Monetary Policy and Labor Income Risk with a Billion Observations

Margio Giarda
Central Bank of Chile

Ignacio Rojas
Central Bank of Chile

Sergio Salgado
Wharton

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Introduction

Motivation: Monetary Policy and Labor Income Risk

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- Growing literature on how policy interacts with worker heterogeneity
  e.g., Kaplan-Moll-Violante (18), Holm et al. (21), Leahy-Thapar (22), McKay-Wolf (23), Patterson (23)
- Most of this literature focuses on response of income levels to shocks
- Large literature on how workers' risk varies over the business cycle
  e.g., Storesletten-Telmer-Yaron (01), Guvenen-Ozkan-Song (14), McKay (17), Bayer et al. (19), Catherine (21)
- Little on the response of the distribution of income changes to **aggregate shocks**

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This paper: how does income risk respond to monetary shocks?

- Does it affect overall dispersion (second moment) or downside risk (third moment)?
- What is the labor market flow that drives income risk (e.g., JtU, JtJ, etc.)

This paper

Use high-frequency administrative panel income data for formal workers

- Build monthly moments of the labor income annual growth distribution
- Study the response of these moments to monetary policy shocks
- Study responses conditional on labor market flows (JU, UJ, JTJ, Stayers)

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We find

- Skewness of labor earnings growth declines after contractionary monetary policy shock
- Dispersion does not respond to monetary shocks
- The skewness of all (most relevant) labor market flows fall in response to monetary policy
  → Unemployment risk is not the only source of labor income risk!

Aggregates and Income Risk

Data

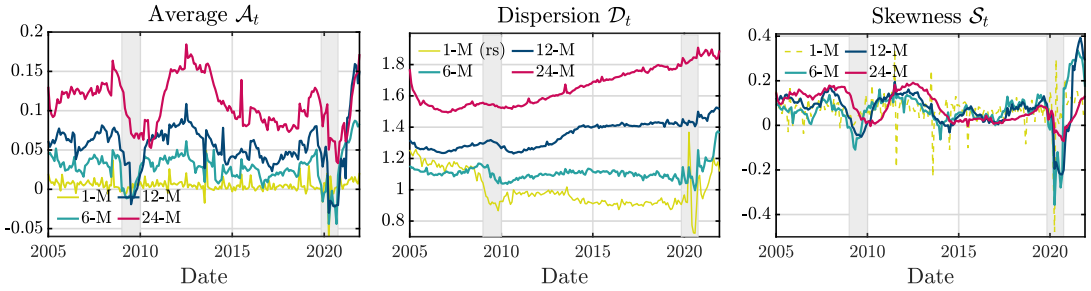
Data from unemployment insurance fund (AFC)

- Employer-employee monthly panel: wages, U insurance, firm identifier, education, gender, industry
- Formal workers in private sector; about 1 billion obs from 2002m1-2022m12
  (Do not consider self-employment income)
- Data reported by firms each month, little misreporting, no attrition, low share top coded ($\approx 2.7\%$)

Variables

- Labor income from main employer and CPI deflated
- Measure log-change of real earnings $\Delta^h y_{i,t} = y_{i,t} - y_{i,t-h}$ where $h \in \{1, 6, 12, 24\}$
- We account for zeros and income below min wage according to Guvenen et al. (2021,WP):
  - ★ If $y_{it} < y_t^{min}$ we set $y_{it} \approx y_t^{min} + \Delta$
  - ★ Preserves the ranking between workers and the information from JtU and UtJ ▸ Accounting for zeros

Moments Over the Business Cycle



Note: gray bars indicate recessions measured as more than three consecutive month with negative y-o-y GDP growth. These are 2009m1-2009m10 and 2020m3-2020m10

- **Average: procyclical**
- **Dispersion:** $(\mathcal{D}_t = \mathcal{P}_{90t} - \mathcal{P}_{10t})$ is **acyclical**
- **Skewness** $(\mathcal{S}_t) = \frac{(\mathcal{P}_{90t} - \mathcal{P}_{50t}) - (\mathcal{P}_{50t} - \mathcal{P}_{10t})}{\mathcal{P}_{90t} - \mathcal{P}_{10t}}$ is **procyclical** → **Risk: countercyclical**

▸ Distribution

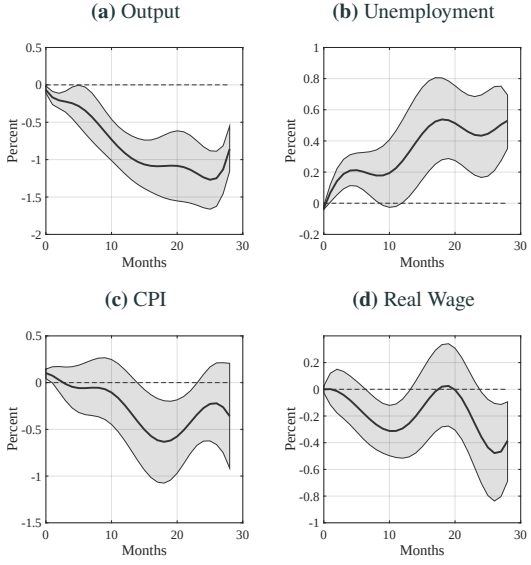
Monetary Shocks and Income Risk

(Smooth) Local Projections:

$$y_{t+k} - y_t = c + \beta^k \boldsymbol{mps_t} + \Gamma' X_t + \delta_t + \varepsilon_{kt},$$

- y_{t+k}: macro variables (check) and moments of 12-month changes
- **Monetary Shock:** $\boldsymbol{mps_t}$. Daily difference btw effective MPR and Bloomberg expectations (Gonzalez and Tadle, 2018, Aruoba et al, 2022) ▸ Shocks
- **Controls:** 14 lags of: MPR, inflation, output, Terms of Trade index, and nominal exchange rate, lagged moments
- Sample: 2005m1-2019m12
- Report the Smooth LP (Barnichon and Brownlees, 2019) and the 90% confidence interval

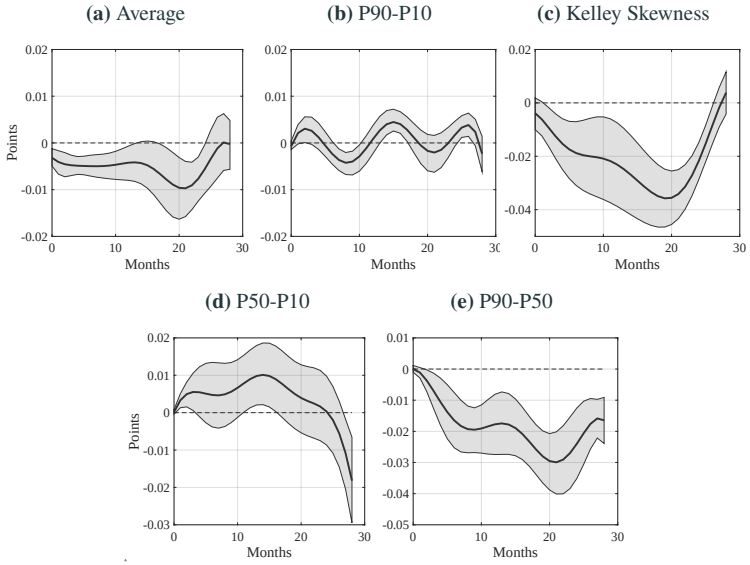
Monetary Shocks on Aggregates



Aggregate responses to 25bp increase

- Output ↓
- Unemployment ↑
- CPI ↓
- Real Wages ↓

Monetary Shocks on 12M Changes Distribution



Moments to 25bp increase

- Average income growth ↓
- No effect on dispersion
- Skewness ↓
- Skewness falls from both tails!

$$\mathcal{S}_t\downarrow = \frac{(\mathcal{P}_{90t} - \mathcal{P}_{50t})\downarrow\downarrow - (\mathcal{P}_{50t} - \mathcal{P}_{10t})\uparrow}{(\mathcal{P}_{90t} - \mathcal{P}_{10t})}$$

The response of skewness is large

- $\Delta\mathcal{S}_t \approx -0.035$ to 25bp is large
- In the GFC $\Delta\mathcal{S}_t \approx -0.2$
- 75bp → around half the GFC

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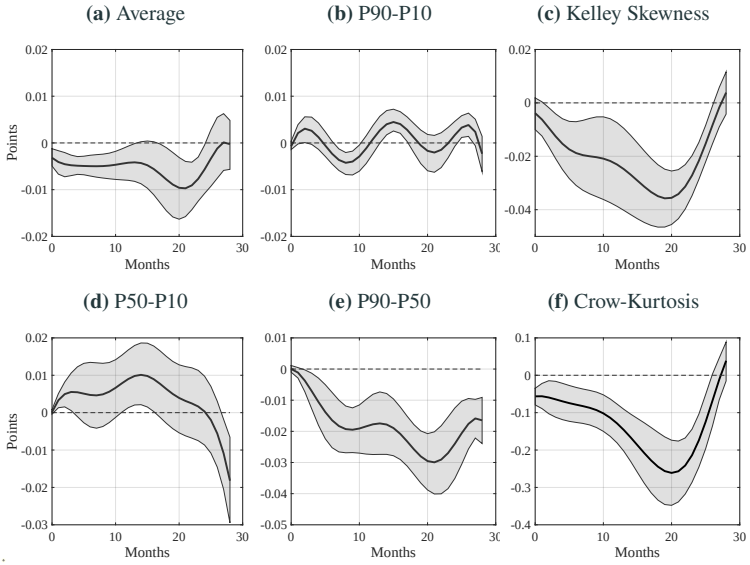

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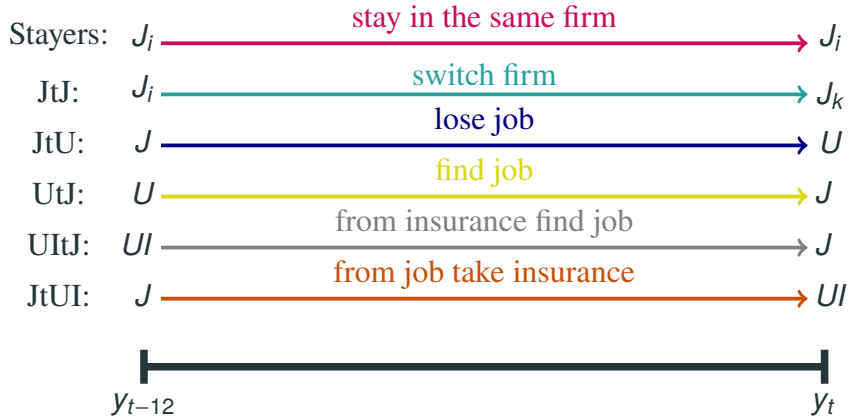
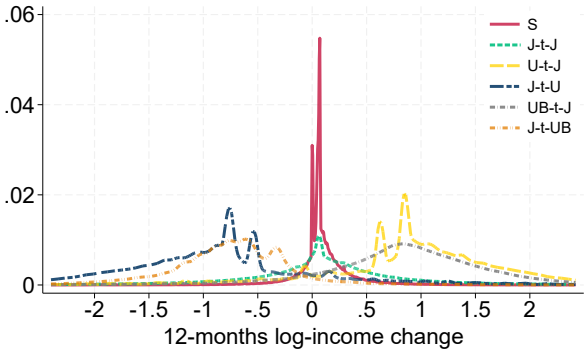
Income Risk from Labor Flows

Labor Market Flows: Definitions

- Three states: J (work), U (unemployment), UI (Unemployment Insurance)
- Flow: state in t compared with state in $t-12$ (ignore "within period" flows)



Labor Market Flows: Descriptive Statistics



Note: Distributions for 2015. All distributions sum to one.

- Job-to-Job, Job-to-Unemployment Insurance, Unemployment Insurance-to-Job
- Stayers, Unemployment-to-Job, Job-to-Unemployment

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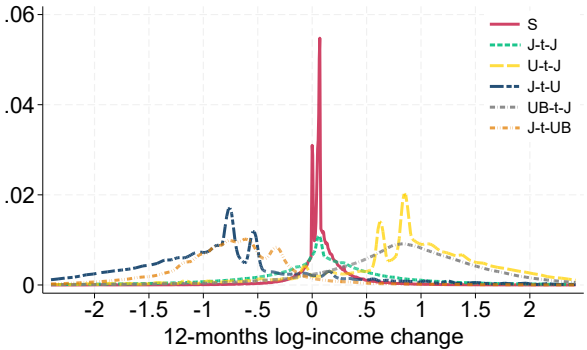

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Table 1: Flows 12-month changes.

Flow	Pct.	$\mathcal{A}$	$\mathcal{D}$	$\mathcal{S}$
Stayers	39.02	0.07	0.36	0.19
JtJ	16.13	0.11	0.84	0.04
JtUI	0.42	-0.78	0.63	-0.01
JtU	9.67	-0.74	0.95	-0.14
UtJ	10.29	0.82	0.90	-0.03
UItJ	0.21	0.80	0.83	-0.07
Jan-05 to Dec-21. N: 1006780473				

- Job-to-Job, Job-to-Unemployment Insurance, Unemployment Insurance-to-Job
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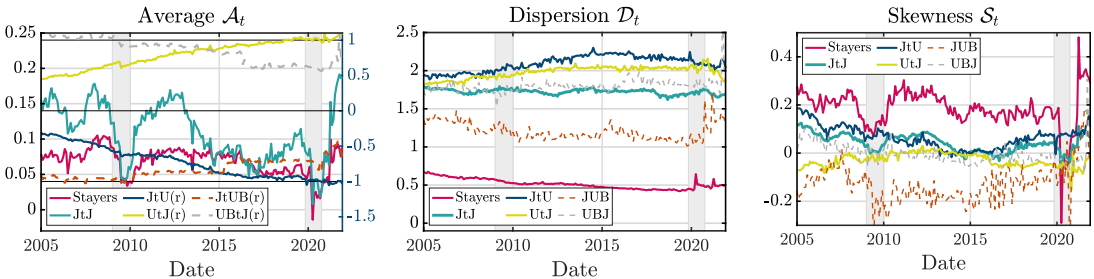
Distribution of Labor Market Flows over the Business Cycle: 12-month Changes



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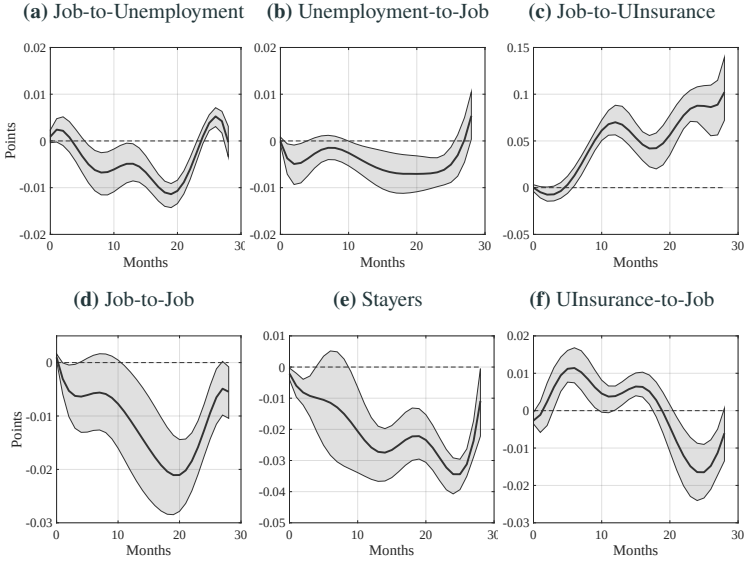
- **Average: procyclical** mostly **JtJ** and **Stayers**
- **Dispersion:** $(\mathcal{D}_t = \mathcal{P}_{90t} - \mathcal{P}_{10t})$ is **acyclical** in all flows
- **Risk: countercyclical**. $\mathcal{S}_t = \frac{(\mathcal{P}_{90t} - \mathcal{P}_{50t}) - (\mathcal{P}_{50t} - \mathcal{P}_{10t})}{\mathcal{P}_{90t} - \mathcal{P}_{10t}}$ is **procyclical** mostly **JtJ** and **Stayers**

▸ Levels

Moments of Flows: Response of Skewness to MP Shocks



Moments of Flows to 25bp increase

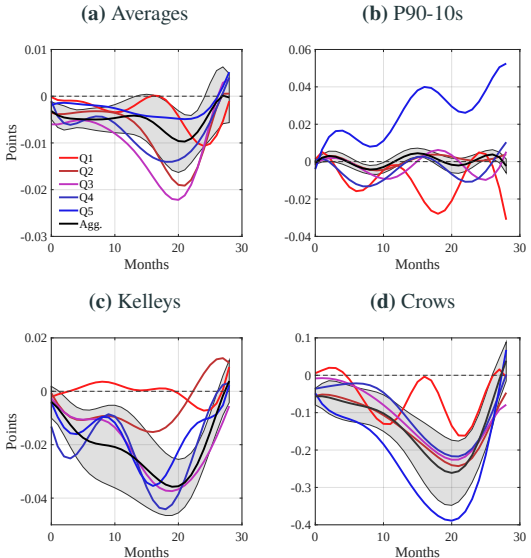
- **JtU** and **UtJ** skewness ↓
- **JtJ** and **Stayers** skewness ↓ too!
- → **U not the only source** high risk
- UI helps to mute higher risk
- UI result implies the existence of an optimization from workers

▸ Averages Fall ▸ Dispersion mixed

▸ Flows as expected

Heterogeneity across Income Distribution

Heterogeneity: Response to MP shock



- For lower quintiles of income the MP shock affects the level, while for high quintiles the shock move the risk.
- **Avg:** $Q2$ and $Q3$ Average income growth exhibit the highest response to a MP shock.
- **Ske:** $Q3$, $Q4$ and $Q5$ the Kelley response is deeper and longer lasting.
- The Kurtosis affects similarly all quintiles, except the $Q1$.

Conclusions

Conclusion and Next Steps

Conclusions

- We revisit the countercyclicality of labor income risk and study how it responds to MP shocks
- We show that **risk** measured by the skewness earnings growth **increases** in response to MP shock
- We show that **all** labor market flows contribute to aggregate skewness after an MP shock
- That suggests income risk goes beyond unemployment risk
- For low income groups, the MP shock affects the **levels** of its income growth distribution
- For high income groups a MP shock affect its **income risk**

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- For low income groups, the MP shock affects the **levels** of its income growth distribution
- For high income groups a MP shock affect its **income risk**

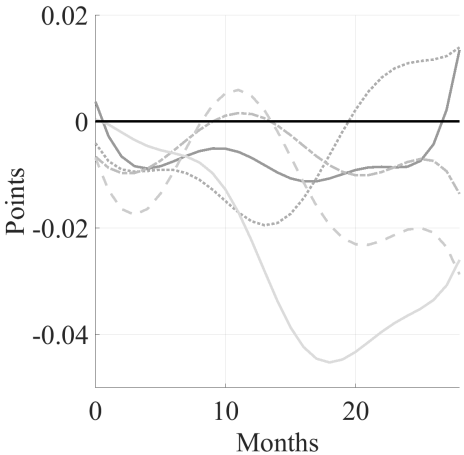
Next steps

- Study the flows of other shocks (external rate, commodity prices)
- Finish the model (in early stage) and calibrate it to Chile
- Heterogeneity and the role of firms

Appendix

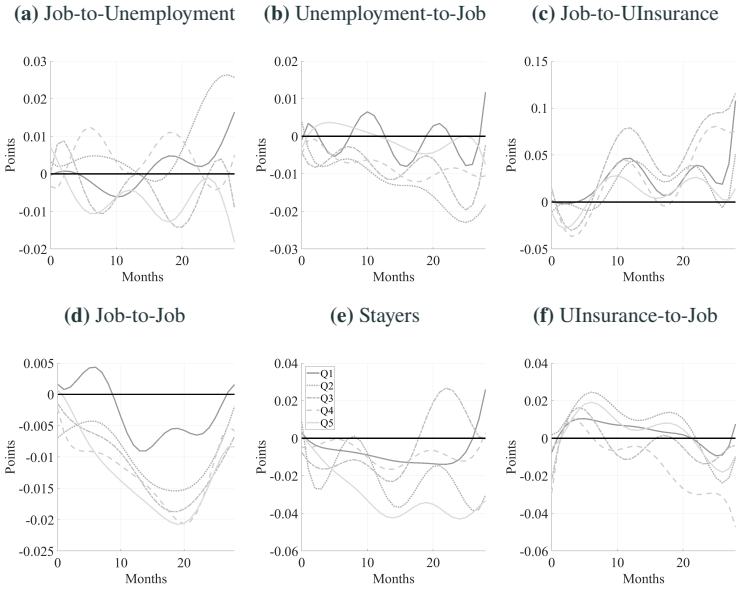
Heterogeneity

- Major difference between Qs are on the third moment.
- The $Q5$ skewness respond significantly, while $Q1$ and $Q2$ ruturn to its previous level the quickest.
- The larger response in flow terms come from the richest part of the distribution. (Next slide)



Note: Quintiles obtained as individuals' FE coefficient.

Skewness by Quintile/Flow



Accounting for zeros

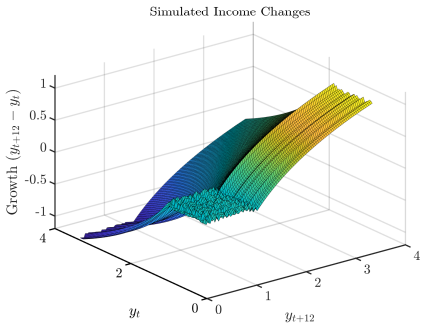
Back

- If wages are low or zero, we use

$$\hat{y}_{i,t} = \ln\left(\overline{w}_{min} + \frac{\overline{w}_{min}}{10(\overline{w}_{min}+10)}\left\{\exp\left(w_{i,t}\right) + 10U[0,1]\right\}\right)$$

  $\rightarrow w_{i,t} = 0,\ \hat{y}_{i,t} = \ln(\overline{w}_{min} + \Delta)$

- $w_{i,t} = 0$ has relevant information for income risk (UtJ,JtU).
- Calculate an approx log-change if unemployed at t or $t+h$
- Preserve the earnings' ranking among individuals.
- log-changes in UtJ and JtU have a distribution
- Fluctuations with zeros represent compositional effects



Distribution

Back

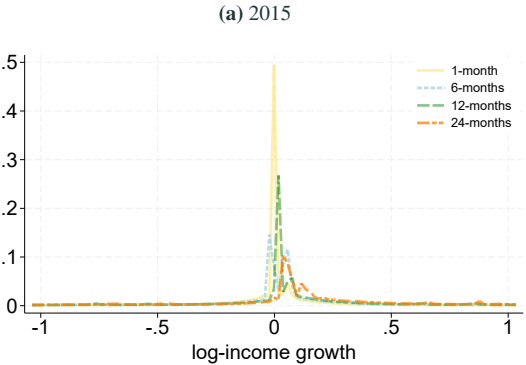


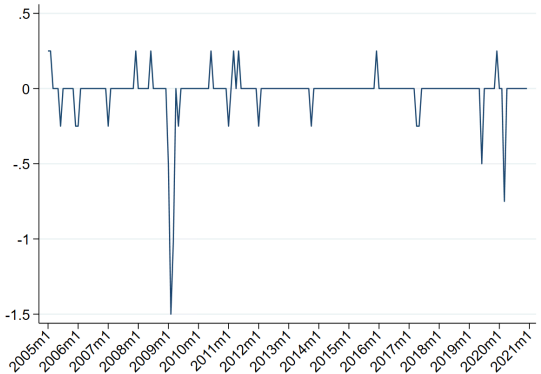
Table 2: Description of δw h-month changes.

H	Mean	Std. Dev	Kelley
1-M	0.005	0.167	0.082
6-M	0.033	0.442	0.040
12-M	0.067	0.551	0.103
24-M	0.138	0.663	0.062
Jan-2015 to Dec-2015. N=70795178			

Shocks

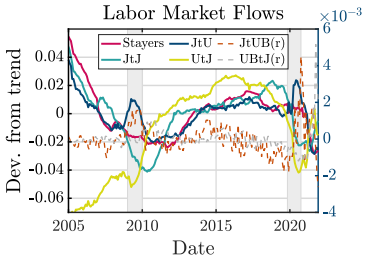
Back

Figure 8: Monetary Shocks in Chile, 2002-2021 **(Aruoba et al., 2022)**



Levels

Back



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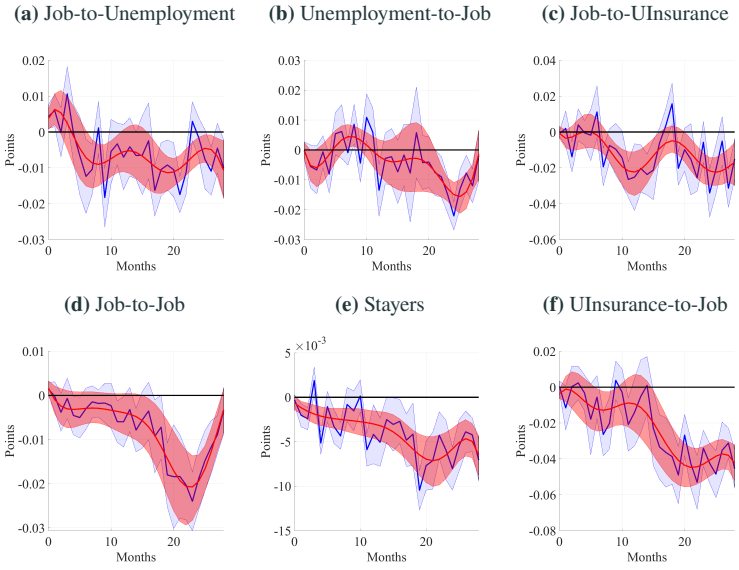
Averages Fall

Back

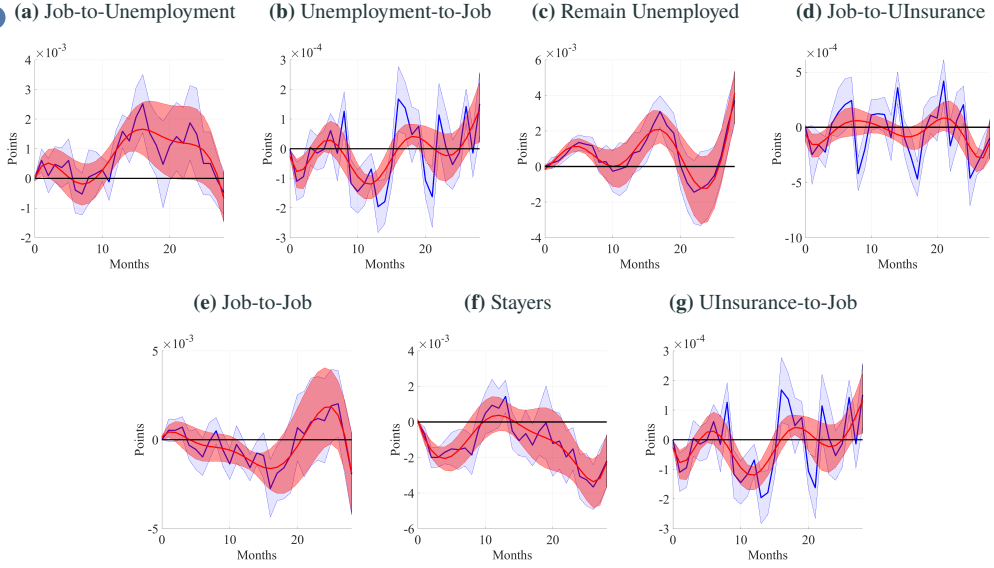


Dispersion mixed

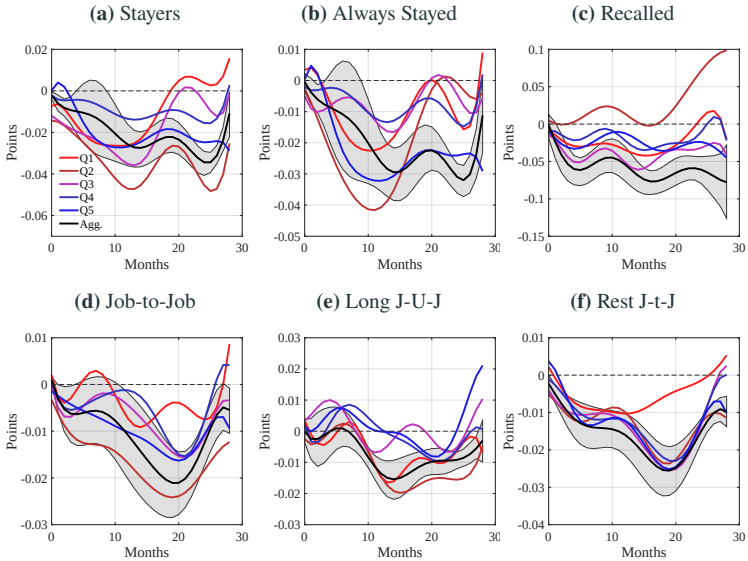
Back

Flows as expected

Back



Heterogeneity income & flows: Response to MP shock



- Conditional to remain in job the $Q1$ is the group that face the higher income risk
- When passing through a long period of unemployment $Q1$ faces the major income risk