

Migration prospects and educational choices: evidence from the Lorraine-Luxembourg Corridor

Michel Beine ¹ Vincent Fromentin ² Javier Sánchez Bachiller ³

¹University of Luxembourg, IZA and CES-Ifo

²University of Lorraine

³University of Luxembourg

May 24 2024

Outline

- Introduction
- Context
- Model
- Data
- Results

Brain Drain on the rise

- International mobility of workers has grown significantly over the last decades, especially among high qualified individuals.
- **Brain Drain on the rise:** in 2022 about 281 millions migrants. Share of tertiary-educated migrants about 32%. Between 2000 and 2015, increase of share of high-skilled immigrants from 21 to 30% (OECD born) and 27 to 35% (non OECD born) (DIOC, 2020). Today, more tertiary-educated foreign born migrants in OECD countries than low-educated ones.
- In OECD : global competition to attract foreign skilled workers: biased technological progress and increase in shortages of skills in many sectors/occupations.
- Initial view of detrimental brain drain (Bagwati, 1974) mitigated by evidence of offsetting mechanisms/effects. One key mechanism : potential **incentive effect of emigration prospects**.

Incentive effect of migration prospects

- Incentive effect : migration prospects increase incentives to invest in human capital (Beine, Docquier, Rapoport, 2001; Mountford, 1997). Driven by skill premium and selective immigration policies.
- The study of the incentive effect of emigration in education has traditionally focused on how it affects the **level** of human capital.
- Evidence at macro level: Beine, Docquier, Rapoport (2001, 2008).
- Micro: Batista, Lacuesta, Vicente (2012) or Theoharides (2018).
- While evidence on level, little empirical evidence on the **type of human capital** → this paper.

What we do

- We study the **incentive effect** of emigration prospects on the choice of educational topics.
- We take benefit of a specific context : labour mobility between Lorraine (North East of France) and Luxembourg (main foreign destination).
- We use the potential incentives of the Luxembourgish labour market on the chosen study field of graduates from the University of Lorraine in France.
- We test whether students tend to enroll more in fields that are more rewarded in Luxembourg.
- We find evidence in favour of such an effect. Incentive effect more driven by employability prospects.

Contribution to 3 literatures

- Brain drain and incentive effect: very few evidence of an incentive effect in terms of type of human capital. Limited evidence of Theoharides (2018) for nurses in Philippines → we use a large set of potential skills.
- Determinants of educational choices. Rational choices (Chapman, 2012; Cameron and Heckman, 1998). Most evidence in favour of incentives from domestic opportunities → we show foreign opportunities matter.
- Brain Drain : most studies look at South-North context → we study mobility between developed countries (North-North labour mobility).

Lorraine, *départements* and main cities



Incentives to work in Luxembourg:

- Lorraine : only French region to share border with Luxembourg. Luxembourg by far the main foreign opportunity for workers from Lorraine.
- Luxembourg : Booming labour market. On average wage premium : 90% compared to France. Lorraine : main provider of foreign labour force. 1620000 French workers : 25% of labour force in Luxembourg (30% immigrants and 70% cross-border workers).
- Favourable bilateral agreements for cross-border workers in terms of taxation and healthcare (social security). No language barriers and mobility restrictions (Shengen agreements)
- In short : context of almost unrestricted mobility with strong incentives to work abroad.

DRAPEQ Survey on graduates

- We leverage a survey of 3038 graduates from university of Lorraine. Key information: choice of educational field.
- University of Lorraine : main provider of tertiary education in North East of France. Comprehensive university → Large choice of topics.
- Individual characteristics of graduates. Survey supplemented by questions about interest for foreign countries and for Luxembourg at time of enrolment.

Discrete choice Model

- Random Utility Maximisation: students n choose the degree j that maximizes their expected utility, which can be decomposed into a deterministic V_{jn} and random part ϵ_{jn} :

$$U_{jn} = V_{jn} + \epsilon_{jn}.$$

- Benchmark: ϵ_{jn} : extreme value distribution of type-1 following McFadden (1973) \rightarrow Multinomial Logit.
- We use other distributions later to allow deviations from IIA.

V_{jn} : deterministic part

- The deterministic component depends on the expected market outcomes from choosing degree j . Expected wage broken down between employability prospects and wage conditions in both markets.

$$V_{jn} = \beta_1 \text{Prob}(e_j) + \beta_2 \ln(w_j) + \alpha_1 (I_n * \text{Prob}(e_j^*)) + \alpha_2 (I_n * \ln(w_j^*)) + \delta_j$$

$\text{Prob}(e_j)$: probability of finding a job related to degree j and w_j the expected wage. I_n is the expressed interest of student n in Luxembourg .

- Testable implication of model \rightarrow incentive effect of foreign prospects $\rightarrow \alpha_1$ and/or α_2 positive.

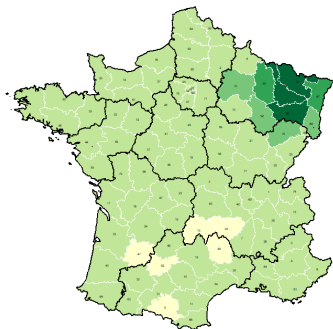
- 2019 DAPEQ students' choice survey:
 - 178 possible degree choices aggregated into **58 broad educational topics**.
 - **3038 students** from University of Lorraine
 - Demographic characteristics
 - Educational and parental background
 - Interest expressed for Luxembourg (at the time of studies' elicitation)

Summary stats

Statistic	N	Mean	St. Dev.	Min	Max
Age	3,038	24.947	3.356	20	58
Female	3,038	0.492	0.500	0	1
Foreigner	3,038	0.143	0.350	0	1
Parents: contiguity to LU	3,038	0.474	0.499	0	1
Parents: distance to LU	3,038	481.3	1,257.9	0.00004	12,220
Origin: GrandEst	3,038	0.683	0.466	0	1
Origin: Lorraine	3,038	0.474	0.499	0	1
Interest in Grand Est	3,038	0.672	0.470	0	1
Interest in FR	3,038	0.444	0.497	0	1
Interest abroad	3,038	0.307	0.461	0	1
Interest in LUX	3,038	0.204	0.403	0	1
LU as a deciding factor	3,038	0.055	0.229	0	1
Working in LU	2,759	0.104	0.305	0	1
Level: Master	3,038	0.586	0.493	0	1
Faculty: Arts	3,038	0.063	0.243	0	1
Faculty: Law, Econ., Mng.	3,038	0.314	0.464	0	1
Faculty: Social Sciences	3,038	0.195	0.396	0	1
Faculty: Sciences	3,038	0.411	0.492	0	1
Faculty: Physical	3,038	0.017	0.128	0	1

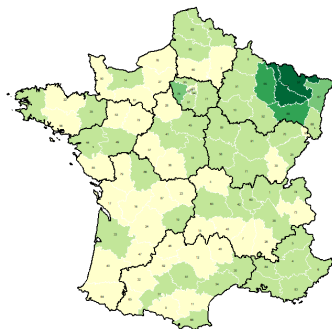
The interest questions are nested. The proportion for students having an interest for Luxembourg are those of the two highest modalities (Strong and Very Strong)

Geographical distribution of students



% of students
None (0-1) (1-2) (2-10) (10-20)

(a) Origin of the graduates

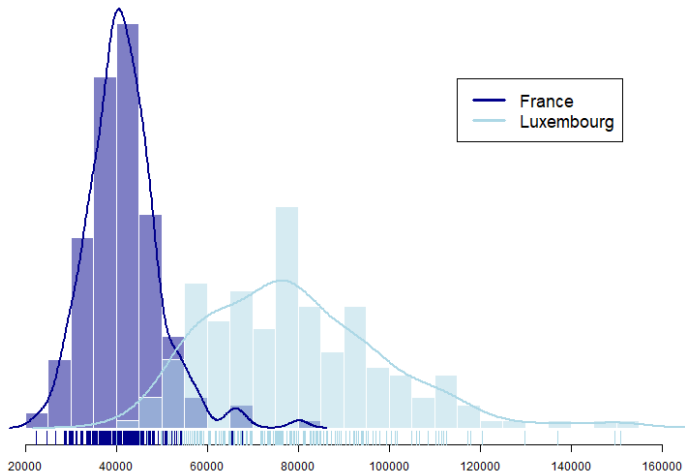


% of students
None (0-1) (1-2) (2-10) (10-20)

(b) Share interested in Luxembourg

- Wages and Employability (labour demand):
 - We use wage data by occupation from governmental statistical offices (INSEE and STATEC).
 - We use indicators of shortage of occupations to proxy for employability (labour demand). France : Labour requirements (BMO -Pole emploi);Luxembourg : (Labour shortage indicators) :ADEM.
 - We compute these measures by degree by using the association of each program to a set of occupations developed by the Ministry of Education in France.

Wage comparison



Baseline results

	Dep. var: probability of enrolment in topics				
	(1)	(2)	(3)	(4)	(5)
Empl France	3.67*** (0.192)	4.83*** (0.27)	4.74*** (0.273)	-	5.42*** (0.277)
IntLux*Empl Lux	1.61*** (0.466)	2.09*** (0.51)	2.530*** (0.478)	-	1.72*** (0.486)
Wage France	0.062 (0.138)	0.549*** (0.139)	-	0.187 (0.145)	1.62*** (0.135)
IntLux*Wage Lux	0.330* (0.191)	0.282 (0.207)	-	0.610*** (0.195)	-0.309* (0.18)
scaled α_1	0.438***	0.432***	0.533***	—	0.317***
scaled α_2	0.089*	0.058	—	—	-0.071*
Level dummies	Y	Y	Y	Y	Y
Faculty dummies	N	Y	Y	Y	Y
Obs	3038	3038	3038	3038	3038
Nber of topics	58	58	58	58	58
Log-Lik.	-12147.82	-12046.24	-12054.41	-12209.73	-12005.86
LRT (p-val)	0.0000	-	0.0003	0.0000	-

Dependent variable: probability of enrolment in topic. LRT (Likelihood ratio test) against model of column (2). Column (5) uses data on wages for those younger than 30 years old. Scaled coefficients α_1 and α_2 are normalized estimates as a ratio of the coefficient of employability in France.

- Evidence of an **incentive effect** (model (2)).
- We use the least restrictive definition of interest in Luxembourg → results should be considered a **lower bound**.
- **Main driver of choice is the employability prospect.**

Extensions and robustness

- Endogeneity of interest variable.
- Heterogenous substitutions between topics (deviations from IIA assumption).
- Sub-sample estimations.
- Placebo.

- Endogeneity could be an issue, since interest in Luxembourg might be related to unobserved factors affecting educational choices. E.g. Unobserved preference for sea.
- We use a **control function** approach based on the **initial location of students**. Initial location related to parental choices.
 - Instruments : Contiguity to Luxembourg and distance to the border.
→ **incentive effect holds**.

First stage results

	Dependent Var: Interest for Luxembourg					
	All students			with Interest for abroad		
	(1)	(2)	(3)	(4)	(5)	(6)
Contiguity	0.185*** (0.047)	0.349*** (0.038)	—	0.258*** (0.098)	0.603*** (0.075)	—
Log distance	-0.111*** (0.022)	—	-0.145*** (0.019)	-0.194*** (0.034)	—	-0.239*** (0.03)
Female	-0.183*** (0.037)	-0.168*** (0.037)	-0.190*** (0.037)	-0.227*** (0.068)	-0.199*** (0.070)	-0.231*** (0.068)
Foreign	0.508*** (0.075)	0.295*** (0.058)	0.510*** (0.080)	0.587*** (0.193)	0.242** (0.010)	0.573*** (0.134)
Constant	2.015*** (0.119)	1.439*** (0.033)	2.265*** (0.095)	3.589*** (0.193)	2.266*** (0.069)	3.936*** (0.133)
Nber obs.	3036	3036	3036	931	931	931
R ²	0.050	0.034	0.044	0.119	0.072	0.111

Notes: Dependent variable: interest for Luxembourg expressed at the time of enrolment. Scale: 1-4, with 1 if no interest and 4 if strong interest. Distance is minimal distance from home at time of enrolment to closest point on the Luxembourgish border. Contiguity: 1 if lived in a department contiguous to Luxembourg.

Control function results

	Dependent var: probability of enrolment in topics				
	(1)	(2)	(3)	(4)	(5)
Empl France	4.83*** (0.27)	4.83*** (0.27)	4.83*** (0.27)	4.83*** (0.27)	2.38*** (0.152)
Int.*Empl Lux	2.09*** (0.510)	2.09*** (0.510)	2.09*** (0.510)	2.09*** (0.510)	0.41* (0.235)
Wage France	0.549*** (0.139)	0.549*** (0.139)	0.549*** (0.139)	0.549*** (0.139)	-0.129* (0.066)
Int*Wage Lux	0.282 (0.207)	0.282 (0.207)	0.282 (0.207)	0.282 (0.207)	0.334*** (0.068)
$\hat{\nu}_{jn}$	0.000* (0.000)	0.000 (0.000)	-0.000*** (0.000)	0.000*** (0.000)	1.60*** (0.085)
Lvl + fac. dummies	Y	Y	Y	Y	Y
Nber Obs	3038	3038	3038	3038	3038
Nber of topics	58	58	58	58	58
Log-Lik.	-12046.24	-12046.24	-12046.24	-12046.24	-11451.3
Endog. var. 1	Int*Empl	Int*Empl	Int*Wage	Int*Wage	Int*Empl
Endog. var. 2	-	-	-	-	Int*Wage
Instrument 1	Contig.	Dist	Contig.	Dist	Contig.
Instrument 2	-	-	-	-	Dist

Dependent variable: probability of enrolment in topic. LRT (Likelihood ratio test) against model of column (1).

Robustness: Relaxing IIA

- We can expect that changes in attractiveness of one specific topic does not lead to the same substitution across all the other ones. Depends on many factors (e.g. knowledge background)
- We allow for different structures of the error term ϵ_{jn} so that it accounts for heterogeneous substitution patterns across topics:
 - Nested Logit (NL)
 - Cross-Nested Logit (CNL)

NL/CNL graphs

Heterogeneous substitution patterns

	Dependent var: probability of enrolment in topics				
	MNL	NL	NL	CNL	CNL
Empl France	4.83*** (0.27)	1.030*** (0.145)	4.87*** (0.225)	1.37*** (0.149)	2.38*** (0.152)
IntLux*Empl Lux (α_1)	2.09*** (0.510)	0.222*** (0.090)	1.920*** (0.451)	0.263 (0.188)	0.41* (0.235)
Wage France	0.062 (0.138)	-0.013 (0.021)	-0.211* (0.125)	0.134** (0.052)	-0.129* (0.066)
IntLux*Wage Lux (α_2)	0.282 (0.207)	0.061** (0.028)	0.386** (0.170)	0.095*** (0.024)	0.334*** (0.068)
Scaled α_1	0.433	0.216	0.394	0.192	0.172
Scaled α_2	0.058	0.059	0.079	0.069	0.140
$\mu_{\text{quantitative}}$	-	3.82*** (0.355)	-	3.21*** (0.530)	1.60*** (0.085)
$\mu_{\text{non-quantitative}}$	-	13.40*** (2.020)	-	99.2*** (11.1)	20*** (1.18)
μ_{societal}	-	-	1.35*** (0.027)	3.21*** (0.231)	2.36*** (0.107)
$\mu_{\text{non-societal}}$	-	-	1	2.36*** (0.157)	2.23*** (0.146)
Lvl + fac. dummies	Y	Y	Y	Y	Y
Obs	3038	3038	3038	3038	3038
Number of topics	58	58	58	58	58
Log-Lik.	-12046.24	-11729.18	-11936.97	-11468.53	-11451.3
LRT (p-val)	-	0.00	0.00	0.00	0.00

Dependent variable: probability of enrolment in topic. Tests based on Null hypothesis $\mu = 1$.

LRT (Likelihood ratio test) against model of column (1). Cross-Nested Logit participation parameters set to 0.5.

Sub sample regressions and robustness

- We restrict our sample to
 - native students only (no return option) → **incentive effect stronger**.
 - EU students only (no restriction) → **incentive effect stronger**
- We redefine the *interest* variable:
 - Our baseline defines interest in Luxembourg as those who were either “somehow interested” or “very interested”.
 - Those “very interested” → **incentive effect stronger**
 - those for which Luxembourg was the determining factor in their study choice → **incentive effect stronger**
 - Natives+ Lux as deciding factor → **incentive effect further stronger**

Additional checks

	Dependent Var: probability of enrolment in topics				
	(Natives)	(Only EU)	(Very strong int.)	(Deciding Lux)	(Dec. Lux & Natives)
Empl France	5.46*** (0.313)	5.48*** (0.31)	4.82*** (0.27)	4.81*** (0.269)	5.43*** (0.312)
IntLux*Empl Lux (α_1)	3.34*** (0.592)	3.36*** (0.581)	2.98*** (0.723)	4.38*** (0.938)	6.1*** (1.07)
Wage France	0.413*** (0.155)	0.375** (0.154)	0.575*** (0.138)	0.597*** (0.137)	0.474*** (0.154)
IntLux \times Wage Lux (α_2)	0.206 (0.231)	0.224 (0.226)	0.335 (0.26)	0.179 (0.342)	0.12 (0.378)
scaled α_1	0.612***	0.613***	0.618***	0.911***	1.123***
scaled α_2	0.048	0.041	0.070	0.037	0.022
Level and faculty dummies	Y	Y	Y	Y	Y
Obs	2605	2659	3038	3038	2605
Nber of topics	58	58	58	58	58
Log-Lik.	-10325.56	-10541.75	-12045.87	-12046.26	-10327.74

Dependent variable: probability of enrolment in topic. Scaled coefficients α_1 and α_2 are normalized estimates as a ratio of the coefficient of employability in France.

Robustness: Placebos

- We expand our main model to account for the incentive effect among students **with no interest** for Luxembourg

$$V_{jn}^{(pl)} = V_{jn} + \gamma_1[(1 - I_n) * Prob(e_j^*)] + \gamma_2[(1 - I_n) * ln(w_j^*)]$$

- We find that γ are not significant or have an nonintuitive sign \rightarrow incentive effect restricted to those getting information.

Placebos

	Dep. var: probability of enrolment in topics		
	(1) MNL	(2) MNL	(3) CNL
Empl France	4.86*** (0.192)	4.79*** (0.27)	2.49*** (0.151)
IntLux*Empl Lux	1.83*** (0.516)	—	—
(1-IntLux)*Empl Lux	-0.127 (0.307)	-0.22 (0.30)	-0.376 (0.113)
Wage France	0.997*** (0.163)	1.03*** (0.151)	-0.003 (0.068)
IntLux*Wage Lux	-0.238 (0.218)	—	—
(1-IntLux)*Wage Lux	-0.841*** (0.136)	-0.852*** (0.13)	-0.132** (0.057)
μ_{quant}	—	—	1.56*** (0.088)
μ_{noquant}	—	—	20*** (1.090)
μ_{soc}	—	—	2.32*** (0.106)
μ_{nosoc}	—	—	2.21*** (0.135)
Lvl + fac. dummies	Y	Y	Y
Obs	3038	3038	3038
Nber of topics	58	58	58
Log-Lik.	-12034.44	-12039.01	-11453.43

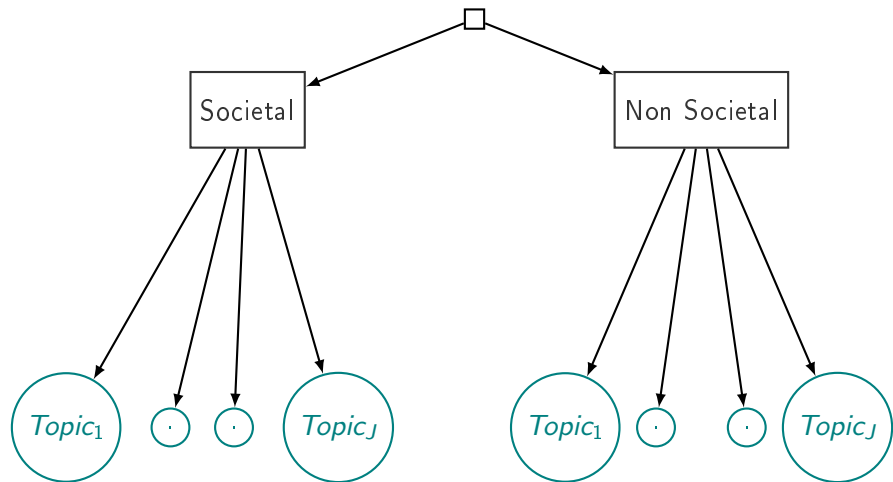
Dependent variable: probability of enrolment in topics. μ_{noquant} constrained to 20.

Conclusions and policy implications

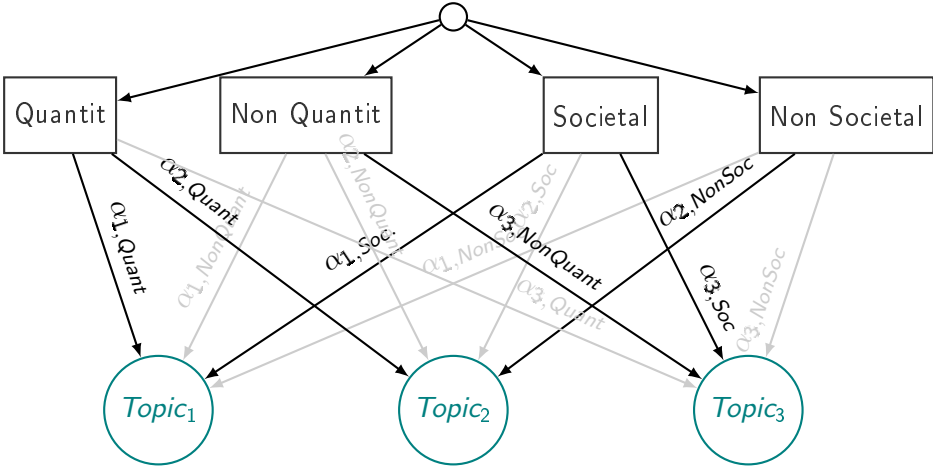
- Evidence that presence of an attractive foreign labor market abroad does **shape students' decision of which field they want to study**.
- This incentive effect is robust to several specifications, endogeneity and deviations from IIA.
- Policy implications :
 - Brain drain leads to a depletion of HC **after** acquisition of education → detrimental for origins
 - Incentive effect of emigration implies change in set of skills **before** acquisition of education → detrimental for origins if creates mismatch (depends on differences in industrial structures)
 - Nevertheless, In the **long run**, potential **reshape of the region's availability of skills**.

Thank you for your attention!

Nested Logit



Cross-Nested Logit



back