

# Screening, churning, and life-cycle worker flows in a dual labor market

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# Motivation

- Large applied and macro-labor literature on “**dual**” labor markets
  - Strict protection of **permanent jobs** vs. lax regulation of **temporary jobs**
  - **Dual employment protection** is a feature of many OECD countries
- Temporary employment is highly prevalent among the youth
  - In 2019, 50% of workers aged 15–24 in EU27 held temporary jobs (OECD, 2024)
- Micro evidence: youth are among the *main losers* from temp. job reforms
  - e.g. García-Pérez, Marinescu, Vall Castello (2019); Daruich, Di Addario, Saggio (2023)
- Macro literature on dual labor markets generally **ignores life-cycle heterogeneity**

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## This paper:

- Develop a quantitative Diamond-Mortensen-Pissarides (DMP) model to study the macro implications of dual labor markets with age heterogeneity.

## ① Life-cycle DMP models

- e.g., Chéron, Hairault, Langot (2013); Choi, Janiak, Villena-Roldàn (2014); Esteban-Pretel, Fujimoto (2014); Papageorgiou, (2014); Menzio, Telyukova, Visschers (2016); Gorry (2016); Gervais et al. (2016); Jung, Kuhn (2019); Kuhn, Ploj (2020); Cajner, Güner, Mukoyama (2022)

## ② Effect of (dual) employment protection in DMP models

- e.g., Cahuc and Postel-Vinay (2002), Blanchard and Landier (2002); Cao, Shao, and Silos (2011); Chéron, Hairault, Langot (2011); Bentolila, Cahuc, Dolado, and Le Barbanchon (2012); Berton, Garibaldi (2012); Faccini (2014); Cahuc, Charlot, and Malherbet (2016); Cahuc, Malherbet, and Prat (2019); Franceschin (2020); Charlot, Malherbet, Menestrier (2024); Créchet (2024).

## ③ Labor-market policies and cross-country outcomes

- e.g., Mortensen, Pissarides, 1999; Ljungqvist, Sargent, 1998; Delacroix, 2003; Pries, Rogerson, 2005; Ljungqvist, Sargent, 2007; Gorry, 2013; Kitao, Ljungqvist, Sargent, 2018; Engbom, 2022; Doepke, Gaetani, 2022; Créchet, Lalé, Tarasonis, 2024; Gottlieb, Doss, Gollin, and Poschke, 2024; Poschke, 2025.

# Motivating facts: youth unemployment across countries

- Aggregate unemployment rate of a country  $c$ :

$$u_c = \sum_{i=1, \dots, I} \phi_{i,c} u_{i,c},$$

$\phi_{i,c}$  and  $u_{i,c}$ , LF share and U rate of subpopulation  $i$ .

- U rate difference between countries  $c$  and  $b$ :

$$u_c - u_b = \sum_i \left[ \underbrace{\bar{\phi}_i (u_{i,c} - u_{i,b})}_{\text{within-group diff.}} + \underbrace{\bar{u}_i (\phi_{i,c} - \phi_{i,b})}_{\text{LF share}} \right]$$

where

$$\bar{\phi}_i \equiv \frac{\phi_{i,c} + \phi_{i,b}}{2} \quad \text{and} \quad \bar{u}_i \equiv \frac{u_{i,c} + u_{i,b}}{2}.$$

## Variance decomposition (OECD sample)

- Sample: 25 OECD countries (2000-2019).
- Cross-country unemployment variance (age-group) decomposition:

<b>Age</b>	<b>Variance contribution</b>	<b>LF share</b>
20–24	20%	9%
20–29	37%	21%
20–34	52%	35%

**Table:** Decomposition of unemployment-rate variance across a sample of OECD countries (2000-2019).

- Youth unemployment contributes disproportionately to aggregate unemployment differences.
  - Age 20-29  $\approx$  20% of labor force but 30-50% of unemployment variance.

# Worker flows by age: France vs. the U.S.

Data sources:

- *Current Population Survey* (IPUMS-CPS), 2003-2018
- *Enquête emploi en continu* (EEC), 2003-2018 (French LFS)

	France			U.S.		
	U	UE	<b>EU</b>	U	UE	<b>EU</b>
Aggregate	7.1	24.7	<b>2.2</b>	4.8	43.1	<b>3.1</b>
Low education						
20-29	13.6	28.8	<b>6.1</b>	8.1	43.8	<b>5.9</b>
30-59	7.0	20.1	1.8	4.9	41.9	3.3
High education						
20-29	7.5	41.6	<b>3.8</b>	4.2	54.1	<b>2.6</b>
30-59	4.3	25.1	1.1	2.8	43.4	1.7

Table: Average quarterly transition probabilities, 2003-2018 (%). Calculations from CPS and EEC.

## EU rates by age across selected countries

- Donovan, Lu, Schoellman (2023): harmonized LFS data (2000s-2010s)
- Compute quarterly hazard rates and report transition prob.

Age	USA	ITA	ESP	PRT	DNK	GBR	NLD
All	3.3	1.6	4.2	2.4	2.1	1.5	1.0
15–24	5.4	<b>5.6</b>	<b>12.1</b>	<b>7.9</b>	2.7	3.0	2.5
25–34	3.3	2.1	5.7	3.0	2.6	1.4	1.1
35–44	2.5	1.3	4.2	1.9	1.5	1.0	0.9

Table: Quarterly EU rates by age (%) in selected countries

- High age dispersion in EU rates in Southern Europe countries
  - Low in aggregate, but high for the youth.
  - Common institutional feature: “**dual**” **employment protection**.

# Model overview

- Quantitative model: study the role of employment protection in accounting for youth unemployment across countries.
- Two sources of heterogeneity in labor reallocation/mobility:
  - ① **Learning** about comparative advantages (e.g., Papageorgiou, 2014; Gervais et al. 2016)
  - ② Heterogeneity in job-specific unemployment risk (e.g., Jung, Kuhn, 2019; Jarosch, 2023) —**churning**.

# Model overview

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## Model elements:

- Life-cycle search
- Heterogeneous workers
  - heterogeneous **skill acquisition ability**, unobserved but **learned upon**
- Heterogeneous jobs
  - heterogeneous degree of skill intensity or **complexity** & **job separation risk**
- Policy: **permanent** and **temporary** contracts with different **firing costs**.

# Model (1/3)

## Technology

- Match output:

$$y = \underbrace{(1 - \omega) \bar{y}}_{\text{"generic" task}} + \omega \underbrace{\max(x - \underline{x}, 0)}_{\text{"complex" task}}$$

- $\omega \in \Omega \subseteq [0, 1]$ : job *complexity*
- $x \in \mathcal{X} \equiv \mathbb{R}_+$ : worker's *skill*
- Match technology is a **blend of a *generic* and a *complex* task**
  - $\bar{y} > 0$ : generic-task output
  - $\underline{x} \geq 0$ : complex-task skill cutoff
- Match becomes unproductive with **job-specific** probability  $\delta \in [0, 1]$ .

## Model (2/3)

### Skills

- Skill accumulation:

$$\ln x' = \underbrace{\underline{A} + \omega(A^* - \underline{A})}_{\text{skill growth rate}} + \alpha \ln x + \varepsilon', \quad \alpha \in (0, 1) \text{ and } \varepsilon' \sim \mathcal{N}(0, \sigma_\varepsilon^2)$$

- $A^* \in \{\underline{A}, \bar{A}\}$ ,  $0 < \underline{A} \leq \bar{A}$ : skill-acquisition ability (unobserved)
- **High-ability** individual has **faster accumulation rate in complex jobs**
- Belief  $\tilde{\pi} \in [0, 1]$ . Updated based on skill realizations.

# Model (3/3)

## Search, matching, and wages

- Contact probability: from unemp.,  $\lambda_0 \in [0, 1]$ , on-the-job  $\lambda_1 \in [0, 1]$
- Job type sampled from joint distribution  $G(\delta, \omega)$
- Surplus sharing subject to renegotiation (Lise, Postel-Vinay; 2020).

# Model (3/3)

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## Policy

- **Firing costs**  $F > 0$  applying to long-tenure (*'permanent'*) jobs
- Short-tenure (*'temporary'*) jobs have no firing costs.
- Stochastic switch from temp. to perm (probability  $\phi$ )

# Policy functions

Special case:

- $\lambda_1 = 0$ : no search on the job.
- $\Omega = \{0, 1\}$ : two types of jobs, **generic**  $\omega = 0$  or **complex**  $\omega = 1$ .

Policy functions:

- **Hiring** or **continuation** in a **temporary job**.
  - ① Generic: surplus is always positive.
  - ② Complex job: a reservation skill-level cutoff function (of belief)

$$\underline{x}_T : \tilde{\Pi} \rightarrow X$$

such that match surplus is positive if **skill level**

$$x > \underline{x}_T(\tilde{\pi}),$$

given  $\tilde{\pi} \in [0, 1]$ .

- The function  $x_T$  is strictly **decreasing** (with beliefs).

# Policy functions

- **Conversion** into a **permanent job**.

- ① Generic: a reservation job-destruction cutoff **value**  $\bar{\delta}_g \in [0, 1]$  such that surplus is positive if **job destruction risk** is

$$\delta < \bar{\delta}_g;$$

- ② Complex: a cutoff **function** (of skill and belief)

$$\bar{\delta}_c : X \times \tilde{\Pi} \rightarrow [0, 1]$$

such that surplus is positive if job destruction risk

$$\delta < \bar{\delta}_c(x, \tilde{\pi}),$$

given  $(x, \tilde{\pi}) \in X \times \tilde{\Pi}$ .

- The function  $\bar{\delta}_c$  is strictly **increasing** with skill level  $x$  and beliefs  $\tilde{\pi}$ .
- $\bar{\delta}_g$  and  $\bar{\delta}_c(x, \tilde{\pi})$  are **strictly decreasing** with firing costs.

# Policy functions

- **Continuation** in an ongoing permanent job

- ① Complex: a reservation-skill cutoff function (of belief and job destruction risk)

$$\underline{x}_p : \tilde{\Pi} \times [0, 1] \rightarrow X,$$

such that the match continues (and separates otherwise) if  $x < \underline{x}_p(\tilde{\pi}, \delta)$ .

# Equilibrium transition probabilities

- Permanent employment to unemployment, conditional on age  $a = 0, 1, \dots$ :

$$\Lambda_{PU}(a) = \underbrace{n_{p,g}(a) \int \delta dH_{p,g}(\delta|a)}_{\text{from generic}} + \underbrace{n_{p,c}(a) \int \left\{ \delta + (1 - \delta) \mathcal{I}(x' < \underline{x}_p(\tilde{\pi}')) \right\} dH_{p,c}(x', \tilde{\pi}', \delta|a)}_{\text{from complex}},$$

for age  $a = 0, 1, \dots$ , with

- $H_{p,g}$  and  $H_{p,c}$ , equilibrium distributions of skills and beliefs (gen., complex)
- $n_{p,g}(a), n_{p,c}(a)$ , employment shares.

# Equilibrium transition probabilities

- Permanent employment to unemployment, conditional on age  $a = 0, 1, \dots$ :

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for age  $a = 0, 1, \dots$ , with

- $H_{p,g}$  and  $H_{p,c}$ , equilibrium distributions of skills and beliefs (gen., complex)
- $n_{p,g}(a), n_{p,c}(a)$ , employment shares.
- *Two* sources of reallocation:
  - job destruction (from both generic and complex)
  - evolution of skills/beliefs (from complex).

# Equilibrium transition probabilities

- Temporary employment to unemployment

$$\begin{aligned} \Lambda_{TU}(a) = & \overbrace{n_{t,g}(a) \int \left\{ \delta + (1 - \delta) \phi \mathcal{I}(\delta > \bar{\delta}_g) \right\} dH_{t,g}(\delta|a)}^{\text{from generic}} \\ & + \underbrace{n_{t,c}(a) \int \left\{ \delta + (1 - \delta) \left[ \underbrace{(1 - \phi) \mathcal{I}(x' < \underline{x}_T(\tilde{\pi}'))}_{\text{temp. job continues}} + \underbrace{\phi \mathcal{I}(\delta > \bar{\delta}_c(x', \tilde{\pi}'))}_{\text{temp. job ends}} \right] \right\} dH_{t,c}(x', \tilde{\pi}', \delta|a)}_{\text{from complex}}. \end{aligned}$$

# Equilibrium transition probabilities

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- *Three* sources of reallocation:
  - job destruction (from both generic and complex)
  - evolution of skills/beliefs (from complex)
  - contract “switching” (with probability  $\phi$ ).

## Model fit to selected outcomes

- Model calibrated to French LFS data, 2003-2018 (EEC)

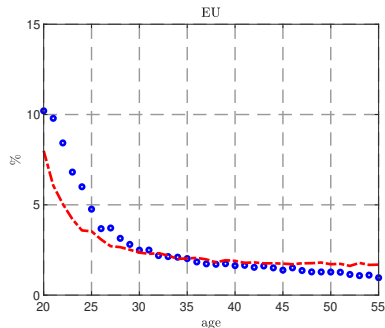
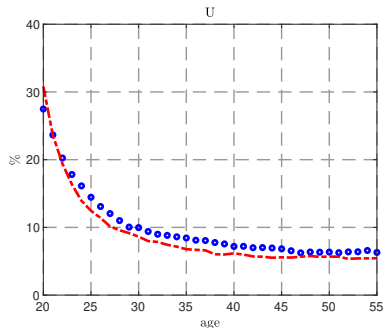


Figure: Model fit to quarterly EU and unemployment rates by age (blue dots: EEC data; red line: model)

# Quantitative results: the effect of firing costs on unemployment by age

- Counterfactual: economy without employment protection ( $F = 0$ )

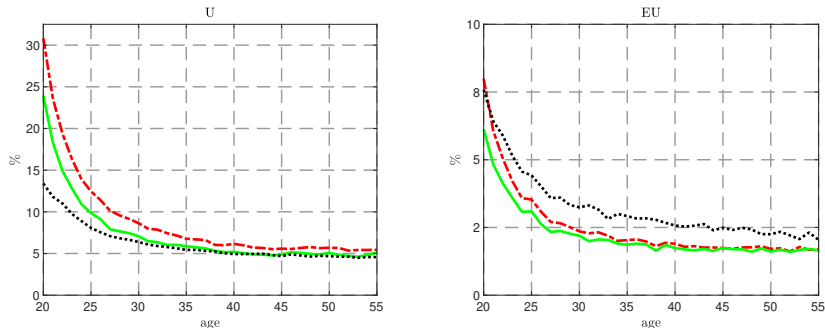


Figure: The effect of firing costs on EU and unemployment rates by age (green line: counterfactual; dotted line: CPS (2003-2018))

## Counterfactual - the effect of firing costs on aggregate outcomes

- Effect on aggregate quarterly flows and unemployment

	U rate	EU	UE	EE
Benchmark (%)	11.1	2.6	26.5	2.7
Counterfactual	9.4	2.3	29.1	3.4

- Effect on output and productivity

	Output	Product.	Skill	Complex.	Var. beliefs
Benchmark (%)	100	100	100	44.8	11.5
Counterfactual	102.8	100.9	102.5	45.3	12.0

# Conclusion

- Youth unemployment rate accounts for a disproportionate share of aggregate unemployment differences across OECD countries.
- Quantitative model of life-cycle search with information frictions, heterogeneity in skills and job-specific unemployment risk.
- Employment protection have a quantitatively important positive effect on unemployment—especially youth unemployment.
- Employment protection is associated with output and productivity loss—through skill accumulation and mismatch.

# Unemployment inflows (EU) - low education

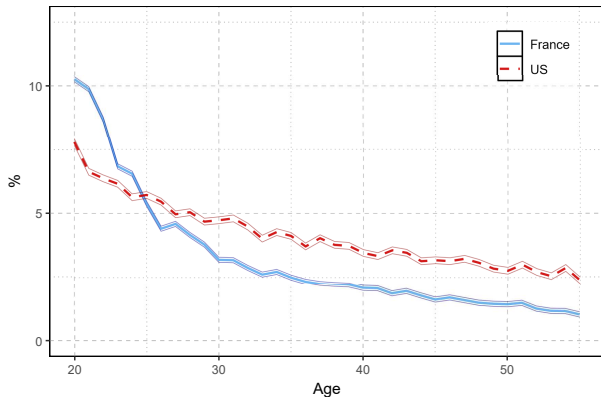


Figure: Quarterly EU rate by age, dropout and secondary education (CPS and EEC, 2003-2018)

UE rate

U rate

Aggregate

# Unemployment inflows (EU) - high education

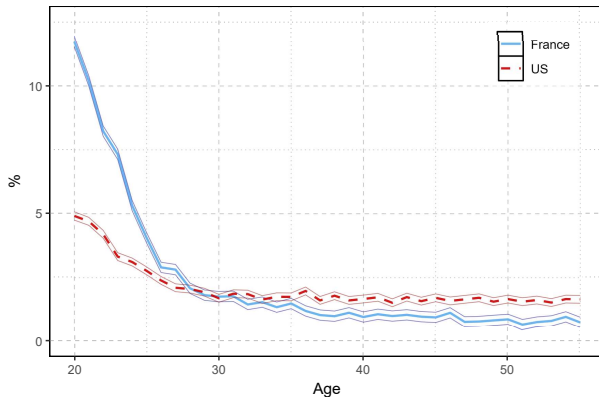


Figure: Quarterly EU rate by age, tertiary education (CPS and EEC, 2003-2018)

UE rate

U rate

Aggregate

# Life-cycle unemployment rates: contribution of EU flow age dispersion

- Compute “Markov-chained” unemployment profiles (age-transition matrix with 3 states: U, E, I)
- Counterfactual: impose U.S. EU age dispersion (keeping aggregate constant) into French data

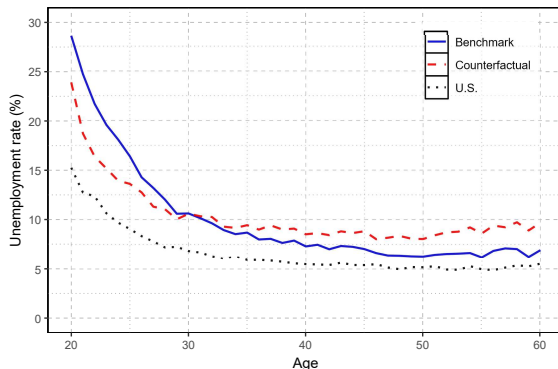


Figure: Actual and counterfactual U.S.-France unemployment rates

## Unemployment rate, cross-country age profiles - low education

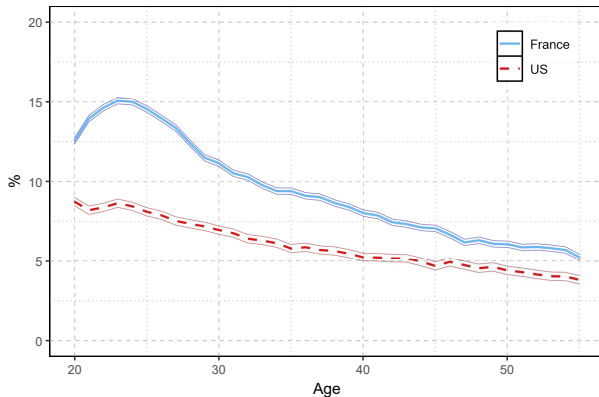


Figure: Unemployment rate by age, dropout and secondary education (CPS and EEC, 2003-2018)

Aggregate

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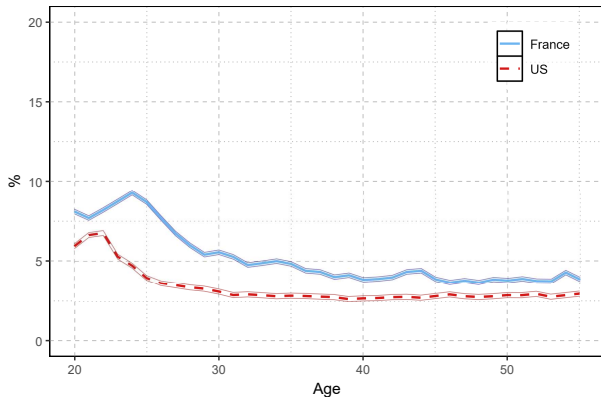


Figure: Unemployment rate by age, tertiary education (CPS and EEC, 2003-2018)

Aggregate

## Unemployment outflows (UE) - low education

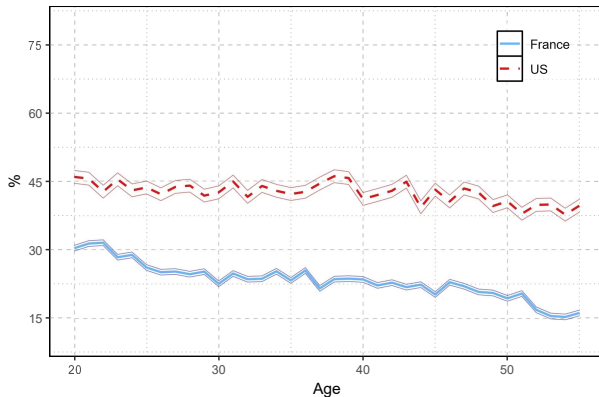


Figure: Quarterly UE rate by age, dropout and secondary education (CPS and EEC, 2003-2018)

Aggregate

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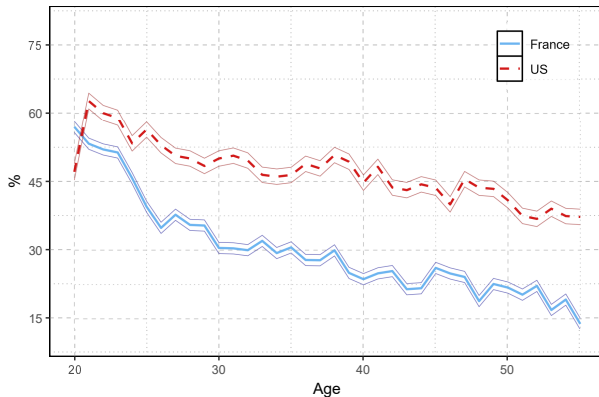


Figure: Quarterly UE rate by age, tertiary education (CPS and EEC, 2003-2018)

Aggregate

# Life-cycle temporary employment in France

- Take advantage of the French Employment survey to study the role of temporary jobs.
- Temporary job: fixed-term contracts (*contrats à durée déterminée*) and temporary-agency contracts (+ seasonal contracts)
  - Flexible/unstable: data suggest that most temp. contracts are **not** converted into a permanent job (e.g., Cahuc et al., 2016)
- Permanent job: indefinite-term contracts (*contrats à durée indéterminée*)
  - Subject to "regular" employment protection regulation.

Model

# Life-cycle temporary employment in France

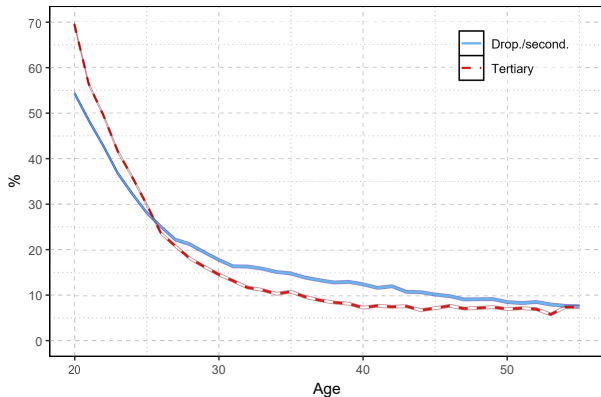


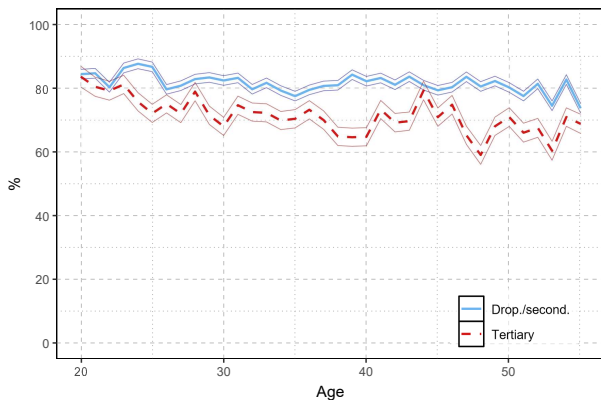
Figure: Employment (employee, non-public) share of temporary jobs (EEC, 2003-2018)

Flows

Cross-country

Model

# Composition of employment inflows, temporary and permanent jobs



**Figure:** Employment (employee, non-public) inflow rates (quarterly), share of temporary jobs (EEC, 2003-2018)

- Temporary jobs represent the vast majority of employment inflows for all groups.

## Employment outflows, from temporary jobs

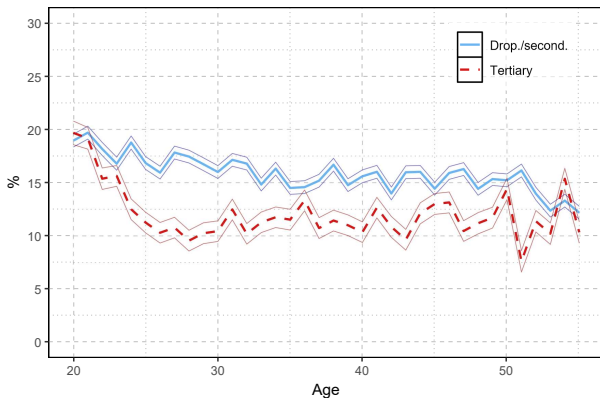


Figure: Quarterly TU flows (EEC, 2003-2018)

- Temp. jobs associated with very large labor movements/reallocation flows.
- Temporary jobs + firing costs likely account for a large part of youth unemployment.

# Cross-country correlations: youth unemployment and temp. employment



Figure: Youth (15-24) unem. rate vs. temp. emp. share (OECD data)

- Positive association consistent with temporary employment driving youth unemployment.

Stock

Model

# Cross-country correlations: EU age ratio (15-24 to 35-44) and temp. employment

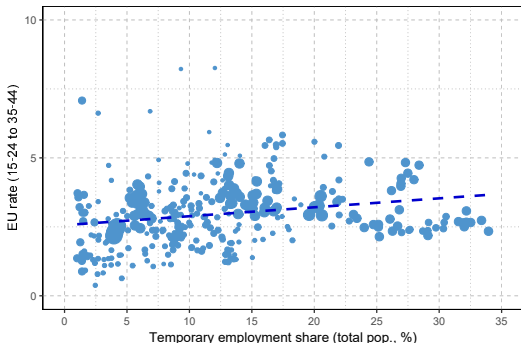


Figure: Quarterly EU flows vs. temporary employment (Donovan, Lu, Schoellman, 2023; OECD)

- EU rate age ratios (15-24 to 35-44) in yearly sample of 49 countries in Donovan, Lu, Schoellman (2023)
- Temporary employment share (employees, private) from the OECD
- Consistent with temp. jobs and firing costs disproportionately affecting the youth.