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Have greed and rapidly rising wages triggered a profit-wage-price spiral? Firm-level evidence for Belgium[☆]

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ABSTRACT

Our study of Belgian firms found that 2022 price increases were largely attributable to rising intermediate input costs. Wage increases also contributed to prices hikes. Interestingly, markups appeared to play no role in driving up prices and in fact decreased or even offset the contribution of wages. In a country with automatic wage indexation, this is an important point for discussion in the debate on the profit-price or wage-price spiral.

1. Introduction

The recently coined word "greedflation" refers to a situation in which exorbitant corporate profits contribute to inflationary pressures and turn the well-known wage-price spiral into a profit-wage-price spiral (Schnabel, 2023). The concept has triggered a wave of empirical research of late aimed at examining the extent to which markups as well as wages have contributed to the recent spike in inflation. Arce et al. (2023) and Hansen et al. (2023) found that corporate profits rose faster than wages in the euro area in 2022. Hebbink and Öztürk (2023) reached a similar conclusion for the Netherlands. Relying on aggregate data, these recent studies focus on the evolution of profit share, defined as the ratio of gross operating surplus to value added. The numerator represents the surplus generated by a firm's activity, after having compensated for the labour factor. However, this methodology does not allow the role of intermediates in driving up prices to be studied. Furthermore, as pointed out by Colonna et al. (2023), using aggregate profit share as a proxy for corporate markups could lead to erroneous conclusions on how markups evolve, especially when input costs have risen substantially.

In this paper, we look at 2022 price increases in Belgium using a rich firm-level dataset. We decomposed price increases based on input costs, wages and markups and found no evidence that markups contributed positively to price increases. This is in line with Glover et al. (2023) who found that although markup growth was a major contributor to inflation in the US in 2021, its contribution fell in the second half of the year, suggesting a minor role in 2022. Rather, the main driver of prices increases in Belgium was a steep rise in input costs.

This study contributes to the literature as follows:

- To the best of our knowledge, it is the first to use 2022 firm-level data to decompose recent price increases.

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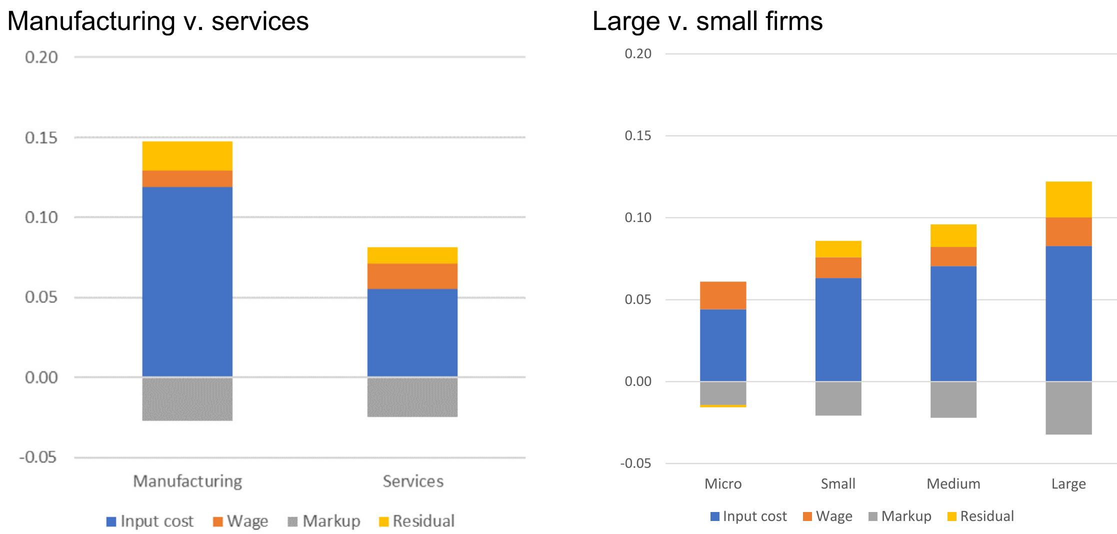

Fig. 1. The contribution of markups to price increases was mostly negative in 2022.
(decomposition of $\Delta \log \hat{p}$ into the markup, input cost and wage effects and the residual term over the period 2021–2022).
Note: micro firms defined as firms with 1–10 employees, small firms 11–50, medium firms 51–250 and large firms have more than 250 employees.

- Our methodology allows the impact of input costs on price changes, in addition to wages and markups, to be taken into account.
- Our study focused on Belgium, a country with automatic wage indexation, which offers insight into the debate on the profit-price and wage-price spirals.

2. Method

We applied a simple framework to measure the role of markups, wages and input prices in driving inflation. Consider firm j with a constant returns-to-scale production function $y_j = A_j * F_j\left(q_j^I, L_j, K_j\right)$, where y_j represents total output quantity, A_j total factor productivity, q_j^I input quantities, L_j labour and K_j capital stock. This production function is associated with the total cost function $C_j = y_j \frac{c_j(p_j^I, w_j)}{A_j}$, with c_j a function of intermediate input prices (p_j^I) and wages (w_j). At time t, labour and intermediate inputs are assumed to be variable, while capital is fixed and predetermined at time *t-1*. Firms set prices by applying a markup to marginal costs:[1]

$$p_j = \frac{c_j\left(p_j^I, w_j\right)}{Aj} * \mu_j \qquad (1)$$

where p_j is firm j's output price and μ_j its markup. Transforming (1) into logarithms and using Shepard's lemma, the change in producer price between t and t+*1* can be written as:

$$\Delta logp_j = \Omega_j^q * \Delta \log p_j^I + \Omega_j^L * \Delta \log w_j + \Delta \log \mu_j - \Delta \log A_j \qquad (2)$$

where Ω_j^q is firm j's material input costs and Ω_j^L its wage costs, as a share of total variable costs at time t. We cannot directly observe firm-level output prices p_j and input prices p_j^I or output quantities y_j and input quantities q_j. We therefore define:

$$\Delta \log \hat{p}_j = \Delta \log p_j + \Delta \log y_j - \Delta \log L_j \qquad (3)$$

$$\Delta \log \hat{p}_j^I = \Delta \log p_j^I + \Delta \log q_j - \Delta \log L_j \qquad (4)$$

As $\Delta \log \hat{p}_j$ represents the change in nominal labour productivity, it differs from the actual change in prices $\Delta \log p_j$ by accounting for the change in real labour productivity. Substituting (3) and (4) for (2) yields:

$$\Delta log\hat{p}_j = \underbrace{\Omega_j^q * \Delta \log \hat{p}_j^I}_{Input\ \ price\ \ effect} + \underbrace{\Omega_j^L * \Delta \log w_j}_{Wage\ \ effect} + \underbrace{\Delta \log \mu_j}_{Markup\ \ effect} + \psi_j \qquad (5)$$

We use Eq. (5) to understand the contribution of each factor to 2022 price changes. Interestingly, the wage effect and the markup effect are the same in both Eqs. (2) and (5), so using change in nominal labour productivity rather than "actual" producer prices does not blur these two effects. The input price effect could be different. In Eq. (4) we see that this is the case if the change in input quantities is not equal to the change in labour. The main difference between the two equations is the last term. As opposed to the price Eq. (2), nominal labour productivity decomposition does not account for the change in TFP. Rather, it includes the term ψ_j, which captures that we do not fully account for substitution across inputs.

3. Data and calculation

Our empirical analysis combined firm-level data from different sources for the period 2021–2022. We relied on VAT returns that reported sales ($y_j p_j$) and purchases of intermediate goods and services ($q_j p_j^I$). We combined these data with declarations to the National Social Security Office reporting quarterly employment (L_j) in full time equivalents and the wage bill ($L_j w_j$). Finally, we relied on the business register used by the National Accounts Institute which indicates the institutional sector and five-digit NACE code of each firm.

For privacy reasons, we used only data from non-financial corporations (institutional sector S11). Therefore, the self-employed (S14), non-profit institutions (S15), public administrations (S13) and financial enterprises (S12) fell outside the scope of our analysis. Firms with two-digit NACE codes 64–66 (financial services) and 84 and above (public services) were also excluded. Manufacturing is defined as NACE codes 1–39 and services as codes 41–82.

[1] The subscript t is omitted from subsequent equations to improve readability.

Fig. 2. No widespread evidence of greedflation.
(decomposition of $\Delta\log\hat{p}$ *into the markup, input cost and wage effects and the residual term over the period 2021–2022 per SUT-level sector)*

This classification yielded a universe of 108,607 firms employing 1,873,770 workers in 2021, covering 81% of Belgian private sector employment. Summary statistics are set out below.

For purposes of sector-level analysis, firms were grouped into approximately 100 detailed sectors based on the classification used for the Supply Use Table (SUT). This is the most granular level used to compile macroeconomic data, with a level of detail between two-digit and three-digit NACE codes. SUT sectors with fewer than 500 employees or 20 firms were excluded for privacy reasons.

We now described how we map Eq. (5) to data. Wages, w_j, are calculated by dividing the wage bill by employment. The input cost share, Ω_j^q, is equal to $\frac{q_j p_j^I}{\left(q_j p_j^I + L_j w_j\right)}$ in year t. Similarly, $\Omega_j^L = \frac{L_j w_j}{\left(q_j p_j^I + L_j w_j\right)}$.

Following De Loecker and Warzynski (2012) we computed the change in markup $\Delta\log\mu_j$ as $\Delta\log\left(y_j p_j\right) - \Delta\log\left(q_j p_j^I\right)$.[2] Since we studied only the change between 2021 and 2022, we assumed the output elasticity of intermediate inputs to be constant.

The last term ψ in Eq. (5) can be calculated as the residual since all other terms are observed. It therefore also captures measurement errors or second-order effects.

Eqs. (3) and (4) describe how we constructed $\Delta\log\hat{p}_j$ and $\Delta\log\hat{p}_j^I$. We aggregate firm-level variables using a weighted average, with firm-level wage cost as the weight. As first differences in logarithmic values can easily lead to extreme values, we trimmed the price data based on the 5th–95th percentile.

4. Results

Fig. 1 shows the decomposition of nominal labour productivity into input costs, wages and markup and the residual factor according to Eq. (5). Both manufacturing and services firms raised their prices notably in 2022 (left panel). The main driver of these price increases was higher input costs. Wages also contributed to price increases, although to a lesser extent, as their share in total cost is more limited (see Table 1). Nevertheless, the wage effect for services is larger than for manufacturing, as labour costs typically represent a higher share of the total cost of services. The contribution of markups was negative and more than offset the contribution of rising wages. The negative contribution

[2] Results are very similar if the change in markups is computed as $\Delta\log\left(y_j p_j\right) - \Delta\log\left(q_j p_j^I + L_j w_j\right)$.

Table 1
Summary statistics.

Variable	Mean		p25		p50		p75	
	2021	2022	2021	2022	2021	2022	2021	2022
Sales	8802	10,552	351	403	819	932	2267	2565
Wage cost	917	985	46	54	115	131	340	377
Input cost	7205	8794	188	212	508	575	1605	1814
Employment	18.2	18.6	2.0	2.0	3.8	4.0	9.0	9.3

Note: Based on a balanced panel of 103,265 firms, after trimming prices based on the 5th–95th percentile. Sales, wage costs and input costs are measured in '000 euros. Employment is measured as the average full-time equivalents (FTE) over 4 quarters.

of markups becomes smaller with decreasing size of the firm (right panel) and for the smallest firms does not compensate for the wage effect anymore. Our findings illustrate the variability of markups documented in existing literature (e.g. Amiti et al., 2019). Large firms are slow to reflect marginal cost shocks in their prices. Additionally, the substantial transmission of sizeable input cost shocks is underscored.

Fig. 2 shows the same decomposition per detailed sector. Here the same conclusion can be drawn. Markups contributed negatively to price increases in virtually all sectors. We therefore did not find evidence of widespread excessive profit-seeking behaviour in Belgium.

5. Discussion and conclusion

Arce et al. (2023) highlighted that if firms and workers repeatedly raise profits and wages in line with inflation, this could lead to an upward price spiral. To keep inflation under control, profits and/or wages should rise at a rate lower than overall price increases, and at least one side must be willing to accept a decline in purchasing power. In Belgium, wages are automatically indexed by law. In the absence of a significant increase in unemployment, real wages cannot be reduced to bring down inflation, and the risk of a wage-price spiral and/or profit-price spiral increases. We however found that even in a country with automatic wage indexation, the profit-wage dynamics did not fuel prices increases in 2022. Furthermore, the presence of large firms seems to have had a dampening effect on price increases as they are slower in adjusting their prices after a cost shock. In short, we have found no evidence thus far of a profit-wage-price spiral. Price increases in 2022 were mainly driven by higher input prices, suggesting that initial import price shocks gradually spread to all sectors.

Data availability

The data that has been used is confidential.

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