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MIMOSIS: MIcrosimulation MOdel for Belgian Social Insurance Systems
Modelling rules for household composition and family relationships

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Abstract

Within the tax benefit legislation it is often important to know whether a given individual shares the same dwelling with a partner and/or with some relatives. We will refer to such units of individuals as families. In this note we explain how we construct these family units within MIMOSIS.[1] The subset of MIMOSIS that covers these family relation construction rules, is called the FAMREL module.

[1] The development of the MIMOSIS model was supported by Federal Science Policy within the framework of the AGORA programme, on the request of the F.P.S. Social Security, who is responsible for the management and the maintenance of the MIMOSIS model. The model is based on administrative data from the Datawarehouse Labour market and Social protection, managed and maintained by the CrossRoads Bank for Social Secruity.

Table contents

Introduction

In the data-set, disposable for the construction of MIMOSIS, we observe which individuals make up a sociological household. For these individuals we also observe some information on how they are related. This information allows us to identify singles or couples and their possible relatives within the sociological household. A family unit may thus coincide with the observed sociological household, but it might as well be that several different family units make up the larger encompassing sociological household.

In a first section of this note we describe how we disentangle the sociological household into family units. The second section describes how the inter-family links will be processed throughout the model.

1 CONSTRUCTION OF SEPARATE FAMILIES WITHIN THE SOCIOLOGICAL HOUSEHOLD

The starting point for all interhousehold relationship variables is the variable NAREGNIS_RELATION. The variable NAREGNIS_RELATION captures the relationship between the head of the household and the other household members. This variable is an exogenous variable, taken from the National Register. It can take 18 different values. We list the possible values of NAREGNIS_RELATION and their label in Table 1.

Table 1: Values of the variable NAREGNIS_RELATION

Code	Description	Omschrijving
1	Head of the household	Gezinshoofd
2	Spouse	Echtgenoot
3	Son, daughter	Zoon, dochter
4	Son in law, daughter in law	Schoonzoon, schoondochter
5	Grandson, granddaughter	Kleinzoon, kleindochter
6	Father, mother	Vader, moeder
7	Father in law, mother in law	Schoonvader, schoonmoeder
8	Grandfather, grandmother	Grootvader, grootmoeder
9	Brother, sister	Broer, zuster
10	Brother in law, sister in law	Schoonbroer, schoonzuster
11	Relative (without further specification)	Verwant (zonder bijkomende specificatie)
12	Non relatives	Zonder verwantschap
13	Stepson, stepdaughter	Stiefzoon, stiefdochter
14	Great-grandson, great granddaughter	Achterkleinzoon, achterkleindochter
15	Uncle, aunt	Oom, tante
16	Cousin (relations in the third degree)	Neef, nicht (verwantschap in de derde graad)
17	Cousin (relations in the fourth degree)	Neef, nicht (verwantschap in de vierde graad)
20	Relative living in community or home	Gemeenschappen, tehuizen

In principle, the reference person is the household member that manages the household affairs or contributes the largest part of household income. In practice, it often turns out to be the household member that is responsible for the administrative affairs.[2]

Starting from the observations in the variable NAREGNIS_RELATION, we can construct families within the sociological household.

We will store a unique number of the family to which an individual belongs in the variable FAMREL_FAMILY. Next to this unique identifier we will construct three additional variables FAMREL_RELATION, FAMREL_FAMTYPE and FAMREL_COUPLE. All these variables have the value 0 as their default.

[2] APS (2004). If we do not observe a head of the household, i.e. NAREGNIS_RELATION is different from 1 for all members of the sociological household, we make the oldest household member the head of the household, i.e. NAREGNIS_RELATION is set equal to 1 for this individual. All other value of NAREGNIS_RELATION are left unchanged in this case.

The variable FAMREL_RELATION contains, for each individual, a value that identifies the relationship between the given individual and the head of his family. The variable FAMREL_RELATION can take 7 different values, apart from the default value. We list these values in Table 2.

Table 2: Values and labels of FAMREL_RELATION

Value	Label
1	Head of the family
2	Partner of the head of the family
3	Child of the head of the family or of his partner
4	Ascendant in the first degree of the head of the family or of his partner
5	Ascendant in the second degree of the head of the family or of his partner
6	Relatives up till the third degree of the head of the family or his partner, other than ascendants or children
7	Other family members

We can distinguish different types of families within a sociological household. We will store for each individual an indication of the type of family to which the individual belongs, in the variable FAMREL_FAMTYPE. To understand the labelling of these different types it is important to note that throughout the model we will treat both relatives (bloedverwanten) and those related by marriage (aanverwanten) to the head of the household, in the same way.

Family of the head of the sociological household (FAMREL_FAMTYPE = 1): The head of the sociological household (i.e. the individual with value 1 for the variable NAREGNIS_RELATION) is considered as head of a separate family. If in the same sociological household, we observe a spouse of the head of the household, (i.e. the individual with value 2 for the variable NAREGNIS_RELATION), this individual is said to be the partner of the head of this family.

If we observe more than one individual with the value equal to 2 for NAREGNIS_RELATION, we select the individual that differs the least in age with the head of the sociological household, as partner of the head. We observe age by aid of the variable NAREGNIS_DATBIRTH.

Family of children of the head of the sociological household (FAMREL_FAMTYPE = 2): If we observe a single child or step child in a sociological household (i.e. value 3 or 13 for NAREGNIS_RELATION) and some grandchildren (i.e. value 5 for NAREGNIS_RELATION) we check an age condition. We observe age by aid of the variable NAREGNIS_DATBIRTH. If the grandchildren are at least 15 years younger than the observed child or step child, the child or step child and the grandchildren are identified as respectively the head and the children of a separate family. If in addition we observe a single son or daughter in law in this sociological household, i.e. an individual with a value 4 for NAREGNIS_RELATION, this individual is considered as the partner of the head

of this newly created family. If in addition we also observe great grandchildren (i.e. code 14 for NAREGNIS_RELATION) in the sociological household, we consider them as relatives up till the third degree of this new created family.

Unique observations of a child or step child and of a son or daughter in law, are identified as a separate family as well, even if there are no grandchildren in the sociological household.

Family of parents of the head of the sociological household (FAMREL_FAMTYPE = 3): If we observe two and only two individuals that are qualified as father or mother of the head of the household, i.e. individuals with value 6 for the variable NAREGNIS_RELATION, we consider them as a separate family. If we encounter two and only two parents in law (code 7) that have a different value for sex, which is observed in the variable NAREGNIS_SEX, we consider them as a separate family as well.

In both cases the oldest of the two is considered to be the head of the family. If they have the same age, the head of the family is selected at random.

Family of grandparents of the head of the sociological household (FAMREL_FAMTYPE = 4): If we observe two and only two individuals that are qualified as grandfather or grandmother of the head of the household, i.e. individuals with value 8 for the variable NAREGNIS_RELATION, that have a different value for sex we consider them as a separate family as well.

Again the oldest of the two is considered to be the head of the family. If they have the same age, the head of the family is selected at random.

Family of brother or sister of the head of the sociological household (FAMREL_FAMTYPE = 5): If we observe only one brother or sister in the sociological household (i.e. code 9 for NAREGNIS_RELATION) and only one brother or sister in law (i.e. code 10 for NAREGNIS_RELATION), we consider them respectively as head and partner of the head of a separate family.

Family of grandchildren of the head of the sociological household (FAMREL_FAMTYPE = 6): If we observe only one grand son or daughter (i.e. code 5 for NAREGNIS_RELATION) and great grant children (i.e. code 14 for NAREGNIS_RELATION) and no children of the head of the sociological household (i.e. code 3 NAREGNIS_RELATION) we consider the grand son or daughter with the great grandchildren as a separate family if the great grandchildren are at least 15 years younger than the grandchild.

Family of aunts of the head of the sociological household (FAMREL_FAMTYPE = 7): If we encounter two and only two aunts or uncles (code 15 for the variable NAREGNIS_RELATION) with an opposite sex, we consider them as a separate family. If we observe in addition relatives up till the third degree (i.e. code 16 for the variable NAREGNIS_RELATION) we consider them as children of this newly created couple.

If we encounter only one aunt or uncle in a sociological household and a number of relatives up till the third degree, we consider them as a separate family as well.

Family of individual living in a collective household (FAMREL_FAMTYPE = 8): If an individual is living in a collective household, we consider this individual to be head of a separate family, i.e. FAMREL_RELATION is equal to 1. The value of FAMREL_FAMTYPE is set equal to 8 in this case.

Family of the head of the sociological household (FAMREL_FAMTYPE = 1 continued): All individuals that have not been allocated so far but who are below the age of 18 and have the codes 3, 4, 5, 9, 11, 12, 13, 14, 16 or 17 are considered as children within the family of the head of the sociological household.

If we do not observe a partner for the head of the household (i.e. code 2 for NAREGNIS_RELATION) but a single individual that is not a relative (i.e. code 12 for NAREGNIS_RELATION) in a sociological household that further only consists of children as defined above, we consider this non relative as the partner of the head of the family.

All individuals, not classified as member of a family until now, will be considered as member of the family of the head of the sociological household. How we convert the values of NAREGNIS_RELATION into values of FAMREL_RELATION, is listed in Table 3.

Table 3: Values and labels of FAMREL_RELATION[3]

Value FAMREL_RELATION	Label of FAMREL_RELATION	Label of NAREGNIS_RELATION and value between parenthesis
1	Head of the family	
2	Partner of the head of the family	
3	Child of the head of the family or of his partner	Spouse (2) not allocated yet and younger than 26, Son, daughter (3), Son in law, daughter in law (4), Stepson, stepdaughter (13)
4	Ascendant of the first degree of the head of the family or of his partner	Father, mother (6), Father in law, mother in law (7)
5	Ascendant of the second degree of the head of the family or of his partner	Grandfather, grandmother (8)
6	Relatives up till the third degree of the head of the family or his partner, other than ascendants or children	Spouse (2) not allocated yet and 26 or older, Grandson, granddaughter (5), Brother, sister (9), Brother in law, sister in law (10), Great-grandson, great granddaughter (14), Uncle, aunt (15), Cousin (relations in the third degree) (16)
7	Other family members	Relative (without further specification) (11), Non relatives (12), Cousin (relations in the fourth degree) (17)

Next to the variables FAMREL_RELATION and FAMREL_FAMTYPE, we also construct the variable FAMREL_COUPLE. This variable identifies whether the individual is part of a couple or not. If the individual is identified as part of a couple, we set the variable FAMREL_COUPLE equal to 1 except if one of the partners was identified as a non relative of the head of the sociological household (i.e. code 12 for NAREGNIS_RELATION). In this case the variable FAMREL_COUPLE is set equal to 2 for both partners. We assume the partners of the latter couples are not married, while the partners of all other couples are assumed to be married. Hence, the variable FAMREL_COUPLE can take 3 values. We list these values and their labels in Table 4.

[3] Remark that if there is more than one household member that is classified as spouse of the head of the sociological household (i.e. value 2 for the variable NAREGNIS_RELATION), that we still have to classify the non classified spouses (see construction of family type 1).

Table 4: Values and labels of FAMREL_COUPLE

Value	Label
0	Individual is not part of a couple
1	Individual is part of a married couple
2	Individual is part of an unmarried couple

If an individual is part of a couple, we make the man the head of the family if both partners are of different sex. If both partners are of the same sex, we make the oldes of the two head of the family.

2 IDENTIFICATION OF RELATIONSHIPS BETWEEN FAMILY MEMBERS

In the previous section we have identified the relation that each family member has with the head of the family. Depending on the member being analysed, we will have to determine his or her relationship with all other family members as well. To identify these relationships we will convert the values, stored in FAMREL_RELATION, to new values.

If, for instance, we are analysing a child (i.e. FAMREL_RELATION = 3), we will consider the head of his family (i.e. FAMREL_RELATION = 1) to be an ascendant of the first degree. To quantify these new relations, we distinguish 7 different values that can derive from crossing the value of FAMREL_RELATION of the individual being analysed with the value of FAMREL_RELATION of another family member. We list these different values and their labels in Table 5.

Table 5: Values and labels of inverted relations derived from the value of FAMREL_RELATION

Value	Label
0	Individual being analysed
1	Partner of the individual being analysed
2	Child of the individual being analysed
3	Ascendant in the first degree of the individual being analysed
4	Ascendant in the second degree of the individual being analysed
5	Relatives up till the third degree of the individual being analysed
6	Other family member of the individual being analysed

The matrix, given in Table 6, illustrates how we translate the values of FAMREL_RELATION into one of the 7 values listed in Table 5. The first column of Table 6 contains the value of FAMREL_RELATION, observed for the individual being analysed. The first line of Table 6 contains the value of FAMREL_RELATION, observed for the family member for which we have to determine the relationship with respect to the individual being analysed. The cells of the matrix in Table 6 then contain the value chosen to quantify the

relationship between these two individuals from the viewpoint of the individual being analysed.

Table 6: Matrix with values chosen to quantify the relationship between family members conditional on
a) the value of FAMREL_RELATION for the individual being analysed (see column 1) and
b) the value of FAMREL_RELATION for the family member (see line 1)

	1	2	3	4	5	6	7
1	0	1	2	3	4	5	6
2	1	0	2	3	4	5	6
3	3	3	5	4	5	6	6
4	2	2	5	6	6	6	6
5	5	5	5	6	6	6	6
6	5	5	6	6	6	6	6
7	6	6	6	6	6	6	6

Meaning of values in cells:
0=individual itself, 1=partner, 2=child, 3=ascendant in the first degree, 4=ascendant in the second degree, 5=relative up till the third degree, 6=other

Note that a unique combination of two values of FAMREL_RELATION could result in multiple values for certain cells of Table 6. To understand the choices we made, it is important to note that we are interpreting the relationships within a single family.

Suppose, for example, that the individual being analysed is an ascendant of the second degree of the head of the family (FAMREL_RELATION = 5) and that the family member for which we want to determine his relationship, is also an ascendant of the second degree of the head of the household, i.e. we try to determine the value for cell 5,5 in Table 6. We could assume that these two individuals are either partners and thus select value 1 for cell 5,5 or assume that they are independent grandparents and thus select value 6 for cell 5,5. If multiple choices were possible, we selected the least restrictive choice since we have tried to isolate the different couples already before when constructing the different family types.

REFERENCES

[1] APS (2004), http://aps.vlaanderen.be/sgml/reeksen/2568.htm.