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The Link between Family Formation Dynamics and Migration. The Case of Senegalese Migrants in Europe.

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Abstract:

This paper examines the relationship between migration experiences and family formation trajectories of Sub-Sahara African migrants in Europe. It builds on two theoretical approaches that link migration with fertility and nuptiality, namely the disruption and the interrelation of events hypotheses. I use longitudinal data from Senegalese migrants in Spain, France and Italy collected in the framework of the survey "Migrations between Africa and Europe" (MAFE-MESE-Senegal). Applying sequence analysis techniques and distinguishing between genders, I compute the distances between different life course sequences in terms of childbearing and union formation during the immediate time before and after migration. Individuals are grouped into clusters according to the dissimilarities in their family formation trajectories. The clusters indicate that for men and women union formation and childbearing are strongly linked with migration processes. Regression analyses reveal that age at migration and educational levels are important predictors for different family formation-migration trajectories.

1. Introduction

In 2010, the World Bank estimated that almost five percent of the Senegalese population was living abroad (The World Bank 2012), a big share that only accounts for international migration stocks by excluding illegal border crossings and internal migratory movements. In the same year, the top five destination countries of Senegalese migrants were The Gambia, France, Italy, Mauritania and Spain. These numbers might reflect the importance of shedding light on Senegalese migratory processes. International migration is associated with abrupt changes in migrants' surroundings and living arrangements and ensuing demographic behaviors, such as family formation dynamics. So far, research on migration in this geographic context is scarce and it is not clear if migrants from Sub-Sahara Africa follow similar patterns with regard to family formation as migrants in other migratory settings. Most of the research that has been done in this field analyses short- and long-term effects of migration from high- to low-level fertility countries on marriage timing and fertility quantum and tempo, mainly concentrating on Mexican migration processes to the U.S. This paper aims to examine how individual family formation[1] trajectories of Senegalese men and women are linked to their migratory movements. In the context of migration it is of special interest to get an insight in the way migrants arrange their family life across time and space. The objective is to identify the variations in Senegalese family formation dynamics and its interactions with the migration process. The main research questions that are addressed in this paper are: *How does family formation interact with the migration process of Senegalese migrants in Europe? What are the gender-specific family formation trajectories in the context of migration? How divergent are migrants' life courses when comparing family formation processes across ages, genders and different receiving contexts?*

Using Sequence Analysis techniques it is possible to go beyond a static description at one point in time, but rather to provide insights over a period of time. So, the understanding of different family trajectories and how these can be influenced by other variables can be enhanced. The objective is to examine associations between different family formation trajectories and migration, rather than finding a causal relationship between them.

After this first introductory part, the paper is structured in the following way: The second section summarizes the major theoretical approaches that link migration with family formation and that serve as a theoretical basis for the analysis – namely disruption and interrelation of events. Relevant previous findings are presented. Third, Senegalese family and household dynamics in the context of migration are explained. Thereby I take a closer look at Senegalese family arrangements, fertility and nuptiality patterns, as well as family-migration strategies. In the forth part several research hypotheses are proposed. Fifth, the data and methods (Sequence Analysis and Multinomial Logistic regression) are presented. Section six presents the results and the last part summarizes and discusses the major findings and as well as directions for future research and policy implications.

2. Migration and Family Formation: Theoretical Approaches and Previous Empirical Findings

As fertility and nuptiality patterns are already a phenomenon difficult to analyze within one country, it even gets more difficult when disentangling the family formation behavior of migrants. Migration is a crucial event in an individual's life course, affecting future behavior in the short- but also in the long run. Migrants relocate to a new setting with often completely different systems of norms, values and structures with regard to family formation, as well as diverging socio-economic and demographic

[1] Throughout this paper I use the expressions “family building” and “family formation” to refer to both, marriage and fertility behavior.

characteristics. These differences might not be more pronounced as for the case of Senegalese migrants in European destination countries. There is a battery of theoretical approaches and mechanisms describing the relationship between internal and international migration and fertility and marriage behaviors. In previous empirical studies these theories have been tested for many different migratory settings (see literature review in the reminder), but so far they rarely have been applied to the case of Sub-Saharan, and especially Senegalese, migrants in Europe. The existing theoretical approaches are partly competing, partly complementary and have the common goal of explaining the impact of geographic mobility (internal and international migration flows) on family building patterns of the migrant population (Kulu 2005).[2] Since this paper has its focus on the direct and short-term interrelations between family formation and migration that take place in the years shortly before and directly after migration, only two approaches are relevant, namely disruption and interrelation of events.

As migration does not only interact with fertility but also with union formation, and fertility itself is also connected to marriage, both phenomenons will be taken into account. According to Baizán et al. (2001), nuptiality and childbearing are strongly interrelated and one cannot be examined without taking into consideration also the other. Especially in the here-analyzed Senegalese case, and in general in the whole sub-Saharan African context, union formation and childbirth are two highly intertwined events and thus should be studied together.

2.1 Disruption Hypothesis

The disruption hypothesis builds on two main features: 1) It states that low fertility levels in the time shortly before and after migration can be drawn back to economic and psychological situations of stress inherent to migration processes. The individual undergoes drastic changes in a new environment and in his daily life (Milewski 2007). He has to adapt to the new context in the destination country with "other political, social policy, labor market, and gender systems". This also might affect fertility outcomes (Andersson 2004: 752). Especially when origin and destination countries are different as for the case of Senegal and Europa, disruption due to psychological stress is likely. 2) The *separation of couples* as a direct effect of the migration process itself also contributes to low fertility outcomes after migration. The disruptive effect of migration due to separated spouses implicates important differences by sex depending on the type of migration. In general, the spouse who migrates first within a union shows a disrupted fertility after migration. On the other side and in case it comes to couple reunification at destination, the other spouse experiences a reduced fertility before his or her own migration until reunification occurs. To sum up, this theoretical approach "locates the causative mechanisms at neither destination nor origin, but rather views them as associated with the move itself" (Stephen and Bean 1992: 70). Generally, the effects of disruption are supposed to be temporary and only occurring during the immediate time before and/or after migration.

[2] The *selection hypothesis* argues that the fertility behavior of migrants differs from the one of non-migrants due to the fact that migrants are a selected group with fertility patterns that are more similar to the one of the host country than to the one of their origin country (Kulu 2005, Milewski 2007). The *adaptation hypothesis* states that the initial characteristics in fertility behavior are different in origin and destination countries and over time migrants' behaviors converge to the one of the host country (Andersson 2001). The *socialization hypothesis* states that the first generation of migrants maintains the fertility patterns of their origin country and only the subsequent generations, born in the host country, converge to the patterns of their native-born counterparts (Milewski 2007). The *disruption hypothesis* affirms that in the time directly after migration, migrants have a low fertility level as a result of the "disruptive factors" inherent to the migration process (Kulu 2005: 53). And finally, *interrelation of events* is the last hypothesis, which argues that migration itself is not the reason for higher fertility, but rather are higher levels of fertility the coincidence of migratory processes and family building at the same time (Andersson 2004).

By contrast, several empirical studies observed relatively high birth rates directly after migration. This can be seen as “catching-up behavior for postponed or interrupted childbearing” (Milewski 2007) in the time immediately before and during migration (see also Goldstein and Goldstein 1981). Thus, these increased levels of birth can be seen as a result of a previous disrupted fertility. A disruptive effect of migration on union formation has also been found (Carlson 1985).

Several empirical studies found evidence for the disruption hypothesis in different geographical migratory settings. Goldstein (1973) carried out one of the first quantitative empirical studies examining rigorously the relationship between internal migration processes and fertility. He finds that the fertility levels during the first years after migration (less than 5 years) are lower for migrants than for the local population at destination, but on the long run, birth rates are the same for both groups. In a later study, Goldstein and Goldstein (1981) examine this association more in detail, again for rural-urban migration in Thailand. The results suggest that migration has a clear disruptive effect on fertility, meaning that childbearing levels are relatively lower in the time preceding migration and higher after migration in comparison to non-migrant women. So, they observed a "catching-up behavior" of postponed or interrupted childbearing (Milewski 2007). Also Hervitz (1985) found support for the disruption hypothesis for the case of internal migration in Brazil. Brockerhoff (1995) found very low fertility levels of recent rural-urban migrants in different African countries. Reasons for this are on the one hand a big share of unmarried migrants and, on the other hand, the separation of spouses leads to low birth rates for female migrants. White et al. (1995) came to similar results for Peruvian internal migrants. A change of residence substantially reduces the childbearing rate and it lengthens the birth interval between first and second child. For international migrants to Australia, Carlson (1985) found evidence for a short-term disruptive effect of migration on family formation (marriage and childbirths). Kulu (2005) analyses fertility patterns of internal migrants in Estonia. Individuals moving to big cities have a relative low risk of getting pregnant in the time immediately after migration. This postponement of childbearing might be due to the economic and psychological stress of migrating and getting settled in a new environment (migrants moving to small/rural areas have elevated risks of birth after migration; see interrelation of events hypothesis). Andersson’s (2004) findings challenge the disruption hypothesis as he found relatively high birth rates in the period immediately after migrating to Sweden. However, his results indicate that there is a disruptive effect of migration on fertility in the time preceding migration, which he explains with a “postponement of the childbearing in anticipation of such a possible event” (Andersson 2004: 771). Devolder and Bueno (2011) analyze the interplay of fertility and migration by comparing different migrant groups in Catalonia, Spain, with native-born women. Distinguishing between natives, European, American and African women they calculate age-specific fertility rates and apply duration models in order to measure the likelihood that the migrants have a child in the period before or after migration. African women are the ones with the most obvious disruptive effect in their childbearing behavior before migration. For the Canadian migration context, Ng and Nault (1997) did find no or only limited evidence for the disruption hypothesis. They argue that other authors’ findings of this hypothesis could be due to inappropriate methods used. Bledsoe, Houle and Sow (2007) examined from an ethno-demographic point of view the fertility behavior of Gambian migrants in Spain. They find that this migrant group has a higher number of children per person than do Gambians have in the origin country. The authors explain this phenomenon with “child accumulation” as a result of Spanish restrictive migration laws. These policies make that Gambians circulate their family members mainly through marriage and childbearing, which explains the high fertility rates among this migrant group.

A big body of literature deals with the case of Mexican and other Latin American migrants to the United States, where migration and its implications have a several decade long history. Since Hispanic countries have traditionally higher fertility levels than the U.S. one can observe migrants’ changes in fertility over time. In this context researchers analyze the direct effects of migration on fertility and marriage patterns. Several studies also found evidence for the disruption hypothesis in

this migratory setting. Stephen and Bean (1992) detected that the disruptive effect of migration for Mexicans in the US is only observable for young women up to the age of 24. So, disruption seems to be age-related. Lindstrom and Giorguli Saucedo (2002 and 2007), using data from the Mexican Migration Project, found that spouses who are separated due to temporary migration to the US are less likely to have a birth in the period shortly after migration. But in the long-term, marital fertility is not affected. However, these findings also provide evidence for the interrelation of events hypothesis that will be explained in the remainder of this article.[3]

2.2 Interrelation of Events

The interrelation of events hypothesis, which has been paid attention to more recently, accounts for the short-term interactions between family formation and migration. It states that higher birth rates after migration are the result of an interrelation of these two events that take place at the same time or one shortly after the other (Milewski 2010a). Authors argue that migration itself is not the reason for higher fertility, so there is no catching-up behavior, but rather are higher levels of fertility the coincidence of migratory processes and family building. To sum it up: "Births are not only delayed or averted as a consequence of migration, but migration as well is initiated, postponed, or deterred as a consequence of births" (Lindstrom and Giorguli Saucedo 2007: 849).

As mentioned above, not only fertility but also marriage is interrelated with migration. One particular case within this approach is marriage migration ("imported spouses"). Marriage is directly linked to migration itself and it is expected that childbearing begins in the period shortly after migration took place (Andersson 2004). Mulder and Wagner (1993) are one of the first researchers who see marriage and migration as synchronized events within life courses. They call the interrelation between two key events in a person's life "dependence", so one event or trajectory depends on the other one ("synchronized events").

Several empirical studies found evidence for the interrelation of events hypothesis. For the case of internal migration in Estonia, Kulu (2005) found increased levels of fertility in the immediate time after migration to rural and small areas. Individuals migrate, then conceive their child and then formalize their union. And on the other hand, there are individuals who form a union, then move to their partner (migrate) and then get pregnant. In both cases, individuals migrate because of family formation. Andersson (2004) arrived at similar results for the case of migrants in Sweden. There are relatively high (first) birth rates shortly after migration, but migrants who stay already for more than five years do display similar patterns to individuals born in Sweden. So, apart from a disruptive effect also an interrelation of events could be observed. Thus, the author stresses that it is crucial to take into consideration the time that passed since migration when studying fertility outcomes of migrants. Also the interrelation of events hypothesis has been studied in the US-migration context. Lindstrom and Giorguli Saucedo (2007) found relatively high birth rates of Mexican migrants in the US in comparison to women staying behind in Mexico. They interpret this as a legal strategy to give birth to a child in the US to obtain US-citizenship for that child in order to also regularize the legal status of the parents themselves. Analyzing the case of Puerto Rican migrants in the US, Singley and Landale (1998) found that the likelihood of conceiving a child or to marry is much higher for single migrants than for their counterparts who stayed behind in Puerto Rico. These results suggest that migration is an "integral part of the family formation process" (1998: 1460) of these migrants. Alders (2000) analyses the case of migrants from Turkey, Morocco, Suriname, and the Netherlands Antilles and Aruba in the Netherlands. He found a strong interrelation between migration and childbirth for

[3] For other studies focusing on migration and family formation in the context of the United States see for example Fernández and Fogli 2009; Fernández and Fogli 2006; Frank and Heuveline 2005; Jonsson and Rendall 2004; Lindstrom and Giorguli Saucedo 2002.

Moroccan and Turkish women, but interestingly not for Surinamese and Antilleans. Devolder and Bueno (2011) also find a clear interrelation of migration and fertility for in Catalonia, which is strongest for African migrants. Milewski (2007) found evidence for the interrelation of migration, marriage and birth of the first pregnancy for migrants in West Germany.

This summary of previous research shows the absence of studies focusing on other rather recent migratory flows, such as the case studied here. Going beyond traditional migratory settings – especially the one of Mexico-US - might help to test the above-presented existing theoretical approaches and to put forward new theories.

3. Background: Family Formation and Migration In Senegal

3.1. Fertility and Union Formation in Senegal

Family structures, as well as fertility and marriage behaviors in Senegal are complex. A household consists of around nine individuals on average (in 1997, Locoh and Mouvagha-Sow 2005), one of the largest household sizes in West Africa. The size can be seen as a result of the extended family structure living in the household and the polygamous regime. The number of household members is on average higher in rural than in urban areas (Bass and Sow 2006).

Looking at fertility, Senegal resembles other countries in Sub-Sahara Africa (Randall and LeGrand 2003). Fertility is still high with a total fertility rate (TFR) of 5.0 in 2010 (for comparison: TFR in 1986 was 6.4 and in 1997, 5.7 [Agence Nationale de la Statistique et de la Démographie, 2012]). There is an important urban-rural gradient with a TFR of 3.9 in urban areas and 6.0 in rural areas (Agence Nationale de la Statistique et de la Demographie 2012). Also child and infant mortality are relatively high with an under-one mortality rate of 51 and an under-five mortality rate of 93 per 1,000 live births in 2009. Most births occur within marriage, but there is a growing share of women having children outside the marital union (Bass and Sow 2006). The still high fertility levels can be seen as the result of "the cultural desire for large families, the high infant mortality rate, and the low use of modern contraceptive methods" (Bass and Sow 2006: 95).

Marriage in Senegal is almost universal, staying unmarried is seen as a "secondary choice" (Antoine and Nanitelamio 1996: 130) and there are only few Senegalese who do not marry. The legal minimum age of getting married is fixed at 20 years for males and 16 years for females, but many females get married at younger ages (Bass and Sow 2006). According to the latest Demographic and Health Survey (DHS), in 2010, 40 percent and 28 percent, in rural and urban areas, respectively, of all married women between 15 and 49 have at least one co-wife (Agence Nationale de la Statistique et de la Demographie 2012). Young ages at marriage and getting remarried shortly after widowhood or divorce[4] lead to these high levels of polygyny (Antoine and Nanitelamio 1996). Polygyny is less prevalent among higher educated women living in urban areas. From a religious point of view, Catholics are less likely to have a polygamous marriage (Bass and Sow 2006). Partner choice is mainly rather a decision taken by the family than by the individual him- or herself (Randall and Mondain 2009). Marriages are often endogamous within ethnicities or religions. Partner selection as well as endogamous unions are varying according to the rural-urban background and the educational level, being more rigid in rural areas and for lower educated (Bass and Sow 2006).

[4] Despite a low share of divorce with only 1 percent of the Senegalese being 12 or older are divorced in 2002, according to ANSD 2008

3.2 Family Formation Strategies of Senegalese Migrants in Europe

The family and household structures as well as the marriage and fertility patterns exposed above are strongly interrelated with internal and international migration processes. Migration, both rural-urban, to other African countries or to Europe, is strongly linked to marriage and childbearing patterns on the individual and the community level (Randall and Mondain 2005, Randall and Mondain 2005a). Randall and Mondain (2005) argue that migration, along with other dynamics of modernization, have transformed and are still transforming the economic and social values related to marriage and family building patterns. As mentioned above, fertility rates in sub-Saharan Africa are still high, although they have been decreasing throughout the last decades. Along with other causes such as socio-economic development, decline in mortality and national initiatives for family planning strategies, migration is seen as an important factor that explains declining fertility levels in many African countries (Genereux 2007).

Two concepts cannot be neglected when talking about migration and family formation, namely transnational families and family reunification. Transnationalism means that at least one family member migrates while the rest of the family stays behind in the country of origin. Thus, families are "living apart-together" in different states with the difficulty of organizing family life transnationally across national boundaries (Mazzucato and Schans 2008). Family reunification appears in the context of family-linked migration processes; traditionally it refers to spouses that after migration-related separation (and transnational family life) reunify either in the origin or destination country. Transnationalism depends on family reunification laws and preferences, since in many cases reunification is not possible due to strict migration policies in destination countries or just as a result of cultural and societal predilections (Mazzucato and Schans 2011). Especially in the African context, these preferences concerning transnational family arrangements are frequent. In many cases, and not as the result of migration, partners and also parents and children do not necessarily live together under the same roof and family structures are complex, as explained above. Child fostering is a prevalent practice in many African countries and also in Senegal (Beauchemin, Caarls and Mazzucato 2013). Using MAFE data, these authors find that transnational families are a very common phenomenon. In almost one half of the households in Dakar at least one member of the (extended) family is abroad. In fact, transnational family practices are more prevalent than reunification in the destination country. But, since reunification is not unidirectional, reunification in the origin country is also a quite common strategy (Baizán, Beauchemin and González-Ferrer 2011).

Family strategies of sub-Sahara African migrants in Europe changed over time. In the sixties, when the Senegalese migratory flows towards France increased, there was a quite homogenous strategy of the then mainly male migrants (Barou 2001). This traditional approach means that first only young male single migrants moved over to France, then, after having spent some ten years at destination and having accumulated sufficient economic resources, these men returned for the first time to their origin country in order to get married there and to procreate the first child.[5] The migrants went back to Europe, but they returned to their origin country at more or less regular intervals. During the stays at home the men might marry other wives and procreate more children. When the migrants returned definitely to their origin country, they were in the advantaged position of being the head of a family with various polygyny unions and many offspring (Barou 2001).

In the late seventies this traditional family-migration strategy became more difficult due to the stricter migration policies. On the one hand, it is getting more and more complicated to move back and forth between origin and destination countries and men feel a "certaine lassitude vis-à-vis de cette existence loin du pays, loin de la famille, dans laquelle on n'a même pas l'occasion de connaître

[5] It should be mentioned that in many cases men had and still have to contribute economically to the dowry that his family has to pay to the wife's family. In some cases young men even had to migrate in order to get together the money for the dowry.

ses propres enfants (Barou 2001: 17). On the other hand, the left-behind women are also not satisfied with the situation of living in the households of their families in law, where they are often controlled by their mothers in law. In this context, and with relatively loose family reunification laws before 1984, the practice of couple reunification at destination emerges. From then on it is more and more the wives who join their husbands in Europe.

The more “modern” sub-Sahara African family building strategies in the context of migration are adapted to the actual circumstances of the migratory system and have a twofold aim. First, children should acquire the values and norms of the origin culture thanks to raising them in the traditional African environment. Often, when they are still young, they are sent to the origin country in order to establish an emotional attachment to their African roots and culture (Gabrielli 2010: 85). Second, they should have the possibility to get more easily the citizenship of the European destination country and the highest possible educational attainment in order to enter and work in the destination country (Barou 2001). These modern preferences and strategies are quite different to the ones prevailing at the beginning of the eighties. They show that the more established and experienced a migratory system is, "les migrants sont de plus en plus à même de penser leur migration et de s'adapter à la nouveauté du contexte, en utilisant toujours les ressources que peut leur offrir le maintien du lien avec le pays d'origine" (Barou 2001: 25). Another more recent phenomenon is independent migration of Senegalese women. While in the 1970s there were three times more men migrating, in 2000 there were only double as many men undertaking this step (Sakho 2013).

4. Research Hypotheses

As exposed above, there is no consistent previous quantitative evidence for the link between migration and family formation for the case of Senegalese migrants in Europe. Neither is it clear whether the theories that work for other migratory settings also can explain the case studied here. The Senegalese migration strategies explained above come from qualitative and more anthropological-oriented studies, but they have not been tested using quantitative data analyses.

4.1 Male Family Formation-Migration Scenarios

H1: Male Senegalese single migrants without children maintain this status during several years after migration.

H2: Male Senegalese migrants who entered a union immediately before migration remain childless in the period following migration.

H3: For male married fathers from Senegal to Europe procreation/ birth of every subsequent child will be delayed.

4.2 Female Family Formation-Migration Scenarios

H4: Married female migrants from Senegal to Europe experience a lower risk of giving birth in the immediate time before migration.

H5: Married female migrants from Senegal experience an increased fertility in the immediate time after migration.

5. Data and Methodology

5.1 Sample

For the empirical analysis of this paper I use data collected in the framework of the MAFE-Senegal ("Migrations between Africa and Europe") project.[6] In the framework of this project longitudinal life-history data was collected in origin and destination countries. In 2008, about 200 current Senegalese migrants were interviewed in Spain, France and Italy. Furthermore, 1067 individuals were interviewed in Senegal. In Spain, another round of the survey was conducted in 2011.[7] This second round of interviews, called MESE ("Migraciones Entre Senegal y España"), adds 405 individuals to the sample of Senegalese migrants in Spain. Life-history data includes residential histories as well as fertility and nuptiality dynamics and thus makes it possible to analyze the interrelation of both trajectories that are addressed in this paper. The MAFE-MESE data allows to analyze the different steps of the migration process and family formation separately as well as to study the timing and order of these events.

The final sample used for the analysis of this paper includes only Senegalese men and women who migrated directly from Senegal (without staying at any intermediate destination for more than one year) to either Spain, France or Italy. Furthermore, the sample is reduced to those individuals that migrated to their respective destination countries between age 15 and 45 years. This is necessary, since family formation is supposed to happen in this age period and migrations happening before, and especially after this age interval most probably do not have any major impact on fertility and nuptiality outcomes. Furthermore, the sample is reduced to the first migrations to Europe; possible subsequent migrations are excluded. Nevertheless, individuals might have experienced one or more previous migrations, but to other non-European countries. One limitation of the data that should be mentioned here is that the survey only collected yearly data, and thus we only know the year when a child was born, but there is no information on the exact date of birth nor on when perception happened. It might be misleading if migration and birth and/ or union formation occurred in same year, but the exact order of events is not known.

Table 1 shows the numbers of each specific migratory flow according to where the interview was carried out. Half of the final sample are women, and the other half are men.

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[6] The MAFE project is coordinated by INED (C. Beauchemin) and is formed, additionally by the Université catholique de Louvain (B. Schoumaker), Maastricht University (V. Mazzucato), the Universit Cheikh Anta Diop (P. Sakho), the Universit de Kinshasa (J. Mangalu), the University of Ghana (P. Quartey), the Universitat Pompeu Fabra (P. Baizan), the Consejo Superior de Investigaciones Científicas (A. González-Ferrer), the Forum Internazionale ed Europeo di Ricerche sull'Immigrazione (E. Castagnone), and the University of Sussex (R. Black). The MAFE project received funding from the European Community's Seventh Framework Programme under grant agreement 217206. The MAFE-Senegal survey was conducted with the financial support of INED, the Agence Nationale de la Recherche (France), the Région Ile de France and the FSP programme 'International Migrations, territorial reorganizations and development of the countries of the South'. For more details, see: http://www.mafeproject.com.

[7] For a detailed description of the MAFE-sampling procedure see Beauchemin and González-Ferrer (2011)

Table 1: Distribution of final sample, by sex and destination country

	Male			Female			Total		
	N (unw.)	% (unw.)	% (w.)	N (unw.)	% (unw.)	% (w.)	N (unw.)	% (unw.)	% (w.)
Spain	251	47.2	85.4	281	52.8	14.6	532	100	100
France	99	53.8	53.2	85	46.2	46.8	184	100	100
Italy	119	60.1	87.3	79	39.9	12.7	198	100	100
Total	**469**	**51.3**	**73.4**	**445**	**48.7**	**26.6**	**914**	**100**	**100**

Data: MAFE/MESE-Senegal biographical data; unw.: unweighted, w.: weighted

The final sample includes in total 914 Senegalese migrants. Sampling weights are used in order to represent the Senegalese population in a realistic way.

5.2 Statistical Methods

In order to see the immediate short-term interactions between the dimensions of interest - union formation, childbirth and migration - time periods are created that reach from five years before to five years after migration. The year of migration is included additionally. So, in total, the time interval observed extends over a period of eleven years. The two main statistical methods that are used in this empirical part are *Sequence Analysis* and *Multinomial Logistic Regressions.*

Sequence Analysis

In the first step, *Sequence Analysis* (SA) [8], originally coming from biology and transferred to the Social Sciences by Abbott (1995), is used in order to deepen the insights into the process of migration and family formation. SA treats "the trajectory itself as the unit of analysis, facilitating identification of prevalent patterns in temporal sequences rather than the estimation or prediction of the step-by-step transitions contained within the sequence" (Stovel and Bolan 2004: 562; see also Abbott and Tsay 2000). Thus, focusing on sequences helps identifying "regular patterns of events". This technique allows to analyze life course trajectories, and, at the same time, to take into consideration their timing, sequencing, and quantum (Billari et al. 2006). Furthermore, ideal types of trajectories can be identified by clustering individuals in different groups (Aassve et al. 2007). For a more recent review of this technique and its implications see Aisenbrey and Fasang (2010).

Migration and major family formation events are supposed to be sequential processes and therefore SA is an appropriate way to deal with it. Using the MAFE-MESE data it is possible to analyze the sequencing of family formation and migration events, and therefore it is the adequate data to do sequence analysis. Following the analytic approach of Colombi and Paye (2012) I "synchronize" the sequences. Sequence synchronization means that each individual sequence is arranged - synchronized - according to an "idiosyncratic event" taking place during each individual's life course. This allows to study events (migration) and structural patterns (family formation trajectories) and their interaction at the same time. Therefore, in the following analysis I synchronize the sequence data on the event of first migration to Europe (Spain, France and Italy).

[8] For this analysis I use the TraMineR package with the statistical software R. Gabadinho, A., G. Ritschard, M. Studer and N. S. Müller (2010): "Mining sequence data in R with the TraMineR package: A user's guide". University of Geneva.

Table 2: Sequence Analysis Alphabet: Possible States defining Individual Sequences

Alphabet	Description	Code
1	Single, Childless	S0
2	Single, 1 Child	S1
3	Single, 2 Children	S2
4	Single, 3 or more Children	S3+
5	In Union, Childless	U0
6	In Union, 1 Child	U1
7	In Union, 2 Children	U2
8	In Union, 3 or more Children	U3+

To begin with SA, individual year-by-year sequences of migrants' family trajectories during the period under observation have to be constructed. The sequences consist of eight mutually exclusive *states*, also called the *alphabet*, which are represented in Table 2. Each Senegalese migrant in the sample has a (not necessarily unique) sequence that shows when and for how long he or she prevails in a specific state. The different states account 1) for the *number of children* and at the same time for 2) *being single or being in a union.*

1) The number of children goes from being childless up to three or more children. Only 6.2 percent (unweighted) of the whole sample has three or more children, therefore higher-order births are not included as specific states apart.[9]
2) With reference to the family status, I distinguish between being single and being in a union (married or not). Although several men have unions with more than one wife at the same time, the alphabet does not account especially for these polygyny partnerships. This means that for instance state 5 - "In Union, Childless" – means that Ego has at least one union. Since only 6.6 percent of our sample (unweighted) of all men have two or more unions at the same time this might not be a problem.

Missing values are an important point to consider when doing SA. In the case of this study, there are missings on the right-hand side due to data censoring. Individuals migrated to Europe less than five years before the interview took place and, consequently, they could not be observed during the full period of five years after migration and thus missing values are coded.

In the next step Optimal Matching (OM) is used.[10] This method is based on an algorithm that tries to find "sequential equivalence" (Aisenbrey and Fasang 2010) of different trajectories in order to identify specific patterns in life courses. OM detects the dissimilarities ("distances") between two given sequences and calculates the cost that is needed to transform one sequence into another. Possible operations to do this transformation are insertion, deletion and substitution of states. The more operations are needed to transform sequences into one another, the higher the transformation costs and the more distinct they are.[11] Generally, the costs for different types of transformations are based on transition rates or on theory. Since the first one is supposed to be the more objective technique, it is used more often in demographic and sociological research and it will be used also in this study. Based on the distances between sequences, individuals are grouped into different clusters that represent ideal types of life course trajectories (Barban 2011). The aim of doing cluster analysis is to "construct a grouping of a set of objects in such a way that the groups

[9] The states do not account explicitly for the total number of children an individual has throughout his or her life. But as Carlson (1985) states "[f]amily formation and adjustments to migration are interacting, dynamic processes and, therefore, a concentration on completed family size is singularly inappropriate" (Carlson 1985: 61).

[10] "Generalized Hamming (HAM) and dynamic Hamming (DHD) dissimilarities are intended for sequences of equal lengths only" (Gabadinho et al. 2011: 27). Since I have sequences of different length, I cannot use HAM or DHD. See also Hollister (2009).

[11] For a more detailed description of this procedure see for example Abbott and Hrycak (1990) and Abbott (1995), or the more recent studies by Gabadinho et al. (2011) or Aisenbray and Fasang (2010).

obtained are as homogeneous as possible and as different from one another as possible" (Studer 2013: 1). For clustering I employ the "Partitioning Around Medoids" (PAM) algorithm (see Studer 2013), which detects the "medoids", the best representative sequence of a given group. To fix the most suitable number of clusters, the Average Silhouette Width introduced by Kaufman and Rousseeuw (1990) is used. This last measure is "based on the coherence of the assignment of an observation to a given group, comparing the average weighted distance of an observation from the other members of its group and its average weighted distance from the closest group" (Studer 2013: 13). Thus, it indicates how homogenous the clustered groups are.

Multinomial Logistic Analysis

After having applied OM and having grouped all individuals into different clusters, the identified groups serve as a basis for regression models. Multinomial logistic regression is employed in order to identify how different socio-economic and demographic individual characteristics affect the probability of belonging to one type and not to another. Moreover, it will be examined whether or not the country of destination affects family formation trajectories and their interaction with migration. Multinomial logistic models do "simultaneously estimating binary logits for all comparisons among the dependent categories" (Long and Freese 2003: 190). In the case of the here presented analysis this technique allows pairwise comparisons between the different clusters. The dependent variable is a nominal categorical variable with one possible outcome per. Again, the multinomial models are separated by sex. Some explanatory variables are used for both sexes, others only for men or women, according to theoretical reasoning and/or previous empirical evidence.

The independent variables included in the regression analysis are:[12]

Age at migration (men and female): An individual's age at time of migration is linked to family formation patterns as well as to migration. Depending on the age, men and women are at different stages in their family formation. As mentioned above, the range of age at migration goes from 15 to 45 years. Ages are clustered in age groups with three possible outcomes: Younger than 25 (reference category), between 25 and 34 years, and 35 or older.

Birth cohorts (male and female): Since the migration and family formation strategies vary over historical time, this categorical variables accounts for the year of birth in a particular period of time. The variable is also categorical: Born before 1964 (reference), between 1965 and 1974, and born in 1975 and after.

Education (men and female): Education does not only account for the actual educational attainment of an individual, but it is also an important variable that serves as a measure for socio-economic status. On the one hand, higher educational levels are associated with a higher socio-economic status of the parents and later higher income of the individual during his or her life. On the other hand, educational levels are linked to different family formation outcomes. In short, education is clearly associated with fertility and union formation and migration patterns. The categorical variable has three values accounting for the highest educational level reached by a person: having at least some primary education (reference), having at least some secondary education and having at least some tertiary education.

Destination (only male): The three destination countries where migrants were surveyed are Spain, France and Italy. Previous findings indicate that migratory flows to the different destination countries are differing in their socio-economic and demographic composition (González-Ferrer and Kraus 2012). Moreover, as already explained, Senegalese migration to France has a longer history than to

[12] Other independent variables were tested, but no patterns were apparent (e.g. religion for men, ethnicity for men and women, parental class, among others)

the other two countries. Since destination choices are mostly male decisions, and wives only follow their husbands, this variable is included only for men.

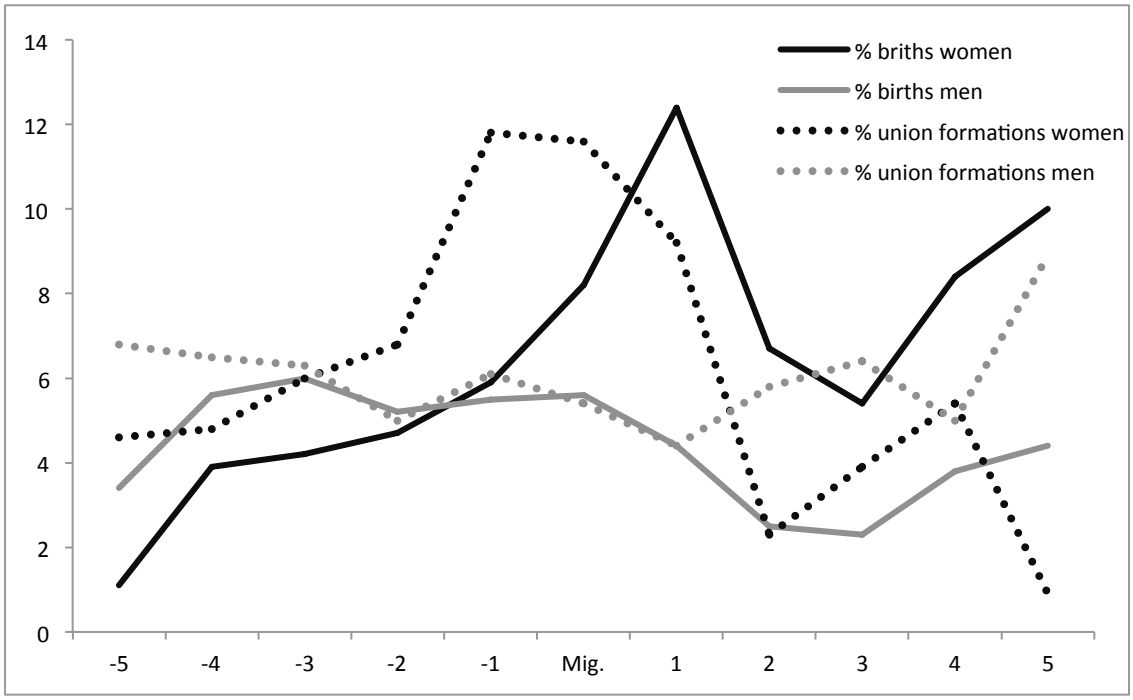
Partner in Europe (only female): Female family formation trajectories and migration decisions are connected to trajectories of the male partners, who are already in the country of destination (Baizán et al. 2013). In so doing the variable accounts for family reunification at destination. It is a dummy variable that takes a value of 1 if the partner is already at destination and a value of 0 otherwise.

Religious affiliation (women): The Senegalese society is also divided into different - mainly Muslim - religious groups (brotherhoods), which account for some of the variability in family formation outcomes. Tidiane and Mouride are the two biggest brotherhoods, which I distinguish as different categories of the variable. The other religions are grouped together in another category.

6. Results

The line plot in Figure 1 depicts the percentages of male and female union formations (dotted lines) and childbirths (solid lines) from five years before to five years after migration. Senegalese female migrants have an elevated probability to start a new union in the year before migration, in the year of migration or in the first year after migration, in decreasing order. For men, in contrast, migration seems not to be directly related to union formation.

Figure 1: Share of union formations and births before and after migration, by sex



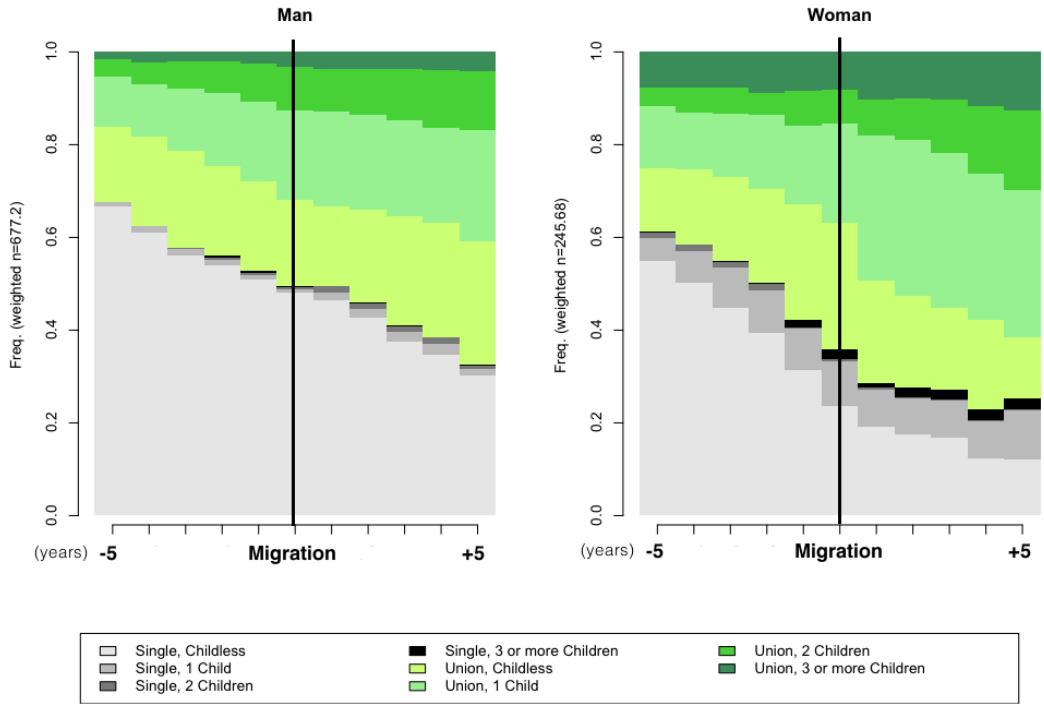
Data: MAFE/MESE-Senegal biographical data; weighted

The solid lines illustrate that migration is associated with having a new child, but in opposite directions for men and women: while an elevated share of female migrants gives birth in the year of and especially in the year after migration, the share of male migrants having a new child is decreased in the period after migration.

6.1. Sequences analysis: Typology of female and male trajectories

In the following the results obtained doing Sequence Analysis are presented. Looking at the distribution plot[13] (Figure 2) one can see again that migration has an effect on previous and subsequent family formation dynamics, both for men and women. About half of all male migrants are single at time of migration. The other half are in union, partly with and partly without children. Not surprisingly, the share of women being single at time of migration is much smaller. One interesting pattern is the increased share of women that are in union when they migrate and that give birth to their first child in the year directly after their migration to Europe. Then, two or three years later, some of these women have their second child. This might indicate that these women reunify at destination with their husbands in order to start their families in Europe.

Figure 2: Distribution plot by sex (weighted)



Data: MAFE/MESE-Senegal biographical data; weighted

Following the strategy presented in the methodology section, in the next step the differences between the individual sequences are calculated and clustered. The optimal number of clusters (according to the above presented Average Silhouette Width quality measures) is a three-cluster solution for women and a four-cluster solution for men.[14] These groups can be interpreted as ideal types representing the interrelation of family formation and migration. Figures 3a and 3b present the distribution plots of the clusters separated by sex.

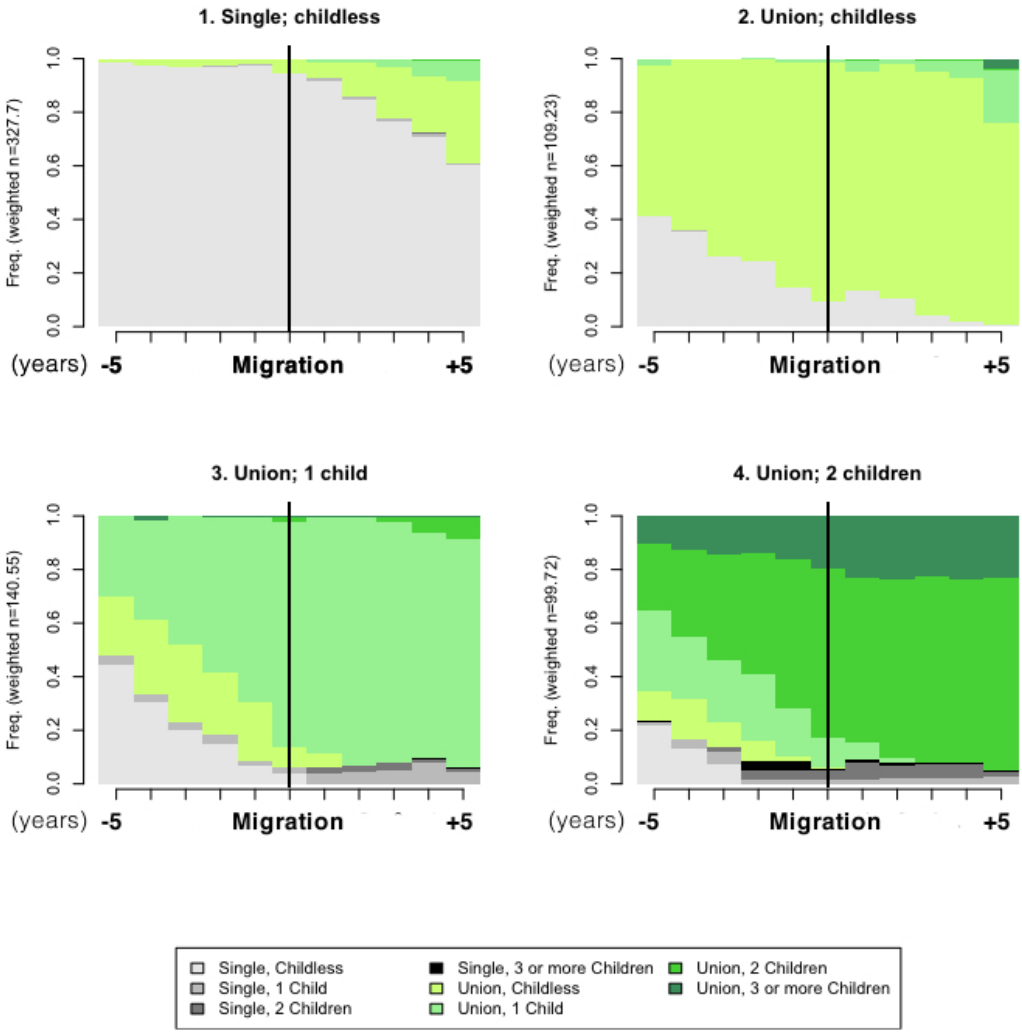
[13] Note that distribution plots do not show individual sequences, but rather an aggregated picture of *transversal characteristics* (Gabadinho et al. 2011).

[14] Other cluster solutions were tested (3, 4, 5, 6 clusters per sex), but according to the Average Silhouette Width measure the best solution is 3 clusters for women and 4 clusters for men.

Male family formation – migration ideal types:

1. Singles; childless (48.4 percent, weighted)
2. In union; childless (16.1 percent, weighted)
3. In union; 1 child (20.8 percent, weighted)
4. In union; 2 children (14.7 percent, weighted):

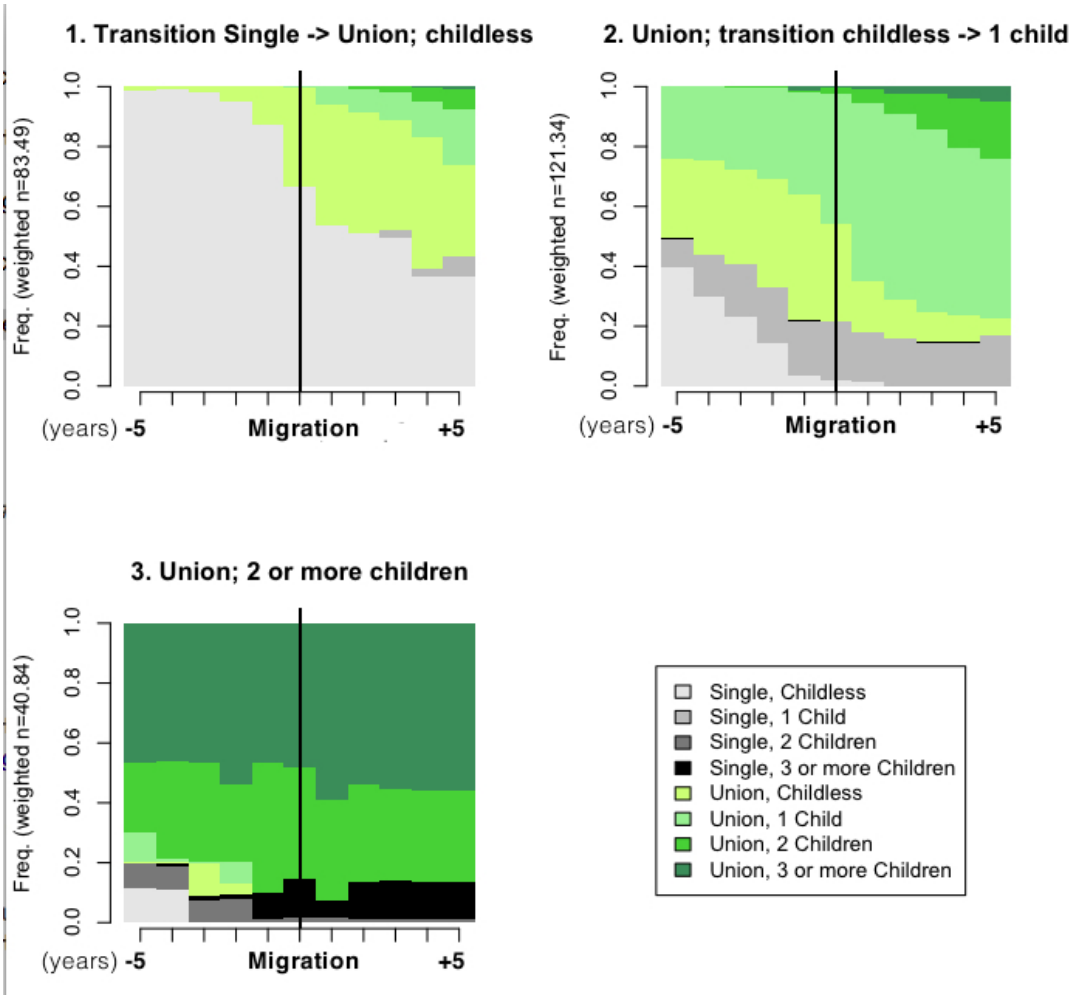
Figure 3a: Distribution plot 4 clusters - Male



Data: MAFE/MESE-Senegal biographical data; weighted

Female family formation – migration ideal types:

Figure 3b: Distribution plot 3 clusters - Female



1. Transition Single -> Union (34.0 percent, weighted)
2. Union; transition childless -> 1 child (49.4 percent, weighted)
3. Union, 2 or more children (16.6 percent, weighted)

6.2. Multinomial Logistic Regression

To begin with, results for men are examined. Two statistical models are developed. The first one accounts only for basic demographic and socio-economic characteristics (age at migration, birth cohort and educational attainment). The second one includes also the destination variable. Base outcome is Type 1.

Table 3: Multinomial Logistic Regression Models

Males (N 469)

Base outcome Type 1 (N 212)	**Type 2**		**Type 3**		**Type 4**	
	(M 1)	**(M 2)**	**(M 1)**	**(M 2)**	**(M 1)**	**(M 2)**
Age at migration (Ref. < 25)						
25-34	0.28 ns	0.30 ns	1.34 ***	1.30 ***	2.05 ***	1.97 ***
35 and older	1.73 **	1.94 ***	3.76 ***	3.80 ***	4.60 ***	4.59 ***
Birth cohort (Ref. Before 1964)						
1965-74	0.24 ns	0.18 ns	0.37 ns	0.15 ns	0.04 ns	- 0.38 ns
1975-89	0.33 ns	0.62 ns	0.047 ns	- 0.10 ns	- 0.59 ns	- 1.05 **
Educational level (Ref. Some primary or less)						
Some secondary	- 0.61 *	- 0.87 **	- 0.51 ns	- 0.60 *	0.41 ns	0.40 ns
Some tertiary	- 0.29 ns	- 0.41 ns	- 1.09 ***	- 0.95 **	- 1.21 **	-0.87 *
Destination (Ref. France)						
Spain		- 0.34 ns		0.45 ns		1.19 **
Italy		0.74 *		0.79 *		1.26 **
N	70	70	106	106	81	81

* p<0.10, ** p<0.05, *** p<0.01, ns not significant
Data: MAFE/MESE-Senegal biographical data; weighted

For females three statistical models were computed. The first one is the same as for men, the second one includes also religion and the third model contains apart from the before mentioned also a variable indicating whether or not the partner is already in Europe. Base outcome is Type 2.

Females (N 445)

Base outcome Type 2 (N232)	**Type 1**			**Type 3**		
	(M 1)	**(M 2)**	**(M 3)**	**(M 1)**	**(M 2)**	**(M 3)**
Age at migration (Ref. < 25)						
25-34	- 0.98 *	- 1.15 ***	- 1.24 ***	0.43 ns	0.34 ns	0.29 ns
35 and older	- 2.98 ***	- 3.14 ***	- 3.32 ***	2.10 **	1.94 **	1.90 **
Birth cohort (Ref. Before 1964)						
1965-74	0.53 ns	0.45 ns	0.25 ns	- 0.95 *	- 0.98 ns	- 1.04 *
1975-89	0.58 ns	0.55 ns	0.16 ns	- 1.57 **	- 1.63 **	- 1.72 **
Educational level (Ref. Some primary or less)						
Some secondary	0.24 ns	0.054 ns	- 0.04 ns	- 1.20 **	- 1.24 **	- 1.29 **
Some tertiary	1.15 **	0.98 *	1.01 *	- 4.55 ***	- 4.38 ***	- 4.33 ***
Religion (Ref.: Other)						
Tidiane		- 1.69 ***	- 1.61 ***		- 0.43 ns	- 0.42 ns
Mouride		- 0.63 ns	- 0.69 *		- 0.00 ns	- 0.01 ns
Partner in Europe (Ref.: No)			- 1.07 ***			- 0.32 ns
N	126	126	126	87	87	87

* p<0.10, ** p<0.05, *** p<0.01, ns not significant
Data: MAFE/MESE-Senegal biographical data; weighted

7. Conclusion and Discussion

Family trajectories depend on the interrelation of a set of influencing variables in different domains. Apart from the social, economic and biological contexts, migration is an important factor that shapes family formation outcomes. This paper makes a deeper understanding of a complex phenomenon possible: the relationship between migration and family formation. In so doing, it contributes to its better comprehension, both from a theoretical and empirical point of view.

The resulting clusters show that the timing of migration is clearly associated with marriage and childbearing patterns for most of the individuals in the sample. Interesting differences between female and male trajectories could be disentangled indicating that at least for the case of the Senegalese, the migration-family formation nexus has to be studied separately for men and women. Both theoretical approaches – the disruption and the interrelation of events hypothesis – advanced in the literature and proved in other migratory settings, could be found also for the Senegalese migrant population in Europe. The five research hypotheses advanced in Section 4 could be confirmed by means of the patterns present within the different clusters. While disruption could be found for both, men and women, interrelation of events seems more pronounced for women. The regression results revealed important variables that have to be taken into consideration when disentangling and explaining migration-related fertility outcomes of Senegalese migrants in Europe. Thereby age at migration and educational levels seem to be the most important predictors for different family formation-migration scenarios of men and women.

This paper can give some new perspectives as well as new theoretical and empirical insights to existing theories on family formation of the immigrant population, and especially for migration flows from sub-Sahara Africa to Europe. Since many of the previous studies have focused on the dynamics of the migratory system of Mexico and the United States, this paper contributes to the literature on Sub-Saharan migration to Europe. Furthermore, the method of sequence analysis so far is not a standard procedure to investigate family formation trajectories of the immigrant population. This allows studying the phenomenon of family formation among the migrant population more closely than many previous studies did. The main policy and social implications are in the field of migration and social policies of countries that receive migration from Senegal and other sub-Saharan African countries. Knowing the possible determinants of the link between migration and fertility allows to identify in which area it is necessary to act, in order to adapt reunification and integration policies.

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