Unemployment and Participation Dynamics
A Flow-Based Approach

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A Flow Approach to labor market analysis

Flow approach provides a more accurate picture of the labor market and the additional richness it delivers captures important implications of labor market mechanisms for macroeconomics.

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Blanchard and Diamond (1990)

- Provides a unified framework to link a wide range of indicators.
- Connects more directly to the underlying labor market dynamics.
- Helps identify structural and nonmonetary factors.
- Is useful in real time to distinguish between competing/reinforcing forces.
- Helps discipline structural models.

Outline

Focus on the United States, Argentina, Brazil and Chile

Estimate the secular trend of unemployment

- Use a state-space model along with rich micro data
- Policy Application I: Cyclical vs. structural unemployment in the US and Brazil

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Flow origins of unemployment and participation fluctuations

- A dynamic flow-based decomposition of unemployment and participation fluctuations
- Policy Application II: Labor force participation after the COVID pandemic
- Policy Application III: Soft landings and unemployment dynamics

Four Central Banks and their Mandates

United States

Has a **dual mandate**. Maximum employment is a goal that changes over time and is not directly measurable.

Argentina

The central bank charter includes **employment** and economic development alongside monetary and financial stability, although inflation and exchange-rate stabilization dominated policy implementation.

Brazil

Price stability is the fundamental objective; fostering **full employment** and smoothing fluctuations in economic activity are explicit but subordinate objectives.

Chile

The mandate centers on **price stability and the normal functioning of domestic and external payments**, without a separate employment objective.

Measurement of Flows

Two approaches:

Duration-based unemployment inflow and outflow rates

Allows us to track rates of inflows (s_t) and outflows (f_t) for unemployment without origin and destination

Shimer (2005, 2012)

$$\underbrace{u_{t+1} - u_t}_{\text{Change in u}} = \underbrace{s_t(1 - u_t)}_{\text{Inflows}} - \underbrace{f_t u_t}_{\text{Outflows}}$$

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Gross worker flows from matched panel data

Match workers across consecutive periods to measure transitions which allows for labor force entry and exit

Blanchard and Diamond (1990), Shimer (2012), Elsby et al. (2010, 2015)

Data Sources and Sample Periods

Country	Survey	Sample Period
United States	Current Population Survey (CPS)	1960Q1–2026Q2
Argentina	Encuesta Permanente de Hogares (EPH)	2003Q3–2026Q1
Brazil	Pesquisa Nacional por Amostra de Domicílios Contínua (PNADC)	2012Q1–2026Q1
Chile	Encuesta Nacional de Empleo (ENE)	2010Q2–2025Q3

Secular Trend of Unemployment

Estimating secular trend of unemployment ($\bar{u}_t$)

- Use unemployment inflow (s_t^i) and outflow (f_t^i) rates by age and gender group i
- Model flows jointly using state-space model
  - allow for common business-cycle component (stationary VAR): φ_t^s and φ_t^f
  - group-specific (stationary AR) business cycles: ϵ_{it}^s and ϵ_{it}^f
  - estimate group-specific trends ($\bar{s}_t^i$, $\bar{f}_t^i$): $\tau_t^{s,i}$ and $\tau_t^{f,i}$

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Each flow is described by the following set of equations,

$$s_t^i = \theta_i^s \varphi_t^s + \tau_t^{s,i} + \epsilon_t^{s,i}$$

$$f_t^i = \theta_i^f \varphi_t^f + \tau_t^{f,i} + \epsilon_t^{f,i}$$

for $i = 1, \ldots, 6$, six demographic groups men and women aged 16–24, 25–54, and 55+

Map into the aggregate rates s_t and f_t using

$$s_t = \sum_{i=1}^{6} \omega_{it}^{s} s_t^i \quad \text{and} \quad f_t = \sum_{i=1}^{6} \omega_{it}^{f} f_t^i.$$

$\bar{\mathbf{s}}_\mathbf{t}, \bar{\mathbf{f}}_\mathbf{t}$ are weighted sum of group-specific trends, $(\bar{s}_t^i, \bar{f}_t^i)$.

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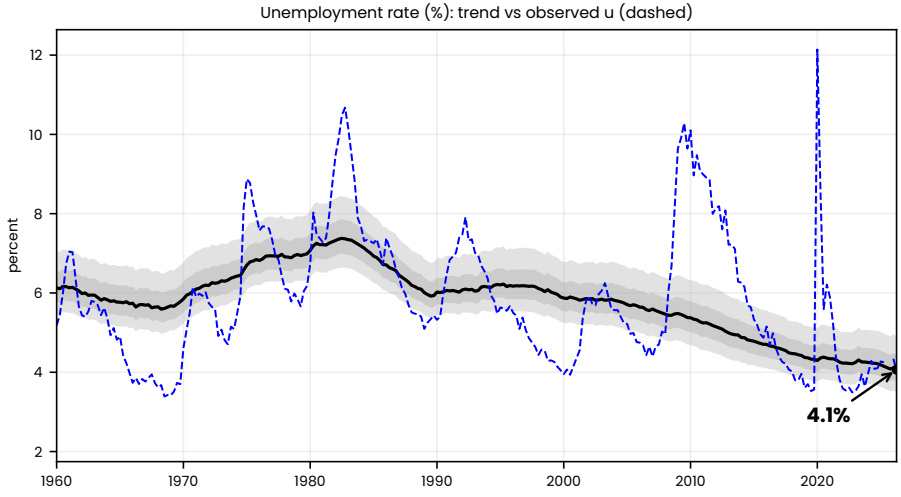
Compute $\bar{\mathbf{u}}_\mathbf{t}$ using $\bar{\mathbf{s}}_\mathbf{t}$ and $\bar{\mathbf{f}}_\mathbf{t}$

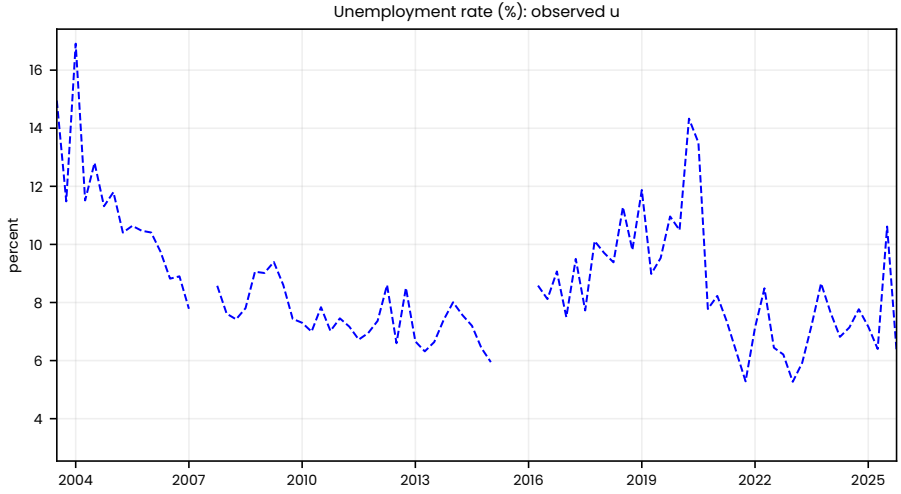
$$u_t \simeq \frac{s_t}{s_t + f_t} \qquad \longrightarrow \qquad \bar{u}_t = \frac{\bar{s}_t}{\bar{s}_t + \bar{f}_t}$$

United States

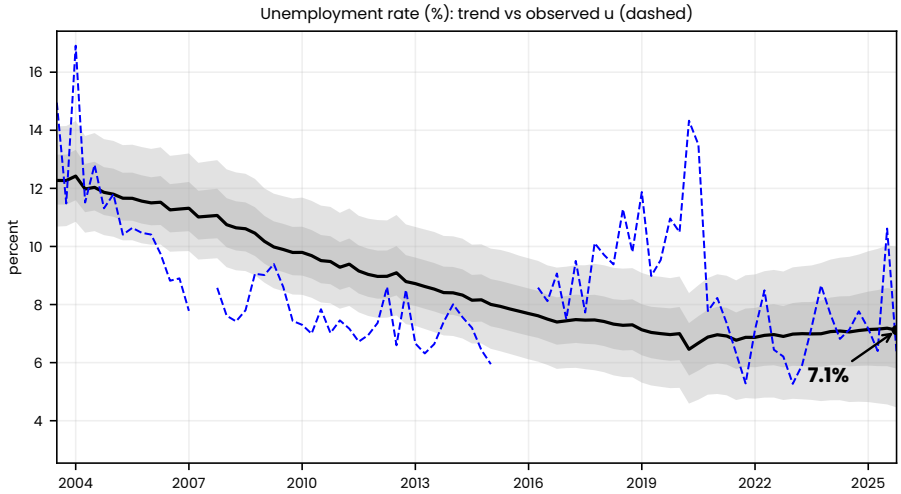


Declining Trend unemployment driven by inflows

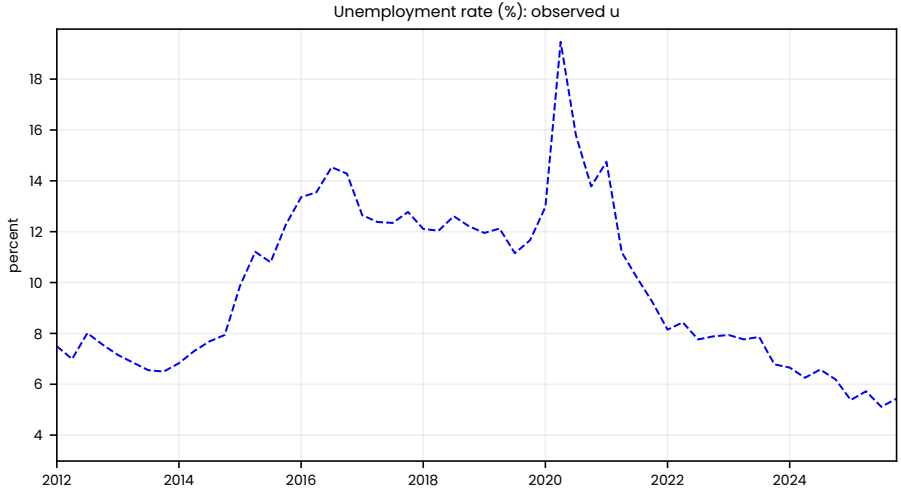



Unemployment rate (%): observed u
percent
16
14
12
10
8
6
4
2004
2007
2010
2013
2016
2019
2022
2025

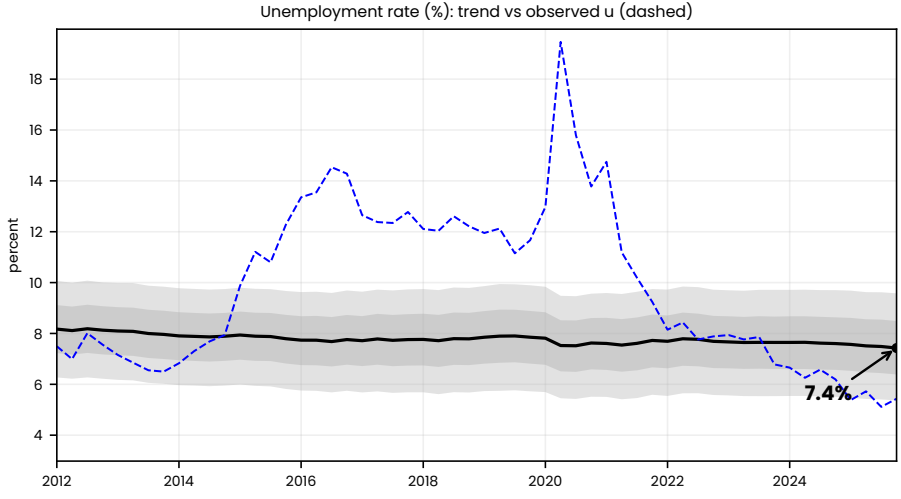
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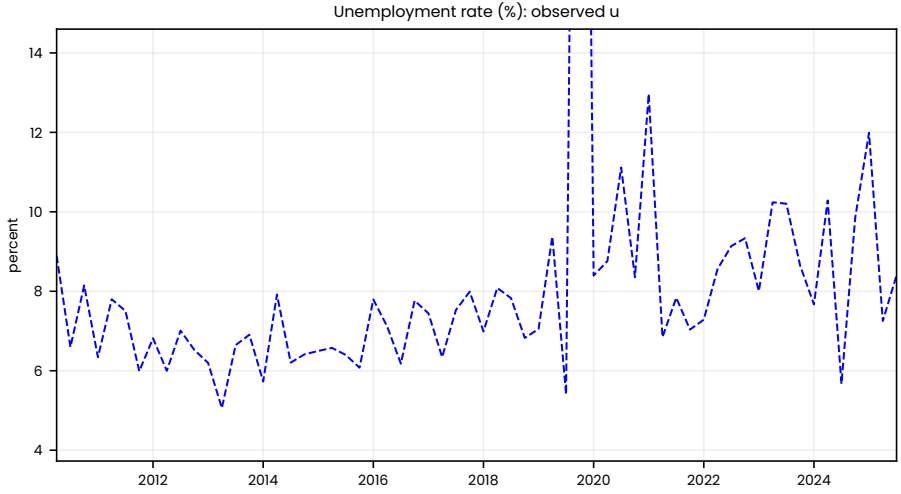
Brazil


Unemployment rate (%): observed u
percent
18
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12
10
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4
2012
2014
2016
2018
2020
2022
2024

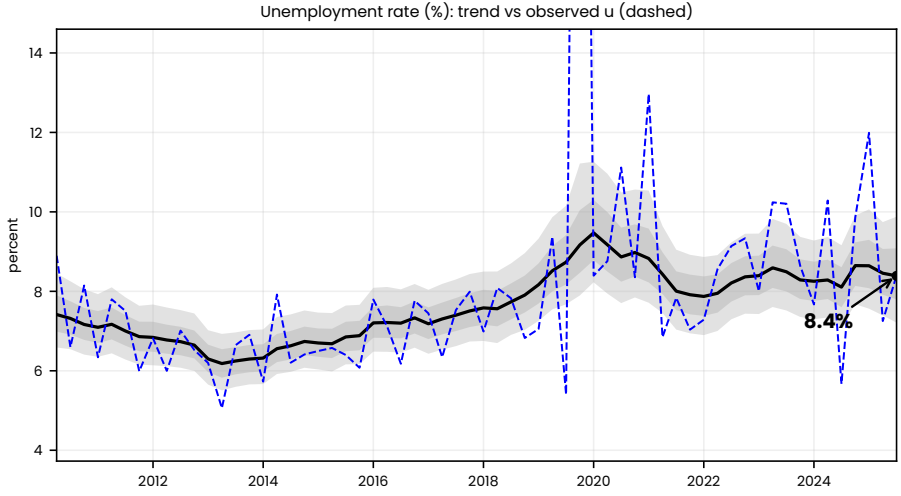
Little change in trend unemployment in Brazil



Chile


Unemployment rate (%): observed u
percent
14
12
10
8
6
4
2012
2014
2016
2018
2020
2022
2024

Increase in trend unemployment driven by outflows in Chile



Policy Application I
Cyclical vs. Structural Unemployment

Cyclical vs. Structural Unemployment Debate in 2011

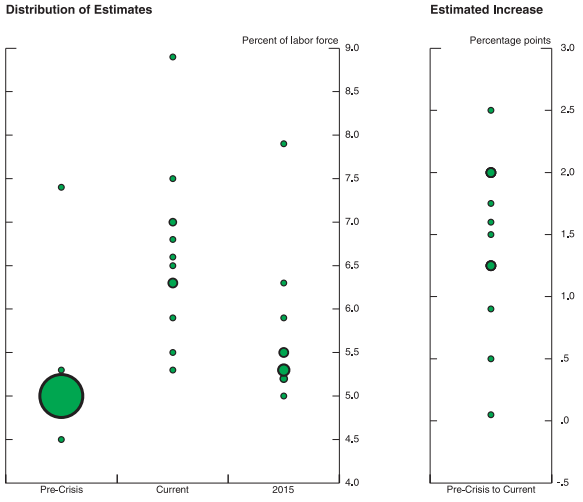
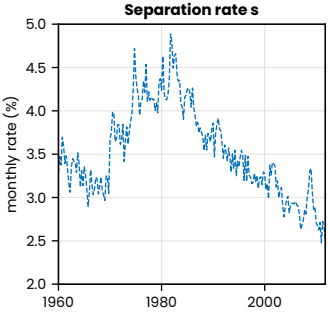
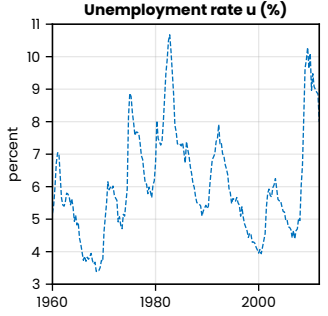


Exhibit 12 from the presentation materials at the January 25-26, 2011 FOMC meeting.

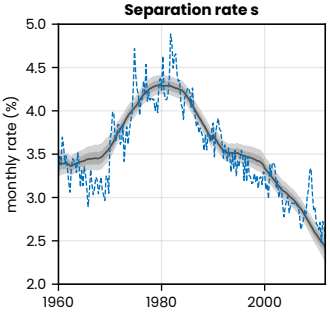
Labor Market in 2011 in the United States

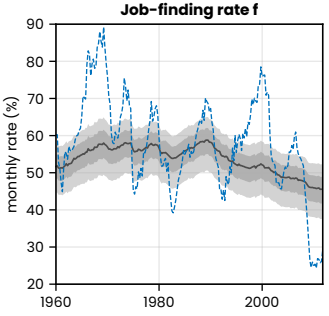






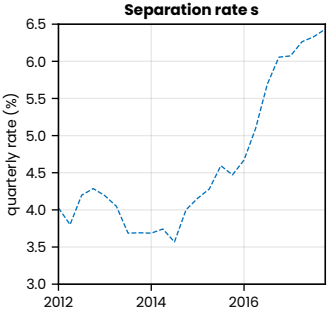
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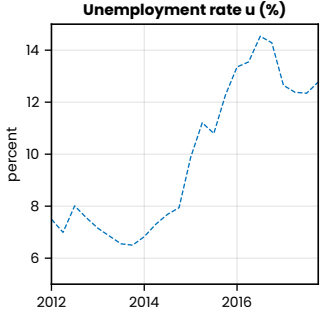




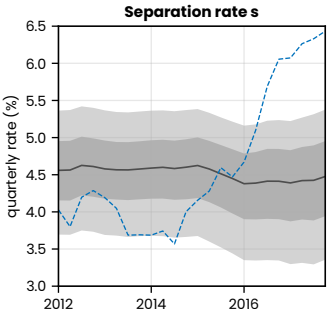
Labor Market in 2017 in Brazil

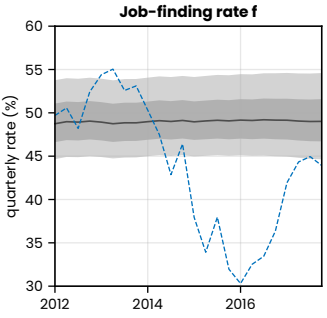


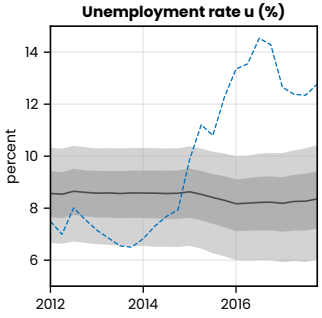




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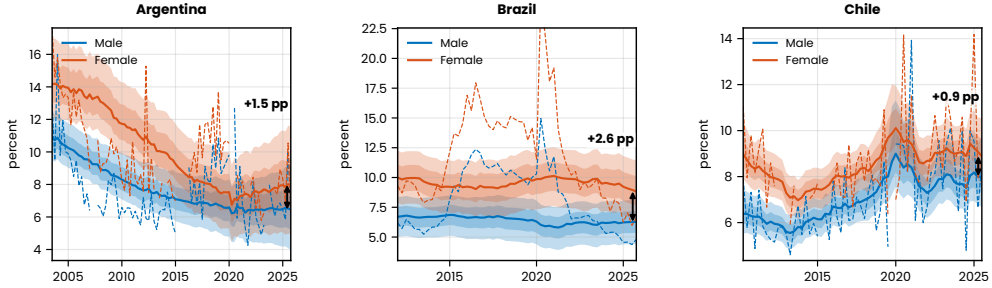


Gender Unemployment Gaps

United States: Convergence in Gender Unemployment Gap



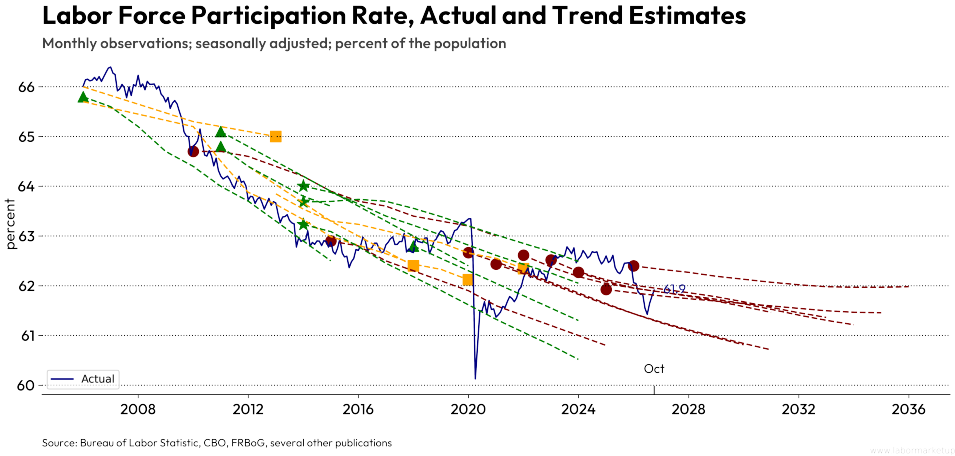
Argentina, Brazil and Chile



- Persistent gender unemployment gaps in Argentina, Brazil and Chile.
- Gender gap driven by outflow rate differences in Brazil and Argentina and by the inflow margin in Chile.

Unemployment and Participation Dynamics

Large disagreement about trend participation rate in the US



Note: Vintage of forecast is indicated by dot. Actual is seasonally adjusted monthly observations. Trend estimates in bottom panel by source: ●: CBO trend estimates (2011,2015,2020,2021), ■: Tealbook estimates (backward-looking, Jan 2011 and Jan 2015), ⋆: Aaronson et al. (2014), and ▲: from Aaronson et al. (2006), Aaronson (2012), Van Zandweghe (2012), and Hornstein et al. (2018).

Participation was the main source of perceived slack in 2021

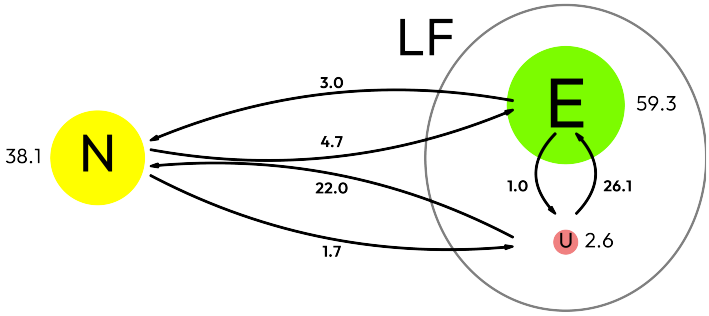
"The unemployment rate was 4.8 percent in September. This figure understates the shortfall in employment, particularly as participation in the labor market remains subdued."

Jay Powell, FOMC Press Conference, Nov 3, 2021

Unemployment and Participation driven by the same flows

Flow Origins of the Participation Cycle: Oct 2026

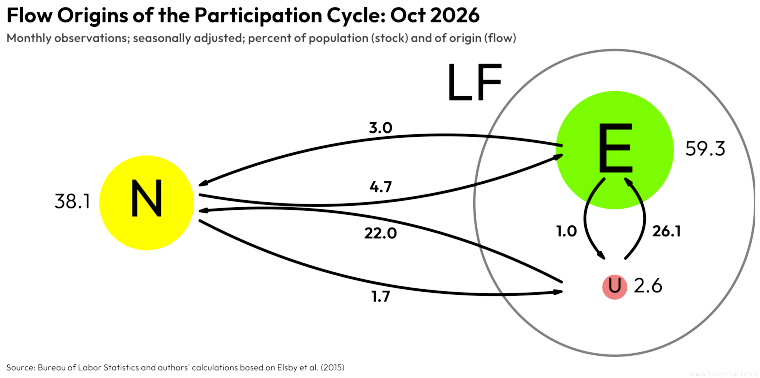
Monthly observations; seasonally adjusted; percent of population (stock) and of origin (flow)



Source: Bureau of Labor Statistics and authors' calculations based on Elsby et al. (2015)

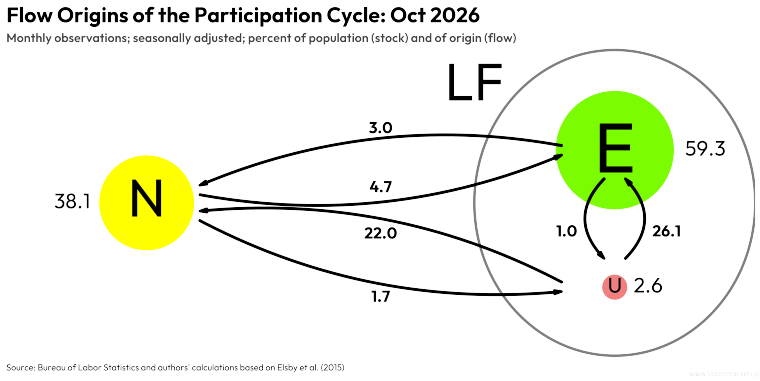
www.tradingeconomics.com

Unemployment and Participation driven by the same flows



- Flows >> Net changes in stocks
  - Large flows in and out of labor force
- Unemployed are less attached than the employed
  - *Attachment wedge:* 3% vs. 22%

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Key Intuition: When someone moves from U to E, they are more likely to remain in the labor force going forward. This simple mechanism (*the participation cycle*) is the source of procyclicality of participation, *not* labor force entry and exit.

A Dynamic Flow Decomposition

Define the vector of labor force states,

$$\boldsymbol{x}_t = \begin{bmatrix} e_t & u_t \end{bmatrix}'$$

where

- e_t is the epop
- u_t is the upop

The *lfpr* is given by

$$lfpr_t = e_t + u_t$$

A Dynamic Flow Decomposition

$\boldsymbol{x}_t$ evolves as

$$\Delta \boldsymbol{x}_t = \boldsymbol{d}_t + \boldsymbol{P}_t \boldsymbol{x}_{t-1},$$

where

$$\boldsymbol{d}_t = \begin{bmatrix} p_{n,e,t} & p_{n,u,t} \end{bmatrix}'$$

and $\boldsymbol{P}_t$ is

$$\begin{aligned}
\boldsymbol{P}[1,1]_t &= -p_{e,n} - p_{e,u} - p_{n,e} \\
\boldsymbol{P}[1,2]_t &= p_{u,e} - p_{n,e} \\
\boldsymbol{P}[2,1]_t &= p_{e,u} - p_{n,u} \\
\boldsymbol{P}[2,2]_t &= -p_{u,e} - p_{u,n} - p_{n,u}
\end{aligned}$$

with $p_{i,j,t}$ the probability of transitioning from state i to state j.

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For fixed transition probabilities, the state vector $\boldsymbol{x}_t$ converges to the flow-steady-state

$$\tilde{\boldsymbol{x}}_t = -\boldsymbol{P}_t^{-1}\boldsymbol{d}_t$$

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An additive decomposition of changes in $\boldsymbol{x}_t$

$$\Delta\boldsymbol{x}_t = \underbrace{\boldsymbol{P}_t\left(\boldsymbol{I}+\boldsymbol{P}_{t-1}\right)\boldsymbol{P}_{t-1}^{-1}\Delta\boldsymbol{x}_{t-1}}_{\text{Transitional dynamics}} + \underbrace{\boldsymbol{P}_t\left(\boldsymbol{P}_t+\boldsymbol{P}_{t-1}\right)^{-1}\left[2\Delta\boldsymbol{d}_t+\Delta\boldsymbol{P}_t\left(\tilde{\boldsymbol{x}}_t+\tilde{\boldsymbol{x}}_{t-1}\right)\right]}_{\text{Change in flow steady state}}$$

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Movements in the *unemployment rate* and *lfpr* are determined both

- by the flow transition probabilities in $\boldsymbol{P}_t$
- by the distribution of workers in $\boldsymbol{x}_t$, across *all three* labor force states, not just those between in and out of the labor force.

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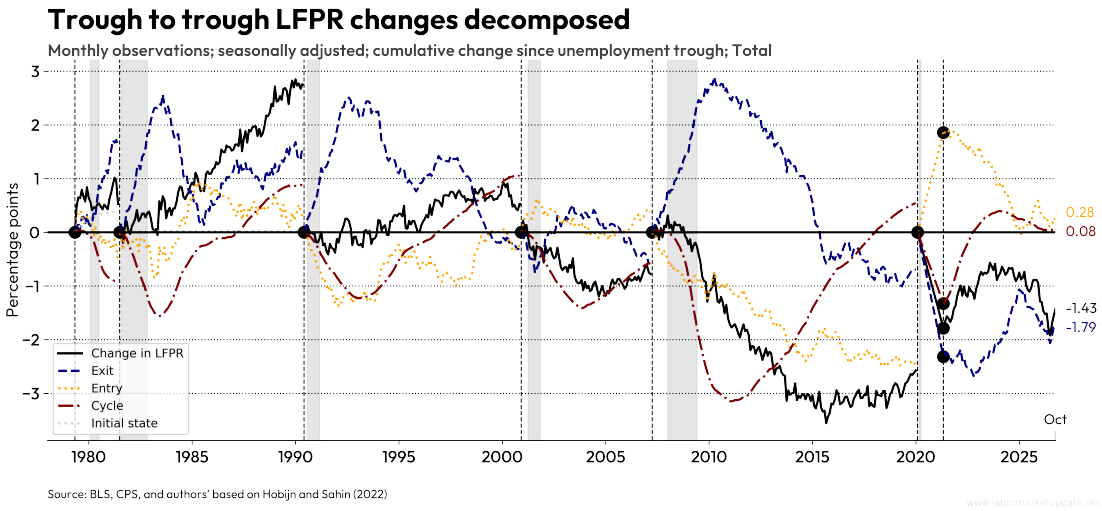
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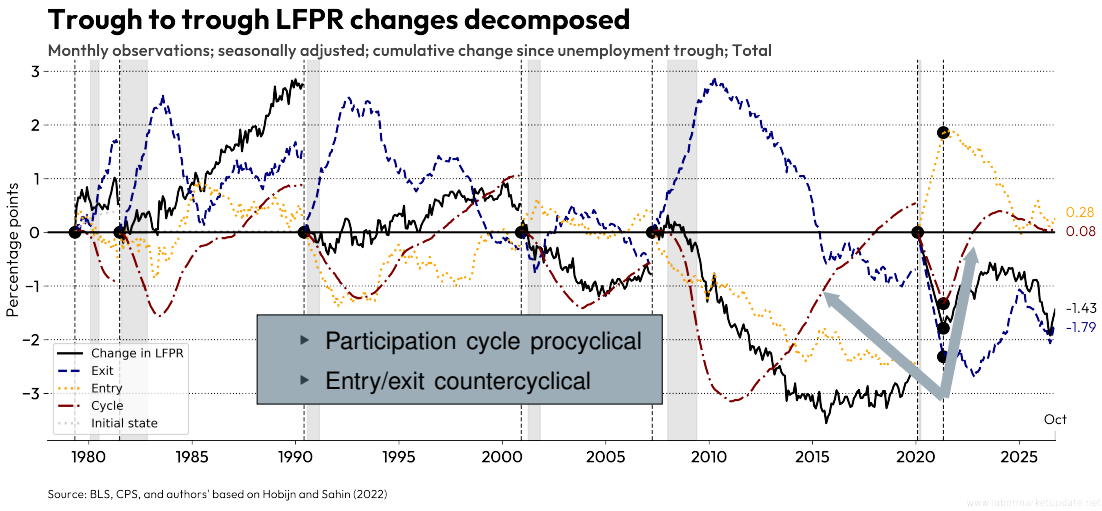
Past and current flows between u_t and e_t play a role in shaping unemployment and labor force participation dynamics.

Participation cycle driven by job loss/finding



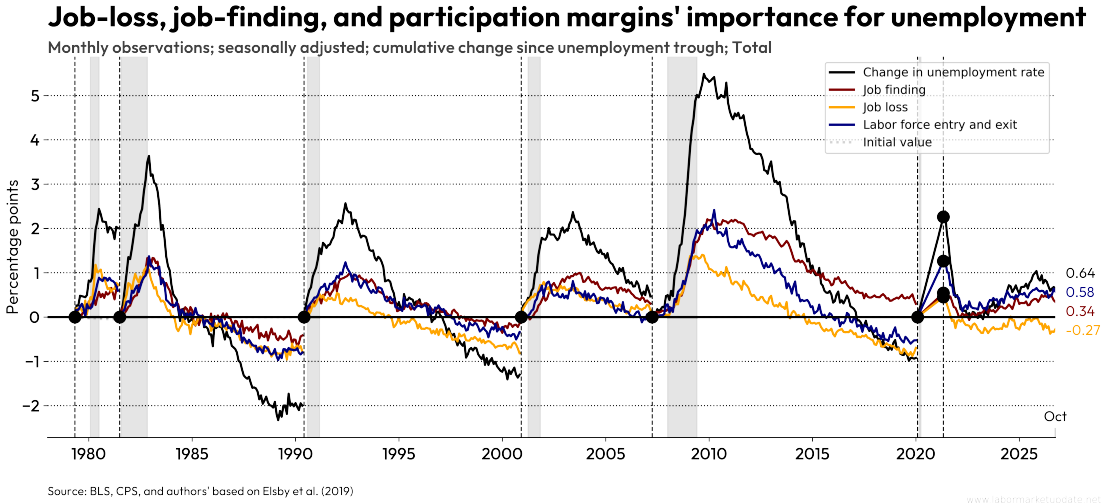
Note: Seasonally adjusted monthly data. Cumulative effect on LFPR from every trough in the unemployment rate. Entry is contribution from $P_{N,U}$ and $P_{N,E}$, exit is contribution from $P_{U,N}$ and $P_{E,N}$, and cycle from flows between U and E, i.e. $P_{E,U}$ and $P_{U,E}$.

Participation cycle driven by job loss/finding



Note: Seasonally adjusted monthly data. Cumulative effect on LFPR from every trough in the unemployment rate. Entry is contribution from $P_{N,U}$ and $P_{N,E}$, exit is contribution from $P_{U,N}$ and $P_{E,N}$, and cycle from flows between U and E, i.e. $P_{E,U}$ and $P_{U,E}$.

Unemployment cycle reinforced by entry/exit

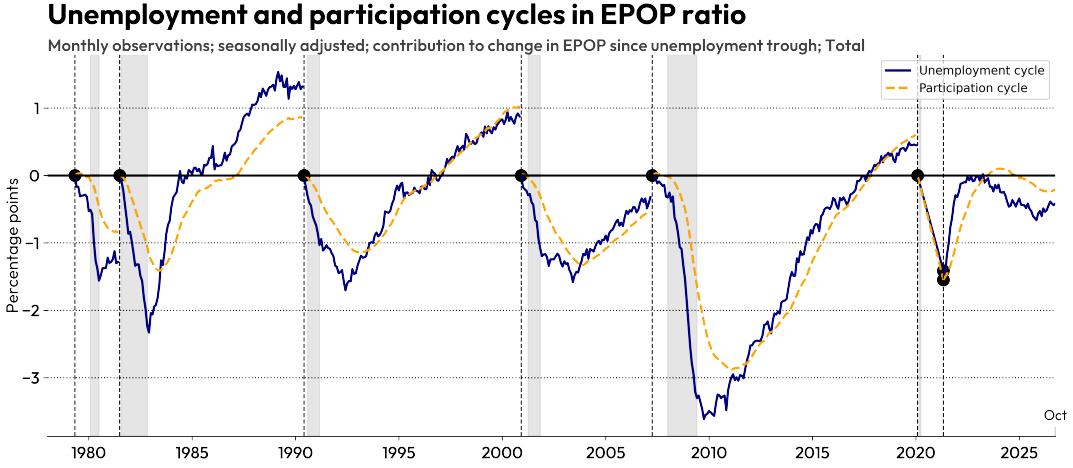


Note: Seasonally adjusted monthly data. Cumulative effect on unemployment from every trough in the unemployment rate.

The cyclical change in the employment-to-population ratio is the sums of unemployment and participation cycles:

$$\Delta EPOP_t^c = \underbrace{-\overline{LFPR}_t \Delta u_t}_{\text{unemployment cycle}} + \underbrace{(1-\overline{u}_t)\,\Delta LFPR_t^c}_{\text{participation cycle}}$$

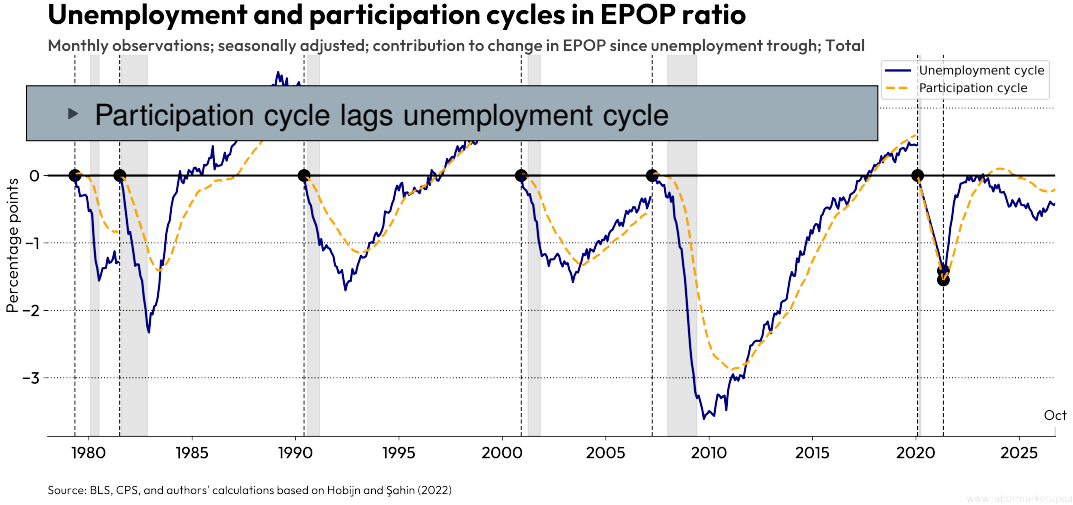
Effect of unemployment and participation cycles on Employment



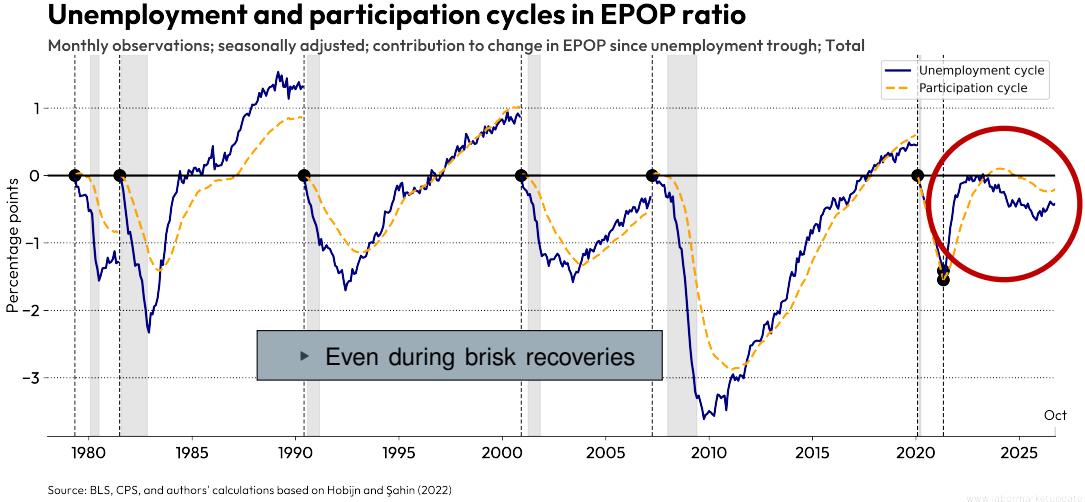
Source: BLS, CPS, and authors' calculations based on Hobijn and Şahin (2022)

www.laborMarketUpdate.net

Effect of unemployment and participation cycles on Employment



Effect of unemployment and participation cycles on Employment

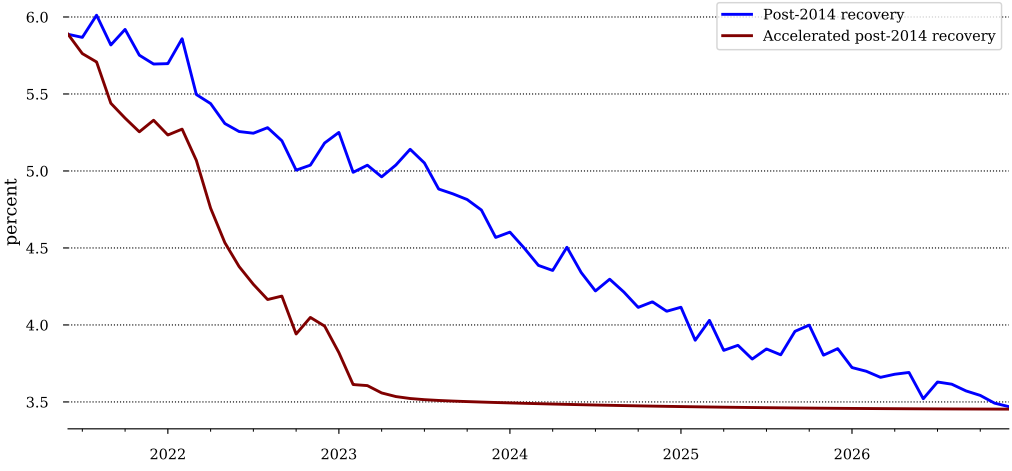


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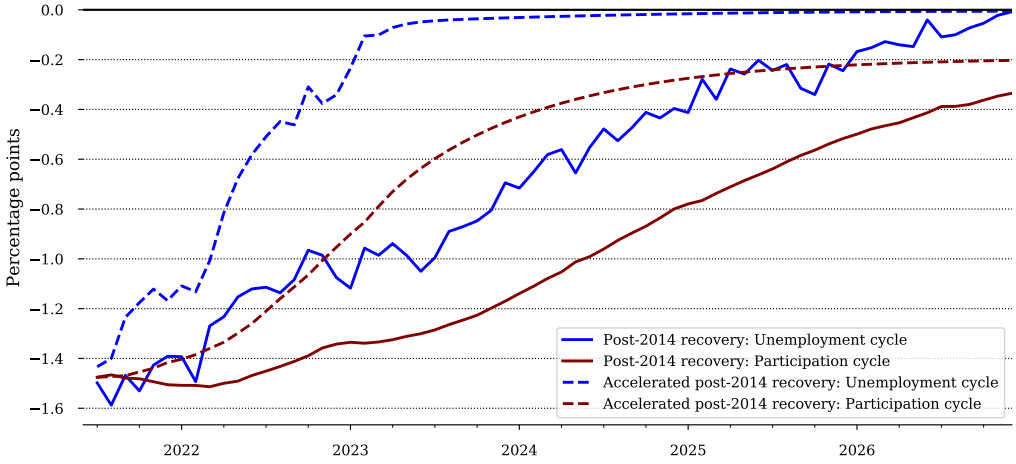
Policy Application II
Slack after the COVID Pandemic

Revisiting Unemployment projections of August 2021



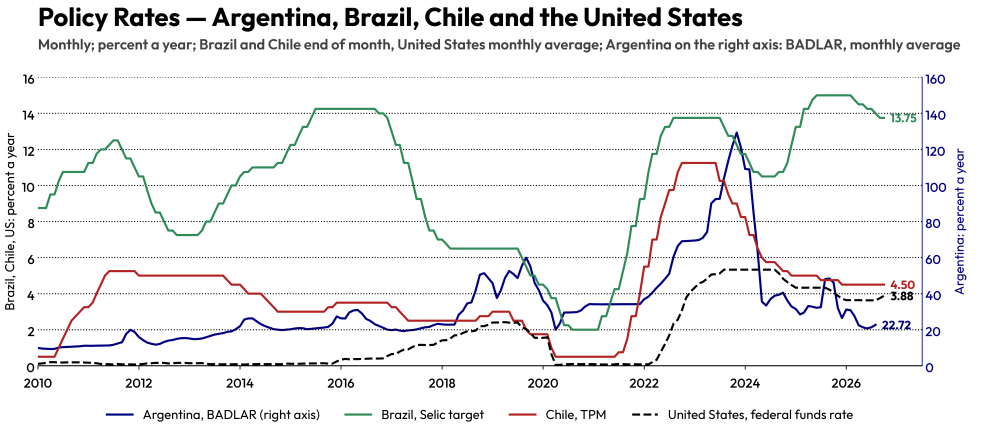
Hobijn and Şahin (2021)

Tight link between unemployment and participation cycles



Hobijn and Şahin (2021)

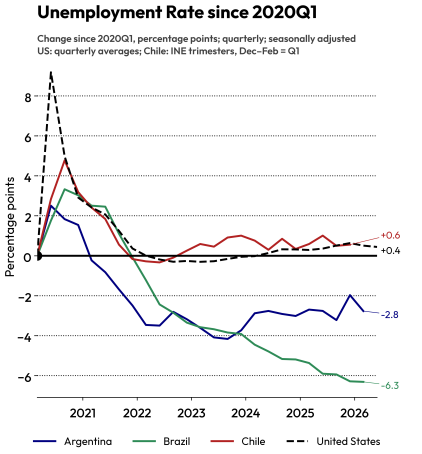
Policy Application III
Soft Landings in the Labor Market

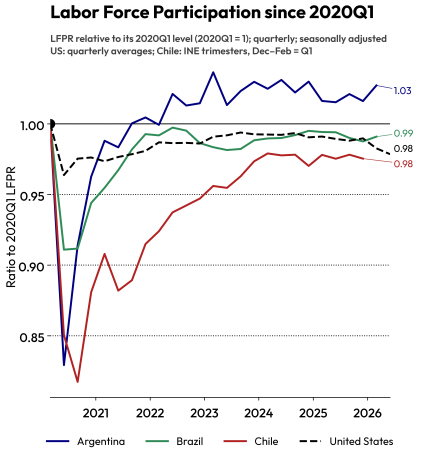


Source: BCRA via datos.gob.ar (BADLAR); BCB and BCCh via BIS central bank policy rates (WS_CBPOL); Federal Reserve (FRED FEDFUNDS)

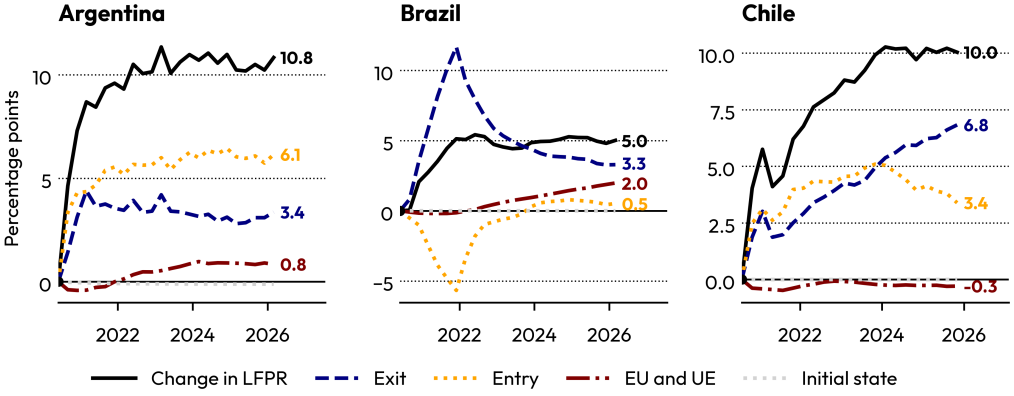
www.labormarketupdate.net

Labor markets after covid





Flow origins of participation movements



Cumulative change in the LFPR since the lowest LFPR after the pandemic (Argentina 2020Q2, Brazil 2020Q2, Chile Jun–Aug 2020), by flow; quarterly; seasonally adjusted. Source: authors' calculations based on INDEC EPH, IBGE PNADC, INE ENE, following Hobijn and Sahin (2022).

Key takeaways

The flow approach offers a unified framework for interpreting a wide range of labor market indicators.

- Useful for cyclical vs. trend discussions even in real time.
- Highlights employment stability rather than labor force entry for the US.
- Informality could be integrated separately since labor force attachment is different.

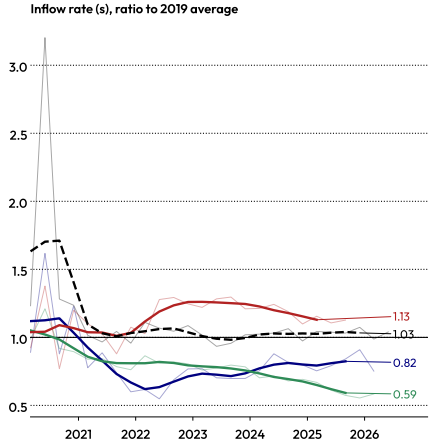
The flow approach also creates a bridge to understanding price stability.

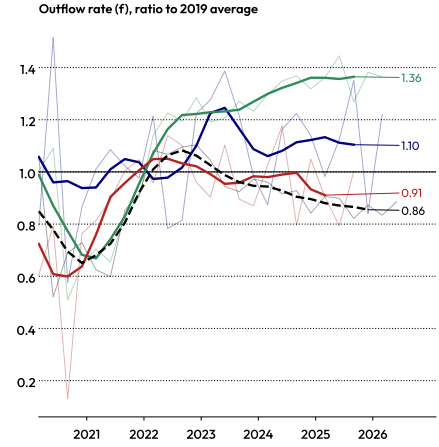
- Connects to nonmonetary factors and underlying economic mechanisms.
- Helps identify the natural rate of unemployment.

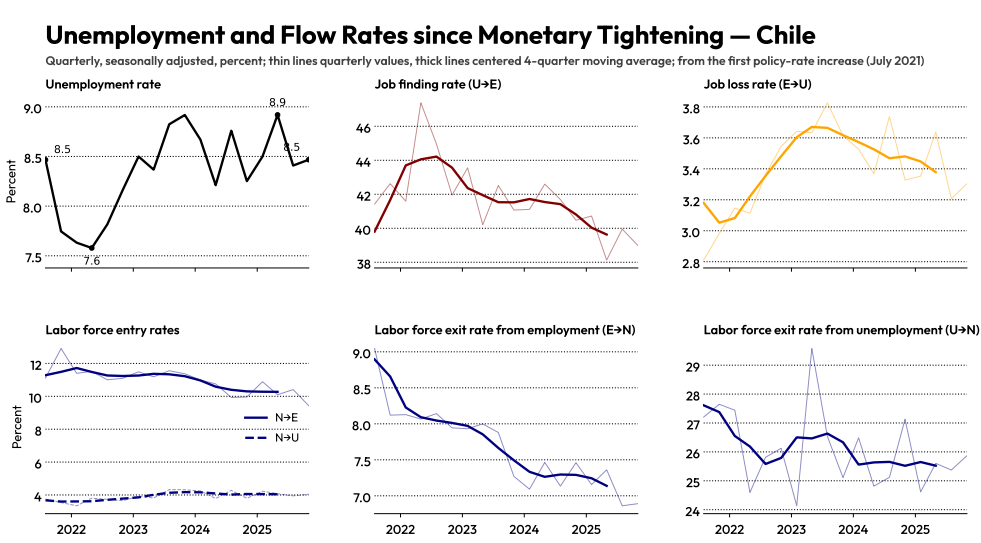
Appendix

Unemployment Inflow and Outflow Rates since 2020Q1

Two-state hazard rates, ratio to their 2019 average; thin lines quarterly values, thick lines centered 4-quarter moving average; seasonally adjusted; US: quarterly averages of monthly rates; Chile: INE trimesters, Dec-Feb = Q1






Unemployment and Flow Rates since Monetary Tightening — Chile
Quarterly, seasonally adjusted, percent; thin lines quarterly values, thick lines centered 4-quarter moving average; from the first policy-rate increase (July 2021)
Unemployment rate
Percent
9.0
8.5
8.0
7.5
8.5
7.6
8.9
8.5
Job finding rate (U→E)
46
44
42
40
38
Job loss rate (E→U)
3.8
3.6
3.4
3.2
3.0
2.8
Labor force entry rates
Percent
12
10
8
6
4
N→E
N→U
2022
2023
2024
2025
Labor force exit rate from employment (E→N)
9.0
8.5
8.0
7.5
7.0
2022
2023
2024
2025
Labor force exit rate from unemployment (U→N)
29
28
27
26
25
24
2022
2023
2024
2025

Estimating $\bar{u}_t$: Group-Specific Trends

US:

$\tau_t^{s,i}$ is characterized by an $I(2)$ process and $\tau_t^{f,i}$, is instead a random walk:

$$\tau_t^{s,i} = g_t^{s,i} + \tau_{t-1}^{s,i}, \quad g_t^{s,i} = g_{t-1}^{s,i} + \eta_t^{s,i}$$
$$\tau_t^{f,i} = \tau_{t-1}^{f,i} + \eta_t^{f,i}$$

The common component, $\varphi_t \equiv (\varphi_{st}, \varphi_{ft})'$, follows a second-order vector autoregressive process:

$$\varphi_t^f = \phi_{11}\varphi_{t-1}^f + \phi_{12}\varphi_{t-1}^s + \phi_{13}\varphi_{t-2}^f + \phi_{14}\varphi_{t-2}^s + \zeta_t^f$$
$$\varphi_t^s = \phi_{21}\varphi_{t-1}^f + \phi_{22}\varphi_{t-1}^s + \phi_{23}\varphi_{t-2}^f + \phi_{24}\varphi_{t-2}^s + \zeta_t^s$$

The common cyclical component, φ_t, accommodates joint business-cycle behavior between the inflow rate and outflow rate for each group.

Other countries: trend specifications vary to address data limitations.

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