Two-home adults and children: long-lasting or transitory family situation? The case of France

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Abstract

With the increasing diversity of family situations, more people – children as well as adults – now 'usually' live in more than one dwelling. In a previous paper we estimated the proportion of people living in two dwellings in Australia and France, and described the consequences of these two-home situations on basic estimates of family situations based on 'routine' surveys or censuses.

We base our paper on a large-scale survey, the EU-SILC in France, where people are followed annually. We use the three first waves, which took place in 2004, 2005 and 2006. Periods of multi-residence are short: around 1.4 year. Multi-residence is related to living with separated parents, for children and young adults, to living alone for adults, and to living as a couple for older people.

The significance of the 'two-home' family situations heavily depends on whether they are long-lasting or transitory. We describe the transitions into and out from 'two-home' situations, in order to better understand the dynamics of these situations and their place in the family biographies of adults and children.

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Introduction

Family transitions and situations are becoming less and less easy to identify. The processes of union formation and dissolution take time, and during that period people may live 'more or less' as a couple, e.g. spending together a few days and nights per week, while keeping one household each. The distinction between categories such as living as a couple (in one or two dwellings), living apart together or having a stable relationship is sometimes difficult to make. Older adults preparing their retirement may spend an important period of the year in their holiday house; older people may 'visit' their children for a long period of the year, while keeping their own home. These ambiguous family situations correspond to multi-residence, i.e., living 'usually' in several dwellings, or 'commuting between households'. The same is true for children: after a parental disruption, children may spend some time with one parent, and some time with the other, especially when parents have shared custody of their children, which is becoming more common.

As these new family situations become more common, the proportion of adults and children sharing their time between two dwellings could thus be increasing in France, and it is likely to be also the case in many other Western countries (see e.g. Heuveline, Timberlake and Furstenberg 2003 about family situation of children). In most countries, some rules are applied within the census or routine surveys, in order to take these situations into account and to avoid double-counting of individuals (most often by restricting the observation of individuals to their 'main' dwelling, i.e. where they live more than half of the time), but these rules do not allow for an accurate description of the current situation of individuals living 'usually' in two dwellings.

Two-home situations are likely to disturb the population estimates, due to the high probability to count twice people who usually live in two dwellings, if their actual situation is not taken into account, and if their homes are both included in the survey sample. The distribution among family situations may also be distorted; for instance, more than half of the children who 'usually' live with their father only actually share their time between mother's and

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father's homes (Toulemon, Pennec 2008). Furthermore, the same prevalence of multi-residence, around 4% of children as well as of adults, may result from either many people experiencing such episode, for a short duration, or few people spending a long time with two homes.

The aim of this work is twofold. The first part presents an estimate of the proportion of people living in two or more households, based on a typology of family situations which includes 'two-home' situations as specific categories. The second part describes the transitions into and out from the various 'two-home' situations, in order to check the prevalence with life table estimates, to look for some heterogeneity in the transition probabilities, and to estimate the mean duration of such 'two-home' episodes, a key feature to understand their place within family biographies, and to check the estimation of prevalence based on the first wave.

I – Background

In a seminal paper, Saraceno (1997) introduced the concept of 'commuting between households' as a challenge to family boundaries. Commuting has been first defined as the process of travelling between one's place of residence and one's regular place of work or study. Most often, commuting takes place on a daily basis. But commuting may also exist over a longer time period. All the persons who usually live in more than one dwelling are to be considered as commuting between households. In this paper the term of multi-residence is used as a synonym to commuting between households.

Identifying Commuters between households is not straightforward. In censuses and surveys, the Household members grid often considers only persons living in the household on a permanent basis. The distinction, among other members of the household, between 'visitors' and persons 'usually' living in the household, is not an easy task. First, objective definitions, such as the number of nights spent in the household, may not be considered as relevant by the individuals, and people may be tempted to use their 'own' definitions. Second, some situations may be ambiguous and different persons may have different views on the situation of a particular person.

In the *Recommendations* for the 2010 censuses (UNECE-Eurostat 2006), a new non-core topic was added on secondary, seasonal and vacant dwelling available for the household (see paragraphs 632-637). Censuses already use that definition in Switzerland, and Italy (Toulemon 2009).

In the Italian survey *Famiglia e soggetti sociali* (Family and social subjects), no less than seven precise questions are included, in order to identify commuters between households (Fraboni 2006, page 189). The total number of commuters between households is estimated to be 2.4 million, which accounts for 4.2% of the Italian population. Compared to 1998, the estimated number of commuters slightly decreased, with a reduced difference between men and women.

Smyth and Parkinson (2003) describe the contacts that Australian children who usually live with their mother have with their non-resident father. They find that 47% of non-resident fathers have children staying overnight (at least once a month), while 17% see their youngest non resident child only during the day and 36% report no face-to-face contact. From the viewpoint of children, 56% of children with a parent living elsewhere never stay overnight with this parent. The boundary between multi-residence and frequent visits to the non-resident parent is not simple.

An individual can only be at one place at a time, but when the observation window is larger than one day (or one night), it is possible to 'live' in more than one dwelling. People having two usual residences in two households can be omitted, or counted one, or counted twice in the surveys, according to the rules defining who are the members of the household. The family links of an individual with the other persons living in the dwelling are a very efficient way to understand the concrete situations of commuters between households. Living in more than one dwelling may result from diverse family situations, and thus lead to different kind of bias if multi-residence is not taken into account (Toulemon, Pennec 2008).

II – Data

The *Enquête sur les ressources et les conditions de vie*, ERCV, is the French edition of the EU Survey on Income and Living conditions (EU-SILC, see e.g. Ardilly et al. 2007, Eurostat 2007). The survey is conducted by the French National Institute for Statistics and Economic Studies, *Institut National de la Statistique et des Études Économiques* (INSEE). One aim of this survey is to provide indicators on income distribution, poverty, exclusion, to describle those in need in the EU, it allows also comparative analyses on income differeneces and on social and tax policies used to tackle these differences/inequalities (Ardilly et al. 2007). The first wave took place in 2004, and a follow-up is conducted yearly. Only private households are included and each member of the 'panel households' becomes a panel member and is followed up to 9 years. If a member of 'panel household' leaves the household during the panel period, he/she is surveyed in his/her new household. A child born to a woman who is a panel member is considered as a panel member. The design chosen for EU-SILC panel is a rotational pattern with partially overlapping samples. For France the rotation time is 9 years and the size of the sample in 2004 is around 9,000 households. The survey is made of two different forms, the household form and the individual one. This latter is filled by every person of the household aged 16 and over. For this paper we had access to the three first waves, which were conducted in 2004, 2005, and 2006. We estimated transitions probabilities from 2004 to 2005, and from 2005 to 2006, when applicable.

1) Questions about multi-residence

In addition to the dwelling, the household unit is defined as a group of people sharing daily expenses, so that several households can be present in the same dwelling, and some members of a household may live in another dwelling. For each member of the household, a first question is asked whether the person lives only in the dwelling or also in another one:

- Does <first name> live here…
  - 0. No (member of the household living elsewhere, in another dwelling)
  - 1. (Almost) all year
  - 2. During the weekend or holidays => (A8) How many days per year?
  - 3. During the working days => (A9) How many days per week?
  - 4. Some months in the year => (A10) How many months since last year?
  - 5. Less often => (A11) How many days per year?

For people living only in the dwelling where the interview takes place (answer '1'), the question is asked again:

- Does <first name> live also elsewhere from time to time?

The others are asked:

- Does <first name> live also elsewhere?

For those persons living also elsewhere, a set of specific questions are asked:

- How much time spent in another dwelling?
- Is one of the other dwellings a communal establishment?
- How many other dwellings (private households) the person is living in?

The SILC survey also includes very precise questions about couples, parents, and family links.

Among the 25,299 individuals in the French EU-SILC 2004 sample, 6,147 were aged 0-17 and 18,331 were aged 18-79. After the age of 80, the proportion of people living in nursing home is too high for the sample to be representative. Results for adults aged 80+ must then be used with caution.

From the second wave 2005 onwards, a new question on the other dwelling has been added. If a child aged under 15, whose parents are separated, lives also in another dwelling,, a question is asked whether the other parent is living in the other dwelling mentioned. As the question is at dwelling level, we assume that all children (from same father and mother) of the current dwelling who live also in this other dwelling are all in the same situation regarding living with the other parent or not. Therefore, we can capture older children sharing their time between their both parents' dwellings as long as they have a younger spinster aged under 15. Thus, this estimate for children over 15 is a low estimate. We made some assumptions on this underestimation and corrected the figures for those over 15 and in particular those aged 15 to 17. But this first attempt showed that the changes in the distribution by family situation did not change significantly, and the sample size was small for children living in such situations. Therefore we decided not to correct the figures.

2) Follow-up and attrition

In the SRCV survey, the sample is renewed by part: each year one ninth of the sample is dropped out, and another ninth is included, so that the sample is completely renewed after a cycle of nine years.

The transition probabilities from one year to the next can thus be estimated on 8/9 of the sample (i.e. 22,431 individuals for 2004-05, see Table 1), and the analysis of the three consecutive years 2004-06 is based on 19,556 individuals

Unless specified, the transition probabilities are estimated from the sub-sample present at the beginning and the end of the transition period. For instance, transitions from 2005 to 2006 are estimated from all sub-samples included in both years; transitions from 2005 to 2006 estimated by situation in 2004 and 2004 are based on the subsample which was present in 2004, 2005, and 2006, etc. For some analyses we imputed the situation at the end of the period, then the estimates are based on the whole sample present at the beginning of the period.

As in every panel, there is attrition. For EU-SILC the attrition is 17% between waves 2004 and 2005, 13% the following period (Table 2). People living in multi-residence are twice more likely to be lost at the following wave: the attrition reaches 30.2% among people living in multi-residence.

Table 1. Sample size by multi-residence situation at first and second observation, periods 2004-05, 2005-06 and 2004-06

Residence at first observation	All	Two residences			One residence			All
Residence at end of observation	All	Lost	Two	One	Lost	Two	One	Lost
Period 2004-2005	22,431	429	721	272	3,381	547	17,081	3,810
Period 2005-2006	21,845	356	780	418	2,525	498	17,268	2,881
Period 2004-2006	19,556	507	465	254	4,290	546	13,494	4,797

Source: INSEE, French EU-SILC 2004-2005-2006. Unweighted counts

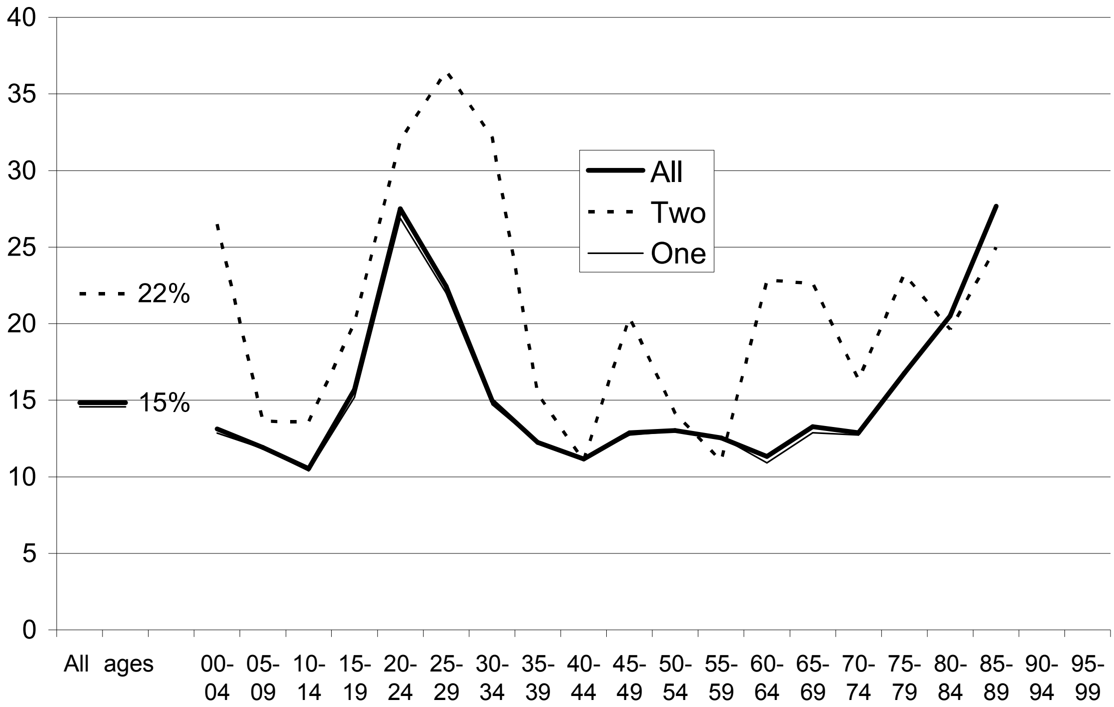
Table 2. Attrition by multi-residence situation at first and second observations, periods 2004-05, 2005-06 and 2004-06

	Residence at first observation		
Percent lost	All	Two	One
Period 2004-2005	17,0	30,2	16,1
Period 2005-2006	13,2	22,9	12,4
Period 2004-2006	24,5	41,4	23,4

Source: INSEE, French EU-SILC 2004-2005-2006. Unweighted counts

As people with a small weight (living in many usual residences) are more likely to be lost, the weighted attrition is lower. Figure 1 presents the attrition estimated from the two follow-ups 2004-05, and 2005-06, in order to smooth random variations. Among those with one residence, the attrition is the highest between ages 20 and 24 (more than 25%) and increases with age after 75. Among commuters, attrition is more frequent (22% vs. 15%) and is concentrated among very young children (age group 0-4) and young adults (ages 20 to 34), where it is larger than one third.

Figure 1. Attrition in 2004-05 and 2005-06, by age and number of residences at the beginning of the period



Source: INSEE, French EU-SILC 2004-2005-2006. Unweighted counts

III – Methods

1) Using weights corrected for multi-residence

In the SRCV dataset, the weights are computed at the household level, and they do not take into account the fact that people who have more than one 'usual residence' have a higher probability to be included in the sample. If both 'usual residences' are eligible for the survey, their inclusion probability is double, and their weight should be divided by two in each dwelling they are living in. In practice, in order to correct the weight, the original weight is divided by the number of usual residences, excluding communal establishments, which are not included in the sample. In 2004, the weight is unchanged for 21% of commuters; it is halved for 76%, and divided by more than two for 3%. The mean weight is multiplied by 0.60 for commuters taken as a whole.

Using the household weights induces a bias in all the estimates which are correlated with multi-residence. Of course, the estimation of multi-residence itself is severely biased: the overall prevalence of multi-residence is estimated at 6.3% from the 2004 survey weighted by the original weights, as against 3.7% when using the corrected weights. But a bias also occurs for other distributions. For instance, the proportion of children under 18 living in a stepfamily is estimated at 7.0% with the original weights, *vs*. 6.3% with the corrected weights (Toulemon, Pennec, 2008).

2) Life-table estimates of 'current conditions' prevalence

Using transition probabilities from one year to the next, the 'current condition' prevalence may be derived from a multiple life table (see e.g. Lièvre et al. (2003) for an application to health expectancies). The transition probabilities from single residence to multi-residence, and vice-versa, are estimated, e.g. for each sex and age, and the 'stationary population' can be deduced from these rates.

For each sex, we estimate the transition probabilities $q_{12}(x)$ and $q_{21}(x)$ at all ages x, respectively into and out from multi-residence. The observed proportions of people having one usual residence $O'(x)$ and having more than one residence (commuters) $C'(x)$ are then estimated by $O(x)$ and $C(x)$, with:

$$\begin{cases} O(0) = 1 \\ C(0) = 0 \\ O(x+1) = O(x)\,\left(1 - q_{12}(x)\right) + C(x)\,q_{21}(x) \\ C(x+1) = C(x)\,\left(1 - q_{21}(x)\right) + O(x)\,q_{12}(x) \end{cases} \tag{1}$$

This method is very efficient, and leads here to an accurate estimate of the current prevalence in the population, for two reasons. First, if the prevalence is strongly biased when the original weights are used, the transition probabilities may be almost unbiased. At each sex and age, among people with two usual residence, the weight has most often been divided by two, and the probability to exit from multi-residence may not be correlated with the weights (i.e., with the type of their other residence). As the weights are unbiased for people with one only residence, the probabilities of transition into multi-residence are unbiased. Second, as multi-residence is a transient state, with a short duration of stay, the 'current conditions' prevalence deduced from the life table may be very close to the current prevalence, as 'compositional effects' are almost absent.

Using the three waves 2004, 2005, and 2006 of the French EU-SILC panel survey, the transition probabilities may be estimated from the observed transitions from 2004 to 2005, and from 2005 to 2006.

We also estimated the rates by age deduced from the transition probabilities, as well as the cumulated hazards by age, in order to estimate their variance, and thus the confidence intervals. See appendix 3.

3) Assumptions on commuting situation of people lost in follow-up

Unfortunately, the life table method has a strong shortcoming: it may be biased because of differential attrition. Two assumptions can be made on the transition probabilities of people who are lost. The first hypothesis is based on the assumption that all people who are not captured in the follow-up live in a single residence. This leads to underestimate the probability to enter into multi-residence, and to overestimate the probability to exit from multi-residence. The overall impact is thus a downward bias in the prevalence of multi-residence. The bias may be small in practice. People who are lost in follow-up have moved, and thus have lost one of their usual residences, and are likely to live in their other residence only. The second hypothesis is based on the assumption that follow-up is not informative: the transition probabilities are the same for those who are followed up and the others. Under this second assumption, the probabilities estimated on the followed-up sub-sample are unbiased. Figure A1 (appendix 4) shows that the two hypotheses are likely to lead to different results: among people living in one residence, 83.0% are in the same situation one year later; 14.6%

have been lost and 2.4% are living in more than one residence. Among commuters, 49.9% are still commuting one year later, 28.1% have one single residence, and 22.0% have been lost.

Table 3. Distribution by multi-residence in 2004 and 2005

Number of residences in 2004	2005	Distribution	Conditional distribution
One		96,7	
Two		3,3	
	One	79,2	
	Two	4,2	
	Lost	16,7	
One	One	78,4	81,1
	Two	2,4	2,5
	Lost	15,9	16,4
Two	One	0,8	23,1
	Two	1,8	52,9
	Lost	0,8	24,0

Source: INSEE, French EU-SILC 2004-2005. Weighted counts (corrected weights)

4) Taking heterogeneity into account

Transition rates are not a siomple function of age, and they may not be described by a simple parametric function of age. Nevertheless, the life table method presented in section 2 above may be completed by including heterogeneity and/or duration-dependence. We rely here on very simple models, for three reasons. First, we only know the current status of individuals in 2004, 2005, and 2006, and we do not know the precise dates of transitions (Lievre et al., 2003; Wolf, Gill, 2009). Furthermore, the transition from single to multi-residence may be a progressive process, with a large uncertainty on its precise date. Even the current situation may be ambiguous in many cases. Second, we do not have any information on previous episodes of multi-residence, or duration since last change. Third, first attempts to describe the population heterogeneity lead to a large uncertainty, and we prefer to show estimates based on both extreme and simple assumptions. We assume an heterogeneity in the probability to enter into multi-residence (mover-stayer model with some people never commuting between households) and the other one the heterogeneity to exit from multi-residence (some commuting episodes lasting less than one year, for a short and fixed period).

Heterogeneity in the probability to enter into multi-residence

With three waves, we have some information on the heterogeneity in the probability to enter in multi-residence. Applying a mover-stayer model, we can assume that the probability of transitions $q_{12}(x)$ are applied to two groups, the movers M and the stayers S. The stayers S spend all their life in a single residence ($S_1 = S$). They may migrate but never live in two usual residences at the same time. The movers may live in a single residence, M_1 or in two residences, M_2:

$$
\begin{cases}
M(x)+S(x)=1 \\
S_1(x)=S(x)=S \\
M(x)=M_1(x)+M_2(x) \\
O(x)=S+M_1(x) \\
C(x)=M_2(x) \\
q_{12}^S(x)=0 \\
q_{12}(x)=\dfrac{M_1(x)\, q_{12}^M(x)}{S+M_1(x)}
\end{cases}
\qquad (2)
$$

Neglecting the heterogeneity by sex and age, and assuming that the movers are an homogenous group, we can estimate the transition probability among the movers, from those who were already commuters in 2004 and living in one only residence in 2005. Noting [*X*;*Y*;*Z*] the number of respondents in situation *X*, *Y*, and *Z*, respectively in 2004, 2005 and 2006, *X*, *Y*, *Z* taking their values in {*O,C,A*} for 'One residence', 'Commuters', and *A* meaning 'All situations (*O* or *C*)', we have:

$$
\begin{cases}
q_{12}^M=\dfrac{[C;O;C]}{[C;O;A]} \\
q_{12}=\dfrac{[A;O;C]}{[A;O;A]} \\
q_{21}=\dfrac{[A;C;O]}{[A;C;A]}
\end{cases}
\qquad (3)
$$

At equilibrium, the proportions M_1, M_2 and S can be deduced from the transition probabilities by the three following equations:

$$
\begin{cases}
S+M_1+M_2=1 \\
M_2\, q_{21}=M_1\, q_{12}^M \\
\left(S+M_1\right) q_{12}=M_1\, q_{12}^M
\end{cases}
\qquad (4)
$$

The solution is:

$$
\begin{cases}
M_1=\dfrac{q_{12}\, q_{21}}{q_{12}^M\left(q_{12}+q_{21}\right)} \\
M_2=\dfrac{q_{12}}{\left(q_{12}+q_{21}\right)} \\
S=\dfrac{q_{21}\left(q_{12}^M-q_{12}\right)}{q_{12}^M\left(q_{12}+q_{21}\right)}
\end{cases}
\qquad (5)
$$

Of course, equation 5 can be defined for any sub-group in the population.

An alternative model could be based on the probability to enter into multi-residence for the fist time, among those who have never been in such a situation. As we only know their situation in 2004 and 2005, we can estimate the probability $q^f{}_{12}$ between 2005 and 2006 for those who were living in one residence in 2004 and 2005:

$$q_{12}^{f} = \frac{[O;O;C]}{[O;O;A]} \tag{6}$$

Using these new probabilities does not change much the picture, as most people living in one residence in 2005 were also in one residence in 2004. Moreover, many people living in one residence in 2004 and 2005 may in fact already have experienced an episode of multi-residence.

Heterogeneity in the probability to exit from multi-residence

The transitions from 2004 to 2005 may also be used to identify some heterogeneity among people living in one or more than one residences. Among commuters in 2005, the probability to exit multi-residence may be different for those who were already commuting in 2004 and those who started living in more than one residence between 2004 and 2005.

We may estimate, on the one hand, the overall probability $q_{21}(x)$ to exit from multi-residence, between the first two waves 2004 and 2005, or 2005 and 2006. From the transitions between the second to the third wave, we may estimate this probability among two groups: those who were already commuters in 2004, and those who lived in a single residence in 2004 and were commuters in 2005.

Similarly to the mover-stayer model, we may assume that the commuters C are divided in two groups: commuters of the first group are commuting only for a short period, lower than one year, the others are commuting for a longer period, with a constant probability to exit from commuting. If s_{obs} is the proportion of short term commuters observed among the commuters in 2005, and q^{l}_{21} the probability of the longer commuters to exit multi-residence, we have:

$$\begin{cases} q_{21}^{l} = \dfrac{[C;C;O]}{[C;C;A]} \\ q_{21} = \dfrac{[A;C;O]}{[A;C;A]} \end{cases} \tag{7}$$

The equation in s_{obs} is the following:

$$q_{21} = s_{obs} + (1 - s_{obs})\, q_{21}^{l} \tag{8}$$

The solution is:

$$s_{obs} = \frac{q_{21} - q_{21}^{l}}{1 - q_{21}^{l}} \tag{9}$$

Taking this heterogeneity into account may change the estimate of the mean duration of an episode of multi-residence.

5) Estimating the mean duration of multi-residence episodes

In addition to the 'current conditions' prevalence, the transition probabilities allow to estimate the mean duration in each state. In practice, the estimation of each episode of multi-residence can be deduced from the transition probabilities under two assumptions. The simplest way is to estimate the instant transition rate of exit from multi-residence $t_{21}(x)$ using the transition probability $q_{21}(x)$, under the homogeneity assumption. The mean duration d of an episode of multi-residence is then estimated by:

$$\begin{cases} t_{12} = -\ln(1-q_{21}) \\ d = \dfrac{1}{t_{21}} = \dfrac{1}{-\ln(1-q_{21})} \end{cases} \tag{10}$$

The other assumption is that a part s of commuters are commuting for a short period of time, known in advance, shorter than one year. Assuming that the mean duration in commuting is d^s ($0 < d^s < 1$ year) for short term commuters, and d^l for the other commuters, we have:

$$\begin{cases} d = s\ d^s + (1-s)d^l \\ d^l = \dfrac{1}{-\ln(1-q_{21}^l)} \end{cases} \tag{11}$$

The actual proportion of short term commuters is a function of the observed proportion s_{obs} and of the duration of the episodes for short term commuters d^s and long term commuters d^l. As the probability to be observed as a commuter in one point is time is proportional to the duration of the episode (ignoring seasonality in the transitions, and assuming that people declare themselves as commuters if they are commuting at the time of the survey), we have:

$$s_{obs} = \frac{s\ d^s}{s\ d^s + (1-s)d^l} \tag{12}$$

The solution is:

$$s = \frac{s_{obs}\ d^l}{s_{obs}\ d^l + (1-s_{obs})d^s} \tag{13}$$

Equation (13) means that the shorter the (unknown) duration d^s, the larger the proportion of short term commuters s, because many commuting episodes are not observed if they are short. The mean duration d is thus strongly decreasing with d^s: putting equations (11) and (13) to the limit, $d = 0$ if $d^s = 0$, because in this case $s = 1$. In practice we will assume, as extreme hypotheses, that ($0.25 < d^s < 1$), because episodes shorter than 3 months may not be included in the questionnaire.

The difference between s_{obs} and s (equation 12) holds if and only if people declare only their other usual residence at the time of the survey. The wording of the question is not clear on that point, because the question “Does <first name> live also elsewhere?” does not refer explicitly to the current situation, to the whole one-year period, or to the ‘usual’ situation.

6) Family situations taking multi-residence into account

In order to have a complete overview of family situations, we created two variables: one is a typology of family situations, with five categories for people living with parent(s), i.e., ‘living with both parents’, ‘living with his/her mother only’, ‘living with his/her mother and a stepfather’, ‘living with his/her father only’, ‘living with his/her father and a stepmother’; four categories for those not living with any parent in the dwelling where the survey is taking place, i.e., ‘living alone’, ‘living in a couple’, ‘not living alone nor in a couple’ – this category gathers mainly those who are head of a one-parent family, and an ‘others’ inconsistent situations (with only 8 respondents) – this last situation is not shown. A second variable of interest is the multi-residence status. This variable is computed from questions included in the household members grid and in the household form: ‘living in one dwelling’, ‘also living in another dwelling’ and ‘also living with the other parent’. This last category is based on a question asked only for children aged less than 15, living with one parent only; if a child is concerned, all brothers and sisters (even older than 14) going to the same other household are supposed to share their time with both parents,

The results that we present here are those computed for wave 2005.

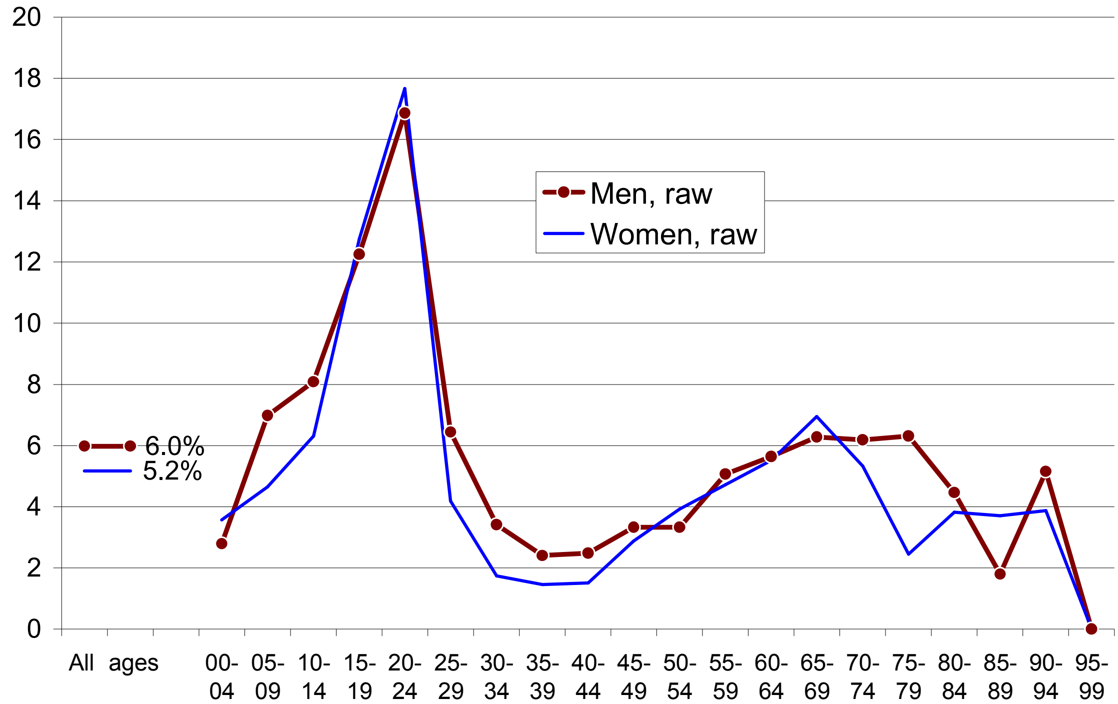
IV – Results

1) 'Two-home' family situations in France

Prevalence of multi-residence in 2004

According to the 2004 wave, multi-residence is far from being a marginal phenomenon in France. Around 5% of women and 6% of men in the sample 'usually' live in more than one dwelling. The proportion is 4% at ages below 5, and reaches 17% at ages 20-24. The prevalence of multi-residence is lower for adults: lowest at ages 30-55, it slightly increases at higher ages (Toulemon, Pennec 2008). According to these data, no less than 3.5 million people would thus be concerned by multi-residence in France in 2004 (Figure 1).

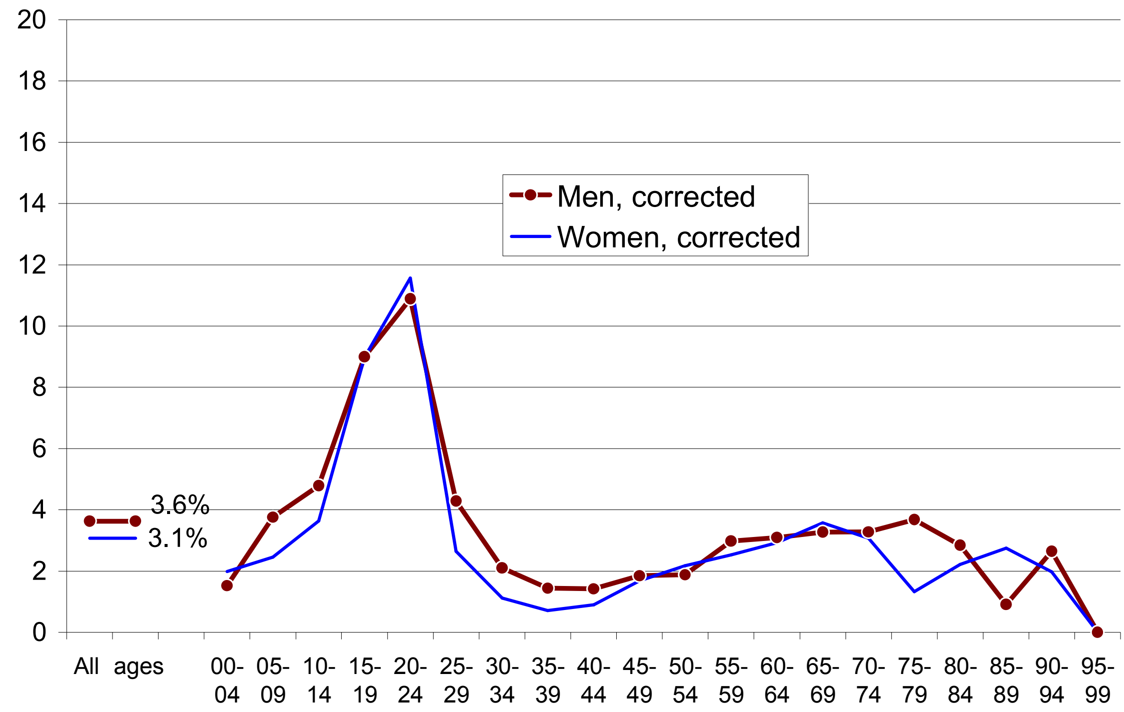
Figure 2. Proportion of men and women living in two dwellings, in France in 2004, by age (in %), according to the uncorrected household weights



Source: INSEE, French EU-SILC 2004.Weighted sample (raw weights)

When using a corrected weight that takes into account the higher inclusion probability of commuters, the prevalence is much lower, but still not negligible: 3.1% of women, and 3.6% of men are usually living in two dwellings. In France, 1.0 million women and 1.0 million men thus live in more than one private dwelling (Figure 2). This estimate of 2.0 million is a minimum because we assumed that people could be reached in all their family households[1]. It is very close to the 2.4 million estimated in Italy (Fraboni 2006).

Figure 3. Proportion of men and women living in two dwellings in France in 2004, by age, using corrected weights taking into account sampling probability (in %)



Source: INSEE, French EU-SILC 2004.Weighted sample (corrected weights)

Commuting during the year or commuting at the time of the survey?

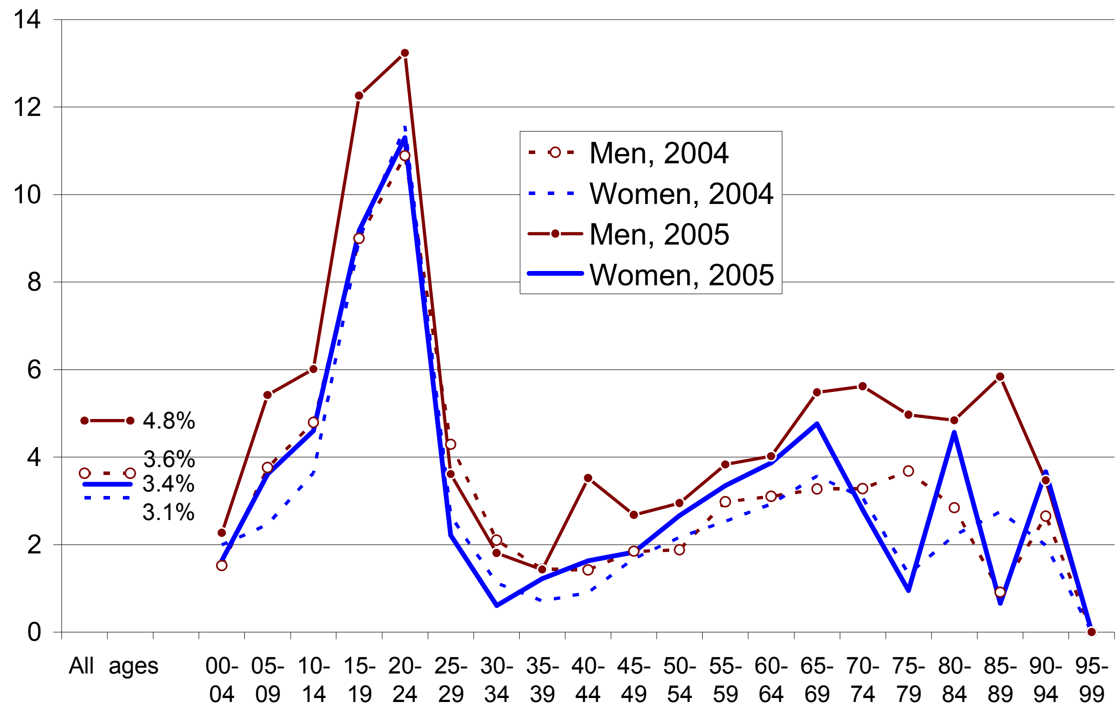
According to the second wave, the proportion living in multi-residence in 2005 is higher. Among the respondents in 2004 interviewed again in 2005, 5.3% of respondents (4.2% among 79% followed-up) have two residences in 2005, despite the fact that attrition is larger among those who were already commuting in 2004 (see Tables 2 and 3 above). Using the whole 2005 sample, with new weights calibrated on the population structure in 2005, the proportion reaches 6.3%. When the weights are corrected for likely double counting of commuters in 2005, the (best) estimate is 4.1%, as against 3.3% in 2004..Despite the fact that statistical tests are not straightforward (most of the sample is made of the same individuals surveyed twice, weights reflect different inclusion probabilities, calibrated on the structure of the population), this difference may not be attributed to hazard: the increase reaches 0.8%, while its confidence interval is estimated at [-0.3%;-0.3%] under simplifying assumption of independent samples with uniform probability inclusions.

The increase between 2004 and 2005 is larger for men than for women. The proportions are almost constant at ages 25-40, increasing for children and for older adults (Figure 4). The proportions are much more stable between 2005 and 2006 (results not shown).

[1] The estimates are slightly lower than those of (Toulemon, Pennec 2008) (3.7 million people, 2.3 million using corrected weights), because new weights are used in this paper, based on a new calibration made by the INSEE (Ardilly et al. 2007).

Four reasons may explain this strange result. First, only a sub-sample (eight households our of nine) was followed between 2004 and 2005, and the attrition is not negligible between the two first waves; second, some people may be followed-up even if they are living in 2005 in a communal establishment, while in the 2004 first wave only ‘ordinary households’ were included; third, people living in multi-residence in 2005 are not the same than in 2004: the changes into and out from multi-residence are frequent (see below section IV-3). As a matter of fact, more than half people commuting in 2005 had only one residence in 2004 (2.4% among 4.2%, see Table 3).

Figure 4. Proportion of men and women living in two dwellings in France in 2004 and in 2005, by age, using corrected weights taking into account sampling probability (in %)



Source: INSEE, French EU-SILC 2004-2005.Weighted sample (corrected weights in 2004 and in 2005).

Last but not least, it could be that the question “Does <first name> live also elsewhere (from time to time)?” (see section II.1) may have a different meaning in 2004 and 2005. During the first wave, the question may implicitly be understood as relating to the situation at the time of the survey: ‘Does <first name> *currently* live also elsewhere?’. On the contrary, the question may be understood by some respondents as relating to the whole year since last interview at subsequent waves: “Does <first name> live also elsewhere *during the year, since last interview*?”. The Italian survey on Families and social topics is more specific in its wording, the question on another usual residence referring explicitly to the whole year: “During last year, did you live on a regular basis in another dwelling: two days a week, or all week except the week end, or during schooling or university term, but excluding travels for holydays or occasional work?” (Fraboni 2006, p. 189).

2) Family situations and multi-residence

As the question on the presence of the other parent has been included in 2005, we now present the multiresidence status of respondents according to their family situation (Table 4). People can live with their both parents, with one parent only – with or without a stepparent -, alone, in a couple or in another situation (mostly as the head of a one-parent family) [2].

Table 4: Proportion of respondents living in multi-residence with or without the other parent in the other household in case of multiresidence, according to the family situation

Family situation in the dwelling the interview took place	Living in one dwelling only	Also another dwelling without any parent	Another dwelling with the other parent	Total	Sample size
With mother and father	95,6	4,4	-	100,0	6 191
With mother only	89,0	7,5	3,5	100,0	1 137
With mother and stepfather	84,6	7,2	8,3	100,0	365
With father only	65,6	15,9	18,5	100,0	226
With father and stepmother	58,6	17,6	23,8	100,0	180
Living alone	96,1	3,9	-	100,0	2 640
Living in a couple	97,4	2,6	-	100,0	12 558
Others	96,1	3,9	-	100,0	1 134
All	**95,9**	**3,6**	**0,4**	**100,0**	**24 431**
Living with one separated parent	83,4	9,1	7,5	100,0	1 908

In 2005, 4.1% of the respondents lived in two dwellings. Living in another dwelling is strongly related to the family composition of the surveyed dwelling. People living with one parent only (mostly children from separated parents) are by far those who most frequently have two usual residences: only 83.4% have one single residence (Table 4, last line); when a person lives with one parent only in the surveyed dwelling, and also lives ‘usually’ in another dwelling, the other parent is living in this other dwelling in nearly half the cases (7.5% among 16.6%), which means that the person is sharing his/her time between both parents. Multi-residence is much most frequent among those who live with their father only – or with their father and a stepmother – than for those who live with their mother only – with or without a stepfather. The repartnering of the parent the person is living with is related to a higher proportion of multi-residence. This difference is weak and is partly explained by an age effect among children and young adults.

Having more than one usual residence is the least frequent among people living in a couple (2.6%, as against 3.9% among people living alone, 4.4% among people living with both parents, and 3.9% for the other family situations).

Table 5 presents the same data, where the respondents are distributed by family situation and multi-residence status. The proportion of people sharing their time between both parents is 0.45%. Half of them (0.23%) are surveyed in their mother’s dwelling, half of them in their father’s (0.22%). The two proportions are very similar, which means that, at the population

[2] The sample is weighted with corrected weights taking multiresidence into account. With the crude household weights, the proportion of people living in more than one residence would be upward biased, and thus higher.

level, mothers and fathers give consistent answers to the question of their children sharing their time between both parents' dwellings.

Table 5: distribution of all respondents by family situation and multi-residence

Family situation in the dwelling the interview took place	Living in one dwelling only	Also another dwelling without any parent	Another dwelling with the other parent	Total	Sample size
With mother and father	21,85	1,01	0,00	22,86	6 191
With mother only	3,27	0,28	0,13	3,68	1 137
With mother and stepfather	0,98	0,08	0,10	1,16	365
With father only	0,40	0,10	0,11	0,61	226
With father and stepmother	0,27	0,08	0,11	0,46	180
Living alone	12,55	0,51	0,00	13,06	2 640
Living in a couple	52,00	1,40	0,00	53,41	12 558
Others	4,58	0,18	0,00	4,77	1 134
All	95,92	3,64	0,44	100,0	24 431
All with separated parents	4,92	0,54	0,45	100,0	1 908

One approach to this table would be to consider that the 5 first lines refer to children and the 3 following ones to adults. Of course, living with mother and father are highly correlated with being a child. But some items of the family status variable correspond to different behaviours at different ages. We therefore present separately the distributions according to age categories, i.e. for children (0-17 years old) , and more rapidly for young adults (aged 18-24), working age adults (25-59) and retirement age adults (60 years old and over).

More children share their time between both parents than live with their father only

While 95% of children aged 0 to 17 live in one dwelling and 5% in more than one dwelling, the percentage varies strongly according to the family situation. Not surprisingly, those living with their both parents have a lower probability to live also usually elsewhere (2%), but for those of children whose parents are separated the situation differs tremendously: 10% of those living with their mother in the surveyed dwelling, live also in another dwelling, and 15% when the family comprises a stepfather. More than half of children surveyed in their father's dwelling live in another dwelling (45% when a stepmother lives in the dwelling). The other dwelling mentioned is between 60 to 70 % the mother's dwelling.

Most children live with their both parents. In 82% of cases because their both parents live in the same dwelling, 2% of children share their time between their both parents' dwellings. While nearly 12% of children live only with their mother or mother and stepfather, not living at all with their mother is the case of less than 2% of children. While children living with their mother only or with a stepfather are living also in their father's dwelling for 6-11%, those living with their father (with or without a stepmother) are 35% to live also at their mother's place.

The repartnering of parents does not show the same effect for children under 18 than for the overall population. Those living with their mother and a stepfather are more often multi-resident and the other residence is often the father's one. When the father repartners, the effect is different, the proportion of those having another dwelling at their mother's place does not change but the proportion of those living only in one dwelling is increasing (Table 6).

Table 6: Proportion of children (aged 0-17) living in multi-residence with or without the other parent in the other household in case of multiresidence, according to the family situation

Family situation in the dwelling the interview took place	Living in one dwelling only	Also another dwelling without any parent	Another dwelling with the other parent	Total	Sample size
With mother and father	98,0	2,0	0,0	100,0	4 650
With mother only	88,7	4,8	6,5	100,0	645
With mother and stepfather	84,5	4,8	10,7	100,0	274
With father only	48,3	16,2	35,5	100,0	137
With father and stepmother	54,7	9,8	35,5	100,0	126
Living alone					6
Living in a couple					4
Others	80,7	19,3	0,0	100,0	65
All	95,0	2,9	2,1	100,0	5 907
Living with separated parents	81,1	6,3	12,7	0,0	1 182

Table 7: distribution of children (0-17) by family situation and multi-residence

Family situation in the dwelling the interview took place	Living in one dwelling only	Also another dwelling without any parent	Another dwelling with the other parent	Total	Sample size
With mother and father	80,86	1,67	0,00	82,53	4 650
With mother only	8,17	0,44	0,60	9,21	645
With mother and stepfather	3,57	0,20	0,45	4,23	274
With father only	0,71	0,24	0,52	1,47	137
With father and stepmother	0,76	0,14	0,49	1,39	126
Others	0,91	0,26	0,00	1,17	75
All	94,99	2,95	2,06	100,00	5 907
All with separated parents	13,21	1,02	2,06	16,30	1 182

The gender differentials are not statistically significant: boys aged under 18 live nearly twice as much in multi-residence than girls of the same age (6.06 vs. 3.92). and are more likely than girls to be in a multi-resident state between their parents dwelling and another dwelling without any parent.

Table 8: distribution of children (0-17) by sex, family situation and multi-residence

	Boys				Girls			
	one dwelling	another dwelling without any parent	another dwelling with a parent	Total	one dwelling	another dwelling without any parent	another dwelling with a parent	Total
with mother and father	81.39	1.92	0.00	83.31	80.31	1.40	0.00	81.7
mother only	7.54	0.48	0.70	8.71	8.82	0.40	0.50	9.72
mother and stepfather	3.03	0.36	0.56	3.94	4.15	0.04	0.34	4.53
father only	0.69	0.32	0.50	1.51	0.73	0.16	0.55	1.43
father and stepmother	0.78	0.14	0.61	1.53	0.74	0.13	0.37	1.24
others	0.51	0.48	0.00	0.99	1.34	0.04	0.00	1.38
Total	**93.94**	**3.70**	**2.36**	**100**	**96.08**	**2.16**	**1.76**	**100**

At ages 18-24, the other dwelling is often a communal establishment

Between ages 18 to 24, half of young adults live with their both parents, 18% with one parent in the surveyed dwelling, 20% in a couple and 6% alone.

As we already saw, multi-residence is much more widespread among young adults than at other ages (12.4% vs. 4.9% for the overall population, 5% for children under 18; 2.4 for 25-59 and 4 for 60+). At this ages, young adults may partly leave their parental home due to education- or work- related reasons. Hence, 15 % of those surveyed as member of their parents' dwelling live also in another dwelling and 15% of those surveyed as living alone are also living in another dwelling. Once they live in a couple, less than 3% are multi-resident. Multi-residence is higher for both young men and women, and women living alone are more likely to live also in another dwelling than men of the same age group (Table 9).

Overall, 9% of young men and 6% of young women (7.6% for both sexes) are sharing their time between the parental home and another dwelling, most often a communal establishment: only 0.8% of men and 2.3% of women (1.5 for both sexes) are interviewed in a household where they live with no parent and declare that they live also in another dwelling. On the one hand the communal establishments are not included in the field of the survey; on the other hand it is possible that young adults under-declare that they partially live in their parental home, compared to the declaration of their parents (Villeneuve-Gokalp, 2005).

Table 9: distribution of young adults (18-24) by sex, family situation and multi-residence

	Men			Women		
	one dwelling	another dwelling	Total	one dwelling	another dwelling	Total
living with mother and father	49,69	8,90	58,58	39,96	6,23	46,20
mother only	8,91	1,69	10,60	9,78	1,81	11,59
mother and stepfather	2,71	0,44	3,15	1,82	0,37	2,19
father only	1,63	0,59	2,22	1,63	0,41	2,04
father and stepmother	1,98	0,78	2,76	0,63	0,61	1,24
no parents and living alone	4,93	0,42	5,35	4,81	1,27	6,08
no parents and living in a couple	13,92	0,33	14,25	26,29	0,68	26,98
others	2,95	0,00	2,95	3,24	0,38	3,63
Total	86,85	13,15	100,00	88,23	11,77	100,00

At adult ages, men are more often multi-resident than women when they do not live anymore with their parents

For this age group, that can be defined as the working age population, 78% are living in a couple, 11% alone, 6.5% not in a couple nor living which includes mainly head of one-parent household, 4% are living with at least of their parents. Men are more often with their parents (6% vs. 2.3%), and women in the category 'Others' which comprises mainly heads of one-parent family.

Multi-residence is at its lowest in this age-group with an average of 2.35%. Here again, those living alone or living in their parents' dwellings are twice as much more likely to live also in another dwelling. Men living with their parents are less likely than women to live also in another dwelling, while it is the contrary for those who are not living with any parent: whatever in a couple or living alone, men are more often living also in another dwelling than women: at adult ages, the woman is more often living only in the family home, while the man is commuting between two households, related to work or study (Table 10).

Table 10: distribution of adults (25-59) by sex, family situation and multi-residence

	Men			Women		
	one dwelling	another dwelling	Total	one dwelling	another dwelling	Total
living with mother and father	3.58	0.14	3.72	1.03	0.06	1.09
mother only	2.01	0.05	2.06	1.03	0.12	1.15
mother and stepfather	0.16	0.02	0.18	0.02	0.01	0.03
father only	0.36	0.01	0.38	0.10	0.02	0.12
father and stepmother	0.00	0.00	0.00	0.00	0.00	0.00
no parents and living alone	11.39	0.55	11.94	9.70	0.37	10.07
no parents and living in a couple	76.54	1.98	78.51	76.85	1.08	77.93
others	3.09	0.12	3.21	9.43	0.18	9.61
Total	97.12	2.88	100	98.15	1.85	100

At older ages, women living in a couple are more often multi-resident

People of retirement age (60+) are most often living in a couple (62%), or living alone (32%). On average, 4% of the persons of this age group are multi-resident. The probability is lower for those living alone than for the others (2.83%).

The type of family women are living in are somewhat different than that of men. While nearly 8 men out of 10 live with a partner and 2 live alone, women distribute themselves between living with a partner and living alone. Multi-residence is slightly higher than working age group (3.97% vs.2.35%). One reason is that once retired what was the holiday house may become another usual residence as well as what was the usual residence while they were working. A surprising result is that those living alone at 60+ are slightly less often multi-resident than those living alone of working age (4.2% vs. 2.8%) and the other category of retirement age. Men are on average more multi-resident (4.9% vs. 3.1) and this is true whatever the family composition. But this age-group is characterised by the transition for impaired people towards living with one of their adult children or in a nursing home. One difference for those living in a couple is that women are almost as often multi-resident than men

Table 11: distribution of adults (60+) by sex, family situation and multi-residence

	Men			Women		
	one dwelling	another dwelling	Total	one dwelling	another dwelling	Total
living with parent(s)	0.44	0.00	0.44	0.24	0.00	0.24
no parents and living alone	17.27	0.75	18.02	42.61	1.05	43.66
no parents and living in a couple	74.29	3.91	78.2	47.83	1.96	49.8
others	3.05	0.29	3.33	6.11	0.19	6.31
Total	95.06	4.94	100	96.79	3.21	100

3) Moves into and out from ‘two-home’ situations

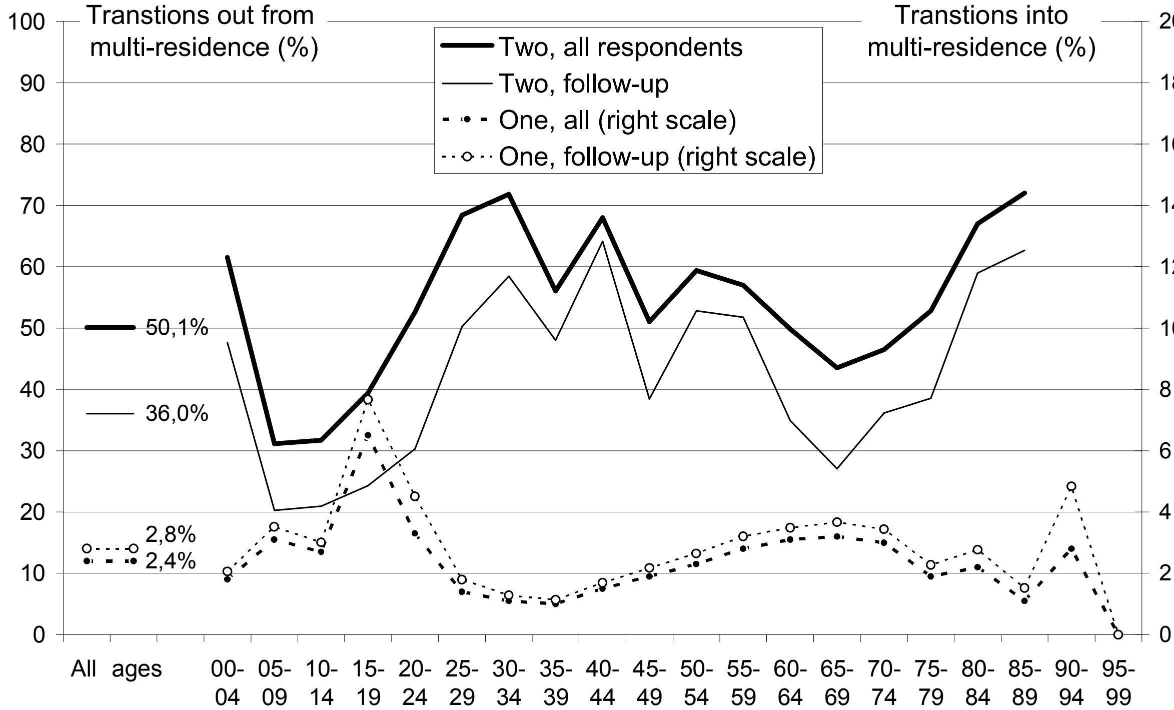
The 2005 and 2006 waves of the French EU-SILC survey include precise information on all the individuals who were present in the 2004 first wave. This follow-up allows describing in detail the annual probabilities to enter in a ‘two-home’ situation, as well as the probability to exit from such a situation. The transition probabilities are estimated by sex and age, looking for consistent estimates between the results coming from successive waves of the survey..

Transition rates by sex and age

As the proportion of people lost in the follow-up are large, the transition probabilities by sex and age vary with the assumption made (Figure 5). Under the assumption that all people lost are living in a single residence at the end of the period, 2.4% people are entering into multi-residence each year. The probability reaches 6.5% at ages 15-19, it is around 3% before age 15 and varies between 1% and 4% at adult ages, and the adults aged 30-39 are the less likely to enter a period of multi-residence (Figure 5, right scale). Multi-residence is a very transient state: 50.1% of commuters are no more commuting one year later. The probability to exit from multi-residence is lowest at ages 5-19 (around 30%), while at other ages it varies between 50 and 70% (Figure 4, left scale).

Looking only at the people who are actually followed-up, under the (unlikely) assumption than those who are lost have the same probability transitions than those who are followed-up, the entries into multi-residence are more numerous (2.8% as against 2.4%) and the exits are less frequent: 36% as against 50%. The age profiles are mostly unchanged.

Figure 5. Probability to change multi-residence situation, by number of usual residences at first observation, periods 2004-05 and 2005-06, according to the assumptions about people lost in follow-up

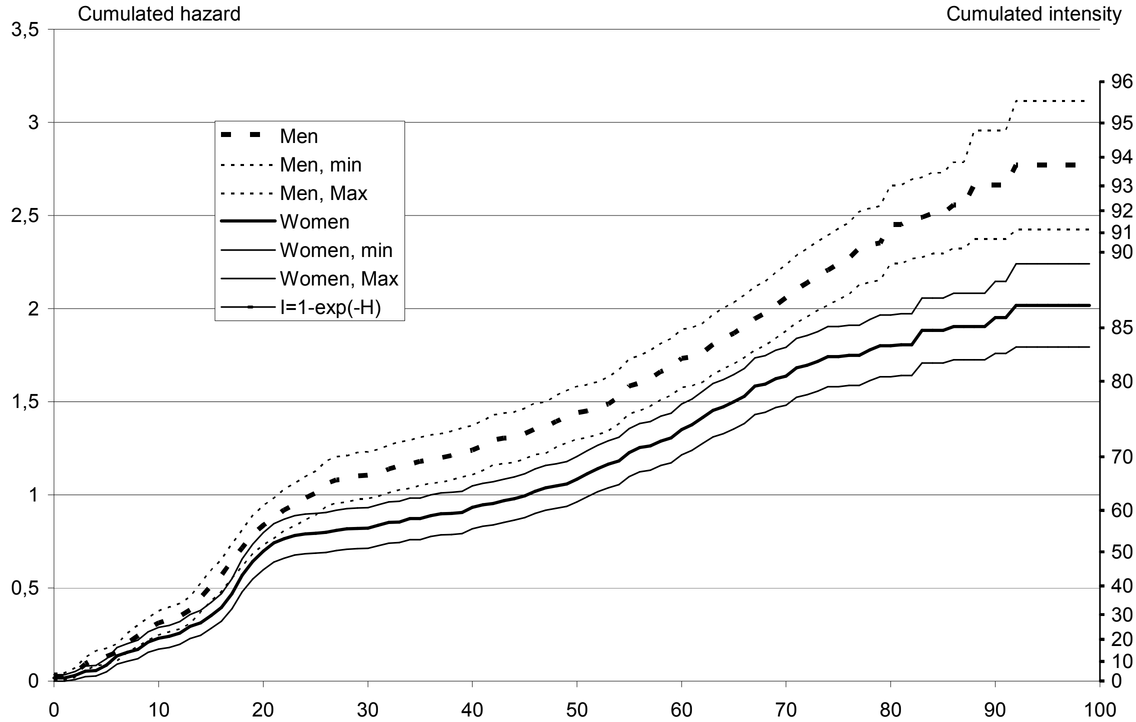


In order to get a better idea of the magnitude of the entries into multi-residence, we plot on Figure 6 the cumulated hazard by sex and age. The main result is the extremely high frequency of entries into multi-residence: at age 100 the cumulated hazard reaches 2.8 for men and 2.0 for women. In case of homogeneity by sex and age, this means that 94% of men and 87% of women would experience at least once a period of multi-residence. The cumulated hazard is significantly higher for men after age 25: during childhood, and especially during early adulthood, men are more prone to enter a period of multi-residence than women. At age 30, no less than 56% of women and 67% of men would have experienced a period of multi-residence, according to the transition probabilities. The cumulated hazard is even larger when we look only at people present at follow-up (not shown).

With probabilities to exit from multi-residence as high as 50% per year, the cumulated hazard is almost meaningless, all the more that almost nobody has more than one residence at birth. Nevertheless, we plotted the cumulated hazard of exiting from multi-residence in Figure A2 in appendix 5, in order to show that there is almost no difference between men and women in these probabilities.

These very high cumulated hazards are probably due to a large heterogeneity in the probability to enter into or to exit from multi-residence. Before examining heterogeneity and its consequences, we will now transform these transition probabilities into 'current conditions' prevalence by sex and age.

Figure 6. Cumulated hazard of entry into-multi-residence by age, men and women, periods 2004-05 and 2005-06, under the assumption that people lost are living in one residence only



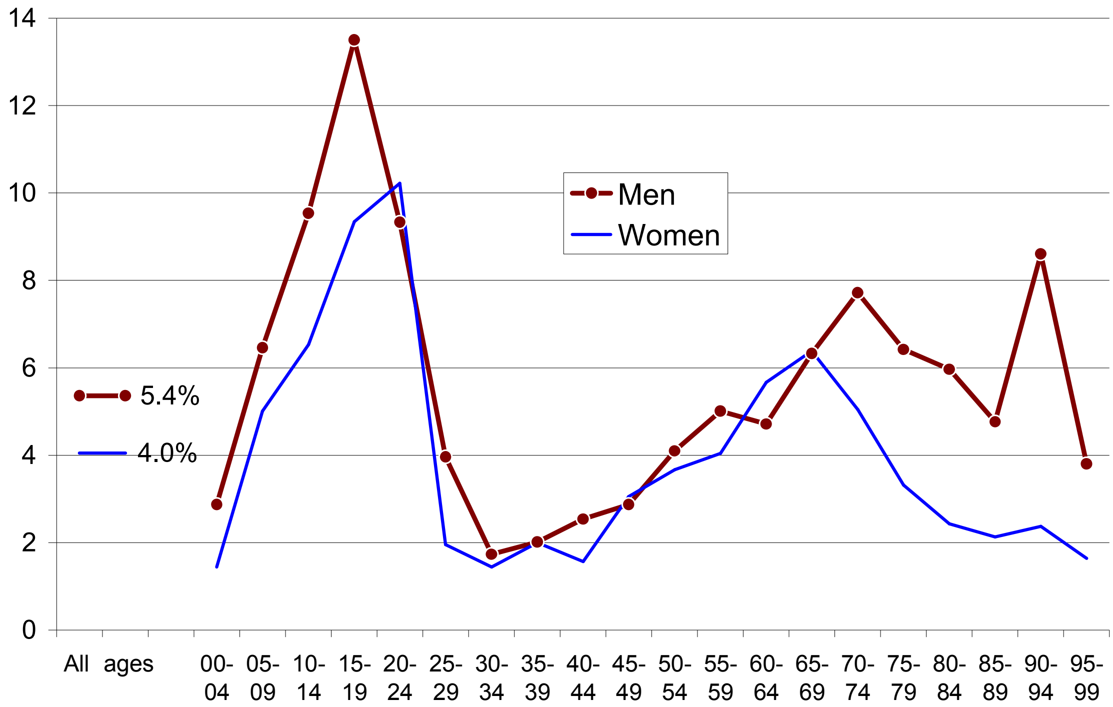
4) Prevalence deduced from multi-state life table

Would the transition probabilities be stable on a long period of time, the 'current conditions' prevalence would be very similar to the observed one. As we saw in the methods' section III-1, this estimate is all the more reliable that multi-residence is a transient state.

Figure 7 presents, in the same format that in figures 2 and 3, the proportion of men and women living in more than one residence, according to the 2004-05 and 2005-06 transition probabilities. We estimated the transitions by sex and precise age and then grouped the population into age-groups, using the corrected weights. We checked that the 'current conditions' prevalence was almost insensible to the weights used: the overall prevalence is estimated at 4.7% with the corrected weights, and 4.9% with the raw weights, the difference being present at all ages, and much lower than uncertainty on the estimate.

The 4current conditions' estimate falls between the estimates obtained using raw weights and multi-residence corrected weights (4.1% and 6.3%), closer from the corrected estimate than from the raw estimate, but not as similar as the corrected estimate as we expected. As exit probabilities from multi-residence are very high and similar for men and women (see Figure A2 in appendix 5), the differences in 'current conditions' estimates are mainly the consequence of difference in the transitions into multi-residence. The larger incidence into multi-residence among boys than among girls is found at all ages before 17; for women, the incidence probabilities decline rapidly after age 19, while for men the decrease with age is more gradual. At ages 30 to 70, the transitions are very similar; at older ages, the probability to enter into multi-residence declines for women, not for men (see Figure 5 above). At ages above 85, transitions out from multi-residence are more frequent for women, as if men were better to keep a bond with their residence more often than women, when they go to a communal establishment (maybe because their wife is still living in their residence). A precise description of the moves of older people goes beyond the scope of this paper: at these very old ages the attrition is large, deaths are numerous, and the sample size is small.

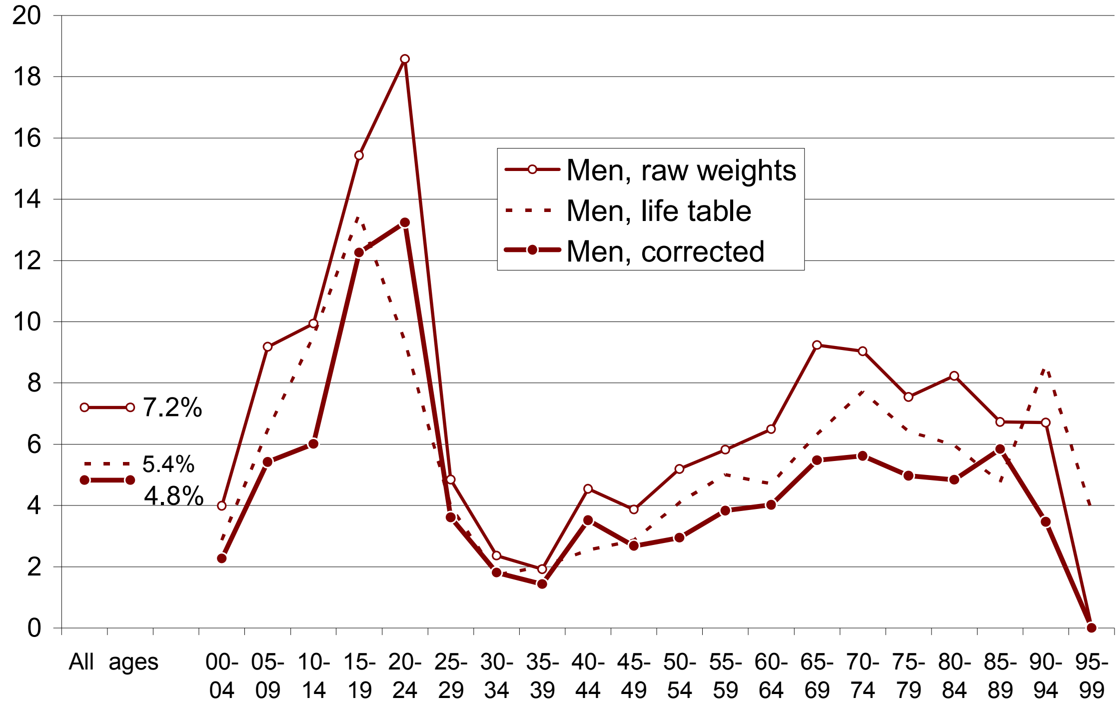
Figure 7. Proportion of men and women living in two dwellings in France, by age, based on life table estimates of transitions by sex and age (in %)



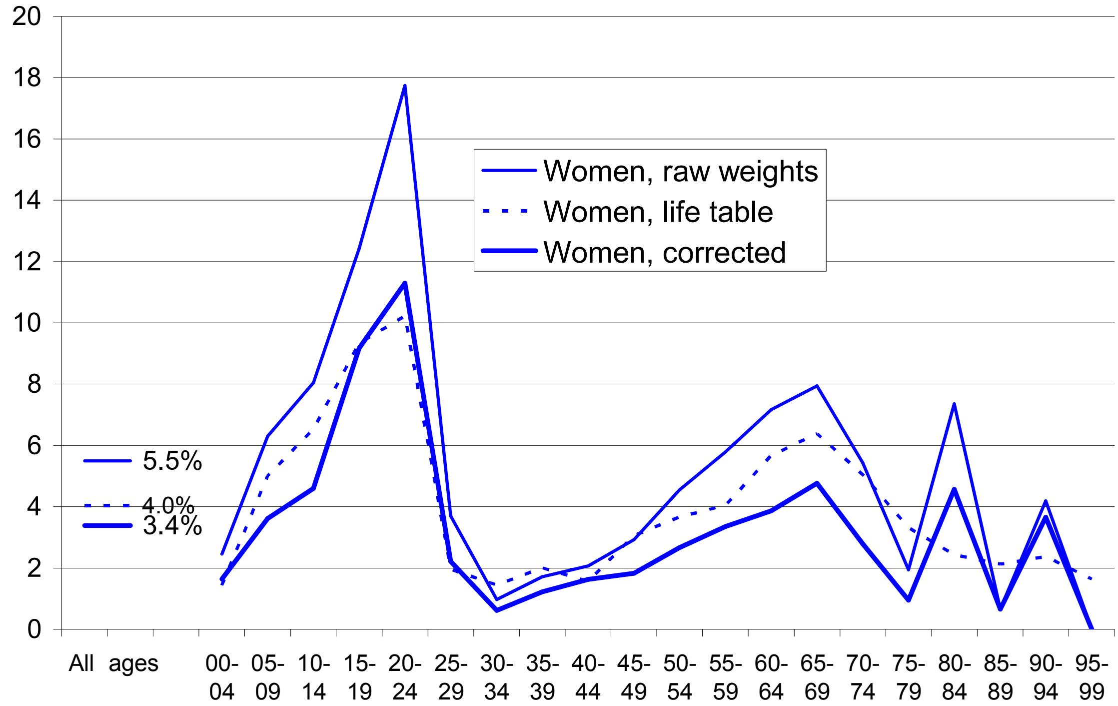
A closer comparison of the life table ‘current conditions’ estimate with the observed prevalence by sex and age with both raw and corrected weights (Figures 8 and 9) shows contrasting situations by age. At ages 20 to 34 for men, and ages 15-29 for women, the life table ‘current conditions’ estimate is very close to the ‘corrected weights’ estimate: double counting is very likely. We know that the mean age at leaving parental home is older according to the parents than according to the young adults, as during the process of decohabitation the parents still consider their child as living with them, while the child considers him/herself as having left the parental home (Villeneuve-Gokalp 2005). In such a situation it is likely that both parents and child declare that the child is living in a situation of multi-residence. It seems that all young adults living in more than one usual residence are counted twice. At all other ages, on the contrary, the ‘current conditions estimate’ is close to the ‘raw weight estimate’, like if people living in more than one usual residence were included in the household grid in one dwelling only.

Figure 8. Proportion of men and women living in two dwellings in France in 2005, by age, based on raw weights, corrected weights and life table estimates of transitions by age between 2004 and 2005 (in %)

a.Men



b. Women



Two hypotheses can be made to explain this discrepancy between 'current conditions' and 'corrected weights' estimates.

First, our hypothesis of double counting for people having more than one usual residence might be false. Despite explicit instructions to include in the household grid all people living also in another household, it could be that interviewers or respondents include in the household grid only people living most of the time in the current dwelling (where the interview took place), or people who considered the current dwelling as their 'main' dwelling. Adults living in more than one residence may not participate in the survey in their 'second dwelling', if they do not consider it to be an 'usual dwelling'. Some parents may also be reluctant to include their children who live most of the time elsewhere. Finally, old adults living in a communal establishment for a part of the year could consider that this communal establishment is not a 'usual residence'. Under this hypothesis, there would be no need to correct the weights for double counting, because most people could have been included in one and only one household grid. If the first hypothesis were true, the share of the time spend in the other dwellings would be less than half, which is not the case (results not shown).

A second hypothesis is that there could be some underreporting of situations of multi-residence, especially in the first wave of the survey. This could be the case for children, some parents being reluctant to say that their children are also 'usually living elsewhere', especially when the live with the other parent, after a parental disruption. Some adults can also consider that they have one and only one 'usual dwelling', even if they spend more than half of their time elsewhere. This is the case, for instance, in Australia, where workers and students who are out from 'their' home for a long period of time do not consider that they are 'usually' living in their work- or education-related accommodation (ABS 2007). During the follow-up, as the focus is made on changes in housing situations, changes into multi-residence could be declared more accurately. In that case there would be an underestimation of multi-residence, compensated for most ages by double-counting.

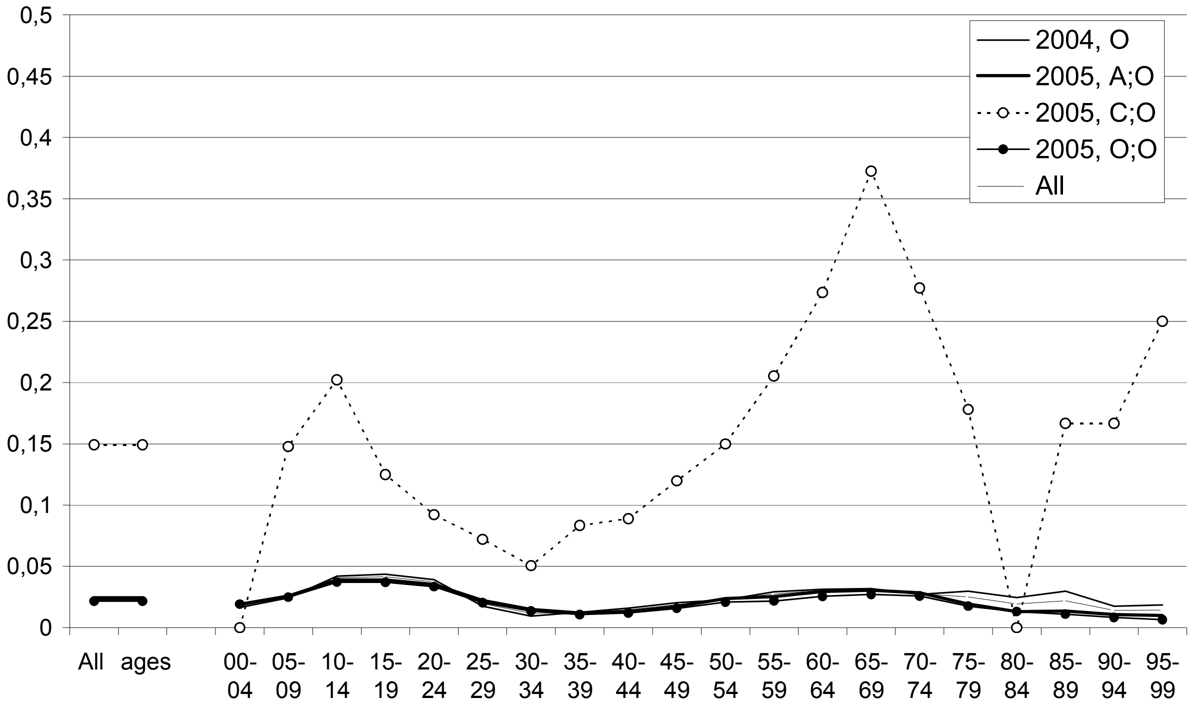
Moreover, the implicit question may not be the same during the first and the second wave. During the first interview, the answers would relate to the current situation, at the time of the survey, while the follow-up answers would include episodes of multi-residence which took place during the previous year, since the previous wave, and not only the current situation at the time of the survey. As the transition probabilities out from multi-residence are very high, it is likely that many episodes of multi-residence lasted less than one year, and were not included in the answers to the first wave. This hypothesis is consistent with the result that prevalence of multi-residence is much higher in 2005 than in 2004, even under our (preferred) assumption that people lost in the follow-up have only one residence.

When the life table estimates are based on the sub-sample of people who were actually followed-up, the 'current conditions' prevalence is much higher (Figure A3 in appendix 6).

5) Heterogeneity in the transition probabilities

The transition probabilities between 2005 and 2006 depend much on the occurrence of a change between 2004 and 2005 (Figures 10 and 11). The probabilities to enter into multi-residence are around 2.4%, while for those who were already commuting in 2004 (C;O in Figure 10) it reaches 15%. This means that there is a large heterogeneity in probabilities of entry, some people experiencing many short episodes of multi-residence. It also questions the uncertain border between commuting and not commuting.

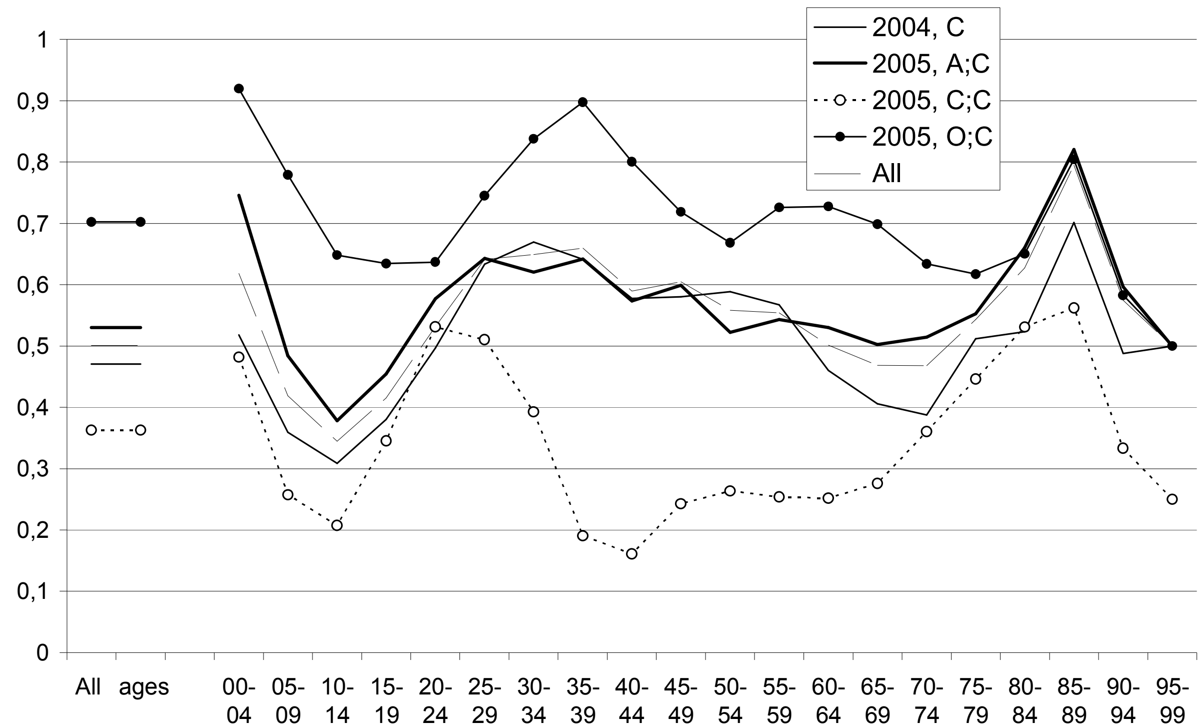
Figure 10. Probability to enter into multi-residence between two waves, by situation at the previous waves, 'O' for 'One residence', 'C' for 'Commuting'



Note: the transition probabilities are estimated for men and women altogether. In order to make the figure clearer, the probabilities have been smoothed with a three-age-groups moving average.

The same is true for probabilities to exit from multi-residence: probabilities are higher in the period 2005-06 than in 2004-05 (53% vs. 47%), consistently with the higher prevalence in 2005. More importantly, the transition probability reaches 70% for those who were living in only one residence in 2004, and who were thus commuting since less than a year in 2005 (O;C in figure 10). The contrast is the lowest at ages 20-24, when muti-residence is frequent and related to leaving the parental home, irrespective of the previous family history

Figure 11. Probability to exit from multi-residence between two waves, by situation at the previous waves, 'O' for 'One residence', 'C' for 'Commuting'



Note: the transition probabilities are estimated for men and women altogether. In order to make the figure clearer, the probabilities have been smoothed with a three-age-groups moving average.

The transition probabilities (for the whole population by sex, irrespective of age) are presented in Table 12, part A. As the difference between men and women are weak, we will only describe the results for both sexes. Part A describes the transition probabilities already presented in figures 10 and 11. Part B shows that 91% of people (94% of men and 87% of women) would experience at least one episode of multi-residence, under the homogeneity assumption; one third would experience such an episode before age 15, and two-thirds before age 30 (see also figure 5 above). Part C presents the results of a mover-stayer model by sex. As the probabilities of entry between 2005 and 2006 are strongly varying with the occurrence of a episode of multi-residence in 2004 (15% vs. 2.1%), the proportion of stayers is estimated to be no less than 80%: only 20% of people would experience multi-residence. With these data, we are thus not able to answer the question about how many people would experience at least once in their life an episode of multi-residence (20% or 91%). Between the homogeneity and the 'maximum heterogeneity' (mover-stayer model) assumptions, some intermediary assumptions could be made, taking into account an heterogeneity among the 'movers', but to estimate such a model we would need data from more than three waves. An attempt to look at the probabilities by age indicates that the proportion of stayers is 60% (according to transition probabilities at ages 20-24).

Taking the heterogeneity among commuters into account, the proportion of short term commuters observed among commuters is estimated at 22%. Considering that short term commuters have a lower probability to be observed, the proportion of short term episodes (foreseen to last less than one year) is estimated between 38% (if the mean duration of such episodes is one year) and 71% (if the mean duration is three months, 0.25 year).

Table 12. Transition probabilities in 2004 and 2005 and estimates of the heterogeneity of the population

Whole sample, including lost in follow-up Assumption that lost in follow-up are not commuting			
A. Transition probabilities (%)	Total	Men	Women
All waves (2004-2005-2006)			
Probability to exit commuting	50.1	50.1	50.1
Probability to enter commuting	2.4	2.8	2.1
Movers in 2004-2005			
Probability to exit commuting in 2005-06	70.2	70.3	70.2
Probability to enter commuting in 2005-06	14.9	14.8	15.0
Stayers in 2004-2005			
Probability to exit commuting	36.1	34.6	38.0
Probability to enter commuting	2.1	2.4	1.9
B. From all waves together, homogeneity			
Probability to commute (%)			
Before age 15	32	36	27
Before age 30	62	67	56
Before age 100	91	94	87
C. Mover-stayer heterogeneity			
Non commuters (%)	80	77	83
Probability to commute (%)	20	23	17
D. Commuters heterogeneity			
Proportion of short term commuters (%)			
As observed in 2004-2005 (%)	22	24	20
With minimum duration for short term commuters	71	75	67
With Maximum duration for short term commuters	38	42	34

Results based on transition probabilities estimated with similar models on the sub-sample of people followed-up only are presented in Table A3 in appendix 7. The major difference is that short term commuters are estimated to be more frequent (between 61% and 86% of multi-residence would be foreseen to last less than one year).

6) Mean duration of multi-residence

Under the homogeneity assumption, a yearly probability of exit of 50% corresponds to a mean duration of 1.4 years for the episodes of multi-residence (Table 13). Under the heterogeneity assumption, 'short-term commuters' would stay in multi-residence between 0.25 and 1.0 years, and 'long-term commuters' would, on average, stay 2.2 years in multi-residence. Note that among 'long term commuters' 36% are no more commuting one year after the start of their episode of multi-residence. Taking commuters as a whole, the mean duration of an episode of multi-residence would thus lie between 0.8 and 1.8 years.

These results come from the hypothesis that people lost in the follow-up are not multi-resident anymore. According to the transition probabilities estimated with similar models on the sub-sample of people followed-up only, the mean duration of episodes of multi-residence is much longer: 2.2 years under the homogeneity hypothesis, between 0.9 and 2.7 years under the heterogeneity assumption (see Table A4 in appendix 7).

Table 13. Mean duration of episodes of multi-residence, under different assumptions on heterogeneity

Whole sample, including lost in follow-up Assumption that lost in follow-up are not commuting			
Mean duration of a commuting episode	Total	Men	Women
Homogeneity assumption	1.4	1.4	1.4
Heterogeneity assumption			
Short term commuters, min	0.25	0.25	0.25
Short term commuters, Max	1.0	1.0	1.0
Long term commuters	2.2	2.4	2.1
All commuters, min	0.8	0.8	0.9
All commuters, Max	1.8	1.8	1.7

VI – discussion and conclusion

Using three waves of a panel survey providing information on multi-residence, we have been able to produce many new results. Nevertheless, these results present some limitations.

A first series of shortcomings are data related. Firstly, we only have partial information on people living in communal establishments. This can be most severe for our estimations at old ages, but may also introduce some bias among students. Secondly, attrition is large: 17% between the first and second wave, 25% between the first and third waves (the attrition reaches 26% and 42% if the exiting sub-samples are considered, see Table A2 in appendix 2); moreover, the attrition is larger among people who were living in more than one residence than among others, making bias informative. We thus made the assumption that people lost in follow-up were all living in only one residence. Despite this assumption, the prevalence of multi-residence is higher in 2005 than in 2004, due to the numerous entries into multi-residence. This increase could be attributed by an ambiguity of the notion of 'usual residence', without any explicit reference to a fixed period of time. It is likely that respondents are more likely to declare short term commuting episodes in the second and following waves than in the first wave: in the first wave, 'another usual residence' would refer to the time of the survey, while in subsequent waves it could refer to any residence used since the previous wave. Thirdly, another attrition bias linked with multi-residence is for those who migrate. They are more at risk of being lost if they 'completely' move than if they 'partially' move and are still living partially in the sampled household at the same time.

Our modelling attempts did not lead to simple and consistent results. First, the 'Current conditions' estimate of multi-residence did not confirm our 'corrected weight' estimate of prevalence, except for young adults who are more likely to be counted twice, once by themselves in their 'usual residence' and once by their parents if they come back from time to time. If this result comes from the fact that, with the exception of young people, people are answering to the survey only in one place, for themselves as well as for their relatives, then our correction of the weights is inaccurate. Another possible explanation is the ambiguity of the definition of multi-residence (see above). We tried to capture the heterogeneity of the population, taking benefit of the three waves of the survey that were available to us. This allowed us to propose consistent estimates of commuters heterogeneity, and of mean duration of episodes of multi-residence, but did not allow us to produce reliable estimates of the proportion of people who would experience at least once an such an episode. When more waves will be available, we will be able to deepen our analysis of changes (in family situation, working status, etc.) linked to an episode of multi-residence. But the main results, as well as the main shortcomings, will remain.

The main results are the relatively high prevalence of multi-residence: at a period of time, some 3 to 5% of people, children as well as adults, are 'usually living' in more than one household. Children whose parents are separated are more likely to be multi-resident, especially if they are surveyed at their father's place. Young adults (18-24 years old), except those living in a couple, are the most likely to live in multi-residence. For older adults, the main result is that men are more likely to be in a multi-residence situation than women, whatever the family situation they are living in (living alone, in a couple, or not alone nor in a couple). This analysis showed that the common family categories do not give a complete picture, as some situations are not fully covered, i.e., the fact that a child who is sharing his/her time between his/her both parents is lost in the usual family categories. Not taking into account multi-residence when describing family situations may give a false picture, in particular for those children whose parent are separated and consequently of one-parent families. Children living in one-parent families may be in very different situations if they have only one parent to take care of them or if they are actually living with their both parents but with an alternate pattern.

A second result is the short duration of such episodes. Despite we only know the situation at different points in time, we could estimate the mean duration at around 1.4 years (0.8 and 1.8 being the results based on extreme assumptions on heterogeneity). Changes into and out from multi-residence are very common: more than half commuters are commuting since less than one year. Thus, we were not able to study multi-residence by number of previous episodes, a mover-stayer model leading to unreliable results.

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Appendix

1) Table A1. Sample size in 2004, and percent lost between 2004 and 2005, by number of usual residences

	Sample size			Percent lost		
	All	Two	One	All	Two	One
All ages	22 431	1 422	21 009	16,7	24,0	16,4
00-04	1 450	51	1 399	13,5	27,4	13,3
05-09	1 450	92	1 358	12,8	14,9	12,8
10-14	1 543	122	1 421	11,9	15,9	11,7
15-19	1 690	239	1 451	16,4	20,8	16,0
20-24	1 401	295	1 106	30,2	29,8	30,2
25-29	1 156	79	1 077	21,8	30,1	21,5
30-34	1 559	47	1 512	15,5	39,5	15,1
35-39	1 595	34	1 561	14,6	10,4	14,7
40-44	1 641	34	1 607	13,6	7,7	13,6
45-49	1 610	50	1 560	15,5	33,3	15,2
50-54	1 578	61	1 517	15,9	12,8	16,0
55-59	1 406	78	1 328	15,0	16,4	14,9
60-64	983	65	918	13,2	34,5	12,5
65-69	938	56	882	14,4	15,0	14,4
70-74	971	53	918	14,2	24,8	13,8
75-79	722	31	691	20,3	31,5	20,0
80-84	493	26	467	26,2	24,9	26,2
85-89	147	6	141	24,7	55,0	24,0
90-94	84	3	81	53,5	100,0	52,4
95-99	13	0	13	31,2		31,2

2) Table A2. Distribution by number of usual residences, including lost in follow-up and exit in follow-up, 2004-2005-2006 waves (%). Sample interviewed in 2004

	Corrected weights				Raw weights		
	Number of residences in				Number of residences in		
	2004	2005	2006		2004	2005	2006
Respondents							
One	96,7	95,0	94,6	One	94,4	93,6	93,5
Two	3,3	5,0	5,4	Two	5,6	6,4	6,5
Respondents and people lost in follow-up since 2004							
One	96,7	79,2	71,2	One	94,4	77,9	70,2
Two	3,3	4,2	4,0	Two	5,6	5,3	4,9
Lost		16,7	24,7	Lost		16,8	24,9
Respondents, people lost since 2004 and people who exited from the sample							
One	96,7	70,2	55,1	One	94,4	69,0	54,2
Two	3,3	3,7	3,1	Two	5,6	4,7	3,8
Lost		14,8	19,1	Lost		14,9	19,3
Exit		11,4	22,7	Exit		11,4	22,7

3) Variance of cumulated hazard

In order to estimated the cumulated hazard and their variance, we first transformed the probabilities into rates, in order to estimate the cumulated hazard and their variance.

a. Entry into multi-residence: instant rate

We first used the formula $$t(q) = -\ln(1-q) \qquad \text{(A1)}$$

The derivative is $$t'(q) = \frac{1}{1-q} \qquad \text{(A2)}$$

Neglecting the heterogeneity of the weights, the variance of the transition probability is:

$$V(q) = \frac{q(1-q)}{n} \qquad \text{(A3)}$$

Using the linearization of variance, we have:

$$V(t) = \left(t'(q)\right)^2 V(q) = \frac{q(1-q)}{n(1-q)^2} = \frac{q}{n(1-q)} \qquad \text{(A4)}$$

The cumulated hazard and its variance are:

$$\begin{aligned} H(x) &= \sum_{y<x} t(y) \\ V(H) &= \sum_{y<x} V\left(t(y)\right) \end{aligned} \qquad \text{(A5)}$$

So the limits of the confidence intervals are:

$$\begin{aligned} H_{Max} &= H + 1.96\sqrt{V(H)} \\ H_{\min} &= H + 1.96\sqrt{V(H)} \end{aligned} \qquad \text{(A6)}$$

We transformed the cumulated hazard $H(x)$ into intensity $I(x)$ up to age x:

$$I(x) = 1 - \exp\left(-H(x)\right) \qquad \text{(A7)}$$

b. Exit from multi-residence: linear population rate

For the rates out from multi-residence, we did not use the formula $t = -\ln(1-q)$, because some transition probabilities are estimated at 1, but instead a 'linear population' of the rates, presented in equation A11. Using equation A11 instead of A1, A2, A4 and A5 become A12, A14 and A15.

$$m(q) = \frac{q}{1-\frac{q}{2}} \qquad \text{(A11)}$$

$$m'(q) = \frac{1-\frac{q}{2}+\frac{q}{2}}{\left(1-\frac{q}{2}\right)^2} = \frac{1}{\left(1-\frac{q}{2}\right)^2} \qquad \text{(A12)}$$

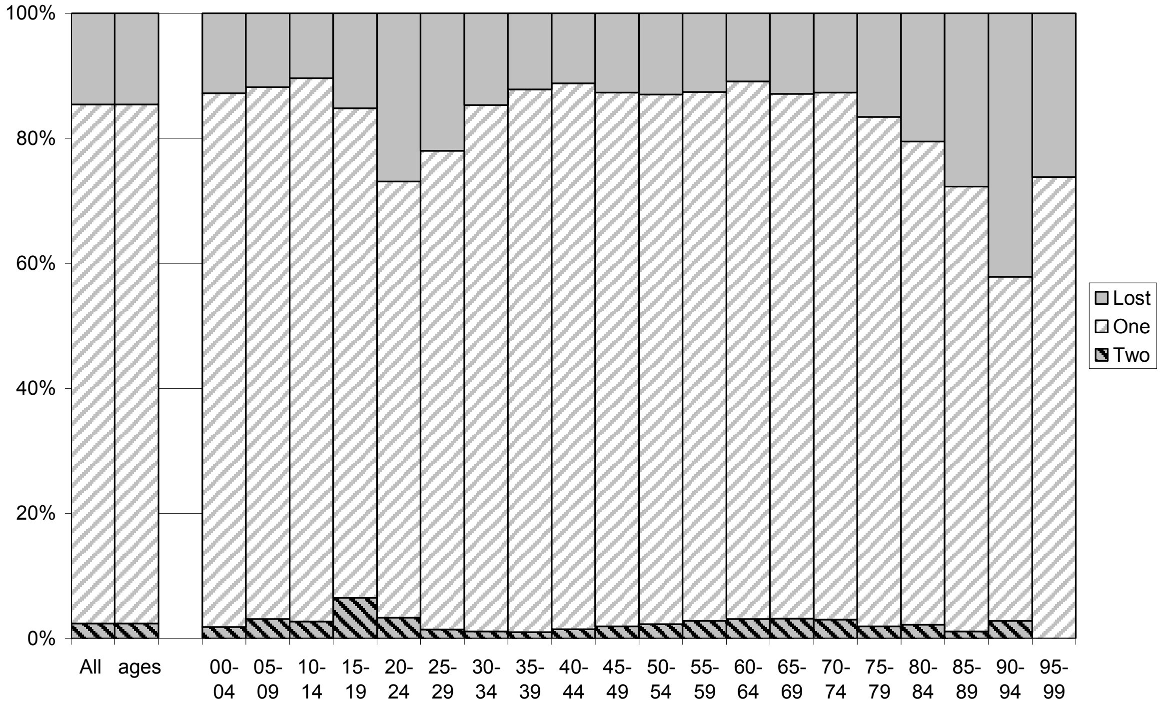
$$V(m) = \left(m'(q)\right)^2 V(q) = \frac{q(1-q)}{n\left(1-\frac{q}{2}\right)^4} \tag{A14}$$

$$\begin{aligned} H(x) &= \sum_{y<x} m(y) \\ V(H) &= \sum_{y<x} V\left(m(y)\right) \end{aligned} \tag{A15}$$

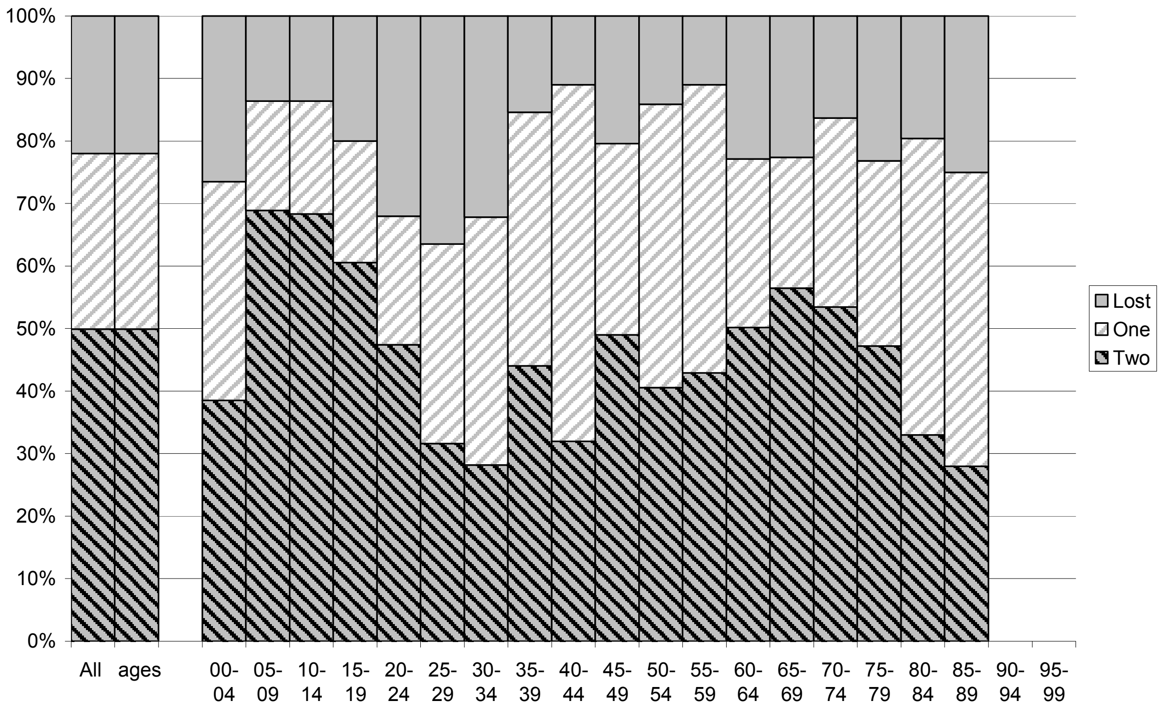
4) Transition probabilities, taking into account attrition

Figure A1. Transition probabilities by age, and number of residences at the beginning of the period

a. People living in one residence

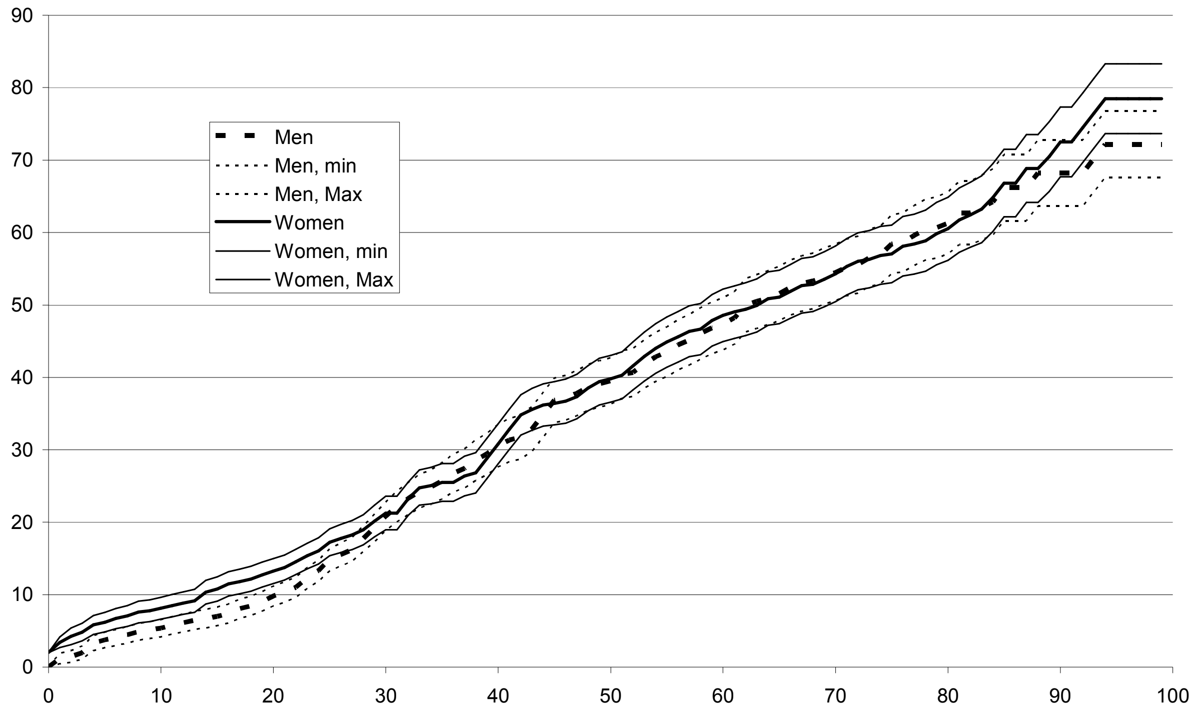


b. People living in more than one residence



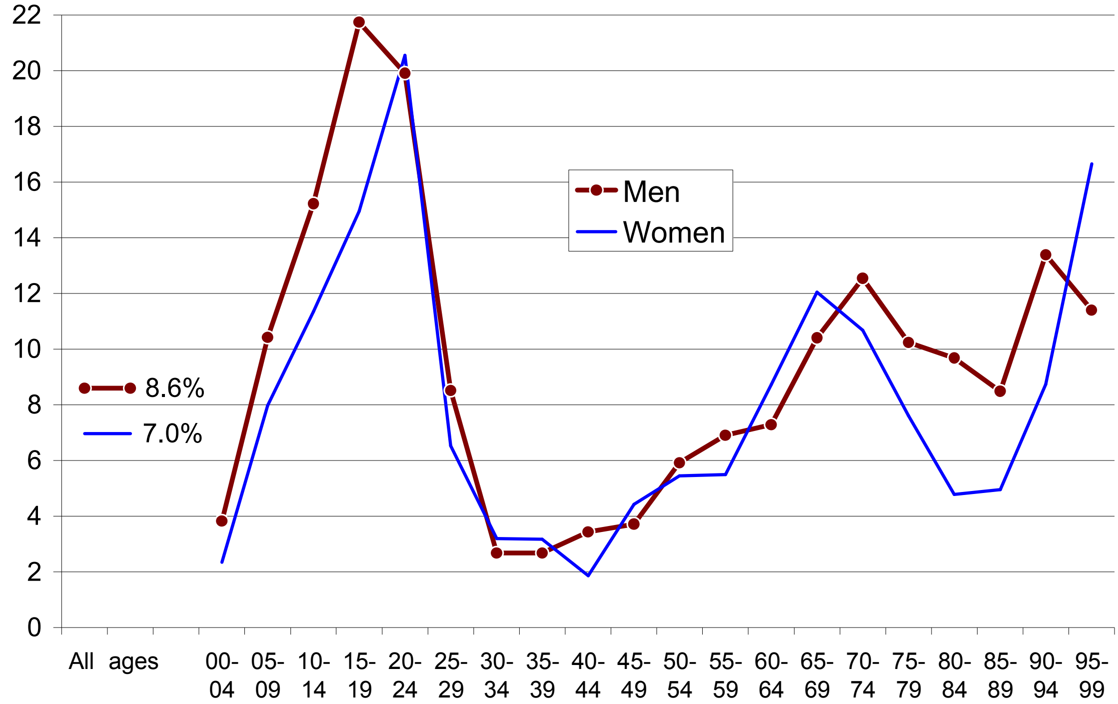
5) Cumulated hazard of exit from multi-residence by age, with an estimation of confidence intervals based on equations from Appendix 3.b.

Figure A2. Cumulated hazard of exit from multi-residence by age, men and women, periods 2004-05 and 2005-06, under the assumption that people lost are living in one residence only



6) Transition probabilities under the assumption that people lost have the same behaviour than those who are followed-up

Figure A3. Estimated transition probabilities, based on the sub-sample of people followed-up between 2004 and 2005



7) Transition probabilities and derived estimates under the assumption that people lost have the same behaviour than those who are followed-up

Table A3: Transition probabilities in 2004-2005 and 2005-2006, and estimates of the heterogeneity of the population, based on the sub-sample of people followed-up between 2004 and 2006

Follow-up only			
A. Transition probabilities (%)	Total	Men	Women
All waves (2004-2005-2006)			
Probability to exit commuting	36.0	36.6	35.3
Probability to enter commuting	2.8	3.3	2.4
Movers in 2004-2005			
Probability to exit commuting in 2005-06	64.2	64.1	64.3
Probability to enter commuting in 2005-06	19.9	19.0	21.1
Stayers in 2004-2005			
Probability to exit commuting	17.1	16.5	17.9
Probability to enter commuting	2.4	2.7	2.2
B. From all waves together			
Probability to commute (%)			
Before age 15	35	40	30
Before age 30	69	74	63
Before age 100	95	97	91
C. Mover-stayer heterogeneity			
Non commuters (%)	80	76	83
Probability to commute (%)	20	24	17
D. Commuters heterogeneity			
Proportion of short term commuters (%)			
As observed in 2004-2005 (%)	23	24	21
With minimum duration for short term commuters	86	88	85
With Maximum duration for short term commuters	61	64	58

Table A4: Mean duration of episodes of multi-residence, under different assumptions on heterogeneity, based on the sub-sample of people followed-up between 2004 and 2006

Follow-up only			
Mean duration of a commuting episode	Total	Men	Women
Homogeneity assumption	2.2	2.2	2.3
Heterogeneity assumption			
Short term commuters, min	0.25	0.25	0.25
Short term commuters, Max	1.0	1.0	1.0
Long term commuters	5.3	5.5	5.1
All commuters, min	0.9	0.9	1.0
All commuters, Max	2.7	2.6	2.7