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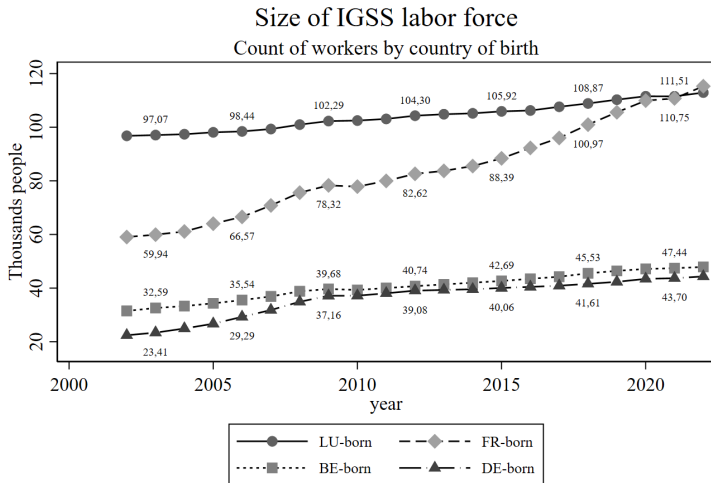ooooooooo

Conclusion

Understanding cross-border workers' decisions

Michel Bierlaire [1], Vincent Dautel [2], Frédéric Docquier [3], Silvia Peracchi [4]
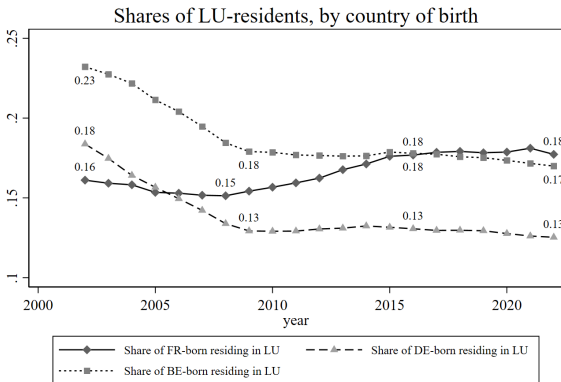
[1]TRANSP-OR, EPFL [2, 3]LISER [4]IRES/LIDAM, UCLouvain

June 6, 2024

Cross-border labor supply in Luxembourg

Size of IGSS labor force
Count of workers by country of birth

Who resides in Luxembourg?

Shares of LU-residents, by country of birth

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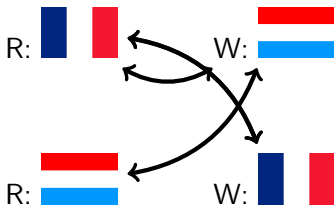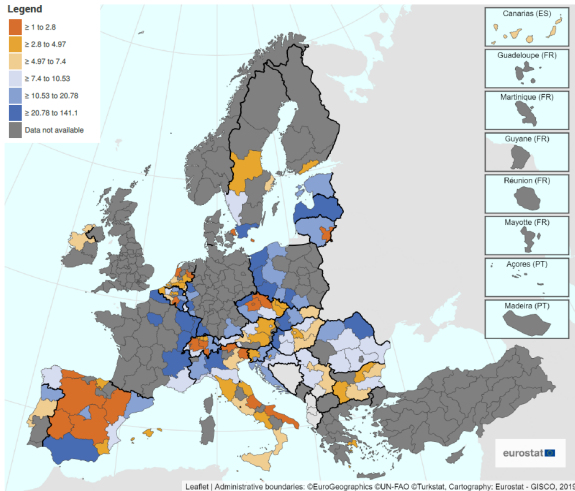○○○○○○

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Conclusion

What we do

RQ:

- What are the determinants of **commuting** and **residential** migration decisions?

- What are the implications for the size and selection of individuals on each side of the borders?

- Run counterfactual scenarios: How do wage shocks and housing market shocks impact the size and selection of people along the borders?

FR-Born decisions:

R: W:

R: W:

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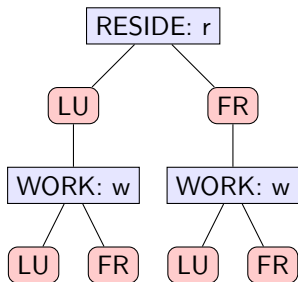
Cross-border labor supply, Eurostat 2022

15-64 years-old thousand persons working in a foreign country, by NUTS 2. Source:
Eurostat lfst_r_lfe2ecomm

Contribution

- Determinants of destination decisions:
  - **Regular migrants**: Ortega and Peri 2013; Beine et al. 2011; Mayda 2010; Grogger and Hanson 2011; McKenzie and Rapoport 2010; Cattaneo and Peri 2016; Dao et al. 2018;
  - **Asylum seekers and refugees**: Beine et al. 2021; Hatton 2014; Hatton 2015; Hatton 2020;
  - **Undocumented migrants**: Gathmann 2008; Bazzi et al. 2021; Friebel et al. 2024; Jandl 2007;
  - **Commuters**: Persyn and Torfs 2016; Walker and Li 2007; Guidon et al. 2019;
- Linked data for (cross-border) migration:
  - **aggregated data**: Illing 2023;
  - **linked registers**: Weber and Saarela 2023 (Finland and Sweden); Austria and Germany (Weber, ongoing).

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Model set up

	FR-Born, 2005-2019		
Segment	**Availability**	**Models**	
A) rLUwLU	IGSS Population	$\hat{P}(rLU|wLU)$,	
		$P(wLU|rLU) = 1$	
B) rFRwLU	Population (IGSS) & sample (EE)	$\hat{P}(rFR|wLU)$, $\hat{P}(wLU|rFR)$	
C) rLUwFR	ignored, negligible	$P(rLU|wFR) = 0$	
D) rFRwFR	EE Sample	$\hat{P}(wFR|rFR)$, $P(rFR|wFR) = 1$	

Notes: EE= Enquête Emploi, French labor force survey, we focus on Moselle, Meurthe-et-Moselle.
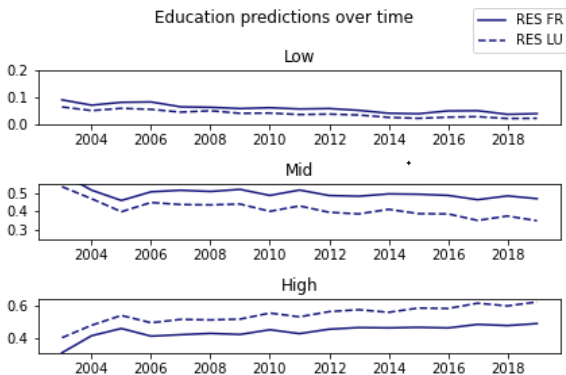IGSS= Luxembourg's social security body.

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Conditional models: IGSS

$$
\begin{aligned}
P(rLU_n|wLU_n) &= P(\epsilon_n \leq V_{rLU_n|wLU_n} - V_{rFR_n|wLU_n}) \\
&= \frac{e^{V_{LU_n|wLU_n}}}{e^{V_{LU_n|wLU_n}} + e^{V_{rFR_n|wLU_n}}}, \\
V_{rin|wLU_n} &= X_{in}B, \ \forall i \in \{LU, FR\}
\end{aligned}
$$

- X: age in 5-year intervals, gender, French nationality, full-time work, years since arrival in Luxembourg/ job-tenure, sector of activity; (wages, housing price gap LU-FR)* education (Low, Mid, High).

- IV for individual wages: wage averages by sector*educ*gender*age. We use a control function and bootstrap estimations.

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Challenge 1

- IGSS data miss education. →We impute it (MI). Based on a penalized elastic-net multinomial logit (Low, Mid, High) from data in EE.

Education predictions over time

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Conditional models: EE

$$
\begin{aligned}
P(wLU_n|rFR_n) &= P(\epsilon_n \leq V_{wLU_n|rFR_n} - V_{wFR_n|rFR_n}) \\
&= \frac{e^{V_{LU_n|wFR_n}}}{e^{V_{LU_n|rFR_n}} + e^{V_{wFR_n|rFR_n}}}, \\
V_{win|rFR_n} &= X_{in}B, \; \forall i \in \{LU, FR\}
\end{aligned}
$$

R: W:

R: W:

- X: age in 5-year intervals, gender, French nationality, full-time work, years since arrival in Luxembourg/ job-tenure, sector of activity; (wages gap FR-LU)* education (Low, Mid, High).

- IV for individual wages: wage averages by sector*educ*gender*age. We use a control function and bootstrap estimations.

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Joint models

We derive:

$$P(wLU\&rFR) = \frac{P(rFR|wLU)P(wLU|rFR)}{P(wLU|rFR) - P(rFR|wLU)P(wFR|rFR)} \quad (1)$$

$$P(wLU\&rLU) = \rightarrow \frac{P(wLU|rFR) - P(rFR|wLU)P(wFR|rFR) - P(rFR|wLU)}{P(wLU|rFR) - P(rFR|wLU)P(wFR|rFR)} \quad (2)$$

$$P(wFR\&rFR) = \frac{P(rFR|wLU)P(wFR|rFR)}{P(wLU|rFR) - P(rFR|wLU)P(wFR|rFR)} \quad (3)$$

$$P(wFR\&rLU) = 0 \quad (4)$$

Note: CIs determined by bootstrapped coefficients.

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Challenge 2

- To run joint predictions we need to join the population, available separately in 2 remote-access datasets. → We synthetize one dataset, with GIBBS sampling and export this synthetic version.

Prediction Data		
Segment	*Availability*	*Source*
rLUwLU	IGSS remote desktop	Original dataset
rFRwLU	IGSS remote desktop	Original dataset
rFRwFR	EE remote desktop	Synthetized and exported to IGSS.

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Conditional model results: IGSS

IGSS Data: $P(rLU_n|wLU_n)$			
	1	*2*	*3*
Education High	0.225 [0.138; 0.327]	0.244 [0.161; 0.344]	-0.780 [-1.226; -0.313]
Education Mid	0.019 [-0.037; 0.101]	0.024 [-0.031; 0.104]	-0.950 [-1.382; -0.514]
Housing prices (log, m^2), FR	-0.347 [-0.479; -0.203]	NaN	NaN
Housing price gap LU-FR	NaN	-0.022 [-0.088; 0.042]	-0.210 [-0.395; -0.021]
Housing price gap LU-FR # Education High	NaN	NaN	0.302 [0.118; 0.472]
Housing price gap LU-FR # Education Mid	NaN	NaN	0.019 [-0.192; 0.202]
Housing prices (log, m^2), LU	-0.121 [-0.219; -0.021]	NaN	NaN
Log wage	0.396 [0.179; 0.636]	0.325 [0.128; 0.541]	0.087 [-0.177; 0.356]
Log wage # Education High	NaN	NaN	0.249 [0.078; 0.419]
Log wage # Education Mid	NaN	NaN	0.337 [0.169; 0.503]
Residual	1.076 [0.842; 1.311]	1.148 [0.931; 1.367]	1.112 [0.896; 1.331]
AIC	570616.462	570631.873	570456.605
N	916597	916597	916597
Controls	Yes	Yes	Yes

Notes: logit coefficients, 95% Confidence intervals in brackets
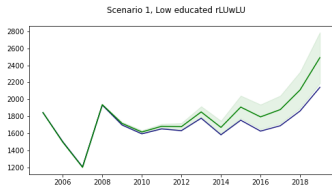
Conditional model results: IGSS

	IGSS Data: $P(rLU_n|wLU_n)$		
	1	*2*	*3*
Education High	0.225 [0.138; 0.327]	0.244 [0.161; 0.344]	-0.780 [-1.226; -0.313]
Education Mid	0.019 [-0.037; 0.101]	0.024 [-0.031; 0.104]	-0.950 [-1.382; -0.514]
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AIC	570616.462	570631.873	570456.605
N	916597	916597	916597
Controls	Yes	Yes	Yes

Notes: logit coefficients, 95% Confidence intervals in brackets

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Conditional model results: EE

	EE Data: $P(wLU_n|rFR_n)$		
	1	2	3
Education High	-1.973 [-3.677; -0.355]	-0.16 [-0.377; 0.081]	-1.058 [-1.664; -0.442]
Education Mid	0.652 [-0.719; 1.891]	0.194 [-0.043; 0.438]	-0.204 [-0.759; 0.306]
Log wage	13.235 [12.251; 14.273]		
Log wage # High	-0.767 [-1.319; -0.174]		
Log wage # Mid	-0.925 [-1.456; -0.377]		
Wage gap		-0.902 [-1.627; -0.288]	-3.109 [-4.138; -2.122]
Wage gap2			-4.459 [-5.517; -3.473]
Wage gap # High		-0.945 [-1.366; -0.498]	-2.786 [-3.963; -1.637]
Wage gap # Mid		-0.029 [-0.522; 0.52]	-0.92 [-2.014; 0.174]
AIC	3794.905	4361.057	4233.29
Residual	-11.807 [-12.966; -10.882]	6.16 [5.538; 6.768]	3.896 [2.951; 4.924]
ResidEducation High			1.827 [0.563; 2.898]
ResidEducation Mid			1.087 [-0.124; 2.324]
Residual^2			4.055 [2.966; 5.33]
N	9286	9286	9286
Controls	Yes	Yes	Yes

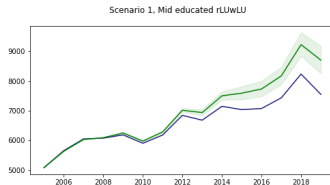Notes: logit coefficients, 95% Confidence intervals in brackets

Scenario 1

- Run the counterfactual scenarios:
    - If the gap in housing prices in LU vs FR had stayed constant from 2005, how would the distribution of FR-born workers have been?

    - Note: this scenario impacts $P(rLU|wFR)$, not $P(wLU|rLU)$.
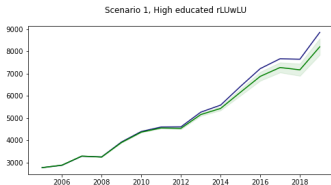
Scenario 1

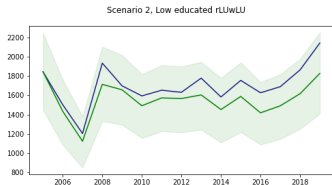(a) Low Educated, rLUwLU

(b) Mid Educated, rLUwLU

(c) High Educated, rLUwLU

In total, this impact concerns around 16% of migrants that were residing and
working in Luxembourg in 2019.

Scenario 2

- Run the counterfactual scenarios:
    - If the gap in wages in LU vs FR had stayed constant from 2005, how would the distribution of FR-born workers have been?

    - Note: this scenario impacts $P(wLU|rLU)$'s individual wages, and $P(rLU|wFR)$'s wage gap.

Scenario 2

(a) Low Educated, rLUwLU

(b) Mid Educated, rLUwLU

(c) High Educated, rLUwLU

In total, this impact concerns around 38% of migrants that were residing and working in Luxembourg in 2019.
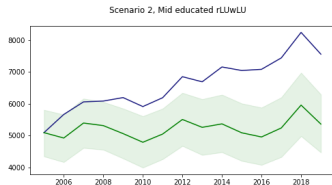
Scenario 3

- Run the counterfactual scenarios:
    - If the gap in wages in LU vs FR had stayed constant from 2005, how would the distribution of FR-born workers have been?

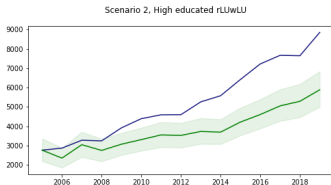   - Note: this scenario impacts $P(wLU|rLU)$'s individual wages, and $P(rLU|wFR)'swagegap$.
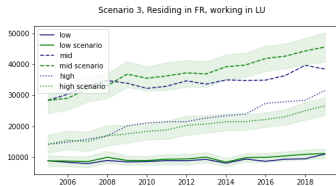
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Scenario 3

(a) rLUwLU

(b) rFRwLU

(c) rFRwFR

Conclusion

- Self-selection patterns arise along the two sides of the border.
    - Housing prices are observed to screen individuals along education levels.
    - Wage growth would make Luxembourg less-attractive for French-born workers, but would especially impact the highest skilled groups.
    - Effects sizeably impact the migrant-resident segment and to some extent the cross-border worker group.
    - We uncover a growth in the high-skilled labor in all segments, but especially impacting the skill distribution of the rLUwLU.

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Appendix

Appendix

Cross-border labor supply in Luxembourg

Flux de frontaliers vers le Luxembourg au 31.03.2021 par lieu de résidence
Grenzgängerströme nach Luxemburg am 31.03.2021 nach Wohnort

Part des frontaliers dans le flux total de frontaliers travaillant au Lux.
Anteil der Grenzgänger an der Gesamtzahl aller Pendler nach Luxemburg

- 25,1% et plus / 25,1% und mehr
- 10,1% à / bis 15,0%
- 5,1% à / bis 10,0%
- 2,1% à / bis 5,0%
- 1,1% à / bis 2,0%
- jusqu'à / bis 1,0%

Entités territoriales - *Gebietseinheiten:*

Lorraine, Wallonie: arrondissements
Rheinland-Pfalz: Landkreise, kreisfreie Städte
Saarland: Landkreise

Les valeurs absolues sur la carte correspondent aux chiffres arrondis fournis par l'IGSS.
Die absoluten Werte auf der Karte entsprechen den gerundeten Zahlen der IGSS.

Données de référence - Referenzdaten:
© ACT Luxembourg 2017,
GeoBasis-DE / BKG 2017,
IGN France 2017, NGI-Belgium 2017

Données thématiques - Fachdaten:
IGSS 2021

Calculs - Berechnungen: OIE / IBA

Auteurs - Autoren: SIG-GR / GIS-GR

Réalisation - Erstellung: 09.2022

GIS-GR SIG-GR IBA OIE