STATISTICS FLANDERS

Bridging the backlog: the use of National Register data for monitoring the Ukrainian displaced persons in Flanders

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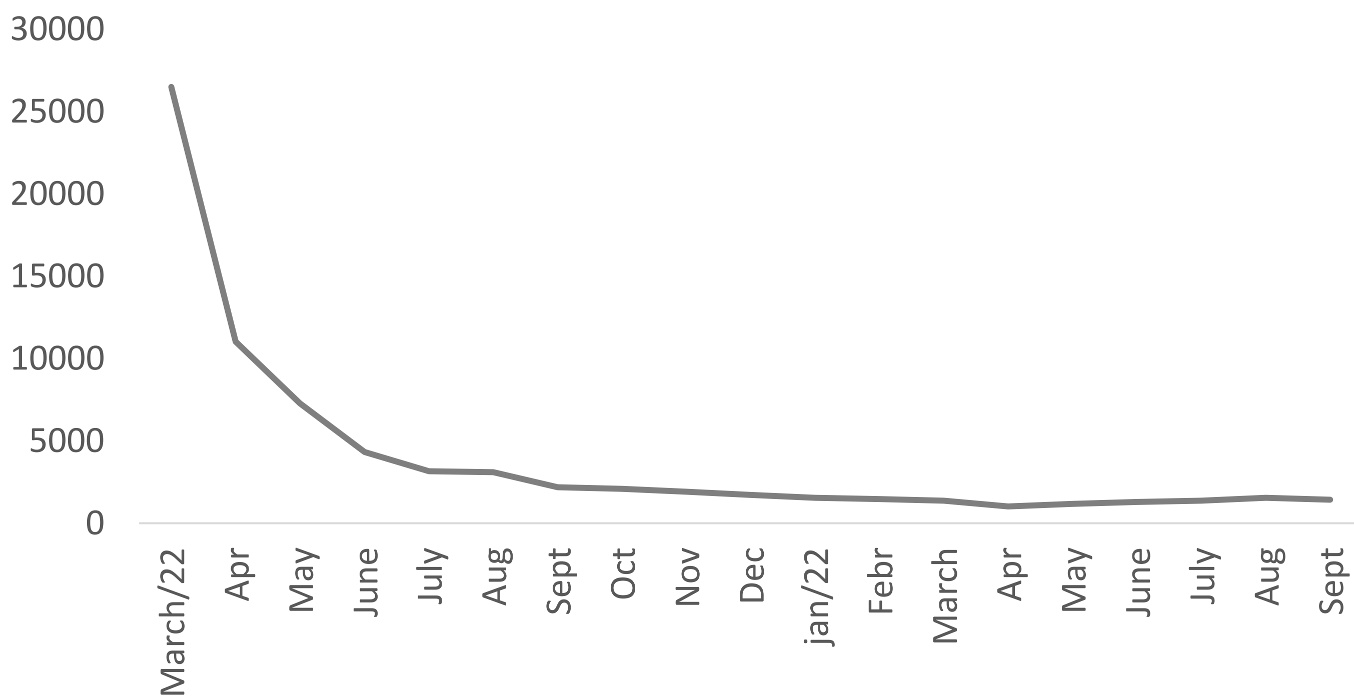
Flanders
State of the Art

Background

Displaced people from Ukraine, Monthly arrivals since March 2022



Source: Migration Office, Oct, 20, 2023

Background

Residence permit, Immigration office → Registration Municipality → Admin. proces → Notification NR

Internal movements and external migrations

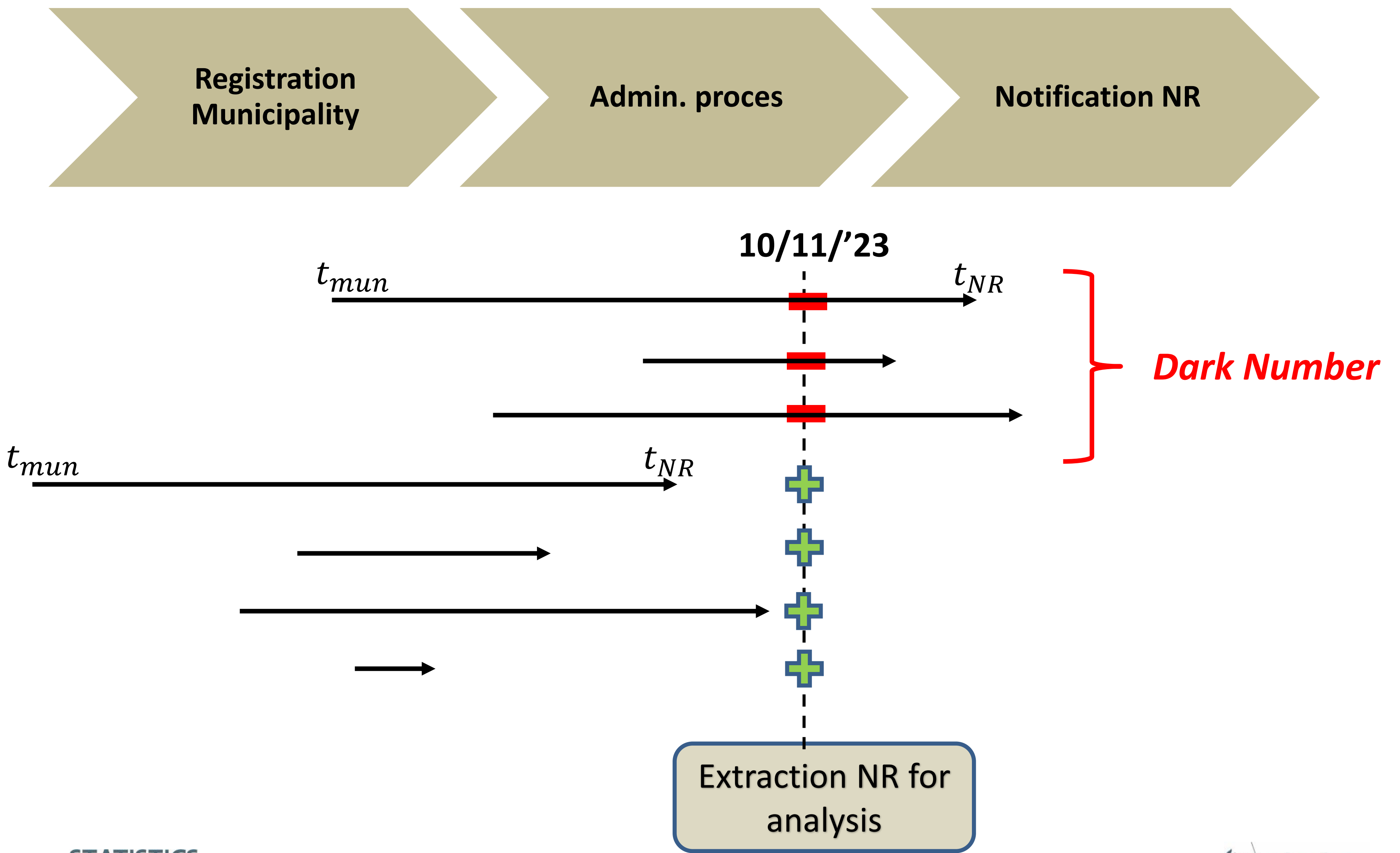
Date reg.mun.

Adress

Age, gender

Household-composition, …

Background



Registration Municipality
Admin. proces
Notification NR
10/11/'23
t_{mun}
t_{NR}
Dark Number
t_{mun}
t_{NR}
Extraction NR for analysis

Objective of the paper

Bridge the backlog and estimate from a ***recent extraction*** from the National Register (NR), the ***real***

1. **Population of displaced persons** from Ukraine in Belgium
2. **Distribution** across regions (Flanders/Wallonia/Brussels)

➔ **DEVELOPMENT OF 2 COMPEMENTARY SIMULATIONS METHODS**

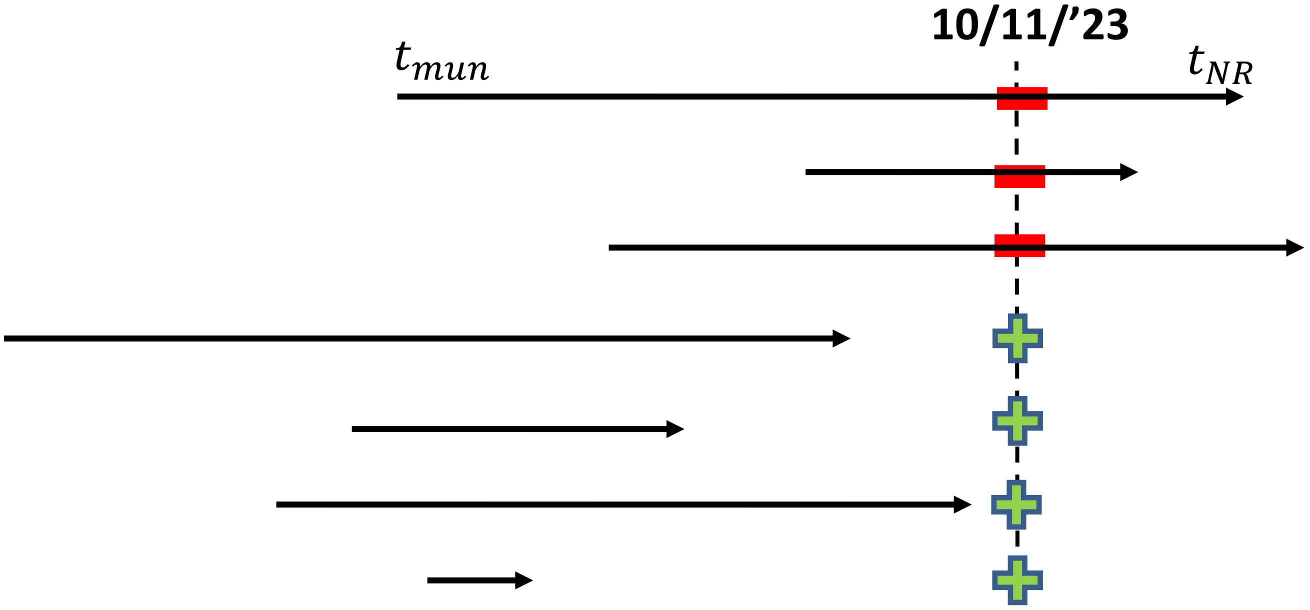
Data: periodic extrations from NR

IND	SEQ	T-REG	TYPE-MOV	MUN	T-EXTR	COVARS
1	1	17/3/22	ENTRY	ANTW	10/11/23	Age gender hh-comp
1	2	25/4/22	INT.MOV	GENT	10/11/23	
1	3	4/1/23	EXIT		10/11/23	

Source: Statbel

Method 1
Simulation of the administrative delay

The principle

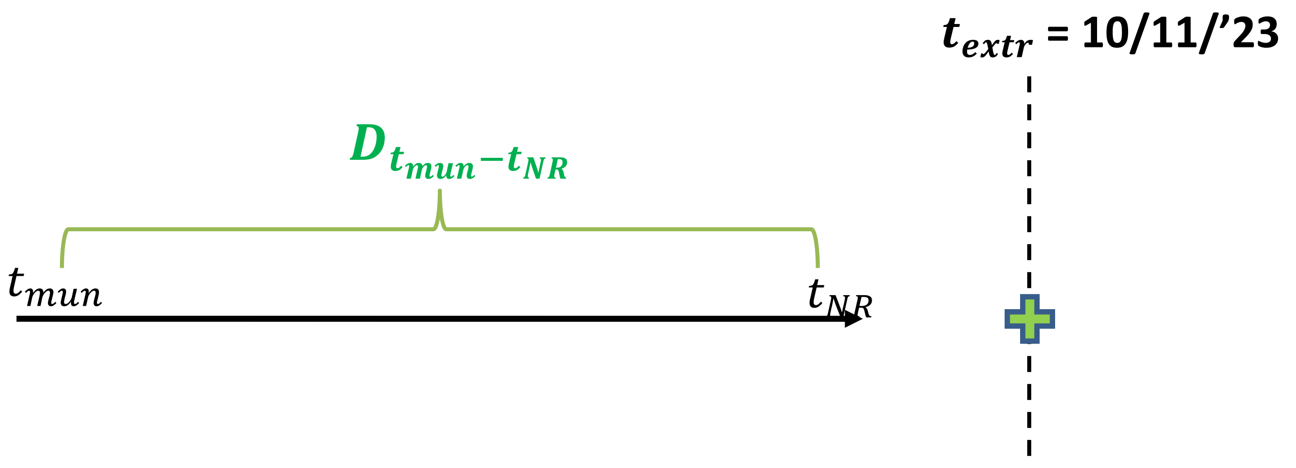


$$mov\_real(t) = w(t) * mov\_extr(t)$$

$$mov\_real(t) = 1/(\frac{4}{7}) * mov\_extr(t)$$

$$\boldsymbol{?? \; prob\_extr(t)}$$

The principle



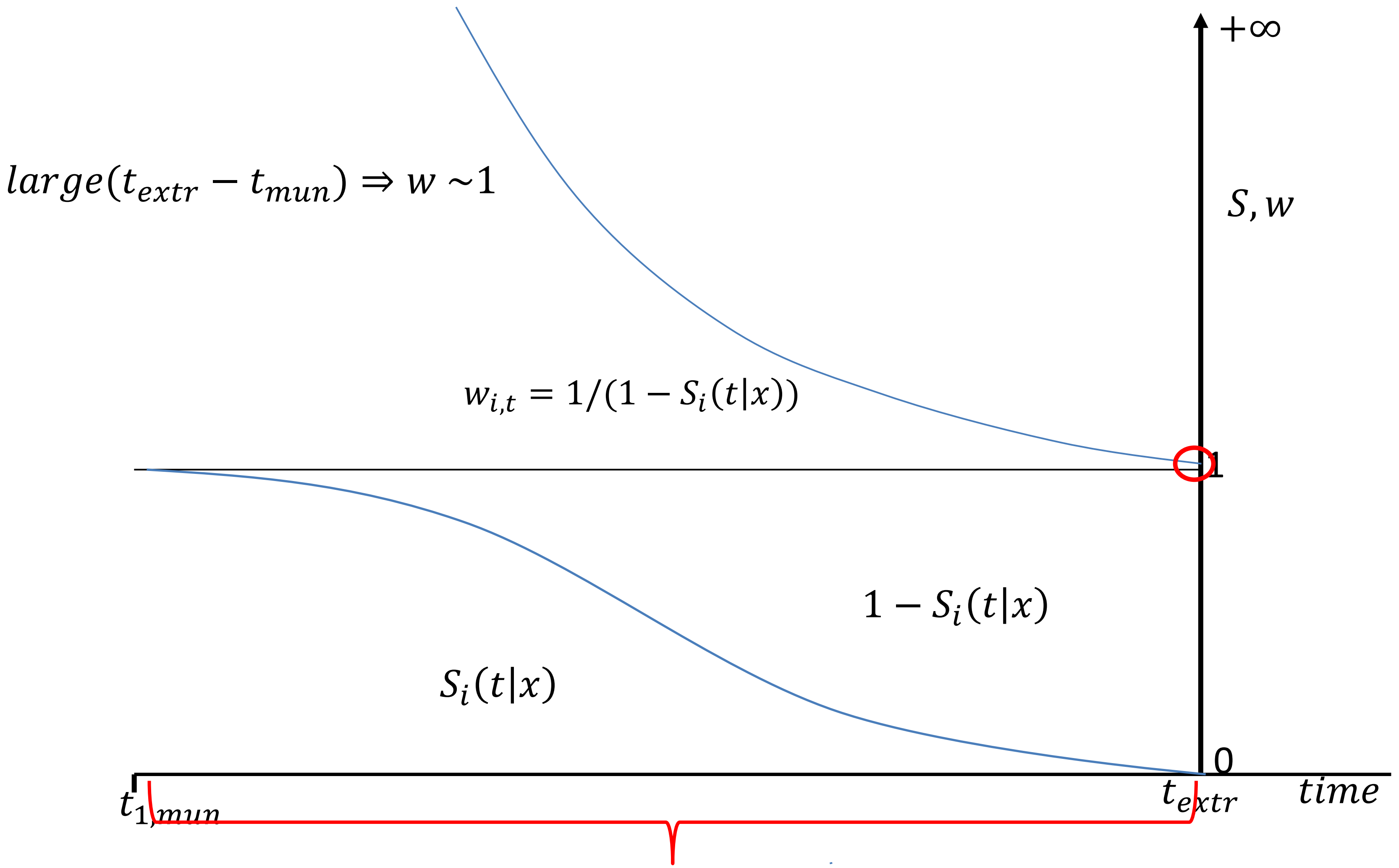
$$prob\_extr(t) = prob\left(t_{mun} + D_{t_{mun}-t_{NR}} < t_{extr}\right)$$

$$d_{t_{mun}-t_{NR}} = S(d|x)$$

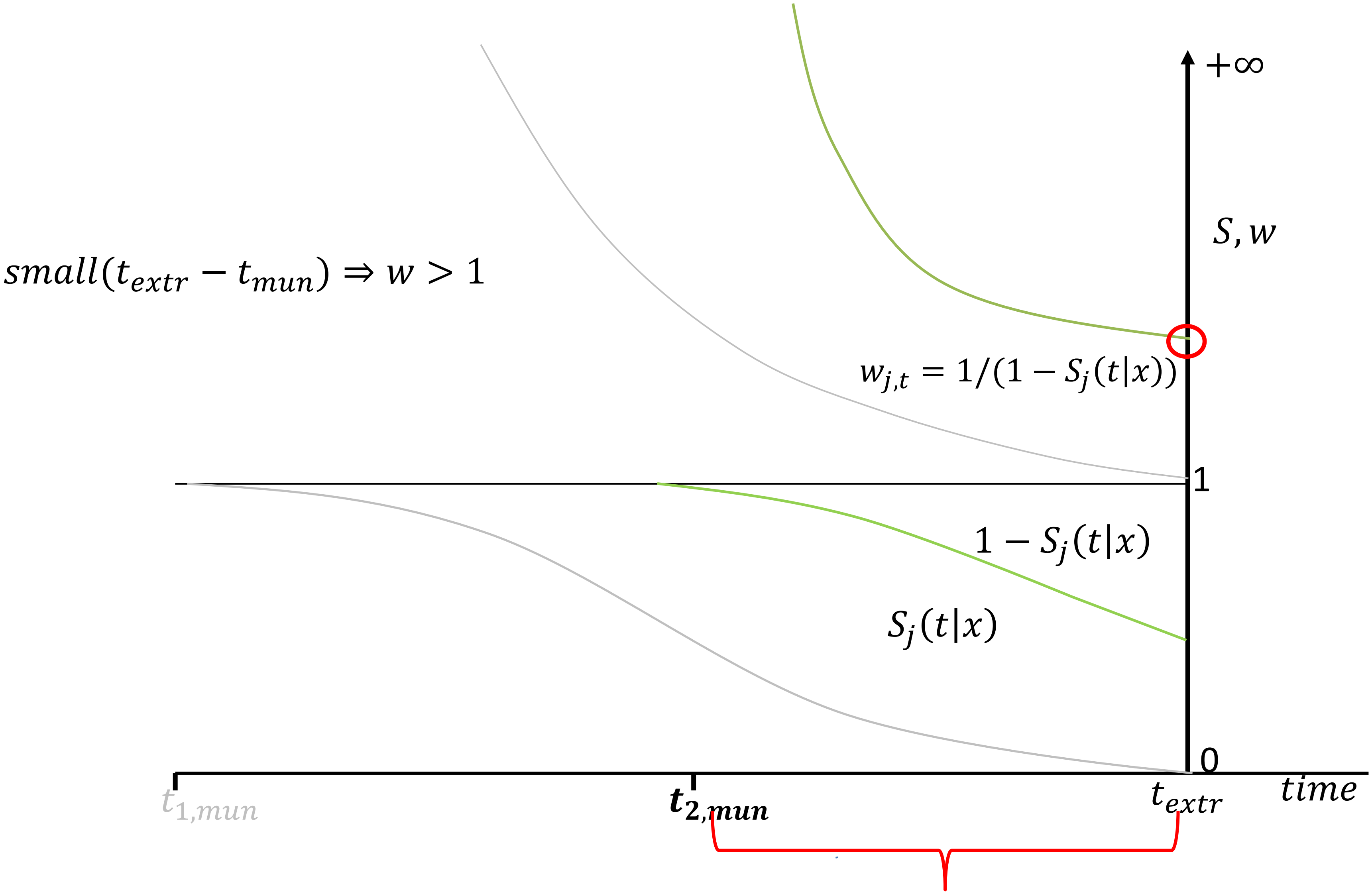
$$prob\_NR(d) = 1 - S(d|x)$$

$$prob_{extr(t)} = prob_{NR(t)} = 1 - S(t|x) \quad with\ t = t_{mun} + d$$

The principle



The principle



Model specification

Parametric survival function with Weibull distribution

$$S(t|x) = exp\left[-(\frac{t}{\lambda(x)})^{\alpha}\right]$$

$With\ S(t|x)\ the\ survival\ probability\ of\ non-$
$declaration\ to\ the\ NR\ at\ time\ t$ given x

$\lambda(x)\ is\ the\ scale\ parameter$

$\lambda(x) = \exp(\beta_0 + \beta_x)$

$$\boldsymbol{x = \ age, gender, household\ composition\ at\ arrival, month\ of\ arrival, city, region}$$

$\alpha\ is\ the\ shape\ parameter\ of\ the\ Weibull\ distribution$

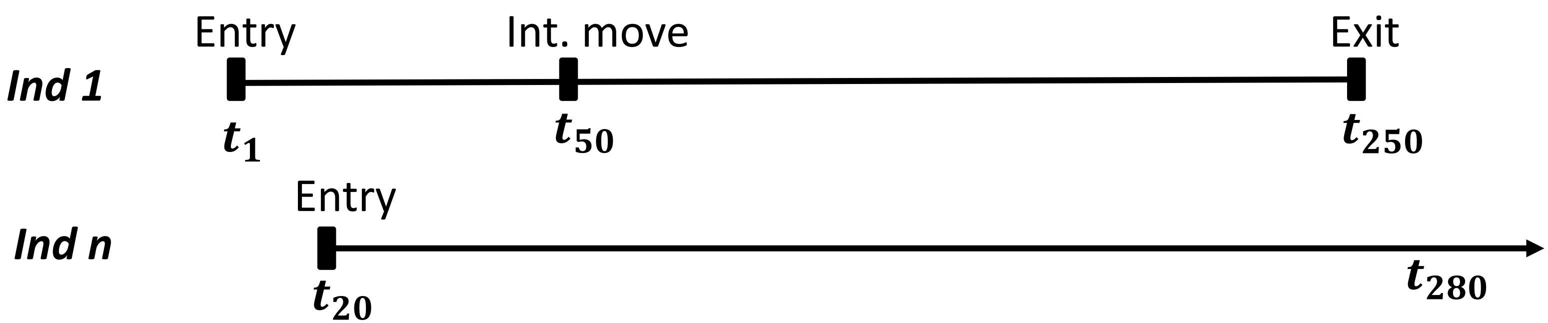
Results

	Predicted 10/11/'23	St. Dev	Observed 10/11/'23	Dark Number
Entries				
Flemish Region	41472	1.46	41211	261
Walloon Region	15363	0.49	15322	41
Brussels Region	13644	1.45	13478	166
Exits				
Flemish Region	7292	2.73	7240	52
Walloon Region	3056	0.29	3053	3
Brussels Region	1178	1.10	1166	12
Internal movements from Flemish Region				
Flemish Region	23319	1.02	23030	289
Walloon Region	332	0.19	324	8
Brussels Region	683	0.23	674	9
Internal movements from Walloon Region				
Flemish Region	964	0.21	954	10
Walloon Region	9077	0.57	8996	81
Brussels Region	449	0.18	443	6
Internal movements from Brussels				
Flemish Region	657	0.23	645	12
Walloon Region	217	0.26	206	11
Brussels Region	5468	0.94	5268	200
Population				
Flemish Region	33489	1.45	34572	-1083
Walloon Region	9489	-	11402	-1913
Brussels Region	15227	-	12578	2649

Methode 2
Simulation of internal movements and exits

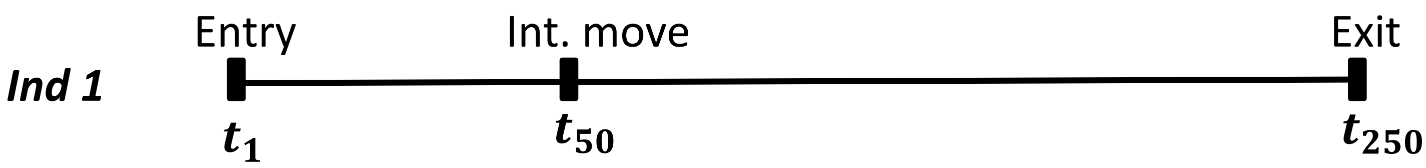
Principle

IND	SEQ	T-STRT	TYPE-MUT	MUN-STRT	T-EXTR	COVARS
1	1	17/3/22	ENTRY	ANTW	20/1/23	Age gender hh-comp
1	2	25/4/22	INT.MOV	GENT	20/1/23	
1	3	4/1/23	EXIT		20/1/23	

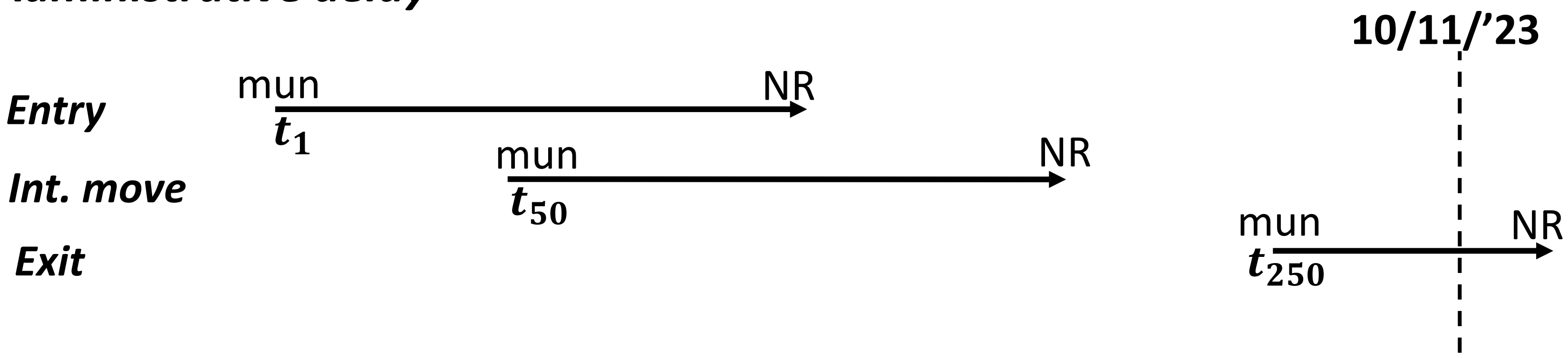


Principle

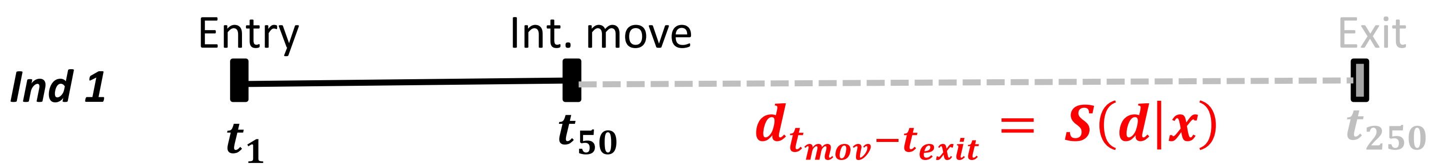
Real life course



Administrative delay



Visible + predicted life course during admin. delay



Model specification

Parametric survival function with Weibull distribution

$$S(t|x) = exp\left[-(\frac{t}{\lambda(x)})^{\alpha}\right]$$

$With\ S(t|x)\ the\ survival\ time\ to\ a\ movement\ at\ time\ t$ given x

$$\lambda(x) = \exp(\beta_0 + \beta_x)$$

$\boldsymbol{x = covariats\ age, gender, householdcomposition\ at\ arrival,}$
$\boldsymbol{week\ of\ arrival, city, region, number\ of\ previous\ movements}$

$\alpha\ is\ the\ shape\ parameter\ of\ the\ Weibull\ distribution$

Model specification

Competing risks between exits and internal movements

⇒ Exits are estimated with internal movements as censoring events &
Internal movements are estimated with exits as censoring events

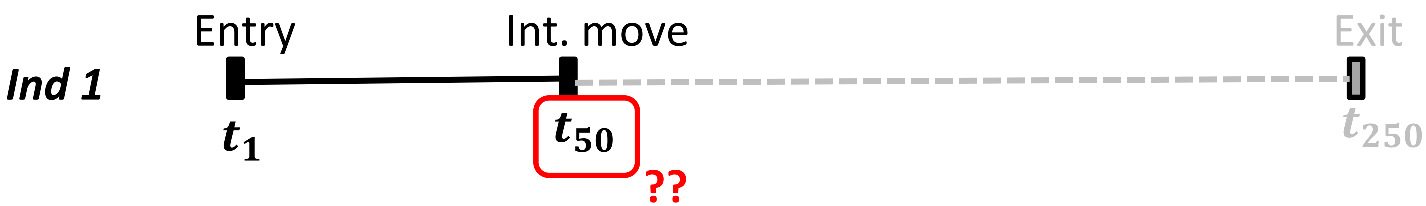
⇒ These functions are integrated in the CFC to obtain for consistency in the estimates (Mahani, A. S. and Sharabiani, M. T. A. , 2019)

=> Max. probability to move remains below 1.

Mahani, A. S. and Sharabiani, M. T. A. (2019) Bayesian, and Non-Bayesian, Cause-Specific Competing-Risk Analysis for Parametric and Nonparametric Survival Functions: The R Package CFC. *Journal of Statistical Software*, **89**, 1–29. DOI: 10.18637/jss.v089.i09.

Determining the “visible” life course and starting point of the predictions

Visible + predicted life course during admin. delay



$$d_{max}(admin. delay) = 124\ days$$

$$t_{extr} - 124\ days = t_{visible}$$

Simulation internal movements and exits

$$S_i(t|x) > uniform(\quad) \Rightarrow Event = 1$$

Updating covariats:
Time invariant**:** Age, household composition, city:
Deterministic: Number of movements

Time variant: Region
if Event == 1 & Event == internal movement =>

Destination distribution		**To**		
		Flanders	Wallonia	Brussels
From	Flanders	94.36%	1.45%	4.19%
	Wallonia	7.91%	88.21%	3.88%
	Brussels	9.14%	2.48%	88.37%

Results

	Predicted	St. Dev	Observed	Dark Number
Entries				
Flemish Region	40465	35.11	41211	-746
Walloon Region	15438	28.08	15322	116
Brussels Region	13683	29.71	13478	205
Exits				
Flemish Region	6652	6495.79	7240	-588
Walloon Region	2971	2374.33	3053	-82
Brussels Region	1032	1767.65	1166	-134
Internal movements from Flemish Region				
Flemish Region	21158	7121.11	23030	-1872
Walloon Region	283	781.68	324	-41
Brussels Region	664	1339.28	674	-10
Internal movements from Walloon Region				
Flemish Region	851	668.96	954	-103
Walloon Region	8213	2393.15	8996	-783
Brussels Region	409	474.61	443	-34
Internal movements from Brussels				
Flemish Region	565	822.55	645	-80
Walloon Region	182	503.70	206	-24
Brussels Region	4703	2352.99	5268	-565
Population				
Flemish Region	34282	6616.07	34572	-290
Walloon Region	11672	2607.90	11402	270
Brussels Region	12977	2426.55	12578	399

Discussion

Discussion

Method 1	Method 2
Results	
Credible results of number of movements	Systematic underestimation of the number of movements
Small Standard Error	Large Standard Error =>rank based simulation/repeated runs
Need for validation	Need for validation
Target variable and model specification	
Administrative delay	Individual internal and external migration behaviour
Good model fit	Weak model fit
	Need for refinement of the hazard model (additional covariates)

Discussion

Method 1	Method 2
Underlying assumptions	
The registration in the municipality of notified and non-notified movements are similarly distributed in time	The registration in the municipality of notified and non-notified movements are similarly distributed in time
Impact of covariates on the administrative delay remains cte in time	Impact of covariates on movements remains cte in time
The administrative delay of notified and non-notified movements are similar distributed in time	Distribution of movements remain cte in time ("future behaviour remains similar to past behaviour")
Application	
Now-casting of number of movements and people	Now-casting of number of movements and people
	Forecasting of number of movements and people