

Monetary policy rules and the inequality-augmented Phillips curve

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Introduction

Model structure

Inflation-Unemployment-Inequality nexus

Flattening of the Phillips curve

MP reaction functions

Conclusions

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- Low-wage workers are more exposed to cyclical fluctuations in unemployment (Clark and Summers, 1980, Kydland, 1984, Mitchell et al., 1985, Mueller, 2017, Solon et al. 1994, Okun et al., 1973);
- This heterogeneous effect can have distributive implications.

Introduction

- We explore the **inflation-unemployment-inequality nexus** to investigate the role of changes in workers' bargaining power for the **shape of the Phillips curve** and expand the analysis of the **trade-offs faced by the CBs**;

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- To do so, we consider **workers' heterogeneity** in an extended version of the **SFC-AB model** by Rolim et al. (2023) with no long-term growth.

Introduction

Model structure

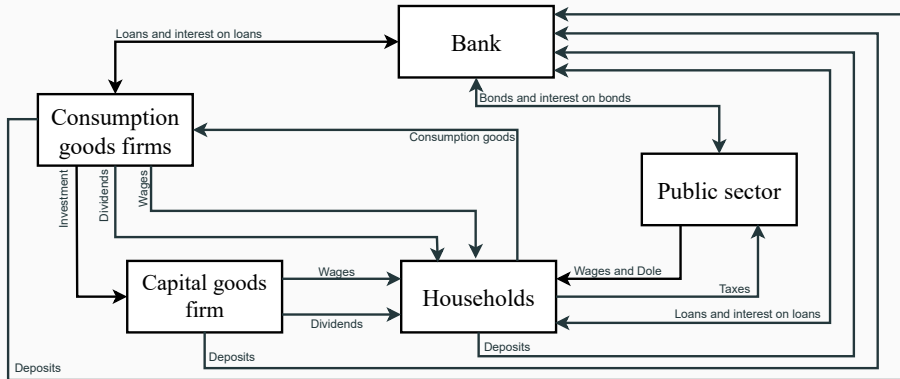
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The model



Consumption goods firms

- Production level depends on expectations and sales depend on market share (competitiveness);

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- Direct workers to produce goods:

$$L_{c,t}^{D,dir} = \left\lceil \frac{Q_{c,t}^d}{y^c} \right\rceil; \quad (1)$$

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- Indirect workers supervise those workers and manage the firm (overhead labor):

$$L_{c,t}^{D,ind} = \lfloor \rho_2 L_{c,t}^{D,dir} + \rho_3 L_{c,t}^{dir,fc} \rfloor; \quad (2)$$

Note: $L_{c,t}^{dir,fc}$ is the demand for direct worker at full capacity utilization (proxy for production capacity).

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- Investment is based on desired capacity utilization rate;
- Firms exit the market depending on specific criteria.

- Sets interest rate for loans at the same level as CB (i);

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- Grants credit to all creditworthy clients (C firms and households): evaluation depends on interest payments to revenue ratio relative to R threshold.

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- Workers' desired wage:

$$w_{h,t}^{d,\$} = \begin{cases} w_{h,t}^{d,*,\$}(1 + \gamma) & \text{if } T_{h,t}^w = 0 \\ w_{h,t}^{d,*,\$}(1 - \gamma T_{h,t}^w) & \text{otherwise.} \end{cases} \quad (3)$$

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- Consumption depends on income (class-specific propensity to consume) and on emulation consumption (average consumption of class above).

Inflation targeting regime:

$$\dot{i}_t = i_{t-1} \{ 1 + \lambda_1 (\bar{\hat{p}}_{t-1} - \hat{p}^T) - \lambda_2 [(1 - \bar{\eta})_{t-1} - (1 - \eta)^T] \} \quad (4)$$

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Labor market

Wage setting:

$$w_{f,t}^{j,\$} = (1 - \phi^j \eta_{j,t-1}) w_{f,t}^{j,d,\$} + \phi^j \eta_{j,t-1} w_{f,t}^{j,s,\$} \quad (5)$$

Note: $w_{f,t}^{j,d,\$}$ is firms' desired wage, $w_{f,t}^{j,s,\$}$ is workers' desired wage, ϕ^j is the class-specific parameter, and $\eta_{j,t-1}$ is the class-specific employment rate.

$\phi^j \eta_{j,t-1}$ is the **class-specific bargaining power**.

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Inflation-Unemployment-Inequality nexus

- How do the cyclical properties of employment and income distribution lead to the inflation-unemployment-inequality nexus?

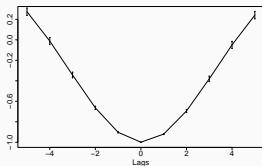
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- Analysis is based on stylized facts concerning key variables which are reproduced by the model (validation).

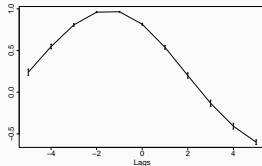
Inflation-Unemployment-Inequality nexus

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- Model is simulated for 500 periods (200 transient periods and 300 considered periods);
- 100 Monte Carlo runs per simulation configuration.

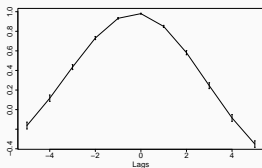
Cyclical behavior of macroeconomic series



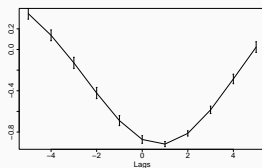
Unemployment rate



Inflation rate

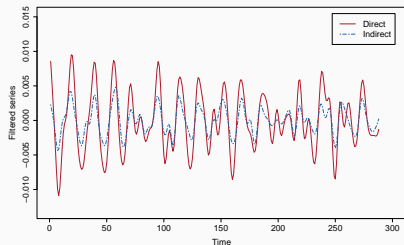


Productivity

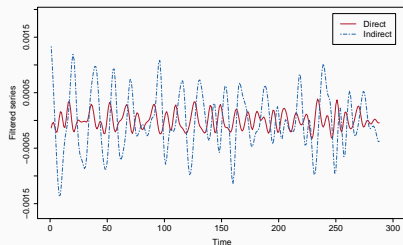


Wage share

Workers' heterogeneity

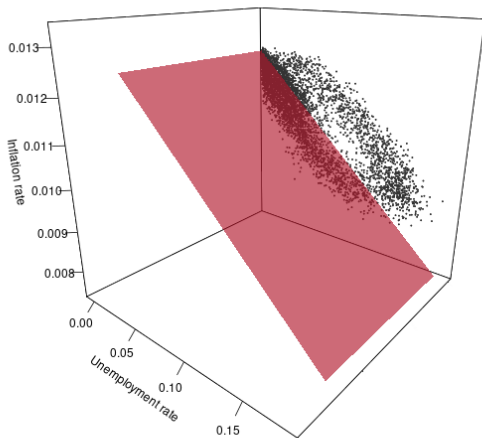


Unemployment rate per class

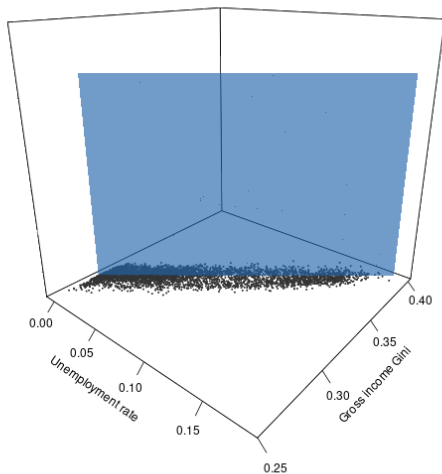


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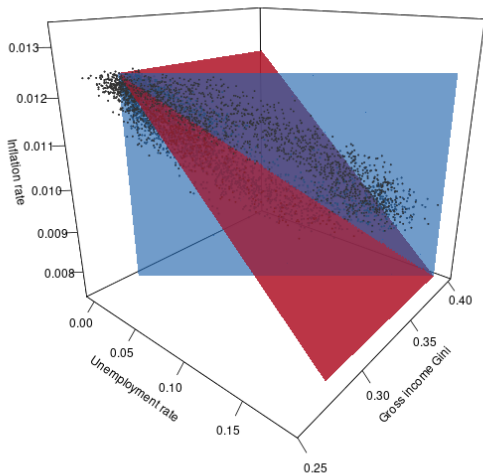
Phillips curve



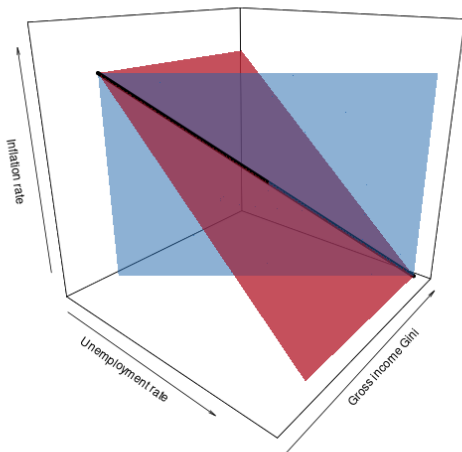
Unemployment-Inequality curve



Inequality-augmented Phillips curve



Generalized inequality-augmented Phillips curve



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- Similar argument is made in a TANK model with Kaleckian features (Ratner and Sim., 2022);
- The PK tradition has long emphasized this (Setterfield, 2005, Setterfield and Blecker, 2022, Setterfield and Lovejoy, 2006, Summa and Braga, 2020);

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We explore the implications of lower bargaining power of low-wage workers by applying a **one-time permanent negative shock** at $t = 100$ to ϕ^{dir} .

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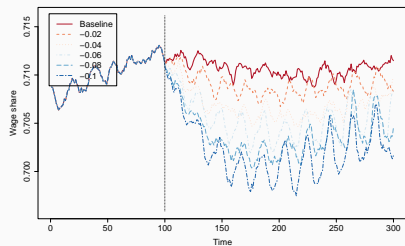
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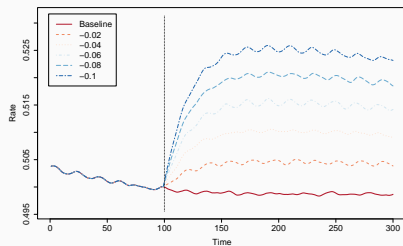
Experiments configuration: direct workers' bargaining power shocks

Exp.	1	2	3	4	5	6
$\Delta\phi^{dir}$	0	-0.02	-0.04	-0.06	-0.08	-0.1

Income inequality

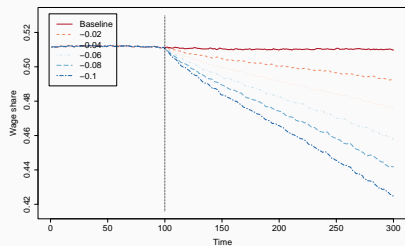


Wage share

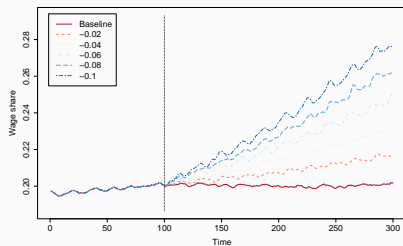


Mark-up C sector

Wage share per class

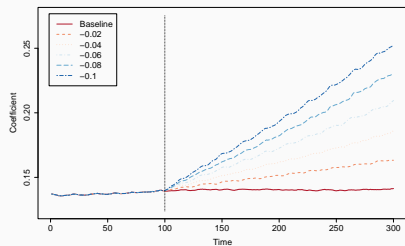


Direct workers

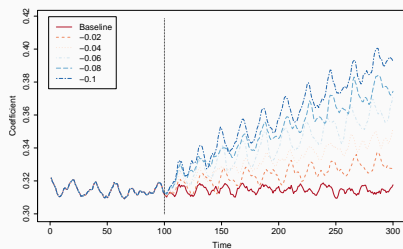


Indirect workers

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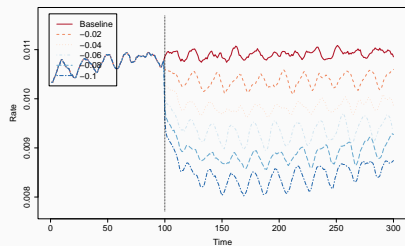


Wage Gini

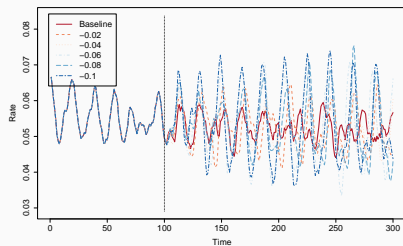


Gross Income Gini

Macroeconomic variables

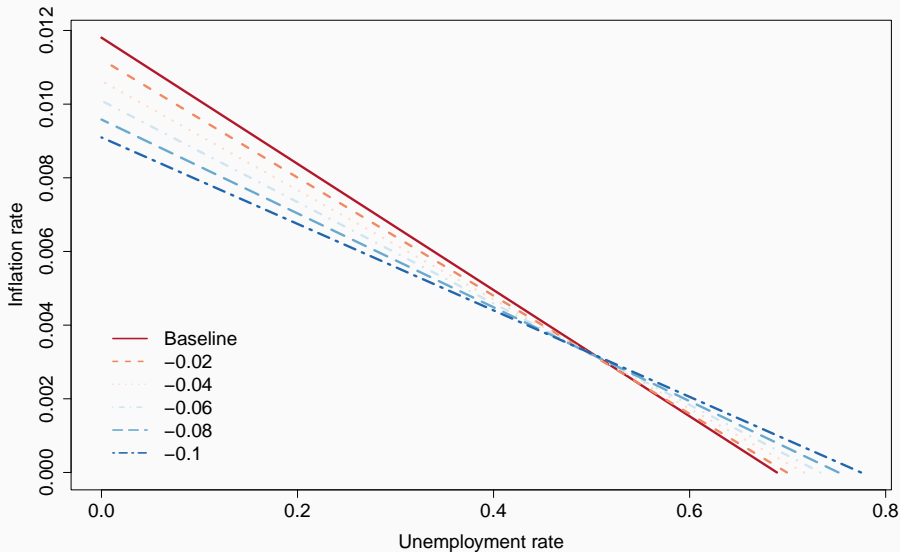


Inflation rate



Unemployment rate

Phillips curve



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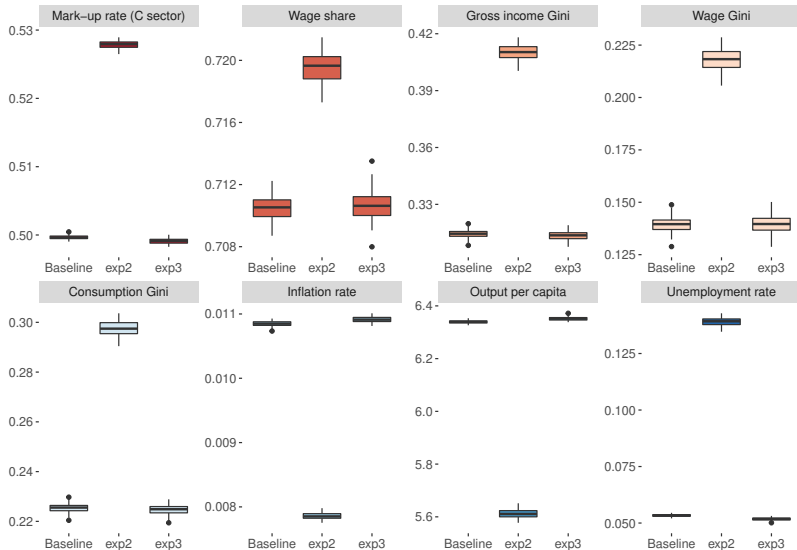
The inflation-unemployment-inequality nexus suggests that monetary policy management has important implications for inequality. We explore this by comparing **dovish and hawkish** scenarios.

Experiments configuration: monetary policy reaction function parameters

Exp.	Baseline	Hawks	Doves
λ_1	1	1	0
λ_2	0.2	0	0.2

In all scenarios: $\hat{p}^T = 0.01$ and $u^T = 0.05$.

Macroeconomic and inequality variables



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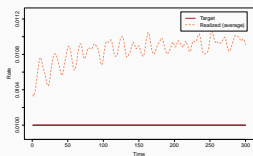
- Empirical regularities suggest the validity of the inequality-augmented Phillips curve;
- Income inequality ought to be considered a relevant dimension when analyzing the macroeconomic effects of monetary policy and the Phillips curve in general.

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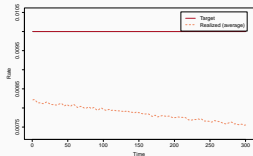
Funding by São Paulo Research Foundation (FAPESP, grant # 2018/21762-0) is acknowledged. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

Inflation rate

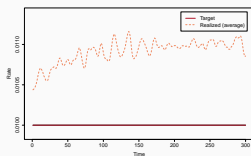
Inflation rate



Baseline

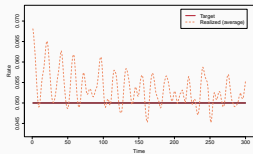


Hawkish

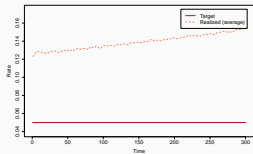


Dovish

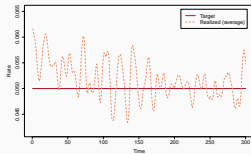
Unemployment rate



Baseline



Hawkish



Dovish

Parameters (1)

Symbol	Description	Value
γ	sensitivity of workers desired wage to employment rate	0.02
δ	entrant firms' expected sales share of sector average sales (C sector)	0.5
$(1 - \eta)^T$	unemployment rate target	0.05
ϑ	employees turnover share	0.05
λ_1	sensitivity of nominal interest rate to inflation gap	1
λ_2	sensitivity of nominal interest rate to unemployment gap	0.2
$\mu_{c,0}$	initial mark-up rate (C firms)	0.6
μ_k	mark-up rate (K firm)	0.5
ν_1	sensitivity of mark-up rate to market share (C firms)	0.01
ν_2	mark-up deviation persistence (C firms)	0.95
ν_3	sensitivity of mark-up deviation to unit costs (C firms)	0.2
ν_4	sensitivity of market share to competitiveness (C firms)	1
ρ_1	managers per direct workers (K firms)	0.16
ρ_2	indirect workers per direct worker (C firms)	0.085
ρ_3	indirect workers per direct worker at full capacity production (C firms)	0.065
ρ_4	number of capitalists per firm*	1
ϱ_1	initial ratio between direct workers wage and minimum wage	2.5
ϱ_2	initial ratio between indirect workers wage and direct workers wage	2.5
τ	tax rate on income	0.05
$\phi^{dir,ind}$	sensitivity of workers' bargaining power to employment rate for direct and indirect workers respectively	(0.4, 0.4)
$\omega_{1,2,3,4}$	sensitivity of expected demand to past demand (C firms)	(0.4, 0.3, 0.2, 0.1)
C_1	consumption emulation weight	0.12
$C_2^{dir,ind,cap}$	propensity to consume out of income (direct workers, indirect workers, capitalists)	(0.95, 0.85, 0.75)
i_0	initial nominal interest rate	0.02
j^{min}	minimum nominal interest rate	1e-07
$L_g^{dir,ind}$	workers hired as public servants *	(239, 39)
ms^{min}	minimum market share to stay in the market (C firms)	0.0025

Parameters (2)

Symbol	Description	Value
N^c	number of consumption goods firms	200
$N^{dir,ind,cap}$	number of direct workers, indirect workers*, and capitalists*	(1696,286,201)
$n^{dir,ind}$	percentage of direct and indirect workers in total population	(0.844, 0.142)
n^g	proportion of public servants in total initial employment (direct workers)	0.16
n^{IN}	desired share of inventories	0.1
$n^{s,dir,ind}$	proportion of workers in survey	(0.15, 0.3)
n^w	number of hiring rounds per open position	1.5
\bar{p}^T	inflation target	0.01
$Q_{c,0}^{fc}$	initial full capacity production (C firms)	80
Q_m^{fc}	machines production at full capacity	2.5
R	maximum interest payments to cash flow ratio	0.05
T^c	number of periods before a new firm can exit the market	10
T^i	number of periods for average variables in monetary policy reaction function	4
T^k	machines lifetime	20
u^d	desired capacity utilization level	0.8
v	expansion investment speed of adjustment	0.2
$w_0^{min,s}$	initial minimum wage	1
y^c	productivity at C sector	10
y^k	productivity at K sector	10