employed and thus puts downward pressure on their wage demands in wage negotiations. In Denmark, Kristoffersen (2018) finds that a lower unemployment compensation rate has reduced wage increases since 2013. This is one example of how changing economic structures may have affected wage and price formation during a period when Danish inflation has been lower than in the euro area. More generally, pro-competitive initiatives can also reduce companies' profit margins and thus affect prices in a country independently of the situation in the euro area as a whole.

**Inflation differentials sometimes arise due to asymmetric business cycles**

There is often a high degree of overlap between the economic situation in Denmark and the euro area, as the economies are closely linked through trade. Nevertheless, countries sometimes find themselves in asymmetrical economic cycles, and if the Danish economy is experiencing a stronger boom than the euro area, for example, due to an expansive fiscal policy or exposure to industries characterised by high global demand, it could contribute to higher inflation in Denmark. This would worsen competitiveness and dampen global demand for Danish goods, which in turn would even out the inflation differential in the long run, although it may take some time. Competitiveness thus acts as a key adjustment mechanism in a fixed exchange rate regime where the nominal exchange rate cannot give way in response to a different inflation rate than in the euro area. For this adjustment to be successful, it is particularly important to have flexible economic structures where flexible wage and price formation, as in the Danish case, helps to absorb economic fluctuations.

Even in situations where Denmark and the euro area are hit by a common shock, it can lead to inflation differences if economies react asymmetrically to it. For example, the trajectory of consumer energy prices following Russia's invasion of Ukraine in 2022 varied widely across European countries, partly due to differences in energy intensity and the speed of pass-through from energy commodity prices to consumer prices. As noted in part 1, the majority of the inflation differential between Denmark and the euro area in 2023-24 was driven by energy, illustrating an asymmetric response after a common shock.

**Independent shifts in inflation expectations result in a pro-cyclical real interest rate in a fixed exchange rate regime**

If an economic boom or other country-specific circumstances increase price increases in a country more than in the euro area, it is possible that this will push inflation expectations up and real interest rates down, giving an additional boost to demand and inflation, and vice versa in the case of downward pressure on inflation expectations. This means that households and businesses may have different expectations of future inflation than their euro area counterparts, creating a self-fulfilling inflation differential. The situation arises because the nominal interest rate is imported from the single monetary policy in the euro area and produces a pro-cyclical real interest rate[4]. Although competitiveness

[4] In theory, the impact of real interest rates on activity cannot be viewed independently of the natural real interest rate, i.e. the interest rate level that brings actual activity in line with potential activity. It is not possible to observe the natural real interest rate directly and it can only be estimated with great uncertainty. This makes it difficult to determine whether the levels of the natural real interest rate are so different in Denmark and the euro area that it contributes to inflation differences. For example, if the natural real interest rate is lower in Denmark, it could lead to a sustained tightening of monetary policy in Denmark, dampening demand and inflation. In practice, however, GDP, private consumption and

continues to act as an equilibrium-creating adjustment mechanism in such a case, it certainly takes longer compared to more moderate economic fluctuations.

**A number of other drivers can also cause short-term inflation differentials**

While the structural and cyclical drivers of inflation differences have a clear economic interpretation, there are several other explanations that are often more technical. Firstly, not all consumer prices are market-determined: Changes in taxes, publicly administered prices or the use of price controls as seen in some euro area countries to mitigate high energy prices in 2022 may have contributed to short-term inflation differences between Denmark and the euro area at times. However, government intervention over a longer period of time is not believed to have been a decisive factor behind the lower average inflation in Denmark[5]. Secondly, inflation differences can theoretically arise if some products are more important in a country's overall consumption due to, for example, different preferences, and the prices of these products systematically rise more than others. However, in Denmark and the euro area, the different weights in the HICP index are approximately the same and thus not a significant source of persistent inflation differences[6]. Finally, the calculated inflation differences should be seen in light of the measurement uncertainty that will inevitably exist in practice when comparing price statistics across countries, even if the methodology behind HICP inflation is harmonised in the EU.

**Periods of inflation differentials due to converging price levels reflect a natural adjustment**

Whether inflation differentials are inappropriate or not in a fixed exchange rate regime depends on their underlying driver. As illustrated in the previous sections, the literature mentions many possible causes of inflation differentials and it can be argued that not all of them are a symptom of unhealthy macroeconomic conditions and should therefore be considered in the organisation of economic policy.

The starting point for this discussion is that the ECB ensures stable inflation in the euro area as a whole in the long term, while the fixed exchange rate policy creates the basis for Denmark to have the same consumer price increases over time. This happens because the Danish monetary policy is imported from the ECB, and the adjustment of competitiveness helps to even out the inflation differential in equilibrium. If necessary, fiscal policy can also stabilise independent Danish economic and inflationary fluctuations. There are two scenarios in particular where unaddressed inflation differentials vis-à-vis the euro area can develop into an imbalance in a fixed exchange rate regime like the Danish one, although neither seems to be descriptive of the situation in recent decades.

For example, if persistently higher Danish inflation than in the euro area reflects wage increases that are out of line with productivity growth, it leads to a competitiveness imbalance that must later be corrected via an internal devaluation, where prices are pushed down again through falling employment and rising unemployment. The situation is not a current concern for the Danish

investments have increased more strongly in Denmark than in the euro area in recent decades, so this analysis will not explore the natural real interest rate further.

[5] The average contribution of tax changes to the inflation difference between Denmark and the euro area in 2013-2024, measured by the difference between the HICP index with and without constant taxes, is approximately zero, while administered prices have increased less in Denmark. However, the prices used to calculate administered prices are not always the same across countries, making it more difficult to compare them.

[6] A calculation indicates that average HICP inflation in Denmark in 2001-2024 would be almost 0.1 percentage points higher if euro area HICP weights for energy, food, goods and services were used instead of actual Danish weights. This is an approximation as the HICP index is calculated as a chained Laspeyres index and not a weighted average as in this calculation. Furthermore, there may be some differences in weights within the four main price categories.

economy, given the improvement in competitiveness after the financial crisis and because the average Danish inflation rate has been lower than in the euro area since 2013. Prolonged periods of lower Danish price increases than in the euro area, on the other hand, can ultimately give rise to an independent deflation risk. That is, a macroeconomic condition where a downward shift in inflation expectations leads to higher real interest rates at home, but not in the euro area, keeping the economy in a self-reinforcing spiral of too low inflation. However, measures of survey-based inflation expectations and the generally stronger Danish economy than in the euro area suggest that since the introduction of the euro, there have been no periods with a distinct risk of deflation in Denmark without this also being the case in the euro area.

On the other hand, if the lower Danish inflation rate than in the euro area reflects converging prices, the phenomenon is not a true macroeconomic imbalance and should rather be interpreted as a natural adjustment towards a common long-term equilibrium price level. As the empirical analysis in part 3 will argue, there is evidence that price convergence can explain a large part of the inflation difference between Denmark and the euro area, and it is therefore not obvious that the trend towards lower inflation in Denmark should be countered with economic policy.

03

# High price level contributes to lower inflation in Denmark than in the euro area

Without a more detailed analysis of the driving forces behind the inflation difference between Denmark and the euro area, it is difficult to determine what the weaker Danish price development is a symptom of. In order to get an impression of the quantitative significance of various macroeconomic factors, a modelling exercise is carried out that confirms some of the theoretical explanations from part 2 and supplements the analysis of the individual price categories from part 1. Overall, the results indicate that a high price level and more moderate wage increases have dampened Danish inflation relative to the euro area since 2013. The modelling exercise therefore supports the impression that the trend towards lower Danish inflation reflects a structural adjustment of the price level.

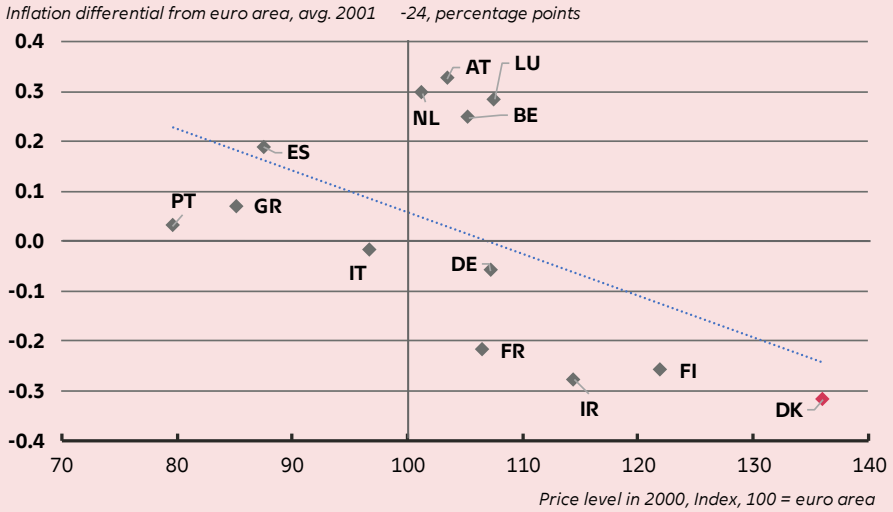
**Countries with high price levels generally have lower inflation**

As a starting point for the later modelling exercise, it is initially worth highlighting some basic correlations relevant to the relative price development between Denmark and the euro area. Across the original euro area countries and Denmark, for example, there is a clear negative correlation between their pre-euro price levels and average inflation rates in 2001-2024, see chart 7. As a result, price levels have gradually become more similar over the lifetime of the euro as a currency. In a Danish context, this provides a first indication that the high price level in Denmark has dampened inflation relative to the euro area.

CHART 7

**Countries with high price levels have subsequently experienced lower inflation**

Price level and HICP inflation




Note: The chart shows the price level of household consumption expenditure and average HICP inflation relative to the euro area.
Source: Eurostat, Macrobond and own calculations.

### Price levels in Denmark and the euro area are converging despite lack of real economic convergence

If price convergence is a contributing factor behind the lower Danish inflation rate than in the euro area, identifying why this is the case is relevant. The Danish HICP index has fallen relative to the euro area, even though a number of indicators suggest that economic prosperity has increased more in Denmark, see chart 8. This indicates that price levels have converged despite the absence of real economic convergence, which as explained in part 2 is one of several possible mechanisms behind price convergence. In other words, the euro area countries as a whole have not narrowed the gap to the higher Danish level of prosperity measured by, for example, GDP per capita, but only to the price level.

There are several factors that potentially contribute to explaining the divergence in Danish prosperity and price development compared to the euro area. Firstly, extensive Danish merchanting and processing has probably led to some decoupling between GDP and consumer prices in Denmark. Secondly, the increased relative output and falling relative consumer prices in Denmark can be interpreted as the result of a price-reducing supply shock to the Danish economy, such as stronger productivity growth or more labour supply reforms than in the euro area. For example, the higher Danish productivity growth compared to the euro area since the financial crisis has reduced labour costs per unit produced, which also affects Danish consumer prices. However, there are several nuances to the relationship between productivity and inflation. In a globalised world, a large part of Danish consumption is imported from abroad, and Danish companies sell to foreign consumers to a large extent. Therefore, it is not only productivity in Denmark that affects consumer prices in Denmark. Price levels also tend to be higher in countries where economic prosperity is high. This reflects that increased productivity over time can also lead to higher prices for non-traded products, such as certain services, even though it immediately

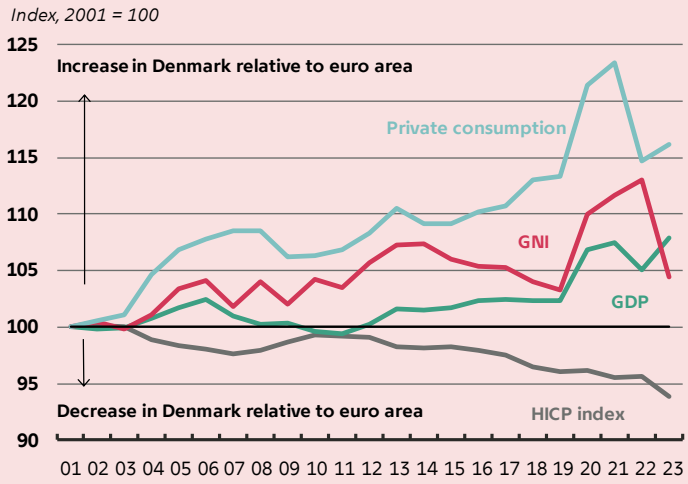
reduces unit labour costs in some industries[7]. Thirdly, it's possible that weaker inflation itself has created more economic growth, as it has led to an increase in real wages, thereby supporting demand. Although the savings surplus is high in the Danish economy, private consumption and investments have increased significantly more than in the euro area since 2001. Finally, there may be two opposing effects at play, with higher Danish prosperity on the one hand pushing up non-traded consumer prices relative to the euro area, while international competition on the other hand dampens traded consumer prices.

Over the past decades, the higher price level of consumer goods in Denmark has narrowed in relation to the euro area, while it has widened slightly for consumer services, see chart 9. This is consistent with the theoretical explanation mentioned in part 2 that price convergence occurs because price differences of traded goods are gradually levelled out in a fixed exchange rate regime, otherwise it would be possible to trade them with a risk-free profit across countries. However, this mechanism does not ensure complete price convergence because the market for many services is characterised by multiple barriers to international competition. Service prices are therefore not equalised to the same extent as goods prices across borders, but instead remain linked to the development of wealth in each country[8].

**CHART 8**

**Danish HICP index has fallen relative to the euro area, even though economic prosperity has increased more in Denmark**

HICP, GDP, GNI and private consumption in Denmark relative to the euro area

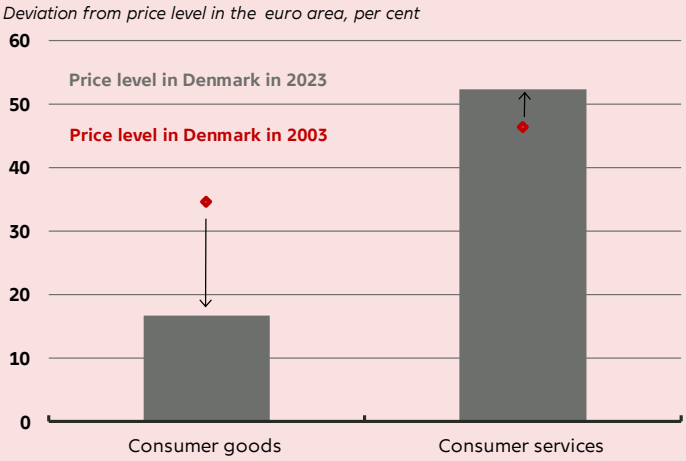



Note: All variables are calculated per capita. Gross National Income (GNI) is measured in current prices, while GDP and private consumption are in constant prices.
Source: Eurostat and own calculations.

**CHART 9**

**Price levels of consumer services and consumer goods are still higher in Denmark than in the euro area**

Price level in Denmark relative to the euro area




Note: The delimitation is based on national accounts and is not identical to the breakdown of goods and services in the HICP index. Data is not available further back than 2003.
Source: Eurostat and own calculations.

[7] See the discussion of Balassa-Samuelson effects in part 2 for an elaboration of the argument.
[8] Taxes are another barrier to full price level convergence between countries. However, the Danish Competition and Consumer Authority (2024) estimates that the price level in Denmark adjusted for VAT and taxes is almost 24 per cent higher than the average in seven selected EU countries, while it is 15 per cent higher when wealth differences are also taken into account. The analysis compares price levels in Denmark, Finland, France, Italy, Belgium, Germany and the Netherlands.

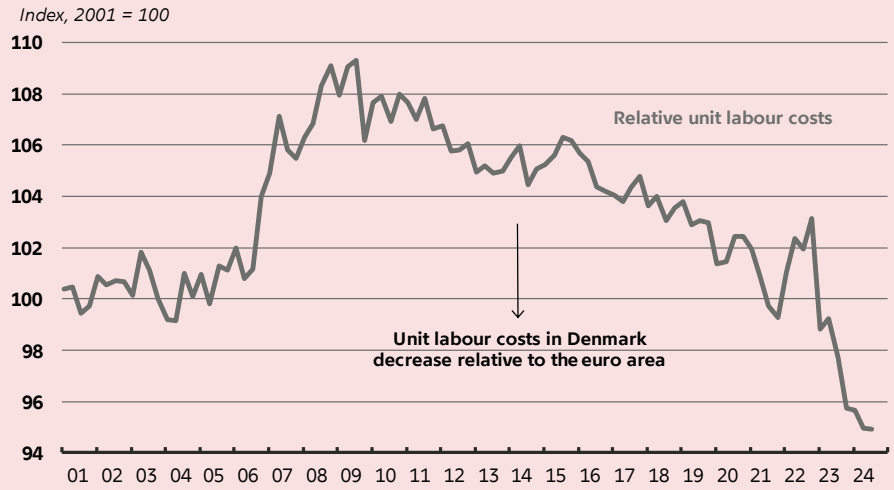
### Moderate wage increases also dampen Danish inflation relative to the euro area

In addition to price convergence, the lower Danish inflation rate compared to the euro area is probably also related to the more moderate wage increases in Denmark since the financial crisis. According to economic theory, companies typically set their prices as an addition to costs, of which wages make up a significant proportion. It is therefore possible that the fall in relative Danish unit labour costs vis-à-vis the euro area has put independent downward pressure on consumer prices in the Danish economy, see chart 10. The decline in Danish unit labour costs relative to the euro area mainly reflects stronger productivity growth in Denmark without correspondingly higher wage increases. Demand and supply conditions in the labour market also play a role for wages, and here, for example, access to foreign labour and labour market reforms have continuously strengthened the Danish labour supply[9].

**CHART 10**

**Lower Danish inflation than in the euro area may be related to a decline in relative unit labour costs after the financial crisis**

Unit labour costs in Denmark relative to the euro area




Note: Unit labour cost is the labour cost per unit produced.
Source: Macrobond, Eurostat and own calculations.

### Model calculations indicate that a high price level and moderate wage increases dampen Danish inflation relative to the euro area

The previous sections highlighted several macroeconomic explanations for the weaker price development in Denmark than in the euro area, such as price convergence, moderate wage increases and economic fluctuations. To understand their quantitative significance, a decomposition of the historical inflation differential is performed here using a statistical model, see the appendix for a description of the methodology. The methodology is inspired by a number of international studies that have previously analysed inflation differences within the euro area, see box 1 for more details. The idea behind the approach is to use fluctuations over time and between countries to establish some general drivers

[9] See Kristoffersen (2018) for an analysis of the reasons for the low Danish wage increases, which emphasises that lower average unemployment compensation and weak price development have contributed to low nominal wage increases in Denmark since 2013 and up to 2018.

of inflation differences and then apply them to understand the specific Danish situation.

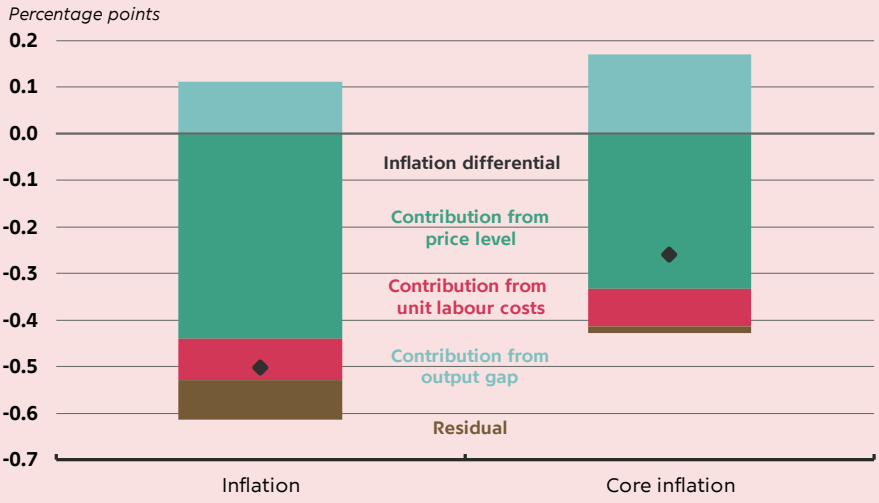
The results indicate that price convergence linked to the higher Danish price level has on average dampened annual inflation in Denmark relative to the euro area by around 0.4 percentage points from 2013 to 2023, see chart 11. Alternatively, the modelling exercise indicates that Danish inflation should be lower than in the euro area, given the macroeconomic conditions and especially the higher price level in Denmark. This suggests that the inflation difference reflects a structural adjustment of price levels in Denmark and the euro area.

The decline in relative Danish unit wages since the financial crisis has also put a damper on Danish inflation, while a stronger economic situation measured by the relative output gap has pushed up consumer prices in Denmark[10]. The modelling exercise suggests that, on average, the state of the economy has contributed less to the inflation differential than price convergence. This is natural to a certain extent, as economic fluctuations by definition even themselves out in the long run, although they also contribute to different price developments in Denmark and the euro area in some periods.

**CHART 11**

**Model calculations show that a high price level and moderate wage increases explain a large part of the inflation difference between Denmark and the euro area**

Contribution to average inflation difference between Denmark and the euro area in 2013-2023




Note: See box 2 in the appendix for a detailed description of the methodology behind the decomposition of the inflation differential between Denmark and the euro area.
Source: Own calculations.

**Model calculations suggest that price convergence has dampened annual Danish inflation by around 0.4 percentage points relative to the euro area in 2013-2023**

[10] As in previous empirical studies, the output gap is used as an indicator of the economic situation, see also the discussion in box 1. It is possible that there is a mutual dependency between the output gap and prices, i.e. the state of the economy affects inflation and inflation provides signals about the state of the economy. However, if trend-adjusted GDP based on a HP filter is used instead as an economic indicator for the Danish economy, which by construction does not depend on inflation, it gives approximately the same result as in chart 11.

**BOX 1**

## Previous empirical studies find that price convergence plays a role in inflation differentials within the euro area

A number of international studies based on panel regressions generally confirm the impression from chart 11 that price convergence is a driver of inflation differentials within the euro area. For example, Lane et al. (2003), Checherita-Westphal et al. (2023) and ECB (2012) all find that a higher price level in the previous year is associated with lower subsequent inflation. This means that there is a common equilibrium price level that each country gradually adjusts towards. Specifically, their estimates indicate that a one per cent increase in a country's price level against the euro area is associated with a decrease in relative inflation of approximately 0.02-0.05 percentage points. This results in slightly faster price convergence than estimated in this analysis and probably reflects differences in the time period considered, data sources and model specification.

In addition to price convergence, the above studies find a positive effect of relative output gaps on inflation differentials, similar to this analysis. This means that if a country is experiencing a stronger economic boom than the rest of the euro area, it will also lead to higher inflation in that country. In addition, inflation differentials have been linked to a variety of macroeconomic indicators, and there is also evidence that a common economic shock may affect consumer prices differently across euro area countries. Lane et al. (2003), for example, emphasises that fluctuations in the nominal effective euro exchange rate create inflation differences, partly because euro countries have different degrees of trade openness. Furthermore, Checherita-Westphal et al. (2023) concludes that discretionary fiscal policy has not contributed to inflation differentials in the euro area, except via a possible indirect effect on the output gap. On the other hand, their analysis shows that rising unit wages in a country typically increase inflation relative to the euro area. This suggests that the build-up of economic imbalances has traditionally been an important driver of inflation differentials. In the years leading up to the 2008 financial crisis, the ECB (2012) argues that inflation differences in the euro area were created by over-optimism, lack of risk pricing and inappropriate national policies, after which the correction of economic imbalances took over as the driving force behind inflation differences. Their conclusion is supported by a statistical analysis that suggests that inflation expectations and country-specific risk premia both have explanatory power for inflation differences in the euro area.

Institutional conditions in labour and product markets, such as the degree of employee protection, can also cause inflation differentials by affecting the extent of inflation persistence[1] or the slope of the Phillips curve, see Jaumotte et al. (2012). This may be relevant to the Danish economy, where the labour market is flexible and characterised by easy hiring and firing. If the adjustment mechanisms in the Danish economy are generally better-functioning than in the euro area, the basis for periodic inflation differences is created, even if shocks to the economies are basically identical.

Finally, another branch of the literature analyses inflation differences in the euro area by looking at simple measures of dispersion, such as standard errors. The European Parliament (2022) notes that the increased inflation dispersion between euro area countries in 2022 was mainly driven by energy and food prices, as well as high inflation in the Baltic countries, while it was smaller in terms of core inflation and within the original euro area countries. In a longer perspective, according to the ECB (2003), there was significant inflation dispersion in the later euro countries from the early 1990s, which subsided towards the introduction of the euro in 1999. This suggests that the changeover to the single currency led to a more uniform price development in the euro area.

[1]The concept of inflation persistence describes how persistent inflation is, i.e. if inflation persistence is high, inflation this year depends on what it was the year before.

04

# Lower Danish inflation than in the euro area may persist for some time

It is difficult to predict how the inflation differential between Denmark and the euro area will develop in the coming years. Although consumer prices have risen less in Denmark than in the euro area in recent decades, there are still differences in price levels, even for traded goods. If the potential for price convergence is not yet realised and in the absence of unforeseen shocks to the economy, it is possible that the trend of lower inflation in Denmark will continue for some time.

**Conditions are in place for slightly lower inflation in Denmark than in the euro area if price convergence continues to unfold**

The possible continuation of the previous trend of lower Danish inflation is due to the fact that the prices of traded goods exposed to global competition are still higher in Denmark than in the euro area. Thus, the conditions are in place for further price convergence to favour lower Danish price increases than in the euro area in the future.

In the long term, the overall price level is closely linked to economic prosperity, as several services are not tradable across borders. If the Danish economy continues to grow faster than the euro area economy or the high level of savings eventually translates into increased demand, it could lead to higher price increases in Denmark over time. In such a scenario, it is possible that future inflation will initially be slightly lower in Denmark than in the euro area until traded goods have been competed down to approximately the same price level, after which the difference will depend more on the development of prosperity. When the prices of traded goods are closer together, Danish inflation may be slightly higher than in the euro area in case Danish wealth grows faster. On the other hand, if the growth path becomes more uniform, it suggests that the inflation differential is levelling out in equilibrium. Both scenarios are compatible with lasting price differences on non-traded products and do not imply complete price level convergence between Denmark and the euro area.

In any case, the modelling results in part 3 indicate that price convergence is a sluggish process and Danish consumer prices have fallen relative to the euro area despite the fact that prosperity in Denmark has already increased more for some years now. This suggests that price convergence may dampen Danish price developments relative to the euro area in the immediate future, as long as unforeseen shocks to the economy do not separately boost inflation in Denmark or reduce it in the euro area.

# 05
# Appendix

Box 2

## Statistical model for estimating drivers of inflation differentials

The estimated effect of different macroeconomic conditions on the inflation differential between Denmark and the euro area is based on the panel regression model below:

$$Inflationdiff_{i,t} = \alpha + \beta * Prisniveau_{i,t-1} + \gamma * Gab_{i,t} + \delta * ULC_{i,t} + \varepsilon_{i,t}$$

Where the following notation is used:

- $\boldsymbol{Inflationdiff_{i,t}}$ is the difference between the annual HICP inflation in country i and the euro area measured in percentage points. Data is obtained from the Eurostat database via Macrobond.
- $\boldsymbol{Prisniveau_{i,t-1}}$ is the price level of household consumption expenditure in the previous year in country i measured as the percentage deviation from the price level in the euro area. A significant negative coefficient is a sign of price convergence, i.e. a situation where countries with a high price level subsequently have lower inflation than countries with a low price level. Data is from the Eurostat database.
- $\boldsymbol{Gab_{i,t}}$ is the difference between the European Commission's estimates for the output gap in country i and the euro area. The variable thus measures whether a country is in a different economic situation than the euro area as a whole. For Denmark, Danmarks Nationalbank's own estimate of the output gap is used.
- $\boldsymbol{ULC_{i,t}}$ is the difference between the annual growth of unit labour costs in country i and the euro area measured in percentage points. The inclusion of this variable in the model reflects the fact that, according to economic theory, companies set prices as an addition to their costs. As labour costs make up a significant proportion of companies' total costs, differences in wage growth per unit of output are therefore a possible source of inflation differences. Data is obtained from the Eurostat database via Macrobond.

The model is estimated on data for 12 euro countries and Denmark in 2001-2023, i.e. Denmark, Belgium, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Netherlands, Austria, Portugal and Finland. By default, the model does not include a country-specific effect as it is not compatible with a common long-term equilibrium inflation across countries. The results of the estimation can be seen in table 1 in the appendix, which also contains the results for a similar model for core inflation. The contributions to the inflation differential between Denmark and the euro area in chart 11 are subsequently calculated as the product of the estimated elasticities in this table and the model variables calculated for Denmark. The idea behind the statistical model is to use fluctuations over time and across European countries to shed light on the driving forces behind the Danish inflation differential with the euro area.

A number of robustness checks have been performed on the results, e.g. by expanding the model specification to include lagged inflation differentials, household inflation expectations for the next 12 months, terms of trade, nominal effective exchange rates, GDP per capita, country-specific effects and a time-specific dummy for each year. However, none of these alternatives change the general conclusion that higher price levels, output gaps and unit labour costs have a negative, positive and positive effect on the inflation differential between a country and the euro area respectively.

**TABLE 1**

## Regression results

| Coefficient on explanatory variable | Inflation differential model $Inflationdiff_{i,t}$ | Core inflation differential model $Inflationdiff\_core_{i,t}$ |
|---|---|---|
| $Prisniveau_{i,t-1}$ | -0.0129***<br>(-3.93) | -0.0097***<br>(-2.61) |
| $Gab_{i,t}$ | 0.0829***<br>(4.84) | 0.1257***<br>(8.29) |
| $ULC_{i,t}$ | 0.1147***<br>(5.96) | 0.1050***<br>(6.42) |
| Constant | 0.0823*<br>(1.67) | 0.1291**<br>(2.22) |
| Country specific effect | No | No |
| $R^2$ | 0.1973 | 0.2970 |
| N | 299 | 286 |

Note: See box 2 in the appendix for a description of the statistical model. A *, **, *** indicates a significance level of 10, 5 and 1 per cent respectively. The number in brackets is the t-value.
Source: Own calculations.

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