

Equalising Monetary Policy The Earnings Heterogeneity Channel in Action

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Motivation

- Unconventional monetary policy has unintended effects:
 - direct effects: capital income
 - indirect effects: wages
- Monetary stimulus increases job creation
- > 70% of income from labour earnings (HFCS, 2014)

Earnings Heterogeneity Channel

- Earnings of high-income and low-income workers may respond differently to monetary policy
- Expansionary monetary policy is...
 - **equalising**: poor households' wages are more affected by recessions through changes in unemployment (Krueger et al., 2010)
 - **dis-equalising**: poor households' wages are stickier (Ko, 2015), the skill-premium increases (Dolado et al., 2021) and jobs for low-skilled workers (Faia et al., 2023)

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- **Coibion et al. (2017)** vs **Inui et al. (2020)**
→ quality of survey data, no unconventional MP

Research Agenda

Research Question:

How does conventional and unconventional monetary policy affect the quarterly wage distribution and why?

Agenda:

- Create quarterly wage inequality measures with admin data (SIAB)
- Identify exogenous conventional and unconventional monetary policy shocks
- Estimate IRFs in a IV local projection framework
- Decompose of the Earnings Heterogeneity Channel

SIAB Data

- Stichprobe integrierter Arbeitsmarkt-Biographien (SIAB) by the IAB
- 2% random sample of German labour market participants
- 1975-2019 → 1.9 million worker, 72 million observations

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Strengths

- large (sub-)samples
- reliable
- gross wages
- representative

Weaknesses

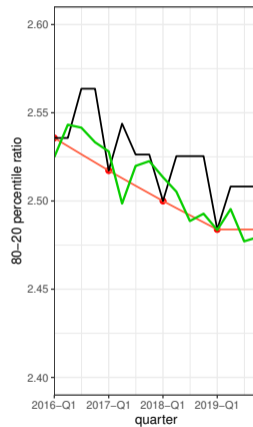
- top-coded wages
- average wage btw reports

Temporal Disaggregation

- Combining known annual wage deciles and within-year sub-sample dynamics
- Litterman (1983): Estimate missing quarterly values of an annual series by quarterly indicator series
 - GLS Regression: $Y_t = CX_q\beta + Cu$
 - Annual value of the *estimated* quarterly series is consistent with the annual series
- Suitable indicators: "employed changers" subsample
 - incumbents with reports during the year - unrelated to monetary policy [▶ Reasons](#)
 - average age, tenure, high education share close to overall sample [▶ Table](#)
 - high correlation with overall sample wage deciles [▶ Graph](#)

[▶ Regression details](#)

Quarterly Wage Inequality



IV Local Projections

- Estimate IRFs according to Jordà (2005) using instrumental variables
- Cumulative relative change compared to pre-policy change

$$\ln(y_{t+h}) - \ln(y_{t-1}) = c^h + \sum_{p=1}^P \alpha_p^h \ln(y_{t-p}) + \beta^h \widehat{policy}_t^i + \phi^h X_t^i + u_{t+h}^h, \quad h = 0, 1, \dots, H$$

\widehat{y} real gross wage deciles or percentile ratios

\widehat{policy} Policy Rate change or (3 quarter) Balance Sheet change

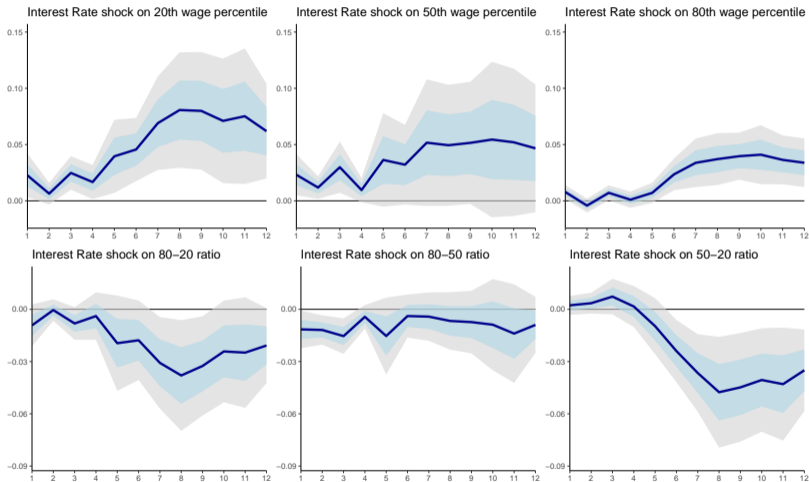
X current and lagged HICP, lagged instruments, other monetary policy tool

High-frequency Identification

- Exogenous monetary policy shocks: [▶ Shock series](#)
 - Data and Euro area application by Altavilla et al. (2019)
 - Changes in OIS rates in a 3h window around ECB announcements
 - Anticipated effects incorporated, controlling for reverse causality, unpredictable
- Target rate, Forward guidance and QE shocks - controlled for info effects
- Endogenous monetary tools instrumented by monetary policy shocks:
 - Policy Rate change - Target Rate shock
 - Balance Sheet change - QE shock and QE announcement (Dedola et al., 2021)

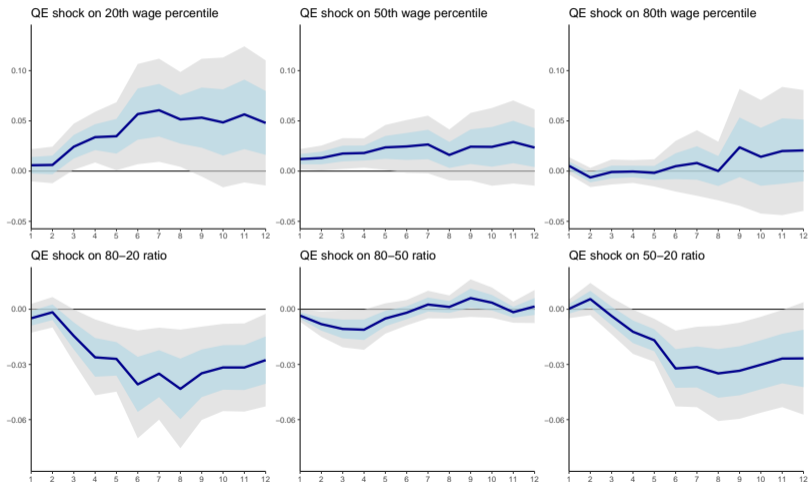
[▶ First stage](#)[▶ Macro check](#)

Interest Rate cuts boost wages similarly



confidence intervals: blue shaded area 68%, grey shaded area 95%

QE boosts low wages and reduces wage inequality



Robustness

- All wage deciles / whole wage structure [▶ Graph](#)
- Other temporal disaggregation (Chow-Lin, Q1 benchmark) [▶ Graph](#)
- 90-10 percentile ratio [▶ Graph](#)
- Gini coefficient [▶ Graph](#)
- More controls (recession dummy, hartz dummy) and more lags [▶ Graph](#)
- Narrative approach (Romer and Romer, 2004) [▶ Graph](#)
- Period 2008-Q1 to 2019-Q4 [▶ Graph](#)

Sub-Channels

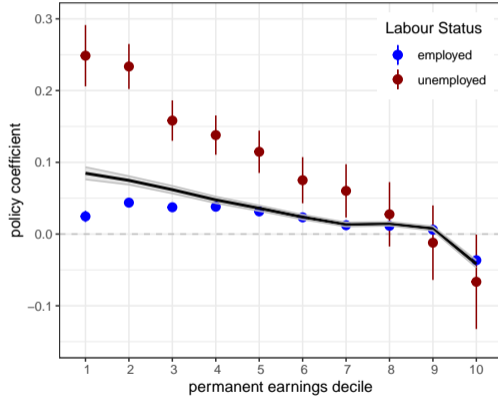
Earnings heterogeneity channel ✓

→ Why do we observe equalising effects and differences across tools?

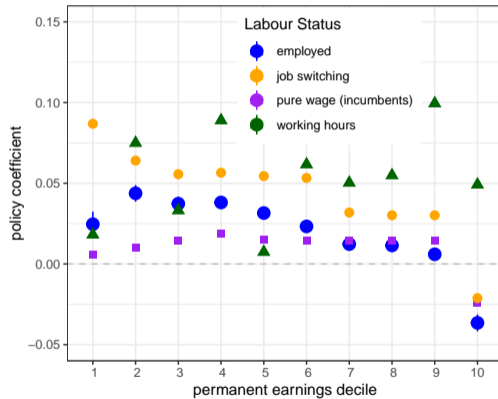
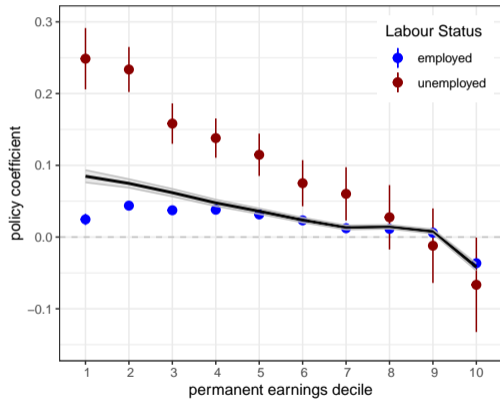
Sub-Channels

- Job creation channel
- Job switching channel
- Pure wage channel
- Hours worked channel

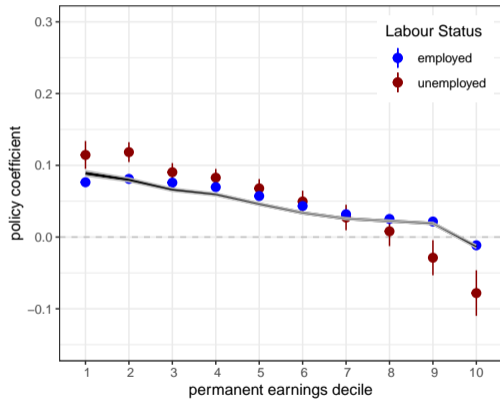
Channel Decomposition - Policy Rates



Channel Decomposition - Policy Rates



Channel Decomposition - QE



Conclusion

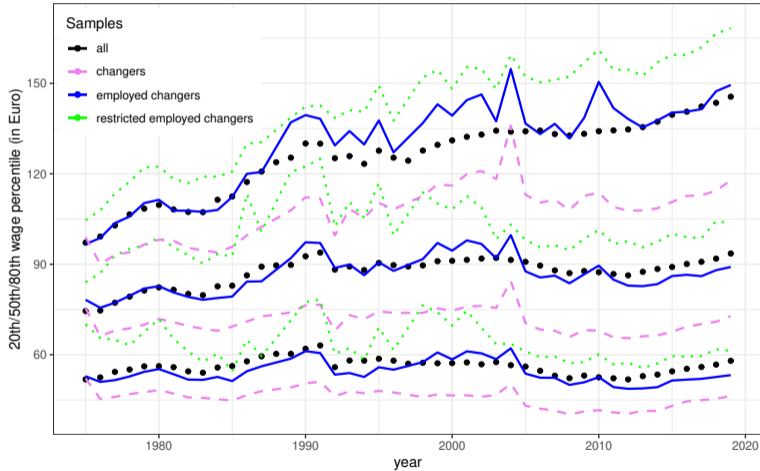
- Exogenous monetary policy shocks and administrative labour market data
- Lower wages react (i) stronger and (ii) quicker to monetary policy changes
- Interest rate effects are similar across the wage distribution
- QE reduces wage inequality, by affecting mainly the bottom of the distribution
- Main channels: job creation and job switching

Sample Characteristics

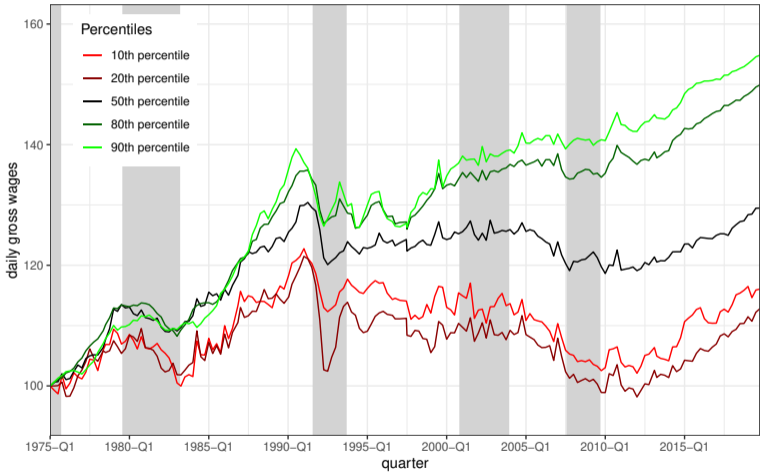
	1975-1991	1992-1998	1999-2008	2009-2019	qtr corr
Average Age					
All	38.13	39.08	40.40	42.04	1.00
Changers	-4.42	-3.22	-3.39	-4.31	0.82
Employed Changers	-0.32	-0.54	-0.80	-0.79	0.87
Average Tenure					
All	1,641.69	2,312.43	2,672.18	2,968.48	1.00
Changers	-949.54	-1,362.84	-1,438.79	-1,738.13	0.78
Employed Changers	-28.99	-95.22	-59.65	-111.78	0.98
Higher Education Share					
All	5.81	10.02	13.49	18.54	1.00
Changers	0.05	-0.13	-0.29	-1.02	0.97
Employed Changers	-1.06	-0.61	0.68	0.25	0.92
(Average) Median Wage					
All	83.14	89.29	90.35	89.07	1.00
Changers	-13.49	-16.82	-17.70	-20.94	0.51
Employed Changers	-3.51	-2.67	-1.08	-4.44	0.67

Note: This table compares age, tenure, higher education share and median wage of the subsamples "Changers" and "Employed Changers" to the main sample (All). Tenure counts the days a worker is employed at a firm. The higher education share shows the sample share of workers with a university or Fachhochschul degree. Wages are the daily gross real wages. The average values are reported for the period 1975-1991 (pre Reunification in SIAB), 1992-1998 (pre Euro), 1999-2008 (pre GFC) and 2009-2019. The last column shows the quarterly correlation with "All" over the whole period. Source: factually anonymized SIAB 2019

Indicator Comparison



Interpolated Wage Deciles

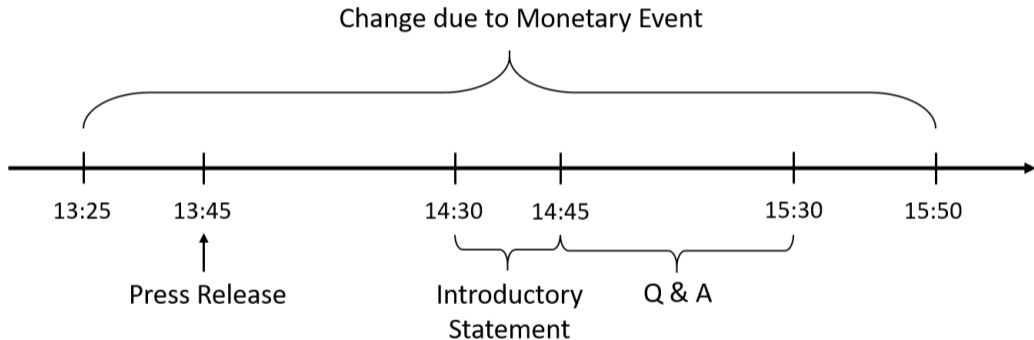


High-frequency Identification - Details

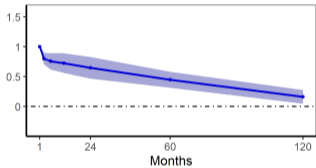
- Exogenous monetary policy shocks by high-frequency approach
 - Isolate the impact of news about monetary policy in a tight window [▶ MP timeline](#)
 - Unanticipated part of the policy action
 - Euro Area Monetary Policy Event-Study Database (Altavilla et al., 2019)
- PCA to extract 3 relevant factors from different maturities
- Orthogonal rotation for interpretation: Target rate, Forward guidance and QE
- Remove information effects (Jarocinski and Karadi, 2020)
- Weighted average of two monetary policy meetings/shocks (instead of eight)

[▶ factor loadings](#)

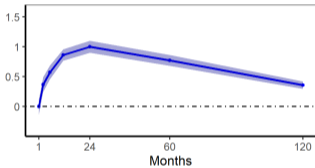
Monetary Policy Event - timeline



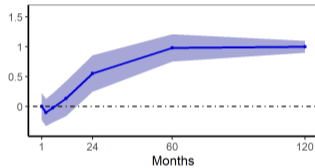
Factor loadings



(a) Target Rate



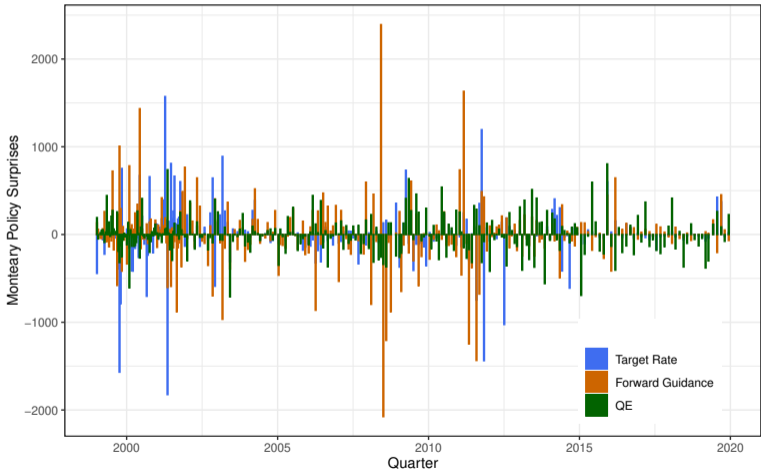
(b) Forward Guidance



(c) QE

▶ back

Monetary Policy Surprises - detailed



First stage - IV local projection

Table: First Stage - IR and QE

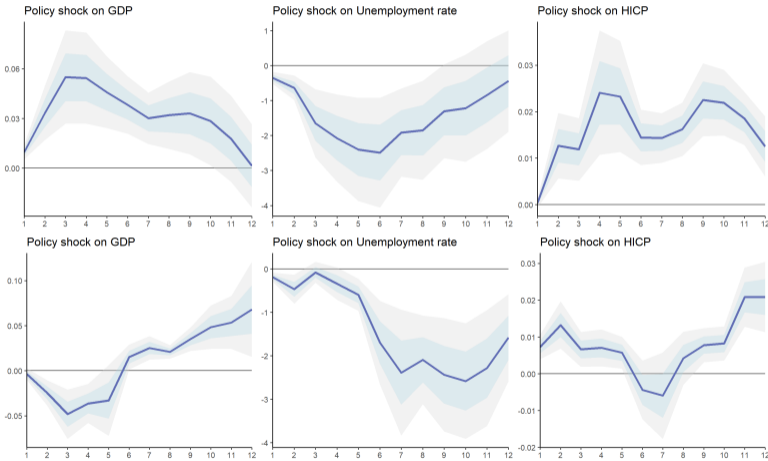
	Coef	SE	F-Stat	p-value
80-20 ratio	-0.05	0.02	15.4	0.000
80-50 ratio	-0.04	0.02	11.1	0.003
50-20 ratio	-0.04	0.01	9.2	0.008
20th percentile	-0.04	0.01	14.5	0.000
50th percentile	-0.03	0.01	15.4	0.000
80th percentile	-0.04	0.01	22.5	0.000

Note: First stage regressions of policy rate changes instrumented by Target Rate shocks for the six main dependent variables. The columns show the shock coefficient (1), the Newey West standard error (2), the HAC F-Statistic (3), the p-value of the weak instrument test (4)

	Coef	SE	Coef II	SE	F-Stat	p-value
80-20 ratio	0.03	0.02	0.44	0.12	15.3	0.000
80-50 ratio	0.04	0.02	0.43	0.12	7.3	0.002
50-20 ratio	0.03	0.02	0.48	0.11	19.4	0.000
20th percentile	0.04	0.02	0.50	0.11	21.8	0.000
50th percentile	0.04	0.02	0.50	0.11	15.9	0.000
80th percentile	0.04	0.02	0.28	0.12	4.8	0.012

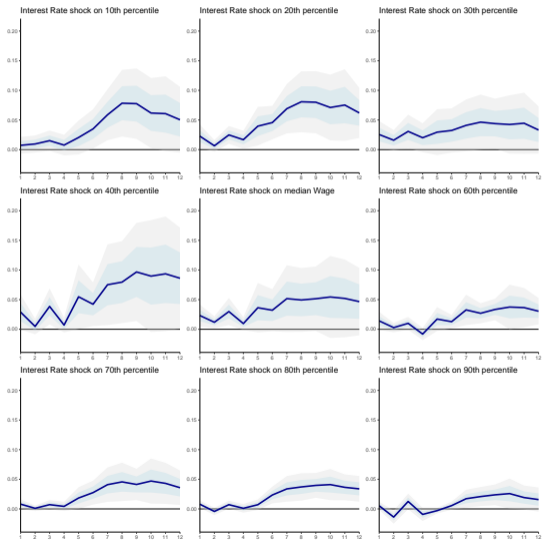
Note: First stage regressions of balance sheet changes instrumented by QE shocks and QE announcement dummy for the six main dependent variables. The columns show the shock coefficient (1), the Newey West standard error (2), the announcement dummy coefficient (3), the Newey West standard error (4), the HAC F-Statistic (5), the p-value of the weak instrument test (6)

Macroeconomic consistency check

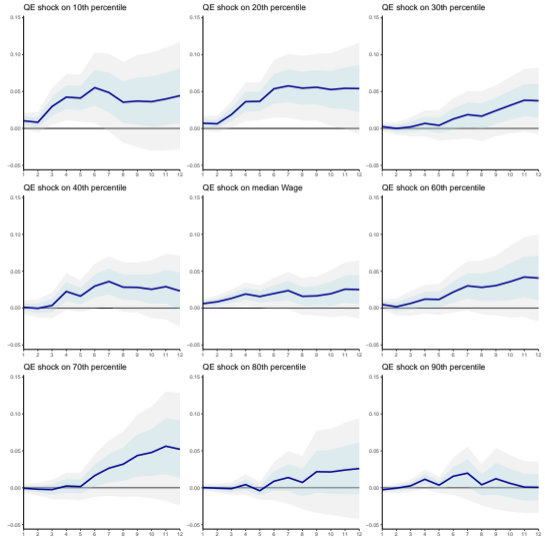


Note: upper row = interest rate shock, lower row = QE shock [▶ back](#)

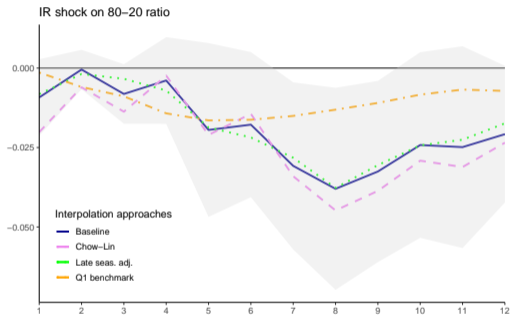
Wage structure - Interest Rate Policy



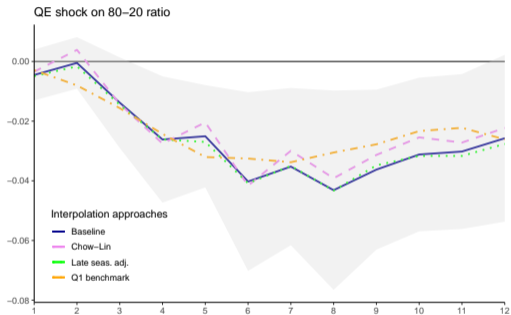
Wage structure - QE



Alternative temporal disaggregation



(a) IR shock



(b) QE shock

90-10 ratio

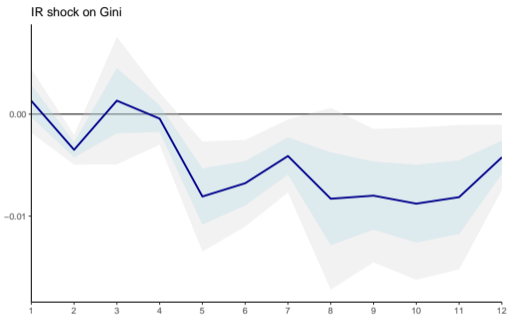


(a) IR shock

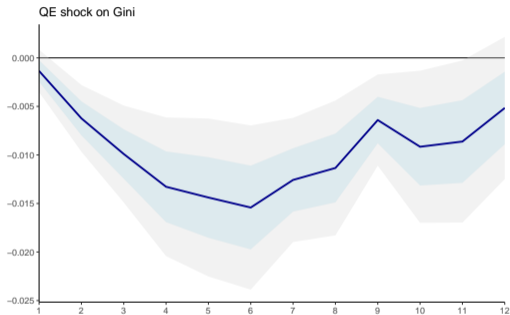
(b) QE shock

Figure: Responses of the 90-10 percentile ratio

Gini coefficient



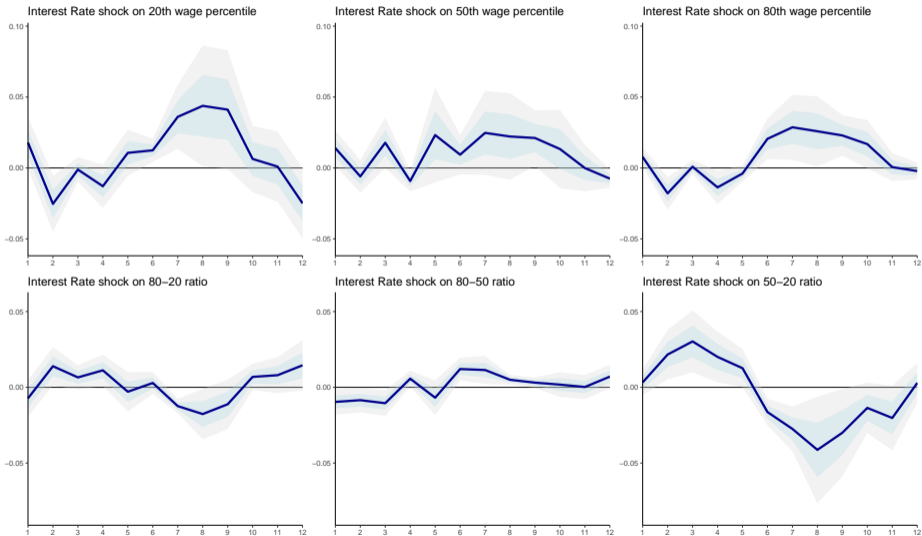
(a) IR shock



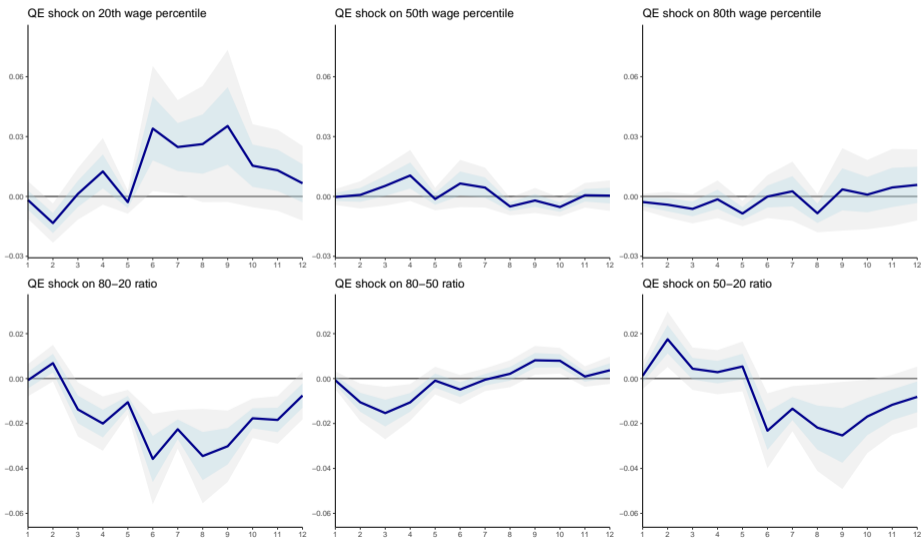
(b) QE shock

Figure: Responses of the Gini coefficient

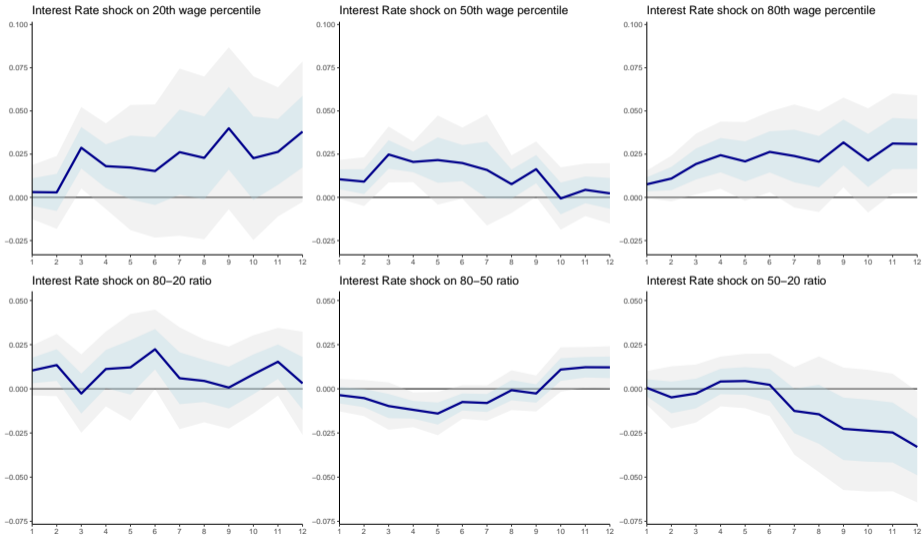
Robustness - Interest Rate



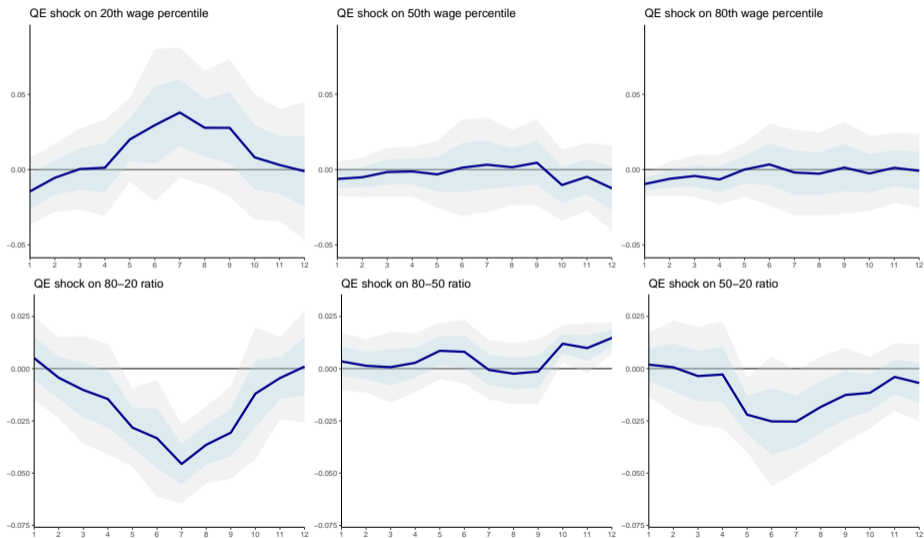
Robustness - QE



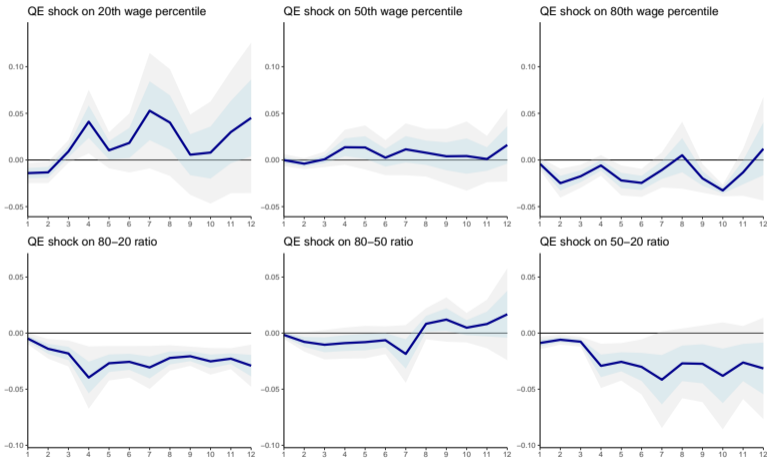
Narrative approach - Interest Rate



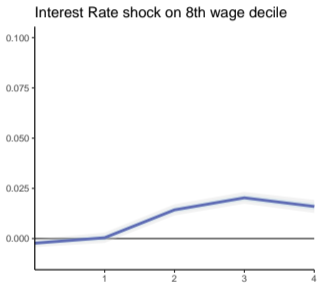
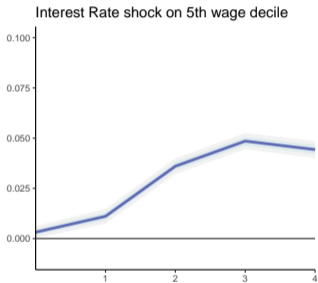
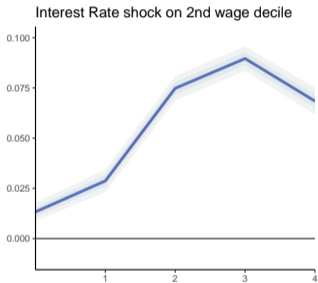
Narrative approach - QE



QE - 2008-2019

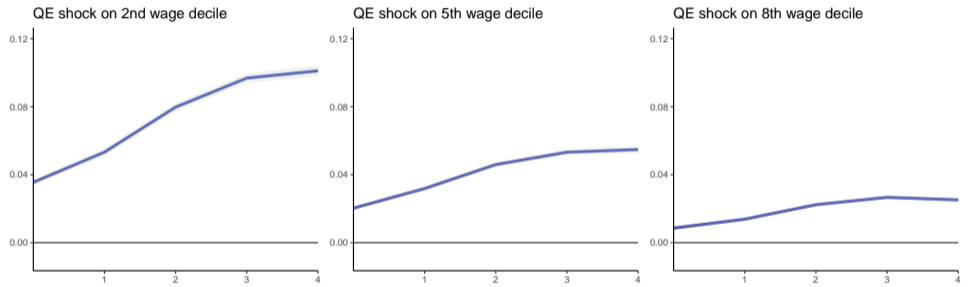


Annual IR effects



▶ back

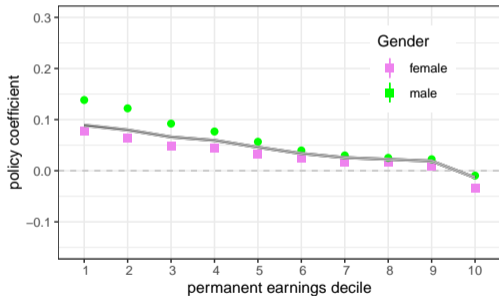
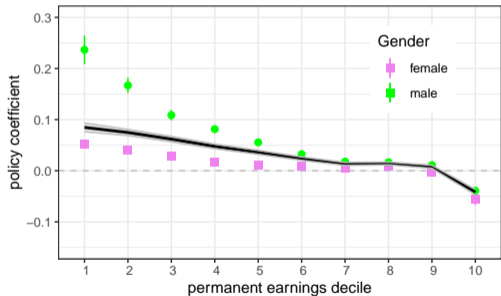
Annual QE effects



▶ back

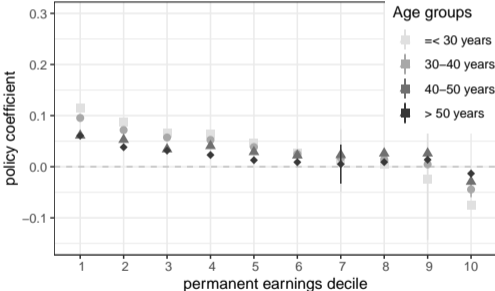
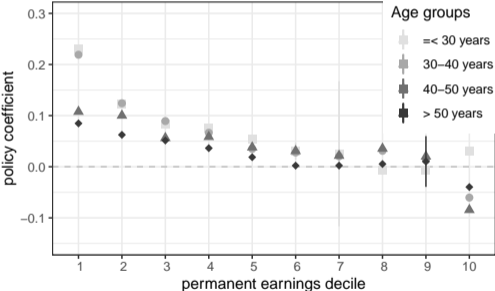
Gender Decomposition

Figure: IR & QE effects - Gender differences



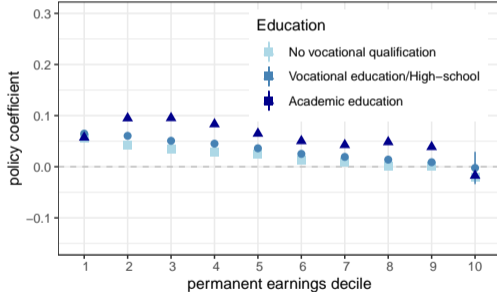
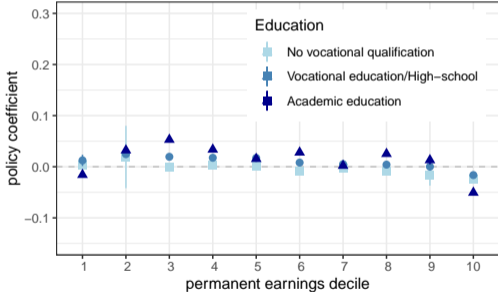
Age Decomposition

Figure: IR & QE effects - Age differences



Education Decomposition

Figure: IR & QE effects - Education differences



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