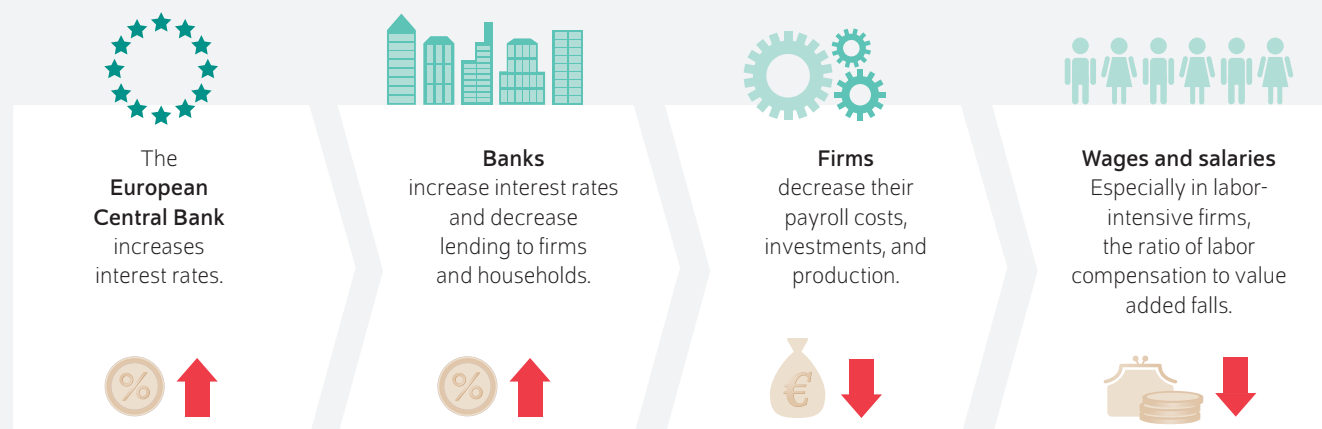


## Labor-intensive firms are a catalyst for monetary policy and its distributive effects

By Jan Philipp Fritsche

- Balance sheet data from over two million firms in the euro area show that interest rate increases reduce the share of wages and salaries of value added in the short term
- Labor-intensive firms react relatively strongly to interest rate increases by adjusting labor costs
- In highly leveraged firms, value added changes comparatively strongly
- Harmonizing European labor market institutions could result in more uniform monetary policy effects across the euro area countries

### Interest rate increases reduce the ratio of total labor compensation to value added



Source: Author's own depiction.

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### FROM THE AUTHORS

*“The effectiveness of monetary policy is partly determined by distributive effects. These differ strongly between firms and European regions. Thus, the ECB’s monetary policy has different effects in different countries. Harmonizing European labor market institutions should be considered.”*

— Jan Philipp Fritsche —

### MEDIA



**Audio Interview** with J. P. Fritsche (in German)  
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# Labor-intensive firms are a catalyst for monetary policy and its distributive effects

By Jan Philipp Fritsche

## ABSTRACT

The mandate of the European Central Bank's monetary policy is to ensure price stability. Interest rate changes by the ECB affect labor costs and the value added of firms. If both dimensions are not equally affected, monetary policy has a distributive effect between workers and shareholders. Balance sheet data from over two million companies in the euro area show that the labor costs in labor-intensive companies decrease more strongly than in other firms in response to interest rate increases. Heterogeneity of the companies can lead to asymmetries in the transmission of monetary policy in the euro area countries. Therefore, new monetary policy instruments targeting firms should be discussed. European labor markets with uniform labor law and European labor market institutions, along with the long-discussed banking and capital markets union, could help monetary policy affect the whole euro area more evenly.

The mandate of the European Central Bank (ECB) is to ensure price stability. According to the ECB Council, price stability can best be ensured by a medium-term inflation rate of two percent.<sup>1</sup> To achieve this objective, the ECB utilizes interest rate changes. Such changes mark the beginning of a long cause-effect chain that is expected to affect inflation rates via various channels (Box 1). However, this chain also gives rise to redistributive effects: If the costs of employees fall more sharply than value added in firms as a result of an interest rate increase, there is redistribution to the detriment of employees and to the benefit of shareholders.<sup>2</sup>

Although this redistributive effect is postulated by New Keynesian models, there has been no empirical evidence so far.<sup>3</sup> In a new study, it is empirically proven which effects interest rate increases have on the share of overall paid wages and salaries of value added (labor share) of the firms.<sup>4</sup> It is also analyzed what impact the average labor share and the average share of leverage of the balance sheet total (leverage ratio) of firms have.

## Interest rate increases decrease the labor share

The effects of monetary policy shocks—i.e., an unexpected quarter percentage point increase in the key interest rate—are broken down to the firm level via balance sheet data to conduct the empirical analysis (Box 2). On average for the companies, the labor share, which is around 72 percent, experiences a significant decline following a monetary policy shock. In the first year following the shock, the labor share falls by about 0.4 percentage points (Figure 1).

<sup>1</sup> Bundesbank, *Zusammenfassung der geldpolitischen Sitzung des Rates der Europäischen Zentralbank* (Frankfurt am Main: 2021) (in German; available online, accessed on August 23, 2021). This applies to all other online sources in this report unless stated otherwise.

<sup>2</sup> Here, a firm's value added of a firm is defined as the sum of its profits, taxes, cost of employees, interest, and depreciation. Thus, it measures a firm's contribution to GDP.

<sup>3</sup> See Cristiano Cantore, Filippo Ferroni, and Miguel León-Ledesma, "The missing link: monetary policy and the labor share," *Journal of the European Economic Association* no. 3 (2020): 1592–1620 (available online) as well as Kai Philipp Christoffel, Günter Coenen, and Anders Warne, "The new area-wide model of the euro area: a micro-founded open-economy model for forecasting and policy analysis," ECB Working Paper Series (2008) (available online).

<sup>4</sup> Jan Philipp Fritsche and Lea Steininger, "Zooming in on Monetary Policy—The Labor Share and Production Dynamics of Two Million Firms," *DIW Discussion Paper 1967* (2021) (available online).

Box 1

**Transmission of interest rate increases in New Keynesian models<sup>1</sup>**

Initially, an increase in interest rates has a direct impact on capital costs in the repurchase and interbank markets and credit institutions adjust financing conditions for their customers in the real economy. Depending on the business model, firms then invest less in new machinery or hire fewer people. This decreases aggregate demand. Fewer capital goods are produced and wage increases tend to be lower. In addition, more expensive consumer credit reduces demand for consumer goods. In such an environment, price increases are unlikely and the inflation rate decreases. At the same time, value added decreases at the firm level. If the cost of employees falls more sharply than value added, there is a redistribution in favor of the shareholders.

<sup>1</sup> See Cantore et al., "The missing link: monetary policy and the labor share," Aloisio Araújo, Susan Schommer, and Michael Woodford, "Conventional and unconventional monetary policy with endogenous collateral constraints," *American Economic Journal: Macroeconomics* 7, no. 1 (2015): 1–43 (available online), as well as Jordi Gali, "The return of the wage phillips curve," *Journal of the European Economic Association* 9, no. 3 (2011): 436–461 (available online).

This decline is driven by the decreasing costs of employees. Initially, value added declines only slightly, but reacts more strongly after two and three years—which brings the labor share, together with a renewed increase in the labor costs, closer to its starting level.

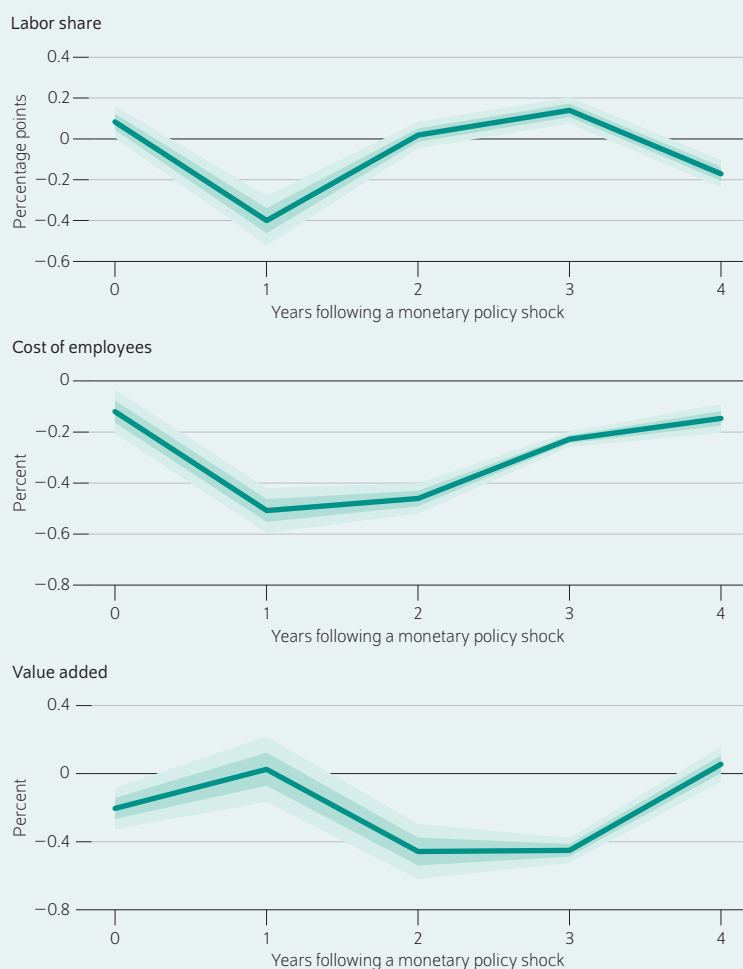
**Firms can be distinguished by average labor share and leverage ratio**

The leverage ratio and labor share can be used to discriminate between firms and their business models. While in some industries production is very much based on the use of leverage, machinery, and hardly any labor—manufacturing of tobacco products being one example, with an average labor share of 25 percent and an average leverage ratio of 72 percent—in other industries production is very labor-intensive, such as research and development, which has a labor share of 72 percent and a leverage ratio of 30 percent.

The leverage ratio and the labor share can approximate how a firm divides its costs between leverage and labor costs, respectively. It is assumed that firms react differently to monetary policy shocks depending on their cost structure. Labor-intensive firms tend to be able to manage their costs more easily through personnel policies after a monetary policy shock, while highly leveraged firms can influence their costs by modifying their balance sheets. Both the labor share and the leverage ratio contain specific company information that would not be available were the two variables considered separately.

Figure 1

**Effects of an interest rate increase on average for all firms**  
Percentage points (labor share) and percentage changes (cost of employees and value added)



Notes: The charts show the response of the labor share in percentage points and the percentage change in the cost of employees as well as value added, in each case after zero to four years following a monetary policy shock. The (dark) green areas indicate the 95 (68) percent confidence interval.

Sources: Amadeus BvD; author's own calculations.

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The labor share declines in the first year following an interest rate increase before beginning to rise again.

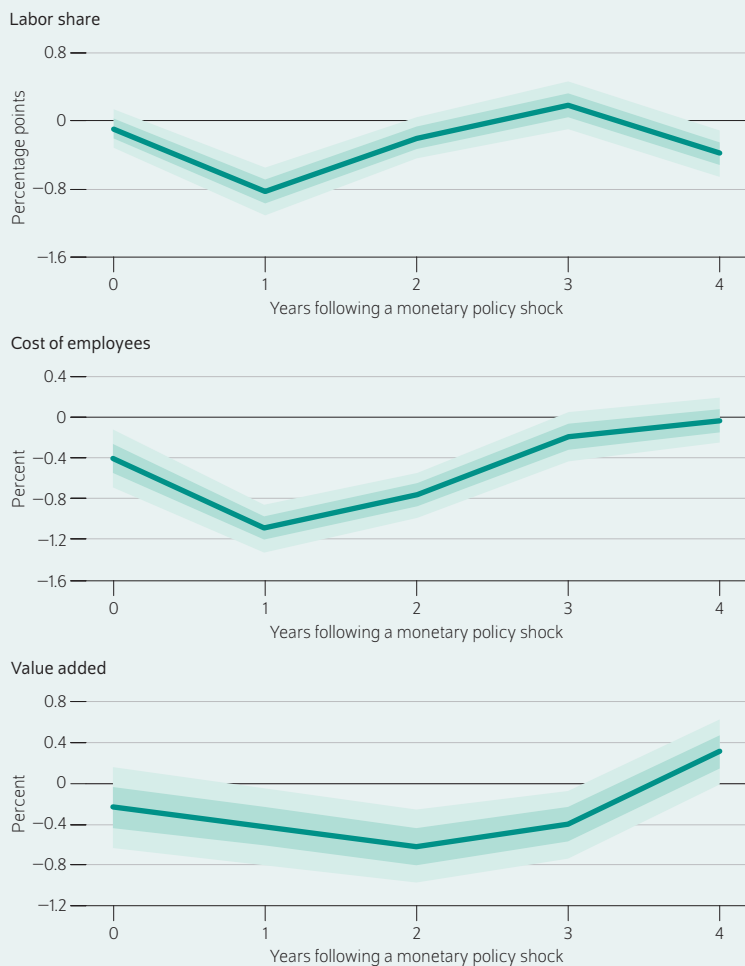
**Firms with a high labor share react strongly by adjusting cost of employees**

Labor-intensive firms are especially affected by interest rate increases, even when the leverage ratio is relatively low. The labor share of these firms reacts significantly in response to increases, mainly through a decline in labor costs (Figure 2). One year following the monetary policy shock, employees receive one percentage point less than shareholders relative to value added.

Figure 2

**Effects of an interest rate increase on labor-intensive companies**

Percentage points (labor share) and percentage changes (cost of employees and value added)



Notes: The charts show the response of the labor share in percentage points and the percentage change in the cost of employees as well as value added, in each case after zero to four years following a monetary policy shock. The (dark) green areas indicate the 95 (68) percent confidence interval. Only firms belonging to both the 25 percent of firms with the highest labor share and the 25 percent of firms with the lowest leverage ratio were included.

Sources: Amadeus BvD; author's own calculations.

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The labor share falls particularly sharply in labor-intensive firms, driven by a decline in cost of employees.

**Response of costs of employees is low in firms with high leverage ratios**

The annually changing leverage ratio can be used to calculate the impact of monetary policy shocks at the firm level (Box 2) while the (average) leverage ratio of firms can be used to categorize them by business models and industries.

In firms with a high leverage ratio and a high labor share, the labor share falls in the year of the monetary policy shock (Figure 3). This is not mainly driven by adjustments of labor

costs but rather an (insignificant) increase in value added. In the case of firms with a high leverage ratio, this increase does not necessarily have to be achieved in the short term by expanding production capacity; it can also be achieved by stock clearings or taking steps to reduce the balance sheet or to increase profitability. Two years following the interest rate increase, value added is significantly lower than in the initial year. The labor share increases (insignificantly) above its original level.

**Labor share response is an indicator of effective monetary policy**

The above results are not only interesting from a distributional perspective, but also show that the effectiveness of monetary policy depends on the labor share: Wages and salaries determine the purchasing power of most households, as they are their main source of income. When the labor share sinks, other declines follow: the purchasing power of the majority of the population decreases compared to value added, their demand decreases, and the inflation rate decreases too.

Thus, monetary policy has a relatively strong impact via its influence on particularly labor-intensive manufacturing companies. Following an interest rate increase, these companies make a greater adjustment to the labor share compared to other firms. If, however, the labor share hardly responds at all, an interest rate increase will have little effect on demand and thus the inflation rate.

**Inequality across euro area regions makes stabilizing monetary policy in the euro area more difficult**

At the European level, this means that the ECB's monetary policy has a stronger impact in the countries and regions in which firms have particularly labor-intensive production. The heterogeneity of the average firm-based labor share<sup>5</sup> is high in the different regions of the euro area founding countries (Figure 4). In Germany, for example, the difference between the eastern and western regions reaches up to 30 percentage points. This heterogeneity applies to the comparisons of individual countries as well: In France, the labor share tends to be high while it tends to be low in Portugal.

This makes it difficult for the ECB to stabilize inflation rates across the euro area and can lead to macroeconomic imbalances. If labor costs fall more sharply in labor-intensive regions than in others after an interest rate increase, this curbs inflation rates in these regions more strongly. Conversely, the effect of monetary policy tends to be more impaired in regions with low labor shares, which often coincide with country borders. In a worst-case scenario, this heterogeneity may also lead to divergences in countries' business

<sup>5</sup> The firm-based labor share may differ from other regional labor shares because the firms' workers are not necessarily registered in the same region as the firm employing them.

Box 2

Data and empirical process

This study uses the BvD Amadeus dataset, which aggregates firm data from the commercial registers (and similar institutions) of the euro area. Firms from the founding euro area countries were observed over the period of 1999 to 2017, resulting in around 14 million observations of over two million firms. The effect of interest rate increases on the labor share and its components for the first four years after recovery is calculated using Local Projections. DvB calculates value added as the sum of a firm's profits, taxes, cost of employees, interest, and depreciation. The study uses the monetary policy shocks of Jarocinski and Karadi and breaks them down to the firm level by multiplying them by the leverage ratio under the assumption that monetary policy affects firms directly through their current debt.<sup>1</sup>

The regressions include a variety of control variables, for example, annual trends for sectors and countries or firm variables such as operating assets. These regressions are performed for individual parts of as well as the entire dataset. Using the average values of the firms, the dataset is divided into six parts. The dimensions of labor share, leverage ratio, balance sheet size, and age are decisive here. It turns out that that the labor share and the leverage ratio are key dimensions. Therefore regressions are run for only two groups of firms: those with a high labor share and a low leverage ratio and those with a low labor share and a high leverage ratio. This makes it possible to observe the various effect channels in isolation, which would otherwise be difficult due to the low correlation between the leverage ratio and the labor share. Only the results of this last distinction are shown in this study.

<sup>1</sup> Marek Jarociński and Peter Karadi, "Deconstructing monetary policy surprises the role of information shocks," *American Economic Journal: Macroeconomics* 12, no. 2 (2020): 1–43 (available online).

cycles, making it more difficult to conduct stabilizing monetary and fiscal policies in the euro area.

**Conclusion: additional tools can alleviate distributive effect**

The results highlight the heterogeneous impact of monetary policy on employees, shareholders, different types of firms, and across countries.

While the redistributive effect between employees and shareholders seems to be particularly significant for national policymakers and the general public, the ECB and other actors with a more macroeconomic or European perspective might be more interested in the heterogeneity in the transmission of monetary policy. The question for all actors is whether monetary policy can have a more homogeneous effect on the economy by using other tools and how redistributive

Figure 3

**Effects of an interest rate increase on firms with a high leverage ratio**

Percentage points (labor share) and percentage changes (cost of employees and value added)



Notes: The charts show the response of the labor share in percentage points and the percentage change in the cost of employees as well as value added, in each case after zero to four years following a monetary policy shock. The (dark) green areas indicate the 95 (68) percent confidence interval. Only firms belonging to both the 25 percent of firms with the highest labor share and the 25 percent of firms with the lowest leverage ratio were included.

Sources: Amadeus BvD; author's own calculations.

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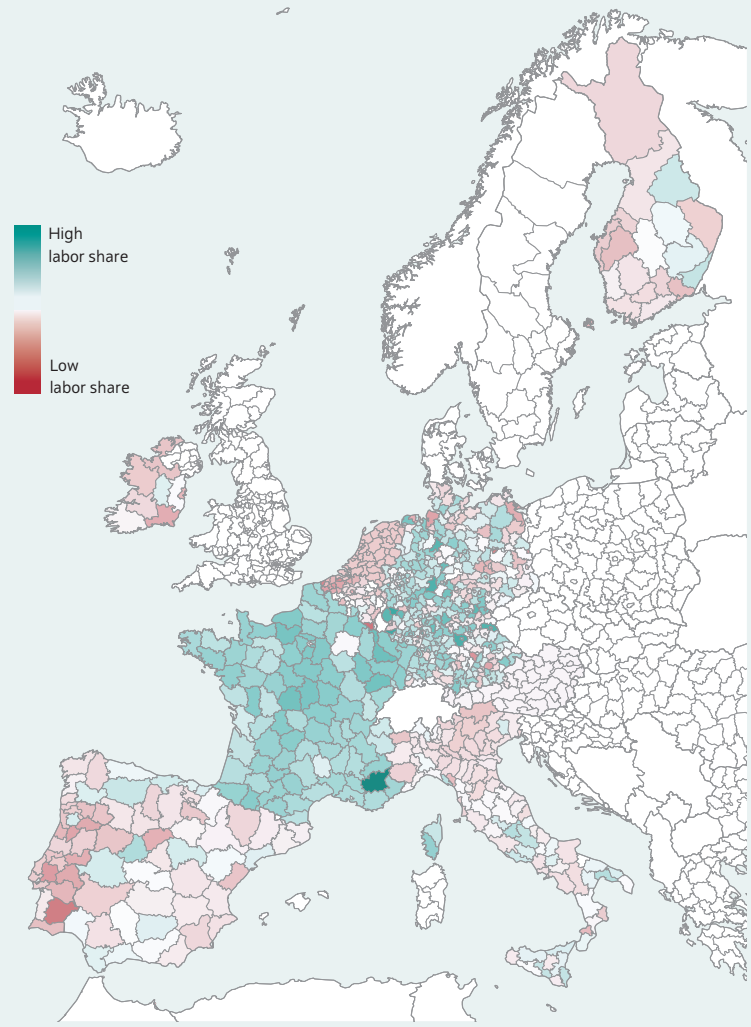
In firms with high leverage ratios, the drop in the labor share cannot be explained primarily by a decline in costs of employees.

effects and imbalances can be offset. Therefore, policy makers should discuss the redistributive effect and check if it is in line with their political agenda.

From a macroeconomic perspective, a monetary policy with a more symmetric effect across the euro area is desirable, both across firms and countries. To this end, a convergence of labor and capital markets among the euro area countries would be welcome. However, greater integration of the European labor market is essential to accelerate such a convergence and it is thus worthwhile to discuss harmonizing

Figure 4

Labor shares across euro area regions



Notes: The graphic displays the average firm-based labor shares in the NUTS-3 regions of the founding euro area countries. The (dark) green regions have a comparatively (very) high labor share while the (dark) red regions have a (very) low labor share.

Sources: Amadeus BvD; author's own calculations.

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The labor share in the euro area varies greatly between regions and countries.

the European labor market institutions. Similarly, the banking union and the capital markets union could address structural imbalances. Regional differences in the use of production factors may also have to do with the availability of such factors: If the capital market and loans are less readily available, firms not characterized by high leverage ratios that are less responsive to monetary policy are more likely to develop. In this context, ECB loan programs targeting households and firms could also be discussed.

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