Analysis

# Wage-price dynamics: a negative spiral?

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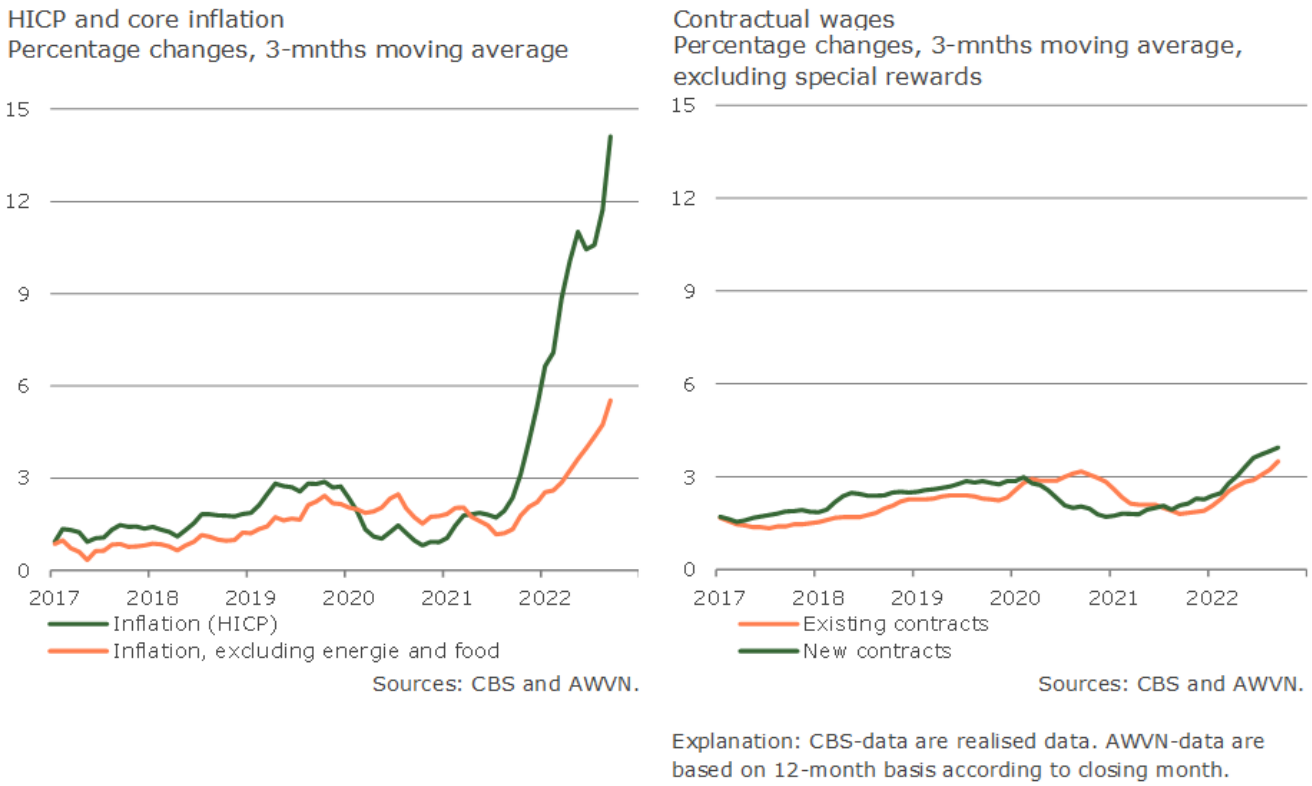
# 1 Introduction and main conclusions

Inflation in the Netherlands reached record levels in September 2022. Compared to a year earlier, prices were 17% higher on average. The energy price rise was even as high as 114%.[1] This raises questions among households, businesses and the government as to how long the surge in prices will continue. This will largely depend on foreign developments, particularly with respect to oil and natural gas prices. Wage developments are the most important factor from a domestic perspective. Indeed, a major proportion of companies' costs consist of wages. If wages rise significantly, companies will be pressured to raise prices further, especially if they are unable to sufficiently absorb that cost increase in their profit margins.[2] At the same time, workers want to be compensated for their loss of purchasing power due to high inflation through higher wages. These normal dynamics between inflation and wage growth are a point of extra concern in today's situation where prices are rising so rapidly. Could unprecedentedly high inflation lead to unprecedentedly high wage increases, thus fuelling inflation even further? Would this result in a higher risk of wage-price spiral, in which the economic interaction between wages and prices goes off the rails, causing damage to the economy? And what underlying economic factors are at work?

## Figure 1 Inflation and wage growth




Explanation: CBS-data are realised data. AWVN-data are based on 12-month basis according to closing month.

[1] On 31 October, Statistics Netherlands (CBS) published the first results of a new method of calculating energy prices for consumers. (link). According to the new data on gas and electricity price increases, energy inflation since autumn 2021 has been significantly lower than the current perception of energy prices. As a result, inflation should also be lower than published in recent months. As this new series is not yet available for statistical production, this study is based on the inflation rates according to the current method.
[2] Companies also have other adjustment options, such as increasing labour productivity through investment and innovations, improving energy efficiency, adjusting the production mix, etc.

Figure 1 on the left shows that inflation has increased sharply since mid-2021, which is shown here as a three-month moving average. The recovery from the Covid-19 recession was accompanied by bottlenecks in production chains and rising energy prices. The increase in the price of energy was revived in 2022 by the impact of the Russian invasion of Ukraine, resulting in sanctions and uncertainty about energy supplies. Inflation has now broadened to other goods and services, as shown by increased core inflation (inflation excluding energy and food). The right part of Figure 1 shows, on the same scale, that although average wage growth is increasing, it still lags far behind inflation. Wage growth in new collective labour agreements was 4% in the months from July to September 2022. Wage growth has thus increased substantially compared to a year earlier, and is now at its highest level in the past twenty years.

According to recent literature, a wage-price spiral would in any case require wage and price increases to affect each other and for this to happen sequentially, or with a delay. The resulting interaction then lasts for some time. This adjustment process need not be problematic in itself, which is why a much stricter definition states that wage and price increases must *reinforce each other* for a wage-price spiral to emerge. In the process, several factors can exacerbate the interaction between wages and prices. For instance, a wage-price spiral can be reinforced by employees still expecting high inflation, when actual inflation has already declined. A second reinforcing factor is the extent to which rising prices are automatically passed on in wages. In the case of automatic price indexation, wages react to inflation on a one-to-one basis, with a certain time-lag.

Looking at wage and price developments since 1996, on average it appears that a price increase (as measured through the GDP deflator) is fully reflected in nominal wages over time. Over a longer period of time, an inflation shock is reflected in comparably higher nominal wages. Conversely, however, an increase in wages does not lead to an equally large increase in prices, at least not over the course of several years. Part of the cost increase due to higher wages is then absorbed in the profit margin. The interaction between wages and prices mapped in this way, based on historical data for the Netherlands, suggests that the likelihood of an adverse wage-price spiral is currently small. While it is true that today's rapid rise in inflation means that a rise in wages is to be expected, this wage increase is less likely to lead to a renewed price impulse based on the wage-price dynamics observed in the past. This final aspect is important because current inflation is very high from a historical perspective, meaning that economic relationships, such as the interaction between wages and prices, may not hold their validity. That said, the interaction between wages and prices could have robust negative second-order effects even under current conditions. The macroeconomic impact, for instance on economic growth and employment, could be substantial, as seen during the stagflation period of the 1970s.[3] We explore this further using the DELFI macroeconomic model, with a scenario analysis of the impact of an inflation shock on wages and the rest of the economy in which we look at different wage-price simulations.

As these conclusions are drawn from an analysis of past data, we also look at a number of factors that may increase the risk of a wage-price spiral in the present economic situation. One important factor is the development of inflation expectations, which can play a role in wage negotiations. Surveys show that households' inflation expectations for the future have increased recently. Workers and households appear to base their expectations mainly on past inflation, which may lead to wage demands being fuelled by high actual inflation. Wage negotiations currently lead only sporadically to agreements on automatic and full price indexation, which is

[3] See Inflation is high, but context differs from the 1970s (dnb.nl).

another factor that would increase the likelihood of a wage-price spiral. For now, employers and employees seem to be opting for agreements with other, more temporary forms of indexation for actual price increases.

The results of this DNB Analysis indicate a low risk of a wage-price spiral in the Netherlands, also because corporate profit margins are generally healthy and wage growth need not lead to higher prices straight away. It is however crucial to prevent such a wage-price spiral. Various parties can contribute to this. DNB itself has an important responsibility to prevent a spiral through its involvement in the European Central Bank's monetary policy. The ECB pursues an inflation target of 2%, and to avoid a wage-price spiral, it is important to prevent high inflation expectations from persisting. For its part in limiting inflation, the government can ensure that the measures to compensate households and businesses for higher energy prices are as targeted and temporary as possible, and that the cost of these measures is covered. This will avoid creating additional inflationary pressures due to unnecessary stimulation of the economy. Finally, parties at collective bargaining tables should remain mindful of the harmful side effects of automatic price indexation on employment and the overall health of the corporate sector. Automatic indexation arrangements and full compensation for workers' loss of purchasing power increases the risk of a wage-price spiral.

There is scope for wage growth on average, however. In companies or industries where this is feasible, a reasonable starting point would be to let wages rise by the sum of labour productivity growth and the growth of the GDP deflator. This would enable the distribution of earned income between employers and employees to remain constant. Where companies' profitability and financial health allow, wage growth may exceed this sum. Higher wages may come at the expense of earnings growth, but they will help employees limit their real loss of income. Higher wages are also an obvious development in the face of labour shortages.

# 2 Insights from the literature

The current high inflation rate has triggered a wide-ranging debate among academics and policymakers about the risk of a wage-price spiral. This section discusses a number of insights and findings taken from the literature and highlights the complex nature of wage-price dynamics and the concept of a wage-price spiral.

## 2.1 Wage-price spiral in the economic literature

There is no uniform definition of a wage-price spiral. The main feature of such a spiral is a mutual dependency between an increase in wages and an increase in prices. Blanchard (1986) defines a wage-price spiral as the economic interaction between nominal wages and prices that emerges as wages and prices are adjusted at different times.[4] For example, if macroeconomic demand for goods and services increases, it will cause both average wages and average price levels to rise. Since companies do not adjust their wages and prices simultaneously, this process can continue for some time. When prices have risen ahead of wages, this signifies a drop in employees' real wages, which may lead to higher wage demands. Then, when wages indeed rise, companies' profit margins fall, prompting them to raise their prices. This creates a constant interaction between prices and wages. The essential feature of a wage-price spiral would then be its duration. When economic conditions change, the adjustment in aggregate wages and prices persists for a longer period of time because wages and prices do not change simultaneously.

Another, somewhat stricter, definition of a wage-price spiral involves an ever-accelerating interaction between wages and prices. A recent IMF overview study (Alvarez et al, 2022) defines a wage-price spiral as an episode where at least three out of four consecutive quarters saw accelerating consumer prices and rising nominal wages. The essential feature in this context is that the pace of wage and price increases keeps accelerating over some period of time. The BIS (Boissay et al, 2022) uses a similar definition, in which wages climb more rapidly than prices in a wage-price spiral, prompting companies to further raise their prices.

## 2.2 International periods of wage and price growth

Alvarez et al. (2022) conclude in their international sample that a wage-price spiral generally tends to be short-lived. Having observed rising, hence accelerating, wage and price inflation in the first four quarters, inflation generally stabilises again. This study uses the Wage Phillips Curve model to estimate what wage growth would be under normal circumstances.[5] According to that model, the change in nominal wages depends on price inflation in the recent past and the degree of tightness on the labour market, among other things. Averaging across their international sample, Alvarez et al. observe that at the end of a four-quarter period when increases in wage and price inflation are the norm, quarterly wage growth is higher than one would expect based on this Wage Phillips Curve. However, after that period, wage growth is back in line with model-based expectations. This study thus holds that wage-price spirals generally do not lead to long-lasting deviations from wage growth that can be explained on the basis of inflation and the labour market.

Suthaharan and Bleakley (2022) discuss the extent to which the oil price shocks of the 1970s gave rise to a wage-price spiral. They note that wages surged in developed countries at the time in response to high price inflation as employees sought to limit the drop in their real wages. However, the authors also argue that wages

[4] See Zeira (1989), Helpman and Leiderman (1990), and Musy and Pereau (2010) for variations on Blanchard's model (1986).
[5] See Ball and Moffitt (2001), Bonam, de Haan and van Limbergen (2018) and Domash and Summers (2022).

generally increased less than prices anyway. This, they observe, indicates a general pattern: if an economic development raises price inflation, wage growth often lags behind price inflation because wages are adjusted less frequently than prices.

All in all, it should be borne in mind that rising wages may play a role in further price increases. In this sense, Burdekin and Burkett (1992) consider that growth in nominal wages played an important role in German hyperinflation in 1920-1923. However, Suthaharan and Bleakley (2022) also mention cases where an economic development did raise inflation but barely affected wage growth. One such example is the impact of rising oil prices from 2009 to 2013. In countries such as the United States, these rising oil prices led to a surge in broader price inflation, while wage growth remained relatively stable. Another example is the depreciation of the British pound after the Brexit referendum in 2016. This depreciation increased inflation in the UK as imported goods became more expensive. However, inflation in domestic goods and services prices remained virtually unchanged, as did wage growth.

## 2.3 Determinants of wage-price dynamics

Future inflation expectations are a key determinant of wages and prices. For example, if employees expect inflation to remain higher for an extended period, they may strengthen their case for higher nominal wages in wage negotiations.[6] If companies expect high inflation, this could prompt them to raise prices further, as it would prevent their prices from being too low compared to competitors in the future. By anticipating price increases in this manner, companies also avoid having to adjust their prices too often.

Blanchard (2016) and Ball and Mazumder (2019, 2021) argue that inflation expectations have become more stable, both nationally and internationally. This suggests that households and businesses expect central banks' inflation target to be met in the long to medium term. However, these findings were made at a time when inflation had been low and stable for a long time, in an economy very different from today's situation with a war in Europe and skyrocketing energy prices. A recent study by Schwartzman and Ravindranath Waddell (2022) suggests that US companies are paying more attention to inflation rates now that inflation is high, and that they are factoring this into their pricing decisions. Galati, Moessner and Van Rooij (2022) hold that long-term inflation expectations are not well embedded in the European Central Bank's recent euro area inflation target.[7] Section 4 focuses on new studies into inflation expectations in the Netherlands.

A second determinant of the interaction between wages and prices is the level of inflation. High inflation may mean that companies want to adjust their prices more frequently, so changes in demand for goods and services feed through to inflation more quickly. This may contribute to a more pronounced interaction between prices and wages. In many countries, including the Netherlands, the inflationary response to demand for goods and services is weaker today than it was in the 1970s and 1980s.[8] However, this was a period of gradual decline in inflation. High inflation and strong fluctuations in demand and production costs are reasons for companies to adjust their

[6] Bonam and Smadu (2022) have analysed this for the Netherlands. See also Erken and de Groot (2022) and Leering and Harteveld (2021).
[7] By making use of a survey for the United States, Hajdini et al. (2022) conclude that a 1% increase in inflation expectations causes a 0.2% increase in income growth expectations. The effect in the other direction is insignificant.
[8] See, for example, De Veirman (2009), Ball and Mazumder (2011) and Blanchard, Cerutti and Summers (2015). The latter study concludes, among other things, that inflation in the Netherlands has been less responsive to demand since the mid-2000s than it had been since 1990.

prices more frequently.[9] Nakamura et al. (2018) showed that US companies often adjusted their prices in the late 1970s. This is relevant because inflation was high then and energy prices fluctuated widely, as is also the case today. If companies also frequently adjust their prices now, this could mean that inflation will react more strongly to demand.[10] The level of inflation can also affect the probability of a wage-price spiral via wages. Holland (1988) considers that wages respond more strongly to inflation at high inflation levels. Again, this implies that a wage-price spiral occurs at a faster rate when inflation is high.

Furthermore, companies' competitive position and market power play a role. If companies with less market power have lower profit margins, they are more likely to be forced to pass on changes in labour costs in prices. This would increase the risk of a wage-price spiral. The extent to which cost increases are passed on to consumers through higher prices generally depends on the market structure: the more market power ("pricing power"), the less a cost increase is passed on in the price (Hinloopen, 2022; Suthaharan and Bleakley, 2022). In their search formargin, companies with strong market power (e.g. a monopolist) will try to find a maximum trade-off between higher price and loss of demand. In full competition, companies have no market power and therefore no choice. Their margin was already non-existent and after a cost increase, they still have no margin. Cost increases are therefore entirely passed on to consumers. The market power of companies in other sectors is somewhere between these two extremes, and they can pass on cost increases to consumers to a greater or lesser extent. It should be noted that more labour-intensive sectors are more affected by higher wages as wage costs account for a larger share of total costs.

Finally, labour market conditions are important. If many employees are union members or if wages are negotiated more collectively, this strengthens employees' bargaining power in wage negotiations.[11] In such a situation, wages can be expected to adjust more quickly to any increase in prices. If wages are automatically indexed to the price level, high price increases will automatically lead to high wage increases.[12] Also, if wage agreements are concluded for a shorter period of time, or if many employees were hired under fixed-term contracts, the result will be that wages adjust more quickly to increased prices.[13] Moreover, the broader state of the economy plays a role in wage-price dynamics. In times of strong economic growth and a tight labour market, employees usually have a stronger starting position at the bargaining table and employers are more inclined to agree to wage increases. And the labour market is historically tight right now, measured by the number of vacancies per employee and the high proportion of employers experiencing problems due to staff shortages.[14] In each of these cases, increased wage growth also means a stronger rise in production costs, which could cause a further upsurge in inflation.

[9] This relationship is modelled in Ball, Mankiw and Romer (1988) and Dotsey, King and Wolman (1999). De Veirman and Schoenle (2022) examine the relationship between volatility and company-level price adjustments.
[10] De Veirman (2022) show that inflation reacts more strongly to changes in demand when companies adjust their prices more frequently.
[11] Bonam and Smadu (2022) and Erken and De Groot (2022) discuss the effects of a decline in the number of employees affiliated to a union on wage formation. See also Suthaharan and Bleakley (2022).
[12] Van Aarle, et al. (2022) observe wage-price spirals in Belgium, where wages are mostly automatically indexed.
[13] The proportion of employees with flexible contracts may also be an important factor in this context. Grajales, Uras and Vellekoop (2019) show that the wages of employees working flexible hours are adjusted more frequently in the Netherlands.
[14] See CBS and Ondernemersplein (available in Dutch only).

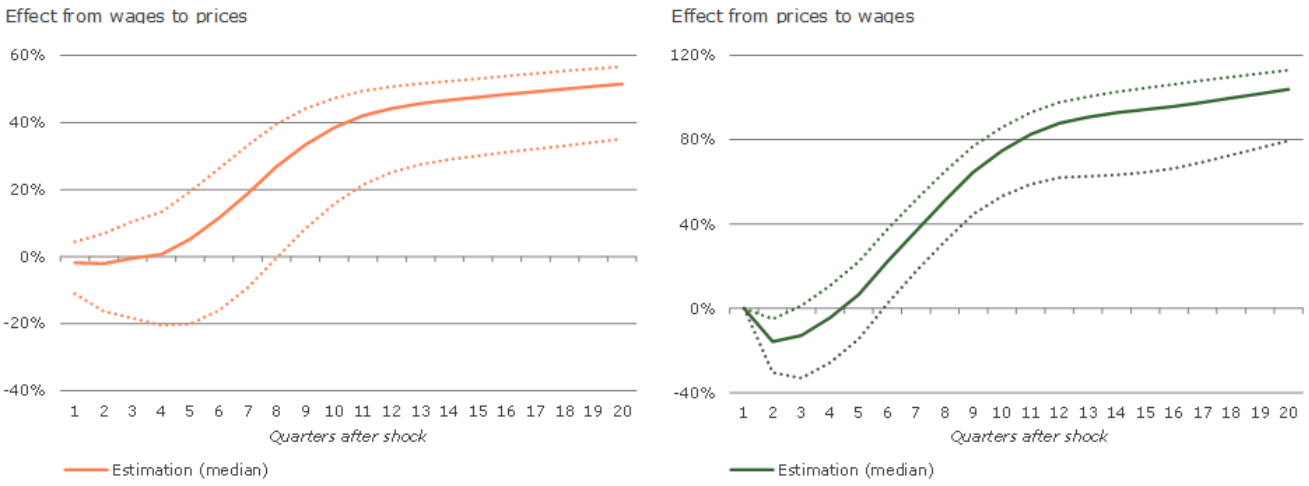
# 3 Wage and price correlation in the Netherlands

One of the factors determining the likelihood of a wage-price spiral is the extent to which changes in wages and prices are passed through. Section 3.1 quantifies this interaction between wages and prices with new estimates for the Netherlands. Section 3.2 then explores wage-price dynamics from a broader economic perspective, with estimates of the macroeconomic consequences of rapidly rising wages and prices.

## 3.1 Empirical analysis of the pass-through between wages and prices

We estimate the pass-through from wages to prices and vice versa using a so-called vector autoregression model (VAR model), which captures the dynamic relationship between different variables. This VAR model includes three variables: real GDP growth, wage growth and core inflation.[15] This approach is purely data-driven and not based on an underlying structural economic model, as in Section 3.2 in which the macro effects of an inflation shock are studied. We estimate the VAR specification with quarterly data for the Netherlands over the period from 1996 to 2022 (Q2). We use the estimated VAR to generate timelines of the variables after a boost to wage growth. The pass-through from wages to prices is then calculated as the ratio of core inflation to wage growth after five years. The pass-through from prices to wages is calculated in the same way following a shock in core inflation.[16] It is important to note that this analysis is based on historical data in a macroeconomic environment that is not necessarily comparable to the current situation. At any rate, inflation is now unprecedentedly high.

Figure 2 Interaction between wages and prices




Note: The dotted lines indicate the margin of reliability (16th and 84th percentiles).

The pass-through from prices to wages, estimated with the use of the VAR analysis, is full. However, the pass-through from wages to prices is not. Figure 2 shows that a shock in core inflation fully passes through into wage growth after five years. Conversely, a shock in wage growth only affects core inflation by half after five years. The partial pass-through from wages to prices may be explained by the fact that companies cannot or choose not

[15] Wage growth is measured as the year-on-year growth of compensation per employee. Core inflation is the year-on-year change of the harmonised index of consumer prices, excluding energy and food.
[16] The VAR estimate includes four lags of each of the three variables. The shocks have been identified with the use of a Cholesky decomposition. See Bobeica et al. (2021) for a detailed description of the working method.

to adjust their prices following an increase in wage costs. Part of the cost increase due to higher wages is then absorbed in the profit margin. This suggest that the degree of wage-price dynamics and interaction is not in itself such that a wage-price spiral will be triggered in all cases where wages or prices are shocked. Section 4.2 follows up on this suggestion, listing recent profitability figures to interpret absorption capacity.

## 3.2 Macroeconomic effects and wage-price dynamics following an inflation shock

Dutch inflation has recently skyrocketed, mainly due to rapidly rising international energy prices. In addition to the impact on wages and prices, this inflation shock has triggered all kinds of macroeconomic adjustment processes. DELFI, the macro model for the Dutch economy, was used to simulate these economic effects.[17] These simulations assume a substantial shock to domestic inflation, which is largely based on persistently higher energy prices, in order to clearly illustrate the interaction between wages and prices and its effects on GDP growth and unemployment.

Wage-price dynamics are described in DELFI by the interdependency between the wage setting equation and price setting equation. The theoretical framework of wage setting is based on the "Nash bargaining model" in which employers and employees jointly set the ratio of wages to profits. This results in a wage equation in which short-term wage adjustments contribute to restoring the long-term balance between wages, prices, labour productivity and unemployment. The price equation is based on a model of long-term business costs, including wage costs, plus a mark-up that is subject to tension or slack in the market for goods and services and import prices ("pricing to markets"), among other factors. These wage and price equations are estimated using economic data between 1971-2019 and determine the outcome of the `standard' simulation in Table 1 below.

The shock to HICP inflation is more than seven percentage points in the first quarter of the simulation and is based on a doubling of energy price inflation.[18] Given that this analysis particularly zooms in on the wage-price dynamics in the Netherlands and that it emphasises the comparison between different simulations, we assume unchanged monetary policy for simplicity's sake.[19] As economic adjustments take time, the table shows the differences in percentage terms compared to the baseline, i.e. the development of the Dutch economy without an inflation shock, in the fourth year after the shock.

[17] DELFI is also used for the six-monthly estimates with respect to Economic Developments and Outlook; see Berben, Kearney and Vermeulen (2018) a comprehensive model description.

[18] The HICP energy went up by 100% between Q2 2020 and Q2 2021. This doubling of the energy price level is more or less maintained for four years in the simulations.

[19] This simulation analysis is not framed as an international worldwide boost to energy prices. That would trigger a major monetary interest rate reaction with negative effects on global trade and on equity prices and housing markets. This would then lead to stronger negative volume effects for the Netherlands, but would allow inflation to be contained sooner. Our simulations, however, focus mainly on the comparison between different wage-price simulations, which provides useful insights even without international monetary framing.

## Table 1 Results wage-price dynamics after inflation shock

Percentage deviation from base line, after 4 years
(levels, unless otherwise stated)

| | Simulation scenario | | | |
|---|---|---|---|---|
| | standard | labour union | apc hicp | apc core |
| **Wages and prices** | | | | |
| Contractual wages business sector | 8.6 | 15.9 | 25.9 | 8.9 |
| HICP | | | | |
| - including energy and food | 19.4 | 21.3 | 25.9 | 18.6 |
| - excluding energy and food | 9.7 | 11.6 | 16.4 | 8.9 |
| **Real effects** | | | | |
| Gross domestic product | -8.0 | -8.3 | -9.3 | -7.6 |
| Unemployment (% labour force) | 5.5 | 6.2 | 8.0 | 5.1 |
| Real wages | -10.8 | -5.4 | 0.0 | -9.7 |

Explanation: Energy prices 100% higher than in base line during 4 years; real wages measured to contractual wages business sector deflated by HICP.

Table 1 shows that in the standard simulation, which is based on the historical relationship between wages and prices, wages more or less keep pace with core inflation (inflation excluding energy and food). On average, the negotiated wages increase by 8.6/4 = 2.1 percentage points *per year* faster than they would in the baseline due to the inflation shock, while core inflation is higher with an average of 9.7/4 = 2.4 percentage points *per year*. Increased wages and prices also cause unemployment to increase by 5.5 percentage points after four years compared to the baseline. Lower profits and higher operating costs reduce the demand for labour and weigh on business investments. Higher unemployment rates, less business investments and negative private expenditures result in an 8% lower GDP volume after four years than in the baseline.

A second wage-price simulation assumes that trade unions - in response to rapidly rising inflation - start giving more weight to wage growth relative to employment in wage negotiations with employers than in the baseline.[20] To model this, we simply halve the dampening effect of unemployment on wage growth in the wage equation. It is furthermore not beyond the realm of possibility that energy prices explicitly form part of the wage bargaining package, whereby companies compensate employees for increased energy costs when fixing wages.[21] In this second simulation, wages increase at a faster rate than in the standard simulation, as a result of which both HICP inflation and core inflation will also eventually end up higher (Table 1). In the wake of this, higher wages result in an additional increase of unemployment, leading in turn to lower GDP volume.

[20] This assumption will in essence lead trade unions to focus more on the working population, the insiders, than on the non-working population, the outsiders. See, for example, Layard, Nickell and Jackman (1991).
[21] In particular, it is assumed that instead of the GDP deflator, companies use the consumer price in the long-term trade-off between wages and nominal labour productivity.

Finally, we simulate the macroeconomic effects of collective labour agreements with automatic price indexation (api). We do so in a third simulation which assumes that HICP price increases are passed on to all wages by 100% in the following period. This automatic and full price indexation of wages drives up prices further, which in turn are fully passed on in wages. The results are telling. After four years, the average wage increase is about three times the size as in the standard simulation, causing the core inflation to practically double. The economic situation has deteriorated sharply by then: although real wages, by definition, remain constant in this extreme scenario, unemployment rises by 8 percentage points above the baseline after four years and the GDP volume is down by around 10%. Conversely, if wages are indexed to core inflation only (fourth simulation), the macroeconomic effects of the increase in energy prices are still unfavourable, but the effects are considerably milder than when indexed to HICP inflation. Table 1 shows that automatic price indexation to core inflation leads to similar outcomes as the standard simulation, in which nominal wage growth keeps pace with nominal labour productivity in the long term.

In summary, an inflation shock caused by increased energy prices produces significantly more negative economic effects as soon as wage growth is automatically indexed to inflation. It matters whether the indexation is to headline inflation (HICP) or core inflation (HICP excluding energy and food, see also Figure 1). In the latter case, the effects hardly differ from the standard simulation, based on normal dynamics between wages and prices.

# 4 Risks of a wage-price spiral

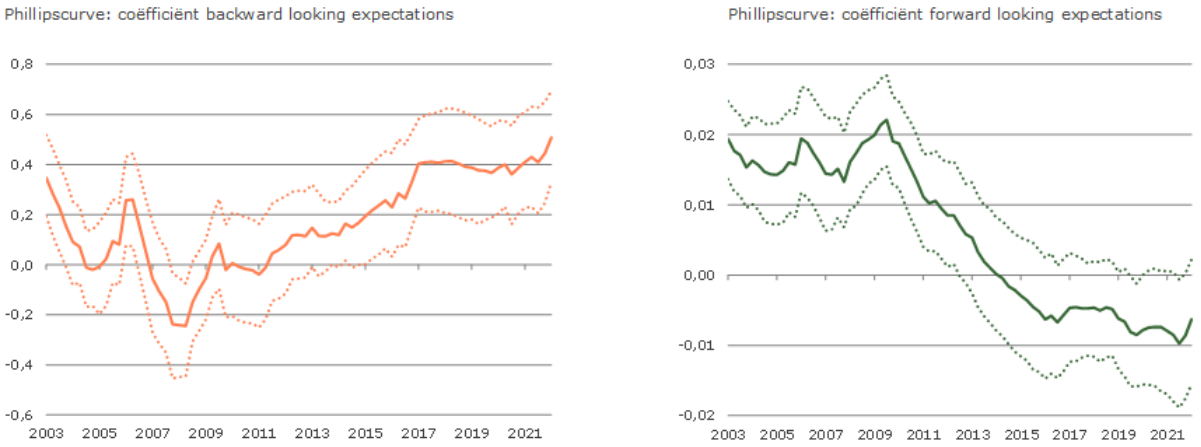
Although the average wage increase in the Netherlands is currently still lagging behind inflation, certain signs in the economy may indicate increasing risks of a wage-price spiral. We focus below successively on the impact of increasing inflation expectations, the room for wage growth at sectoral level and at the impact of wage indexation.

## 4.1 Higher expected inflation

### 4.1.1 The impact of inflation expectations on wage growth

One key factor determining the pass-through of prices to wages are the inflation expectations of workers and trade unions, as these play a role in wage negotiations. Inflation expectations can be both 'backward-looking expectations' and 'forward-looking expectations'. Backward-looking expectations assume that future inflation will more or less remain as it was in the past. Forward-looking expectations make use of more information than just past inflation to predict future inflation. In practice, inflation expectations will have both backward-looking and forward-looking components, where the relative importance of both may change over time.

Figure 3 Impact inflation expectations on wage growth




Notes: Estimated using Bayesian methods. The dotted lines indicate the reliability margin (16th and 84th percentile).

The impact of inflation expectations varies over time. For the Netherlands, we estimate this impact by making use of a Phillips wage curve. This is a supposed linear relationship that explains wage growth by a constant, the unemployment rate, labour productivity, backward-looking inflation expectations and forward-looking inflation expectations, and historical wage growth.[22] The model is estimated using quarterly data for the Netherlands over the period Q1 1998 to Q2 2022. Figure 3 on the left shows that the estimated impact of backward-looking inflation expectations on wage growth had been relatively low during the 2008-2009 financial crisis, but that it has risen in recent years. The impact of forward-looking inflation expectations demonstrates a reversed pattern. It has, in fact, decreased in recent years. See Figure 3, on the right-hand side. The relative importance of

[22] Wage growth is measured as the year-on-year growth of collective bargaining wages. Labour productivity is measured as the year-on-year growth of the GDP/employee ratio. Backward-looking inflation expectations are measured as the average consumer price inflation of the past four quarters. Forward-looking inflation expectations are derived from the Consumer Survey of the European Commission, which asks consumers about their prediction of the price level in twelve months' time.

backward-looking inflation expectations in wage-price dynamics thus appears to be increasing, which in itself implies that a period of higher inflation may have longer-lasting effects on wage growth.

### 4.1.2 Inflation expectations of households are rising

Since December 2019, in a special module of the DNB Household Survey a representative group of the Dutch population is asked on a monthly basis about their perception of current inflation and their inflation expectations for the short-term (the next year) and long-term (ten years from now). These perceptions were stable during the first years of the period studied (see Figure 4, on the left). The middle (or, median) of all perceptions for current inflation thus remained unchanged at 2%. When actual inflation rises and clearly exceeds 2%, this perception also rises, albeit with a slight delay. In September 2022 the median perception of current inflation is 11.3%, while the actual HICP inflation for the Netherlands comes to 17.1%.

Figure 4 Inflation perception and -expectations households
Percentage changes preceding year


Source: DNB Survey, Centerpanel, StatLine (CBS).

In the wake of perceived inflation and actual inflation, inflation expectations have also surged for the short term (see Figure 4, in the middle). In September 2022, the median expected inflation in the next twelve months equals 9%. Long-term inflation expectations have also increased (Figure 4, on the right). The median expectation of all respondents is that the twelve-month inflation will be equal to 5% in ten years' time. Worth noting here is that even when inflation was close to zero, respondents reported relatively high long-term inflation expectations, making the increase in expected long-term inflation much more limited than for short-term inflation, i.e. 7 percentage points versus 2 percentage points compared to the first half of 2021.

The results from the survey prompt some observations.[23] First, the responses show that the average (median) consumer barely reacts to current price developments in periods of low inflation, if at all. With prices of all goods soaring, and certainly those of highly prominent goods and services such as energy and food, price developments have become much more relevant to consumers' purchasing power. Their estimates of current inflation and expectations of future inflation therefore now react much more directly to changes in prices. Second,

[23] For more information, see Galati, Moessner, Van Rooij (2022) 'Reactions of household inflation expectations to a symmetric inflation target and high inflation', DNB Working Paper 743 (new version available upon request).

developments show that inflation expectations have an important backward-looking component. Short-term expectations depend to a large extent on current estimated inflation. Also, long-term expectations are not insensitive to developments in current inflation. Nevertheless, the respondents do assume that inflation will not remain at its current level and are therefore also looking ahead. Both short-term and long-term expectations are lower than estimated current inflation. However, respondents do assume some persistence in inflation, in the sense that their inflation expectations remain high in the coming year.

## 4.2 Wage growth at the sectoral level

There is no uniform measure to assess whether and exactly what margin there is for wage growth. It therefore seems sensible to look at a wide range of indicators, such as the labour income share (LIS) which represents the share of the labour income in total value added (national income). We can also look at the financial position and profitability of the businesses and firms.[24] A comparison between current levels and long-term averages yields a useful qualitative interpretation of the margin for wage growth and the differences between sectors.

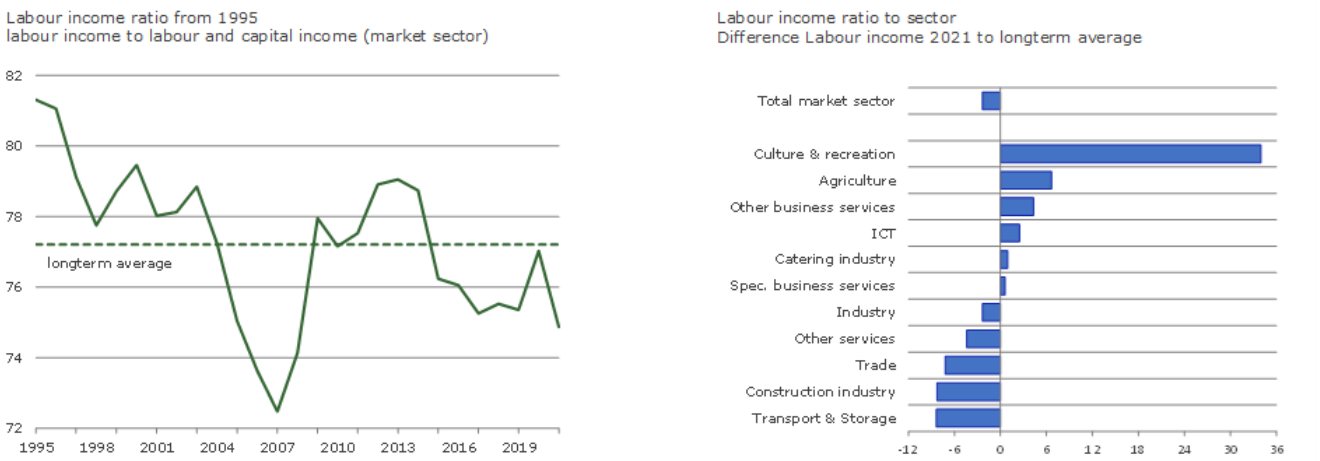
Both data on the sectoral LIS and companies' current financial position suggest that there is scope for higher wage growth in several sectors, apart from labour productivity growth. A caveat in this regard concerns the negative impact of high energy costs on corporate profits. Previous scenario analyses show that the sharply increased energy prices have a limited hold on the profitability of Dutch companies at macro level.[25] However, these scenarios do not provide an answer to the question of what the consequences are for wage growth rates. Arguably, higher energy costs lead to a less favourable financial position of companies than most recent data show and thus strain the room for wage growth. Additionally, the most recent sectoral data on the LIS and the financial position of Dutch companies relate to 2020 and 2021. Nevertheless, given the strong and broad-based economic recovery in 2021 - despite the various lockdowns and contact-limiting measures and owing to the generous recovery package - it is plausible that the financial position of Dutch companies at macro level and sectoral level has not deteriorated broadly speaking although there can be substantial differences across the various sectors.

The use of the LIS as a benchmark implicitly suggests that the LIS has some desired or long-term equilibrium level. From that perspective, we assume that the LIS may increase on a macroeconomic level, and when it does, that it will be from a comparatively low level.[26] The LIS for businesses and firms was below the long-term average in 2021, indicating some scope for wage growth at macro level. Indeed, an increase in nominal wages, at constant nominal labour productivity, leads to a higher LIS.[27] The series published by Statistics Netherlands (1995-2021, Figure 5, on the left) arrived at 74.9% in 2021, which is 2.3 percentage points below the long-term average. In view of the LIS by sector, there mainly appears to be room for wage growth in manufacturing, construction, trading, transport & storage, and other services. In these sectors, the LIS was below, and in some cases well below, the long-term average (see Figure 5, on the right). In other sectors, the situation was markedly different. In the culture and recreation sector, the LIS was even 32 percentage points above the long-term

[24] See "Stable distribution of labour and profit income despite coronavirus crisis" (dnb.nl).
[25] See Higher energy costs have limited impact on corporate profits (DNB, 18 July 2022)
[26] Ter Weel et al. warn against a too rigid interpretation of the LIS (2018).
[27] Simply define the LIS as wL/PY, with (w) being the wage rate, (L) the number of employed people, (P) the GDP deflator and (Y) the real national income. For constant LIS, the percentage growth of (w) should then be equal to the percentage growth of PY/L, i.e. nominal labour productivity. This is the conceptual definition. A further explanation is available in the DNBulletin, for example, A currently relatively low alternative LIS (dnb.nl) (available in Dutch only).

average in 2021. This was for a large part related to the Covid-19 pandemic. The crisis caused production and profitability in this sector to plummet, while the wage bill fell to a lesser extent due to temporary emergency measures (NOW). The sectoral breakdown of the LIS also shows that the scope for wage growth is more limited in some large sectors, such as business services.

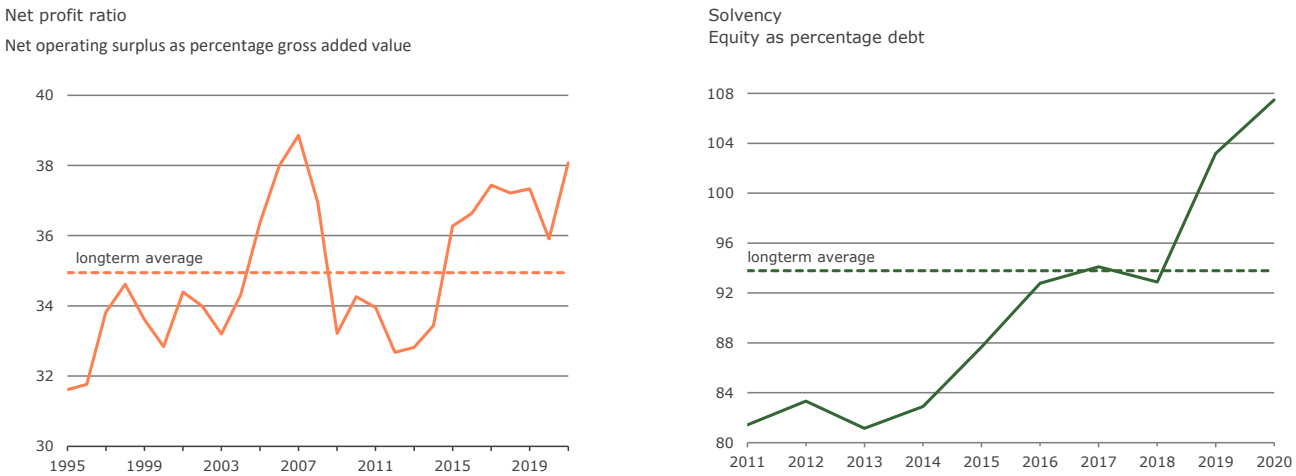
Figure 5 Labour income ratio




Source: Statistics Netherlands (CBS)

Companies' financial health and profit margins also indicate a good macroeconomic starting position and suggest room to absorb some wage growth. Different indicators for profitability show that the profit ratio, which can be defined as operating surplus/gross value added, exceeded the long-term average (see Figure 6, on the left). Consistent with the sectoral LIS, the gross and net profit ratio was above average in construction, transport, trading and manufacturing in 2021. However, profitability alone does not determine the margin for wage growth. This margin also depends on the companies' buffers. Indicators for this include the debt ratio (debt/balance sheet total) and solvency (equity/debt). Figures on this are considerably delayed, with most recent figures relating to 2020. The information on the debt ratio and solvency show that many Dutch companies had ample financial buffers, even in the midst of the coronavirus crisis. The debt ratio in 2020 was lower than the 2011-2020 average, and firms' solvency was above average (Figure 6, on the right). This favourable starting position is widely supported at industry level. None of the market sector industries had a higher debt ratio in 2020 than the 2011-2020 average, and solvency was also above average in all these industries.

Figure 6 Financial indicators business sector




Source: CBS

## 4.3 Labour market and wage setting

The risk of a wage-price spiral increases if wages respond with a degree of automatism to previously realised or expected inflation for the coming year. This risk appears to be low at the moment, as the number of collective labour agreements containing clauses on automatic price indexation is limited in the Netherlands. Among more than 800 collective labour agreements, only a few dozen have some form of price indexation. In total, these collective labour agreements with automatic price indexation pertain to about ten thousand employees. This represents less than 1% of the total labour force. Some of these collective labour agreements with automatic price indexation can be found with companies in the transport and logistics sector. Viewed over time, from 2013, there is no trend towards more indexation. An exception to this are the collective labour agreements for university medical centres and the collective labour agreement for maintenance and repair of dwellings that were concluded at the end of last year. Previously, these agreements did not include any indexation.[28] In response to the high inflation, the employers' association AWVN reports that employers and trade unions more frequently agree to a one-off nominal payment than automatic indexation.[29]

[28] These collective labour agreements pertain to a relatively high number of employees, i.e. almost 100,000. For these collective labour agreements in particular, there has recently been a discussion about the previously agreed link. See press releases *link*; *link*) *(available in Dutch only)*.
[29] See AWVN's press release (available in Dutch only).

# 5 Conclusions and policy issues

Our analysis shows that no wage-price spiral is currently emerging in the Dutch economy. Inflation is at an unprecedented high, in an international environment that has very profound effects on daily life. Nevertheless, current wage developments still lag significantly behind inflation, as well as core inflation (inflation excluding energy and food prices). On average, there is room for wage growth in many industries. Taking a longer-term view, the labour income share (LIS, i.e. ratio of employees' income to national income) has declined and stands below the long-term average in many industries. The starting point for wage growth could thus be to keep the LIS stable, in other words to maintain a stable income distribution between workers and employers. The labour income share will, on balance, remain constant if wages rise in line with nominal labour productivity growth. Put differently, that is the sum of real labour productivity growth and the growth of domestic prices (the GDP deflator). With regard to employees, however, this could still lead to a sharp fall in their real wages, as consumer prices (the HICP) in current economic conditions rise much faster than the GDP price that is applied to deflate profits and nominal labour productivity. Depending on the stance of each particular sector, it may then be possible that nominal wages grow at a slightly higher rate, implying weaker real income growth of companies. Sustained wage growth at the headline (full) rate of inflation is not a good idea, and would increase the risk of a wage-price spiral.

Even if there is no wage-price spiral at present, care must be taken to avoid fuelling the risk of it. For instance, wages will have a stronger response to price increases if they are linked to HICP inflation via automatic price indexation arrangements. Currently, this only seems to be the case for a number of collective labour agreements. It is also vital to try to curb further increase of core inflation and inflation expectations as much as possible. The European Central Bank’s monetary policy is the appropriate means for this. However, the government’s proposed tax policy to support households’ purchasing power is stimulating the economy and has an underlying inflationary effect, making it all the more important to scale back these measures in time and to limit them to society’s most vulnerable groups.

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