

The Missing Link: Labor Share and Monetary Policy

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Abstract

The New-Keynesian transmission mechanism of monetary policy has clear implications for the behavior of the labor share. The labor share is negatively related to the price mark-up and hence is pro-cyclical conditional on monetary policy shocks. However, little empirical evidence is available on the effect of monetary policy on the labor share and its components. We present a comprehensive cross country empirical analysis and find that the data are at odds with the theory. Cyclically, a monetary policy tightening increased the labor share and decreased real wages and labor productivity during the Great Moderation period in the US, the Euro Area, the UK, Australia and Canada. Allowing for a wide range of nominal and real rigidities commonly used in medium scale New-Keynesian DSGE models for monetary policy analysis does not help reconciling this mismatch. Only a combination of labor market frictions and strong wage rigidities are able to reproduce the observed response of the labor share. However, this comes at the cost of a counterfactual response of real wages.

Motivation

- Structural models for Monetary Policy (MP) analysis that rely on nominal rigidities establish **clear transmission mechanisms** from MP shocks to real economic activity and inflation.
- One of the key mechanisms of transmission in these models operates through the **redistribution of income** between labor income, capital income and firm's profits.
- If prices are not perfectly flexible, **MP tightening** should lead to an increase in the markup and a **decrease in the income share of labor** as prices cannot react immediately to the fall in demand. This effect reduces unit labor costs leading to a downward pressure on inflation.
- For this transmission mechanism to be operative, MP shocks should affect the cyclical behavior of factor income shares in ways that are consistent with these theoretical arguments.

Main Objectives

- Despite its importance, studies on the effect of MP shocks on income shares are very limited (e.g. [Ramey(2016)]).
 - Our objective is to fill this gap and provide the first cross-country comprehensive study on the effects of monetary policy on the labor share.
1. We provide **new and robust evidence** on the effects of **MP shocks on the Labor share** for a set of five developed economies: The US, the Euro Area, UK, Australia and Canada.
 2. We compare the empirical results with the **implied transmission mechanism** in standard **DSGE models** displaying nominal, real rigidities and labor market frictions.
 - Given our evidence, are current models used for monetary policy analysis able to match the responses of the variables of interest?

Results

- The empirical analysis presents a **very robust set of stylized facts**: cyclically, a monetary policy tightening **increased the labor share** and **decreased real wages**, and **labor productivity**.
- These facts are robust across time, across countries and across Structural Vector Autoregression (SVAR) identification strategies.
- We show that it is hard to replicate these stylized facts in the standard New Keynesian model of the business cycle.
- This is due to the tight link between the labor share and marginal costs (mark-up) in this set up.

Empirical Evidence

- Measuring the share of labor in total income is complicated by problems associated with how to impute certain categories of income to labor and capital owners. See [Gollin(2002)] and [Gomme and Rupert(2004)] amongst others.
- We consider, as a baseline specification, a 7 variables VAR. Cholesky ordering: the log of Real GDP, the log of GDP deflator, the log of an index for price of commodities, log of CPI, raw Labor Share, short term interest rates and M2 growth.
- The advantages of using the labor share instead of its components is that the *composition bias* in the response of real wages and productivity cancels out when one takes their ratio (see [Basu and House(2016)]).

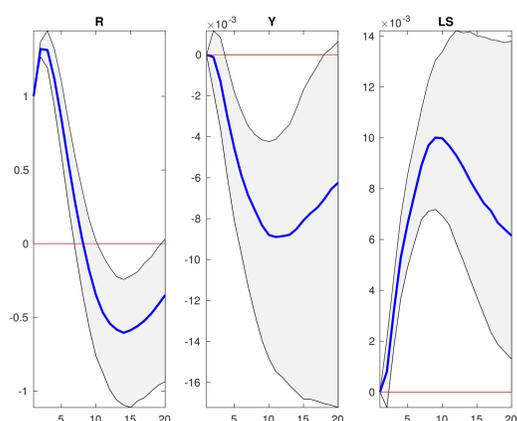


Figure 1: Baseline Cholesky U.S.

VAR Robustness

- Different labor share proxies constructed for the US, Australia and Canada.
- Only for the US: the original sample as [Christiano *et al.*(2005)] 1965:Q1-1995Q3 and 1965:Q1-2007:Q4.
- 9 variables VAR adding C and I.
- **Sign restrictions** and **External/instrumental variable approach**.

Labor share components IRFs

A countercyclical response of the labor share to a monetary policy shock can occur either because real wages are more countercyclical than labor productivity or, vice versa, because labor productivity is more procyclical than real wages. $s_t^h = w_t - lp_t$. The two scenarios have very different implications for the transmission mechanism of MP and will prove to be crucial in evaluating the performance of business cycle models.

- We control for different deflators of wages and output.
- We check the responses of real wages and labor productivity in the same VAR specifications.
- We find consistently that $s_t^h \uparrow$ because $lp \downarrow > w \downarrow$.

Theory

Are current models of economic fluctuations able to match the response of the labor share, real wages and productivity? And, if so, at which cost? We start from the simplest version of the NK model, as in [Galí(2008)], and we build, in stages, a medium scale DSGE model with a broad set of nominal and real frictions ([Christiano *et al.*(2005)] and [Smets and Wouters(2007)]) like the ones currently used for monetary policy analysis. For small scale models, intuitive expressions derived from households' budget constraints can be used to assess whether models are consistent with the data. However, for medium scale models, this is not possible and we rely on numerical techniques using **Prior sensitivity analysis** and **Monte Carlo filtering methods** ([Ratto(2008)]).

Simple NK model

- $s_t^h = w_t + h_t - y_t$
- Assuming monopolistic competition in production, Calvo price stickiness and competitive labor market: $w_t = \underbrace{\theta_t}_{\text{real marginal costs}} + \underbrace{y_t - h_t}_{\text{labor productivity}}$
- $\rightarrow s_t^h = \theta_t = \frac{\pi_t - \beta \mathbb{E}_t \pi_{t+1}}{\lambda}$
- A temporary decline in inflation (tighter MP) will see marginal costs (*labor share*) decline and mark-up increase.
- This result is independent of: factor adjustment costs, nominal wage rigidities, financial frictions (wedge between the real interest rate and the return to K).
- Following a contractionary MP shock we want $y \downarrow$, $h \downarrow$, $w \downarrow$, $lp \downarrow$ and $s_t^h \uparrow$.
- From $s_t^h = w_t + h_t - y_t$, this implies

$$|\Delta y_t| > |\Delta w_t + \Delta h_t| \Leftrightarrow |\Delta lp_t| > |\Delta w_t|$$

is required for countercyclical s_t^h .

Search and Matching (SM)

- Wages as determined by nash bargaining, $w_t \neq \theta_t + lp_t$. Hence $s_t^h \neq \theta_t$. The dynamics of the LS will differ since now wages and marginal product of labor behave differently.
- Consider now a production function of the form $y_t = n_t + h_t$. The labor share is now given by:

$$s_t^h = w_t + n_t + h_t - y_t = w_t$$

- Hence to generate an increase in the labor share the only possibility is to have a counter-factual response of wages to a monetary policy shock.

Medium Scale DSGE Model with capital

We then extend the analysis by introducing and discussing the implication of, in turn: capital accumulation, CES production function, variable capital utilization and variability in both intensive and extensive margin of labor supply. We consider two variants of this model, with only sticky prices NK^p and with sticky wages as well NK^w . Then we add again Search and Matching and we consider two variants, with only sticky prices SMK^p and with sticky wages as well SMK^w . Given the size of these models it is not possible to derive intuitive analytical expressions for the variables of interest. Hence from now on we will have to rely on numerical techniques.

	Restrictions	
Model	LS +	LS +; LP-; W-
SM^p	0%	
SM^w	69.3%	0%
NK^p	0%	
NK^w	0%	
SMK^p	0%	
SMK^w	44.8%	0%

Table 1: Results from prior sensitivity analysis

interest.

Conclusions

- We shed some light on the effect of monetary policy on factor shares and their components: key transmission mechanism of MP in NK models.
- We present a **robust set of stylized facts**: cyclically, a monetary policy tightening (easing) increased (decreased) the labor share and decreased (increased) real wages and labor productivity.
- We show that this is at odds with the theoretical transmission mechanism of monetary policy in structural models widely used for policy analysis.
- Our results emphasise the need to develop model extensions able to replicate the cyclical behaviour of the labor share and its components.
- So far, neither models with price or/and wage rigidities and other relevant real frictions are able to match the dynamics observed in the data, **casting doubts on the traditional theoretical transmission mechanism attributed to MP**.
- This suggest that serious models of joint profit and wage determination, or models with firm and worker heterogeneity where markups and wages display pro-cyclical patterns appear as promising potential avenues for research.