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Complex data management of the national register: methodological choices and their impacts on the intensity of re-emigration of African migrants living in Belgium

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Abstract – Résumé

Abstract

Many studies on re-emigration use population register data to study the emigration of migrants. Despite the advantages they offer, these data also have limitations, and the methodological choices researchers make to address them impact the measurement of re-emigration intensity. This paper examines how re-emigration can be measured using data from the Belgian National Register and under what assumptions deregistrations may or may not be considered in re-emigration measurement. To address these questions, the focus is on African migrants living in Belgium, whose migration and administrative trajectories can be complex, and for whom methodological choices have a significant impact. Analyses reveal that declared emigration alone cannot objectively define re-emigration. Many individuals deregistered from the Register leave the host country without declaring their exit and do not return. These individuals are emigrants in their own right. However, among the deregistrated individuals, some do not actually leave the host country, and should therefore not be considered as emigrants. Our results suggest that only those who leave the host country and are not re-registered should be considered in the re-emigration measurement. The findings obtained militate for better recording of exits, particularly by border staff, and the inclusion of reasons for deregistrations in the population registers to distinguish true deregistrations from deregistrations without emigration.

Keywords: *Re-emigration, African migrants, Deregistration, Administrative invisibility, Belgian national register*

Résumé

Plusieurs travaux sur la réémigration recourent aux données de registres de population pour étudier les émigrations de migrants. En dépit des avantages qu'elles offrent, ces données ont également des limites, et les choix méthodologiques auxquels les chercheurs recourent pour y faire face ont une incidence sur la mesure de l'intensité de la réémigration. Cet article examine comment on peut mesurer la réémigration avec les données du Registre National belge, et sous quelles hypothèses les radiations du registre peuvent ou non être prises en compte dans la mesure de la réémigration. Pour répondre à ces questions, l'étude se focalise sur les migrants africains vivant en Belgique, dont les parcours migratoires et administratifs peuvent être complexes, et pour lesquels les choix méthodologiques ont une incidence non négligeable. Les analyses révèlent que l'émigration déclarée à elle seule ne saisit pas correctement la réémigration. De nombreuses personnes radiées du registre quittent la Belgique sans déclarer leur sortie et ne reviennent plus. Ces derniers sont des donc émigrants à part entière. Néanmoins, parmi les personnes radiées, certains ne quittent pas le territoire du pays d'accueil, et ne doivent donc pas être considérés comme émigrants. Nos résultats proposent que seuls ceux qui quittent le pays d'accueil et ne sont pas réenregistrés soient pris en compte dans la mesure de la réémigration. Les résultats obtenus soulignent la nécessité d'un meilleur enregistrement des sorties, notamment par le personnel aux frontières, et la prise en compte des raisons de radiations dans la tenue des registres des populations afin de distinguer les vraies des radiations sans émigration.

Mots-clés : *Réémigration, Migrants africains, Radiations, Invisibilité administrative, Registre national belge.*

1. Introduction

The Belgian National Register is a computerized and centralized database containing administrative information on all the persons who are listed in the population register, in the register of foreigners of the municipalities, in the waiting register, and in the diplomatic and consular registers (BCSS, 2022a ; Poulain & Herm, 2013). It covers all Belgian citizens residing in Belgium and abroad[1] and all foreigners residing in Belgium - including refugees and asylum seekers whose decision is pending - and who are admitted or authorized to stay in the country[2]. Each person has a unique national identification number (Poulain & Herm, 2013). The information available in the National Register includes age, gender, nationality, country of birth, marriages/cohabitations, births, deaths, and migrations, residence permits, asylum demands, among others. Register data are useful for investigating international migration (Larramona, 2013; Monti, 2020; Vanthomme & Vandenheede, 2021), especially in contexts with no surveys on international migration.

Register data offer several advantages over surveys for studying international migration. They are less costly than surveys (Desrosières, 2013), they are comprehensive and longitudinal, and they allow for the analysis of re-emigration over a long period of time. However, in addition to the limited access to these data, their use is not without its limitations. Methodological choices, in particular the way deregistration[3] is taken into account, may have substantial consequences for the measurement of the intensity of the phenomenon studied. This article focuses specifically on these limitations and the impact of the methodological choices on the measurement of "emigration of migrants" (Ahrens et al., 2016; Turcatti, 2022), hereafter called "re-emigration".

It will answer the following questions: a) how can we measure re-emigration with the register data? b) How can we account for deregistrations? Under what assumption? c) How can we detect deregistrations without emigration? And finally, d) what to do with these deregistrations without emigration, and what does this imply in terms of measurement of re-emigration?

We illustrate these questions by focusing on African migrants living in Belgium. Their migration and administrative trajectories can be complex, and methodological choices may substantially impact the intensity of re-emigration for them. This analysis of register data is part of a research project that examines the role of migrants' family situations, integration, and migration policies in the re-emigration of sub-Saharan migrants from Belgium.

2. Previous approaches to measure re-emigration

The measurement of re-emigration has traditionally used three types of data sources: surveys, census and population registers. We first discuss approaches used in surveys and censuses, and next present the ways population registers have been used for this purpose.

[1] These are listed in the population registers kept in the Belgian diplomatic missions or consular posts abroad.
[2] Law of July 19, 1991 on population registers and identity cards and amending the law of August 8, 1983 organizing a National Register of Natural Persons.
[3] i.e. the process of removing people from the national registry (see section 3.2.3).

2.1. Measuring re-emigration with surveys and census

The surveys aimed at analyzing and understanding international migrations should ideally be of a multisite and retrospective nature, such as in the Migration between Africa and Europe survey (MAFE) and the Mexican Migration Project (MMP) (Beauchemin & Schoumaker, 2013; Durand & Massey, 2019) or panel surveys, like the German Socioeconomic Panel (Amparo Gonzalez & Inmaculada Serrano, 2018)[4]. Multisite surveys interview migrants in the host country as well as migrants who have returned to their country of origin and non-migrants in their home countries. The collection of multi-site data is, by nature, limited to a small number of countries. As a result, their use for the analysis of emigration or return migration focuses on one or a few specific destinations. The measures of outmigration based on these data may also be affected by large sampling errors. Longitudinal panel studies conducted in host countries offer the advantage of identifying not only the evolution of migration intentions and motivations but also determining the factors influencing these intentions on the one hand and migratory behavior on the other, given that not all migration aspirations are realized (Carling & Collins, 2018). The German Socio-Economic Panel (SOEP), for example, is one of the most widely used (Tezcan, 2019 ; Haug, 2008). One of the disadvantages of these types of longitudinal surveys is their high cost, both in financial terms and time-wise, and they are limited to samples (Desrosières, 2013). Furthermore, panel studies face attrition. Analyses focusing solely on individuals followed and ignoring those lost in the study area risk significant bias if attrition is high (Richard, 2017). To sum up, data from longitudinal panel surveys are limited not only by their cost in terms of resources and time but also by the coverage rate between waves (attrition) and the representativeness of the populations from which the samples are selected.

In research on migrants' emigration, the ***attrition approach*** is based on the hypothesis that when information on respondents' deaths is systematically collected, and respondent tracking is of very high quality, attrition can be an appropriate way to measure emigration (Caron & Ichou, 2020). This approach used in several studies analyzing longitudinal data from multiple censuses, including the Office for National Statistics Longitudinal Study (ONS) in England and Wales (Caron & Ichou, 2020) and the Permanent Demographic Sample (EDP) in France (Caron, 2018; Solignac, 2018), is based on the fundamental equation of demography, which considers that an individual can only leave the territory (panel) through death or emigration. Thus, attrition, which is not explained by death, can be assimilated to emigration or re-emigration for migrants.

In addition to death and emigration, attrition can also be attributed to the inability to contact respondents in the next wave (Camenisch & Debarbieux, 2011; Caron & Ichou, 2020). Thus, the resulting attrition, a collection deficiency inherent in any type of longitudinal data, would lead to an overestimation of departures (Caron, 2018). Various strategies are implemented to reduce, manage, and analyze attrition to ensure the validity of results (Régnier-Loilier & Guisse, 2016).[5]

2.2. Measuring re-emigration with register data

An increasing amount of research is focusing on re-emigration using data from population registers, which, although not universal, are nevertheless present in many European countries (Poulain & Herm, 2013), such as Belgium (BCSS, 2022b), Spain (Larramona, 2013b), Sweden (Monti, 2020; Nekby, 2006), and the Netherlands

[4] There is currently no survey that combines multisite, retrospective longitudinal, and panel study characteristics. The implementation of such a survey would be very costly

[5] The main ones are traditional follow-up and secure matching of survey or census data with an administrative database.

(de Hoon et al., 2020). These studies highlight three major approaches to measure re-emigration, based on the country of origin and the next destination of the migrant upon leaving the host country, in order to differentiate between return migration and migration to a third country.

The first approach involves limiting the study of re-emigration to only those emigrations declared by exiting migrants. This method is used in Sweden by Nekby (2006), who defines an emigrant as any individual intending to stay abroad for at least one year and having declared their emigration or, if registration occurs later, whose emigration notification was registered by the authorities. This approach, focusing solely on recorded emigrations, offers the advantage of exhaustively documenting the destinations of migrants leaving the host country, as they are recorded along the declaration of departure. However, it has a serious limitation: underestimating the re-emigrations of individuals. Regarding this issue, Nekby (2006) acknowledges that in the Swedish context, some migrants leave the country without officially registering their emigration to retain various insurance benefits and maintain their eligibility to return to Sweden.

The second approach corrects the first by taking into account unreported emigrations. Studying the determinants of re-emigration in Spain using register data, Larramona (2013) hypothesizes that the deregistrations, i.e. removal of migrants from the register by the authorities, of migrants residing in Spain correspond to emigration. According to the author, migrants who move to another region in Spain register there to access health and education services, considering these movements as internal migrations. If they remain in the same place, they renew their registration for the same reasons. Therefore, those who do not renew their registration are presumed to have left Spain. This approach is also employed by de Hoon et al. (2020) in the Netherlands. Working with register data and focusing solely on refugees, these authors argue that a certain number of individuals do not report their emigration to local authorities, leading to the measurement of an additional category of emigration based on automatic deregistrations from the records. This approach's fundamental limitation is that it may *overestimate* re-emigrations, encompassing both individuals who have indeed left the country and those who still reside in it.

In addition to these two approaches, we develop in section 3 a third approach based on the Belgian national register. In this approach, attrition, or exit from the national register, is explained by declared emigration, deregistration, but also by death.

3. Methodology: Our approach applied to national register data in Belgium.

3.1. Choices and limitations in defining re-emigration

Several studies in Belgium have focused solely on return migration (Perrin, 2007; Vanthomme & Vandenheede, 2021). In contrast, our research specifically focuses on re-emigration, which includes both return migration and subsequent migration.

Return migration is usually defined as a migration through which a person moves to his or her place of departure or country of origin, usually after a stay of at least one year abroad (OIM, 2016). Subsequent migration, or "onward migration" refers to migrants moving to a new destination, different from both the country of origin and the last country of residence (Constant, 2020). However, in this research, we consider return migration as migration of people who return to their continent of origin (Sub-Saharan Africa) – whether to their country of origin or not – after having stayed at least 12 months in Belgium. All other migrations (to countries outside Sub-Saharan Africa) are referred to as subsequent migration. The choice

of grouping people returning to Sub-Saharan Africa as a whole as return migrants is made because the number of migrants who return to their country is small, which makes it difficult to conduct a country-by-country analysis[6]. In our project, subsequent migrations are thus lower than in the classical definition, since some of these subsequent migrations are included in return migration.

3.2. Data and Methodological choices

This section focuses on the measurement of re-emigration, the different choices made, and the hypotheses supporting our approach to measuring re-emigration. Step by step, we describe the proposed method to measure the re-emigration of African migrants living in Belgium using data from the Belgian National Register.

3.2.1. Belgian National Register

The Belgian National Register is organized by type of information (TI). In our research, everal types of information will be used, particularly those that provide information on residential history (TI001 and TI006), civil status (TI120), household composition (TI140 and TI141), residence permit (TI195), and asylum procedure (TI206) (BCSS, 2022a). Therefore, we know where people come from, their country of birth, when they arrived – the date of their first registration in a Belgian municipality – their characteristics upon arrival, and the subsequent changes throughout their entire period of residence. The information is available until the person leaves the territory (for emigrants), is deregistered, or dies, or until the end of observation (censoring) for those who still live in Belgium. In the scope of this research, we focus on all migrants born in sub-Saharan Africa who arrived in Belgium between 1999 and 2014, aged 18 and above. Before merging the files containing the various types of information (TI), each TI is managed separately to harmonize censoring, which must be done on the same date for all types of information. First, the residency file, also known as the 'basic residency file,' is created from TI001. This database records events defining the residency status of each individual in Belgium, with several lines of observations, or episodes, per individual. Each event marks the change from one status (episode) to another. In this long-format database, the entry and exit of migrants under observation are documented and dated. The entry for all migrants, named enumeration, is captured only by the date of arrival, i.e., the date of the first registration in a municipality in Belgium. The end of observation (right censoring) is set for all individuals in the database on January 1, 2015 – which is the latest date at which data are available for all individuals in our dataset. Thus, each individual is represented by their identifier (id), date of birth (DOB), date of arrival (date_arriv), nature of the event (Eventcode), date corresponding to the event (Eventdate), and residence status (residence) at the date of the event (Eventdate)[7]. Starting from this basic residency file, measuring re-emigration appears straightforward. However, an important preparatory step is to ensure that the file is error-free. The event consistency matrix addresses this concern.

3.2.2. Event consistency matrix

The event consistency matrix is the tool for checking and correcting for potential errors and inconsistencies in the order of occurrence of events before the actual analysis (Bocquier et al., 2019). Errors and inconsistencies come from date management or other recording errors.

[6] That is, to analyse the return migration of Angolans to Angola, Beninese to Benin, and so on.
[7] This search is limited to the first exit.

Table 1. Event consistency matrix of African migrants who arrived in Belgium between 1999 and 2014, before correction

	Currents events (Eventcode)						
Previous events (EventPrec)	ENU	OMG	RAD	DTH	OBE	.	Total
ENU	89	5101	26601	647	64998	40136	137572
OMG	4	0	0	0	5110	0	5114
RAD	10	0	0	0	26668	0	26678
DTH	1	0	0	0	647	0	648
OBE	2079	4523	22883	544	0	34582	64611
.	137494	9	67	0	42217	515	180302
Total	139677	9633	49551	1191	139640	75233	414925

Legend: ENU (entry), OMG (exit by reported emigration), RAD (exit by deregistration[8]), DTH (exit by death), and OBE (End of observation).

Reading: The column variable (Eventcode) indicates the events for each individual from their registration in the register (ENU) until the end of the observation (OBE). The row variable (EventPrec) is constructed from Eventcode and defines the event preceding the current event. The order of time reads from left to right. The numbers in the intersection indicate the number of events depicted in the row variable that preceded the depicted in the column variable, e.g., 5101 enumerations preceded exit by reported emigration or 647 deaths preceded the end of observation. The inconsistencies in the order of events are marked in italics (see explanations in the main text).

Table 1 presents the structure of a matrix in which event dates and all errors in the sequence of events are not corrected. Although we can be certain that we are working with the expected number of individuals (139,640), many sequences are inconsistent (marked in italics in Table 1). Non-renewable events cannot occur more than once, let alone occur before the person is registered ("enumerated") in a Belgian municipality. For example, some individuals are enumerated more than once (89), and some events such as death (1), deregistration (10), and emigration (4) precede enumeration. There are also cases where censoring precedes other events (OBE row) or where missing data are wrongly observed after some event ("." column). All these errors in dates and order of events need to be corrected to get a clean file for analysis, which can be checked through the corrected matrix (Table 4).

In the remainder of this section, we present the procedure for making these corrections. We briefly describe how we proceeded to construct the residency file. The basic principle for establishing this file is that each individual must have an arrival date corresponding to their registration in a Belgian municipality (enumeration), as well as an event date for those who know any event under study, and finally, a censoring date marking the end of the observation.

[8] Deregistration is defined and explained in the following pages

Table 2. Table regarding the structure of the raw file.

Id	Date Arrival	Eventdate	Eventcode	Permit resident
1	26 May 2008	26 May 2008	Belgian municipality	Registration certificate
1	26 May 2008	25 October 2008	Belgian municipality	Without Permit
1	26 May 2008	27 October 2008	.	CIRE
1	26 May 2008	27 October 2009	.	Without Permit
1	26 May 2008	11 December 2004	Died	.
2	03 September 1999	03 September 1999	Belgian municipality	Without Permit
2	03 September 1999	12 August 2000	.	CIRE
2	03 September 1999	20 February 2006	.	Foreigner Identity Card
3	28 November 1999	28 November 1999	Belgian municipality	Registration certificate
3	28 November 1999	29 April 2000	Belgian municipality	Without Permit
3	28 November 1999	30 April 2000	.	Foreigner Identity Card
3	28 November 1999	21 September 2004	Deregistred	.
4	31 July 2004	31 July 2004	Belgian municipality	Without Permit
4	31 July 2004	05 April 2005	Declared emigration	.

Table 2 presents how a raw table looks like (example from TI195 on residence permits). Several steps are involved to come up with this file. The first step involves creating an event code variable, named 'Eventcode', based on the variable indicating whether the individual experiences the event or not throughout the entire observation period. This variable will be used for successive merges with other Individual Records (TI) from the national register. We ensure that each episode is counted only once per individual.

The second step involves creating the censoring date. This essentially means adding an extra episode to each individual corresponding to the end of the observation. Table 3 presents how the file is modified for these four individuals (tab.2): the last episode added for all individuals corresponds to censoring, meaning the end of the observation date.

Table 3: Presentation of the structure of the file with censoring: the end-of-observation episode added.

Id	Date Arrival	Eventdate	Eventcode	Permit resident
1	26/05/2008	26/05/2008	Belgian municipality	Registration certificate
1	26/05/2008	25/10/2008	Belgian municipality	Without Permit
1	26/05/2008	27/10/2008	.	CIRE
1	26/05/2008	27/10/2009	.	Without Permit
1	26/05/2008	11/12/2014	Died	.
1	26/05/2008	01/01/2015	OBE	.
2	03/09/1999	03/09/1999	Belgian municipality	Without Permit
2	03/09/1999	12/08/2000	.	CIRE
2	03/09/1999	20/02/2006	.	Foreigner Identity Card
2	03/09/1999	01/01/2015	OBE	Foreigner Identity Card

... Table 3: Presentation of the structure of the file with censoring

Id	Date Arrival	Eventdate	Eventcode	Permit resident
3	28/11/1999	28/11/1999	Belgian municipality	Registration certificate
3	28/11/1999	29/04/2000	Belgian municipality	Without Permit
3	28/11/1999	30/04/2000	.	Foreigner Identity Card
3	28/11/1999	20/09/2004	Deregistred	.
3	28/11/1999	01/01/2015	OBE	.
4	31/07/2004	31/07/2004	Belgian municipality	Without Permit
4	31/07/2004	05/04/2005	Declared emigration	.
4	31/07/2004	01/01/2015	OBE	.

Ultimately, the cleaned matrix, constructed after the insertion of censoring events, removal of episodes with missing event, correction of double enumerations, and adjustment of dates, appears in Table 4.

Table 4. Event consistency matrix of African migrants who arrived in Belgium between 1999 and 2014, after correction.

	Currents events (Eventcode)					
Previous events	ENU	OMG	RAD	DTH	OBE	Total
ENU	0	9,633	49,551	1,191	79,265	139,640
OMG	0	0	0	0	9,633	9,633
RAD	0	0	0	0	49,551	49,551
DTH	0	0	0	0	1,191	1,191
.	139,640	0	0	0	0	139,640
Total	139,640	9,633	49,551	1,191	139,640	339,655

Legend: ENU (entry), OMG (exit by reported emigration), RAD (exit by deregistration[9]), DTH (exit by death), and OBE (End of observation).

The matrix presented in Table 4 shows a perfect sequence of events and confirms the number of 139,640 Sub-Saharan Africans on whom the analysis focuses. For each individual, the entry event (ENU) precedes the exit event (OMG, RAD or DTH) or the end of the observation (OBE) for those who do not experience an event. The exposure time is captured by the residence variable which defines the periods during which an individual is at risk of experiencing an exit event. The residence is equal to 1 during the exposure period and 0 when the person is not, or no longer, exposed to the risk. In the Belgian national register, the minimum period of residence is 3 months for a person to be considered at risk of experiencing an event.

Table 5. Events by residence

	Currents events (Eventcode)					
Residence	ENU	OMG	RAD	DTH	OBE	Total
0	139,640	0	0	0	60,375	200,015
1	0	9,633	49,551	1,191	79,265	139,640
Total	139,640	9,633	49,551	1,191	139,640	339,660

Table 5 confirms coherence in the exposure of the study population likely to experience at least one exit event. The main residency file is thus created, as exemplified in Table 6.

[9] Deregistration is defined and explained in the following pages

Table 6. Extract from the Master Residency File

Id	rank	DoB	Date Arrival	Eventdate	Eventcode	Residence
1	1	18/12/1985	26/05/2008	26/05/2008	ENU	0
1	2	18/12/1985	26/05/2008	25/10/2008	Belgian municipality	1
1	3	18/12/1985	26/05/2008	27/10/2008	Belgian municipality	1
1	4	18/12/1985	26/05/2008	27/10/2009	Belgian municipality	1
1	5	18/12/1985	26/05/2008	11/12/2014	Died	0
1	6	18/12/1985	26/05/2008	01/01/2015	OBE	0
2	1	31/03/1972	03/09/1999	03/09/1999	ENU	0
2	2	31/03/1972	03/09/1999	12/08/2000	Belgian municipality	1
2	3	31/03/1972	03/09/1999	20/02/2006	Belgian municipality	1
2	4	31/03/1972	03/09/1999	01/01/2015	OBE	0
3	1	12/04/1974	28/11/1999	28/11/1999	ENU	0
3	2	12/04/1974	28/11/1999	29/04/2000	Belgian municipality	1
3	3	12/04/1974	28/11/1999	30/04/2000	Belgian municipality	1
3	4	12/04/1974	28/11/1999	20/09/2004	Deregistred	0
3	5	12/04/1974	28/11/1999	01/01/2015	OBE	0
4	1	07/10/1985	31/07/2004	31/07/2004	ENU	0
4	2	07/10/1985	31/07/2004	05/04/2005	Declared emigration	1
4	3	07/10/1985	31/07/2004	01/01/2015	OBE	0

Legend: Id (identifier for each individual), DoB (date of birth), date_arriv (date of arrival in Belgium), Eventdate (precise date at the time of the event), Eventcode (nature of the event), residence (exposure to the risk of experiencing the event).

Table 6 provides information on the life histories of 4 individuals with different outcomes by the end of the observation, January 1, 2015.

- Individual number 1 was born on December 18, 1985, arrived in Belgium on May 26, 2008, and died on December 11, 2014. His exposure is equal to 2.390 days.
- Individual number 2 was born on March 31, 1972, arrived in Belgium on September 03, 1999, and still resides in Belgium as of January 1, 2015. His exposure is equal to 5.599 days.
- Individual number 3 was born on April 12, 1974, arrived in Belgium on November 28, 1999, and was deregistered on September 20, 2004. His exposure is equal to 1.758 days.
- Individual number 4 was born on October 07, 1985, arrived in Belgium on July 31, 2004, and left Belgium by declared emigration on April 05, 2005. His exposure is equal to 248 days.

Returning to the question of dates, it is worth noting that Table 6 results from cleaning up all date-related issues. To detect these, it is recommended to perform two important checks. The first involves creating a date variable, named "datebeg", which informs about the start event for each episode. It should correspond either to the date of birth (before the date of arrival in the country) or to the date of the preceding event. The second check aims to ensure that no date is greater than the censoring date. Once these checks are done, the "stset" Stata command prepares the data for survival analysis, assisting in specifying the temporal structure of the data

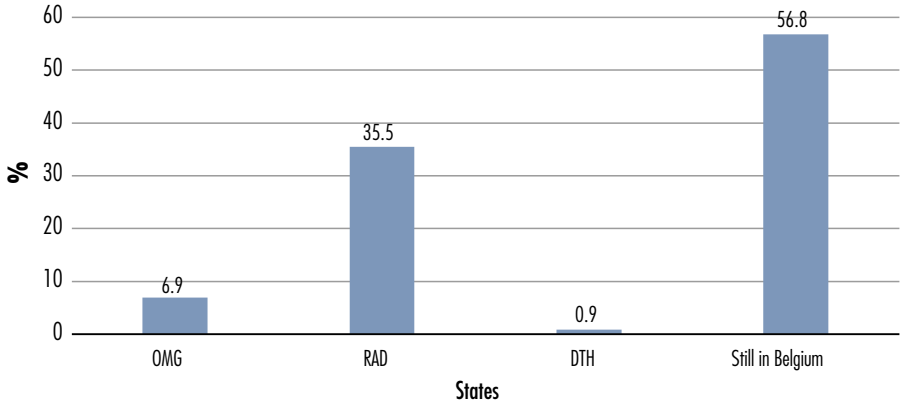
and detecting date errors. Our data have 52 error cases where entries had missing entry times (datebeg>=.), as well as a date error where the entry is recorded after the exit. These inconsistencies have been corrected.

3.2.3. The re-emigration measure: specificities of the Belgian context

The measure of re-emigration is based on the variable Eventcode (see Table 6). This variable provides information on the events experienced by African migrants living in Belgium since their arrival. The proportion of emigration between 1999 and 2014 is equal to the ratio of reported emigration (OMG) to all migrants who lived in Belgium during the same period, i.e. 6.9%.

Figure 1 shows that more than half (56.8%) of migrants from sub-Saharan Africa in Belgium who arrived between 1999 and 2014 are still present at the end of observation. Nevertheless, 35.5% of the migrants were deregistered. Who are these deregistered people?

Figure 1: Distribution of status at the end of observation between 1999 and 2014



Source: *Authors' calculations on the National Register*

Legend: OMG (exit by reported emigration), RAD (exit by deregistration), DTH (exit by death), Still in Belgium (those who remain in Belgium at the end of the observation), and OBE (End of observation).

Before answering this question, it is important to note that a deregistration is an administrative act that can have serious consequences for the persons concerned (Moriau et al., 2024; Robben et al., 2023). It consists of removing a person from the National Register. There are two types of deregistrations: ex-officio deregistrations and deregistrations by loss of the right of residence (BCSS, 2022a; Myria, 2015).

Ex-officio deregistration occurs when an investigation reveals that a person has left their main residence and has been absent for more than six months without interruption, without having reported it, and when it proves impossible to locate their new place of residence (BCSS, 2022a). This is done by the municipality, unlike deregistration by loss of right of residence decided by the Foreigners' Office (*Office des étrangers* – OE) at the end of the individual's right of residence (BCSS, 2022a).

Some measures are being implemented to prevent erroneous deregistrations. The Circular of August 30, 2013, on "Important points for correct registration in the population registers, the judicious application of ex-officio deregistration and the fight against domicile fraud" recommends that people who temporarily leave the country report their temporary absence to their municipality or a consular office abroad. As a result, they remain registered at their address, as a temporary absence of more than six months could lead to ex-officio deregistration (Myria, 2015).

For foreigners, the situation is more complex insofar as some ex-officio deregistrations at the municipality level result from declarations by third parties – including a family member, homeowner, or the neighborhood police – even though the person has not left Belgium. Some foreigners in an irregular situation may remain on the territory for a long time without finding a new address (BCSS, 2022a).

Box 1. Procedure for registration, deregistration, and reregistration of migrants

How are migrants registered in the population register in Belgium, what reasons justify their deregistration, and under what conditions can they be re-registered?

The procedure for registration, deregistration, and reregistration of migrants is regulated in Belgium by the law of December 15, 1980, on access to the territory, residence, establishment, and removal of foreigners, as amended to date. According to this law, all foreigners admitted or authorized to stay for more than 3 months or to establish themselves are required to register with the foreigner's register in the municipality of their residence within 8 working days following their arrival. They then receive from the municipality a registration certificate for this register (residence permit), which authorizes them to stay in Belgian territory for a specified period. For those whose information is insufficient, the file is forwarded to the Office of Foreigners, which decides to grant access to a residence or to order departure from the territory (departure order). Holders of a valid residence permit must renew it before it expires. Foreigners wishing to be absent for more than three months must inform the municipal administration of their intention to leave the country and return, which constitutes the right to return, provided that the residence permit is still valid. However, some migrants leave without declaring their departure and do not return, while others fail to renew their residence permits, which results in their removal from the population registers (BCSS, 2022a; Myria, 2015). Deregistration can be Ex-officio, noting the prolonged absence of a person without notification or due to loss of the right to stay, decided by the Office of Foreigners (BCSS, 2022a). The consequences of deregistration are significant, as they entail administrative invisibility and social, administrative, and economic repercussions (Moriau et al., 2024; Robben et al., 2023). For foreigners, in particular, deregistration could mean the loss of their right to stay (Myria, 2015). Thus, affected individuals are compelled to regularize their situation promptly, especially through reregistration[1]*. However, only foreigners benefiting from a right to stay for more than three months in Belgium and able to justify their presence on the territory are eligible for this procedure. Those who have left Belgium can appeal for the "return" right, subject to the decision of the Office of Foreigners (BCSS, 2022a). Given the mentioned consequences and the relatively long delay for reregistration, the Circular of August 23 2013, 2013, on "Important points for correct registration in the population registers, the judicious application of ex-officio deregistration and the fight against domicile fraud" suggests the municipal college to consider automatic deregistration only as a last resort, when all other alternative solutions have been exhausted.

* The timeframe for being re-registered after a deregistration can vary significantly depending on one's municipality of residence. It includes domicile checks and varies from one municipality to another. At the Office of Foreigners (OE), the processing time for cases involving non-EU nationals ranges from a few months (for Dutch-speaking cases) to up to a year and a half (for French-speaking cases). While awaiting re-registration, several municipalities issue an Annex 15, valid typically for 45 days until the OE's decision. The document protects against the risk of deportation but does not serve as proof of legal residence vis-à-vis third parties, such as an employer or an educational institution.

Deregistration is not trivial indeed for those remaining in the country. The main consequence is the administrative invisibility of those concerned and its corollaries on the administrative, political, and social levels (Moriau et al., 2024; Robben et al., 2023). These people no longer have an official address in the Belgian municipality and, consequently, can no longer contact the municipality to obtain official documents. They risk losing the right to certain social benefits or interventions that depend on being in the population register, and they may experience great difficulties with their health insurance. For foreigners, in particular, deregistration could mean the loss of their right of residence (Myria, 2015) and result in the loss of access to any service or benefit for which this residency status is a prerequisite. This is what Robben et al. (2023) refer to as "administrative death." For instance, for those affected, the identity card (residence permit) and driving license become invalid. It is then difficult for them to do anything without a new registration; even opening a banking account is premised on being registered. The population register thus becomes, besides a source of information, an instrument of inclusion and exclusion (Peeters & Widlak, 2018; Prescott, 2015). A few recent studies are looking into mitigating measures to tackle consequences of administrative invisibility. These solutions involve providing proxy addresses to the homeless and possibly to deregistered individuals. Additionally, some recommend separating social assistance from the obligation to provide a residential address for eligible individuals. The primary goal is to ensure that deregistered individuals do not lose their social rights (Prescott, 2015; Robben et al., 2023).

In view of all these consequences and the rather long delay in re-registration, the Circular of August 23, 2013,[10] recommends that the municipality withdraws, as soon as possible, its decision of ex-officio deregistration for any person erroneously deregistered to allow a return to the correct residence situation and to consider the procedure of ex-officio deregistration only in the absence of any alternative solution[11].

To sum up, deregistration can have serious consequences on migrants' lives and considerably complicate the estimation of re-emigration.

3.2.4. Under what assumptions can deregistrations be accounted for in the measurement of re-emigration?

In this article, deregistrations are considered in the estimation of re-emigration, as is the case for the Statbel data, which include ex-officio deregistrations in the measurement of re-emigration[12]. Two assumptions justify this choice. The first hypothesis is called presumption, and the second is called under-reporting.

Art. 39 § 7 of the Royal Decree of October 8, 1981, on access to the territory, residence, settlement, and removal of foreigners, as amended and completed to date[13], stipulates: "*A foreigner who is ex-officio deregistered from the register by the local administration or whose residence permit has expired more than three months ago is presumed, unless proven otherwise, to have left the country.*" It is, therefore, by the legal presumption that the person who has been deregistered is considered to have left the country.

Moreover, despite the recommendation to declare their temporary absence to their municipality or a consular office abroad, many foreigners who temporarily leave the

[10] Circular of August 23, 2013 on Important points for correct registration in the population registers, the judicious application of ex-officio deregistration and the fight against domicile fraud.

[11] That is, when all efforts to determine the principal residence have been in vain.

[12] https://statbel.fgov.be/fr/themes/population/mouvement-de-la-population

[13] Last updated on 18-07-2022 :_
https://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=fr&la=F&cn=1981100831&table_name=loi

host country do not declare their departure either to a Belgian municipality or to a consular office abroad. As a result, after 6 months, which may vary according to the commune, these foreigners will be removed from the national register on the basis that they no longer have a legal address in Belgium (BCSS, 2022a). Two cases can be considered. The first confirms the "under-reporting" hypothesis, which states that foreigners return home or migrate elsewhere without reporting their exit and without coming back. This category is called "deregistrations with emigration" and should be considered in measuring re-emigration because the people concerned have left the country. The second case includes people who are deregistered but who do not leave the country. This is the case for those who have lost their right of residence but are still in the country without a residence permit and are administratively invisible (Farcy & Smit, 2021; Merla et al., 2021). This category is called "deregistrations without emigration" because the persons are still present in the country (Robben et al., 2023).

3.2.5. How to detect deregistrations without emigration?

In practice, it is difficult to dissociate the two types of cases mentioned above, and thus to detect with certainty the "deregistrations without emigration." The rule proposed here is to consider as "deregistrations without emigration" all the deregistrations that are not directly followed by the end of observation (OBE) but by a change in status in the National Register. This is the case, for example, of an individual who arrived in Belgium in 2004 and was deregistered in 2013. However, before the end of the observation period (January 1, 2015), we notice that she changed her marital status and her professional status, and obtained the answer to an asylum procedure. Only the deregistrations directly preceding the end of the observation period – without subsequent events - will be considered as true deregistrations. Therefore, any change of status that occurs after the person has been removed from the register is evidence of their presence on the territory. Thus, persons in this situation are considered to have changed their legal status and not to have left the country. These deregistrations are qualified as deregistrations without emigration.

The disadvantage of this rule is that when a migrant is deregistered without emigration and then experiences a new episode before the end of the observation period, it may be difficult to determine whether the migrant actually left and returned or remained in the territory for the entire period after deregistration. This approach also depends on the duration after the deregistration. People who were deregistered long before the end of the observation period are more likely to have experienced an event before the end of observation than people who were deregistered a few months before the end of the observation. However, when the duration between deregistration and the end of observation is short, status changes for individuals who have not left the territory are less recorded, leading to an overestimation of re-emigration. In contrast, when this duration is long, the chances of recording status changes for individuals remaining on the territory increase, thus bringing the data closer to reality.

3.3. Methods of data analysis

Descriptive methods are employed in the analysis. First, cross-tabulations are used to highlight the impact on the measurement of re-emigration among African migrants in Belgium depending on the way various types of deregistration are considered. Bivariate analyses are also conducted to study migrant profiles, taking into account specific socio-demographic characteristics such as region of origin, region of arrival in Belgium, family situation, permit of residence, and asylum procedure.

4. Empirical results

4.1. Impact of the methodological choice on re-emigration intensity

In this research, we decided not to apply the same logic used for deregistration (with or without emigration) to declared emigration, for several reasons. Indeed, the concept of "falsely declared emigration" is hardly relevant, as individuals who declare their departure do actually leave the territory.

Table 7 below summarizes all the possible scenarios discussed above and shows how it affects the measurement of re-emigration occurrence. Scenario 1 considers only reported emigration; scenario 2 includes both declared emigration and all deregistrations; scenario 3 includes reported emigration and a fraction of deregistrations, namely deregistrations with emigration. Scenario 1 is unrealistic and greatly underestimates re-emigration, as many migrants leave the host country without reporting their departure. Similarly, scenario 2 would be biased, as it considers all deregistrations without distinction, while many migrants are deregistered without leaving the country. Scenario 3 seems more plausible and is justified by the assumptions of legal presumption and underreporting developed above.

Table 7. Summary of the impact of choices made on measuring the re-emigration of African migrants who lived in Belgium between 1999 and 2014

	Scenario 1: Considers reported emigration only		Scenario 2: Considers reported emigration and all deregistrations		Scenario 3: Considers reported emigration and deregistrations with emigration	
Nature of events	Frequency	%	Frequency	%	Frequency	%
Reported emigration	9,633	6,9	9,633	6,9	9,633	6,9
All deregistrations	49,551	35,5	49,551	35,5		
Deregistrations with emigration					23,599	16,8
Deregistrations without emigration					25,952	18,6
Deaths	1,191	0,85	1,191	0,85	1,191	0,85
Still in Belgium	79,265	56,76	79,265	56,8	79,265	56,8
Proportion of re-emigration		6,9		42,4		23,7
Total	139,640	100.0	139,640	100.0	139,640	100.0

Source: *Belgium register national and BCSS*

From this table, we see that more than half of the deregistrations are "without emigration" because other events follow them before the end of the observation (scenario 3)[14]. The long-term observation of individuals regarding their socio-professional situation (BCSS) and changes in municipality or region allows for more effective detection of false deregistrations[15]. Deregistrations without emigration are taken into account as a change in status, which reduces deregistrations from 35.5% to 16.8%. Consequently, the proportion of re-emigrants in this research is estimated at 23.7% (Table 7: scenario 3), much higher than in Scenario 1 (6.9%) but much lower than in Scenario 2 (42.4%). The Kaplan-Meier estimates shows that 25% of all sub-Saharan Africans had left Belgium after 6.5 years (scenario 3).

[14] Appendix illustrates the difference between a deregistration without emigration and a true deregistration (with emigration).
[15] The results are generated solely from data in the Belgian National Register.

4.2. Profile of persons deregistered without emigration, persons deregistered with emigration and declared emigrants

Now that the option has been examined and the proportion of re-emigrants is estimated (23.7%), we examine to what extent individuals who have been deregistered and have left the territory differ from those who have been deregistered but have not left the territory. In other words, what are the factors that differentiate these two categories of deregistered individuals? The importance of this question is both scientific and political. Scientific, as it allows for the identification of specific characteristics of individuals deregistered without emigration. Political, in the sense that it could assist policymakers in proposing targeted interventions for this population group to propose solutions aimed at limiting these deregistrations.

This section answers this question by analysing the profiles of these individuals and examining whether the differences between these two categories are significant (chi-square test). In addition to these categories, declared re-emigrants are added to the analysis, to identify if people who experience deregistration with emigration are similar to declared re-emigrants.

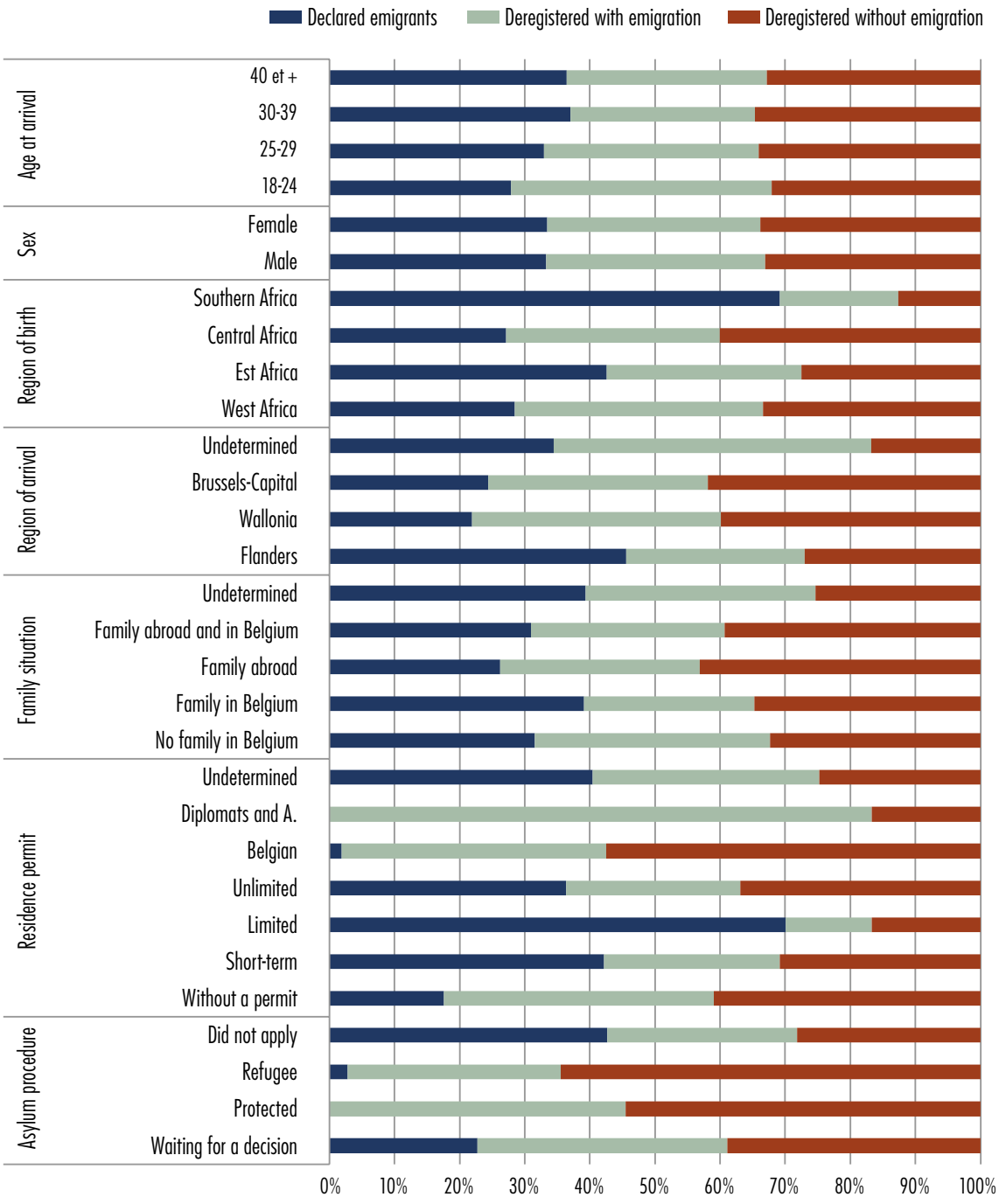
Based on the results presented in Figure 3, deregistration without emigration and deregistration with emigration have almost similar characteristics. The latter arrive in Belgium very young. They are, on average, 30 and 31 years old, respectively. In most cases, they have no family in Belgium. They live either alone or with unrelated persons. As far as their administrative situation is concerned, many of them have applied for asylum and/or subsidiary protection and are waiting for a response (48%). This situation concerns more than half of the cases of deregistration without emigration, that is, individuals who experienced an event on the territory sometime after their deregistration (51.5%). Periods of irregularity seem to be the fundamental reason for their deregistrations, as many do not have a residence permit (51.1%), either because they have lost their right of residence or because they are waiting for a response to their asylum application (BCSS, 2022a).

Many of the declared emigrants have a limited residence permit (29.7%). Almost one out of two has no family in Belgium (49%). This category is overrepresented by single and young migrants who came to Belgium for study reasons, as around seven out of ten have not applied for asylum (69.7%). They come mostly from Central and West Africa and reside in Flanders in 57.4% of cases.

The detailed analysis of these events at the level of the municipalities[16] shows that the municipalities of Brussels, Anderlecht, Antwerp, Liège, Molenbeek-Saint-Jean and Schaerbeek are the municipalities which record the highest number of deregistered without emigration, which can partly be explained by the size of the African population in these municipalities. However, administrative practices in terms of deregistrations by municipality deserve close attention to understand the differences between municipalities.

[16] Detailed results not presented in this text.

Figure 3: Distribution of deregistered persons without emigration, with emigration, and declared emigrants in Belgium, based on socio-demographic, family, and administrative characteristics[17]



Source: *Authors calculations on the National Register*

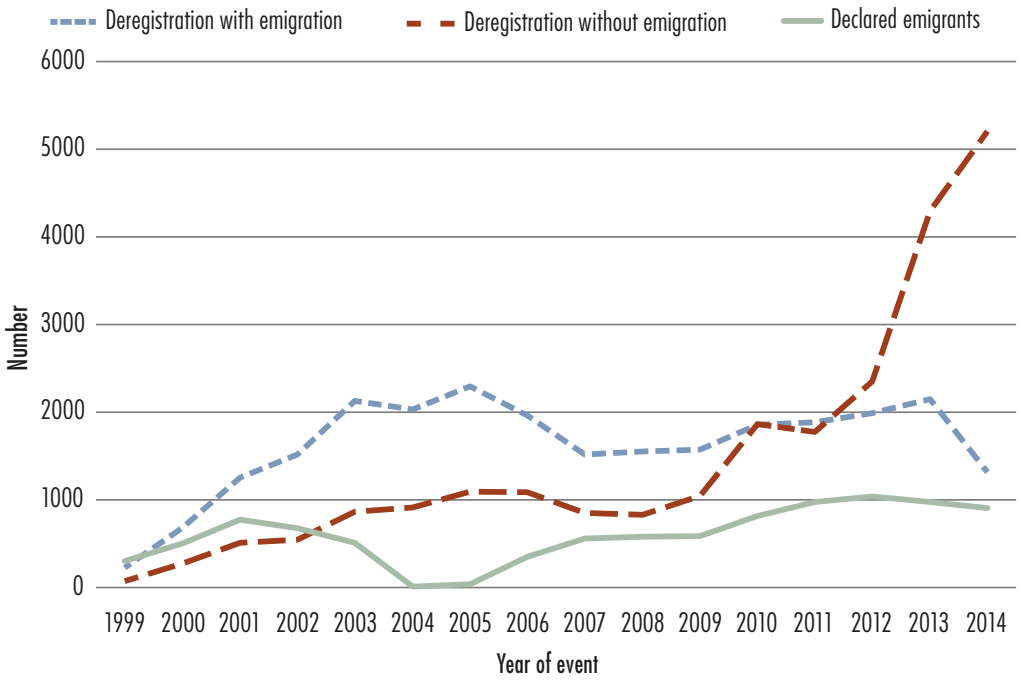
Legend : Residence permit: Short-term (3 to 6 months), limited (1-year renewable), and unlimited, corresponding to authorization to settle in the territory. Belgian: these are my naturalized African migrants. Without a permit corresponds to periods of irregularity during which migrants stay without a regular residence permit (Schoumaker et al., 2021). Diplomats and A. are the diplomats and assimilated, and finally, Undetermined are the missing. Furthermore, the number of diplomats and associates, as well as beneficiaries of subsidiary protection, is extremely low and, therefore, less represented.

[17] The results in figures 3 are statistically significant, as shown by the Chi^2 test. Data not presented in this article.

These results confirm that many deregistration cases are linked to the end of the asylum procedure. Asylum seekers who remain without a residence permit for months or even years can be regularized afterward. Actually, they do not leave the territory of the host country but change their status. This reinforces the decision to exclude them in the measurement of re-emigration.

Figure 4 shows that the number of departures is low in the first few years since few people arrive and leave in the same year or the year after. The trends are more reliable from 2002 onward. The number of individuals who declare their departure (declared emigrants) is lower than those who leave without declaring it (deregistration with emigration). Together, they represent between 2 000 and 3 000 departures every year since the early 2000s. The number of African migrants who are deregistered without leaving the territory increased significantly from 2009 to reach its peak in 2014. This high number could be explained by the relatively long durations of asylum procedures resulting in orders to leave the territory and systematic deregistrations while migrants remain in the territory in an irregular situation (without a residence permit). These trends clearly show that the way deregistered people are taken into account in the measurement of emigration matters. If all deregistrations were taken together in the measurement of emigration, one would conclude to a growing number of emigration – which is not the case according to our approach.

Figure 4. Evolution of deregistrations without emigration, deregistrations with emigration, and declared emigrations in Belgium between 1999 and 2014



Source: *Authors' calculations on the National Register*

4.3. Summary of results and implications for research

Our descriptive analyses reveal that younger individuals (aged 25 to 39) are more likely to experience deregistration with emigration compared to older individuals. This suggests that younger people are more inclined to leave Belgium without declaring their departure, unlike their older counterparts. This trend is also noticeable among those not living with their families in Belgium, especially students and individuals living alone.

Furthermore, the asylum procedure appears to reduce the likelihood of leaving the host country's territory. Individuals involved in an asylum process have lower probabilities of emigrating and, consequently, declaring their emigration compared to those who have not initiated an asylum procedure. Consequently, a change in status, particularly for those obtaining a refugee status or acquiring Belgian nationality, exposes migrants more to being deregistered without emigration. This is due to the almost negligible probability of declaring departure for migrants obtaining a refugee status.

Regarding residence permits, our results indicate that living without a valid residence permit (either short-term, limited, or unlimited) reduces the chances of declaring emigration compared to those holding a valid permit. However, this situation increases the risk of being deregistered, with or without emigration.

Our descriptive analyses do not highlight significant differences in profiles between deregistered migrants without emigration and those deregistered with emigration. However, comprehensive multivariate analyses are required to confirm the absence of significant differences and, if necessary, identify the most discriminating factors among these two categories. It is essential to highlight factors such as the asylum procedure, the type of residence permit, the region of residence (municipality), and the age of migrants. Age is particularly relevant, as it would allow for examining whether deregistrations without emigration affect more active individuals, young adults, or older persons. Similarly, the asylum procedure and type of residence permit are key factors, as the processes associated with these statuses influence deregistration cases. Finally, procedural differences between regions, particularly in terms of duration, may also explain some deregistrations.

5. Conclusion

Many deregistered people leave the territory of the host country without declaring their exit and do not come back. In most of the literature, these deregistrations are treated as emigrants in their own right. However, some of these deregistrations are "nonemigrants" because the individuals concerned do not leave the territory of the host country. Declared emigration alone cannot objectively define re-emigration.

For those who leave the host country and do not return, their inclusion in the re-emigration is justified by the assumptions of legal presumption and under-declaration. This is not the case for those who are removed and whose presence is recorded in the years following their removal from the register.

This research shows that National Register data can be used to estimate re-emigration in a more refined way. Unlike the procedure used by some statistical institutions, our method can reduce the bias of using all deregistrations as emigrations as well as reported emigrations. We show that it is possible to detect deregistrations without emigration and to adjust the measure of re-emigration accordingly. Only true deregistrations that are preceded by the end of the observation are considered in the measure of re-emigration. However, despite efforts to differentiate between deregistrations without emigration and true deregistrations, the next destination after true deregistrations remains unknown.

As far as migration data are concerned, our results militate for a strengthening of the measures that would facilitate the declarations of exit as per Art. 39 § 7 of the Royal Decree of October 8, 1981, on access to the territory, stay, settlement, and removal of foreigners. In addition, the municipal administrations should work more closely with the border staff. The reasons for leaving and the country of next destination would be better captured if reported at the border, as the next destination is generally not documented in the deregistration procedure. Finally, to disaggregate the true deregistrations with and without emigration, it would be

useful to consider the reasons for deregistrations in the population registers. In this way, it would be possible to determine whether deregistrations are related to the loss of the right of residence rather than to leaving the country.

However, increased coordination between municipalities and border control services risks shifting data collection from a support-based to a surveillance-based approach, further marginalizing vulnerable groups.

Finally, sustained attention should be paid to those who are deregistered and do not leave the country after being deregistered. Thousands of them, during the period covered by the study (1999-2014), become invisible to the administrative system. Many would be in a situation of distress or would live in precariousness. It would be worth considering other, more ethical alternatives, such as dissociating migrants' access to social rights from their registration or administrative status, as proposed by Moriau et al. (2024)ons.

References

Many derAhrens, J., Kelly, M., & Liempt, I. V. (2016). Free Movement? The Onward Migration of EU Citizens Born in Somalia, Iran, and Nigeria. *Population, Space and Place*, *22*(1), 84-98. https://doi.org/10.1002/psp.1869

Amparo Gonzalez, F., & Inmaculada Serrano, S. (2018). *Preparation of Survey Tools for Merged Dataset :* (WORKING PAPER SERIES Temporary versus Permanent Migration, TEMPER EU Project No. 14).

BCSS. (2022a). *Description des données du Registre National et du Registre BCSS*. https://www.ksz-bcss.fgov.be/sites/default/files/assets/services_et_support/cbss_manual_fr.pdf

BCSS. (2022b). *Nomenclature de la position socio-économique à partir de 2003 : Description de la structure et des conditions*. https://www.ksz-bcss.fgov.be/dwh/fr/dwh_page/content/websites/datawarehouse/others/structure-nomenclature.html

Beauchemin, C., & Schoumaker, B. (2013). Les enquêtes MAFE : repères méthodologiques. In *Cris Beauchemin éd., Migrations africaines : Le codéveloppement en questions : Essai de démographie politique.* (p. 23-40). Paris: Armand Colin. https://doi.org/10.3917/arco.beauc.2013.01.0023

Begu, M. J. (2025). *Revenir chez soi ou partir ailleurs ? : Dynamiques familiales, politiques migratoires et trajectoires de migration des migrants africains vivant en Belgique et au Canada.* Presses universitaires de Louvain, Belgique. 329p.

Bocquier, P., Ginsburg, C., & Collinson, M. A. (2019). A training manual for event history analysis using longitudinal data. *BMC Research Notes*, *12*(1), Article 1. https://doi.org/10.1186/s13104-019-4544-1

Camenisch, M., & Debarbieux, B. (2011). Les migrations inter-communales en Suisse : Un « effet-montagne » ? *Journal of Alpine Research | Revue de géographie alpine*, *99-1*, Article 99-1. https://doi.org/10.4000/rga.1360

Caron, L. (2018). De qui mesure-t-on l'intégration ? Remigration des immigrés et insertion professionnelle en France. *Population*, *Vol. 73*(3), 503-542. https://doi.org/10.3917/popu.1803.0503

Caron, L., & Ichou, M. (2020). High Selection, Low Success : The Heterogeneous Effect of Migrants' Access to Employment on Their Remigration. *International Migration Review*, *54*(4), 1104-1133. https://doi.org/10.1177/0197918320904925

Constant, A. (2020). *Time-Space Dynamics of Return and Circular Migration* (Handbook of Labor, Human Resources and Population Economics No. 8053; p. 1-42). Center for Economic Studies and ifo Institute (CESifo), Munich. https://doi.org/10.1007/978-3-319-57365-6_107-1

de Hoon, M., Vink, M., & Schmeets, H. (2020). A ticket to mobility? Naturalisation and subsequent migration of refugees after obtaining asylum in the Netherlands. *Journal of Ethnic and Migration Studies*, *46*(7), 1185-1204. https://doi.org/10.1080/1369183X.2019.1629894

Desrosières, A. (2013). Chapitre 5. Enquêtes versus registres administratifs : Les deux sources de la statistique publique. In *Gouverner par les nombres : L'argument statistique II* (p. 95-118). Presses des Mines. http://books.openedition.org/pressesmines/352

Durand, J., & Massey, D. (2019). Evolution of the Mexico-U.S. Migration System : Insights from the Mexican Migration Project. *The ANNALS of the American Academy of Political and Social Science*, *684*, 21-42. https://doi.org/10.1177/0002716219857667

Farcy, J.-B., & Smit, S. (2021). Statuts sous contraintes : Influence des temporalités imposées sur l'irrégularisation des étrangers. In *Merla, Laura ; Sarolea, Sylvie ; Schoumaker, Bruno (dirs.) Composer avec les normes. Trajectoires de vie et agentivité des migrants face au cadre légal.»* (Academia-L'Harmattan, p. 151-167).

Larramona, G. (2013a). Espagne : L'émigration des immigrés. *Population*, *Vol. 68*(2), 249-271. https://doi.org/10.3917/popu.1302.0249

Larramona, G. (2013b). Out-migration of immigrants in Spain. *Population, English edition*, *68*(2), 213-235. https://doi.org/10.3917/popu.1302.0249

Merla, L., Sarolea, S., & Schoumaker, B. (2021). *Composer avec les normes. Trajectoires de vie et agentivité des migrants face au cadre légal.* Academia-l 'harmattan, 366p.

Monti, A. (2020). Re-emigration of foreign-born residents from Sweden : 1990–2015. *Population, Space and Place*, *26*(2), e2285. https://doi.org/10.1002/psp.2285

Moriau, J., Malherbe, A., Sanderson, J.-P., Pierre, A., & Leclercq, A. (2024). Invisible to the state. An initial estimate of "administrative disappearances" in the Brussels-Capital Region. *Brussels Studies. La revue scientifique pour les recherches sur Bruxelles/Het wetenschappelijk tijdschrift voor onderzoek over Brussel/The Journal of Research on Brussels*. https://journals.openedition.org/brussels/7553

Myria. (2015). *La migration en chiffres et en droits. Focus : La problématique des inscriptions et la radiation d'office.* (p. 244). https://www.myria.be/fr/publications/la-migration-en-chiffres-et-en-droits-2015

Nekby, L. (2006). The emigration of immigrants, return vs onward migration : Evidence from Sweden. *Journal of Population Economics*, *19*(2), 197-226. https://doi.org/10.1007/s00148-006-0080-0

OIM. (2016). *Etat de la migration dans le monde 2015 : Les migrants et les villes - de nouveaux partenariats pour gérer la mobilité*. United Nations, Geneve, 239p.

Peeters, R., & Widlak, A. (2018). The digital cage : Administrative exclusion through information architecture – The case of the Dutch civil registry's master data management system. *Government Information Quarterly*, *35*(2), 175-183. https://doi.org/10.1016/j.giq.2018.02.003

Perrin, N. (2007). Les déterminants individuels du retour ou de la pérennisation de l'immigration : Une analyse du cheminement des immigrants dans les années 1990 en Belgique. In *Les migrations internationales: observation, analyse et perspectives: colloque international de Budapest, 20-24 septembre 2004* (No. 12, p. 297). INED.

Poulain, M., & Herm, A. (2013). Le registre de population centralisé, source de statistiques démographiques en Europe. *Population*, *68*(2), 215-247. https://doi.org/10.3917/popu.1302.0215

Prescott, C. (2015). What Is the Value of an Address? *Journal of Creating Value*, *1*(1), 33-44. https://doi.org/10.1177/2394964315569642

Régnier-Loilier, A., & Guisse, N. (2016). Chapitre 2. Attrition et déformation de l'échantillon au fil des vagues de l'enquête Érfi. In *Parcours de familles : L'enquête Étude des relations familiales et intergénérationnelles* (p. 53-85). Ined Éditions. https://doi.org/10.4000/books.ined.4768

Robben, L.-L., Pierre, A., & Hermans, K. (2023). 'Without an address, you do not exist' : The administrative invisibility of people experiencing homelessness in Belgium. *Citizenship Studies*, *27*(5), 566-583. https://doi.org/10.1080/13621025.2023.2237418

Schoumaker, B., Le Guen, M., Caron, L., & Nie, W. (2022). Multiple (il)legal pathways: The diversity of immigrants' legal trajectories in Belgium. Demographic Research, 47, 247–290. https://doi.org/10.4054/DemRes.2022.47.10

Solignac, M. (2018). L'émigration des immigrés,une dimension oubliée de la mobilité géographique. *Population*, *73*(4), 693-718. https://doi.org/10.3917/popu.1804.0693

Turcatti, D. (2022). Remapping onward migration through the trajectories of Colombian parents in London. *Migration Studies*, *10*(4), 703-721. https://doi.org/10.1093/migration/mnac022

Vanthomme, K., & Vandenheede, H. (2021). Factors Associated with Return Migration of First-Generation Immigrants in Belgium (2001–2011). *European Journal of Population*, 1-22. https://doi.org/10.1007/s10680-021-09581-5

Appendix

Comparison of true deregistration (id 2977) and deregistration without emigration (id 1126)

id	Rank	Date of Birth	date of arrival	Minicipality	Event date	Code of event	Country of destination
2977	1			Molenbeek-Saint-Jean	19/05/1963 00:00	Lives without family	Dest. unknown
2977	2			Molenbeek-Saint-Jean	27/06/2001 00:00	No residence permit	Dest. unknown
2977	3			Molenbeek-Saint-Jean	27/06/2001 12:01	Brussels-Capital Region	Dest. unknown
2977	4			Molenbeek-Saint-Jean	08/11/2001 23:59	Limited	Dest. unknown
2977	5			Bruxelles	09/11/2001 12:00	Brussels-Capital Region	Dest. unknown
2977	6			Bruxelles	07/11/2005 23:59	No residence permit	Dest. unknown
2977	7				21/11/2005 23:59	Limited	Dest. unknown
2977	8				14/12/2005 00:00	Belgian	Dest. unknown
2977	9				22/09/2010 23:59	Radiation	Dest. unknown
2977	10				01/01/2015 00:33	OBE	Dest. unknown
1126	1			Anvers	31/12/1983 23:59	Lives without family	Dest. unknown
1126	2			Anvers	31/05/2004 23:59	No residence permit	Dest. unknown
1126	3			Anvers	01/06/2004 06:00	Waiting for decision	Dest. unknown
1126	4			Anvers	01/06/2004 12:00	Flemish Region	Dest. unknown
1126	5			Anvers	04/02/2005 00:00	Radiation	Dest. unknown
1126	6			Anvers	09/06/2005 23:59	Lives without family	Dest. unknown
1126	7			Anvers	10/06/2005 05:59	Refugee	Dest. unknown
1126	8			Anvers	10/06/2005 12:00	Flemish Region	Dest. unknown
1126	9				21/03/2008 00:00	Lives without family	Dest. unknown
1126	10				01/01/2015 00:33	OBE	Dest. unknown