



UNIVERSITÀ DEGLI STUDI DI SALERNO



The impact of monetary policy on functional income distribution: a panel SVAR analysis (1970-2019)

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Introduction to the ongoing work 1/2

- In most countries, recurrent crises episodes due to financial disorder, the pandemic, and the recent war have increased income and wealth inequality. Since the 2008 crisis, major central banks have adopted highly expansionary conventional and unconventional monetary policies.
- Several policymakers have shown attention to the distributional effects of such policies (e.g., Bernanke 2015; Draghi 2015) and many researchers engaged with the topic. Accordingly “the last decade has seen an explosion of empirical and theoretical research on the links between monetary policy and inequality” (McKay and Wolf 2023, p. 121).
- There is no consensus in the empirical literature on the impact of monetary policy shocks on inequality (Colciago et al. 2019; McKay and Wolf 2023) and the literature is mainly focused on the effects of monetary policy on personal income distribution, and not on functional income distribution (Kappes 2023).

Introduction to the ongoing work 2/2

- In particular, our goal is to shed light on the effects of monetary policy on the long-run pattern of the distribution of income in terms of **real wages** and the **labor share of income**. In so doing, we want to address the possibility for monetary policy to affect income distribution not only in the short period but also on **longer horizons**.
- Overall, we aim to provide three main contributions to the extant literature on the issue:
 - First, we specifically address the impact of functional income distribution in terms of real wages and labor share and their behavior in the long-term.
 - Second, we make use of a panel SVAR methodology, something which has never been done so far with respect to the literature at hand, and we apply it to a novel cutting-edge panel dataset of fifteen advanced economies spanning the 1970-2019 period.
 - Third, we pose special attention to the **'cost' channel** and the **'labor market' channel** of monetary policy.

Literature 1/6

- According to Colciago et al. (2019) the overall evidence they gathered points to a mixed final assessment concerning the role of conventional monetary policy in shaping income and wealth inequality. This uncertainty carries over the results related to unconventional monetary policies as well.
- From a perspective which is much centered on the European case, Dossche et al. (2021) stress that recent ECB's expansionary monetary policy restrained income inequality, a noticeable result given the ECB's lack of a specific mandate to address income and wealth distribution.

Literature 2/6

- McKay and Wolf (2023) address various facets of the monetary policy-inequality nexus. They stress the heterogeneous influence monetary policy has on different social groups: “low-income households benefit from a tighter labor market, middle-class households benefit from lower mortgage rates, and wealthy households benefit from capital gains on assets” (ibid., p. 122).
- Kappes (2023) contends that on average available literature favors the view according to which conventional expansionary monetary policy and unconventional monetary policy reduce inequality. How monetary policy impacts inequality depends on the degree of fiscal policy redistribution and the size of the wage share.

Literature 3/6

- At first, it is important to note a point that tends to emerge from extant literature, namely the belief referring to the **short-lived nature** of the effects that monetary policy allegedly imparts to inequality trends.
- Colciago et al. (2019, p. 1224): “over the longer horizon, the distributional impact is likely to die out given the temporary nature of the effects of monetary policy shocks. Other factors, such as trade, labor market institutions, fiscal policy, and competition policies may be more relevant to explain trends in inequality”.
- A different opinion is conveyed by Kappes (2023, p. 17), whose contention is for monetary to exert a significant role in shaping inequality, thereby suggesting “policymakers to avoid the repetition of long-established beliefs that the distributional impacts of monetary policy fade out in the long term, a view which is at odds with the best empirical evidence”.

Literature 4/6

- There is a dearth of contributions on income inequality in terms of **functional income distribution**. First, we can see it as a relative lack of contributions when compared to those on personal income distribution (Kappes 2023, p. 2). Second, we can see it as an absolute lack, as the literature on monetary policy and functional income distribution is meager.
- Christiano et al. (1997) find that after a contractionary monetary policy shock real wages decline, while Christiano et al. (2005) find that an expansionary monetary policy has a positive effect on productivity, real wages and profits. In contrast, in Altig et al. (2011), SVAR estimates do not show a significant response of real wages to a monetary policy shock.
- Cantore et al. (2021) indicate that a restrictive monetary policy has a negative effect on real wages and labor productivity. However, the labor share turns out to increase because labor productivity suffers a negative effect stronger than that on real wages.

Literature 5/6

- What is apparent is the complete overlook of the so called “**cost channel**”. Restrictive monetary policy can cause prices to rise (Sims 1992), and with sticky wages there can be a consequent rise of the price-wage ratio engendering a fall in real wages.
- Barth and Ramey (2001), Chowdhury et al. (2006) detect a sizeable cost channel of monetary policy. Gaiotti and Secchi (2006) find a cost channel in a large database drawn on Italian manufacturing firm, and they rationalize such a finding by resorting to the role of working capital. The cost channel may also operate via the effect on rents, which enter the consumer price index (Dias and Duarte, 2019; Stiglitz and Regmi, 2022).
- Recently, Cucciniello et al. (2022) study the case of the US during the 1959-2018 period. According to their results, the price puzzle remains visible also after 1979 and a restrictive shock causes real wages to fall.

Literature 6/6

- There are also Post-Keynesian views on how monetary policy can influence income distribution (see, among other, Rochon and Seccareccia 2023). According to them, there is an income channel of monetary policy that runs through a direct and an indirect route.
- The direct channel accounts for interest rates as the cost of borrowing, but also an income for rentiers (Lavoie and Seccareccia 2016): individuals whose incomes arise from holding financial assets such as government bonds and corporate securities.
- The indirect channel is related to how the rate of interest affects labor markets. In pursuing their inflation targeting strategy, central banks will raise the rate of interest, which may then (eventually) have effects on unemployment. Combined with this, Moore (1989) highlights persistently negative effects of an increase in the unemployment rate on the wage share.

Set up of the empirical study

Transmission channel	Description	1 st round expected effect	2 nd round expected effect	3 rd round effect
Cost channel	Higher cost of working capital for firms, higher rents (included into cpi).	Higher price level.	With sticky nominal wages, fall in real wages.	The labour share of income changes according to the relative strength of the effects on real wages and productivity.
Activity channel	Tighter credit conditions for (private and public) borrowers.	Lower GDP level.	Lower productivity level, higher unemployment rate.	
Labor market channel	Worsening bargaining conditions for employees due to rising unemployment.	Lower nominal wage growth, reduced household spending.	Lower GDP level.	

Data

Variable	Note	Source
Short term interest rate (i)		AMECO; Jordà, Schularick, Taylor Macro Dataset; OECD, Economic Outlook No 112 - November 2022
Energy commodities price index (PCOM)	Expressed in U.S. dollars	World Bank
GDP Deflator (P)		OECD Stats Economic Outlook
Real compensation per employee (WR)	Computed as: Nominal compensation per employee in PPP deflated with private consumption expenditure deflator	AMECO (Gross Domestic Product, Income approach)
Real Gross Domestic Product (GDP)	Gross domestic product (expenditure approach) Constant prices, constant PPPs, OECD base year	OECD National Accounts
Unemployment rate (UN)		AMECO
Adjusted Labour Share (LS)		AMECO

We make use of annual data for a panel of **15 advanced economies** (Australia, Belgium, Canada, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom, United States) during the period **1970-2019**.

Empirical methodology 1/6

- We make use of the **Panel Structural Vector Autoregressive (P-SVAR)** model (Pedroni, 2013) to detect the effect of monetary policy on functional income distribution.
- Therefore, we will analyze a panel composed of $i = 1, \dots, N$ individual countries, each of which includes an $M \times 1$ vector of observed endogenous variables, x_{it} , for $x_{m,it}$ with $m = 1, \dots, M$.
- As with any SVAR model we assume that variability in our data can be explained by unobservable structural shocks. Following Pedroni (2013), we consider an $M \times 1$ vector of composite white noise shocks $\varepsilon_{m,it}$, $\varepsilon_{m,it} = (\varepsilon_{1,it}, \dots, \varepsilon_{M,it})'$ for each country, i , of the panel. These composite shocks are distributed independently over time but may be cross-sectionally dependent.

Empirical methodology 2/6

- However, for the methodology applied in this work such structural shocks can be decomposed into both common and idiosyncratic structural shocks, which are mutually orthogonal and informative for our investigation (Pedroni, 2013, p. 182).
- A key assumption of our methodology is related to the existence of a common factor representation for this dependence, such that

$$\varepsilon_{m,it} = \tilde{\varepsilon}_{m,it} + \lambda_{m,it} \bar{\varepsilon}_{m,t} \quad \forall i, t, m$$

where the two categories of mutually orthogonal structural shocks, $\tilde{\varepsilon}_{m,it}$ and $\bar{\varepsilon}_{m,t}$, represent, respectively, the country-specific idiosyncratic white noise structural shocks and the common white noise structural shocks shared by all countries of the panel, and $\lambda_{m,it}$ are the country-specific loading coefficients for the common shocks.

Empirical methodology 3/6

- P-SVAR models (Kilian and Lütkepohl, 2017):

$$B_{0i}X_{i,t} = B_i(L)x_{i,t-n} + \varepsilon_{i,t}$$

- where B_{0i} is the matrix of contemporaneous coefficients, x is the vector of considered variables, $B_i(L)$ is the matrix of lagged coefficients (with lag=1), and $\varepsilon_{i,t}$ is the vector of estimated structural shocks. P-SVAR modelling allows us to estimate $\varepsilon_{i,t}$ by imposing suitable restrictions on the B_{0i} matrix derived from the considered economic theory (Kilian & Lütkepohl, 2017).
- Identification of the structural shocks:

$$B_{0i}X_{i,t} = \begin{bmatrix} - & 0 & 0 & 0 & 0 & 0 & 0 \\ - & - & 0 & 0 & 0 & 0 & 0 \\ - & - & - & 0 & 0 & 0 & 0 \\ - & - & - & - & 0 & 0 & 0 \\ - & - & - & - & - & 0 & 0 \\ - & - & - & - & - & - & 0 \\ - & - & - & - & - & - & - \end{bmatrix} \begin{bmatrix} i_t \\ PCOM_t \\ P_t \\ WR_t \\ GDP_t \\ UN_t \\ LS_t \end{bmatrix}$$

Empirical methodology 4/6

- At this point, we estimate a Panel SVAR model that consists of the following 7 variables:

$$i - PCOM - P - WR - GDP - UN - LS$$

- In line with Christiano et al. (2005), Castelnuovo and Surico (2010), Cantore et al. (2021), exogenous monetary policy shocks will be identified through a recursive approach based on a Cholesky factorization. An important advantage of Cholesky factorization is that it does not require explicit measures of MP surprises, which allows us to expand the sample.
- However, for Cholesky identification the ordering of variables matters (Christiano et al., 1999). The identification assumption is that a monetary policy shock influences all variables in the model within the year. But this implies that the policy rate does not respond contemporaneously to all the macroeconomic shocks affecting prices and real variables.

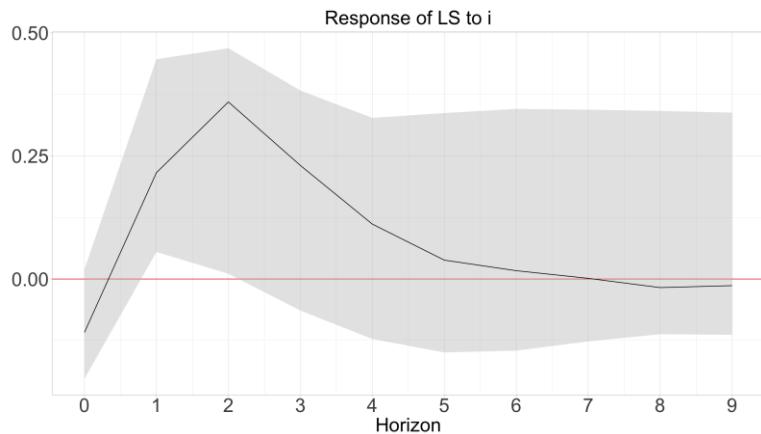
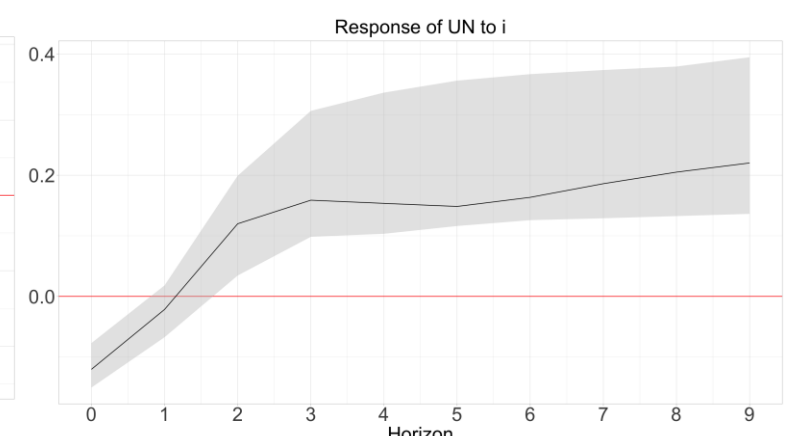
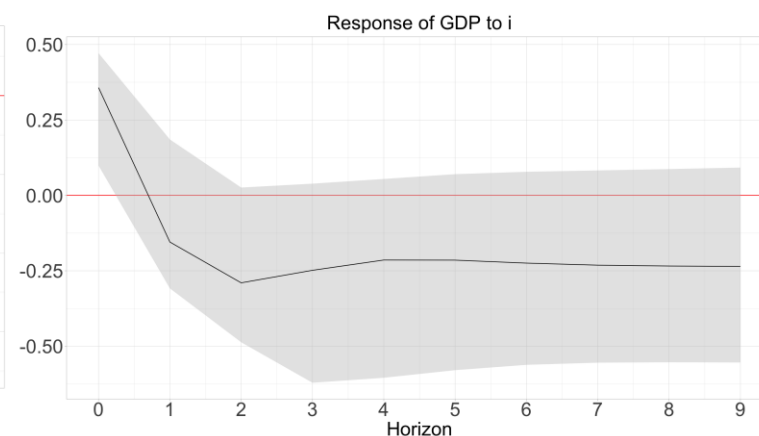
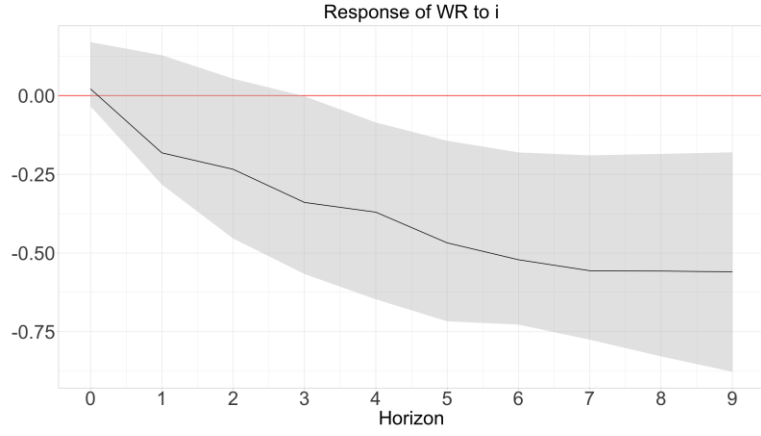
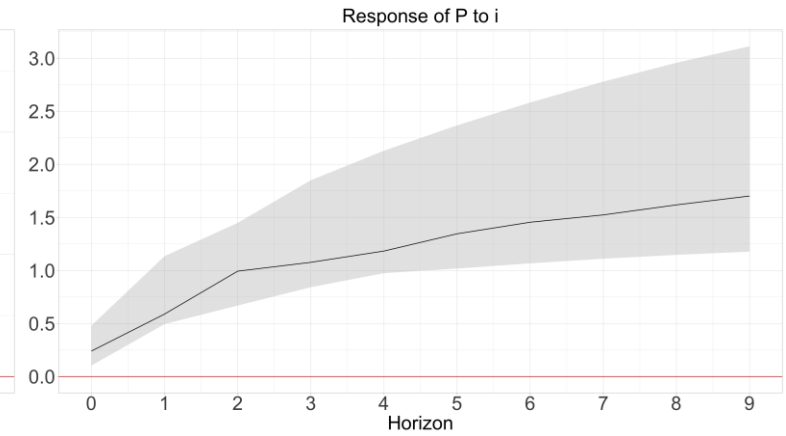
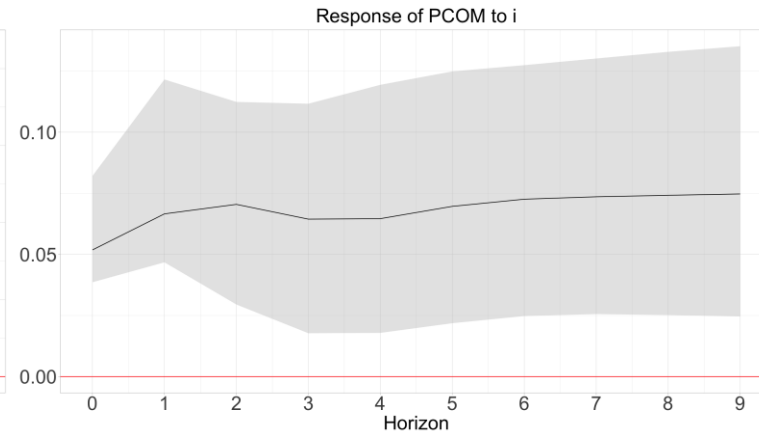
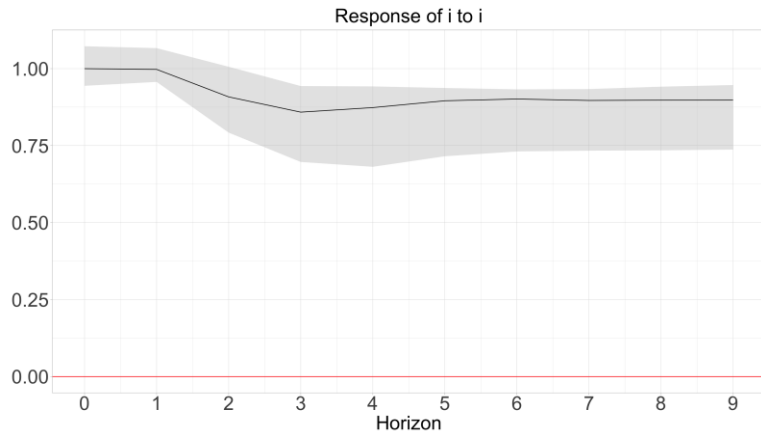
Empirical methodology 5/6

- The main explanation for this identification is related to the fact that the monetary policy decision can be influenced only by those variables available within the year and not by those available with a lag (Sims, 1992; Leeper et al., 1996; Sims and Zha, 1998; 2006; Fragetta and Melina, 2013).
- As there are delays in publishing data on production and prices, the central bank can only observe the past value of these variables when setting the rate of interest because the contemporary data are not available when the monetary policy decisions have to be taken (Fragetta and Melina, 2013; Sims and Zha, 2006).

Empirical methodology 6/6

- Another element seems to us to support our identification and it relates to how long it takes monetary policy to have effects on real variables. Usually with higher frequencies, e.g., quarterly, or even monthly data, the literature points out that it is difficult for a change in interest rates to have effects over the same period in which it is implemented.
- However, over an annual period it seems to us more likely that monetary policy can have effects on these variables, and therefore we consider it appropriate to place interest rates as the first variable in our order.

Findings 1/7



Effects of a monetary policy shock. IRFs are reported with the median (solid line) as well as the 25th and 75th percent quantile responses among the 15 countries in our sample.

Findings 2/7

	P	WR	GDP	UN	LS
First Period	0,24	0,02	0,36	-0,12	-0,11
Last Period	1,70	-0,56	-0,24	0,22	-0,01
Highest Value	1,70 (9)	0,02 (0)	0,36 (0)	0,22 (9)	0,36 (2)
Lowest Value	0,24 (0)	-0,56 (9)	-0,24 (9)	-0,12 (0)	-0,11 (0)

Effects of a monetary policy shock (i) normalized to 1 percent, in parentheses the year in which the highest and lowest values occur.

Findings 3/7

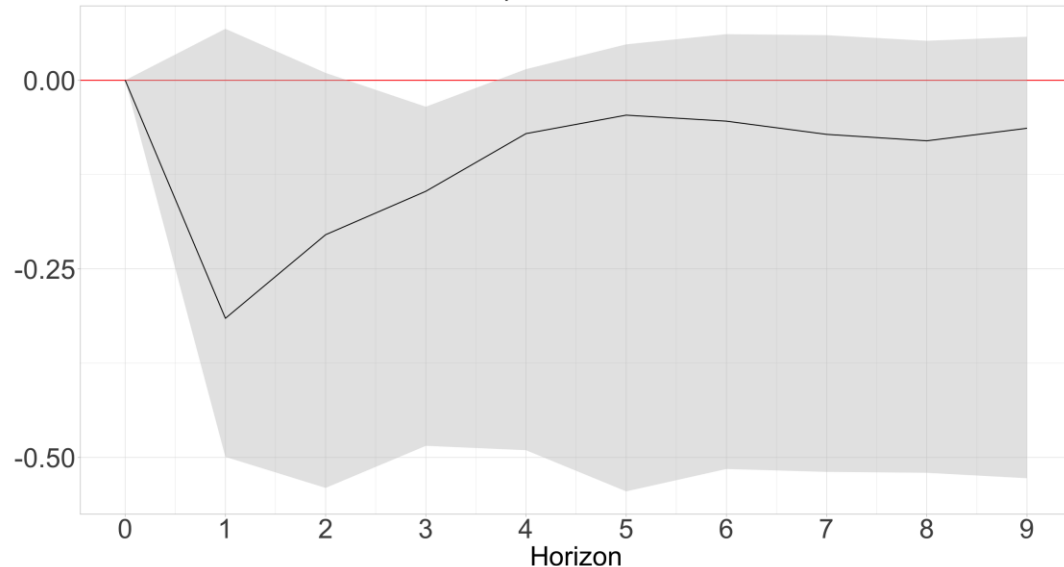
- At first, we focus on what we called the '**cost channel**' of monetary policy. We do so starting from the GDP deflator response to the policy shock: we get a positive and lasting increase of the GDP deflator (over a 10-year horizon).
- **Activity indicators** also react. While GDP persistently falls, the unemployment rate persistently rises to an extent of 0.22% after 10 years. We can suppose that the labor market slack induced by the restrictive policy causes nominal wage growth to slow down with respect to a more accommodative monetary stance.
- These two outcomes concur in delivering the **fall in the real wage level** which is of a magnitude of about -0,56% after 10 years. We show the **non-transitory nature of the income distribution channel of monetary policy**: far from being short-lived, the fall in real wages does not tend to fade over an horizon as long as 10 years.

Findings 4/7

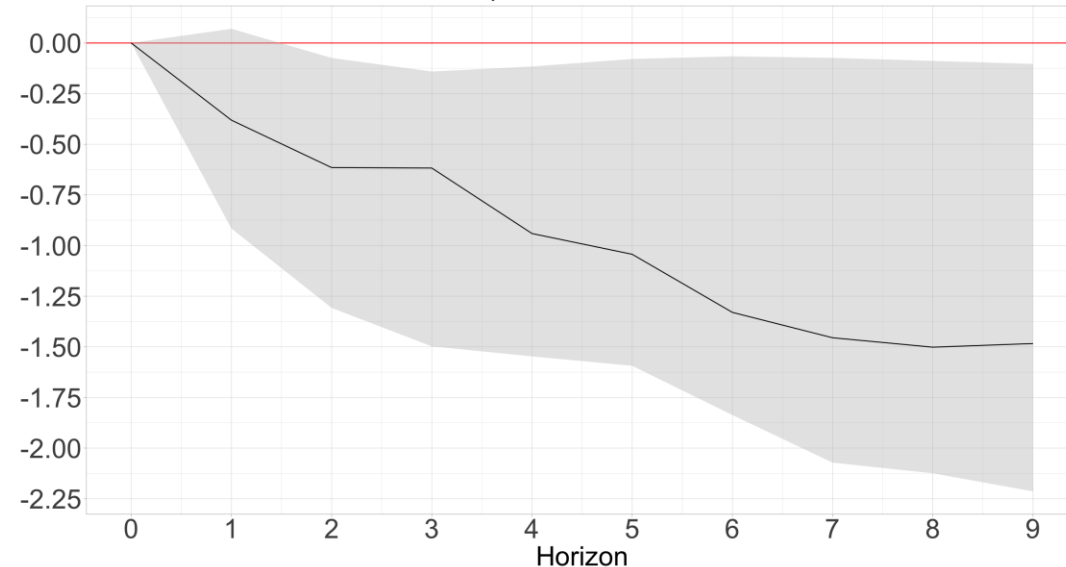
- We now move the attention to the behavior of the **wage share**. Our outcome is analogous to that in Cantore et al. (2021): after an initial phase in which we have a rise in the wage share, the latter steadily reverses its previous increase and it lands after 10 years roughly to its initial value.
- Such a result can be rationalized by considering the usual wage share decomposition into the ratio between the **real wage** and **labor productivity**. Real wages continuously fall after the monetary contraction, and so does GDP. Given the contemporaneous rise in the wage share, what can be surmised is that labor productivity falls more than real wages in the short term.
- However, when we move to a medium- to long-term, GDP stabilizes whereas real wages keep on falling steadily. We suppose that while productivity remains at its new level, the sustained real wage fall causes the wage share to move back to the pre-shock situation.

Findings 5/7

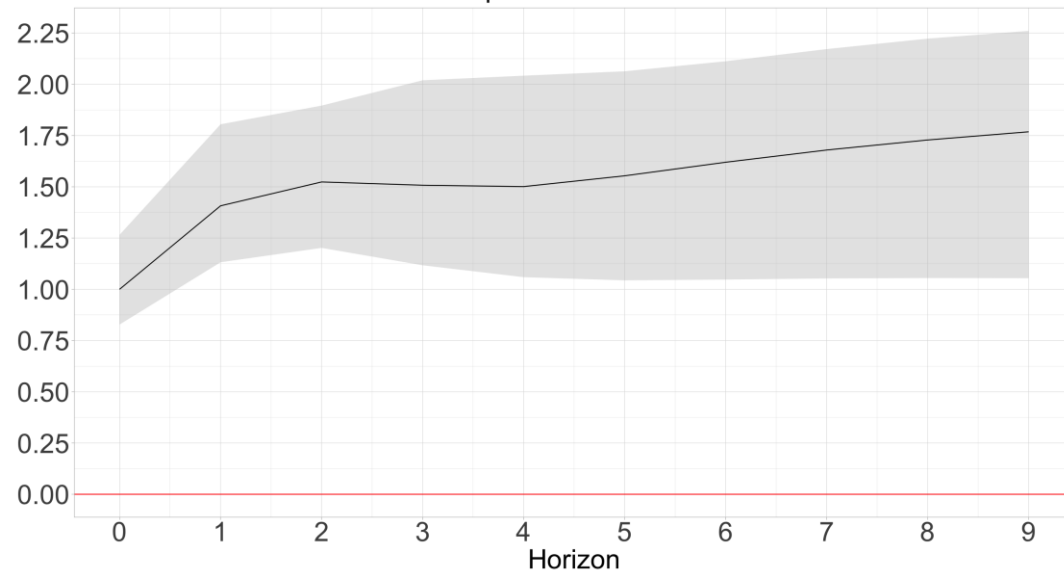
Response of i to UN



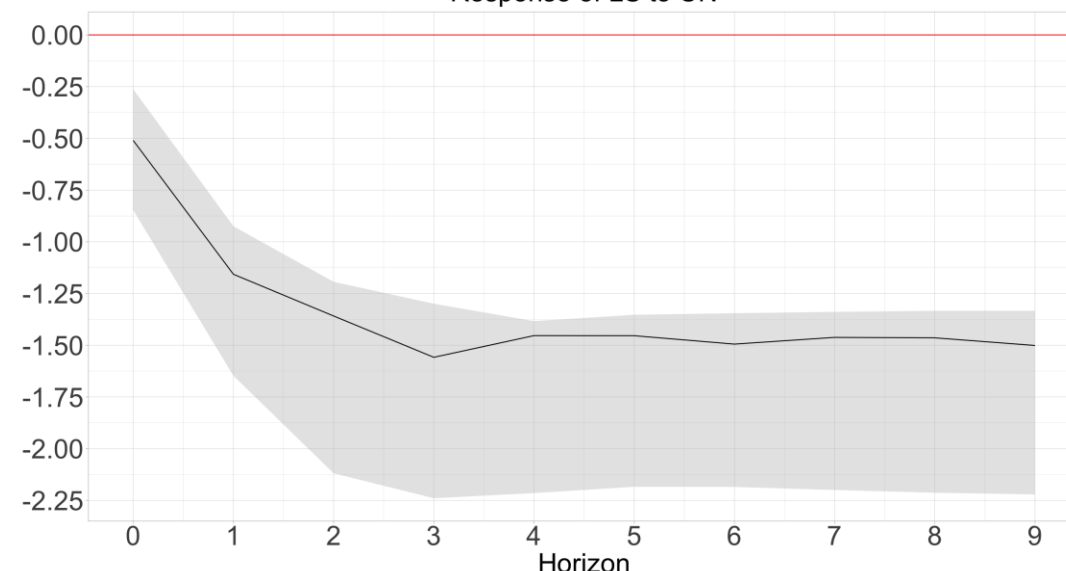
Response of WR to UN



Response of UN to UN



Response of LS to UN



Effects of an unemployment rate shock. IRFs are reported with the median (solid line) as well as the 25th and 75th percent quantile responses among the 15 countries in our sample.

Findings 6/7

- So far we discussed a 'classical' analysis of monetary policy distributive effects. In what follows, we refer to the '**labor market**' channel, whose main determinant in our framework is the level of the rate of unemployment.
- A restrictive monetary shock causes the unemployment rate to rise in the long-term; this causes additional distributive effects. An increase in unemployment is associated with a persistent decrease in both real wages and the labor share. The effects are both long-lasting (both the real wage and the labor share decrease by 1,5% after 10 years).
- Contrary to what we found previously concerning the monetary policy shock, in this case we see a persistent fall in the labor share in line with what we would expect.

Findings 7/7

	I	WR	LS
First Period	-0,32	-0,38	-0,51
Last Period	-0,06	-1,48	-1,50
Highest Value	-0,05 (5)	-0,38 (1)	-0,51 (0)
Lowest Value	-0,32(1)	-1,50 (8)	-1,56(3)

Effects of an unemployment rate shock (UN) normalized to 1 percent, in parentheses the year in which the highest and lowest values occur.

Robustness Checks 1/2

At this point we check the robustness of our results by considering different measures of the variables of interest. In addition, following the literature we take sub-periods and sub-samples from different countries to see if the time span and the sample chosen affected the results shown above. Specifically, we check:

- Pre-crisis Period: 1970-2007;
- Sub-sample of 10 countries: Australia, Canada, France, Italy, Germany, Japan, Netherlands, Spain, the United Kingdom, and the United States;
- Real wages (WR) deflated with GDP deflator;
- Wage share expressed as Unit Labor Cost (LS);

Robustness Checks 2/2

- Different ordering of variables in the Panel SVAR;
- Panel VAR estimated with 2 lags instead of 1;
- Prices of non-energy commodities instead of prices on energy commodities (PCOM);
- Consumer price index instead of GDP deflator (P);
- Sub-sample of G7 countries.

Conclusions 1/4

- Given the now long-lasting adoption of both conventional and unconventional monetary policies by major central banks, the topic of their interaction with inequality has attracted a great deal of attention.
- Our focus in the present work has been directed at the investigation of whether monetary policy can have a long-lasting influence on functional income distribution in the form of the real wage level and the size of the labor share of income.
- To such end, we first brought into play two channels of monetary policy which are seldom given prominence in this strand of literature, namely what we called the ‘cost’ and ‘labor market’ channels. We made use of a panel SVAR methodology, applying it to a novel panel dataset of fifteen advanced economies spanning the 1970-2019 period.

Conclusions 2/4

- We considered a contractionary shock to the short-term interest rate and unemployment rate.
- For what concerned the ‘cost channel’, we started from the GDP deflator response to the policy shock, thereby getting a positive and lasting increase for it. For what concerned the ‘activity’ and ‘labor market’ channels, we saw that while GDP persistently falls, unemployment persistently rises.
- Analogously to Christiano et al. (2005), we find that there is a fall in real wages, and such a fall can be attributed to both the influences we just mentioned. Therefore, we find that the income distribution channel of monetary policy is non-transitory, as it persists over a 10-year horizon.

Conclusions 3/4

- Moreover, when we turned the attention to the labor share of income, we found that, analogously to Cantore et al. (2021), after an initial phase in which the labor share rises, it then steadily reverses by returning over the 10-year horizon to its pre-shock level. We attribute such a behavior to the joint influence of the policy shock to both real wages and productivity.
- At last, we go beyond traditional analyses of monetary policy by giving prominence to the 'labour market' channel. When restrictive monetary shock causes the unemployment rate to persistently rise, this results in a persistent decrease in both real wages and the labor share.

Conclusions 4/4

- Hence, by looking in particular at the 'cost' and 'labor market' channels of monetary policy, we were able to find out a persistent and sizeable influence of monetary policy on functional income distribution in the form of real wages and the labor share of income.
- In our view, additional efforts must be spent on employing non-linear methods which would allow to better account for labor market spillover effects on income distribution within studies targeting the impact of monetary policy.
- One example could be the introduction of a measure of labor market rigidity such as the bargaining cover ratio, the EPL, the unionization density, and so on and so forth.

Thank you for your attention!

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