

# Wages, inflation and a negative supply shock

Alfred Stiglbauer<sup>1</sup>

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The sharp increase in inflation rates to 10% and higher that we have seen over the past months as a result of a negative, import-driven supply shock poses a serious challenge to wage setters. So far, collectively bargained wages have barely reacted to the current rise in inflation. However, given empirical estimates of wage equations and the institutional features of wage bargaining, it can be expected that wage growth will respond to higher inflation with a lag. Forward-looking indicators of negotiated wages also point to higher future wage growth. This raises the question as to what extent wage growth should compensate for inflation. We argue that, based on the implicit aim of collective bargaining of keeping the wage share constant, nominal wages should grow in line with labor productivity as well as the increase of output prices or core inflation rather than in line with total consumer price inflation.

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HICP inflation has recently reached heights not seen in decades in Austria and the euro area, amounting to 11.0% and 10.0%, respectively, in September 2022. The sharp increase in inflation, which is due to negative supply shocks in imported energy goods and food products,<sup>2</sup> poses a serious challenge to wage setters. In this paper, we analyze the appropriate extent to which wages should react to this inflation increase in Austria and the euro area without jeopardizing price stability. The paper is structured as follows: Section 1 presents some stylized facts about the relationship between wage growth and inflation. Section 2 discusses why collectively bargained wages have barely risen so far and discusses the outlook for wage growth. In section 3, we argue that wage negotiations should be guided by output prices or core inflation rather than full consumer price inflation (CPI). In doing so, distributional conflict would be avoided, and the risks of a wage-price spiral would remain contained.

## 1 Wage growth and inflation: some stylized facts

Empirical observations and economic theory suggest that aggregate wage growth and inflation are interrelated in a complex way: Typically, employees and unions seek to protect the purchasing power of wages, i.e., they do not want wages, deflated by consumer prices (i.e., real consumption wages), to fall, and hence they argue that when expected prices increase, so should wages. In addition, workers seek to reap the gains from rising real incomes, which implies that wages should also grow in line with labor productivity.<sup>3</sup> Conversely, (productivity-adjusted) wages are an important cost factor for firms<sup>4</sup> and hence affect prices. The ratio of

<sup>1</sup> Oesterreichische Nationalbank, Business Cycle Analysis Section, [alfred.stiglbauer@oenb.at](mailto:alfred.stiglbauer@oenb.at). Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the OeNB or the Eurosystem. The author would like to thank the referee as well as Gerhard Fenz and Christian Ragacs (both OeNB) for their helpful comments and suggestions.

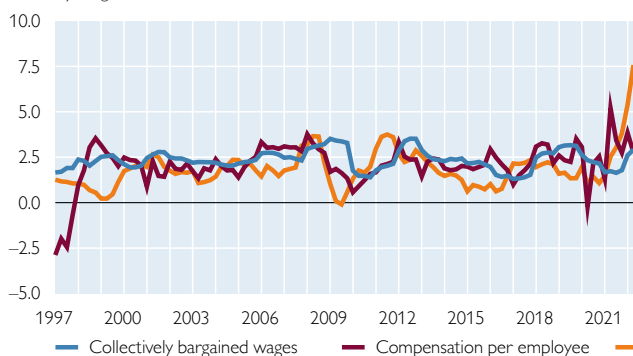
<sup>2</sup> See OeNB (2022) for details on the evolution of energy and food prices.

<sup>3</sup> In addition, cyclical conditions affect the bargaining power of workers and thus wage growth.

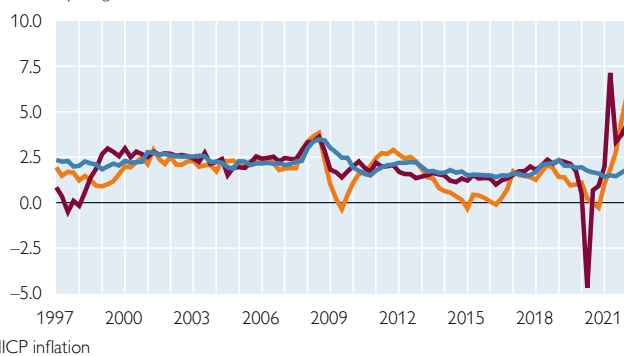
<sup>4</sup> According to Statistics Austria, the share of the compensation of employees in the total production value of the Austrian economy was 27.5% in 2020.

**Wage growth and inflation from Q1 1997 to Q2 2022****Austria**

Year-on-year growth in %

**Euro area**

Year-on-year growth in %



Source: Eurostat, ECB.

Note: The collectively bargained wages series for the euro area excludes bonus payments.

wages to output prices, i.e., the real product wage, is an important determinant of firms' profitability.

How have wage growth and inflation evolved historically? Chart 1 depicts two measures of wage growth and inflation for Austria and the euro area since 1997. The recent surge in inflation (orange lines) is clearly visible. The blue lines represent the growth of collectively bargained wages.<sup>5</sup> There are two further commonly used measures of aggregate wage growth from the national accounts which are based on the compensation of employees. However, these measures have been severely distorted by the COVID-19 shock and pandemic-related policy interventions like job retention schemes.<sup>6</sup> One such measure is compensation per employee (the red lines in the chart). In Q2 2020, compensation per employee fell due to a sharp contraction in working hours (partly mitigated by job retention schemes). After a normalization of earnings, there was a corresponding upward spike in compensation per employees four quarters later. The other measure, compensation per hour, fluctuated even more strongly and is thus not shown in chart 1. Because of these distortions, this paper focuses on collectively bargained wages, which are usually agreed between unions and employer federations. Given that union coverage and hence the share of workers whose wages are subject to collective bargaining is high, negotiated wages strongly affect actual earnings. (In Austria, the union coverage rate is 94%, compared to the euro area average of 75%.<sup>7</sup>)

<sup>5</sup> Source: the index of agreed minimum wages (Tariflohnindex 2016) published by Statistics Austria and the series for negotiated wages compiled by the ECB, respectively. The latter series is the one without one-off payments, which play an important role in Germany.

<sup>6</sup> Due to their different designs, job retention schemes are treated differently in national accounts, therefore compensation-based wage measures are not comparable across countries.

<sup>7</sup> According to the adjusted union coverage measure in the OECD-IAS-ICTWSS database (<https://www.oecd.org/employment/ictwss-database.htm>), bargaining coverage in Austria is 98% (2019). For all euro area countries, the average coverage rate, weighted by the number of employees, is 74.5%. Bilgili (2019) reports the somewhat lower coverage rate of 94% for Austria that is cited in the main text.

The chart suggests that the growth of collectively bargained wages correlates with past inflation. One reason why wages react with a lag is that inflation expectations in wage setting tend to be backward looking. Based on estimates of a large number of wage Phillips curve specifications, the preferred specifications included lagged inflation as an explanatory variable<sup>8</sup> for both Austria and the euro area as a whole, respectively (Nickel et al., 2019).

How large is the effect of inflation on wages? Estimated wage Phillips curves typically find a coefficient that is positive, but smaller than unity (IMF, 2022; Nickel et al., 2019). These results capture rather short-term effects. According to Fenz et al. (2019), who estimate wage equations for the Austrian economy with an error-correction specification, the short-term effect of inflation is around 0.5. They also find that there exists a long-term one-to-one relationship between wage and price levels.<sup>9</sup>

## 2 How wages have reacted to high inflation so far

So far, aggregate negotiated wages have barely reacted to the recent increase in inflation (chart 1). According to the latest monthly data on negotiated wages, wage growth was 3.2% in Austria in August and 2.6% in the euro area in July 2022.

### 2.1 Why negotiated wages react to inflation with a lag

Collective bargaining is often guided by past inflation. For example, in Austria, it is common practice that past CPI inflation forms the starting point of wage negotiations. The backward orientation of bargained wages<sup>10</sup> is reinforced by formal wage indexation and statutory minimum wages, two institutional features that are not present in Austria, but play a role in a number of euro area countries. Wages that are subject to formal indexation and statutory minimum wages are typically adjusted to past inflation. While formal indexation and statutory minimum wages are not governed by collective bargaining, they may have important repercussions for bargained wages as sector- (firm-) and occupation-specific minimum wages have to be adjusted accordingly.<sup>11</sup>

Wages can also be expected to react relatively slowly to inflation because collectively bargained wages are normally only adjusted when collective agreements expire. While in Austria, the usual duration of collective agreements is 12 months, it is more than 24 months in the euro area.<sup>12</sup> Moreover, it has to be considered that wage agreements are staggered – not all agreements are renewed at the same time.

Given that inflation is likely to substantially exceed nominal wage growth in 2022, there will be high real wage losses and, as a result, decreases in the wage

<sup>8</sup> The specifications also include productivity growth and a measure for labor market slack.

<sup>9</sup> The authors find a cointegrating relationship between hourly wages, productivity per hour, prices and trade openness.

<sup>10</sup> However, the current high-inflation environment may lead to more forward-looking inflation expectations.

<sup>11</sup> Economy-wide formal wage indexation is relevant only in Belgium and Luxembourg. The share of employees in these two countries amounts to 3.3% of all euro area employees. Statutory minimum wages are relevant for some 5.4% of euro area employees. This number is based on a Eurostat estimate of the share of minimum wage earners in the relevant countries. See [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Minimum\\_wage\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Minimum_wage_statistics).

<sup>12</sup> The employment-weighted average of the individual durations of collective agreements taken from the ICTWSS database is 24.8 months.

share. For Austria, we expect a real wage loss in the order of 5% for negotiated wages (and somewhat less for wage measures that are based on the compensation of employees) based on the wage projections in the OeNB's June economic outlook and its most recent inflation forecast.

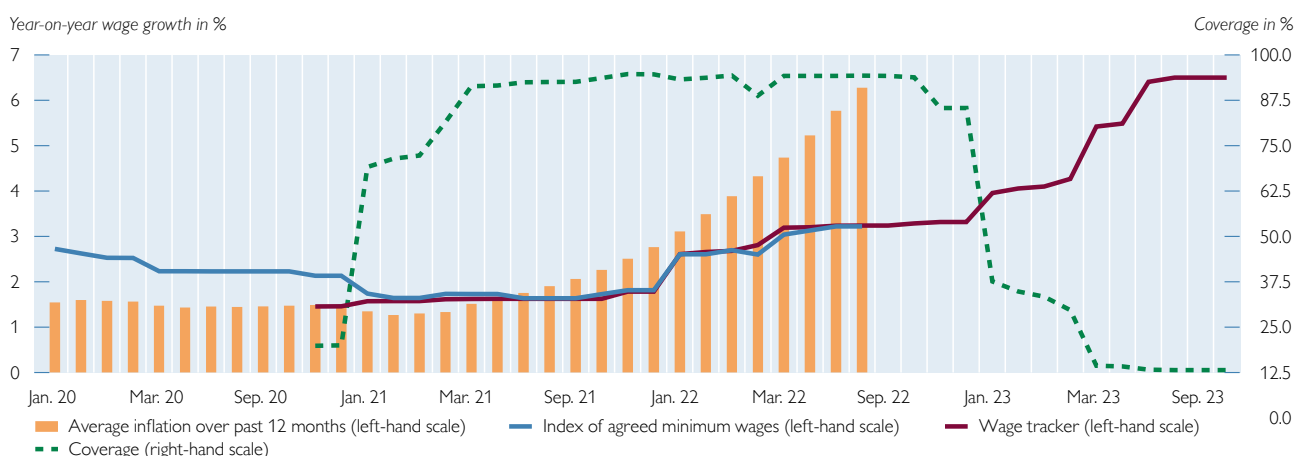
## 2.2 What is the outlook for negotiated wages?

Aggregate wage growth tends to react slowly to recent wage settlements when their weight in the total wage sum is low. To get a better idea of how wages are responding to the increase in inflation and an indication of how wage growth is likely to evolve in the future, let's have a closer look at the most recent wage agreements.

Chart 2 shows a comparison of aggregate wage growth up to the present and future wage growth implied by recent wage agreements in Austria. The blue line depicts growth in negotiated wages according to the index of agreed minimum wages. Wage growth has been increasing since autumn 2021, when the 2021/2022 wage round<sup>13</sup> started. The red line (the "OeNB wage tracker") represents employment-weighted average wage increases based on 340 collective agreements since autumn 2020. For past values, it follows the wage growth indicated by the blue line reasonably well. It also extends into the future because of recent settlements that expire one year after they became effective (given the usual duration of collective agreements). It should be noted that the further the wage tracker line extends into the future, the smaller the employment weight that forms the basis of the calculated wage increase becomes (this is indicated by the dashed green line that represents the underlying bargaining coverage; this coverage becomes very low for the last months of the time horizon). There was a continuous increase in the growth of negotiated wages, with the latest wage settlements exceeding 6%. This increasing

Chart 2

### Current and future growth of negotiated wages: OeNB wage tracker



Source: Statistics Austria, Austrian Trade Union Federation, Ministry of Labor and Economy, OeNB.

Note: Latest data point: Sept. 2023.

<sup>13</sup> Wage negotiations in Austria follow a rather fixed time schedule: A wage round lasts from the wage settlements in the metals sector (which become effective in November) until October of the following year. Most agreements become effective in January.

tendency was in line with the usual inflation measure used in collective bargaining, the average CPI inflation rate in the past 12 months prior to the start of wage negotiations (orange bars in the chart).

For the euro area, the ECB and national central banks are jointly developing similar indicators of future wage growth based on negotiated wages. According to this preliminary work, negotiated wage growth can be expected to increase further in the euro area (Lane, 2022), but less than in Austria.<sup>14</sup>

### 3 What is the “right” increase of nominal wages?

Euro area countries are currently suffering from an import price-driven negative supply shock and associated income losses. How strongly should wage growth respond to the surge in inflation at this juncture? In the following, we argue that for the division of income losses to be fair, wages should increase at a rate that ensures that the wage share remains constant.

#### 3.1 Wage negotiations should not aim for a full compensation of consumer price inflation

A useful benchmark for wage negotiations between unions and employers’ representatives is that nominal wages should grow at a rate equal to the sum of inflation of the past year and the (medium-term) growth rate of labor productivity.<sup>15</sup> When this is the case, the wage share (i.e., workers’ share in aggregate income) remains constant, a result that can be accepted as fair by both employees’ and employers’ representatives. However, when applying this rule to wage negotiations, it has to be considered that the relevant inflation measure is not HICP inflation but the change in output prices, i.e. GDP deflator inflation. Starting from the definition of the wage share, it can be shown that a constant wage share implies that nominal wages grow in line with labor productivity and the changes in output prices because it is the relation between wages and output prices that determines the wage (and the profit) share (see annex). The GDP deflator only captures the extent to which the price increases of imports affect output prices.

Table 1 shows that over the period from 1999 to 2020, the difference between HICP inflation and GDP deflator inflation was very small. Hence,

Table 1

#### Inflation rates in Austria and the euro area

	Austria	Euro area (19 countries)
	%	
<b>Average inflation from Q1 1999 to Q4 2020:</b>		
HICP	1.8	1.6
GDP deflator	1.7	1.6
HICP excl. energy and food <sup>1</sup>	1.8	1.3
<b>Average inflation over the past year:<sup>2</sup></b>		
HICP	6.8	7.0
GDP deflator	2.8	3.4
HICP excl. energy, food, alcohol and tobacco	4.0	3.3

Source: Eurostat.

<sup>1</sup> The time series is only available from 2001 (Austria) and 2002 (euro area) on.

<sup>2</sup> From October 2021 to September 2022 (HICP measures) and from Q3 21 to Q2 22 (GDP deflator), respectively.

<sup>14</sup> See also the blog post by Philip R. Lane: <https://www.ecb.europa.eu/press/blog/date/2022/html/ecb.blog221125~d34babdf3e.en.html> (chart 31).

<sup>15</sup> In Austria, this guidance is called the “Benya rule,” named after a former Trade Union Federation president. It is based on the implicit aim to keep workers’ share in national income constant (Mesch, 2015). Fenz et al. (2019) show that in the early years of monetary union (up to the Great Recession), wage growth was lower than what would have been implied by the Benya rule, leading to a decline in the wage share. After 2008, wage growth matched – or was even higher than – the rate based on the Benya rule, which led to a recovery of the wage share.

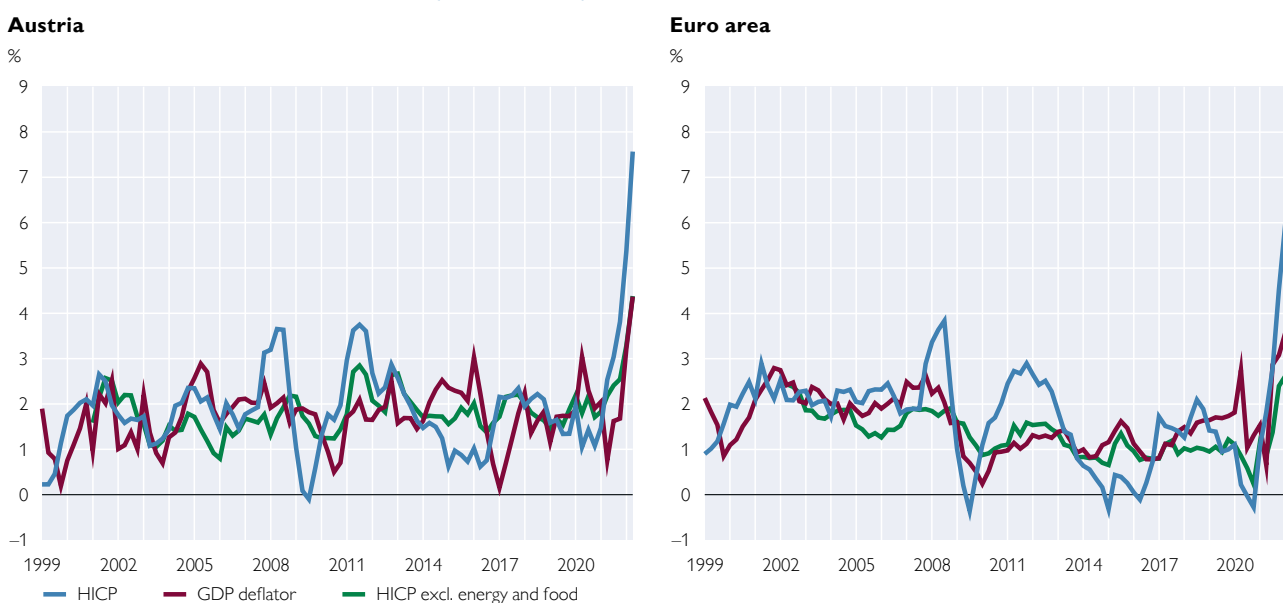
in “normal times,” it does not matter much which price index is actually used in wage bargaining. More recently, however, there has been a substantial divergence between both inflation measures, as the table and chart 3 show: GDP deflator inflation has also risen, but not as much by far as consumer price inflation.

The current wedge between consumer price inflation and the growth rate of the GDP deflator is caused by the large increase in energy prices (and other input prices). For energy-importing countries like Austria, this implies a substantial outflow of income abroad. This income loss can be better understood if one keeps in mind that, according to OeNB calculations for Austria, the energy-price related terms-of-trade deterioration over the past 12 months<sup>16</sup> has led to a deterioration of the trade balance by about EUR 8.5 billion or 2.1% of GDP. In the euro area, the costs of energy imports are likely to increase from 1% to 5% of GDP in 2022.<sup>17</sup> Assuming that the negative supply shock is permanent, a “compensation” of total consumer price inflation through corresponding wage hikes would, at least temporarily, increase the wage share. Given the decreases in the wage share in 2022, this may, in part, be justified. However, as a general rule for the medium term, wage negotiations should be guided by GDP deflator inflation rather than by HICP inflation. By taking this rule as a starting point for wage negotiations, it is ensured that the burden of income losses is appropriately shared between workers and firms.<sup>18</sup>

That said, in practice, the GDP deflator is not a very suitable indicator upon which wage negotiations can be based because of its relatively large publication lag

Chart 3

### Various inflation measures from Q1 1999 to Q2 2022



Source: Eurostat.

<sup>16</sup> From September 2021 to August 2022.

<sup>17</sup> See Der Standard (2022).

<sup>18</sup> De Nederlandsche Bank makes the same point: <https://www.dnb.nl/en/general-news/dnbulletin-2022/avoiding-a-wage-price-spiral-requires-effort-from-governments-central-banks-and-social-partners>.

and the frequent revisions that it is subject to. Instead, as a proxy, a measure of core inflation, such as HICP inflation excluding energy and food, could be used, because it excludes prices of items that are subject to the import price shock.<sup>19</sup> This inflation measure is arguably relatively close to GDP deflator inflation (chart 3).

### 3.2 The danger of a wage-price spiral

What effect will rising wages have on prices? The pass-through of wages to prices depends, among other things, on the degree of competition in product markets and on cyclical conditions. Empirical estimates and model simulation results suggest that the sensitivity of consumer prices to wages is between 0.2 and 0.3 but may be higher in a high-inflation environment (De Fiore et al., 2022). Strong wage increases are thus likely to have sizable second-round effects<sup>20</sup> on prices, thus increasing the inflation rate and inflation persistence.

Does this mean that a “wage-price spiral” is currently imminent? There is no uniform definition of what a wage-price spiral exactly is. It can probably best be described as a process where price and wage increases reinforce each other.<sup>21</sup> While at present, wage growth is likely to accelerate, inflation will probably come down in 2023, which, however, depends very much on how the prices of imported energy and food will actually evolve. If inflation decreases, wages are likely to follow with a lag, given the backward-looking way in which prices affect wages.

However, we currently see several risks to price stability. First, if inflation expectations become de-anchored, inflation may become persistent even after the shocks disappear (Lagarde, 2022). The backward-looking nature of the wage bargaining process could reinforce this process. Second, if distributional conflicts between the partners of collective agreements arise, the danger of a wage-price spiral will increase.<sup>22</sup> Such a conflict may emerge if unions demand a higher compensation for inflation than the GDP deflator or core inflation would imply, as explained above. Price setters could in turn increase their markup over wages to make up for their loss in the profit share. Such a process would in the end benefit neither side, it would only fuel the inflation process.

Given the high real wage losses in 2022, it is understandable that unions are pursuing the goal of strong wage increases. But the current macroeconomic situation implies that some wage restraint is warranted. Such restraint may be helped by the multitude of government measures implemented with the aim of reducing the effects of inflation on disposable household incomes and firms (see Prammer and

<sup>19</sup> Core inflation is a good proxy for output price (GDP deflator) inflation when the markups by domestic energy and food producers remain constant. However, when markups are raised, the core inflation underestimates the domestic inflation effects. The correlation coefficients between both inflation measures for Austria and the euro area are 0.39 and 0.77, respectively, and highly significant.

<sup>20</sup> The ECB gives the following definition of second-round effects: “Second-round effects occur when agents pass on the inflationary impact of the direct and indirect effects [of energy price increases] to wage and price setting [...]” See [https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbbox202205\\_02~e203142329.en.html](https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbbox202205_02~e203142329.en.html).

<sup>21</sup> IMF (2022) adopts a pragmatic definition, defining a wage-price spiral as an episode of several quarters in which both wage and price inflation rates rise simultaneously.

<sup>22</sup> See the CORE Team (2017) for a textbook explanation of how inflation arises from inconsistent claims on output by workers and firms. In a similar vein, a study on the increase of inflation in the 1960s conducted by the Austrian social partners (Beirat für Wirtschafts- und Sozialfragen, 1968) notes that wage-price spirals do not benefit either side.

Reiss, 2022). After all, the negative supply shock we have seen implies a real income loss for the whole economy, which wage negotiations cannot and should not fully compensate. Wage negotiations could result in distributional conflicts that increase inflation even further and would entail stronger disinflationary measures by the Eurosystem.

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## Annex

The wage share is equal to nominal compensation of employees divided by nominal GDP at market prices:

$$s = \frac{h \cdot w}{Y \cdot P_Y},$$

with  $s$  denoting the wage share,  $h$  the number of hours worked,  $w$  the average hourly compensation,  $Y$  real GDP and  $P_Y$  the price index of output (the GDP deflator). A constant wage share implies that  $\hat{w} = (\hat{Y} - \hat{h}) + \hat{P}_Y$  where a hat over a variable denotes the time derivative of the log of this variable. The result is that nominal wages should increase in line with labor productivity growth and GDP deflator inflation. Note that the wage share above is simplified in two ways: (1) It is unadjusted for the ratio between the number of employees and total employment, and (2) it ignores a potentially diverging evolution of nominal GDP and net national income<sup>23</sup> (the usual denominator for the wage share). In the short run, these simplifications should not matter.

<sup>23</sup> See Fenz et al. (2019).