Cooperation and coordination among siblings:
brothers' migration in France, 1870-1940.[1]

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Abstract

Recent works emphasize the role of the family in migration decisions. They particularly insist on the specific schedule of mobility that depends not only on an individual life-cycle but also on the situation of the whole family at a given time. French military registers provide us with very detailed longitudinal information on migrations, scarcely available in other sources. We consider the smallest family group, male siblings, and focus on their migration behaviours. We start by testing the simplest family indicator, birth rank, and we show that, by itself, it has no effect on migration decisions. We then study whether or not there is competition among siblings and, in particular, if the migration of one of them encourages or prevents mobility of the others. Comparing the chances for an individual to move before and after the migration of his brother, we show that brother mobility did have a positive influence on someone's own mobility. However, we find little evidence of the use of networks when looking at migrants' place of destination. Sons are more prone to move in a given family than in another but they don't go to the same places. Therefore, we argue that mobility appears as a collective decision that depends on family strategies. This approach sheds new light on the migration process while insisting on its family component.

Keywords: migration, family strategy, social network, siblings' relationships.

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Introduction

Focusing on the industrialisation period, historical demography has shown how family strategies may influence individual behaviours and choices. The case of migration is particularly well documented, as scholars emphasize the importance of collective decisions for individual labour supply or marriage strategies and the role of migration in these two process (Oris, 2003). Therefore, "migration is a good example of a labor strategy of families" (Engelen & al., 2004 p. 129). In a broader framework, many studies link family and individual choices to the constraints they face at a given time. In this case, migration decisions depend on the specific situation of the family at that time. For instance, Fontaine (1992) gives a comprehensive view of how family resources were used to provide help and support to its members and how migration appeared as one strategy among others.

In another thread of the literature on migration, scholars in development economics often emphasize the role of the household in migration decisions, whether migration is considered as a deprivation mechanism --between household-- such as in Stark (1988) or as an instrument to diversify risk within the household, for instance in Lambert (1994). In this way, migration can be thought of as a family decision after which, in various ways, migrants and stayers are tied.

Both groups of studies show how demographic behaviour, especially migration, is constrained and influenced by family patterns. Among these patterns, siblings' relationships play an important role, both as a constraint and as a support: during the industrialisation era, siblings could at the same time provide help or resources and constitute a rival or competitor. Therefore, the links between siblings' behaviour is of particular importance to assess the family role in shaping and constraining mobility decisions. However, little has been done to understand these mechanisms, especially in an historical framework[2]. It is only recently that demographic scholars have considered studying siblings *per se*; for instance in a recent conference and book focused on this topic and meaningfully entitled "siblings" ("*Les fratries...*", Oris et al., 2007). Although they offered a comprehensive view of recent researches, they mostly insisted on the work to be done (see p. 9-15 especially)[3].

Our aim here is to put life cycle mobility back in the context of several siblings taking migration decisions. We link the migration behaviour of an individual with his position within his siblings set. To do so, we use a large database built from the "TRA-survey"[4]. This study relies on family reconstitution to consider family groups in 19th century France. By adding to this sample the military registers, which provide a continuous recording of all migrations between the ages of twenty and forty-six, we are able to consider very detailed migration mechanisms. Using both family reconstitution and meticulous information at the individual level, we can trace migration precisely.

We focus here on male siblings. This crude measure allows us to test the significance of the family as a collective unit by considering a rather extreme case. Firstly, we show its limit by revealing that birth rank has no effect on migration behaviour. Secondly, we investigate mobility decision among brothers, looking successively at the decision to move or not and the places of destination.

[2] One exception are the works by Bras and Neven (2007a and 2007b) on siblings' migration behaviour.

[3] "En l'état, la démographie sociale de la germanité reste un champ en friche sur lequel il importe de creuser des sillons qui rencontrent les analyses des autres disciplines et les irriguent" (p. 37).

[4] Also known as "3000 familles" survey.

Collective and individual choices: brothers' migration

In the first migration models, a potential migrant compares the cost and the expected return of moving (Sjaastad, 1962; Todaro, 1969; Harris and Todaro, 1970 among many others). The key assumption is that migration is costly. Thus, one will move only if he expects to get a higher income elsewhere than locally. But, in a context where labour or credit markets are imperfect, migration can also be a way for larger groups, such as households, to diversify their income. It can therefore occur even if the expected income is lower after moving, either because labour markets are negatively correlated in the departure and the arrival place or because members of the household have heterogeneous working skills (Chen et al., 2003).

Therefore, migration may be motivated by intrafamily risk diversification as demonstrated in development economics literature[5]. For instance, Stark and Levhari (1982) argue that the mobility of members of the household with strategies that aim at insuring the family against external shocks such as bad harvests. In this view, migration is part of a "contractual arrangement" within the family (Stark and Lucas, 1988). Family can insure themselves through other ways, such as migration for marriage in Rosenzweig and Stark (1989).

At the same time, since the preliminary work of Yap (1977), scholars emphasize the importance of social capital in migration choices: using networks can be a way to reduce both costs and risks. They play a dual role in promoting migration by providing direct support and valuable information. Recent research demonstrates that family networks significantly favour migration (Massey and Garcia-Espana, 1987). Grieco (1988) demonstrates that family members can directly help their relatives find a job, especially by giving "signals" to the employers. In that way, social networks not only help reduce the costs of migration but they also increase its economic returns (see also Massey, 1987)[6].

In a historical framework, the numerous migrants from Europe to the USA have been demonstrated to widely use networks. They provide migrants with information, as Dudley Baynes puts it: "our work suggests that it is likely that virtually all the emigrants from England and Wales in the last forty years of the nineteenth century had made a rational choice which was based on a considerable amount of information" (Baines, 1985, p. 282); networks also furnish movers with direct support as demonstrated by Wegge's (1998) study of 19th century chain migration from Germany to USA.

This general framework can be quite easily applied to family and siblings mobility patterns. As a specific case of networks' mobility, family migration helps reduce the costs of migration, either directly, by providing assistance, or indirectly, by contributing to give more information. In the case of male siblings, it is clear that, as one of the sons moves, he can accumulate networks and ties in a new place which may help his brothers to move at a lower cost. Therefore, migration promotes migration since the fact that one of the sons had already left reduces the cost of moving for the others. Palloni et al. (2001) finds empirical evidences of such phenomenon in migrations from Mexico to the United States whereas Bras and Neven (2007a) show a positive influence of a siblings' migration on that of his sister in 19th century Belgium and Netherlands.

[5] For a survey on the "new economics of labour migration", see Stark (1991).

[6] However, the effects of social networks on wages are not clear throughout the literature, Loury (2006) tries to reconcile opposite views by distinguishing different types of networks.

However, in this case, some arguments may also explain that the mobility of one son prevents his brothers'. First, because of credit constraint: most families do not have enough resources to allow all their male children to migrate. So, if one of the sons migrates, there won't be enough resources left for the others to move. This competition for scarce resources within the family may induce trade-offs based on gender, age or birth rank, decided upon by the parents (Adams and Kasakoff, 1994), which may reveals complex strategies to maintain access to land for everyone (Dérouet, 1993) or, on the contrary, to favour one of the sons in the case of impartible inheritance, which still prevail in some areas of France during the 19th century, for instance in the Basque countries studied by Arrizabalaga (1997). Second, in the case of household-joint decision models, migration helps decrease overall household income variance and, thus, it may induce some of the sons to stay home.

To sum up, we want to explore the existence of collective processes within the family. On the one hand, some family or household may invest in local ties, which may prevent their ability or willingness to move as demonstrated in Kan (2007) or Kesztenbaum (2008)[7]. Some may also be moving in a very local area to take advantage of cheap housing as pointed out by Kok et al. (2005) in their study of Amsterdam. There is then an initial trade-off between migration and local activities. On the other hand, families who decide to promote migration may either take advantage of the networks constructed by the first mobility or diversifying the risk by sending their members in different places. Thus, we want to test: first, whether migrations are correlated within a given male sibling set --which implies that some family choose migration while others choose local activity; second, if such a pattern exists, can it be explained by risk diversification or by the use of within siblings networks.

By observing all migrations during a large part of the life cycle we may clarify how individuals' trajectories vary according to intrafamily relationships. Afterwards, we try to assess if the migration of one son encourages or prevents the mobility of his brothers. To start, we will consider birth rank as a potential determinant of migration choices. We then turn to migration within the brothers' group: we estimate the correlation between the migration decisions of brothers, controlling for other characteristics. Finally, we focus on the place of destination of members of the same family so as to estimate if the link between brothers' migration decisions can be explained, at least in part, by the use of networks to reduce migration costs.

Data: military registers and the TRA-survey

Historical studies of migration are often constrained by the sources available: in some countries, population registers provide a continuous record of individuals within a given town. But they lack places of destination of the movers. In other areas, among which France stands, civil registers give the places of living of a given individual but only at discontinuous points of time, such as birth, marriage or death. Comparison between both sources shows how intensive family reconstitution may compensate the lack of population registers (Adams & al., 2002).

Moreover, none of the sources allow studying the moment of migration at a detailed level: the first because they lose out-migrants; the others because they don't give

[7] At the same time, the incentives to invest in local activities or networks are differentiated according to personal characteristics. For instance, DiPasquale and Glaeser (1999) demonstrate that homeowners are more likely to invest in social capital as opposed to tenants.

the detailed schedule of mobility. This is particularly true for comparing mobility within the siblings set; as mobility decisions not only depend on personal characteristics or individual life-cycle considerations but also on the family situation at a given moment. The migration of a given individual certainly modifies the mobility conditions for his brothers. For instance, Rosental (1999) shows how migration depends on the opportunities offered by the family at a given moment.

In this study, we use a large sample of French young men to assess the influence of an individual's mobility on that of his brother. In order to overcome the limits of both sources, we consider simultaneously large-scale family reconstitution and continuous recording of mobility. We take advantage of the military records as conscripts were very precisely traced by the army during an important part of their life. Despite one important limitation: our sample observes only males, migrations can be analysed in particular detail for adults as military records provide information on the geographic mobility of all males aged between twenty and forty-six[8].

Just before and just after the defeat against Prussia in the 1870 war, the French army was completely renovated. Being replaced was no longer possible[9] as a conscription army was created. From that moment on, military duty applied to everyone --except for medical reasons-- which had never been the case in France except during a short period of the Revolution. At the same time, the military service was considerably extended. Before the 1870 war, the French army was very similar to a professional army with a seven years long military service. People were totally free of military duty after leaving the forces. From the 1872 military law on, the military service was divided into a short part of active service and a long part in the reserve army (Corvisier, 1992). People stayed in the army for twenty-six years in both active and reserve service. While in the reserve, they have training periods and can be recalled at any time in case of war. For this purpose, they must declare their successive residences; they risk penalties or even jail sentences if they fail to do so. The army creates then a complete and efficient system of surveillance of all conscripts so as to be able to locate them at any time. The military registers ("les registres matricules") were the centre of this system, where everyone was recorded and followed until discharged[10]. We use these registers to observe life-cycle mobility as Figure 1 shows. We link them with the TRA-survey to identify the siblings --especially the brothers-- of a given conscript.

< Figure 1 here >

Our sample is based on the TRA-survey. Initiated by Jacques Dupaquier and Denis Kessler, this survey aims to reconstitute the structure of French families whose ancestors were born in the beginning of 19th century. It is built on a patronymic method: all people whose surname begins with the letters T, R and A are recorded from various sources.

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[8] In fact the age at the end of military duties vary in the sample as the military law changes.

[9] Before 1872, there was a lottery to determine who is entitled to military duty but those who were enrolled could still pay someone to go instead of them ("remplacement").

[10] More details on this particular source are to be found in the original texts of the laws (law of "27 juillet 1872 sur le recrutement de l'armée", law of "15 juillet 1889 sur le recrutement de l'armée") or in the army manuals ("code-manuel…", 1873). An excellent summary is provided in (Farcy and Faure, 2003, p. 14-22). On the general organisation of the army and the consequences of the changes of the 1872 law on this organisation, see the study by Odile Roynette (Roynette, 2000).

Apart from the classic "Etat-civil"[11], the two main sources are wedding and fiscal records. The first one gives information on TRA people at the time of their marriage, especially residence of the groom and his bride as well as places of residence of both their parents. They also inform on the signing capacity of the married couple and their relatives. Dupâquier and Kessler (1992) provides an in-depth description of this source. The second source are the fiscal records, TSA: "Tables de successions et absences". Created after the 1799 law, they are used by the French administration to tax inheritance. Every deceased person is mentioned in the TSA with an indication of whether he or she left inheritance[12]. A complete description of the fiscal data can to be found in Bourdieu et al. (2004). Both these datasets were used to reconstruct TRA-families. Here, we exploit them to identify TRA siblings.

We collected the military records for all TRA-people born between 1847 and 1900 but only for a sample of "départements", which is a French territorial division. We choose the départements with the view to balance some of the main geographic and socio-economic characteristics of France at that time, to find an equilibrium between Paris and the "province", between North and South France and between rural and urban areas. Therefore, we have collected the whole Parisian area, which consists of three départements, Seine, including Paris, Seine-et-Marne and Seine-et-Oise and ten other départements across the country[13]. On the whole, more than 2500 conscripts were collected in these areas. Figure 2 shows the number of conscripts born in a given cohort. Except in the first years, when the law was not fully applied, the sample is quite homogeneous, with around sixty individuals observed each year.

< Figure 2 here >

The TRA-survey is representative of the French population at the time of the survey, as Bourdieu and Kesztenbaum (2004) shows. Nevertheless, it has some shortcomings. The most important is the lack of women both in the military records and in the family reconstruction. A woman with a TRA birth name will keep until her death we can then consider the life course of all TRA-women. But we cannot follow their children. In fact, we lost all descendants of a woman after the first generation because her children take the name of the father and therefore, are no longer TRA. This bias reduces the ability to study long-term generational patterns. Here, we choose to focus on male siblings only. This somehow constraint our results and restrict them to a small part of the family but we are then able to concentrate very precisely on life course trajectories.

To analyse them, we focus on the military records. The TRA sample drawn from these records is also representative of the French young men of the same cohorts. As Kesztenbaum (2006) demonstrate, the migration patterns obtained from this sample are identical to those estimated from studies on a larger scale, such as Tugault (1973) or Farcy and Faure (2003). Therefore, we use the military registers to analyse mobility decisions whereas the data on TRA people enables us to reconstruct families. For each TRA recorded in the military registers we have all his brothers who survive until the age of twenty, as they are all recorded by the army, except at the very beginning and the very end

[11] From the French Revolution onwards, the Etat-civil records birth, marriage and death in all French communes. It was also used in the TRA-survey but mainly for family reconstuction.

[12] Before 1870, the exact amount of the inheritance is also given.

[13] A complete description of the TRA-military database is to be found in Kesztenbaum (2006).

of our sample[14]. Table 1 gives a summary of the family structure of the sample for male children. In this study, we focus on families with more than one child, which account for slightly more than half the sample.

< Table 1 here >

Methods for analysing life-cycle mobility

Our aim is to analyse migration trajectories within families so as to see how the mobility of a given conscript is related to that of his brothers. At the same time, we take advantage of the details of the military registers to consider the hazard of the first migration in the observation period. In all cases, the place of residence at the age of twenty (see Figure 1 *supra*) is the reference point for migration: for each conscript, we compare his successive places of living with his twenty years old residence.

Thus, we assume that the conscripts are observed from the end of their active military service --a moment which occurs between the age of twenty years old (no active military service) and the age of forty years old (professional soldiers)-- until the end of their military duty --a moment that varies from forty-one years old (under the 1872 law) to fifty-one years old (under the 1905 law). So all migrations are recorded by the army during this period of time but this period varies among conscripts as they may be discharged of their military duty earlier (for medical reasons) or die before being discharged. By using failure time data analysis, we take into account the differences in observation length among individuals. We then construct hazard rates and survival functions of the first migration during the observation period[15].

We focus on the first migration after the end of the active military service: we oppose those who change their residence at least once in twenty-three years[16] from those who stay at the same place. In doing so, we ignore repeated mobility. We compute the estimated probability of moving at least once from the end of military service to the complete discharge of military duty, which means, on average, from the age of twenty-three until the age of forty-six. Figure 3 plots the survival function of the first migration for the whole sample. The hazard is very high immediately after the end of active military service and then decreases rapidly: one fifth of the sample migrates in the first two years after the end of active military service but it takes half the sample sixteen years to move. This suggests that active military service, which spans from two to five years, was a strong constraint for young French men. For many people living in the French Third Republic, being twenty years old means spending--and so losing-- a few years in the forces. As the service occurred during an important part of life and one of its most productive periods, it must be a strong constraint. In particular, it does prohibit migration. The legal limitation created by military obligations constitutes an essential feature of the decision to move or to

[14] This is due to the fact that people born at the beginning, around 1850, (respectively at the end, just before 1900) of our sample may have an older (respectively younger) brother who isn't recorded in our sample.

[15] The hazard rate of the first migration is defined for each period of time (for instance a year) as the number of migrations in that period divided by the number of individuals at risk at the beginning of the period (a conscript is at risk of moving if he has not moved yet and is still under observation). This rate is expressed in person per unit of time (for instance persons-per-year). On the statistical analysis of failure time data, see Kalbfleisch and Prentice (1980).

[16] Twenty-three years is a shortcut to indicate the length of the observation period, which varies among individuals.

stay, regardless of other factors that may influence it. We will investigate this point in details later on.

< Figure 3 here >

Thus, we consider geographic mobility over the active part of life, *ie* approximately between the ages of twenty-three and forty-six. Moreover, as we try to link migration choices with the position within the family, we care about the timing of migration. For instance, we want to determine if the move of a given individual will affect his brother's decision. So we must take into account the undertaking of a migration as well as its precise moment. In other words, we consider both the intensity of the migration process --probability for a conscript to move given his characteristics-- and its schedule --probability for a conscript to move sooner or later given his characteristics. In order to analyse these two aspects of the migration process, we use failure time data analysis[17] and estimate a Weibull model. The choice of the Weibull model was determined by the general shape of the hazard curve, very high at the beginning but then quickly decreasing and monotonous. We model the hazard of the first migration after the end of active military duty, taking into account the intensity of the phenomenon (the relative position of the hazard curve for different values of the same variable) and its timing (the slope of the hazard rate for different values of the same variable).

The model is defined as follows:

$$h(t,x) = \gamma\lambda[\lambda t]^{\gamma-1}$$

where $\lambda = \exp(\beta_0 + x_1\beta_1 + x_2\beta_2 + ... + x_n\beta_n)$

and $\gamma = \exp(\alpha_0 + z_1\alpha_1 + z_2\alpha_2 + ... + z_m\alpha_m)$

This model estimates the influence of individual characteristics, x_j and z_k, on, respectively the intensity and the schedule of the first migration after the end of active military duty. The x_j and z_k are individual characteristics we use to model migration behaviour; they may be either different or equal. In the second equation, the β_j coefficients give the influence of a characteristic on the intensity of the first migration. A characteristic with a positive coefficient induces a higher mobility rate during the observation period, between 23 and 46 years old approximately. In the third equation, the α_k coefficients estimate the influence of a given characteristic on the schedule of the first migration by modifying the γ parameter of the Weibull law. A positive coefficient increases the γ parameter and thus means a flatter hazard curve, which correspond to a lag in the migration after the end of active military duty. Reciprocally, a negative coefficient diminishes the γ parameter which means a steeper hazard curve and thus a faster mobility after the end of military duty[18].

Mobility before the age of twenty is surely a difficult point for our analysis as we do not observe continuous mobility before this age. Nevertheless, the military registers record

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17 Also known as event history analysis, see for instance Trussell and Guinnane (1993) or Alter (1998).

18 A more accurate presentation of the model is to be found in Kesztenbaum (2006). For a complete description of Weibull models please refer to Kalbfleish and Prentice (1980, p. 33-38) or Cameron and Trivedi (2005, p. 584-591).

the birth place of the conscript and two residences when he reaches the age of twenty: his own residence and that of his parent. By comparing the conscript's birth place and his residence at twenty, we estimate his mobility before the age of twenty. By comparing the residence of the conscript at the age of twenty and the residence of his parents at that moment, we assess whether his mobility was made alone or with his parents. We assume that the conscript moved on his own before the age of twenty if he has a residence at twenty different both from his birth place and the residence of his parents and we will control for these migrations in our analyse. However, only a few conscripts migrate before the age of twenty, around 10% of the sample[19].

Another important aspect of our research is how to characterise the geographical locations in our sample. We use the basic unit in the French administrative organisation, the "commune". We then consider communes as the main reference for places. This choice is debatable since this administrative unit is not perfectly constant over time. Yet, thanks to the reference dictionary of communes (Motte & al., 2003), we can identify the places listed in our database. On the basis of the TRA military registers, we are able to locate each individual in a "commune" at different moments of his life. We thus have a precise measure of individual trajectories since the "commune" is a very small administrative unit as France is divided in 36 000 communes.

We only consider migration between communes although migrants who move from one commune to another could have very different characteristics. Many authors argue that migration is selective according to distance and therefore we need to distinguish intercommune migrants depending on their migration distance. Long distance migrants are positively selected in terms of education (Sewell, 1985 or Heffernan, 1989), wealth (Bourdieu et al., 2000), occupation (Kok, 2004) or even health conditions (Farcy and Faure, 2003). On a theoretical basic, it is coherent with the fact that many costs, not only economic ones, increase with distance. In all cases, as Rosental (2004, p. 111) argues, long distance migrants must be put apart.

So we differentiate short and long distance migration since both their meanings and consequences are very different for individuals, for instance in term of social networks or integration in the labour market. We define short distance migrants as those who move to a commune located less than 17 kilometres away from their departure point. This threshold was determined using both theoretical and empirical arguments[20]. Following Bourdieu et al. (2000), we may consider it as the distance a man can walk in one day going there and back and, as such, it makes a first approximation of what could be called a "local" area. Empirically, the distribution of migrants according to distance increases to a maximum around 17 kilometres. Choosing this threshold divide the sample in two roughly equal groups, as it is approximately the median of the distribution of migration' distance.

Having separated short and long distance mobility, we compute distinctly the rate of the first short distance mobility and the rate of the first long distance mobility. We assume that the migration decision is not independent of the choice of the place, *ie* of the distance moved. At a given moment of time, the conscript chooses between three options:

[19] These are changes of permanent residence. In many cases, the conscript may have moved before the age of twenty, but only temporarily, for instance as servant or apprentice.

[20] All distances we use are crow flies distances. We tried different combinations in order to determine the right number of groups as well as the best thresholds. Using three groups for instance doesn't really change our results.

staying, local mobility and long distance migration[21]. To put it differently, short distance movers are considered as stayers when studying long distance migration. This hypothesis is quite important as we observe mobility during a long period of time. A conscript can make one or even more short distance moves, he will still be thought of as a stayer when estimating the hazard of the first long distance move. In fact, it is as though a short distance mover didn't migrate at all when we study long distance moves[22].

To sum up, we consider separately the hazard rate of the first change of commune, of the first short distance mobility and of the first long distance mobility. Figure 4 presents the three hazards we are going to model. The general shape of the curve for short and long distance migration is very close and quite similar to that of intercommune mobility. We should notice, however, that long distance migrations occur sooner after the end of the active military service: 14% of all conscripts migrate in the following year, 8% made a long distance migration and 6% a short distance mobility. Overall, though, the intensity of migration is exactly the same for short and long distance mobility: the probability of doing at least one migration in twenty-five years of observation is, respectively, 32,8% and 32,9%.

These general patterns give a first estimation of mobility behaviour of Third Republic young French men but we need to look at individual characteristics to clarify the role of the family in migration behaviour. The first question we address is whether or not birth rank influences mobility choices.

< Figure 4 here >

When to leave? Migration choices and birth order

When Joseph Trabesse[23] reached the age of twenty, in 1875, he went in front of the "conseil de révision" as all young French men of his cohort. But, contrary to many of them, he knew that he wouldn't have to join the forces: his older brother, Jean, born in 1853, two years before him, was still in the army. As a consequence, Joseph didn't have to make his active military service because he had a brother already in the forces. This second born began his active life before the first born. Therefore, the army modified within family relationships.

And the case we consider is no exception: as Table 2 shows, in one fifth of the families of our sample the birth order has been turned upside down by the army. In these families, the second born or even --in a very small number of cases-- the third born, is the first to be discharged from active military service. Thus, he starts his active life at a time his older brother still serves in the forces.

Entering the labour market depends on the length of active military service: end-of-19th century French young men have three years to wait before being able to start their working career. However, the situation of these young men also depended on their birth rank. The eldest sons are disadvantaged whenever they experienced a small age gap with

[21] In all cases, individuals face choices under constraints: the conscript decide to migrate according to his characteristics before the migration, at the age of twenty. We mention a "choice" only to make the presentation clearer.

[22] In statistical terms, an individual who made a short distance move will still be considered "at risk" for a long distance move. Conscripts who perform a short distance migration are not excluded from the risk pool of the first long range mobility.

[23] For legal reasons, names have been modified. Places and dates are slightly different so as to prevent identification but the main pattern remains unchanged.

their younger brother: in that case, they would still be in the army when their younger brother enters adult life.

This situation has two important consequences on intrafamily equilibrium. Firstly, the first born is not certain to be the first to enter the labour force, which may to some extent weaken his position within the family. The choice of an heir, for estate or for occupation, can thus be changed at that moment. Secondly, the economic equilibrium of the family is considerably modified as it lost one major income source. While enlisted in the forces, the conscript doesn't bring any more income to the household, which certainly reveals to be a considerable loss[24]. As a consequence, his younger brother could be required to provide the missing income. The second born, while his brother is in the army, takes on, literally, the first born roles and obligations.

More work is required to assess precisely how these changes affect family and individual behaviours. But in this paper we try to capture some of the effects of these changes by looking at migration patterns. We assume that these modifications in the intrafamily equilibrium alter conscripts' migration behaviour. Therefore, we consider simultaneously the influence of birth rank and military service on migration decisions since both may determine mobility choices during a period of life heavily focused on labour participation.

< Table 2 here >

Birth rank is usually regarded as a determinant of migration decisions, or of non-migration decisions, both because it corresponds to the first difference within siblings which may influence their behaviour and because within families inequalities can be in some way related to birth rank; for instance if the first born receives more attention than his younger brothers. As Adams et al. (1992) show, first- and latter-born were advantaged in the context of American farming when resources had decreased. More generally, each individual received resources and social schemes inherited from both the situation of his family within all families and his situation within his own family (Augustins, 1989).

In that context, the opposition between the first born and his brothers is quite well documented (for instance in Ravis-Giordani and Segalen, 1994 or Widmer, 1999). Nevertheless, as Oris et al. (2007, p. 12-15) emphasize, family and inheritance systems are themselves constrained by socio-economic frameworks and shaped by historical context. As a consequence, they are subject to a continuous adjustment process (illustrated, among others, by Dérouet, 1989 or Janssens, 1993).

Furthermore, the difference between sons expressed in birth rank not only refers to inheritance patterns but to a whole range of mechanisms: transmission of occupation, availability of resources for each member of the family or support available from other members of the family. Opportunities and constraints change among the life-cycle of individuals as their families modify. In terms of economic resources, for instance, the first born grew up alone and thus beneficiate from a lot of support from his parents; but he become a young adult at a time other resources are needed for his younger siblings. In that sense, birth order conveys opportunities and constraints encountered by the potential migrant within his family. Let us consider birth rank as a crude marker of intrafamily

[24] At the same time, of course, the household gains resources since it does not need to support the conscript any more as the army generously provides him with food and housing. However, it seems certain that the net result for the household of losing a twenty years old child is negative.

situation. We use it as a summary of each individual situation at the time he may move. To some extent, we would assume that, on average, the first born will be less prone to move in a small siblings set but more prone to do so in a large one.

But, as we discuss *supra*, this pattern can also be modify by the army: roles and places of the different sons may be altered by the order by which they achieve their active military service. To that extent, the length of active military service is a key variable. It measures differences in the first time a conscript can migrate. But it is also a way to assess the importance of the army in migration decision. It represents the counterpart for the army of the birth rank for the family and thus allows us to estimate the impact of conscription on migration behaviours.

Short term services are related to older brothers' enlistment in the army as well as some other family patterns, if the father is deceased for instance. They are also associated with specific medical situations, short-sightedness for example; a case that certainly induce less mobility. Finally, the beginning of the period was characterized by a lottery where those who draw a high number make only a short service. So many different situations may leads to a short term service; the most predominant is certainly changes in the military law, in 1889 and 1905, which reduce both the length of regular active service and the number of exceptions to it. On the other hand, long term active military services, five years or more, are clearly associated with career soldiers or volunteers; these patterns certainly imply more mobility since they characterised people with both less links to the civil life, occupation or family for instance, and surely more initiative than the whole population.

As we argued *supra*, the active service constitutes a major constraint for young men. At a time when they would have been active on the labour market, they are constrained by the army. Therefore, the time they pass in the forces have consequences on their later life. It means they lost between two and five years of income and working experience. In that way, the length of active military service reveals some important features of the life cycle activity patterns. We assume it is in itself a potential determinant of migration behaviours and we explore them at the crossroad between two institutions, family and army.

In addition, the effects of both birth rank and length of military service depend on the total number of children and on parents' presence. We introduce siblings' size as a control variable. If we do have almost all male children for a given family, it should be noted, however, that we only consider those surviving to the age of twenty, as family reconstruction is more difficult for individuals who die younger, especially still-births or children dying before the age of one. On the other hand, we take into account the situation of the parents when the conscript reaches the age of twenty: whether both are present, any of the two has passed away or both are death. Certainly, death of the parents shall increase migration likelihood although the consequences of the death of one of the parents are more ambiguous[25].

Finally, we also introduce some characteristics of the conscripts as control variables. We consider the year of birth to capture historical differences in mobility patterns. We use the occupation at the age of twenty, both by employment sector (in six groups) and social status (in four groups) as a proxy for conscript's social economic origin. Simultaneously, we introduce some geographical indicators: whether the place of living at the age of twenty is urban, rural or Paris, because migration behaviours are quite different according to urban

[25] The consequences of parental death on their children's life are examined in detail, among many studies in Oris and Derosas (2002) or Brunet et al. (2007, p. 87-90).

status, and a dummy variable indicating if the birth place is north or south of Loire which refers to differentiated inheritance patterns (Yver, 1966) although these patterns may have quite weakened by that time (see discussion *infra*).

All control variables reveals usual mobility patterns associated with economic status, death of the parents or urbanisation levels (Table 3). We observe for instance that the hazard is much lower for farmers than for the other occupational groups and this remains true whether we consider short or long distance mobility. We assume farmers own land and so they must be in some way rooted to their farm[26]. Parisians are less prone to move on long distance than the other groups --which may be linked to a very high probability of intracommune mobility-- but more prone to make a short distance migration, which is related with residential mobility in the suburbs of Paris.

An interesting feature of these results is that short distance mobility seems to be very little influenced by individual characteristics such as occupational status. Almost none of the variables we consider here appear to have an impact and, to some extent, short distance migration seems to be really some sort of a random move. We find the Brownian movement described, among others, by Poussou (1970), which Rosental (1999, p. 48-50), referring to a "micro-mobility model", discusses and criticizes.

The results are quite the opposite when considering the family indicator we use, birth rank, and the army indicator we consider, time spent in the army. The first one has no effect at all on the hazard of moving: there is no significant difference between siblings according to their birth rank. To put it differently, none of the sons of a given family will be more or less prone to move only because he is the first or the second born. This result is true whatever type of migration we consider. For long distance migration, the magnitude of the effect is a bit larger but remains unsignificant.

< Table 3 **here** >

Moreover, these results are robust to alternative specifications of the model. Two conscripts with the same observable characteristics will have the same chances to move whatever their birth rank (Table 3). For example, there is no distinctive migration behaviour between the first born and the third born of a five-son family. This remains true if we consider two conscripts with the same birth rank but in families with different numbers of sons as the estimated coefficients of the number of sons are never significant. We can however imagine other ways through which the order of birth may influence migration (Table 4).

A first alternative is to assume that only birth rank matters whatever the number of sons in the family. Even if it seems unrealistic, such a hypothesis allows us to test the robustness of our results. So, we compute the same model without including the total number of sons in the family (*model 2*). The results are more or less the same as before and none of the birth rank variables appears to be significant. A second born in a family of two sons and a second born in a family of six sons, for instance, will have the same migration behaviour, *ceteris paribus*.

Another alternative would be to consider that neither the birth rank itself matters, nor does the birth rank given the total number of children but what matters is the

[26] More details on the construction of occupational groups are available in Kesztenbaum (2006).

interaction of these two elements. In other words, the third born in a family of five sons would have a different migration behaviour than the third born in a family of three sons. This crossed effect is evaluated by an interaction term introduced in the model, equal to the number of sons multiplied by the birth rank (*model 3*). This term is slightly positive which reveals that later born conscripts with many brothers are more prone to move. At the same time the birth rank coefficients are all negative and increasing: compared to first born, the likelihood to move decrease highly with the rank. Overall, it seems that, if birth rank matters, it is only in numerous families: in such cases, the oldest sons will be more likely to move. This may certainly be related to the difficulties of maintaining so much male siblings in the household. The economic pressure resulting of having five or six sons could result in the departure of the oldest of them.

Finally, we question the role of families with only one son. We could expect these families to be rather apart: having only one male heir could lead to specific strategies or constraints. In many cases, this son would certainly be encouraged to stay with his parents. Table 3 results infirm this idea: they fail to show any specificity of the children of one son families. Instead, we could imagine that birth rank only matters when there is more than one child --or at least more than one son. We estimate the model excluding families with only one son (*model 4*). Again, birth rank doesn't matter at all.

< Table 4 here >

The results are robust to all alternative specifications of the model: there is no mechanical effect of birth order on migration (Table 4). This does not mean that mobility choices don't depend on the opportunities at a given moment of time, or on the constraints as shown the effect of belonging to a numerous sibling group. But birth rank by itself has no meaning for a potential migrant: hazards of the first migration are identical across birth ranks, whether we consider short or long distance mobility.

Contrary to birth rank, active military service seems to matter a lot in migration behaviour. The length of the active military service has a positive and significant effect on the hazard of the first migration, mainly for long distance mobility. The more time a conscript spends in the army, the more prone he is to migrate over long distance. However, length of military service and birth rank partly overlap: as described in Table 2, the first born will often make the longer military service. It may be then, that all birth rank effect is captured by the length of active military service and thus the coefficients on this latter variable only measure the correlation between the two. To disentangle this problem, we estimate the model excluding length of military service (Table 4 -- *model 5* and *6*). Clearly, there is no interaction between the two variables: this exclusion has no effect on birth rank.

Therefore, we must conclude than length of active military service is by itself an important determinant of the probability to move. Conscripts migrate faster after the end of their active service if they made a long service. They have undoubtedly been constrained during many years and are then more prone to move when they finally achieve their active service. Secondly, conscripts migrate all the more so as they have made a long active service, partly because of selection effects, since those who made a short service are selected in terms of health for instance, partly because of the service itself, which may provides experience, social networks and constitute a clear cut from the life before twenty. This latter argument has a long tradition and many 19^{th} century observers maintained that military service was a direct cause of migration and rural exodus. A comprehensive view of this topic is to be found in Farcy and Faure (2003, p. 248-252), even though we disagree with their results[27].

So, military service does change later life behaviour whereas birth rank matter only little. However, our results are limited to male siblings, surviving until the age of twenty. Not only we don't consider a whole family but we do not even observe all siblings. What is at stake here is the moment families decide their strategy and on which term. Family strategies may be constructed --at least in part-- during childhood or even before. For instance, the total number of children is certainly a choice of the family by itself as demonstrated, for instance in Van Bavel (2003) or Kemkes (2006).

This analysis is also historically and geographically determined. The importance of birth rank as a family marker can change across time. And it did decline in 19th century France, as shown for instance in Rosental (1995)[28]. In this way, before 1870, sons may discriminate –or at least differentiated-- according to their birth rank and, therefore, that birth rank may imply differences in mobility choices. At the same time, we cannot exclude that some parts of France, such as the Pyrenean regions studied by Antoinette Fauve Chamoux (2002) have specific practices that give some children very strong incentives to move. For instance, as the youngest children in the stem family system have no hope of getting any help from their family (and even no hope to get married for instance), they are almost forced to move. In this way, their migration is a direct consequence of the family strategies that aim at reproducing the family group by concentrating family's resources on the first born.

If you stay, I won't leave: brothers' migration

Conscripts' mobility decisions are influenced, constrained or even determined in many different ways by their environment. Family, for instance, plays a role through various paths. If birth rank isn't one of them as we saw in the previous section, another one, quite simple and direct, may come from the migration of other family members. In this part, we clarify the consequences of a conscript's migration on the mobility choice of his brothers. Our aim is twofold. First, we want to evaluate if the migration decision of a given individual is linked with that of his brother. Second, if so, we aim at establishing whether this influence is positive or negative. In other words, we wonder if the departure of a given child will increase or reduce the mobility of his brothers.

We compare the hazard of migration for a given individual before and after the mobility of his brother. Figure 5 shows the first migration probability depending on whether or not the reference brother did move. It is higher for the conscripts whose brothers moved before them. For instance, just after the end of active military service, they have almost 20% chances to migrate to another commune whereas those whose brother did not move have less than 10% chances to do so. Therefore, the migration of an individual promotes his brother's mobility: if an individual has not moved at the time his brother migrates, he will be more likely to move afterwards.

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[27] Their results are somehow questionable since they fail to identify any influence of the active military service length on mobility. We believe this is mainly because they don't take into account attrition in considering the likelihood of migration.

[28] Although Rosental (1995) is more focused on gender opposition, it did reveal a decrease in the importance of birth rank throughout the century.

< **Figure 5 here** >

What can we expect from observing migration patterns within the siblings group? As we demonstrate in the previous section, short distance migration appears rather similar to a random move. We would then imagine that the mobility of a given individual, whether short or long distance, is independent from a short distance mobility of his brother. On the other hand, long distance mobility is costly, risky and selective. So it matches quite well the case where networks, family ones for instance, could provide assistance to reduce migration costs. For instance, Taylor (1986) demonstrates that international migrations are more network-intensive than national ones, which is coherent with their higher costs. In our case, we expect long distance migration odds to be positively correlated with a long distance migration from one of the brother.

To test these hypotheses, we compute, using Kaplan-Meier estimates[29], the failure function which estimates the probability for a given conscript to make at least one migration during the active part of his life-cycle. We can compare these probabilities according to brothers' migration behaviour. The results (Table 5) show that the migration of someone's brother has positive effects on his own mobility. To be precise, if a conscript made a short distance migration, his brother will be more likely to do so and the same holds true for long distance migration. At the same time, there is no significant link -- neither positive nor negative-- between short and long distance mobility: the probability to make a short distance migration is identical whether or not your brother made a long distance migration. This result clearly reinforces the division between these two kinds of mobility.

At the siblings' level, this means a positive link between the migration of a given child and the migration of one of his brothers as shown in Table 5. But, as we argue *supra*, it may be that some families have resources that allow or prevent their children to make easily some specific type of migration. Taking into account the characteristics of the potential migrant is a first step in controlling for this bias. For sure, we should perform a more accurate analyse by taking into account family characteristics as well as information on the reference brother (or for instance, relative characteristics of the potential migrants within his family) but this work remains to be done.

< Table 5 **here** >

We estimate the same Weibull model as previously (p. 2) in order to take into account other individual characteristics that may influence migration decision. This is particularly important for long distance migration: as we've seen before, this kind of mobility is highly selective. So it may be that some families have resources that would make their children more prone to perform such a migration. In that case, the interaction between siblings migration could be a pure artefact of these resources that favour long distance migration. For instance, if doctors always make a long distance migration and if the probability to be a doctor is heavily correlated between brothers, we would observe a high correlation of migration probabilities between brothers even though the two migrations are completely independent.

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[29] Again, we use failure time data analysis in order to take into account attrition in our sample (*ie* various observation times among individuals). A detailed explanation of Kaplan Meier estimates can be found in Kalbfleisch and Prentice (1980)

However, it should be noticed that we cannot correct our estimates for the endogeneity of brother's migration. Not only because of some obvious links between two brothers, for instance they possess an uncle in some distant place or they grew up and live in a remote village where there aren't any jobs. In other words, any correlation between brother's migration we may be due either to a causal effect (if my brother move, I am more likely to move myself) or to specific characteristics they shared within the same family. Moreover, both sons may have taken the decision to migrate at the same time. Therefore, what will appear as two successive moves, one influenced by the other, may simply be a coordinated choice.

The regression results confirm the positive influence of an individual's migration on that of his brother (Table 6). They are much stronger for short distance mobility. This is coherent with the idea of a higher cost for long distance migration: some families cannot afford too much of such mobility and thus the migration of one son prevent that of his brothers. In both cases however, the departure of an individual is positively linked with his brother's migration even if the cost may reduce such link when considering long distance moves. This result echoes those from previous researches, for instance Bras and Neven (2007a) also show a high correlation between siblings' mobility even after controlling for individual and family variables (p. 63).

We can imagine two main reasons to explain such a framework. On the one hand, migration may constitute an opportunity and a strategy for some families. The members of these families have a higher geographic mobility, which takes place in a favourable background or may be part of a general strategy that aims at taking advantage of spatially distributed opportunities. This can easily be linked with the risk diversification framework we mentioned earlier. On the other hand, the initial migration, the departure of the reference child, helps and facilitates the migrations of the other children, giving them supports and resources. This refers to a network situation patterns. These explanations are not mutually exclusive: families more focused on constructing and maintaining networks may have better resources to distribute to their members and as a consequence be more eager to use migration opportunities.

However, one interesting feature of these results is the independence between the two types of migration: whether or not my brother made a short distance migration has no influence on my likelihood of performing a long distance move. This emphasizes again the difference between these two migration patterns. But it also questions the role of networks --here siblings' network-- in migration decisions, compared to family strategy. In a risk diversification framework, families may prefer distant locations, which could either result in many long distance moves or in some long and some short distance moves. The high correlation between sibling's mobility speaks more in favour of a network migration where the second mover takes advantage of his brother's migration.

To evaluate to which extent the results we present come from within sibling networks, we compare the places of destination of the successive migrants. This first allows us to a more comprehensive understanding, beyond the simple correlation we measure here. Second, it helps us to separate network effects from risk diversification strategy at a family scale. In the case of a network framework, we expect that a lot of conscripts will follow their brother. On the other hand, if only little do so, we may think of risk diversification strategies.

< Table 6 **here >**

Where to go? Places of migration and network mobility

In order to observe network migrations, we consider the destination places of the siblings. We focus on the families with at least two migrants. The question we address is whether or not the second mover follows, literally speaking, the first one. We thus observe their destination places and compare them but we only take into account the first destination of each mover. In other words, we compare the destination of a conscript's first migration to the destination commune of his brother's first migration, regardless of whether that one is still living in that commune or not. In some way it is then a minimal estimate for network mobility: some of the individuals we exclude from the network migration patterns because their first migration commune is different from that of their brother may still get to their brother's place, had he made another move after his first migration[30]. As a result, we underestimate network mobility.

But we simply want to evaluate to which extent the interactions between siblings migration we showed *supra* are related or not to network mechanisms. Again, it should be noted that we exclude cases where brothers move together. In doing so, we ensure that the migration of the conscript and that of his reference brother are made separately. So, we consider the case where an individual moves for the first time and leaves his commune of residence at the age of twenty. The question is then is he going to the place his brother went to when he leaves his own commune of residence at the age of twenty?

The most striking feature of the results (Table 7) is certainly not the high proportion of short distance migrants who move to the place where their brother made his first move. Part of this result is a mechanical effect of considering moves below 17 kilometres: when restricting to a short range around the commune of departure, we only obtain a limited number of eligible communes. What is striking is rather the relatively small number of long distance migrants who choose to follow their brother. It thus seems, contrary to what we expect from the previous section, that networks are of little use in that case. However, this does not means that long distance mobility doesn't imply a network but it is not a brothers' network.

As a matter of fact, Table 7's figures matches quite well the coefficients of the Weibull model displayed in Table 6. Both constitute measures of brothers' role in migration choices. And clearly this role depends on the kind of migration we consider: the extent to which conscripts use their brothers' networks depends on their specific situation and of the type of migration they perform. It is thus a way to quantify network migration according to a certain type of migration, but also to a certain type of network. For instance, here, the conscripts hardly use their brother's resources for long distance move.

Finally, we clearly establish, first, that migration is highly correlated among brothers: in some families, male children are more prone to move than in others; and, second, that brothers barely move to the same place. From these two evidences, it is quite certain that the migration patterns we observe are more related to risk diversification strategy than to network use.

< Table 7 **here** >

[30] But it is exactly what we would expect from "chain migration", where one individual left the place he occupied and is, literally, replaced by his follower within the networks (see for instance Tilly, 1978). A review and critic can be found in Lesger et al. (2002).

Concluding remarks: family and network migrations

We deliberately chose a restrictive definition of the family. In fact, the kinship group we study is limited to brothers. In some way, it is the simplest characterization of the family that can be thought of. Not that we ignore or deny complex mechanisms that may be at stake in family relationships but we wanted to show how even this minimal definition could raise interesting questions and draw a somehow original picture of family mechanisms. We also aim at getting more insights of family structure and behaviours without standing at a small scale, such as in monographic studies. Observing siblings, thus, enables us to put apart a small piece of the family and to look very precisely inside.

Birth rank represents an easy way to measure the place and role of a given individual within its own family. We use it to explore family mechanisms and compare it with the order of achievement of active military service. In some cases, indeed, the military institution may, literally, modify the order of descent. But we can definitively exclude that birth order plays any role in migration decision, at least for the time and place we study: French young men living at the turn of the century. In fact, it appears they were heavily constrained by their military service. Differences in the length of this service induce important differences in migration behaviour. Part is related to a selection effect, as conscripts doing a shorter service may be less healthy, and part is related to a direct influence of the military service, through networks, experiences it may bring. And we showed that this effect is independent of birth rank.

But, on the other side, migration patterns also results, at least in part, from intrafamily relationships: mobility choices --not only the decision of moving or not but also whether moving locally or far away-- are highly correlated among families. One issue at stake here is the situation of the two main actors, individuals and families and how their migration decisions interact. One possible answer is given by brothers' networks. We try to assess what part of their mobility we could link with the use of previous brothers' migration. In fact, only a limited number of conscripts seems to take advantage of their brothers previous mobility: we show that the migration of a given individual may favour his brother's mobility but influence only little the place he chooses to go.

Therefore, we argue, mobility is more related to family risk diversification strategies than to the use of networks. Nevertheless, we must remain cautious about concluding on the absence of network mobility. Firstly, other members of the family may play a role as networks providers. The absence of sisters proves to be here an important miss: their migration's choices are certainly also related with that of their brothers. Although it may be argued that both groups have different labour market skills and may therefore experienced different migration choices, it is no doubt that sisters have their role to play in constructing networks, for instance by connecting their family with their brothers in law.

Secondly, it may be that some situations are more prone to network use than others. Various studies show how different kind of migration networks may influence differently migrants' decisions, see for instance the analysis of Mexican migrants to the United States by Davis et al. (2002). Especially, despite the strong ties that link together kinship members, family networks may only be a small piece among many others. Winters et al. (2001) oppose family and community networks and convincingly show how the later may substitute for the former at an advanced stage of the migration process. Moreover, we must consider something that looks like a continuous variable and measures the influence of family on a given form of migration. This measure certainly varies among family structures, social groups and across time as migration is only one of the strategies individuals or families may use.

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Tables and Figures

Figure 1 Descriptive scheme of the military records

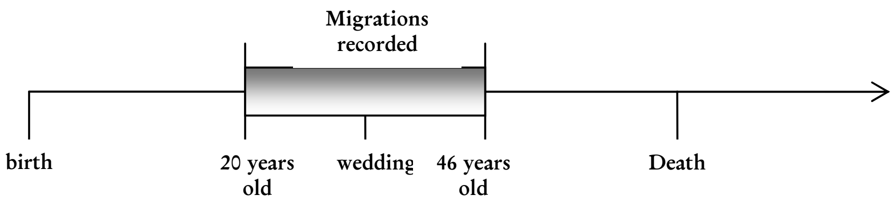

Figure 2 Size of the TRA-military sample, by birth cohort

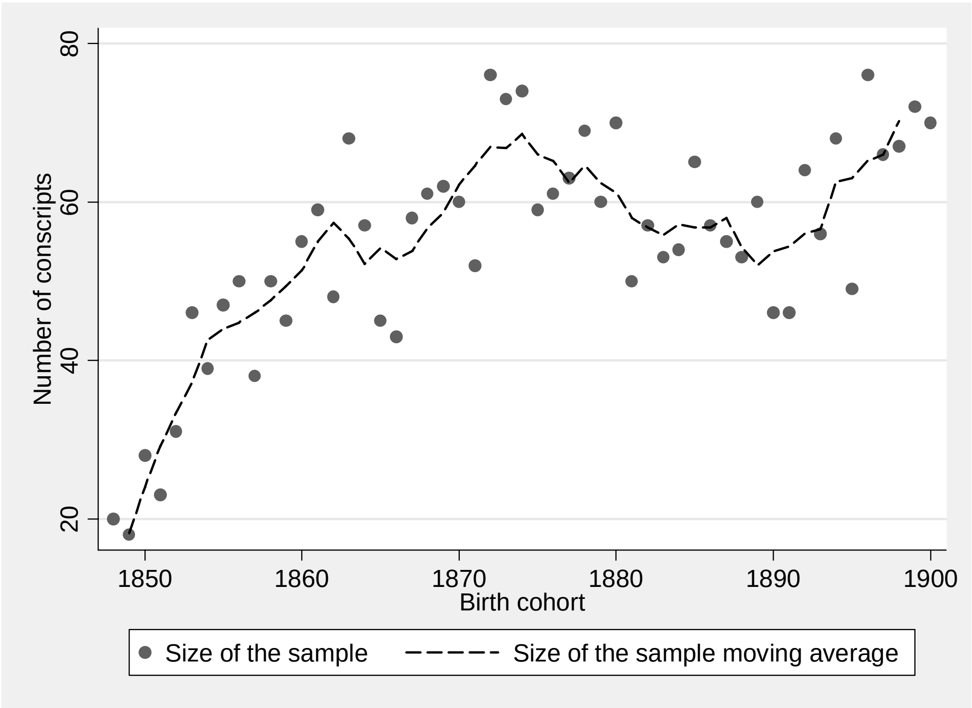

Figure 3 First migration survival function

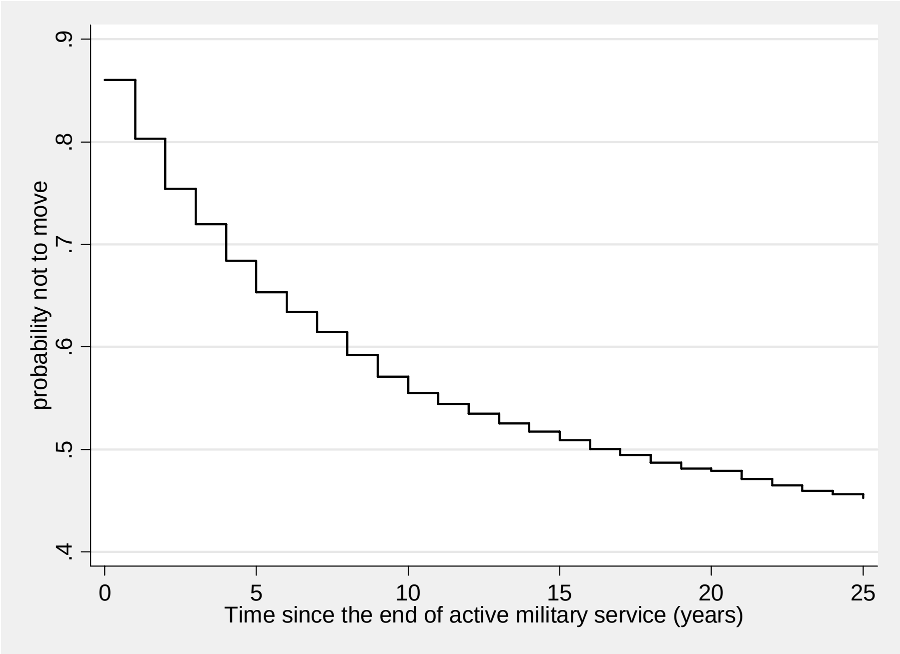

Figure 4 Hazard rate of first migration, by migration type

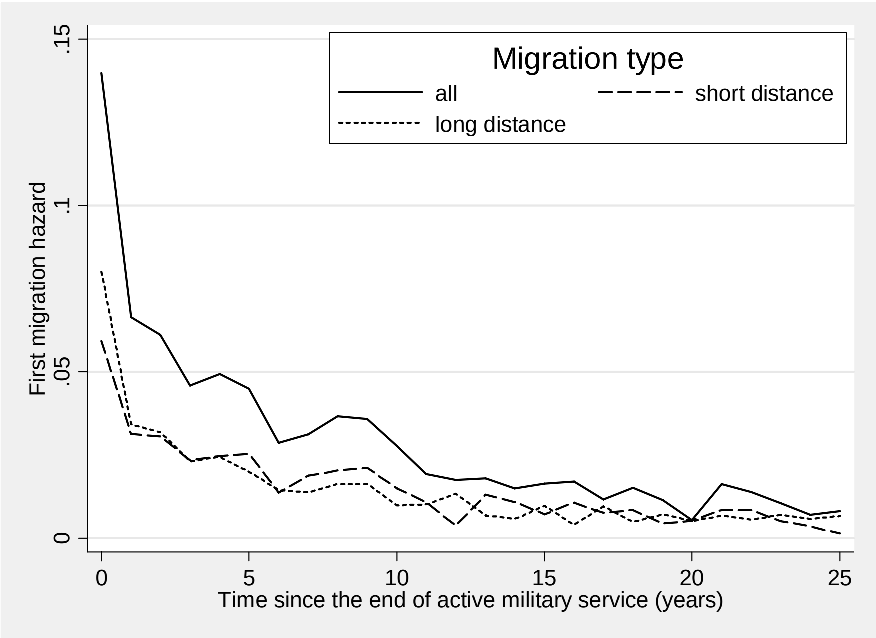

Figure 5 First migration survival function, depending on brother's mobility decisions (long distance mobility)

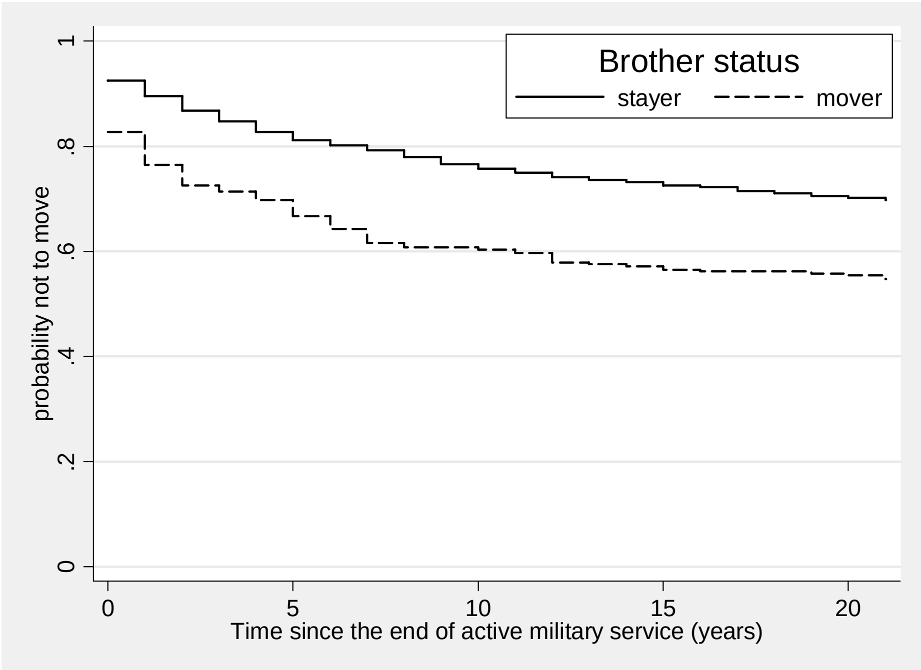

Table 1 Distribution of the families in the sample according to the number of male children

Number of sons	N	%	cumulative %
1	1221	70,46	70,46
2	363	20,95	91,40
3	104	6,00	97,40
4	30	1,73	99,13
5	11	0,63	99,77
6	2	0,12	99,88
7	2	0,12	100,00

Table 2 Distribution of the families according to the birth rank of the first children to achieve his military service

				Number of sons			
			All	2	3	4	5
Birth rank of the first to leave the army	1	N	427	288	91	30	18
		%	79,07	81,59	72,8	75	81,82
	2	N	110	65	32	9	4
		%	20,37	18,41	25,6	22,5	18,18
	3	N	3	0	2	1	0
		%	0,56	0	1,6	2,5	0
	Total	N	540	353	125	40	22
		%	100	100	100	100	100

Table 3 Determinants of first migration hazard -- Weibull estimates

	Migration		
	All kinds	**Short distance**	**Long distance**
N conscripts	2389	2389	2389
Analysis time (years)	31717	40388	40701
N migrations	1210	732	715
Log (pseudo-likelihood)	-3325,74	-2409,34	-2412,52
Birth cohort			
1850-1859	-0,963 ***	-1,421 ***	-0,816 ***
1860-1869	-0,031	-0,262	0,084
1870-1879	ref.	ref.	ref.
1880-1889	-0,114	-0,083	-0,053
1890-1900	-0,254 *	-0,250	-0,206
Active military service			
none	ref.	ref.	ref.
1 to 3 years	0,576 ***	0,344 *	0,777 ***
4 to 8 years	0,671 ***	0,253	0,955 ***
Over 8 years	1,263 ***	0,410	1,884 ***
20 years old residence			
rural	0,201	-0,392 **	1,044 ***
urban	0,143	-0,504 ***	0,824 ***
Paris	ref.	ref.	ref.
Birth place			
North	0,048 ***	0,310 ***	-0,194 **
South	ref.	ref.	ref.
Mobilty before the age of 20			
stayer	ref.	ref.	ref.
migrant	0,367 ***	0,151	0,492 ***
Sector of activity at 20			
farming	ref.	ref.	ref.
craft industry	-0,431 ***	-0,305	-0,627 ***
industry	-0,264	-0,245	-0,399 *
services	-0,346 **	-0,345	-0,492 **
trading	-0,309 *	-0,245	-0,471 **
State employee	-0,117	0,046	-0,116
Occupational status at 20			
unskilled worker	ref.	ref.	ref.
skilled worker	0,192 *	0,008	0,396 ***
farmer	-0,448 ***	-0,213	-0,641 ***
white collar	0,250 **	-0,211	0,590 ***
Parent's situation at 20			
both alive	ref.	ref.	ref.
father death	-0,166 *	-0,035	-0,186
mother death	0,056	-0,006	0,121
both death	0,314 *	0,308	0,050
Number of sons			
only one son	ref.	ref.	ref.
two sons	-0,055	-0,105	-0,101
three sons	0,089	-0,038	0,138
four sons	0,076	0,124	-0,203
five sons or more	0,149	0,071	0,132
Birth rank			
first born	ref.	ref.	ref.
second born	-0,039	0,016	-0,065
third born	0,149	-0,080	0,264
fourth born	0,082	0,119	0,213
fifth born or more	-0,146	-0,609	0,100
Constant	-2,743 ***	-2,811 ***	-4,087 ***

Table 3 (continued)

Parameter ln(γ)	-0,252 ***	-0,374 ***	-0,094
Birth cohort			
1850-1859	0,030	0,193 *	0,023
1860-1869	-0,037	0,019	-0,046
1870-1879	ref.	ref.	ref.
1880-1889	-0,037	-0,081	0,038
1890-1900	0,086	0,023	0,123 *
Active military service			
none	ref.	ref.	ref.
1 to 3 years	-0,115 **	-0,032	-0,279 ***
4 to 8 years	-0,119 *	0,026	-0,331 ***
Over 8 years	-0,134	0,024	-0,447 ***
20 years old residence			
rural	-0,052	-0,019	-0,179 **
urban	-0,135 ***	-0,030	-0,195 ***
Paris	ref.	ref.	ref.
Sector of activity at 20			
farming	ref.	ref.	ref.
craft industry	0,049	0,007	0,124 *
industry	0,089	0,065	0,119
services	0,188 ***	0,161 *	0,147 *
trading	0,001	0,041	0,024
State employee	0,035	-0,250 **	0,133
Birth rank			
first born	ref.	ref.	ref.
second born	0,060	0,098 *	0,030
third born	-0,043	0,058	-0,119
fourth born	-0,028	-0,131	-0,048
fifth born or more	-0,030	0,096	-0,207

Note: The numbers are the coefficients of the Weibull model. Separate regressions are performed for all intercommune mobility, short distance migration and long distance migration.
Standard errors are adjusted for within family correlations.
*: significant at p<0.10; **: significant at p<0.05; ***: significant at p<0.01.

Table 4 Birth rank's effect on migration hazard -- long distance mobility only

	Model (long distance migration only)					
	ref.	(2)	(3)	(4)	(5)	(6)
N conscripts	2389	2389	2389	1310	2389	2389
Analysis time (years)	40701	40701	40701	22420	40701	40701
N migrations	715	715	715	398	715	715
Log (pseudo-likelihood)	-2412,52	-2415,31	-2410,68	-1332,02	-2421,53	-2419,80
Active military service						
none	ref.	ref.	ref.	ref.		
1 to 3 years	0,777 ***	0,782 ***	0,788 ***	1,204 ***		
4 to 8 years	0,955 ***	0,955 ***	0,963 ***	1,313 ***		
Over 8 years	1,884 ***	1,923 ***	1,881 ***	2,581 ***		
Number of sons						
only one son	ref.		ref.	*excluded*	ref.	ref.
two sons	-0,101		-0,255 *	ref.	-0,090	-0,238 *
three sons	0,138		-0,280	-0,063	0,173	-0,232
four sons	-0,203		-1,006 **	-0,795 *	-0,196	-0,967 *
five sons or more	0,132		-1,200	-1,068	0,134	-1,161
Birth rank						
first born	ref.	ref.	ref.	ref.	ref.	ref.
second born	-0,065	-0,080	-0,568 *	-0,458	-0,086	-0,573 *
third born	0,264	0,354 *	-1,012	-0,930	0,243	-0,999
fourth born	0,213	0,146	-2,140	-2,086	0,268	-2,013
fifth born or more	0,100	0,256	-3,421 *	-3,266	0,088	-3,319
Crossed effect						
birth rank x number of sons			0,202 *	0,202 *		0,196 *

Note: Same models as in Table 3, only for long distance migration. All other variables are included but their coefficients are not shown above. Reference model (ref.) is the same as in Table 3; model (2) exclude total number of sons; model (3) includes a crossed effect "birth rank x number of son";

model (5) and (6) are identical to (2) and (3), respectively, but excluding length of active military service. Finally, model (4) is same as ref. excluding one-son families' children.
Standard errors are adjusted for within family correlations.
*: significant at $p<0.10$; **: significant at $p<0.05$; ***: significant at $p<0.01$.

Table 5 Probability (cumulative hazard) of first migration according to brother's situation

	Migration						
	All kinds			Short distance		Long distance	
	N	Proba	Khi²	Proba	Khi²	Proba	Khi²
all	1312	54,65		33,01		33,00	
Brother migration decision							
All mobility							
stayer	1075	50,44	32,08***	30,28	12,20***	30,27	14,19***
migrant	237	67,95		41,44		42,50	
Short distance							
stayer	1196	52,11	30,83***	30,05	37,74***	32,40	1,61
migrant	116	73,17		53,40		37,82	
Long distance							
stayer	1179	52,62	11,95***	32,83	0,05	30,98	16,66***
migrant	133	65,82		33,63		46,76	

Note: The numbers are the failure function after twenty-five years under observation (Kaplan-Meier estimates). It thus represents the probability of moving at least once in twenty-five years. Khi² refers to a long rank test of equality of survival functions.
*: significant at $p<0.10$; **: significant at $p<0.05$; ***: significant at $p<0.01$.

Table 6 Effects of an individual's first move on his brother's first migration hazard

	Migration		
	All kinds	Short distance	Long distance
N conscripts	1235	1235	1235
Analysis time (years)	16453	20914	21142
N migrations	635	382	377
Brother migration decision			
All mobility			
stayer	ref.		
migrant	0,682 ***		
Short distance mobility			
stayer		ref.	ref.
migrant		1,245 ***	0,320
long distance mobility			
stayer		ref.	ref.
migrant		0,638 ***	0,411 *

Note: Same specification as before: weibull model. All variable included in Table 3 are included but their coefficients are not shown here. In fact, they do not appear very different from those in Table 3. As before, three different estimation are performed, considering the hazard of the first change of commune, of the first short distance migration and of the long distance migration. The table gives the coefficient for the variable expressing migration status of the brother.
*: significant at $p<0.10$; **: significant at $p<0.05$; ***: significant at $p<0.01$.

Table 7 Distribution of migrants according to their place of destination: same or different from that of their brother

	Migration type		
	all kinds	**short distance**	**long distance**
Second migrant	265	126	116
Move together with his brother	23	18	20
Move to the same commune	37	25	11
Move to a different commune	205	83	85
% to the same commune	13,96	19,84	9,48

Note: The table includes only families with at least two migrants.

Lecture: There are 126 conscripts who made short distance move after one of their brothers also made one. Among them, 18 move with one of their brother; 25 move later but to the same commune as their brother whereas 83 move to a different commune.

Annex: descriptive statistics of the sample (distribution according to the independent variables in %)

	All sample	Families with at least two sons
N conscripts	2389	1235
Birth cohort		
1850-1859	15,49	11,50
1860-1869	19,84	23,00
1870-1879	23,27	25,51
1880-1889	21,35	25,50
1890-1900	20,05	14,49
Active military service		
none	16,58	17,17
1 to 3 years	62,49	63,32
4 to 8 years	20,05	18,38
Over 8 years	0,88	1,13
20 years old residence		
rural	49,35	54,25
urban	22,35	21,54
Paris	28,30	24,21
Birth place		
North	61,62	60,97
South	38,38	39,03
Mobilty before the age of 20		
stayer	89,54	89,55
migrant	10,46	10,45
Sector of activity at 20		
farming	36,46	39,84
craft industry	17,54	17,73
industry	14,23	14,17
services	13,10	10,93
trading	15,24	13,77
State employee	3,43	3,56
Occupational status at 20		
unskilled worker	23,98	26,16
skilled worker	35,71	34,57
farmer	25,87	27,77
white collar	14,44	11,50
Number of sons		
only one son	45,17	
two sons	30,56	53,44
three sons	13,94	26,64
four sons	5,99	11,50
five sons or more	4,34	8,42
Birth rank		
first born	67,77	40,65
second born	22,23	40,24
third born	6,82	12,96
fourth born	2,13	4,13
fifth born or more	1,05	2,02
Parent's situation at 20		
both alive	73,55	74,01
father death	14,61	15,79
mother death	7,44	6,56
both death	4,40	3,64