Wage and profit rules in times of import price shocks[1]

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Abstract: The increase in inflation rates in Europe at the end of 2022 exceeds the levels observed in the wake of oil price shocks in the 1970s. The sudden strong hike in prices is in stark contrast to more than a decade of very low developments within the euro area. As price shocks had first been considered temporary, monetary tightening of the ECB only started from July 2022 onwards. The rather strong interest rate increases since then are partly provoked by the fear of wage-price spirals that could provoke lasting inflation within the euro area. Yet, not only wage developments, but also profit developments are currently under intense scrutiny, as research for the US (De Loecker et al. 2020, Weber/Wasner 2023) as well as for the euro area (Hahn 2021, Lane 2023) point to unusual developments of profit margins, at least for certain sectors of the economy.

As wage developments in relation to profit developments have the potential to change the functional income distribution, we analyse past and current price developments by decomposing the contributions to domestic price developments, measured by the GDP deflator, into those stemming from unit labour costs, those from unit profits, and those from net unit taxes on production. In order to judge those developments as stability-oriented or not, we follow the literature that recommends that national wage developments should be in line with the inflation target of the ECB plus the increase in labour productivity (see Horn/Logeay 2004, Herr/Horn 2012, Heine/Herr 2013, 2022, 2023, Onaran/Stockhammer 2016, Lane 2023). Such a development, if also applied to profits, would not kick-start an inflationary process and would support a stable functional income distribution.

The decomposition of the GDP deflator based on the distributional approach of the national accounts and comparing it with recommendations for macroeconomically stable developments follows Feigl/Zuckerstätter (2013) and has been used in a similar way in Joebges/Logeay (2018). Such a decomposition based on the distributional approach for calculating GDP is only possible for the GDP deflator, not for the harmonized consumer price index (HICP), and has the advantage that only domestic sources for inflation are under scrutiny – which are the relevant ones for domestic inflationary processes.

Our descriptive analysis covers annual inflation contributions from unit labour costs and unit profits during 1999 and 2022. According to our results, developments among 19 euro area member countries have been heterogeneous since the introduction of the euro and continue to show differences in price developments. Yet, it is striking that the mean, the median and upper quantiles of unit profit increases have recently been above levels observed in the past, and are higher than for unit labour cost increases. Even though it is too early to ignore the possibility of an only temporary cyclical compensation of former losses, the unusual size of unit profit increases may indicate that distributional conflicts are solved at the expense of workers and employees, a sign that could provoke more aggressive bargaining for higher wages.

JEL:E25, E31 E64, F45

Key words:

Inflation, GDP deflator, functional income distribution, wage rule, profit rule

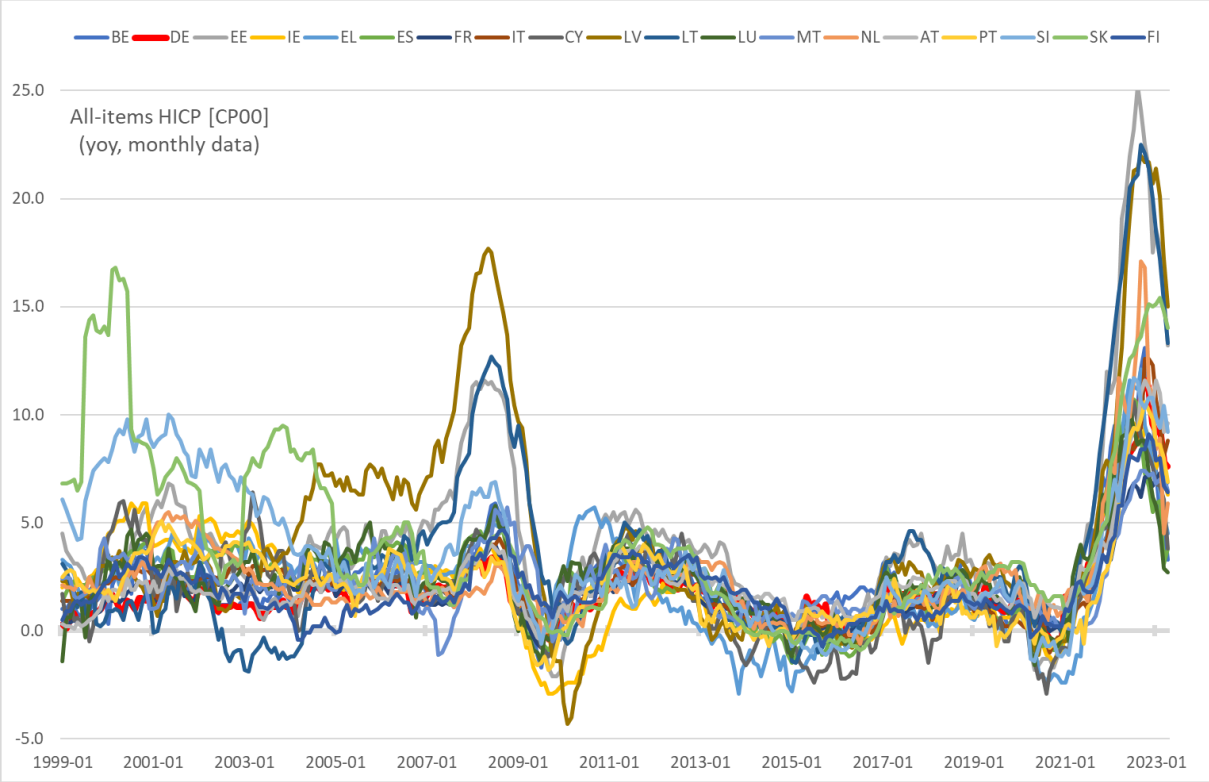
[1] A related previous paper on wage rules has been published as an FMM working paper, https://www.boeckler.de/fpdf/HBS-006893/p_fmm_imk_wp_23_2018.pdf

Outline

1 Introduction

The increase in inflation rates in Europe at the end of 2022 even exceeds the levels observed in the wake of oil price shocks in the 1970s. The sudden strong hike in prices is in stark contrast to more than a decade of very low developments, judged by the former ECB target of a y-o-y HICP inflation rate of below but close to 2% within the euro area.[2] Inflation increased from 2021 onwards (see Figure 1), mainly provoked by price shocks from supply bottlenecks in global value chains during the pandemic (see figure A6 based on Lane 2023 in appendix) and the energy shocks from the war in the Ukraine. As shocks have first been considered temporary, monetary tightening of the ECB only started from mid-2022 onwards. The repeatedly strong interest rate increases since then are partly provoked by the fear of wage-price spirals that could provoke lasting inflation within the euro area. Yet, even profit developments are currently under intense scrutiny, as research for the US (Weber/Wasner 2023) as well as for the euro area (Lane 2023) point to unusual developments of profit margins, at least for certain companies or sectors of the economy, leading to the allegation of "greedflation" (e.g. Lopez 2022).

Figure 1: Inflation rates in % in 10 Euro Area countries



Source: Eurostat

In contrast to the mentioned studies, we aim at identifying problematic domestic wage and/or profit developments in euro area countries. We therefore analyse past and current price changes of the GDP deflator by decomposing the contributions to changes into those stemming from unit labor costs, those from unit profits, and those from unit taxes. In order to judge those developments as stability-oriented or not, we follow the literature that recommends that national wage developments should be in line with the inflation target of the ECB plus the increase in trend labor productivity (see

[2] In 2021, the ECB changed the target to a y-o-y HICP inflation rate of 2% over the medium term, considering too high or too low inflation as equally undesirable (see official ECB websites: https://www.ecb.europa.eu/mopo/strategy/pricestab/html/index.en.html).

Horn/Logeay 2004, Herr/Horn 2012, Heine/Herr 2013, 2022, 2023, Onaran/Stockhammer 2016, Lane 2023). Such a rule, if also applied to profits, would not kick-start an inflationary process and would leave the functional income distribution unchanged. Our research question is: Have unit labor cost or unit profit increases been too high in euro area countries if judged by stability-oriented wage and profit rules, respectively?

The decomposition of the GDP deflator based on the distributional approach for national accounting and comparing it with recommendations for macroeconomically stable developments follows Feigl/Zuckerstätter (2013) and has been similarly applied by Joebges/Logeay (2018). Such a decomposition is only possible for the GDP deflator, not for the harmonized consumer price index (HICP). Focusing on the GDP deflator has the additional advantage that only domestic sources for inflation are under scrutiny – which are the relevant ones for inflationary processes – not those stemming from imports. Such a differentiation between imported and domestic price effects is not possible using the HICP.

To answer the research question, the paper is structured as follows: the next section 2 provides a literature review of theoretical considerations regarding inflation and briefly portrays recommendations for optimal wage (and profit) rules in the euro area. Section 3 discusses data and methodology and provides information on country differences. Section 4 first presents annual results for the decomposition of the GDP deflator for subperiods during 1999 to 2022 and analyzes the findings. The last section 5 presents the conclusions.

2 Literature review

According to Setterfield (2002), theories on inflation can be categorised by whether inflation is demand-pull or cost-push driven (see also Perry 1987a, b for definitions of the two forms). Setterfield (2002: 347) characterizes cost-push driven approaches by "… the idea that workers and firms possess market power, consequently influencing wages and prices independently of demand." As we are not interested in (all) causes of inflation, but rather in the distributional effects of inflation, we will concentrate on New Keynesian and Post Keynesian models, as they indirectly or directly (respectively) entail the resulting distributional conflict by allowing for cost-push driven inflation. Setterfield (2002) considers Monetarists' explanations of inflation based on too expansionary money supply as demand-pull driven. Consequently, such models will not be presented, even though some authors also discuss too expansionary monetary policy as a cause for current inflation (see e.g. Rogoff 2022).

A cost-push shock, e.g. stemming from external factors or from wage increases, will only lead to inflation if firms do not accept lower profits, rolling over the increased wage costs to final prices. The same holds if wage earners do not accept a decreasing wage share as a result of an increased profit mark-up. Consequently, inflation can be profit-led or wage-led in conflicting claims approaches (Setterfield 2002: 348), and very much depends on the bargaining power of workers in relation to the market power of price setting firms in goods and services markets. Cost-push shocks are the ones that are difficult to fight by monetary policy, as they imply a trade-off between the two conflicting goals of monetary policy, stable inflation and stable output developments, while demand pull inflation can be addressed by changes in the nominal interest rate of the central bank without jeopardizing the output goal (see e.g. Clarida et al. 1999).

2.1 Inflation in New-Keynesian and Post-Keynesian approaches

There is a high variety of New-Keynesian models (also partly called New Consensus or DSGE models, see Snowdone/Vane 2005 for an overview) that even increased in the wake of criticism on these models after the financial crisis. The seminal article by Clarida et al. (1999) portrays the main elements of

and resulting conclusions for monetary policy in a stylized simple DSGE model. According to this simple version of a DSGE model, current inflation is a function of expected inflation, deviations from the output gap, and random cost-push-shocks. As all market participants are rational and forward looking, expected inflation is a function of expected future output gaps and cost push shocks. As a consequence, inflation expectations have a prominent role for current inflation (see e.g. Clarida et al. 1999).

As such models assume imperfect market competition, price setting is based on profit maximization in monopolistic competition and implies a profit mark-up over marginal costs.[3]. Marginal costs are assumed to be dominated by unit labour costs (plus capital costs in extended models) for closed economy models. For open economies, costs of imported inputs have to be added. The mark-up is tight to the price elasticity of demand that the firm is facing. The modelling of mark-ups in macroeconomic models has been introduced by Michal Kalecki and depends on structural features of the production sectors (Kalecki 1954, ch. 1; 1971, ch. 5)

Profit mark-ups change over the business cycle for various reasons: First, the nominal profit volume changes with output variations over the cycle even in case of constant per unit mark-ups. Second, the profit share (i.e. profits as a share of income generated by production) changes over the cycle even in case of constant mark-ups per unit, as the mark-up is added to marginal costs which also change over the cycle, especially unit labor costs. According to Marc Lavoie (2023), profits per unit increase relative to marginal costs as (total) unit costs decreases when output increases. In addition, mark-up developments may appear even more cyclical, as they are also driven by the relative composition of unit labor costs to other unit material costs (which are difficult to control for on an aggregate level). If unit material costs increase faster than unit labor costs, the mark-up on unit labor costs will appear to increase just because of an increase in other costs. Third, the price elasticity that firms are facing changes over the business cycle. One motivation for such a change is the changing degree of competition over the business cycle that implies cyclical behavior of mark-ups (see e.g. Martins/Scarpetta 2002). Yet, in most simplified models, mark-ups are assumed to be stable or are not explicitly discussed (e.g. not discussed in Clarida et al. 1999).

Labour market institutions and the bargaining power of unions play an indirect role in stylized New Keynesian models, as they determine in how far deviations from the output gap (or "labour market slack") translate into the wage setting process, without being explicitly modelled. The Clarida et al. 1999 model assumes an expectations-augmented Phillips curve, while most New-Keynesian models use a NAIRU. Snowdone/Vane (2005: 403) write:

> "[T]he NAIRU is that rate of unemployment which generates consistency between the target real wage of workers and the feasible real wage determined by labour productivity and the size of a firm's mark-up. Since the NAIRU is determined by the balance of power between workers and firms the microfoundations of the NAIRU relate to theories of imperfect competition in the labour and product markets (see Carlin and Soskice, 1990; Layard et al., 1991)."

Post-Keynesian approaches put more emphasis on the role of the distributional conflict between workers, employees and unions on the one hand, and companies and employers' associations on the other. Inflation is considered as a result of the "process resulting from a bargaining conflict between firms and employees over the appropriate real wage. Inflation is therefore the result of a distributional conflict." (Prante et al. 2023, ch. 9, n.d.).

[3] See Snowdone/Vane 2005 (ch. 7.5) for an overview on microfoundations for price rigidities in New-Keynesian approaches.

While the textbook model in Prante et al. (2023) assumes a stable mark-up for simplicity, other Post-Keynesians approaches discuss cyclical developments of the mark-up. Dutt (1992) provides an overview on conflicting claim models for inflationary processes that focus on the interaction of inflation and income distribution. His model concentrates on feedback effects between inflation, income distribution and accumulation, this way endogenizing growth as well as income shares. In his model, changes in the functional income distribution have repercussions on the bargaining power (with feedback on the income distribution) and may provoke cyclical growth.

A simplified version for cyclical mark-ups is offered by Heine/Herr (2022), according to which prices are determined by unit labor costs (ULC) plus additional costs (including the equilibrium mark-up) plus an additional component that depends on the economic cycle ("Marktlagengewinne"): Whenever demand exceeds supply (measured by planned investment exceeding planned savings), firms can reap extra-profits.

In Lavoie et al. (2021: 108) the basic Kaleckian mark-up (m) is augmented for an open economy by adding costs for imported goods per unit of output (UIC) to unit labour costs. The resulting price (P) equation is: P = (1+m) (ULC + UIC). In this framework, inflation is mainly driven by costs, while the state of demand determines only whether the pass-though is strong (in the case of high demand) or not (low demand). In a blog paper, Lavoie (2023) summarizes the two views: the New-Keynesian view seeing inflations development as essentially demand driven, except for transitional external shocks, or new rather heterodox views (Weber/Wasner 2023) put the blame on greedflation. A Post-Keynesian view would rather be that the surge in profit is transitory due to recovery of demand (procyclical profit share) and transitional material unit costs (that increases profit share too).

2.2 Stability-oriented wage rules

Both theoretical perspectives play a role in the ECB practical analyses, albeit with a strong emphasis on the New-Keynesian Phillips curve perspective. In a contribution to the ECB monthly bulletin, Bobeica/Sokol (2019: 92) for example summarize the formal framework used in the central bank as consisting out of three determinants: inflation inertia and expectations (1), economic slack (usually but not always measured by output gap or unemployment gap, 2) and additional supply side shocks (mostly transitory external factors, 3). Distributional aspects seem to be important, but seem to focus very much on the development of wages compared to labour productivity. Lane's 2023 speech emphasizes that the ECB is monitoring wage increases along the well-known nominal wage rule where "nominal wages [are expected] to grow at the rate corresponding to the sum of labour productivity growth and the two per cent inflation target." (Lane 2023). That wages should follow trend productivity and the target inflation of the central bank has also been proposed by e.g. Horn/Logeay 2004, Herr/Horn 2012, Heine/Herr 2013, 2022, 2023, Onaran/Stockhammer 2016). Wage developments above that rule could kick-start inflationary wage-price developments. Such a process would then require restrictive monetary policy by the central bank, as e.g. Clarida et al. (1999) demonstrate in the stylized DSGE model. Heine/Herr (2022) discuss such a threat comparing current inflation developments to the ones in Germany in the wake of the 1970s oil price shocks.

Such a wage rule would promote nominal stability and address two issues linked to developments within a monetary union: (1) Excessive wage developments harm external price competitiveness (cost aspect) and boost domestic demand (demand aspect) with unsustainable effects on imports. (2) Inflationary pressures resulting from such wage developments have distributional consequences. Too low wage increases that decrease the wage share harm domestic demand. For Germany, those aspects are well analyzed (Feigl/Zuckerstätter 2013 and Horn et al. 2017).

While in mainstream debates, the cost aspect of too high wages has been analyzed as one of the main problems of “peripheral” EMU countries up to the financial crisis (IMF 2013, Draghi 2013, EC 2013), Post-Keynesians have, by contrast, stressed the relevance of the demand effect for "center" EMU countries of too low wage increases (Hein/Mundt 2012, Onaran/Obst 2016, Onaran/Stockhammer 2016, Stockhammer/Wildauer 2016, Joebges/Logeay 2018). Yet, the focus of this paper is not the demand stabilizing effect on national economic developments, but rather the stabilizing effect on the functional income distribution and the resulting dampening effects on wage-price-spirals: Such a rule, if also applied to profits (see below), would not kick-start an inflationary process and would leave the functional income distribution unchanged.

Some publications suggest additional correcting factors for addressing external trade that we will not discuss. Examples are the suggestion of deviations from the general rule to support corrections of former positive or negative balances of the current account (Hein/Mundt 2012: 47), or corrections for deviations in national unit labor costs from the EU level (Onaran/Stockhammer 2016). In line with the above-mentioned authors, we recommend that such a rule would have to become a policy aim that would need to be supported by adequate institutions in the labor market, as well as national and European economic policies. Onaran and Stockhammer (2016: 10ff) provide an overview of supporting institutions and complementing policies.[4]

2.3 The need for stability-oriented profit rules

Interesting is the absence of a similar rule for profit, recommended in Joebges/Logeay (2018). For example, even Heine/Herr (2023) concentrate on the dominant role of wages, despite the fact that conflicting claims models stress the interaction between profit and wage developments and despite the current discussion about profit inflation. Underlying reasons might be that equilibrium profits are often assumed as stable in the long-run and the cyclical extra-profits in times of excess demand are assumed to be zero over the cycle (see e.g. Kalecki, but also Heine/Herr 2023). Wages instead are assumed as sticky. As a consequence, any increase in wages has long-lasting effects on price levels.

The 2020-2022 context of multi-crises and the sudden surge of inflation (see Figure 1) that seems to be supported by profit inflation question this framework. Bivens (2022) remarks that profit inflation already played an important role in the first years following the recovery from the financial crisis and the global recession, yet, was camouflaged by wage suppression at that time.

An explanation for the role of profit inflation can be found in two papers: Weber/Wasner (2023) and an old analysis of Okun (1975). In both papers the main point for looking at profits is that in most cases persistent inflation does not start with wages (see Galbraith 2023 for a similar claim). Wages are a lagging indicator, albeit the factor that permits the accumulative process. Once this process is started, only costly and painful restrictive economic policy can restore price stability. Factors starting the process are typically external costs push stocks (mostly devaluations and/or commodity price hikes)[5].

In both papers, profits are the most reactive components and an indicator for the transition from transitory costs shocks to persistent inflationary dynamic (see below). The question is then how to alert policy actors that they need to act with other instruments than the costly and painful measures of dampening effective demand with interest rate hikes.

[4] Hein/Mundt (2012) provide even farer reaching policy recommendations, as they aim at correcting the past increase of functional and personal income inequality.

[5] DeLong (2023) lists inflationary episodes in the US. Other impulses came from the reorganisation of the economy from war to peace and the reverse.

Weber/Wasner (2023) analyze the surge of inflation 2020-22 and postulates that market concentration is a prerequisite for profit inflation, but is not sufficient. This is a first departure from New-Keynesian Phillips curve explanation, where the markup is rather predetermined and enters the Phillips curve symmetrically. A cost increasing narrative is further needed along Weber/Wasner (2023) to start inflation dynamics, where profits do not play the buffer role anymore but, on the contrary, the determining role. Common however to New-Keynesian Economics is the idea that as soon as labour tries to regain the lost purchasing power and restore the wage share (the "conflict" phase), the first transitory impulse tends to get persistent and leads to inflation dynamics. Because of this, Weber/Wasner (2023) advise policy actors to prevent the impulse stage to go to the second ("propagation and amplification") and third ("conflict") phases.

Interestingly the analysis of Weber/Wasner (2023) bears strong similarities with the one of Okun (1975) who distinguishes between customer's market (with price maker firms, relevant for most services and goods in the domestic economy) and auction's market (with price takers firms, essentially the ones for globally traded goods like food and energy). Okun (1975) argues that customer markets are socially and economically efficient because the customer-seller relationship, mirrored by the long-term career labor markets, based on custom and fairness, lower transaction and information costs. The social dimension of the relationship between the two types of markets makes it. necessary to have a narrative of increasing costs (as in Weber/Wasner 2023) to be able to increase prices (cut wages) without adverse effects in terms of huge drops of sales on the goods markets and quit rates on the labour market. The downside is that inflation is very much destroying these relationships and once the actors on those markets try to adjust to it, it becomes an accumulative phenomenon that is very costly in terms of output and unemployment from restrictive fiscal and monetary policies. Okun (1975: 387ff) is very sceptical for this reason about indexation policies but rather advocates policies that quickly counteract inflationary impulses from the auction markets to prevent them to propagate and amplificate (to reuse the verbs of Weber/Wasner 2023) into the customer markets: measures to dampen the volatility of commodity prices, using "taxes and subsidies to reduce costs without reducing aggregate demand" (Okun 1975: 390).

From those lines of thoughts, we derive two ideas to analyze the price developments: One is along the wage-and-profit-rules, to assess whether a cumulative process is starting (focus on the wage rule). If inflation is rather driven by the profit component (profit-rule), further analysis is required to assess if a propagation/amplification phase is starting. This can be evaluated in looking at "normal" developments of profits. This is similar to the three components of Heine/Herr (2022): Inflation is the sum of the ULC-component, and the profit component can be separated into two components: normal unit profit and state-of-the market profit. The latter part is more likely to be judged unfair and could give rise to cumulative process from the labour side.

Should the monetary policy disregard profit developments? If the main and ultimate drivers of inflation are wages, the answer is yes. But even if this is the case, this may cause a conflict inflation: in times of high inflation and perceived unfair increases in profits, the danger that this furthers a wage-price accumulation process is high. It is therefore important to know the stage of the inflation process as discussed in Weber/Wasner (2023). Depending on the stage, (monetary) policy should react differently.

3 Data and method

3.1 Price data

Inflation measured by the changes of the harmonized index of consumer prices (HICP) is the best known indicator for inflation, as it is the target for most central banks, including the ECB. The indicator

is constructed based on weighted prices of a basket of retailed goods and services (including imported ones) that are consumed by households. It has the advantage of being intuitive and more quickly available than indicators based on national accounting. The corresponding indicator for HICP based on national accounting is the deflator of private consumption (PCPH). This indicator shows the highest correlation with the HICP headline inflation, the target of the ECB, when compared with other price indicators (see Table 1).

The disadvantage of HICP is that it concentrates on consumption goods only, ignoring other goods of the economy, and that it depends on the composition of consumption. Any shift in consumer preferences or in VAT taxation leads to changes in the HICP, independently of price developments for the different consumption goods. Alcidi/Gros (2020) provide evidence of the measurement bias for the period after the GFC and during the Covid-19-pandemic when the basket composition of the HICP was subject to profound changes. Another disadvantage of HICP, at least regarding our interest in domestic inflation processes, is that it does not differentiate between domestically produced versus imported goods.

As we are interested in potential sources of inflation stemming from domestic sources for all goods, we rely on the GDP deflator. In contrast to HICP, the GDP deflator is not constructed based on weighted prices of a basket of retailed goods and services, but as the ratio between the nominal GDP and its chain-linked real counterparts. The GDP deflator therefore relates the prices of all goods and services produced in the domestic economy. Imports only play an indirect role through their incorporation as inputs into domestic production (ECB 2016). In that respects the GDP-deflator is a broader (and therefore more reliable) indicator of price development than the HICP, but has the disadvantage of being only available with time lags.

The GDP deflator can be analyzed based on the three approaches in national accounting for GDP: expenditure approach (consumption, investment, net exports, and government expenditures), income approach or distribution (compensation of employees, gross operating surplus, net taxes on production) or production approach (the sum of all sectoral value added). For the decomposition, we rely on the income or distribution approach. National accounts allow for calculating cost contributions to the price deflator of final domestic demand, subtracting costs for imported inputs. For our analysis, we are interested, in how far the temporary price shock may lead to a domestic inflation spiral, be it stemming from wage-price or by profit-price (or unit tax) spirals.

Table 1 shows that the correlation between both inflation indices, HICP and the GDP-deflator, is high: 77% for the group of all 19 EMU-countries and 24 years of EMU existence. The highest correlation is found for the time before the Global Financial Crisis (GFC) in 2007/8 with almost 80% that has been followed by a world-wide recession in 2008/9 (the GFC) in big EMU-countries, and the lowest during the years after the GFC up to the recent occurrence of multiple crises with 60%; in the recent crisis years, the correlation has increased again to 90%.

Table 1: Bivariate correlations between selected price developments

	1999-2022	D_PCPH	D_PVGD	D_ZCPIH
Private FCE, price deflator (PCPH)	D_PCPH	100%	85%	93%
GDP, price deflator (PVGD)	D_PVGD	85%	100%	77%
CPI, Harmonised (ZCPIH)	D_ZCPIH	93%	**77%**	100%
	1999-2007	D_PCPH	D_PVGD	D_ZCPIH
Private FCE, price deflator (PCPH)	D_PCPH	100%	86%	88%
GDP, price deflator (PVGD)	D_PVGD	86%	100%	79%
CPI, Harmonised (ZCPIH)	D_ZCPIH	88%	**79%**	100%
	2008-2019	D_PCPH	D_PVGD	D_ZCPIH
Private FCE, price deflator (PCPH)	D_PCPH	100%	76%	89%
GDP, price deflator (PVGD)	D_PVGD	76%	100%	60%
CPI, Harmonised (ZCPIH)	D_ZCPIH	89%	**60%**	100%
	2020-2022	D_PCPH	D_PVGD	D_ZCPIH
Private FCE, price deflator (PCPH)	D_PCPH	100%	90%	97%
GDP, price deflator (PVGD)	D_PVGD	90%	100%	90%
CPI, Harmonised (ZCPIH)	D_ZCPIH	97%	**90%**	100%

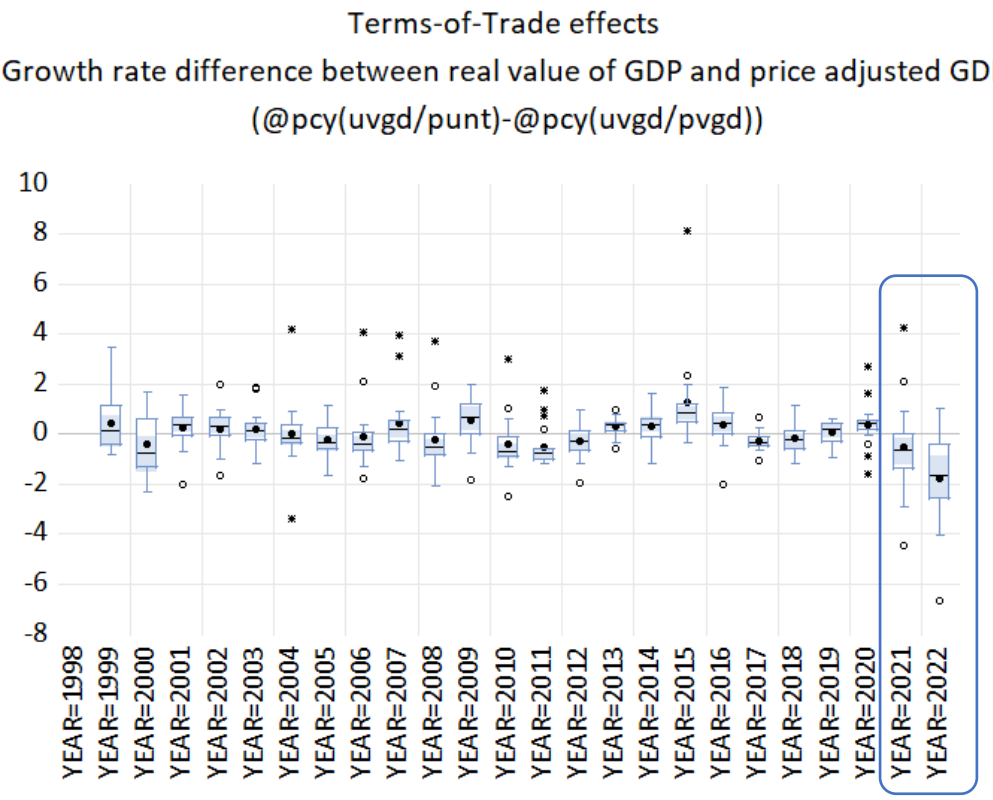
Source of the data: AMECO, own calculations

3.2 Size of the import prize shock

Price shocks from supply bottlenecks in global value chains during the pandemic and the energy shock from the war in the Ukraine (see Figure 8, Figure 9 and Figure 12 in the appendix) had varying effects on euro area countries, due to differences in production structure, energy composition, source countries and differences in energy dependency ratios. As a consequence, the relevance of imported inflation for HICP inflation differs among euro area countries (Fig. 1).

The part of (real) income that has to be given up to (or is gained from) the rest of the world in case of negative (positive) external shocks can be measured by the so-called terms-of-trade effects (see Nierhaus 2022b or Ragnitz 2022). The latter is measured in national account statistics by the difference between the growth rates of the GDP deflator (PVGD) and the deflator of final internal demand (PUNT). Comparing the development of the two deflators shows in the case of a worsening of terms of trade (higher import prices relative to export prices) the effect of increased domestic prices and/or decreased profits (if firms are not able to roll-over costs to final prices). Figure 2 plots the distribution of the differences in these two deflators for each year during 1998 to 2022 over the sample of 19 euro-area countries. A negative sign in the figure implies a great redistribution of (real) income from domestic economies to the rest of the world. As can be seen in Figure 2, the negative external shock starting 2021 and continuing in 2022 is quite extraordinary compared to earlier shocks in the past. Negative values imply that firms could not role over import costs to domestic prices. Whether the burden of higher import prices was equally shared among the different functional domestic income groups is quite controversial.

Figure 2: Terms of trade effects in the euro area (19 countries), in %



Source of the data: AMECO, own calculations.

To answer the question how is bearing the burden of the terms of trade shock, we decompose the GDP deflator into its three income components: unit labour costs (ULC), unit profit (UP) and net unit taxes (UT). Before we show the results, we will briefly point to problems in measuring profits.

3.3 Measuring price contributions from functional income distribution

The distribution approach in national accounting differentiates between compensation of employees (workers' income), gross operating surplus and mixed income (profit income) and taxes on production less subsidies (net tax income). The consumption of capital (depreciation) is included in the profit income as well as interest costs and the balance of primary income from the rest of the world (net foreign income) in excluded from the GDP measure. For our decomposition of GDP deflator inflation, only the first three aggregates are therefore by definition the relevant ones.

As we concentrate on price developments per unit of production, we concentrate on unit labour costs, unit profits and unit taxes. The interpretation of contributions from unit profits may be considered less reliable than the one from unit labor costs. The reason is that gross operating surplus and mixed income, a broad measure of profits, is calculated as a residual based on gross value added minus compensation of employees, minus taxes on production and imports plus subsidies. It is nevertheless an important data source, e.g. for assessing in which stage we are in the inflation process (see the stages in Weber/Wasner (2023).[6]

[6] Our analysis may be subject to future data revisions : Hahn (2021: footnote 1) points to special difficulties in calculating non-market output during the pandemic that may lead to data revisions and thereby slightly different profit developments.

Alternative methods for calculating mark-ups relying on firm's data are sparse and need assumptions about the production function. De Loecker et al. (2020) has developed another method for the US from official firm documentation. Weber/Wasner (2023) find evidence for profit hikes in selected sectors from surveys.

Hahn (2019, 2021) uses the same decomposition of inflation as we do, based on the GDP-deflator with unit profit, unit labour costs and unit taxes. She finds that unit profits are driven by two main factors: economic cycle and the terms of trade. When the economy booms, firms have more scope to raise prices in anticipation of the rise in unit labor costs, expanding profit margins. In a downturn this is the reverse as wages are contractually set and can only adjust with delay. Firms must decrease profits to accommodate the pressure to decrease prices or at least refrain from increasing prices once they face decreasing demand. Therefore, unit profits are procyclical, as Hahn (2019, 2021) shows for quarterly euro area data.

Strong variations in the terms of trade have similar effects: if a strong decrease in import prices measured in the domestic currency and/or a depreciation of the domestic currency is only partly passed through home prices and/or export prices in foreign currency, the profits of importers/exporters will raise (Hahn 2021:66). The unit profits correlates in that case positively with the terms of trade. For the years 2020 to 2021, Hahn (2021) points to new profit developments: less affected by recessions, and at higher levels than in the past.

3.4 Wage and Price rules

The actual inflation rate can be decomposed along the formula (1), where the variables were defined above[7] :

$$\text{Actual: } \frac{\Delta P_t}{P_{t-1}} = \frac{\Delta ULC_t}{ULC_{t-1}} \cdot \frac{COE_{t-1}}{nGDP_{t-1}} + \frac{\Delta UP_t}{UP_{t-1}} \cdot \frac{GOS_{t-1}}{nGDP_{t-1}} + \frac{\Delta UTAX_t}{UTAX_{t-1}} + \cdot \frac{TAX_{t-1}}{nGDP_{t-1}} \qquad (1)$$

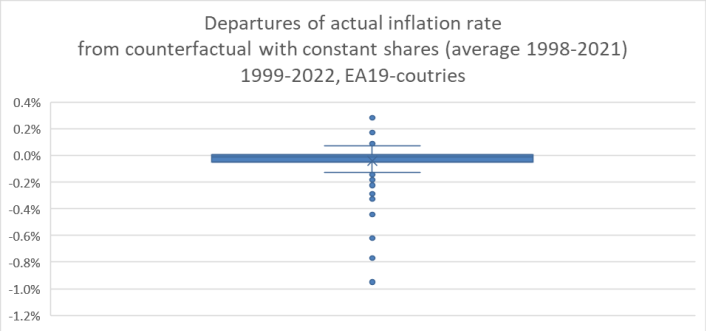
When shares should remain constant $\left(\frac{X_{i,\tau}}{GDP_{\tau}^{nominal}}\right)$ and inflation is set to the ECB targeted 2%, this provides the inflation- and distribution-neutral rule in equation (2):

$$\text{Target: } 2\% = 2\% \cdot \frac{COE}{nGDP} + 2\% \cdot \frac{GOS}{nGDP} + 2\% \cdot \frac{TAX}{nGDP} \qquad (2)$$

Those formulae are cumulated along time, as the inflation target is a medium run objective. Usually half a business cycle length can be thought of. When the actual values are above the target values, inflationary pressure from that component (and/or shift of its share). However, the variations from shares are second order compared to the growth rate contribution in the target calculation (the 2%). This can be taken from Figure 3. Therefore we neglect this aspect as the question on the target share is controversial and take as in the actual definition the past shares.

[7] (P=GDP-Deflator, ULC= unit nominal labour costs, UP=unit profits, UTAX = unit tax, COE=Compensation of Employees, GOS=Gross Operating surplus and mixed income, Tax = taxes-subsidies on imports and production, nGDP = GDP at current prices):

Figure 3: Inflation effects from varying shares



*Source: Data from AMECO, own calculations. The shaded area is the inter-quartile range (IQR) Q1-upper and Q3-upper limits, the bars denote the ends of the whiskers marking the lower/upper extreme limits i.e. 1.5*IQR below/above the IQR, circles are outliers. The two extreme values are -0.15pp and +0.1pp.*

4 Empirical findings

4.1 Wage and profit rule for 1999 to 2019 in two selected groups of countries

We start with the decomposition of price development measured by the GDP deflator by unit labour costs (ULC, defined as compensation of employees per unit or real GDP), unit profits (UP, defined as gross operating surplus and mixed income per unit of real GDP) and unit taxes (UTAX, defined as taxes net of subsidies on imports and production per unit or real GDP).

Figure 13 in the Appendix presents yearly contributions for all 19 EA countries. Red bars show the contribution of profit and the blue bars the contribution of wages. Two main observations can be made: The GFC marks a radical break and the years 2020-22 mark also a new era. The radical change in profit and wage patterns can be more easily illustrated by comparing actual developments with the wage-price rule. We will therefore contrast actual developments with those based on the rule. For the sake of clarity, we will compare developments for two different groups of countries only: First the "euro crisis countries", consisting of Greece, Spain, Italy and Portugal, and second, the "deflation countries", consisting out of Belgium, Germany, the Netherlands and Austria.

The crisis countries (Greece, Spain, Italy and Portugal) showed very dynamic wage and profit developments before GFC (Figure 5). Inflation trespassed the ECB-target almost every year between 1999 and 2007. This was a source of great concern at that time (see literature cited in Logeay/Joebges 2018) and pointed to unhealthy wage-price dynamics. After the GFC, the wage dynamic was extremely depressed as the countries embarked into competitive disinflation through wage restraint. Profits were depressed too. This picture can be refined when looking at the wage-price rule in **Fehler! Verweisquelle konnte nicht gefunden werden.**. In the period before the GFC (1999-2007), the actual price development (first "Actual" line) was well above the implied cumulative growth rates by the 2%-target ("target" line below). This was due in all countries to both components (Wages and Profits, violet figures) as the actual figures were well above stability oriented developments. During the GFC and the immediately following years (2008-2013), the strong wage depression with even negative contributions in two of the four countries lead the price development to slow down dramatically. Profits contributed to the deflationary tendency of wages, even though less in Italy. After the GFC period (2014-2019) the

depressing pattern continued: wages and profits developed below stability oriented rates. This continued competitive disinflation (except in Portugal) is the contrary of a wage-price spiral process but equally problematic for the concerned economy and for the monetary union.

On the other hand the countries with low inflation before the GFC (Belgium, Germany, France, Austria, in Figure 5) show a somehow reversed picture. Before the GFC the wage development (blue bars) were too low, whereas the profits (red bars) on the contrary were positively contributing to inflation, in some years. This is the shift of power ("wage suppression") mentioned by Bivens (2022). After the GFC the patterns are not clear cut, but although inflation rates remain quite stable around the target, the balance of power seem to re-equilibrate. Here the wage-price rule puts light: Before the GFC, only Germany showed too low an inflation (with a cumulated 7,4% instated of a targeted 17,2%), the other three countries were very near the target. This was mirrored in Belgium and France by sound wage developments (i.e. neither inflationary nor deflationary), whereas in Austria and Germany far too weak wage development were observed. In all countries, the wage share was under pressure because the contribution of profits on the contrary was very dynamic at or above target in all countries. The GFC (2008-2013) burdened especially profits (actual < target) but not wages (target and actual somehow in line). In the period after GFC and debt crisis, in Belgium and France, wages were depressed, profits were below (Germany and France), near (Austria) or above (Belgium) target. On the whole all countries remained disinflationary, undermining the competitive disinflationary efforts of the formed crisis countries.

Figure 4: Contributions to inflation in the GFC-crisis countries

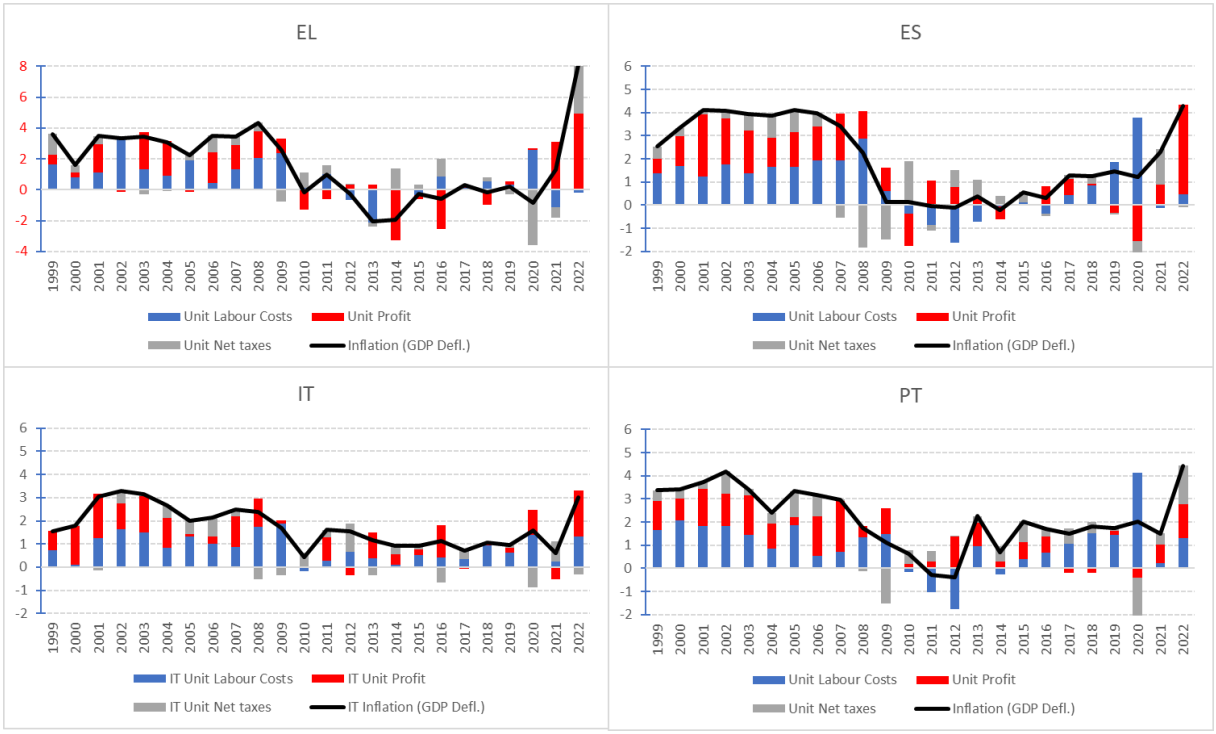


Table 2: Wage-Profit rule for GFC-crisis countries

		Greece	Spain	Italy	Portugal
1999-2007	**Actual**	**26.8%**	**35.3%**	**22.5%**	**29.9%**
	Target	17.2%	17.2%	17.2%	17.2%
2008-2013	**Actual**	**1.0%**	**0.6%**	**6.6%**	**3.4%**
	Target	10.4%	10.4%	10.4%	10.4%
2014-2019	**Actual**	**-0.5%**	**4.9%**	**4.9%**	**9.1%**
	Target	10.4%	10.4%	10.4%	10.4%
Contributions of Wages					
1999-2007	**Actual**	**11.7%**	**14.0%**	**8.8%**	**11.7%**
	Target	5.3%	7.9%	6.2%	7.9%
2008-2013	**Actual**	**0.7%**	**-2.9%**	**3.0%**	**-0.5%**
	Target	3.6%	4.9%	4.0%	4.7%
2014-2019	**Actual**	**1.5%**	**2.9%**	**2.9%**	**5.2%**
	Target	3.6%	4.6%	4.0%	4.5%
Contributions of Profits					
1999-2007	**Actual**	**10.5%**	**15.0%**	**9.7%**	**11.5%**
	Target	9.5%	7.0%	8.3%	6.6%
2008-2013	**Actual**	**-0.4%**	**1.8%**	**1.9%**	**4.0%**
	Target	5.4%	4.4%	4.9%	4.2%
2014-2019	**Actual**	**-3.5%**	**1.2%**	**1.9%**	**1.3%**
	Target	5.1%	4.5%	4.9%	4.3%

Figure 5: Contribution to inflation in the deflation countries

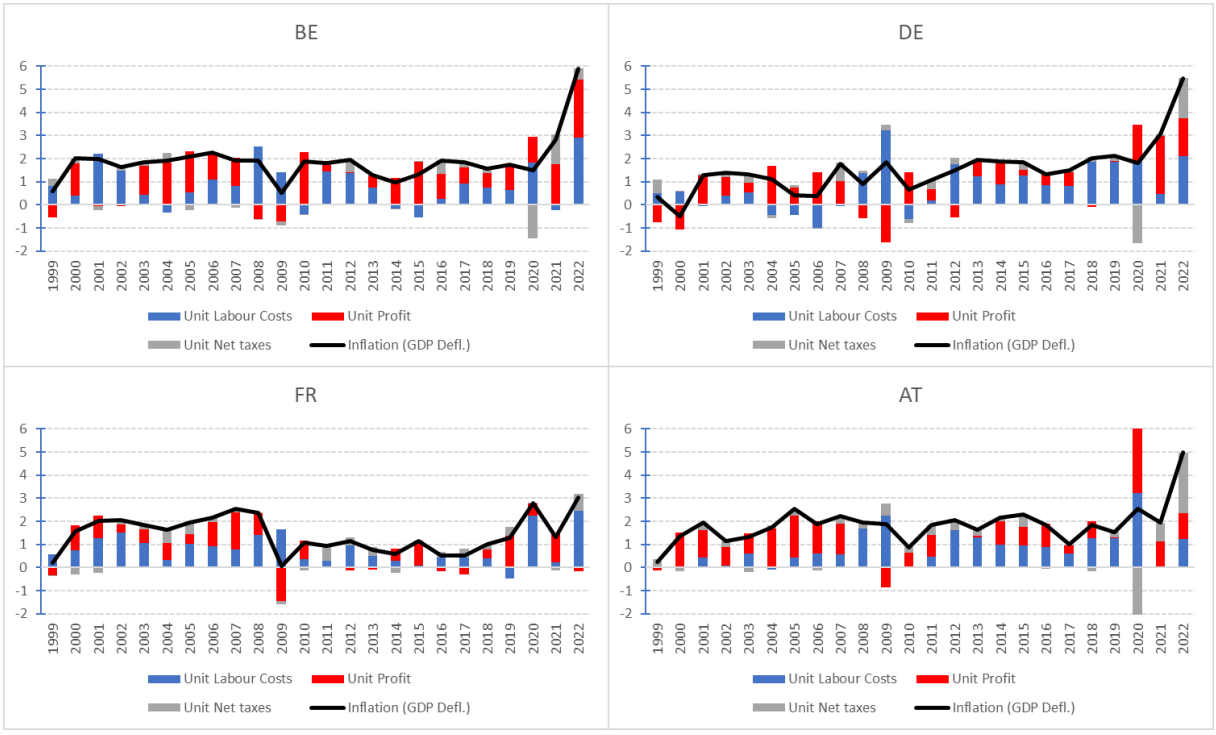


Table 3: Wage-Profit rule for deflation countries

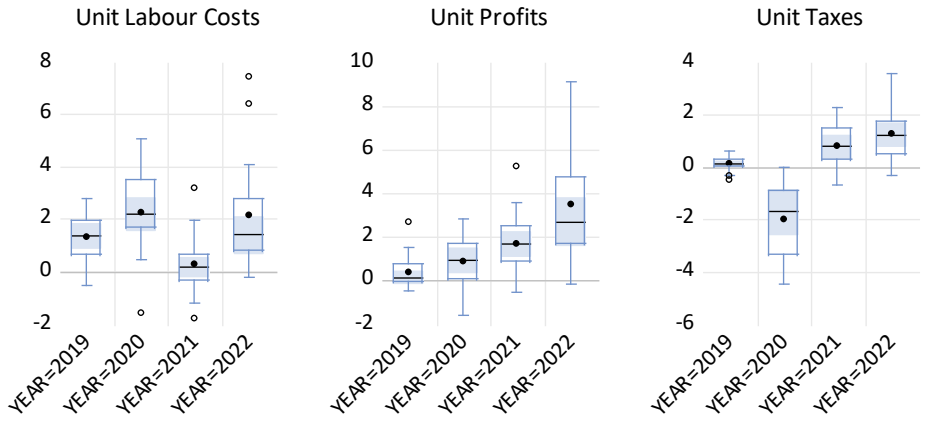
		Belgium	Germany	France	Austria
1999-2007	**Actual**	**16.8%**	**7.4%**	**16.9%**	**15.1%**
	Target	17.2%	17.2%	17.2%	17.2%
2008-2013	**Actual**	**7.7%**	**7.2%**	**4.1%**	**8.5%**
	Target	10.4%	10.4%	10.4%	10.4%
2014-2019	**Actual**	**8.7%**	**9.1%**	**4.5%**	**8.8%**
	Target	10.4%	10.4%	10.4%	10.4%
Contributions of Wages					
1999-2007	**Actual**	**6.8%**	**-0.5%**	**7.9%**	**2.8%**
	Target	8.4%	8.5%	8.5%	7.8%
2008-2013	**Actual**	**4.7%**	**5.9%**	**3.9%**	**5.8%**
	Target	5.3%	5.1%	5.3%	4.8%
2014-2019	**Actual**	**2.0%**	**6.8%**	**0.9%**	**5.1%**
	Target	5.1%	5.3%	5.3%	4.9%
Contributions of Profits					
1999-2007	**Actual**	**8.9%**	**6.4%**	**7.0%**	**11.0%**
	Target	6.3%	6.5%	5.8%	6.6%
2008-2013	**Actual**	**2.4%**	**0.3%**	**-0.9%**	**0.7%**
	Target	3.9%	4.0%	3.6%	4.1%
2014-2019	**Actual**	**5.4%**	**1.2%**	**2.4%**	**3.0%**
	Target	4.1%	3.9%	3.5%	4.0%

4.2 2020-2022 in light of the wage and profit rule

The second break in all countries are the last three years 2020-22.

In looking now at all 19 countries, from Figure 6, the ULC contribution seems not too high (2020 is marked by the labour retention schemes) whereas the profit components contribute in the years 2021 and 2022 very strongly to inflation. The contribution of taxes mirrors the expansive fiscal policy measures to dampen the corona crisis. The much debated issue of greedflation has his root in the extraordinary development of the profit component in 2022, seeming to point to anincreasng trend since 1999.

Figure 6: Contribution of the income components across the 19 EA countries



The paper looks now at it deeper from two perspectives: first from the wage-price rule for the formely selected countries and a departure from historical trends.

Looking at the wage-price rule for the selected countries (see Table 4) confirms that the inflation rate was well about target 2022 the latest (red figures on the top panel). The pandemic effects on wages are seen 2020 as mirroring the job retention schemes but faded somehow in 2021. In the former crisis countries there are signs of too dynamic wage increases that are forecasted to last 2023 (shaded grey lines), whereas in the deflation countries wages were still quite moderate, but the Commission forecasts a strong dynamic for 2023 that cannot be due to base effects as in 2020/21. The profit component was clearly contributing to inflation 2021 in all countries, however there are signs that this fades up in some countries (IT, PT, DE and FR). This points to the very dreaded transition from the amplification/propagation phase to the conflict phase of Weber/Wasner (2023).

Table 4: Wage-Price rule 2020-22

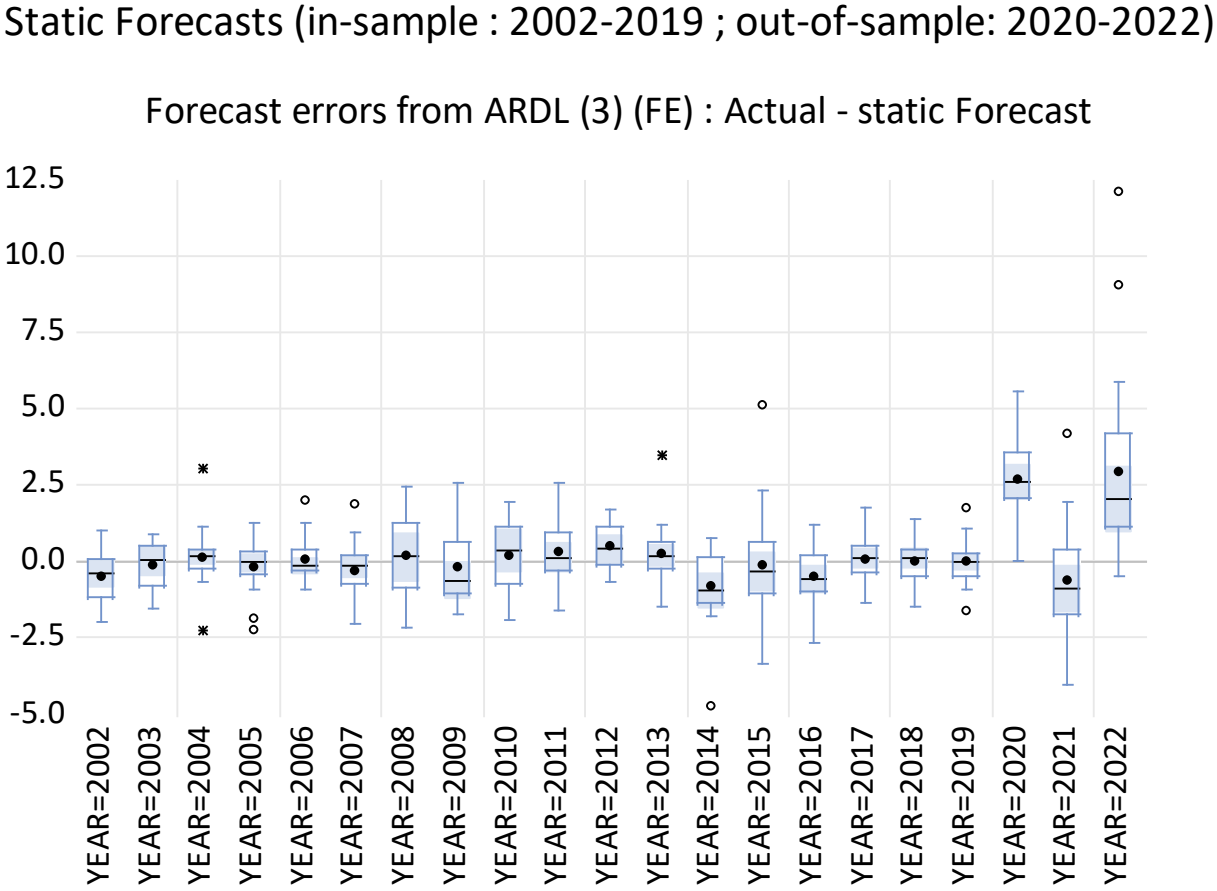
	Greece	Spain	Italy	Portugal	Belgium	Germany	France	Austria
2020 Actual	**-0.9%**	**1.2%**	**1.6%**	**2.0%**	**1.5%**	**1.8%**	**2.8%**	**2.6%**
Target	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2021 Actual	**1.3%**	**2.3%**	**0.5%**	**1.4%**	**2.9%**	**3.1%**	**1.3%**	**1.9%**
Target	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2022 Actual	**9.0%**	**3.5%**	**3.1%**	**3.6%**	**6.7%**	**5.3%**	**2.7%**	**6.1%**
Target	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2023 Actual	**5.6%**	**4.3%**	**3.3%**	**5.2%**	**5.0%**	**6.8%**	**5.0%**	**5.8%**
Target	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Contributions of Wages					Contributions of Wages			
2020 Actual	**3.7%**	**3.3%**	**1.8%**	**1.9%**	**1.8%**	**1.9%**	**2.2%**	**3.2%**
Target	0.9%	0.9%	1.0%	1.1%	1.0%	1.1%	1.0%	1.0%
2021 Actual	**2.0%**	**1.1%**	**0.4%**	**0.5%**	**-0.1%**	**0.5%**	**0.2%**	**0.1%**
Target	0.9%	0.9%	1.0%	1.1%	1.0%	1.1%	1.0%	1.0%
2022 Actual	**5.5%**	**2.5%**	**2.4%**	**2.3%**	**2.6%**	**2.3%**	**1.6%**	**1.2%**
Target	0.9%	0.9%	1.0%	1.1%	1.0%	1.1%	1.0%	1.0%
2023 Actual	**3.5%**	**3.3%**	**1.7%**	**3.2%**	**4.4%**	**3.2%**	**2.0%**	**3.3%**
Target	0.9%	0.9%	1.0%	1.1%	1.0%	1.1%	1.0%	1.0%
Contributions of Profits					Contributions of Profits			
2020 Actual	**1.1%**	**2.0%**	**1.9%**	**1.6%**	**1.1%**	**1.6%**	**0.5%**	**2.9%**
Target	0.9%	0.9%	0.7%	0.7%	0.8%	0.7%	0.7%	0.8%
2021 Actual	**5.7%**	**2.0%**	**1.5%**	**2.5%**	**1.7%**	**2.5%**	**1.2%**	**1.1%**
Target	0.9%	0.9%	0.7%	0.8%	0.8%	0.8%	0.7%	0.8%
2022 Actual	**4.9%**	**5.5%**	**0.0%**	**0.1%**	**3.7%**	**0.1%**	**0.4%**	**2.2%**
Target	0.9%	0.9%	0.7%	0.8%	0.8%	0.8%	0.7%	0.8%
2023 Actual	**-1.3%**	**4.9%**	**2.3%**	**3.2%**	**0.0%**	**3.2%**	**2.6%**	**2.1%**
Target	0.9%	1.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.8%
Contributions of Net Taxes					Contributions of Net Taxes			
2020 Actual	**-0.6%**	**-1.0%**	**-1.1%**	**-1.7%**	**-1.4%**	**-1.7%**	**0.0%**	**-3.5%**
Target	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.3%	0.2%
2021 Actual	**-0.6%**	**0.2%**	**0.9%**	**0.1%**	**1.4%**	**0.1%**	**-0.1%**	**0.8%**
Target	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.3%	0.2%
2022 Actual	**1.7%**	**1.2%**	**0.9%**	**2.9%**	**0.4%**	**2.9%**	**0.7%**	**2.6%**
Target	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.3%	0.2%
2023 Actual	**1.7%**	**0.0%**	**0.4%**	**0.4%**	**0.6%**	**0.4%**	**0.3%**	**0.4%**
Target	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.3%	0.2%

4.3 Are there extraordinary profits in the 2020-22 period?

The propagation along Weber/Wasner and Okun is possible not only through the sole increase of prices, but also need a narrative that not only costs drive inflation but profit increase too. This can be assessed by looking at the normal variation of profit one could expect from the past. Along the fore-

most post-Keynesian literature cited above (Heiner/Herr 2022 and Lavoie 2023) and the practical analysis of the ECB (Hahn 2021), the unit profit (its growth rate) was regressed on the main determinants: economic activity (growth rate of real GDP), Terms-of-Trade (growth rates) but also the national short-term nominal interest rates. Various specifications with fixed effects were tested: static, ARDL, VAR. The ARDL forecasts are presented as the equations performed best in terms of adj. R^2 (in-sample) and forecast (in-sample). As shown in Figure 7, the narrative of extraordinary profits not covered by the normal movements of business cycle, terms of trade and increased interest payments cannot be ruled out. This is contributes to the very fear of a beginning wage-price conflict phase.

Figure 7: Forecast errors as sign of extra-profits



5 Conclusions

The paper applied the instrument of the wage- and price rule proposed by divers authors according to which wag should grow in the medium term with target inflation and productivity. In the present 2022-23 context of high inflation, the fear of a starting wage-price spiral conducted the ECB to increase the interest rates quite sharply. Indeed some wage dynamics above target can be seen in the data. Whereas they would have been at the beginning of a strong cumulative process remain speculative from the wage rule. By the nature of the shock that started only 2021.

One theoretical element to assess if the process has potential to become cumulative is whether the other component of distribution (profit) was exceptional. In Weber/Wasner as well as in Okun, in non-competitive markets with strong social ties between customers and sellers on the one side and between firms and their workers on the other side, the consumer-workers can accept higher prices if

they do not get the impression of being the sole market side to carry the last of the exceptional external costs shocks. The extraordinary profits made in 2021/22 are in these respects posing questions. According to the profit rule, indeed the unit profit were very much contributing to inflation.

In a last step the evaluation of the part of profit that are "normal" i.e. explained by comovements with growth rates, terms- of trade and interest payments and the past that remained unexplained is assessed by forecast errors from ARDL models. From this it cannot be ignored that a part of increasing profits in 2022 was abnormal and going beyond all the costs and recovering economic activity.

Therefore we conclude that according to the wage and price rule, a policy that would have prevented first those extraordinary external shocks (the impulses) would have been optimal to prevent initiating the phase of amplification and propagation. As this phase was observed (as can be seen in the aggregated increasing unit profit beyond the normal), ideas to limit this in time was discussed (extra-profit taxes). Now the conflict phase seems to start.

From this a wage and price rule could contribute to stabilization. How realistic is it that wages would follow such a rule? It would definitely require supporting labour market institutions as well as national and euro area policies based on a social agreement for a fair distribution between functional income groups. This is important as such a rule would be more difficult to implement than the Taylor rule for monetary policy or the Golden rule for investment, as the involvement of more than one relevant actor requires demanding coordination activities. Without a general national and euro-wide consensus, the medium-term implementation seems unrealistic. Yet, a first start could be to implement such a rule for wages and profits into the scoreboard for macroeconomic imbalances.

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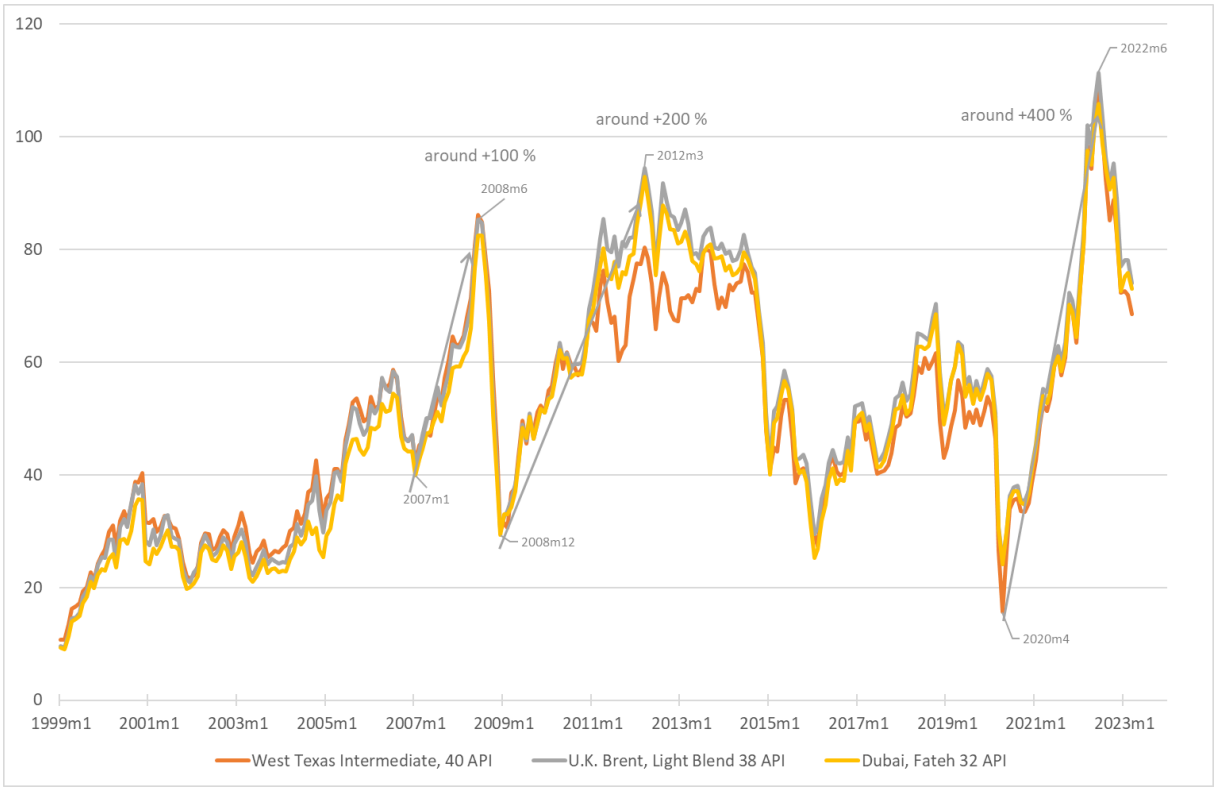
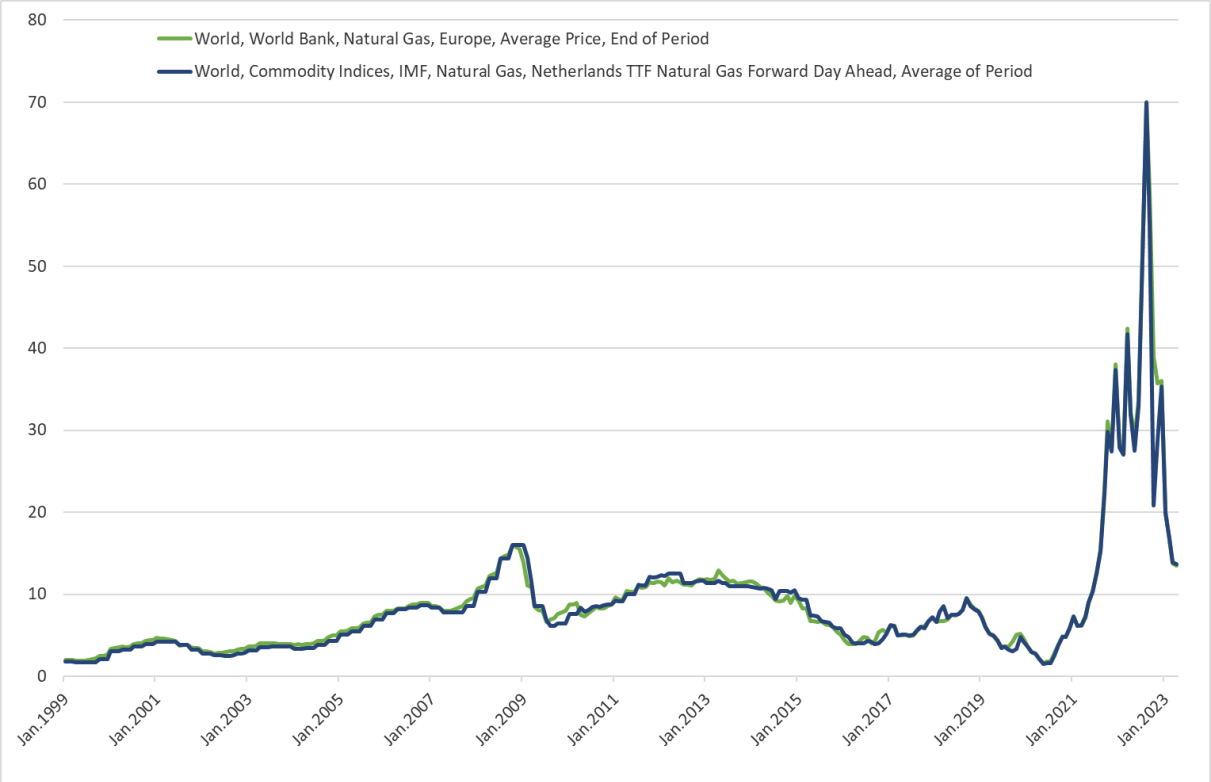
Appendix

Figure 8: Oil Prices



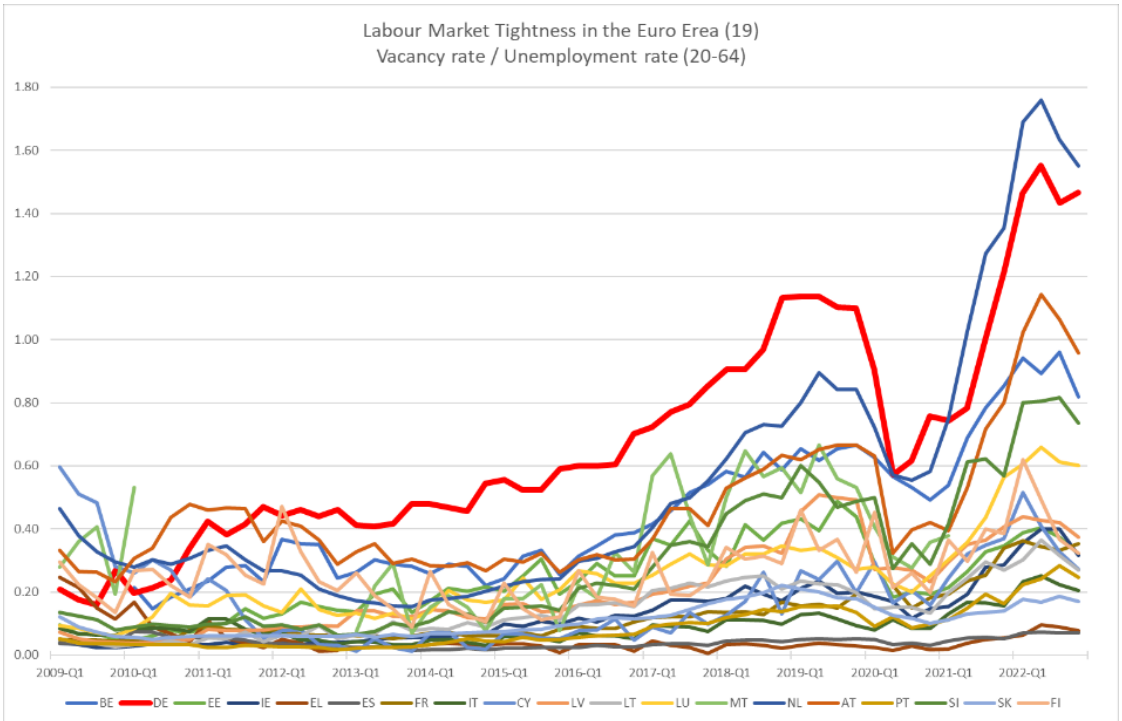
Source: Macrobond (FRED, iea), own calculations

Figure 9: Natural Gas Price (Europe)



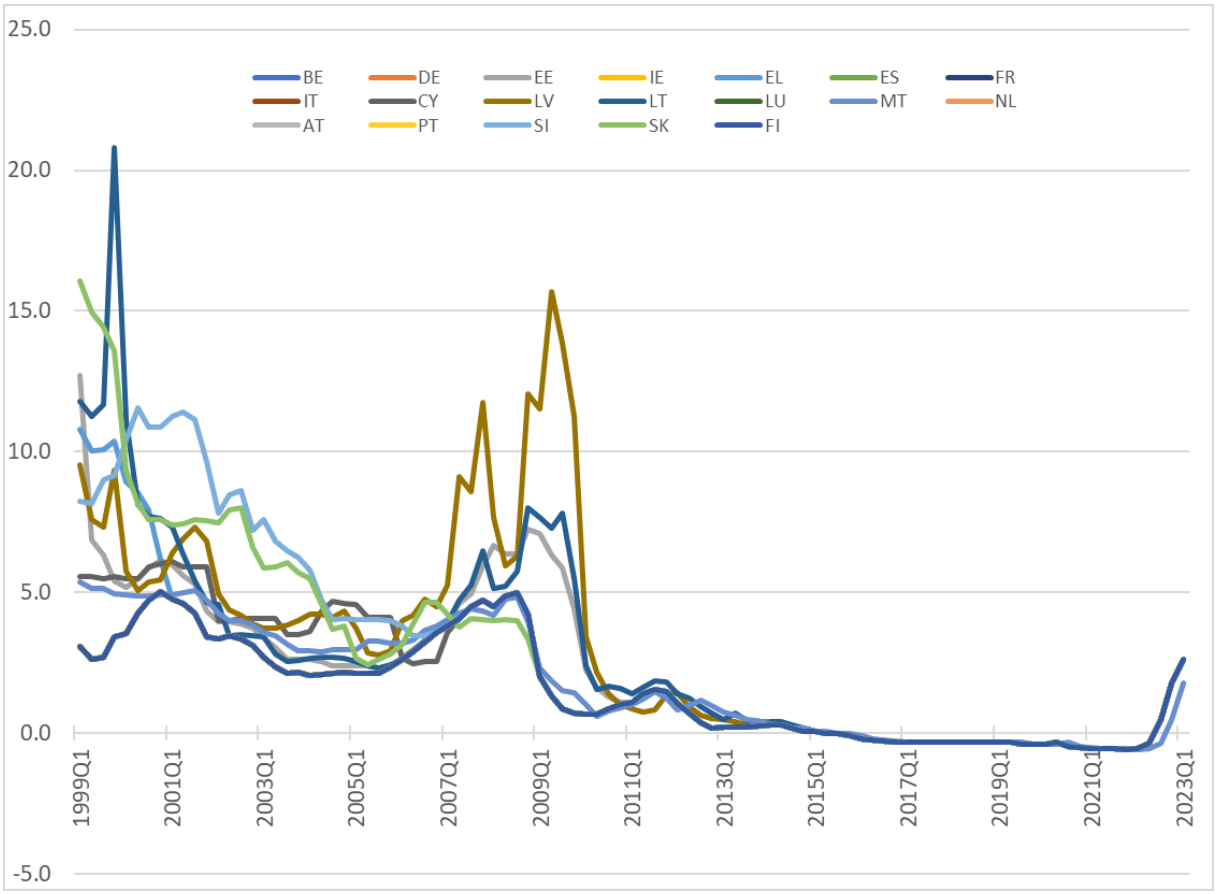
Source: Macrobond (World Bank)

Figure 10: Labour Market Tightness



Source: Eurostat, Own calculations (sparse data before 2009 and none before 2001).

Figure 11: Interest rates (Short term)



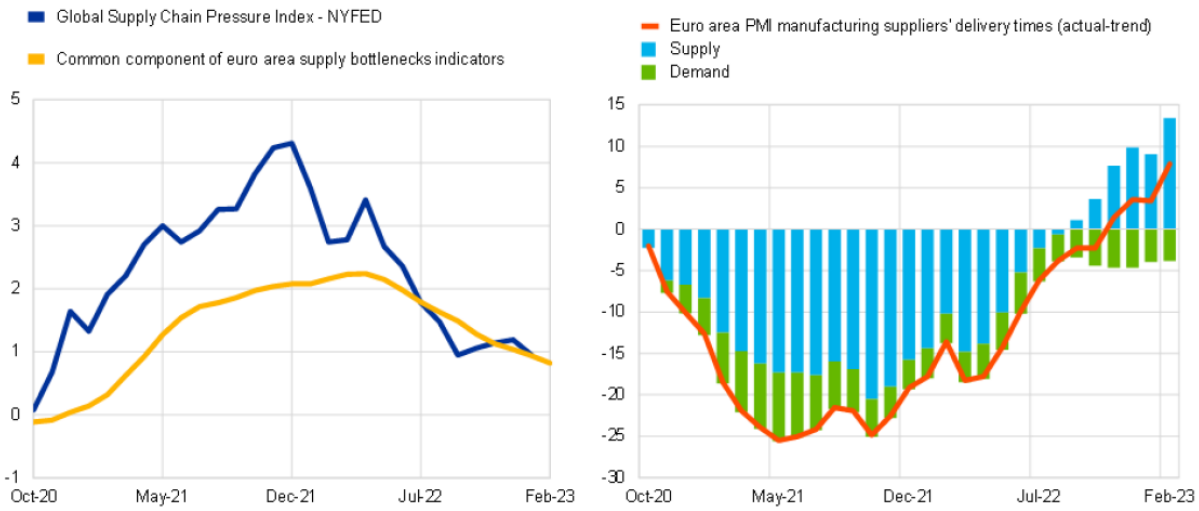
Source: OECD, Macrobond

Table 5: Bivariate correlations between price developments

	CPI, Harmonised (ZCPIH)	Private FCE, price deflator (PCPH)	Domestic Demand, price deflator (PUNT)	Final demand, price deflator (PUTT)	Imports, price deflator (PMGS)	Exports, price deflator (PXGS)	GDP, price deflator (PVGD)	Nominal unit labour costs (PLCD)
ALL 19 EA Countries								
1999-2022	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	93%	85%	84%	67%	68%	77%	23%
D_PCPH	**93%**	1	93%	87%	65%	65%	85%	24%
D_PUNT	**85%**	93%	1	91%	67%	65%	90%	23%
D_PUTT	**84%**	87%	91%	1	85%	89%	85%	15%
D_PMGS	**67%**	65%	67%	85%	1	92%	49%	4%
D_PXGS	**68%**	65%	65%	89%	92%	1	62%	4%
D_PVGD	**77%**	85%	90%	85%	49%	62%	1	22%
D_PLCD	**23%**	24%	23%	15%	4%	4%	22%	1
1999-2007	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	88%	79%	75%	41%	53%	78%	20%
D_PCPH	**88%**	1	91%	80%	44%	49%	86%	20%
D_PUNT	**79%**	91%	1	87%	51%	52%	92%	19%
D_PUTT	**75%**	80%	87%	1	75%	84%	87%	15%
D_PMGS	**41%**	44%	51%	75%	1	82%	37%	7%
D_PXGS	**53%**	49%	52%	84%	82%	1	58%	10%
D_PVGD	**78%**	86%	92%	87%	37%	58%	1	19%
D_PLCD	**20%**	20%	19%	15%	7%	10%	19%	1
2007-2010	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	90%	75%	70%	44%	52%	70%	24%
D_PCPH	**90%**	1	91%	83%	52%	58%	83%	24%
D_PUNT	**75%**	91%	1	92%	52%	63%	95%	23%
D_PUTT	**70%**	83%	92%	1	75%	87%	88%	11%
D_PMGS	**44%**	52%	52%	75%	1	90%	38%	-8%
D_PXGS	**52%**	58%	63%	87%	90%	1	61%	-5%
D_PVGD	**70%**	83%	95%	88%	38%	61%	1	22%
D_PLCD	**24%**	24%	23%	11%	-8%	-5%	22%	1
2011-2019	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	92%	76%	75%	69%	66%	54%	7%
D_PCPH	**92%**	1	87%	79%	63%	63%	68%	5%
D_PUNT	**76%**	87%	1	87%	64%	64%	80%	5%
D_PUTT	**75%**	79%	87%	1	84%	91%	77%	6%
D_PMGS	**69%**	63%	64%	84%	1	92%	35%	8%
D_PXGS	**66%**	63%	64%	91%	92%	1	54%	8%
D_PVGD	**54%**	68%	80%	77%	35%	54%	1	-4%
D_PLCD	**7%**	5%	5%	6%	8%	8%	-4%	1
2020-2022	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	97%	92%	94%	81%	78%	90%	14%
D_PCPH	**97%**	1	95%	93%	78%	74%	90%	18%
D_PUNT	**92%**	95%	1	92%	75%	69%	92%	19%
D_PUTT	**94%**	93%	92%	1	91%	90%	89%	3%
D_PMGS	**81%**	78%	75%	91%	1	95%	65%	-9%
D_PXGS	**78%**	74%	69%	90%	95%	1	68%	-13%
D_PVGD	**90%**	90%	92%	89%	65%	68%	1	20%
D_PLCD	**14%**	18%	19%	3%	-9%	-13%	20%	1

	CPI, Harmonised (ZCPIH)	Private FCE, price deflator (PCPH)	Domestic Demand, price deflator (PUNT)	Final demand, price deflator (PUTT)	Imports, price deflator (PMGS)	Exports, price deflator (PXGS)	GDP, price deflator (PVGD)	Nominal unit labour costs (PLCD)
ONLY BIG COUNTRIES (14 out of 19)								
1999-2022	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	93%	89%	84%	67%	68%	74%	15%
D_PCPH	**93%**	1	95%	85%	65%	64%	79%	14%
D_PUNT	**89%**	95%	1	87%	64%	64%	85%	16%
D_PUTT	**84%**	85%	87%	1	86%	91%	77%	4%
D_PMGS	**67%**	65%	64%	86%	1	93%	39%	-2%
D_PXGS	**68%**	64%	64%	91%	93%	1	53%	-5%
D_PVGD	**74%**	79%	85%	77%	39%	53%	1	14%
D_PLCD	**15%**	14%	16%	4%	-2%	-5%	14%	1
1999-2007	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	93%	89%	74%	33%	49%	83%	19%
D_PCPH	**93%**	1	93%	74%	33%	46%	85%	15%
D_PUNT	**89%**	93%	1	77%	37%	47%	89%	17%
D_PUTT	**74%**	74%	77%	1	74%	89%	79%	8%
D_PMGS	**33%**	33%	37%	74%	1	87%	23%	4%
D_PXGS	**49%**	46%	47%	89%	87%	1	51%	2%
D_PVGD	**83%**	85%	89%	79%	23%	51%	1	12%
D_PLCD	**19%**	15%	17%	8%	4%	2%	12%	1
2007-2010	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	82%	77%	69%	48%	54%	62%	6%
D_PCPH	**82%**	1	93%	82%	55%	58%	73%	3%
D_PUNT	**77%**	93%	1	81%	47%	49%	80%	4%
D_PUTT	**69%**	82%	81%	1	79%	87%	63%	-11%
D_PMGS	**48%**	55%	47%	79%	1	91%	10%	-17%
D_PXGS	**54%**	58%	49%	87%	91%	1	30%	-20%
D_PVGD	**62%**	73%	80%	63%	10%	30%	1	8%
D_PLCD	**6%**	3%	4%	-11%	-17%	-20%	8%	1
2011-2019	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	90%	69%	68%	68%	62%	32%	13%
D_PCPH	**90%**	1	85%	73%	63%	57%	48%	10%
D_PUNT	**69%**	85%	1	82%	58%	56%	70%	14%
D_PUTT	**68%**	73%	82%	1	82%	90%	68%	8%
D_PMGS	**68%**	63%	58%	82%	1	93%	21%	7%
D_PXGS	**62%**	57%	56%	90%	93%	1	42%	7%
D_PVGD	**32%**	48%	70%	68%	21%	42%	1	0%
D_PLCD	**13%**	10%	14%	8%	7%	7%	0%	1
2020-2022	D_ZCPIH	D_PCPH	D_PUNT	D_PUTT	D_PMGS	D_PXGS	D_PVGD	D_PLCD
D_ZCPIH	1	95%	95%	93%	85%	79%	83%	-10%
D_PCPH	**95%**	1	97%	90%	81%	74%	80%	-4%
D_PUNT	**95%**	97%	1	92%	80%	74%	85%	-3%
D_PUTT	**93%**	90%	92%	1	93%	93%	85%	-22%
D_PMGS	**85%**	81%	80%	93%	1	95%	65%	-28%
D_PXGS	**79%**	74%	74%	93%	95%	1	71%	-33%
D_PVGD	**83%**	80%	85%	85%	65%	71%	1	1%
D_PLCD	**-10%**	-4%	-3%	-22%	-28%	-33%	1%	1

Figure 12: Supply constraints



Source: Lane (2023: Fig. 4). left: standard deviations; right: diffusion index in deviation from trend)

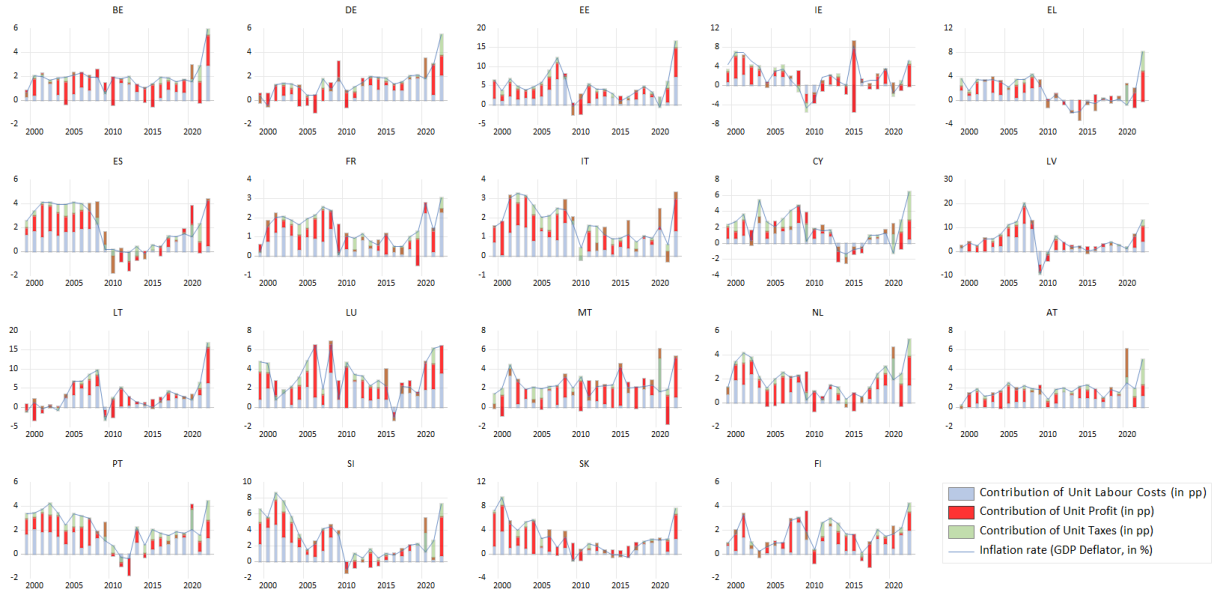
"Federal Reserve Bank of New York (NYFED), S&P Global, Harper Petersen (HARPEX) shipping cost index, European Commission, Eurostat and ECB calculations. Notes: The common component in the left-hand side panel is computed using a dynamic factor model analysis on a range of supply bottlenecks indicators (see "Supply chain bottlenecks in the euro area and the United States: where do we stand?", Economic Bulletin, Issue 2/2022). The SVAR model in the right-hand side panel shows

the contribution of aggregate demand (due to demand and interest rate shocks) and aggregate supply (due to supply-chain disruption, energy and other cost-push shocks) forces (see also De Santis, Economic Bulletin, Issue 8/2021). The model is identified using sign and narrative restrictions as in Antolín-Díaz, J. and Rubio-Ramírez, J.F., "Narrative Sign Restrictions for SVARs", American Economic Review, Vol. 108, No 10, 2018, pp. 2802-2829. " (Lane 2023)

Table 6: Departures from the Wage-Profit-Tax rule (EA19)

		Belgium	Germany	Estonia	Ireland	Greece	Spain	France	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Austria	Portugal	Slovenia	Slovakia	Finland
All																				
1999-2007	IST	16.8%	7.4%	63.8%	35.4%	26.8%	35.3%	16.9%	22.5%	26.6%	88.0%	27.8%	28.2%	21.1%	23.4%	15.1%	29.9%	45.7%	42.1%	11.8%
	SOLL	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%
2008-2013	IST	7.7%	7.2%	15.8%	-2.6%	1.0%	0.6%	4.1%	6.6%	4.6%	1.1%	8.7%	15.3%	11.2%	4.1%	8.5%	3.4%	5.6%	2.8%	10.7%
	SOLL	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%
2014-2019	IST	8.7%	9.1%	15.7%	15.5%	-0.5%	4.9%	4.5%	4.9%	2.0%	10.8%	12.7%	6.9%	13.6%	8.2%	8.8%	9.1%	8.0%	5.1%	6.2%
	SOLL	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%
2020	IST	1.5%	1.8%	-0.5%	-1.6%	-0.9%	1.2%	2.8%	1.6%	-1.2%	1.0%	1.8%	4.7%	1.5%	1.9%	2.6%	2.0%	1.3%	2.4%	1.5%
	SOLL	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2021	IST	2.9%	3.1%	6.0%	0.7%	1.3%	2.3%	1.3%	0.5%	2.9%	6.9%	6.5%	6.2%	1.8%	2.5%	1.9%	1.4%	2.6%	2.4%	2.5%
	SOLL	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2022	IST	6.7%	5.3%	14.3%	9.8%	9.0%	3.5%	2.7%	3.1%	4.6%	11.0%	16.5%	5.7%	5.0%	3.4%	6.1%	3.6%	6.6%	7.5%	5.3%
	SOLL	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2023	IST	5.0%	6.8%	6.9%	5.4%	5.6%	4.3%	5.0%	3.3%	4.3%	6.2%	8.9%	4.2%	4.1%	5.0%	5.8%	5.2%	6.2%	12.2%	3.7%
	SOLL	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Wages																				
1999-2007	IST	6.8%	-0.5%	23.7%	13.4%	11.7%	14.0%	7.9%	8.8%	14.2%	31.7%	10.3%	11.9%	7.2%	7.7%	2.8%	11.7%	21.1%	9.1%	4.4%
	SOLL	8.4%	8.5%	7.3%	6.3%	5.3%	7.9%	8.5%	6.2%	6.8%	6.6%	6.6%	7.9%	7.3%	8.2%	7.8%	7.9%	8.3%	6.3%	7.7%
2008-2013	IST	4.7%	5.9%	2.5%	-5.7%	0.7%	-2.9%	3.9%	3.0%	4.5%	-6.3%	-1.6%	7.4%	5.1%	3.7%	5.8%	-0.5%	2.4%	2.5%	7.4%
	SOLL	5.3%	5.1%	4.8%	4.2%	3.6%	4.9%	5.3%	4.0%	4.8%	4.4%	4.2%	4.8%	4.4%	5.0%	4.8%	4.7%	5.2%	3.7%	5.0%
2014-2019	IST	2.0%	6.8%	10.5%	-4.8%	1.5%	2.9%	0.9%	2.9%	0.1%	11.5%	12.4%	7.3%	5.6%	2.8%	5.1%	5.2%	5.7%	7.5%	0.7%
	SOLL	5.1%	5.3%	4.8%	3.2%	3.6%	4.6%	5.3%	4.0%	4.5%	4.6%	4.4%	4.8%	4.3%	4.9%	4.9%	4.5%	5.0%	4.0%	4.8%
2020	IST	1.8%	1.9%	1.9%	-1.6%	2.6%	3.8%	2.2%	1.4%	1.2%	1.7%	2.4%	1.9%	4.7%	3.7%	3.2%	4.1%	3.6%	2.3%	0.4%
	SOLL	1.0%	1.1%	1.0%	0.6%	0.7%	0.9%	1.0%	0.8%	0.9%	1.0%	0.9%	1.0%	0.9%	1.0%	1.0%	0.9%	1.0%	0.9%	0.9%
2021	IST	-0.1%	0.5%	0.7%	-0.9%	-1.1%	-0.1%	0.2%	0.4%	-0.7%	1.9%	3.3%	2.0%	-1.0%	-0.3%	0.1%	0.2%	0.5%	1.0%	1.5%
	SOLL	1.0%	1.1%	1.0%	0.5%	0.8%	1.0%	1.0%	0.8%	0.9%	1.0%	1.0%	1.0%	0.9%	1.0%	1.0%	1.0%	1.1%	0.9%	0.9%
2022	IST	2.6%	2.3%	6.6%	-0.2%	0.6%	0.7%	1.6%	1.3%	0.3%	5.8%	6.0%	3.3%	0.4%	0.9%	1.2%	-0.4%	-0.6%	3.3%	1.6%
	SOLL	1.0%	1.1%	1.0%	0.5%	0.8%	1.0%	1.0%	0.8%	0.9%	1.0%	1.0%	1.0%	0.9%	1.0%	1.0%	1.0%	1.1%	0.9%	0.9%
2023	IST	4.4%	3.2%	4.2%	0.9%	1.2%	2.3%	2.0%	1.0%	2.8%	3.6%	1.7%	2.9%	0.9%	2.1%	3.3%	1.7%	2.8%	2.4%	1.5%
	SOLL	1.0%	1.1%	1.0%	0.5%	0.7%	0.9%	1.0%	0.8%	0.9%	1.0%	0.9%	1.0%	0.9%	1.0%	1.0%	0.9%	1.0%	0.9%	0.9%
Profits																				
1999-2007	IST	8.9%	6.4%	24.2%	15.4%	10.5%	15.0%	7.0%	9.7%	-0.3%	37.1%	16.2%	11.5%	8.0%	11.8%	11.0%	11.5%	16.8%	26.0%	6.7%
	SOLL	6.3%	6.5%	7.3%	8.3%	9.5%	7.0%	5.8%	8.3%	7.7%	8.1%	8.1%	6.6%	7.3%	6.6%	6.6%	6.6%	6.0%	8.6%	6.9%
2008-2013	IST	2.4%	0.3%	9.7%	5.5%	-0.4%	1.8%	-0.9%	1.9%	2.6%	6.1%	10.5%	5.5%	4.9%	0.5%	0.7%	4.0%	1.3%	-0.5%	-0.2%
	SOLL	3.9%	4.0%	4.2%	5.0%	5.4%	4.4%	3.6%	4.9%	4.0%	4.8%	5.0%	4.3%	4.5%	4.2%	4.1%	4.2%	3.7%	5.6%	4.0%
2014-2019	IST	5.4%	1.2%	2.5%	21.9%	-3.5%	1.2%	2.4%	1.9%	1.8%	-3.3%	-1.4%	-0.2%	7.5%	3.7%	3.0%	1.3%	1.9%	-3.7%	4.5%
	SOLL	4.1%	3.9%	4.0%	6.3%	5.1%	4.5%	3.5%	4.9%	4.3%	4.4%	4.8%	4.3%	4.8%	4.2%	4.0%	4.3%	3.8%	5.2%	4.0%
2020	IST	1.1%	1.6%	0.0%	2.0%	0.1%	-1.6%	0.5%	1.1%	1.2%	0.1%	1.0%	2.9%	1.4%	0.9%	2.9%	-0.4%	1.8%	0.2%	1.7%
	SOLL	0.8%	0.7%	0.8%	1.3%	1.0%	0.9%	0.7%	0.9%	0.8%	0.8%	0.9%	0.8%	0.9%	0.8%	0.8%	0.8%	0.7%	0.9%	0.8%
2021	IST	1.7%	2.5%	3.6%	1.1%	3.1%	0.9%	1.2%	-0.8%	2.0%	5.7%	1.6%	2.5%	2.1%	1.8%	1.1%	0.7%	-0.2%	1.0%	0.6%
	SOLL	0.8%	0.8%	0.8%	1.4%	1.0%	0.8%	0.7%	0.9%	0.9%	0.8%	0.9%	0.8%	1.0%	0.8%	0.8%	0.8%	0.8%	0.9%	0.8%
2022	IST	3.7%	0.1%	5.8%	8.6%	5.8%	2.5%	0.4%	2.4%	1.7%	4.2%	10.1%	1.8%	4.1%	1.4%	2.2%	2.3%	5.4%	3.0%	3.1%
	SOLL	0.8%	0.8%	0.8%	1.4%	1.0%	0.8%	0.7%	0.9%	0.9%	0.8%	0.9%	0.8%	1.0%	0.8%	0.8%	0.8%	0.7%	0.9%	0.8%
2023	IST	0.0%	3.2%	1.5%	4.4%	3.0%	1.4%	2.6%	0.3%	1.0%	1.3%	6.9%	1.4%	3.0%	2.2%	2.1%	2.4%	4.3%	8.6%	1.7%
	SOLL	0.9%	0.7%	0.8%	1.4%	1.0%	0.8%	0.7%	0.9%	0.9%	0.8%	0.9%	0.8%	1.0%	0.8%	0.8%	0.8%	0.8%	0.9%	0.8%
Taxes																				
1999-2007	IST	0.4%	1.4%	7.8%	4.3%	2.8%	3.6%	1.3%	2.7%	11.3%	6.0%	-0.1%	2.9%	4.6%	2.7%	0.9%	4.6%	3.7%	3.8%	0.4%
	SOLL	1.8%	1.5%	1.8%	1.7%	1.7%	1.6%	2.1%	2.0%	2.0%	1.8%	1.8%	1.9%	1.8%	1.7%	2.0%	2.0%	2.2%	1.6%	1.9%
2008-2013	IST	0.5%	0.8%	2.9%	-1.4%	0.6%	1.7%	1.1%	1.5%	-2.6%	1.9%	-0.1%	1.8%	0.8%	-0.1%	1.9%	-0.2%	1.8%	0.7%	3.2%
	SOLL	1.0%	1.0%	1.2%	0.9%	1.1%	0.8%	1.3%	1.2%	1.4%	0.9%	1.0%	1.1%	1.2%	1.0%	1.3%	1.2%	1.2%	0.9%	1.2%
2014-2019	IST	1.1%	0.9%	2.3%	-1.5%	1.5%	0.7%	1.2%	0.1%	0.1%	2.8%	1.6%	-0.3%	0.1%	1.5%	0.6%	2.5%	0.3%	1.4%	0.9%
	SOLL	1.0%	1.0%	1.2%	0.9%	1.1%	0.8%	1.3%	1.2%	1.4%	0.9%	1.0%	1.1%	1.2%	1.0%	1.3%	1.2%	1.2%	0.9%	1.2%
2020	IST	-1.4%	-1.7%	-2.4%	-2.6%	-3.6%	-1.0%	0.0%	-0.9%	-3.6%	-0.8%	-1.6%	-0.1%	-4.5%	-2.6%	-3.5%	-1.7%	-4.2%	-0.2%	-0.7%
	SOLL	0.2%	0.2%	0.3%	0.1%	0.3%	0.2%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%	0.3%
2021	IST	1.4%	0.1%	1.7%	0.8%	-0.6%	1.5%	-0.1%	0.9%	1.5%	-0.7%	1.7%	1.7%	0.7%	1.1%	0.8%	0.5%	2.3%	0.3%	0.4%
	SOLL	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
2022	IST	0.4%	2.9%	1.8%	1.4%	2.6%	0.3%	0.7%	-0.5%	2.6%	1.0%	0.5%	0.7%	0.5%	1.2%	2.6%	1.7%	1.7%	1.3%	0.6%
	SOLL	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
2023	IST	0.6%	0.4%	1.2%	0.2%	1.4%	0.6%	0.3%	2.0%	0.5%	1.3%	0.4%	-0.2%	0.1%	0.7%	0.4%	1.1%	-0.8%	1.1%	0.5%
	SOLL	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.3%	0.2%	0.3%	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%

Figure 13: Three-Components contribution to GDP-deflator inflation in the EA19



Source: AMECO and own calculations