Inflation and the distribution of real income

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The question

- How, in the United States over the period 1967-2024, have inflation shocks affected the distribution of real income across individuals/households?
- Focus on effects of inflation on different income categories and hours worked

Background

- The empirical research on inflation/monetary policy and inequality is vast, and growing fast
  - **Monetary policy and inequality** Coibion et al. 2017, Holm et al. 2021, Amberg et al. 2022, Andersen et al. 2023, Mckay and Wolf 2023, Del Canto et al. 2025, Cantore et al. 2025: identify monetary policy shocks and trace effect on income/consumption distribution
  - **Inflation and wealth redistribution** Doepke and Schneider 2006
  - **Inflation and heterogeneity in consumption baskets** Kaplan and Schulhofer-Wohl 2017, Argente and Lee 2021, Jaravel 2024
  - **Monetary policy, inflation and labor markets** Faia et al. 2022, Graves et al. 2024, Guerreiro et al. 2024, Afrouzi et al. 2026
- **Sticky wages and rationing** Barro and Grossman 1971, Saez and Michaillat 2015, Huo and Rios Rull 2020, Bianchi et al. 2024, Barro 2025

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- Our contribution:
- focus on inflation shocks (as opposed to monetary policy)
- focus on income (rather than consumption or wealth)
- simple model of labor markets with sticky wages to understand impact of inflation on labor income (wages and employment) distribution

From macro to micro in two ways

- Macro: different income categories (Labor, Capital, Transfers) co-move differently with inflation
- Micro: different households have different sources of income, their total income affected differently by inflation.
- Result: how total income of different groups and inequality change with a $x\%$ inflation shock
- quick today!

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- Macro: real wages fall with inflation (imperfect indexation)
- Micro: how labor income, wages and hours of different groups move with a $x\%$ inflation shock
- Theory: why?

Categories of personal income, NIPA

- BEA Table 2.1, Personal income and its disposition 2023
  - Wages and salaries
  - Income from interest and dividends
  - Transfers from the government (includes SS, Medicare, Medicaid, UI)

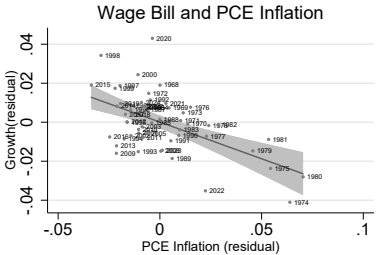
	Per capita	Fraction of Personal Income
Wages and Salaries	35k	50%
Income from Interest and Dividends	11.4k	16.3%
Gov Transfers	12.4k	17.7%

Exclude proprietors income and supplements to wages and salary

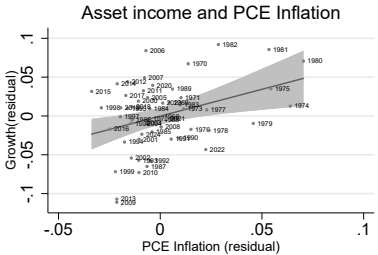
A basic identification issue

- Inflation shocks are positively associated with business cycles
- Business cycles affects different real income category differently, no need to separate impact of inflation from business cycles
- Simplest approach: control for business cycles
- Slightly more sophisticated: VAR

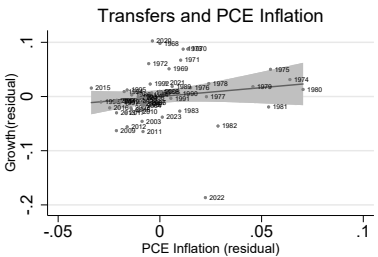
PCE Inflation and Real Income Categories, 1967-2024



Coefficient: -0.38(0.07), control is Emp. growth



Coefficient: 0.69(0.24), control is Emp. growth



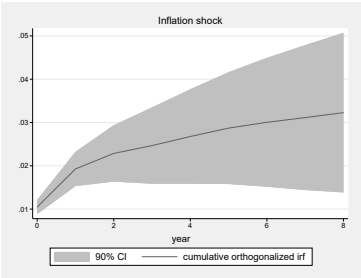
Coefficient: 0.33(0.22), control is Emp. growth

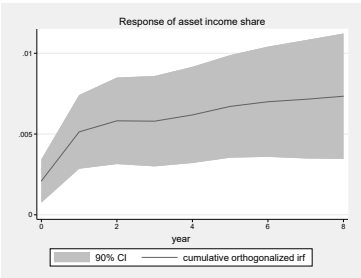
VAR specification

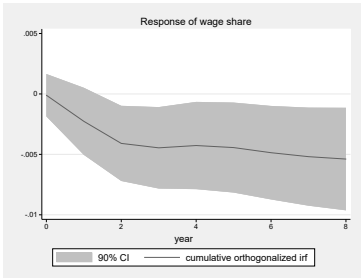
$$\begin{bmatrix} \Delta ws_t \\ \Delta as_t \\ \pi_t \\ \Delta a_t \end{bmatrix} = B_1 \begin{bmatrix} \Delta ws_{t-1} \\ \Delta as_{t-1} \\ \pi_{t-1} \\ \Delta a_{t-1} \end{bmatrix} + B_2 \begin{bmatrix} \Delta ws_{t-2} \\ \Delta as_{t-2} \\ \pi_{t-2} \\ \Delta a_{t-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{wst} \\ \varepsilon_{ast} \\ \varepsilon_{\pi t} \\ \varepsilon_{at} \end{bmatrix}$$

- Δws_t, Δas_t: changes in the share of wage and asset income over total income (i.e. wages + asset income + transfers)
- π_t, Δa_t: inflation and control for real growth (Aggregate employment or Real GDP)
- Measure dynamic association between inflation shocks and share of income categories
- Control for dynamic association between inflation and business cycles

VAR results in shares (cumulative IRF)







- A 6% increase in inflation associated with a decline of approx 1 pct points in the share of wages and similar increase in share of asset income
- No change in share of transfers

Micro impact

- Use micro data(CPS) to assess how the three income categories are distributed across households
- Problem: wage income well measured in surveys, capital income and transfer income are not!
- Solution: Distributional National Accounts (DNA, Piketty et al, 2017, Heathcote et al. 2023)
- Idea: adjust micro data to make them consistent with aggregates

Income distribution in NIPA and CPS, 2023

	Wages and salaries		Asset income		Transfers	
	NIPA	CPS	NIPA	CPS	NIPA	CPS
Level	35k	34.5k	11.4k	2.9k	12.4k	4.4k
Share	59.5%	82.5%	19.5%	7%	20.5%	10.5%

- Wages and salaries in CPS and NIPA very close (going back to 1967)
- Both asset income and transfer income much lower in CPS than NIPA
- Some of the discrepancy due to under-reporting, some due to survey nature (Households not asked about medicare, nor asset income in retirement accounts)

A crude correction

- We simply multiply each income category in CPS to make it consistent with NIPA
- Underlying assumption: missing income accrues only to those households which report at least some income of that category

Impact of correction

	CPS, raw			CPS, rescaled		
	Labor	Asset	Transfers			
Top 1%	90%	9%	1%	51%	44%	4%
Top 5%	89%	9%	2%	52%	42%	6%
Mid 10%	75%	5%	19%	62%	6%	32%
Bottom 20%	26%	5%	68%	59%	5%	36%

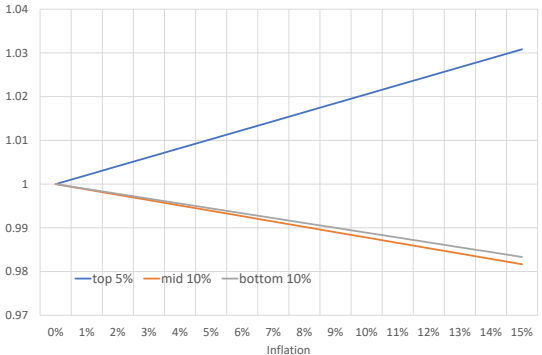
- Asset income much more important at the top (similar numbers as in Piketty et al. 2017)
- Transfer income more important at the bottom and mid of the distribution

Inflation and (corrected) income inequality

- VAR estimates: 6% inflation reduces wage share by 1% and increases asset share by 1%
- Growth of asset income $\frac{\alpha_K + \pi/6}{\alpha_K}$ faster than total
- Growth of labor income $\frac{\alpha_L - \pi/6}{\alpha_L}$ slower than total where α_L and α_K are initial share of asset and wage income

Inflation and (corrected) income inequality

- Applying growth rates of the income portfolios of different section of the distribution:



- A 10% inflation shock increases gap between top and bottom by approx 3%, no difference between bottom and mid
- Effects not large but comparable to those documented in group CPIs (Argente and Lee, 2021, Jaravel 2024)

Inflation and labor income

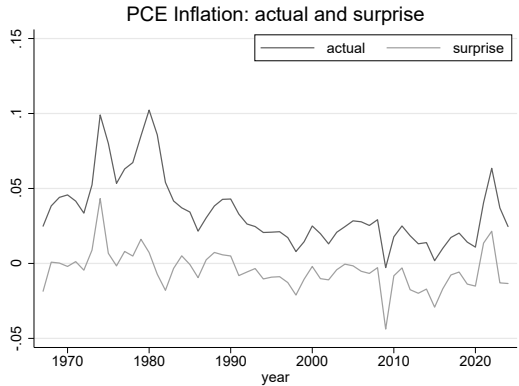
- So far focused on different income types
- Now zoom in on labor income (wage times hours worked)
- Does labor income in different group of population respond differently to inflation? and why?

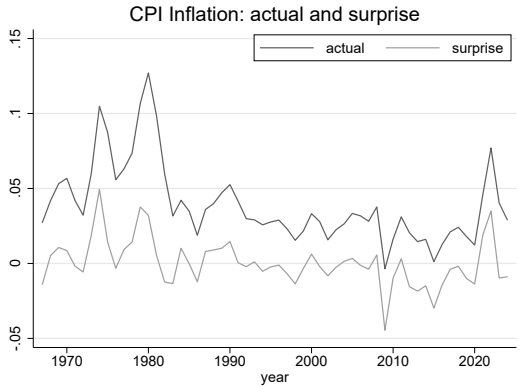
Regression Specification

$$Y_{it} = \beta_0 + \sum_g \gamma_g D_{ig} + \beta_1 \text{inflation\_shock}_t + \beta_2 \text{agg\_emp}_t + \sum_g \beta_{1g} (\text{inflation\_shock}_t \times D_{ig}) + \sum_g \beta_{2g} (\text{agg\_emp}_t \times D_{ig}) + \sum_j \beta_j X_{jt} + \varepsilon_{it}$$

- $Y_{it} = g_h, g_w, g_{wh}$
- $X_{jt} =$ age, age^2, gender

Inflation and inflation shocks





- Inflation shocks= inflation - expected inflation (Michigan after 1978, VAR before)

CPS and PSID samples

- PSID
  - All heads of household and spouses appearing at least 2 consecutive years, 1967(1)1996, 1998(2)2022
- CPS
  - All persons appearing 2 consecutive years in ASEC, 1977-2024
- 3 Educational groups: HSD,HS+SC,C+
- Age between 25 and 65
- Work at least 400 hours in each year, not self-employed: Log Changes in real wages and salaries, real hourly wage, annual hours

CPS results

	Growth in:		
	Lab. income	Wages	Hours
Inflation Shock	-1.15***	-0.70**	-0.45**
	(0.35)	(0.32)	(0.20)
HS+Some Coll. × Infl. Shock	0.44	-0.07	0.51***
	(0.30)	(0.30)	(0.16)
College+ × Inflation Shock	0.60	0.11	0.49**
	(0.37)	(0.39)	(0.19)
Agg. emp. growth	1.30***	0.33*	0.97***
	(0.23)	(0.19)	(0.12)
HS+Some Coll. × Agg. emp. gr.	-0.47**	-0.16	-0.32***
	(0.19)	(0.18)	(0.11)
College+ × Agg. emp. gr.	-0.83***	-0.15	-0.67***
	(0.28)	(0.27)	(0.13)
Observations	769115	769115	769115

- π shocks associated with low real wages for all groups

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- π shocks associated with lower hours only for low education groups

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- π shocks associated with low real wages for all groups
- π shocks associated with lower hours only for low education groups
- High aggregate employment associated with high hours more so for low education groups

PSID results

	Growth in:		
	Lab. income	Wages	Hours
Inflation Shock	-1.45***	-0.53*	-0.92***
	(0.27)	(0.27)	(0.22)
HS+Some Coll. × Inf. Shock	0.74***	-0.03	0.77***
	(0.27)	(0.25)	(0.17)
College+ × Inf. Shock	1.18***	0.29	0.89***
	(0.26)	(0.21)	(0.29)
Agg. emp. growth	1.43***	0.46*	0.97***
	(0.27)	(0.24)	(0.18)
HS+Some Coll. × Agg. emp. gr.	-0.59**	-0.12	-0.46**
	(0.27)	(0.18)	(0.20)
College+ × Agg. emp. gr.	-0.94***	-0.31	-0.63***
	(0.30)	(0.24)	(0.20)
Observations	171994	171994	171994

- very similar patterns

A basic model of inflation and labor markets

- Small open economy which takes price of final output p_t (relative to labor) as given
- (not a theory of inflation, working on it)
- Labor supply
  - Two types of workers, high and low efficiency E_i, both hand to mouth
  - Take as given wages per efficiency unit w_t, profits π_t and p_t and solve:

$$\begin{aligned} & \max_{l^s_{it}, c_{it}} \frac{c_{it}^{1-\sigma}}{1-\sigma} - \frac{1}{1+\phi_i} \left(l^s_{it}\right)^{1+\phi_i} \\ & s.t. \\ p_t c_{it} \quad = \quad & (w_t l^s_{it} E_i + \lambda_i \pi_t)(1-\tau_i) + p_t T_t \end{aligned}$$

  - Let $l^s_{it}(w_t, \pi_t, p_t)$ the labor supply functions of both types
- Labor demand
  - Competitive firms, take as given w and p and solve:

$$\max_{l^d_t} \pi_t = A_t p_t \left(l^d_t\right)^{\alpha} - w_t l^d_t$$

    where A_t is a standard productivity shock.
  - Let $l^d_t(w_t, p_t)$ the labor demand function.

Sticky wages and rationing

- Equilibrium wages w_t^* solve:

$$l_t^d(w_t^*, p_t) - E_H S_H l_{H,t}^s(w_t^*, \pi_t, p_t,) - E_L S_L l_{L,t}^s(w_t^*, \pi_t, p_t) = \eta(w_t^* - \bar{w}_t)$$

- If $\eta = 0$, wages fully flex, $\Delta w_t = \Delta p_t$ and price shocks are neutral
- If $\eta > 0$ wages sticky, labor demand $\neq$ labor supply, price shocks have real effects
- Given w_t^* equilibrium employment is determined by

$$L_{H,t}^* = \beta l_t^d(w_t^*, p_t) \frac{E_H S_H l_{H,t}^s(w_t^*, \pi_t, p_t,)}{E_H S_H l_{H,t}^s(w_t^*, \pi_t, p_t) + E_L S_L l_{L,t}^s(w_t^*, \pi_t, p_t)} + (1-\beta) E_H S_H l_{H,t}^s(w_t^*, \pi_t, p_t)$$

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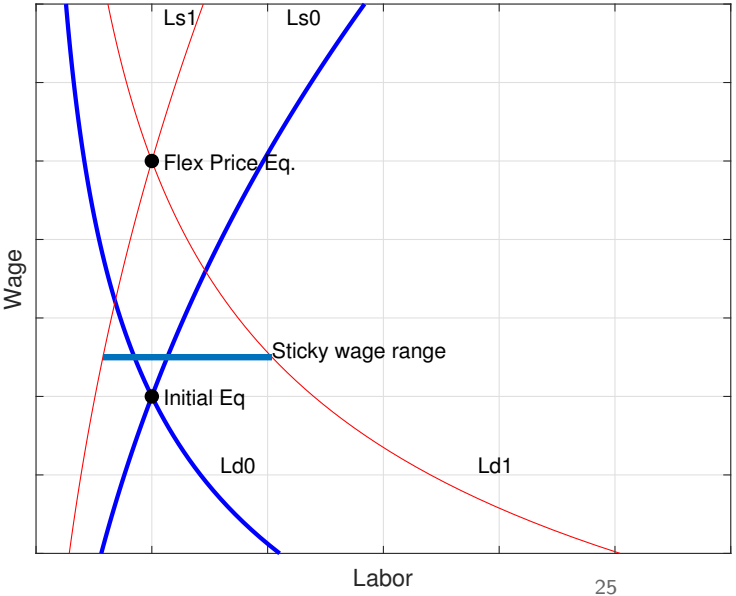
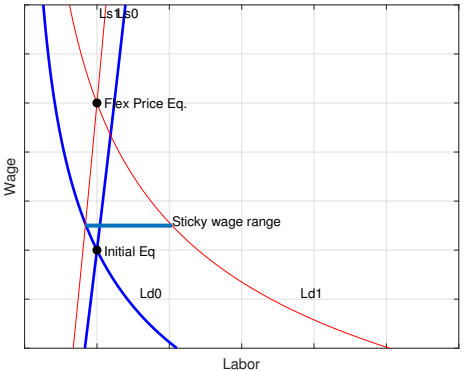
- If $\beta = 1$ employment is demand determined (Standard NK model)
- If $\beta = 0$ employment is determined by labor supply
- If $0 < \beta < 1$ firms off labor demand, wrkrs off labor supply

Labor impact of a price increase

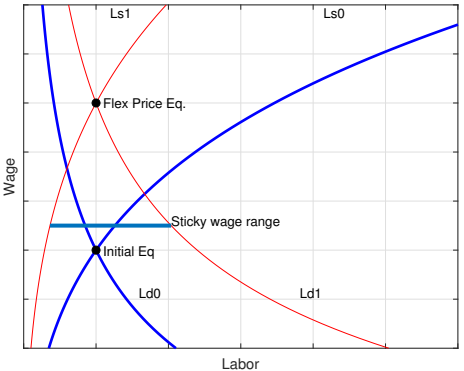


Price increase with different labor supply elasticities ($\frac{1}{\phi}$)

Low elasticity



High elasticity



- With high elasticity the same price shock induces larger reduction in of labor supply, more likely to drive a reduction in equilibrium hours

Equilibrium

- An equilibrium is a sequence for

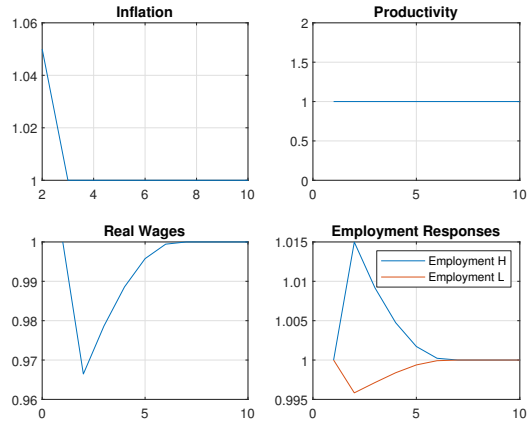
$$l^s_{Ht}, l^s_{Lt}, l^d_t, L^*_{Ht}, L^*_{Lt}, w^*_t, \bar{w}_t, \pi^*_t, G_t, c^*_{Ht}, c^*_{Lt}$$

- Given w^*_t, π^*_t desired labor supply and demand $l^s_{Ht}, l^s_{Lt}, l^d_t$ solve firm and household problem
- w^*_t and $\bar{w}_t$ solve wage equation
- $\bar{w}_t = w^*_{t-1}$ (only dynamic equation)
- Equilibrium employment $L^*_{H,t}$ and $L^*_{L,t}$ set by the β equation
- Equilibrium profits and consumption are determined by equilibrium employment
- Government spending G_t absorbs imbalances

Key parameters

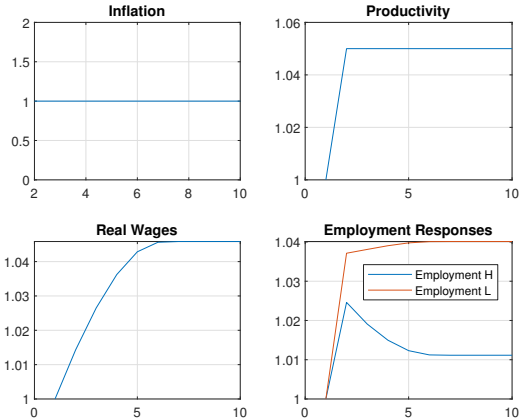
- Taxes, transfers, profit shares, efficiency, shares and curvature of consumption are all set match data on wages, labor supply and other income shares for 2 groups in the CPS ASEC population: high school drop-outs, and some college and more. Easily identified.
- Productivity and prices follow independent random walk with standard deviations set to match observed dispersion of aggregate employment growth and surprise inflation
- The wage stickyness parameter set to match the regression coefficient of individual wage changes on inflation and on aggregate employment
- In order for the model to match the differential comovement of hours of high and low skill with inflation and the aggregate employment need both:
  - Low $\beta << 1$ (Role of labor supply in determining employment)
  - Low skill have higher elasticity (1/2 and 2)

Result 1a. Impulse response to an inflation shock



- Inflation lowers real wages, increases labor demand, lowers labor supply
- Different elasticities of labor supply across groups induce different labor responses
- Wage stickyness induces propagation of shock

Result 1b. Impulse response to a productivity shock



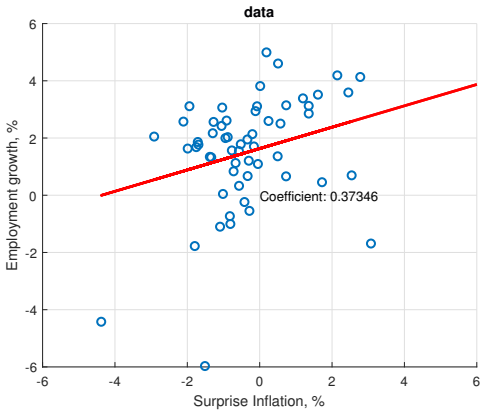
- Productivity increases labor demand, and induces persistent real wage growth
- Higher labor supply elasticity induces stronger employment response by the L group

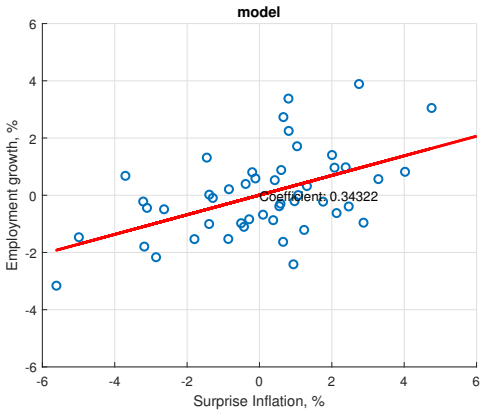
Result 2. Regression coefficients

	Inflation coefficient		Employment Coefficient	
	[CPS,PSID]	Model	[CPS,PSID]	Model
Wages	[-0.70,-0.53]	-0.70 (0.09)	[0.33,0.46]	0.47 (0.09)
Hours	[-0.45, -0.92]	-0.31 (0.02)	[0.97, 0.97]	1.24 (0.02)
Hours $\times$ College+	[0.49, 0.89]	0.33 (0.04)	[-0.67,-0.63]	-0.26 (0.04)

- Model captures differential responses to inflation and aggregate employment
- Key features: differential elasticity of labor supply, and role of labor supply in determining equilibrium employment
- Quantitatively: differential response in data $>$ model
  - other mechanisms (KORV, Bilbie et al. 2025) also needed

Result 3. Aggregate co-movement





- Productivity shocks and Inflation shock uncorrelated, however..
- Wage stickyness induces correlation between equilibrium employment and surprise inflation

Conclusions

- Highlighted two channels through which inflation can affect distribution of income
  - Income composition (asset v/s labor income)
  - Uniform impact on hourly wages and differential effect on hours across groups
- Model suggests three features can explain the observed patterns:
  - sticky wages
  - high labor supply elasticity of low skill workers
  - labor supply impact on equilibrium employment
- In progress: make inflation endogenous (firm pricing decision), allow for imperfect substitutability between high and low skill in production

Extras

CPS results: full table

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HS+Some College	1.66***	0.53	1.14***
	(0.48)	(0.40)	(0.30)
College+	3.97***	1.94***	2.03***
	(0.69)	(0.62)	(0.33)
age	0.04	-0.43***	0.47***
	(0.09)	(0.07)	(0.04)
age^2	-0.00***	0.00***	-0.01***
	(0.00)	(0.00)	(0.00)
Gender (1=M,2=F)	1.14***	0.32**	0.82***
	(0.24)	(0.16)	(0.14)
Observations	769115	769115	769115
R-squared	0.00	0.00	0.00

PSID results: full table

	Growth in:		
	Lab. income	Wages	Hours
Inflation Shock	-1.45***	-0.53*	-0.92***
	(0.27)	(0.27)	(0.22)
HS+Some College × Inflation Shock	0.74***	-0.03	0.77***
	(0.27)	(0.25)	(0.17)
College+ × Inflation Shock	1.18***	0.29	0.89***
	(0.26)	(0.21)	(0.29)
Agg. emp. growth	1.43***	0.46*	0.97***
	(0.27)	(0.24)	(0.18)
HS+Some College × Agg. emp. growth	-0.59**	-0.12	-0.46**
	(0.27)	(0.18)	(0.20)
College+ × Agg. emp. growth	-0.94***	-0.31	-0.63***
	(0.30)	(0.24)	(0.20)
HS+Some College	1.60**	0.09	1.51***
	(0.64)	(0.46)	(0.51)
College+	3.31***	1.33**	1.99***
	(0.73)	(0.52)	(0.56)
Age	0.43***	-0.37***	0.81***
	(0.09)	(0.09)	(0.08)
Age^2	-0.01***	0.00***	-0.01***
	(0.00)	(0.00)	(0.00)
Gender (1=M,2=F)	2.28***	1.14***	1.14***
	(0.34)	(0.25)	(0.21)
Observations	171994	171994	171994

Regression specification

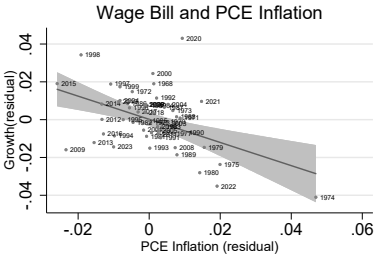
$$\Delta y_{it} = \beta_i \pi_t + \gamma_i \Delta a_t + \varepsilon_{it}$$

Where

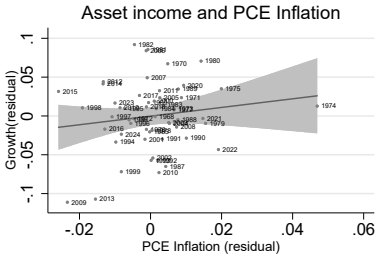
- Δy_{it} real growth in income category i in year t
- π_t inflation (or inflation shock) in year t
- Δa_t control for aggregate real growth in year t

- Real aggregate growth controls for the fact that both inflation and real income categories are systematically associated with real growth
- Coefficient of interest is β_i, if inflation neutral, $\beta_i = 0$ for all i

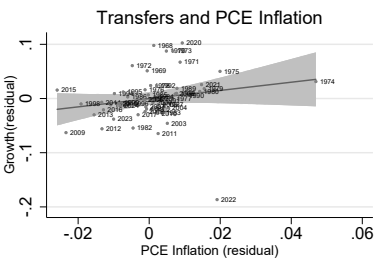
Regression results, PCE Inflation shocks



Coefficient: -0.61(0.19), control is Emp. growth

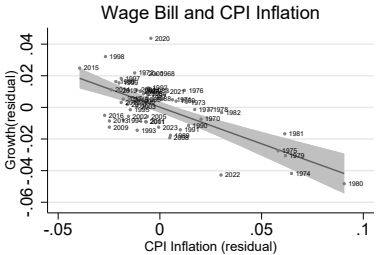


Coefficient: 0.56(0.52), control is Emp. growth

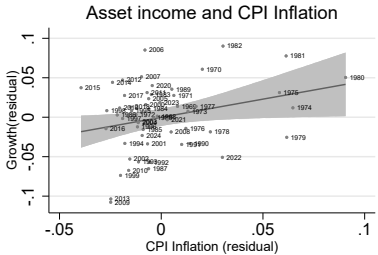


Coefficient: 0.76(0.61), control is Emp. growth

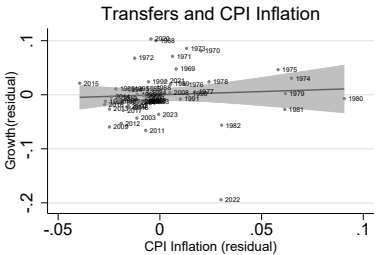
Regression results, CPI Inflation



Coefficient: -0.46(0.06), control is Emp. growth

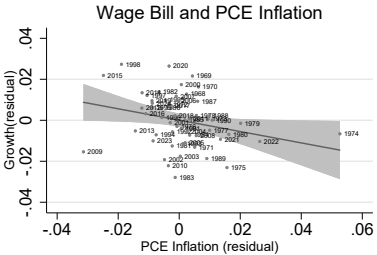


Coefficient: 0.46(0.21), control is Emp. growth

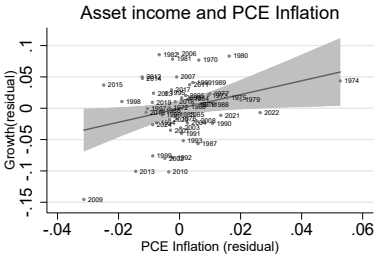


Coefficient: 0.12(0.22), control is Emp. growth

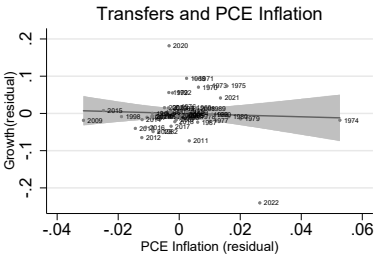
Regression results, PCE Inflation shocks, use Real GDP



Coefficient: -0.28(0.14), control is Real GDP



Coefficient: 1.10(0.57), control is Real GDP



Coefficient: -0.23(0.78), control is Real GDP

Summary

- In the U.S. over the period 1967-2024
- A 10% inflation (shock) increase associated with:
  - Decline in real wage bill of around 5%
  - Increase in real asset income of around 5%
  - No significant change in real transfers

Parameters values

Group specific parameters		
	$i = L$	$i = H$
S_i	0.25	0.75
E_i	1	2.5
τ_i	15%	25%
$\lambda_i \pi^* / wE_i l_i$	4%	18%
$T_i / wE_i l_i$	42%	6%
ϕ_i	0.5	2

Common parameters	
α	0.7
σ	0.6
β	0.3
η	300000
σ_p	1.8%
σ_A	2.3%