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Elderly Care:
an Agent-based simulation on Modena
population

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Chapter 1

Introduction

My thesis is concerned with the institutional and familiar context that determines the assistance to the elderly population in an economy.

After a general discussion on the Italian system of long-term care, including both public and private services and familiar assistance, we will build an agent-based model based on the empirical data collected by the survey ICESmo3, conducted by the CAPP on the population of Modena.

The questionnaire used is comprehensive of an impressive amount of information regarding economic and non-economic characteristics of the population and part of the reason of choosing this dissertation was based on the will of exploiting these data that are, for the most part, still unexplored.

The choice of investigating the elderly care derives from the increasing importance that the matter is assuming, mainly due to the well-known problem of Italian ageing population. Moreover, this subject is usually studied without a broad point of view, capable of considering all the complex factors that interact in determining the final outcome. Indeed, many studies focus only on the public aspects of the issue, neglecting the fundamental role of the families or of the typical Italian phenomenon of domestic assistants, the so called *badanti*. Some others, only focus on one of the last two aspects but with clear difficulties related to finding empirical evidence on those delicate subjects.

The approach of agent-based models allows to study these aspects together, integrating also the missing information with ad hoc hypothesis that can be later evaluated on the basis of other empirical data.

We will organize the discussion in the following way. In chapter 2 we start with a description of the Italian system of long-term care, which includes a brief introduction about the ageing population problem, the services offered, the private domestic assistants and the role of the family.

Then, in chapter 3, we focus on the elderly care services offered in Modena, providing also some data about the costs of that services, that will be useful for the implementation of our model.

Chapter 4 introduces two computational approaches at social science, which are the basis of this work: microsimulations and agent-based models.

In chapter 5 and 6 we describe the construction and results of our agent-based model regarding the long-term care of elderly population. In chapter 5 we describe how the model is constructed, which variables will be exogenously set from the ICESmo3 dataset, which ones we will be able to control in the model and the ones that will be the results of the experiments. In chapter 6, on the other hand, we will present the results of the experiments run, analyzing the effect of different levels and combinations of public policies and of different levels of female employment rate.

Chapter 2

Long-term care in Italy

2.1 Introduction

Long-term care (LTC) is defined as “all the forms of continuing personal or nursing care and associated domestic services for people who are unable to look after themselves without some degree of support, whether provided in their own homes, at a day centre, or in an NHS or care home setting” ([Comas-Herrera et al., 2003](#)). In other words, long-term care includes various services which help meet both the medical and non-medical needs of people who cannot care for themselves for long periods of time, due to a chronic illness or disability. Although it may be needed by people of any age, it is more common for senior citizens.

It is now clear that long-term care radically differs from health care: while the latter aims at improving the health condition, the first intends to make the current unpleasant situation more bearable. It is not uncommon, nevertheless, that a person needs both of them, in particular in the last period of life.

To be more specific, individuals who need LTC are those who have some limitations in the activities of daily living (ADLs) or instrumental activities of daily living (IADLs). The first category, used as a very practical measure of (dis)ability, includes activities such as eating, bathing, dressing, grooming, getting in and out of bed and walking. The second one embrace the complex skills needed to successfully live independently, that are preparing meals, doing homework and basic home maintenance, shopping, handling transportation, taking medication, managing finances and using the telephone/internet. A person who has some limitations in ADLs or IADLs is called dependant, with various degree of assistance required. For the evaluation of the health condition of elderly, there is a special regional commission called *Unità di Valuta Geriatrica (UVG)*, including doctors, nurses, social workers and sometimes administrative employees.

As we will see, some services are completely free of charge, while others are to be paid. In particular, health services provided by the *Servizio Sanitario Nazionale (SSN)* are free of charge whereas social care is means-tested and users can pay up to the full cost of it. National and local taxation are the main funding sources of public LTC.

Total LTC spending is calculated as the sum of health care and social services for

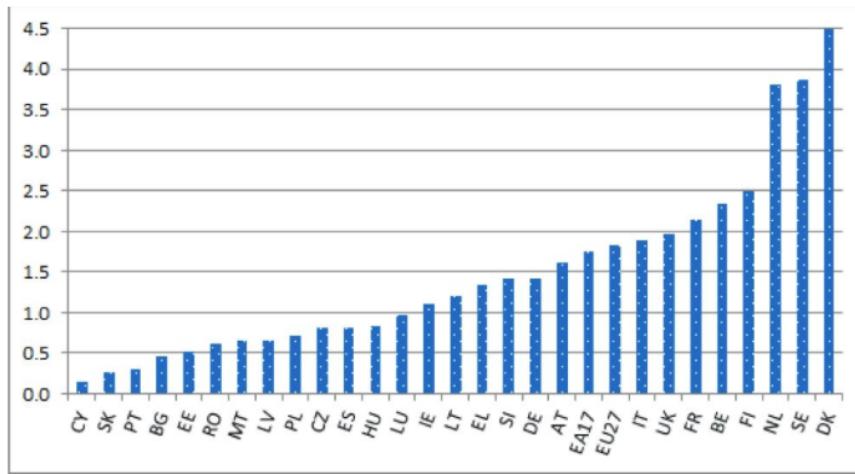


Figure 2.1: LTC expenditures over GDP, countries comparison (%). 2012. Credits: [Coda \(2013\)](#).

dependant people. With respect to health care, expenditures include palliative care, long-term nursing care, personal care services and health services in support of family care. Therefore, the health components regard people who need medical and personal care services. Social services are more related to IADL support so that they encompass, between others, domestic services, care assistance and residential care services. As shown in figure 2.1, in Italy the total LTC spending represents the 1.9% of the public expenditures, slightly higher than the European average (1.8%), but much lower than Germany, which is one of the oldest country in the world with Italy and Japan. Therefore, if we consider the demographic profile of Italian population, total LTC expenditures are relatively low with respect to the younger European countries.

In Italy, social care and integrated social-health services are assuming an increasingly relevant role due to:

- the increase of demand for LTC services caused by the rapid ageing of Italian population;
- the changes in the family structure;
- other socio-economic changes, the most important being the increase in female labour participation.

The first part of this dissertation aims at describing the current system of LTC in Italy and briefly point out what are the challenges that it will probably face in the near future. It is important to keep in mind, however, that Italian LTC system is characterized by a wide variability among Regions and areas in both funding levels and structure of services supply. Therefore, we will describe the main features of the LTC system which are common to all Regions, focusing on Emilia-Romagna in the next chapter. In section 2.2

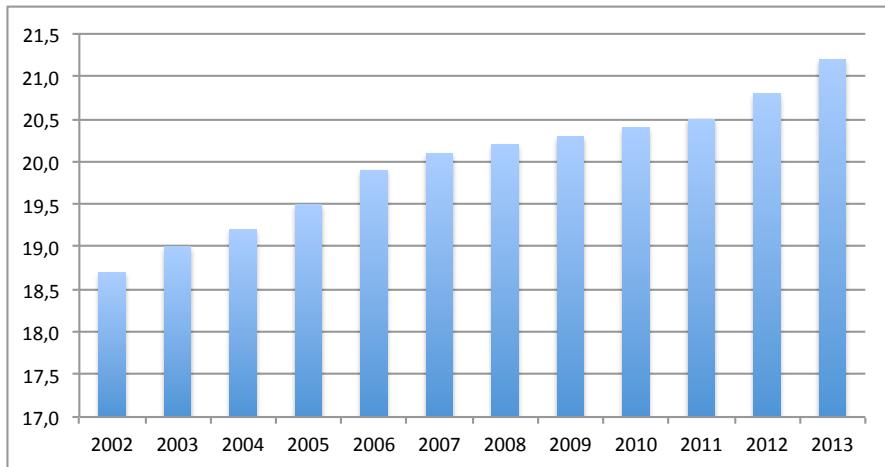


Figure 2.2: People aged 65 and more over the total population (%).

we analyze the demographic profile of Italian population, section 2.3 presents an overview of the formal LTC services offered and sections 2.4 and 2.5 focus on informal caregiver: the *badanti* and the family.

2.2 Demographic Profile of Italian population

As for the majority of European countries, the Italian demographic pyramid tends to a change with an increasing number of people aged 65 and more and a contemporaneous slight decline of the youngest people (0-14 years old). Figure 2.2 shows the evolution of the share of old people over total population in Italy between 2002 and 2013.

Following Istat data, the share of elderly over the total population reaches the 21.2% in 2013, placing Italy as the third oldest country in the world behind Japan and Germany.

The ageing of Italian population, started fifty years ago, is due to both the decrease of fertility rate (or average number of children per woman) and the increase in life expectancy. Indeed, in 2013 the average number of children per woman is 1.39 while the life expectancy at birth increased between 1995 and 2013 from 75.1 years to 79.8 years for male and from 81.6 years to 84.6 years for female. In addition, the situation is expected to worsen in the near future due to the ageing of those people born in the 60's, during the so called *baby boom*, and the projections show that in 2050 the elders will represent until the 35% of the Italian population.

In order to better understand the demographic profile of the population it is useful to look at other two indexes: the old-age index and the age dependency ratio. The former indicates the proportion of people older than 64 to the young people, those below 14 years old, so that it represents the level of the population ageing. The latter is the ratio of those usually out of the labor force, people aged 65 and over, and the *productive* part of the population, people aged between 15 and 65.

In 2014, the old-age index is 154.1, that tells us that there are about 154 elderly every

100 young people, while the age dependency ratio is 54.6, which means that each person aged 65 or more is theoretically sustained by two people in working age.

With regard to dependant people, the part of population on which we focus in this work, we see that the ageing of the population does not necessarily imply a proportional increase in those people who require LTC assistance. Indeed, according to the so called *healthy ageing* hypothesis, as life expectancy at birth increases, also the years in good health increase, so that the prevalence of dependency occurs later in life. On the other hand, if the improvement in the health status results in higher longevity at every age, it may lead to a rise in the prevalence of chronic disease in older age and, consequently, to an increase of dependant people. Following [Dominguez and Barbagallo \(2012\)](#), even if the share of population with disability per age has decreased in the last decades, the absolute number of old dependants is constantly increasing. In Italy, in 2012, one person over five aged 65 or more presents at least one limitation in ADLs and of course this number considerably increases if we consider also those people with some limitations in the instrumental daily life activities. Moreover, according to the same author, the most serious cases of disability, typical of the oldest people, are those which has increased more in the last ten years.

Since the dispersion of the dependency ratios by age across European countries is relatively limited, even if the shape differs, we can look at the dependency ratios estimated by the European Commission and illustrated in figure 2.3. The graph shows that the dependency ratio by age groups is around zero until 62 years old and then sharply increases until the fifty per cent of the population aged more than 85.

To summarize, the current Italian population is characterized by a very high number of people aged 65 or more and by a considerable number of old dependant people. Moreover, the projections for the near future are far from being reassuring: the ageing population will probably increase, also due to the ageing of the baby boom generation and the disable people are expected to increase among the oldest share of population.

Altogether, both the current and the expected demographic and health condition of the Italian population is critical for the sustainability of the existing welfare system, especially for the services relating to LTC. Indeed, the demand for LTC services, that has already increased in the last years, is expected to growth further in the future decades.

In the following section we will describe the organization of the formal assistance in Italy and the services offered.

2.3 Long-term care services

The Italian social model is based on the so called *welfare mix* model, which is characterized by a set of relations between public and private services and largely rests on the informal family networks. The Italian LTC system does not represent an exception, so that, in order to get a clear picture of the whole system, it is necessary to study both the public and the private LTC services, and the informal caregivers. In this section we focus on the formal assistance, while the last one will be dedicated to the informal one.

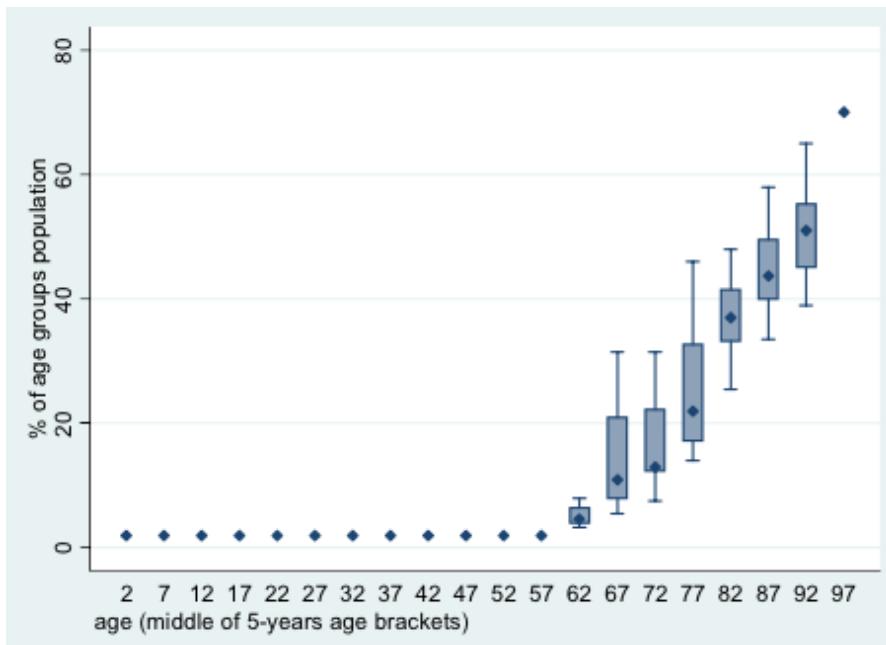


Figure 2.3: Dependency ratios by age groups. Dispersion across OECD countries. Credits:[De la Maisonneuve and Martins \(2013\)](#)

The Italian LTC system is characterized by a high institutional fragmentation, since both funding and management of services are spread over three decision levels: the central State, the Regions and the local authorities. There are, therefore, huge differences in the services available not only between North and South Italy, an important gap that still characterizes the country, but also between adjoining Regions.

In general, LTC for older people includes three main kinds of formal assistance:

- residential and semi-residential care;
- domiciliary care;
- cash benefits.

The first one refers to long-term care given to people who stay in a residential setting rather than in their own home. The **residential homes** are those structures which mainly accommodate non-self sufficient people who require medical and social assistance 24 hours per day. As explained by [Lorenzini \(2011\)](#), there are, however, many kinds of residential homes which differ between them depending on the level of assistance offered. In particular we have:

- (1) Cohousing communities (*Alloggi con servizi*): accommodations in the same building with some common areas. They are intended for elderly with some slight limitations, without need of medical assistance.

- (2) Residential communities accommodations (*Comunità alloggio*): accommodations for few (maximum 12) dependant people who require a low level of assistance. The aim is to stimulate solidarity attitudes and social relations between the residents.
- (3) Care homes (*Case di riposo*): accommodations for elderly non-self sufficient but requiring low level of assistance. They usually organize also recreational and cultural activities.
- (4) Nursing homes (*Case Protette*): they accommodate senior citizens who need a medium/high level of assistance, but who do not require a specific medical care.
- (5) Nursing home with medical assistance (*Residenze Sanitarie Assistenziali, RSA*): homes that accommodates old dependant people who require a high level of both social and medical assistance.

The **semi-residential homes** are day centers that offer not only social and health care, but also recreational activities aimed at the socialization between elders. This service is intended to old dependant people that have the possibility to live in their own home, so that the service provides relief for their relatives who offer them informal care. Moreover, the day centers, as they stimulate the social attitudes of elders, represent a precious service for the well-being of old people.

The last available data on residential homes are those collected by Istat in 2012 in the annual survey *I presidi residenziali socio-assistenziali e socio-sanitari*.

In Italy residential homes accommodate almost 270.000 elders with great differences among areas: in North-east 39 elders every 1000 are admitted to care centers and more than 43 in Trento and Bolzano, while in the South the ratio is considerably lower, reaching 6 elders over 1000 in Campania. Territorial difference are even more evident for non-self sufficient women, as the 77% of them live in residential homes in the North of Italy.

Among these people aged 65 or more, around 75% are women. One reason for this is certainly the greater female longevity with respect to male, since, as already mentioned, they live, on average, 5 years more. Territorial difference are even more evident for non-self sufficient women, as the 77% of them live in residential homes in the North of Italy.

Regarding the age of elders in residential homes, the 74% of them is aged 80 or more, who represent the 76% of non-self sufficient elders and the 67% of self-sufficient. Not surprising, more than three quarters of elderly admitted to care centers are non-self sufficient, as illustrated by figure 2.4.

Finally, the level of assistance needed is medium for half of the elderly admitted to residential homes, while the other half of them is almost equally divided between a low and a high level of assistance required.

The second kind of LTC service is the **domiciliary care**. The Italian National Health Service (*Servizio Sanitario Nazionale, SSN*) plans and manages, through Local Health Units (*ASL, Aziende Sanitarie Locali*), home health services, the so called integrated

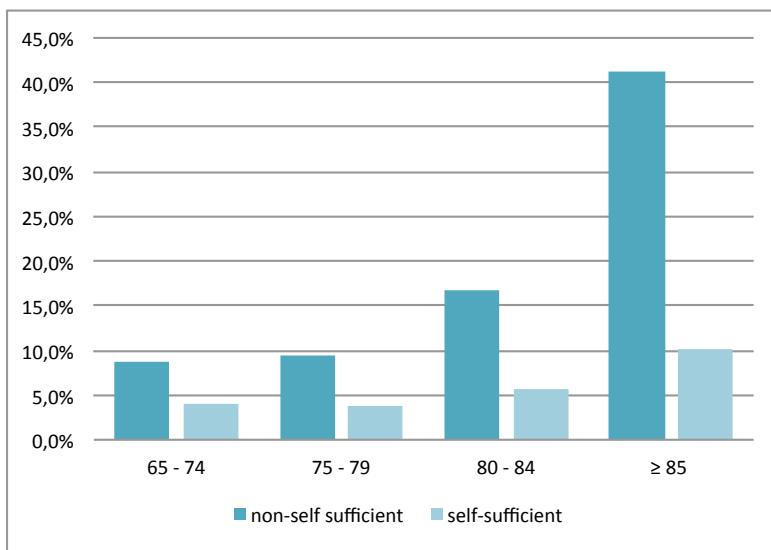


Figure 2.4: Elderly in residential homes by age groups and dependency (%). 2012

domiciliary care (*Assistenza Domiciliare Integrata, ADI*). The ADI consists of a set of medical and nursing treatments aimed at stabilizing the medical case, limiting the functional decline and improving the well-being of the assisted.

As far as we know, the last data available on ADI are those relative to 2011 collected by Istat and published by the Italian board of health (*Ministero della Salute*). In Italy, the elderly assisted by the integrated domiciliary care represent the 4.1% of the total population aged 65 or more. As for the residential homes, also this service is not equally spread over the country, with the lowest rate in Valle D'Aosta (0.3%) and the highest one in Emilia Romagna (10.6%). The table 2.1 shows the coverage rate of ADI by Regions and the average annual hours provided to each elder. From this table, we can notice that most of the Regions in which the coverage rate is low dedicate, in turn, more hours to each assisted person. On average, however, this service provides 20 hours of assistance in the whole year, so that, even if it is very useful for specific medical treatments, it does not represent a great relief for the family carers.

Personal social services, that consists in domestic and personal care tasks provided at home, are called *Servizi di Assistenza Domiciliare (SAD)* and are managed at a local level by Municipalities, though this should be planned in coordination with ADI. The aim of this service is to help in situation of contingent difficulties, to improve the health status of those affected by chronic illness and to prevent hospital recoveries. This service is intended for those who have some limitations in the instrumental daily life activities and, therefore, the main services provided are:

- personal and domestic care;
- help for going to medical visits;

Table 2.1: Elderly assisted by the integrated domiciliary care (ADI) by Regions (% of the total number of elderly) and intensity. 2011. Credits:[Gori \(2013\)](#)

| Regions | Coverage rate | Annual hours per elder |
|-----------------------|---------------|------------------------|
| Piemonte | 2.0 | 14 |
| Valle d'Aosta | 0.4 | 61 |
| Lombardia | 4.1 | 19 |
| Trentino-Alto Adige | 2.1 | / |
| Veneto | 5.4 | 10 |
| Friuli-Venezia Giulia | 6.0 | 4 |
| Liguria | 3.8 | 26 |
| Emilia-Romagna | 10.6 | 20 |
| Toscana | 2.4 | 22 |
| Umbria | 7.2 | 13 |
| Marche | 3.4 | 29 |
| Lazio | 5.0 | 16 |
| Abruzzo | 4.7 | 32 |
| Molise | 3.5 | 75 |
| Campania | 2.4 | 36 |
| Puglia | 2.0 | 43 |
| Basilicata | 5.9 | 54 |
| Calabria | 2.9 | 22 |
| Sicilia | 2.1 | 28 |
| Sardegna | 3.8 | 52 |
| Italy | 4.1 | 20 |

- development of social relations.

Unfortunately, the available data on this kind of service are not very rich, as it is managed at a local level. However, according to Istat data collected in 2010, in Italy the service is provided to 1.44% of elders, with the usual gap North-South. Also in this case, therefore, it is clear that it is necessary an enlargement of the beneficiaries and a higher intensity of assistance.

To summarize, public home care services guarantee only a limited number of hours of actual care per week in even the most developed contexts. Although the home health care administered by local health authorities may show a higher percentage of the elderly covered, it is primarily aimed at providing either intensive short-term, post-acute care or specialized support, as shown by the limited number of hours of services provided. Over all, home care services do not represent a substantial alternative to either institutionalization or intensive informal care [Da Roit and Castegnaro \(2004\)](#).

Italy has traditionally compensated the scarcity of services in LTC with **cash benefits**, dedicating around half of the expenditures in LTC to money transfers.

Following [Gori \(2013\)](#), the cost of this kind of service has quickly increased over the last years due to both the evolution of the needs of Italian population and cultural and organizational factors. In particular, people have been more and more aware of the services offered, but also there have been some flaws in the management of cash benefits. The most relevant one is that, for a long period, who was responsible for the concession of the money transfers (the Regions through the ASL) was not the same institution appointed to finance them (the central State, through the National Institute of Social Security, INPS). Not surprising, this created iniquity and disparity among dependant people, contributed to increase differences among Regions and it has not always been possible to observe a correlation between dependant ratios and the use of this service. Nevertheless, we can notice from INPS data that in 2011 the expenditures for LTC cash benefits started to decreased, probably due to the modification introduced in 2009 about the concession of the money transfers.

Italian LTC system includes two kinds of cash benefits: the so called *indennità di accompagnamento* (companionship allowance) and the *assegno di cura*.

The first one is a money transfer given by the INPS every month to those people who are not self-sufficient, after the evaluation of a special regional commission. Once the individual is considered eligible for this cash benefit, he will receive it for her entire life. The *indennità di accompagnamento* is not graduated on the basis of the level of assistance required and it is not means tested, which means that is provided independently from the economic condition. Moreover, this cash benefit is not directly linked to an obligation to purchase goods or services aimed at improving the personal condition and can thus be used to compensate household for informal care. In 2012, the amount of the money transfer was 492.97 Euros.

As explained in [Gori \(2013\)](#), data about the *indennità di accompagnamento* are collected by the INPS and by ISTAT, in the survey about the pension system, called *Statistiche della previdenza e dell'assistenza sociale. I beneficiari delle prestazioni pensionistiche*.

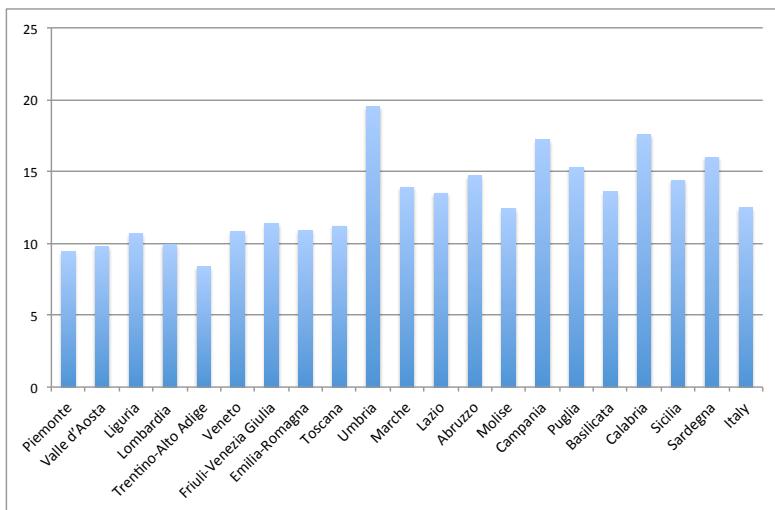


Figure 2.5: Beneficiaries of the *indennità di accompagnamento* aged more than 64 over the total of elderly population by Regions (%). 2010.

tiche. Since data from ISTAT seem to be more accurate, even if less recent, than those provided by INPS, we use them to show in figure 2.5 the beneficiaries of this cash benefit in 2010. In Italy, on average, the *indennità di accompagnamento* is received by the 12.5% of the population aged more than 64, but with big differences between Regions, as already mentioned. Indeed, the lowest percentage is registered in Trentino-Alto Adige (8,5%) and the highest one in Umbria (19.5%).

The other kind of cash benefit provided in LTC system is the *assegno di cura*. It is a money transfer for non-self sufficient people aged 65 or more which aims at financing the assistance of them in their own home. Therefore, it can be used in order to purchase private assistance or as an economic contributions for family caregivers. The *assegno di cura* is provided by Regions following some national guidelines, but with wide discretionary. In 2013, only 14 Regions in Italy provide this cash benefit for dependant elderly. It is generally means tested and graduated on the basis of the level of assistance required. It lasts six months and it can usually be renovated for other six months, giving priority to the most serious cases. Since it is a local social measure, an analysis of data would require to look at different local surveys, which is beyond the scope of this work. However, we will analyze in detail the assignment of the *assegno di cura* in Emilia-Romagna, Modena especially, in the next chapter.

2.4 The peculiar Italian case of domestic assistants: the *badanti*

The scarcity of domiciliary services of assistance, mainly ADI and SAD in Italy, and a welfare system strongly based on family networks, women especially, has pushed the families to hire domestic caregivers, the so called *badanti*. The typical *badante* is an immigrant woman, low qualified, usually co-habiting with an older dependent and often hired without a regular contract. Since this area of the labour market is characterized by a high percentage of black work, it is clearly not easy to quantify how many private caregivers are actually working in Italy and, even less, to collect other relevant informations about their job. Nevertheless, in the last decade many researches focused on this emergent phenomenon, so that, even if the data collected cannot be very precise given the problems already mentioned, we are now able to outline a clear picture.

Before starting with the quantitative analysis of the domestic assistance, it is important to keep in mind that most of the data regard total domestic workers, including housemaids, baby sitters and *badanti*, where the last ones represent the 60% of the total. Most of those workers are actually expected to carry out more than one type of domestic work. In particular, those who offer care to elderly or children, are usually asked to do also the housework and, in this aspect, the employment of private caregivers is in line with the traditional long-term care offered by families, women especially, until the 1990s. Given the versatility of these workers, it is difficult to analyze the domestic workers dividing them by the tasks that perform. We will see, anyway, some data in which they are kept separated.

2.4.1 The problem of irregular immigration

Keeping in mind the remarks above, we can now look at a very rich survey conducted by Censis and Ismu in 2012 on the market of domestic assistance in Italy, with particular attention on foreign population. Main results were published in [CENSIS \(2013\)](#). Between 2001 and 2012 the number of domestic workers increased from 1.083.000 to 1.655.00, which represents an increase of 53%. This boom in the private market of domestic work is mainly due to the demographic pressure and to changes in the lifestyle: on one hand the rapid aging of Italian population and a longer life expectancy, on the other hand the family fragmentation and a higher female participation in the labor market.

Table 2.2 shows the distribution of domestic workers by origin and geographic areas. The 82.2% of domestic workers are women, mainly aged between 36 and 50 and most of them immigrants (77.3%), but with differences between areas. Indeed, in the North and Centre of Italy immigrants represent more than 80% of the total domestic workers, whereas in the South the presence of Italian people is higher, reaching the 35.7%.

Regarding the countries of origin of immigrant domestic workers, we see in table 2.3 that most of them come from East Europe (55.4%) and Romania, the first country of origin, especially. Ukraine, the second one, provides the 9.4% of the domestic workers.

Table 2.2: Domestic workers by origins and geographic areas (%). 2012.

| | Geographic Area | | | |
|--------------------|-----------------|--------|-------|-------|
| | North | Centre | South | Total |
| Nationality | | | | |
| Italian | 18.6 | 18.3 | 35.7 | 22.7 |
| Foreigners | 81.4 | 81.7 | 64.3 | 77.3 |
| Gender | | | | |
| Male | 18.2 | 16.7 | 17.5 | 17.6 |
| Female | 81.8 | 83.3 | 82.5 | 82.4 |
| Age | | | | |
| 18 - 35 | 22.9 | 24.3 | 26.2 | 24.1 |
| 36 - 50 | 57.3 | 56.5 | 56.3 | 56.8 |
| > 50 | 19.8 | 19.2 | 17.5 | 19.1 |

The other two most relevant areas are Asia (20.8%) and South America (18.4%).

Given the high share of immigrant domestic assistants, the Italian government has repeatedly treated long-term care as a problem related to migration policies and has tried to solve it with not completely satisfying policy measures. Indeed, while most of European countries experienced a considerable transformation in their social policies in the 1990s, not much happened in Italy ([Naldini and Saraceno, 2008](#)). It was only in the early 2000s, with the emergence of this new type of caregiver, the *badante*, that the issue of long-term care gained wider exposure in public debate in Italy. Unfortunately, the the only reforms that followed the debate were limited to ex-post regularization of immigrant workers, in 2003, 2009 and 2012.

The *badanti* were considered a specific target group for the 2003 amnesty initiatives and provided a specific quota in the programmed yearly immigration flows.

Following [Gori \(2013\)](#), in 2009, 295.000 applications were submitted and 222.182 were accepted, which translated into a significant increase of workers hired, even if a large part of those applications was probably fictitious: the data on the nationality of the workers left many doubts about the veracity of the statements, with suspects on a relevant number of improper regularizations. At the top there were in fact workers from Morocco and China (21.000 workers, corresponding to the 7.2% of applicants), as well as Egypt, Senegal and Pakistan. All countries of origin now irrelevant in LTC work, as we will see.

In 2012 took place another regularization, in fact an amnesty, of the immigrant workers illegally entered in Italy. Unlike that of 2009, this was not restricted to domestic workers and caregivers, but open to all workers. Also the method was different: employers who irregularly hired an immigrant could expose themselves in month of September. Paying a thousand euro, plus contributions, back taxes related to six months, for a total

Table 2.3: Main areas and countries of origin of domestic workers, by geographic areas (%). 2012.

| | Geographic Area | | | |
|----------------------------|-----------------|--------|-------|-------|
| | North | Centre | South | Total |
| Area of origin | | | | |
| East Europe UE | 21.2 | 21.1 | 19.9 | 20.9 |
| East Europe others | 20.1 | 27.4 | 30.8 | 24.5 |
| North Africa | 9.4 | 4.2 | 9.4 | 7.8 |
| Africa others | 9.7 | 3.5 | 8.6 | 7.6 |
| Asia | 20.6 | 21.8 | 19.8 | 20.8 |
| South America | 19.0 | 22.0 | 11.5 | 18.4 |
| Countries of origin | | | | |
| Romania | 13.6 | 14.6 | 9.2 | 13.1 |
| Ukraine | 5.3 | 13.1 | 14.1 | 9.4 |
| Philippines | 7.2 | 10.3 | 5.6 | 7.8 |
| Moldavia | 5.5 | 6.6 | 1.4 | 5.0 |
| Morocco | 6.3 | 2.1 | 4.4 | 4.6 |
| Peru | 5.5 | 4.8 | 1.1 | 4.4 |
| Poland | 1.0 | 4.3 | 8.3 | 3.5 |
| Russia | 3.8 | 3.6 | 2.4 | 3.5 |

Table 2.4: Applications for the regularization of 2012 for the first ten countries of origin.

| Nationality | Immigrants living in Italy in 2011 | Applications received | Distribution of applications (%) |
|-------------|------------------------------------|-----------------------|----------------------------------|
| Bangladesh | 82.451 | 15.770 | 11.7 |
| Morocco | 452.424 | 15.600 | 11.7 |
| India | 200.730 | 13.286 | 9.9 |
| Ukraine | 121.036 | 13.148 | 9.9 |
| Pakistan | 75.720 | 11.728 | 8.5 |
| Egypt | 90.365 | 10.701 | 8.0 |
| China | 209.934 | 10.198 | 7.6 |
| Senegal | 80.989 | 6.296 | 4.6 |
| Tunisia | 106.291 | 4.617 | 3.4 |
| Albania | 482.627 | 3.884 | 2.9 |
| Others | 2.667.750 | 29.348 | 21.8 |

of at least two thousand euro, and hiring the worker, they could regularize their situation and that of the foreign employee. The applications received by the Ministry of the Interior, Department for Civil Liberties and Immigration, were 134.576. A disappointing result, lower than many forecasts, but not surprising if we consider the high amount of money to be paid. Most of the applications were presented by domestic workers (86%), a number that clearly does not reflect the typical immigrant jobs in Italy, in which the domestic workers represent less than 15% of the total. Again, the distribution of applications for country of origin is strongly distorted with respect to the total number of foreign living in Italy for each country, a fact that made arise several suspects also on these applications. Table 2.4 shows the applications for the first ten countries of origin of those submitted the applications. Indeed, people born in the first two countries, Bangladesh and Morocco, who represent the 23% of the total applications, are not usually employed as domestic workers. In general, among those ten countries, only Ukraine and partially India are the countries of origin of domestic workers, including *badanti*. The reason for these high number of fictitious applications as domestic workers is that the amount to be paid for the regularization resulted much lower in this sector than in others, due to the lower wage. So, why the total number of applications has been lower than expected? First of all, even if the amount to be paid in order to regularize a domestic worker was lower with respect to other sectors, it was still high enough to discourage the operation. Secondly, the families who employs *badanti* in Italy have not the perception of exploiting immigrant workers and the perception of risk of inspections and financial penalties is generally very low. Finally, the black work that characterizes this kind of working relationship is mutually convenient: given the weekly working hours, families pay less and *badanti* earn more without a regular contract.

Besides the regularizations described, over the years the Regions¹ that provide financial support, in the form of care allowance or vouchers, to frail elderly assisted at home with the help of an assistant regularly employed have gradually increased. In addition to the companionship allowance and the *assegno di cura*, indeed, these 15 Regions provide an economic contribution which is supposed to be an incentive for the regular employment of private caregiver. The income thresholds for access these benefit, generally calculated with the ISEE, is between 10 and 15 thousand euro, reaching, in rare cases, more than 30 thousand Euros. Since the amount of the contribution tends to cover only the cost of social security contributions that the employer must pay for regular workers, even this measure has not been particularly successful so far.

2.4.2 The profile of domestic assistants

As we mentioned at the beginning of this section, domestic workers include housemaids, baby sitters and *badanti*. Table 2.5 shows the tasks performed by domestic workers by nationality. Simple assistance consists in supporting elderly, self-sufficient or non-self sufficient, in their daily life activities, whereas advanced assistance includes more specific tasks, nursing assistance especially. The data reveal that the 83.4% of domestic workers performs housekeeping (cleaning, shopping, etc.), the 54.8% simple assistance to the person, the 29.4% basic assistance to dependent individuals, the 18.3% takes care of the children and, finally, the 15.3% performs more specialized assistance to the person. The total exceeds 100% because more than one answer was accepted, reflecting the fact that they usually carry out several tasks. Regarding the nationality, we can notice that foreign employees not only are more versatile - they held, on average, a greater variety of tasks, and it is no coincidence that living with the family assisted is much more frequent than among Italian workers - but they are also much present in assisting people. In particular, the 61% offer simple assistance, the 32.8% take care of dependent people, the 15.7% perform an advanced assistance, while only the 15.7% looks after the children. Aggregating the data about the assistance to non-self sufficient people, almost half (48.5%) of foreign domestic workers are employed with this difficult task, against one third of Italian workers, who work more as baby sitters (36.4%).

Indeed, many domestic workers are employed in the assistance of elderly. In case of assistance to non-self sufficient individuals, and of what we called advanced assistance especially, the job requires some specific skills, that, unfortunately, are not often acquired by the *badanti*. Following Gori (2013), 14 Regions² defined an educational standard for domestic caregivers. The training courses last between 100 and 400 hours and include frontal lectures and internships. However, the participation of *badanti* to the training courses has been very low, in particular for the longest courses. Therefore, local authori-

¹In 2013 are: Abruzzo, Basilicata, Emilia-Romagna, Liguria, Marche, Friuli-Venezia Giulia, Lazio, Lombardia, Piemonte, Puglia, Toscana, Trento, Umbria, Valle d'Aosta, Veneto.

²Abruzzo, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Liguria, Lombardia, Marche, Molise, Piemonte, Puglia, Toscana, Umbria, Valle d'Aosta.

Table 2.5: Tasks performed by domestic workers, by nationality (%). 2012.

| | Nationality | | |
|--|-------------|------------|-------|
| | Italian | Foreigners | Total |
| Housekeeping | 67.4 | 88.1 | 83.4 |
| Simple assistance | 33.8 | 61.0 | 54.8 |
| Simple assistance to non-self sufficient | 17.8 | 32.8 | 29.4 |
| Childcare | 36.4 | 13.0 | 18.3 |
| Advanced assistance to non-self sufficient | 13.8 | 15.7 | 15.3 |

ties developed training courses on the job, which means educational program directly in the house of the assisted elderly, provided by workers of domiciliary care (SAD). Data from the Censis-Ismu survey reveal that in 2012 only the 8% of domestic workers who perform simple assistance attended a training course, rate that increases if look at those who assist non-self sufficient people (11.5%) and reach 36.1% for those who offer advanced assistance. There are, however, many signals that let us hope for an improving of the skills of domestic workers. In particular, almost the 70% of domestic workers expressed interest in acquiring a higher level of expertise, the wages of the specialized ones increased considerably in the last few years and more and more Regions are making efforts in this direction.

Moreover, Municipalities are organizing counter services aimed at helping both families and assistants to different extent: some of them just provide information, others try to match supply and demand on the basis of the level of assistance needed and on the skills of assistants and the most advanced ones also offer ongoing support in the relation *badante-familiy*. Available evidence suggests good results with regard to the first contacts, both among those who demand work (families) and, especially, between those who offer it (caregivers), but the numbers decreased considerably when we look at the matching made, as well as to regular contracts stipulated.

Together with the development of counter services, registers of domestic assistants are largely widespread. They offer to families the opportunity to access information on domestic assistants in a transparent way, exercising a right of choice which is very limited in the case of search by “word of mouth”. To the caregivers, on the other hand, are recognized a professional status, the knowledge gained by attending ad hoc courses and the skills acquired in the workplace. The critical aspect of these registers is the selection in admitting assistants, which translates in the minimum level of qualification guaranteed to the families: the higher the requisites, the less domestic assistants potentially admitted. Therefore, the registers have a limited efficacy in qualifying assistance and increasing the number of regular contracts. Furthermore, the number of domestic assistants admitted in these registers is for the moment very low, in the South especially. Indeed, in the South of Italy almost the 90% of domestic assistants are not present in

Table 2.6: Benefits received by domestic workers, by nationality (%). 2012.

| | Nationality | | |
|-----------------|-------------|------------|-------|
| | Italian | Foreigners | Total |
| Vacation days | 35.8 | 68.1 | 60.8 |
| Sick days | 25.9 | 56.8 | 49.8 |
| Christmas bonus | 27.8 | 55.6 | 49.3 |
| Severance pay | 27.0 | 55.1 | 48.7 |

the registers, whereas in the Centre they represent the 79.4% and in the North the rate decrease to 67.5%.

With respect to the salary, domestic workers receive an average net monthly salary of about 860 Euros, approximately 7.1 Euros per hour, but with considerable differences between foreigners and Italian workers and between North and South of Italy. Since domestic workers often help more than one family, the monthly expense paid by each family is, on average, 667 Euros per month. In order to compare the data, it is better to look at the wage per hour, so that to partially eliminate the differences in the total amount of working hours. In 2012 Italian workers earned, on average, 8 Euros per hour against the 6.7 Euros of foreigners workers and the wage results much lower in the Center and South of Italy (6.1 - 6.4 Euros) than in the North, where domestic workers receive 7.9 Euros per hour. Table 2.6 shows how many domestic workers receive some of the benefits that are usually guaranteed to regular employees, by nationality. The 35.8% of the Italian workers are allowed to take some paid vacation, the 25.9% can be absent for sickness, and about one third receive the Christmas bonus and the severance pay. It is interesting to see that foreigners workers receive a better treatment with respect to their Italian colleagues: more than half of them receive all those benefits. This is probably due to the fact that Italian workers, much more than foreigners, work for more than one family, often part-time and certainly for less hours per week. Consequently, they are less subject to protection and guarantees.

In general, the underground economy that characterizes this sector plays a crucial role in the protection and benefits received by workers. The most obvious evidence of the irregularity that characterizes the market of domestic workers is the non-payment of contributions. Looking at table 2.7, if we exclude the 34.5%, which has a regular position from all points of view, the remaining part work in conditions of irregularities more or less severe, with the 27.7% of completely irregular workers. Between the two extremes of the scale lies the largest group, the one that operates in a context of only partial regularity, or because their families pay the contributions without respecting the national contract (15.5%) or because they pay only some of the contributions that they are expected to pay (22.7%). Again, more foreigners than Italian workers result to have a regular contract, with only the 20.2% against the 53.1% of totally irregular

Table 2.7: Contractual condition of domestic workers, by nationality and geographic areas (%). 2012.

| | Nationality | | Geographic Area | | | Total |
|-------------------|-------------|------------|-----------------|--------|-------|-------|
| | Italian | Foreigners | North | Centre | South | |
| Totally regular | 26.4 | 36.9 | 47.3 | 23.3 | 23.7 | 34.7 |
| Partially regular | 20.5 | 42.9 | 42.8 | 42.8 | 22.4 | 37.8 |
| Totally irregular | 53.1 | 20.2 | 9.9 | 33.9 | 53.9 | 27.7 |

workers.

Finally, relations between domestic workers and families seem to be very positive. On one hand, the 24% of the domestic workers declare to be treated as a member of the family, more than half maintain to have a very good relation, and only the 3.2% said to have a not satisfying relation. On the other hand, the 74% of the families have a relation with the domestic workers that goes beyond a simple employer-employee relation and only the 0.8% is trying to find another person.

2.4.3 Characteristics of families and relations with domestic assistants

Looking at the families which employ domestic workers, they are usually couples, with (26.7%) and without offspring (19.2%), or people who live alone (40.4%). In more than half families at least one member is 65 or more years old and the net monthly income is between 1000 and 2000 Euros in the South and between 2000 and 4000 in the North.

Each month the families sustain a cost for care services carried out by employees of about 667 euro, slightly less in the South (531.1 Euros) and higher in the North (751.4 Euros), as reported in table 2.8. For the most part, this expense lies entirely on family budgets. Indeed, only the 31.4% of households receives some public support, mostly in the form of companionship allowance (19.9%) followed by fiscal benefits (9.4%). Overall, the expenditure that families incur accounts for the 29.5% of the family budget. More than half of the families already have some difficulties in paying their domestic workers: the 20% dented their savings, almost half of them reduced consumption and the 2.8% (but 4.1% in the North) got into debt. And the situation will probably worsen in the near future. Although the 84.4% of the families maintain that the service is fundamental and they will probably need more help in the future, the 41.7% think that they will not afford domestic workers in the future and about the 15% of them is considering the possibility to leave the job in order to assist some family member.

Table 2.8: Cost of domestic assistance and public contributions, by geographic areas (%).
2012.

| | Geographic Area | | | |
|---|-----------------|--------|-------|-------|
| | North | Centre | South | Total |
| Cost and incidence | | | | |
| Average cost of domestic assistants per month | 751.4 | 693.1 | 531.1 | 667.8 |
| Incidence on monthly family budget | 29.1 | 32.4 | 27.7 | 29.5 |
| Main public contributions | | | | |
| - Companionship allowance | 24.8 | 20.6 | 14.3 | 19.9 |
| - Regional Voucher | 3.5 | 3.0 | 2.8 | 3.1 |
| - Fiscal deductions | 17.4 | 2.2 | 6.8 | 9.4 |

2.5 Informal long-term care

Informal carers are those people, usually relatives or friends, who provide care to frail seniors for free. Even if the traditional definition of informal carers regards unpaid care, economic literature has highlighted how this is often not completely true. Researchers found evidence of the existence of exchange contracts between generations: in many cases children exchange care to parents with inter-vivos transfers or bequests ([Coda, 2013](#)).

From a study on long-term care in OECD countries, in which they use data from the Survey of Health, Ageing and Retirement in Europe (SHARE) for European countries, emerges that more than one in ten adults (family and friends) is involved in informal caregiving to elderly with limitations in ADLs and close to one in three adults aged over 50 provide unpaid help with instrumental activities of daily living (IADL). In particular, as we see in figure 2.6, in Italy the 16.2% of the population above 50 reports to be informal carers providing help with ADL, which is the highest percentage among the OECD countries. If we look at figure 2.7, we can also distinguish informal carers by gender. In all countries except Poland most informal carers are women, but this is especially evident for Italy, in which women aged between 50 and 64 who provide informal care represent almost the 40%, around a 10% more than the average.

As we have seen in section 3, a very small share of dependent elderly benefits from residential home services, mainly due to high costs and few available places, and the hours of public domiciliary care are far from substituting the informal long-term care. This is part of two common trends observed in the European welfare systems: a shift to home care away from institutional care and a shift from in-kind to cash transfers. These changes in long-term policies are due to the cheaper cost of the home care, even when formal, with respect to institutional care and to the fact that it is usually preferred by elderly.

However, as well expressed by [Simonazzi \(2011\)](#) “cost considerations pushing towards encouraging and supporting a greater role of the family may run counter to other eco-

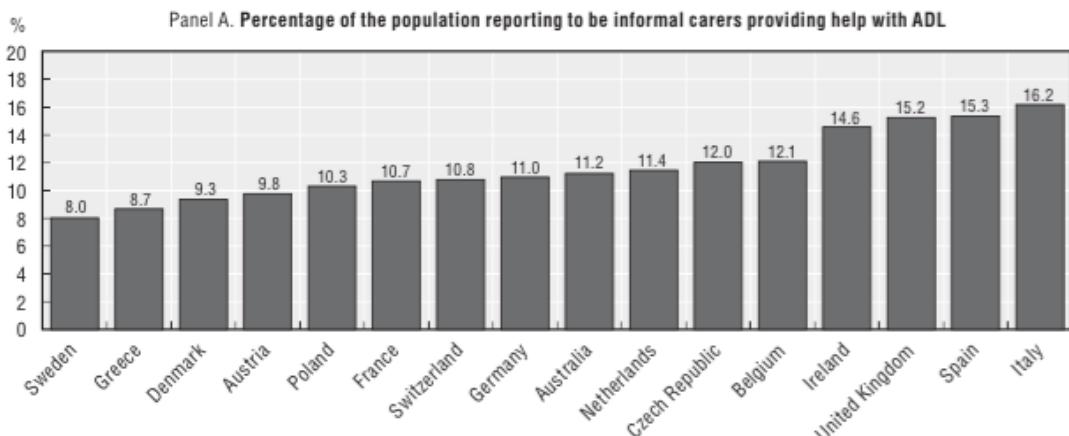


Figure 2.6: Informal caregivers helping with ADL on total population aged 50 and above (%). Credits:[Colombo et al. \(2011\)](#)

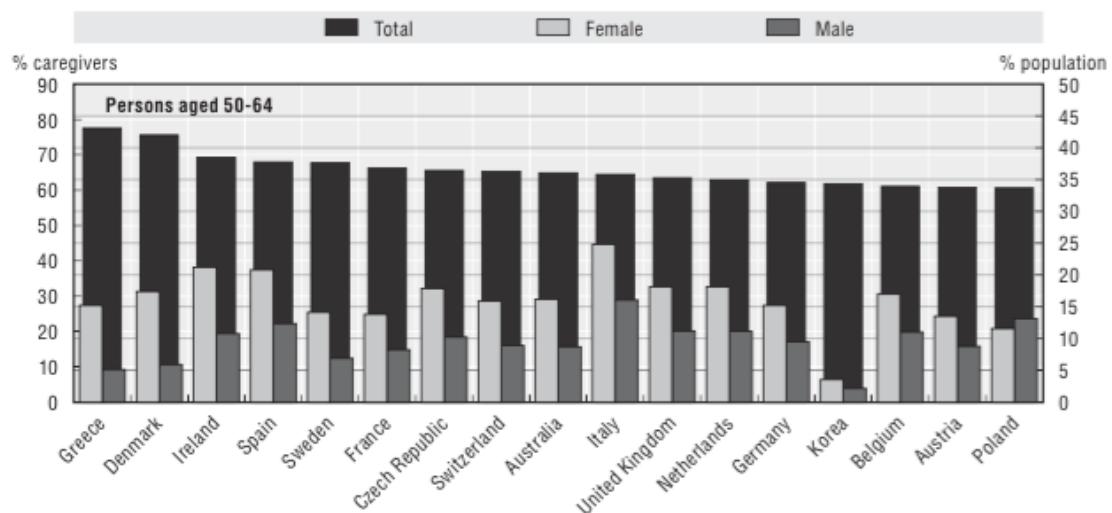


Figure 2.7: Percentage of informal caregivers helping with ADL aged 50 and above on total population aged 50 and above, by gender (%). Credits:[Colombo et al. \(2011\)](#)

nomic and social trends and goals pushing in the opposite direction. Demographic developments, changing family structures and the drive among women for emancipation and higher participation to the labour market will give rise to an increase in the demand for formal long-term care services. Governments may be caught between two apparently conflicting goals: a higher female activity rate and a greater reliance on home care.”

Not surprising, evidence confirms the negative correlation between hours of care and hours of paid work. [Viitanen \(2005\)](#) uses the European Community Household Panel (ECHP) to analyze the relationship between the dynamics of labour force participation (LFP) and informal care to the elderly for a sample of women aged 20-59 across 13 European countries³. Figure 8 shows the relation between the rate of labor force participation, represented by the line, and the informal elderly care, represented by the bars. It is clear that long-term care to elderly increases with age, not only due to the exit of labor market, that surely gives more spare time, but also to the fact of having older relatives, who are likely to need more care. Although figure 2.8 is very effective in showing the negative correlation between LFP and elderly care, it does not distinguish men and women, who show different pattern both in care work and in paid work, in Italy especially. In addition, we must be careful with the quantitative analyses of informal care since many carers do not see themselves as such and, even if questioned, would not declare that they were carers. Indeed, society’s attitudes towards family responsibilities and the availability of services to support both carers and people with health limitations vary widely across countries, influencing the pattern and declaration of informal caring.

From the already mentioned study on long-term care in OECD countries, it emerges that not only there is a negative correlation between elderly care and employment, but also that informal caregiving is associated with poverty risk and to mental problems. In particular, the three problems related to LTC analyzed by [Colombo et al. \(2011\)](#) are:

- 1) high-intensity caring can lead to reduced rates of employment and hours of work;
- 2) for those of working age, caring is associated with a higher risk of poverty;
- 3) intensive caring has a negative impact on mental health.

Regarding the first one, we have seen so far the negative correlation between labor force participation and elderly care, but we didn’t specify in which direction goes the causal relation. In other words, it is important to distinguish whether the correlation is caused by the negative effect of caring on availability for work, or whether individuals with poor job prospects are more likely to engage in caring activities.

After controlling for employment status in the previous year and other observed and unobserved socio-demographic characteristics, it results that carers are less likely to be employed and that it depends on intensity of care: increasing hours of care by 1% results in carers being more likely to stop working by 10%. As we see in figure 2.9, the impact

³Austria, Belgium, Germany, Denmark, France, Finland, Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the UK.

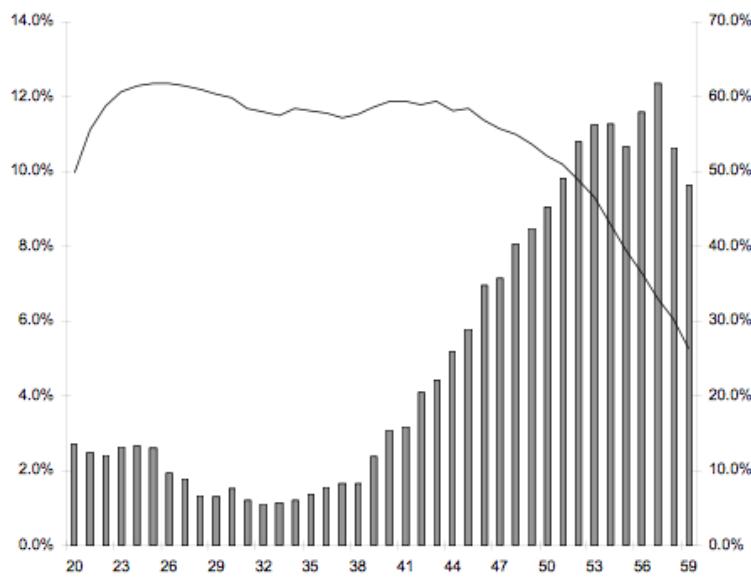


Figure 2.8: Informal elderly care and labor force participation by age (%). Credits: [Viitanen \(2005\)](#).

of caring on the probability of being employed is much higher in southern Europe, due to the lower labour force attachment in southern countries and different policies which might encourage a more difficult combination of work and family responsibilities.

Caregiving also leads to reduced working hours across all countries, but again in southern Europe especially. Figure 2.10 shows the effect of informal care on hours of work and we can notice that the coefficients for southern countries are considerably higher with respect to the other OECD countries, especially for women, with a negative coefficient of 0.6. The magnitude of the correlation is, however, lower than the previous one: a 1% increase in hours of care translates, on average, into slightly more than 1% decrease in hours of work.

Other costs possibly related to long-term caregiving are lower wages and a higher risk of poverty, which are, of course, consequence of the observed lower rate of employment and fewer working hours. While for the first one there is little evidence (difference in wages between carers and non-carers amount to 3-4%), more significant is the impact on poverty risk. In OECD countries, working-age carers have a higher probability of experiencing poverty and women appear to be especially vulnerable to poverty risks. However, this is not true in southern European countries, in which the coefficients are around zero, but the reasons for this exception are not investigated in the study.

Finally, although looking after family members or friends brings great rewards, informal care to elderly is likely to increase psychological distress and health deterioration.

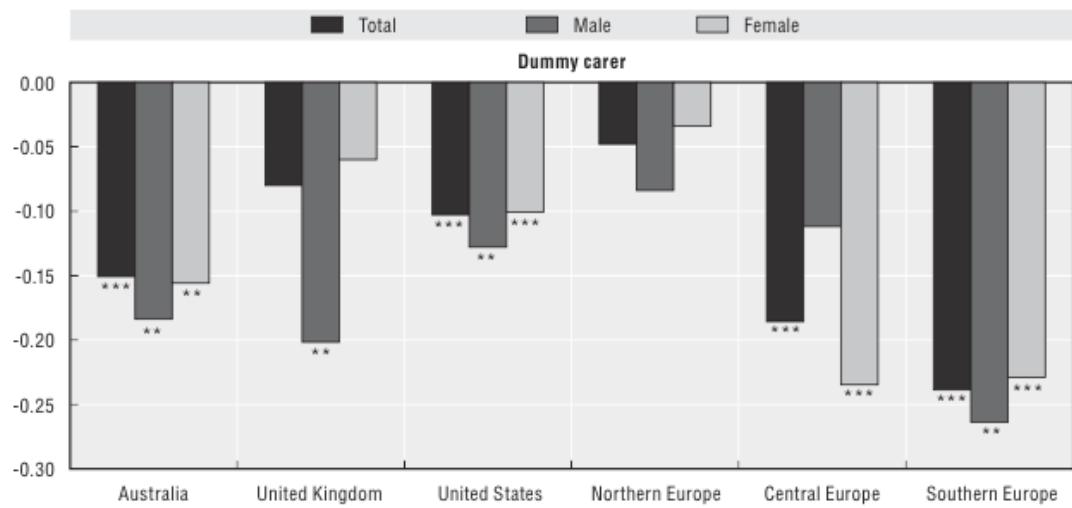


Figure 2.9: The effect of informal elderly care on the probability of employment, by gender and areas. Coefficients from a dynamic probit. Credits:[Colombo et al. \(2011\)](#)

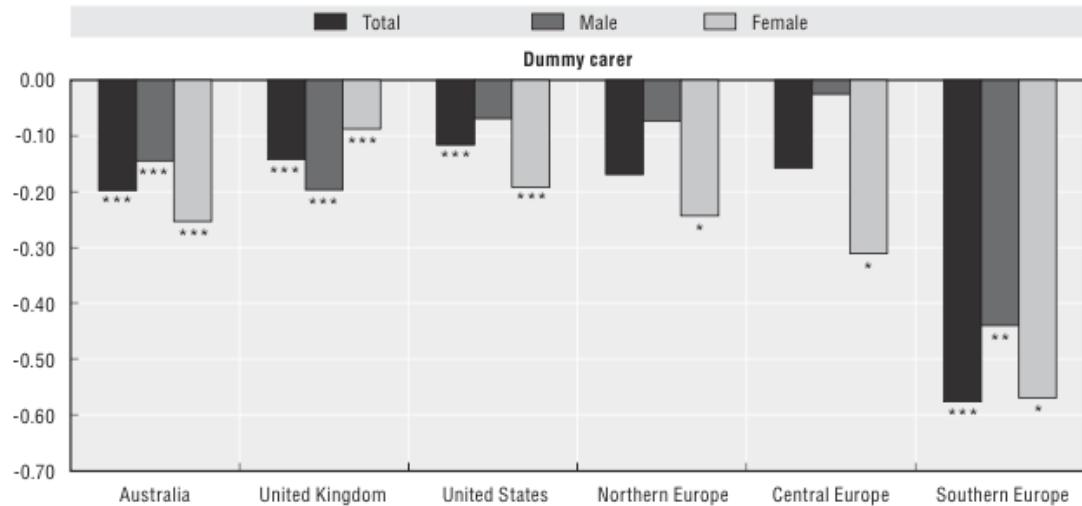


Figure 2.10: The effect of informal elderly care on working hours, by gender and areas. Coefficients from a random effect tobit. Credits:[Colombo et al. \(2011\)](#)

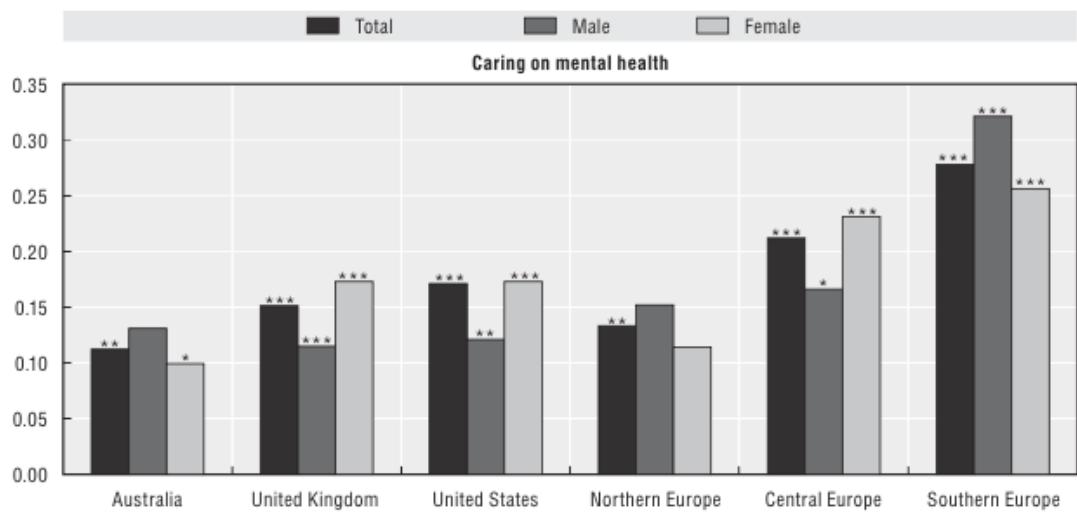


Figure 2.11: The effect of informal elderly care on mental health problems, by gender and areas. Coefficients from a dynamic probit. Credits:[Colombo et al. \(2011\)](#)

This is mainly due to isolation and lack of support, but also to the fact that caring old and sick people is undoubtedly a heavier task than, for example, taking care of children. Results from regression analysis, presented in figure 3.1, confirm that being an informal carer leads to a higher probability of mental health problems, especially in the South of Europe, and the impact is stronger for intensive and co-residential caregivers. We can also notice that it results higher for male than for female, but only in the case of southern countries.

Overall, intensive carers seem to experience greater social disadvantage compared to non-intensive carers: they work less, have a lower income and more mental health problems. Therefore, it is important for the governments to target support policies at this vulnerable group, analyzing in greater detail their delicate situation.

Chapter 3

Long-term care in Modena

3.1 Introduction

Since the simulation model, that will be described in the next chapter (4), is based on data from Modena, collected in 2012 by the Center of Analysis of Public Policies (CAPP) in the survey ICESmo3, in this chapter we focus on the LTC system in the Municipality of Modena.

Before continuing, it is important to keep in mind that the area of Modena is, for some aspects, not very representative of the whole country. In particular, regarding the subject of this dissertation, Modena is located in Emilia-Romagna (North of Italy), which is a Region that traditionally offers a lot of public services. In addition, within this area, Modena is a relatively rich Municipality, as their inhabitants show, on average, a greater level of wealth (see [Baldini et al. \(2010\)](#) for a deeper analysis).

In this chapter we will follow the same scheme of chapter 2, so that we start with a demographic analysis of Modena (section 3.3) and then, in section 3.3, we depict the long-term care system of this Municipality, giving also some specific data. Finally, section 3.4 is dedicated to the expenditures for the LTC services aimed at the elderly population.

3.2 The elderly population of Modena

According to the data of Istat, the percentage of the population of Modena with age greater or equal than 65 reached, in 2010, the 20,8% and the elders above 80 years old represented the 6,4% of the total population. The demographic forecast, as shown in table 3.1, predicts that the elders will be the 24,8% in 2030 and the 30,5% of the total population in 2050, while the share of people older than 80 years old will almost double, reaching the 12,2%.

Comparing these figures with those related to Emilia-Romagna and Italy, we can notice that the population of Modena in 2010 was older with respect to the Italian average, but younger than the population of its Region, whereas in 2050 is expected to be the youngest one. The main reasons for the slowdown of the ageing population

Table 3.1: Elderly population in 2012, 2030 (projections), 2050 (projections) (%). Credits: [Lorenzini \(2011\)](#).

| Elderly population | | | | | | |
|--------------------------|------------|------------|----------------|------------|------------|------------|
| Year | Modena | | Emilia-Romagna | | Italy | |
| | > 65 years | > 80 years | > 65 years | > 80 years | > 65 years | > 80 years |
| 2010 | 20.8 | 6.4 | 22.6 | 7.1 | 20.3 | 5.8 |
| 2030 | 24.8 | 8.3 | 25.8 | 8.9 | 26.5 | 8.8 |
| 2050 | 30.5 | 12.2 | 31.3 | 12.7 | 33.0 | 13.5 |
| Life expectancy at birth | | | | | | |
| | male | female | male | female | male | female |
| 2010 | 82.1 | 87.5 | 80.7 | 86.1 | 79.1 | 84.6 |
| 2030 | 82.4 | 87.7 | 80.9 | 86.4 | 79.4 | 84.9 |
| 2050 | 84.7 | 89.7 | 84.7 | 89.7 | 84.5 | 89.5 |

of Modena are probably two. On the one hand, the natural balance (births-deaths), which is negative in recent years as in the whole country, lately started to shrink with an increase of births. On the other hand, since 1995 the social balance (immigrants-emigrants) is positive and almost always higher, in absolute terms, than the natural balance. Consequently, the population of Modena is constantly increasing.

From the same table (3.1) it is also possible to notice that the elderly population of Modena is, and will probably be, healthier than the Italian population, showing a higher life expectancy. However, from the demographic projections made by Istat, it seems that life expectancy will converge at around 85 years for male and slightly less than 90 for female in 2050 for all the three populations considered, with life expectancy of Italian population improving faster than the one of Modena population.

In order to better understand the demographic profile of the population it is useful to look at two indexes already mentioned in section 2.2: the old-age index, which represents the level of the population ageing, and the age dependency ratio, which is the ratio of those usually out of the labor force over the *productive* part of the population. In Modena, in 2012, the elderly are 46.7% more than young people 0-14 and the age dependency ratio is 32.4%, which means, theoretically, that every 100 people who work, there are around 32 dependent individuals. As shown in the table 3.2, both indexes do not differ significantly from the national ones, so that we can say that Modena is much more representative of the Italian population than the whole Region.

Table 3.2: Population by age class, old-age index and age dependency ratio. 2012. Data from Modena Statistiche.

| Territorial level | Population 0-14 years | Population 15-64 years | Population ≥ 65 years | Old-age index | Age dependency ratio |
|-------------------|--------------------------|---------------------------|-------------------------------|------------------|----------------------------|
| Modena | 100,860 | 456,390 | 147,915 | 146.7 | 32.4 |
| Emilia-Romagna | 598,050 | 2,856,746 | 1,004,450 | 168.0 | 35.2 |
| Italy | 8,325,217 | 38,698,168 | 12,370,822 | 148.6 | 32.0 |

3.3 LTC services

In section 2.3 we described the national LTC system and we pointed out that there are great differences between Regions and Municipalities. Therefore, in this section we will focus on the LTC services offered to the elderly population of Modena. Every entity, either public or private, must necessarily receive the authorization of the Municipality in order to provide social assistance services. Requirements and procedures to obtain it are established by each Region and the evaluation of structures and services provided lies with a specific commission (*Commissione di Vigilanza*). If the entity who submits the request is private, the Local Health Unit (*ASL*) stipulate specific agreements with the entity so that it is always present the mix between public and private typical of the Italian LTC system. This procedure is valid not only in the case of residential homes, but also for the domiciliary assistance services, *ADI* and *SAD*.

Regarding the residential and semi-residential homes, the whole Region, Emilia-Romagna, accommodates 3020 elders every 100 000 residents aged 65 or more, a rate that is much higher than the Italian one (2397). Only the 26% of them are male, in line with the national average, and 76% of them are older than 80.

In particular, in Modena there are 85 residential homes and 32 semi-residential homes, for a total of 117 homes. As we see in table 3.3, all together they offer 3861 places, which corresponds to the 5.5% of the population aged 75 or more, and the 75.5% of them are provided by residential homes that also offer some degree of medical assistance, the nursing homes (*RSA* and *Case protette*). Finally, among the places offered by the nursing homes, the 71.7% operate within the national health service.

Unfortunately, we do not have data about domiciliary assistance at a Municipality level, but we know that in Emilia-Romagna home health services, the so called integrated domiciliary care (*Assistenza Domiciliare Integrata, ADI*), are provided to the 10.6% of elders, which is much higher than the national average (4.1%). Personal social services, called *Servizi di Assistenza Domiciliare (SAD)*, are provided to the 2% of the population. However, as these services provide, on average, 20 hours of assistance per year to each elderly, they cannot be considered *per se* an alternative to residential or semi-residential homes, but they might help in case the elders (or their families) prefer to live in their own homes, assisted by relatives or private domestic assistants.

Table 3.3: Residential and semi-residential homes in Modena, by type. Credits: [Lorenzini \(2011\)](#)

| | Residential homes | | Authorized places | |
|--|-------------------|------|-------------------|------|
| | a.v. | % | a.v. | % |
| Residential homes | | | | |
| Nursing homes with medical assistance | 9 | 7.7 | 306 | 7.9 |
| Nursing homes | 49 | 41.9 | 2610 | 67.6 |
| Care homes | 11 | 9.4 | 306 | 7.9 |
| Residential communities accommodations | 12 | 10.3 | 108 | 2.8 |
| Cohousing communities | 4 | 3.4 | 59 | 1.5 |
| Semi-residential homes | | | | |
| Day centers | 32 | 27.3 | 472 | 12.2 |
| Total | 117 | 100 | 3861 | 100 |

Another social policy aimed at supporting those families who keep the elders in their own homes, so that to avoid or postpone the recovery, is the cash benefit called *assegno di cura*, that we briefly described in 2.3. As it is provided by Regions at a local level, we can now focus on the assignment of this cash transfer in Emilia-Romagna and, so, in Modena. Following the local guidelines, the relatives who assist the dependant elderly must live with her or be present at home at least for a number of hours congruous with her needs; they can also guarantee the assistance of the elderly avail themselves of a private domestic assistance. The special commission called *Unità di Valuta Geriatrica (UVG)* verifies whether the requirements have been met. The amount of the cash transfer is, again, established by each Region and in Emilia-Romagna it depends on the level of assistance needed. Those who need a high level of assistance receive 22 Euros per day, for the medium level is set at 17 Euros per day, whereas for the lowest level is 13 Euros. The *assegno di cura* lasts six months and it can usually be renovated for other six months, giving priority to the most serious cases. Moreover, if the families employs a private domestic assistant with a regular contract and the income of the elderly does not exceed a threshold, they can receive an extra money transfer aimed at the payment of the contributions for the domestic assistant. However, this measure has not been very successful so far, as family and private assistants still prefer informal (and irregular) agreements that leave them more flexibility ([Gori, 2013](#)).

Finally, we try to quantify the number of private domestic assistance in Modena, although, as pointed out in section 2.5, several problems arise in doing such operation so that, ultimately, the quantification results in very approximate estimates. Following data of Inps, in 2012 in Emilia-Romagna there were 91 499 domestic workers with a regular

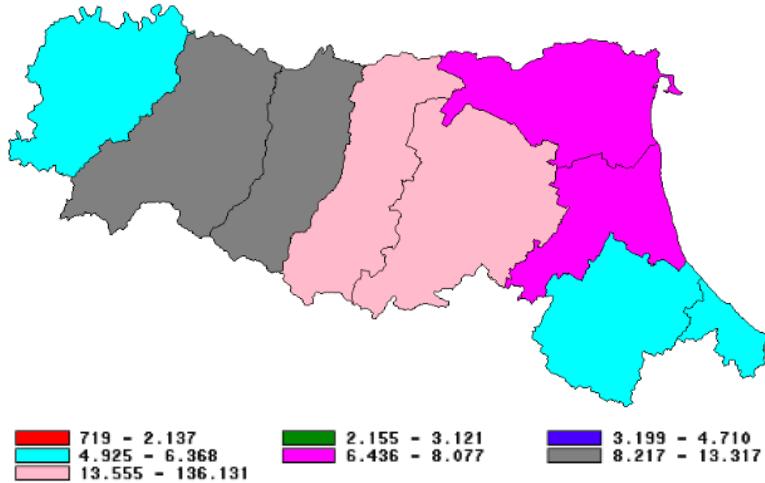


Figure 3.1: Regular domestic workers in Emilia-Romagna by Municipalities. 2012. Credits: Inps.

contract. According to estimates of [Pasquinelli and Rusmini \(2008\)](#), the 48% of them are domestic assistants (so 43 919) and, since only the 40% of the total number of *badanti* is regularly employed, the total estimated number is 109 797 in the whole Region. Regarding Modena, we can see from figure 3.1 that the number of regular domestic workers varies between 13 555 and 136 131. Adopting the same estimates, we can say that the total number of private domestic assistants in Modena is between 16 266 and 163 355, but, given this high variability, it is clear that these data are not so informative.

3.4 Expenditures for LTC

Expenditures for long-term care services for dependant elders should include both the spending related to health care (palliative care, long-term nursing care, personal care services and health services in support of family care) and the social expenditures more related to IADL support, as domestic services, care assistance and residential care services. Moreover, in order to calculate the total amount of LTC expenditures, it is necessary the consolidation of items of expenditure of multiple entities: State, Regions, Municipalities, Local Health Units (*ASL*), Provincial Health Units (*ASP*) and private entities.

Following [Bertoni et al. \(2010\)](#), the total expenditures for LTC services in Modena is about 254.5 millions and the part of it dedicated to elders is 115.6 millions, which represents the 45.4% of the total. As we see in table 3.4, almost half of the total expenditures for elders is payed by the National Health Service (*SSN*), followed by the contributions of consumers, who pay the 35.8%, and the Municipality, which sustains the 21.2% of total expenditures.

The distribution of these expenses between the different services offered is shown in

Table 3.4: Expenditures for LTC services for elders in Modena by financing entities. Credits: [Bertoni et al. \(2010\)](#).

| Financing entities | Expenditures | |
|--|--------------|------------|
| | Mln | % |
| Municipality | 24.5 | 21.2 |
| Consumers' contributions | 41.4 | 35.8 |
| Provincial Health Units (<i>ASP</i>) | 0.01 | 0.008 |
| National Health System (<i>SSN</i>) | 49.7 | 42.9 |
| Total | 115.6 | 100 |

Table 3.5: Expenditures for LTC services for elders in Modena by services. Credits: [Bertoni et al. \(2010\)](#).

| Services | Expenditures | |
|--|--------------|------------|
| | Mln | % |
| Residential homes | 84.9 | 73.4 |
| Domiciliary assistance | 8.6 | 7.4 |
| Cash transfer (<i>assegno di cura</i>) | 5.3 | 4.6 |
| Day centers | 7.1 | 6.2 |
| Others | 9.7 | 8.4 |
| Total | 115.6 | 100 |

table 3.5. The 73.4% (84.9 millions) of the expenditures are used to finance residential homes, the 7.4% is dedicated to domiciliary assistance, namely ADI and SAD, whereas the other part is divided between cash benefits (*assegno di cura*), day centers and other services.

Focusing only on the expense for residential homes, which represent the three quarter of the total expenditures, we can notice from table 3.6 that the National Health System (*SSN*) finance almost half of the expense, consumers pay more than 40%, whereas the Municipality and other local entities sustain the remaining 10% of the expenditures for residential homes.

Expenditures for residential homes for elders can be divided by the population aged 75 or more, the target population. It results that the expense is around 1220 Euros per elderly, but if we divided the total expenditures by the number of places offered, which is a much more precise measure, the cost is around 41,340. Finally, the cost for each day spent in a residential home by one elderly is, on average, 121.3 Euros.

It is interesting to compare the cost of the public supply of LTC services and the one

Table 3.6: Expenditures for residential homes in Modena by financing entities. Credits: [Bertoni et al. \(2010\)](#).

| Financing entities | Expenditures | |
|------------------------------|--------------|------------|
| | Mln | % |
| Municipality | 8.01 | 9.4 |
| Consumers' contributions | 36.27 | 42.7 |
| National Health System (SSN) | 40.60 | 47.8 |
| Others | 0.012 | 0.01 |
| Total | 84.9 | 100 |

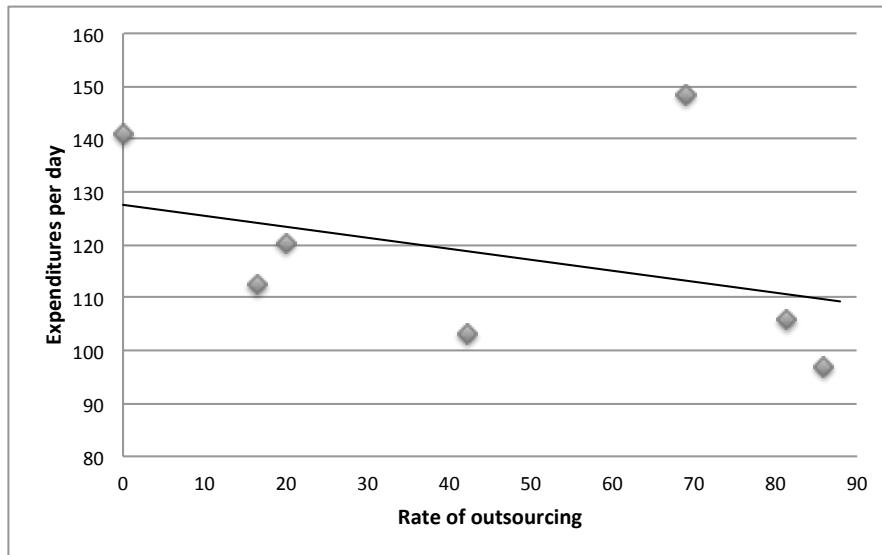


Figure 3.2: Expenditures per day and rate of outsourcing. Credits: [Bertoni et al. \(2010\)](#).

sustained by private entities. In order to do this, we relate the average cost of residential homes in different areas of the Municipality of Modena and their rate of outsourcing, that is the number of places managed by private entities over the total number of places offered. Looking at figure 3.2, it is immediately clear the negative relation between rate of outsourcing and expenditures: the more places in the residential home are managed by private entities, the less it costs.

It is often argued that increasing outsourcing of services results in a more efficient service and the figure 3.2 could lead, misleadingly, to the same conclusion. In fact, a crucial point is omitted, since the higher efficiency is reached or, rather, is confused with a considerable reduction of wages, as shown in table 3.7. More than the 90% of public employees earn more than 6 Euros per hour, against the 13.6% of those who work in non-profit sector and almost half of them earn less than 5 Euros.

Table 3.7: Wage per hour of the LTC workforce, by sectors (%). Credits: [Bertoni *et al.* \(2010\)](#).

| | Public Sector | Non-profit sector |
|-----------------------|---------------|-------------------|
| ≤ 4 Euros | 0 | 5.3 |
| Between 4 and 5 Euros | 0 | 43,4 |
| Between 5 and 6 Euros | 1.6 | 37,6 |
| Between 6 and 7 Euros | 16.1 | 7.2 |
| Between 7 and 8 Euros | 33.9 | 3.1 |
| Between 8 and 9 Euros | 41.9 | 0.0 |
| > 9 Euros | 6.5 | 3.3 |

Indeed, it is not possible to conclude that outsourcing is more efficient than the public management, as from one hand it lowers the costs, but from the other aggravates the cost for the community through a general decline in hourly compensation of the LTC workforce.

Chapter 4

Microsimulations and agent-based models

A social science simulation consists of building a model and experimenting with it. The purposes of a simulation are as wide as the reasons to build models and, therefore, to do research. The most common modeling goals are explain, illuminate core dynamics and uncertainties and predict.

In particular, agent-based modeling and microsimulations are both forms of computational social science, which basically means that they involve building models that are computer programs. Following [Gilbert \(2008\)](#), computational models are computer programs in which there are some inputs, that can be thought as independent variables, some outputs, like dependent variables, and the program itself represents the processes that are thought to exist in the social world. An advantage of using computer simulation is that it is necessary to think through one's basic assumptions very clearly in order to create a useful simulation model: every relationship to be modelled has to be specified exactly and it is necessary to assign a value to each parameter. Moreover, in most of the social science it is either impossible or undesirable to conduct experiments, as it is difficult to isolate social systems, whereas experiments on virtual or computational systems do not present the same problems.

We start describing the microsimulation approach, outlining both advantages and drawbacks, then we will explain the main features of agent-based models and the tendency of these two approaches to converge. Finally, we will see how our model can be positioned between these two forms of computational social science.

4.1 Microsimulation approach

A microsimulation is a data-driven simulation based on micro level units whose actions produce changes in the macro level. In fact, starting from individual behavior models, it

is then possible to obtain macro outcomes by aggregation and this method is particularly convenient when investigating the distributional effects of policies and, more generally, the rules defined on individual or household characteristics. As it is usually used for policy interest, it is possible to give a narrow definition: microsimulation models are “computer programs that simulate aggregate and distributional effects of a policy, by implementing the provisions of the policy on a representative sample of individuals and families, and then summing up the results across individual units” ([Martini and Trivellato, 1997](#)).

The two main phases involved in the creation of dynamic microsimulations are analysis and synthesis. The first step consists in the statistical and econometrical analysis of data in order to model individual behaviors. Once the initial population is created and the probabilities obtained by the analysis are assigned to each events, it is possible to program various behavioral models that allow agents to interact and evolve over time and finally observe the results of the simulation. Therefore, the essential components of a typical dynamic microsimulation are basically the population database and the output routines. The former stores the characteristics of each agent and evolve according to behavioral model and policy rules that can be parameterized by the user. The simulation then results in output routines that can be studied as aggregated tables, individual histories and micro-data files.

Dynamic microsimulation was introduced by [Orcutt \(1957\)](#). He identified three limitations of macroeconomic models that can be overcome by microsimulation: the limited predictive power, the focus on aggregates ignoring distributional effects and the waste of knowledge about individual decision-making process. An additional reason to model at the micro level is that unstable relationships at the macro level can be based on stable relationships at the individual level, in particular in presence of nonlinear dynamics. When the paper was published, however, the insufficient computer power and the lack of available data prevented this new approach succeeding and even now, that these problems are largely overcome, microsimulation still faces the resistance of most mainstream economists. Indeed, a microsimulation approach it is not always appropriate and, even when it is convenient, it presents some drawbacks, that we will analyze after having outlined the main advantages.

Following [Spielauer \(2011\)](#), although microsimulation is a possible approach every time we want to investigate a system made up of micro level units, this specific simulation is worthwhile only when the model presents at least one of the following three features: population heterogeneity, aggregation problems and when the processes possesses memory.

Microsimulation model is the best approach when agents are significantly different and these differences matter in the decision-making process. Regarding population heterogeneity, it is also the most appropriate simulation when the model presents too many possible combinations of important characteristics. The distinction between a cell-based model and a microsimulation approach will clarify the point. In the so-called cell-based model, in which data are represented in cross-classification tables, the population is divided by characteristics and each cell contains a combination of them. For example,

imagine a sample in which there are at least two people of different sex for each age between 20 and 29. A cell-based model of this hypothetical sample will consist of 20 cells, one for each possible combination of age and sex. It is therefore clear that this is not the appropriate model whenever the combinations of relevant variables, and so the number of cells, is greater than the sample size. In addition, modeling at the macro level requires restrictive conditions in order to aggregate individuals. In the microsimulation approach, on the contrary, all the relevant variables are assigned to the agents and the sample is virtually recreated with all the agents that it contains. In these models, any event corresponds to an individual probability so that each simulation experiment will produce slightly different results. These differences, however, tend to converge to the expected value as the population size increases.

Regarding the aggregation problem, many behaviors are better understood at the micro level, where decisions are taken and rules based on characteristics of individuals and families are defined. When this is the case, a relatively simple model based on micro units can help to investigate much more complex behaviors emerging at the aggregate level. Moreover, the aggregation of individuals typical of macro models inevitably leads to a lower level of detail that in some cases determines the limited usefulness of this model for policy-makers. Tax and social security regulations are only two of possible examples in which aggregation is not appropriate.

The last important situation that especially requires a microsimulation approach is when processes possess memory. Indeed, when past events directly influence the present and future events, it is not possible to use a cell-based model, since all previous information is lost any time a cell is entered.

The advantages of building dynamic microsimulations are theoretical, practical and technical.

From a theoretical point of view, the greatest strength of this approach is that it supports innovative research. The technological progress has facilitated data collection and improved data analysis. At the same time, there has been a general shift of paradigm in the social science from macro to micro models, which put individuals at the centre of study. This is also correlated with an increasing interest in causal effects and life course analysis. In addition, linking together social change and individual actions, microsimulation adds synthesis to analysis.

From a practical point of view, dynamic microsimulation represents a useful tool for the study and projection of socio-demographic and economic dynamics. This makes the simulation particularly attractive also for policy makers. Actually, it is possible to make projections also with cross-sectional and static models by re-weighting the initial population, but this method lacks the individual life courses and the longitudinal dimension is essential for sustainability issues as well as distributional effects.

Finally, the technical advantage of microsimulation is that it does not necessarily require most of the restrictions usually needed in modeling. Indeed, it allows for any number of variables, any individual behavior and processes that possess memory. It is not even subject to the restrictions needed to aggregate individuals in the macro models,

since aggregations are made a posteriori. Needless to say, this does not imply that a microsimulation is not based on assumptions, since simplifying hypothesis are inherent in the concept of modeling, but it certainly allows more flexibility than other traditional approaches.

The main drawbacks of simulation regards prediction power, costs and aesthetics.

The first problem, which is common to all methods of forecasting, is that a greater level of detail does not imply an improvement in prediction power. On the contrary, there is a trade-off between introducing more variables that leads to additional randomness and the misspecification errors that occurs when we omit important characteristics. The randomness that characterizes microsimulation also depends on data quality and accuracy and largely rests on the parametrization of the model.

Dynamic microsimulation are also costly in terms of manpower and computer power and extremely expensive if we consider also the costs of data collection.

The last drawback is that a microsimulation, involving a great number of variables, agents and processes, sacrifices the elegance and simplicity of mathematical models. Although not very important, it is one of the reason of the resistance that this method still faces between mainstream economists.

4.2 Agent-based modeling

Another approach to economic analysis that makes use of computer programs is the agent-based modeling.

Following [Gilbert \(2004\)](#), “multi-agent models consist of a number of software objects, the “agents”, interacting within a virtual environment. The agents are programmed to have a degree of autonomy, to react to and act on their environment and on other agents, and to have goals that they aim to satisfy. In such models, the agents can have a one-to-one correspondence with the individuals (or other actors) that exist in the real social world that is being modelled, while the interactions between the agents can likewise correspond to the interactions between the real world actors. With such a model, it is possible to initialize the virtual world to a preset arrangement and then let the model run and observe its behavior. Specifically, emergent patterns of action may become apparent from observing the simulation”.

In particular, according to [Richiardi \(2014\)](#), agent-based models (ABMs) are characterized by three features: (i) there are a multitude of objects that interact with each other and with the environment, (ii) these objects are autonomous, which means there is no central, or “top-down” control over their behavior and more generally on the dynamics of the system, and (iii) the outcome of their interaction is numerically computed.

The interaction of agents and the lack of a central control in ABMs strictly link agent-based models with complexity. In fact, while modelers are usually interested in

addressing specific theoretical questions and working in particular substantive areas, they almost invariably draw on complexity concepts when using an agent-based approach.

The connection between ABMs and complexity it is clear if we read the definition of complex systems given by [Mitchell \(2009\)](#): a complex system is “a system in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated information processing, and adaptation via learning or evolution”, the last one only for complex *adaptive* systems.

It follows that ABMs can be used for the study of a great variety of systems, and not only in social science: we can use them to study the immune system as well as the anthill, economies and networks, hurricanes as well as the brain.

Despite their potential, agent-based models present some weaknesses. In particular, following [Terna \(2013\)](#), they are mainly three. First problem is that is difficult to deeply understand them without studying the code and so the program used to build the model. Another problem is that looking for unexpected behaviors can prevent us to find coding errors: sometimes, the only way to distinguish mistakes from counterintuitive results is to carefully check computer codes. Finally, it is almost impossible to systematically explore the entire set of possible hypotheses, that we have to specify in order to model the behavioral rules of agents.

After having briefly described microsimulations and ABMs, we are now able to find differences and common points between the two approaches.

Agent-based models and microsimulations are, indeed, very similar, as they are both computational models built at the micro level in order to understand the aggregate behavior.

However, whereas the ABMs pay much attention on the interaction between agents and the emergence of complex aggregate behavior and are generally identified as theoretical exercises, microsimulations have traditionally lacked of interaction between units and are always built from sample data.

We conclude outlining the convergent paths that the two literatures have recently embraced, with an increasing number of agent-based models that presents a high empirical content ([Richiardi, 2014](#)).

4.3 Elderly-care model: microsimulation or ABM?

As we will see in the next chapter, our model artificially recreates a representative part of the population of Modena, corresponding to the sample of a local survey. After the specification of individual rules, we use the model mainly to study how different policies affect the assistance of the elderly population created.

Our model presents characteristics that are typical of both a microsimulation and an agent-based model.

The main trait that our model shares with microsimulation is surely the use of empirical data. Most of the individual characteristics of the agents are, indeed, not endogenously

determined or arbitrarily given, but derive from a very detailed survey conducted by the CAPP of Modena. Moreover, the main aim of the model is to provide assistance for the evaluation and design of public policies regarding the care of elderly population.

On the other hand, our model presents some features that are typical of an agent-based model. In fact, the agents of the model interact between them and relationships and interactions play a crucial role in the outcome of our experiments.

In fact, we do not consider individuals as isolated, but we keep them aggregated in their families and we also include in the analysis those younger families that can be thought as the children' families of the elders who need assistance. This allows us to specify behavioral rules for the elders which are also based on their relatives: it makes a huge difference if an elderly is alone or if he has a spouse and children; if their relatives have time to assist him or they can help him paying for formal services.

In conclusion, our model can be considered an hybrid of microsimulations and ABMs, coherently with the tendency to converge of these approaches that we outlined in the previous section.

Chapter 5

The model

5.1 Introduction

We dedicate this chapter to the description of our model.

As we briefly mentioned in the previous chapter, we decide to study the elderly-care in Modena making use of data mainly collected in 2012 by the local survey called ICESmo³ and building an agent-based model in an appropriate program called Netlogo. The model includes both the expressed and the potential demand of assistance of elders and we enrich it using some other data that we presented in chapter 2 and 3.

We start with a brief description of the survey ICESmo, in section 5.2, in order to give an idea of what kind of information are collected and why they can be useful for our study.

Then, we proceed with a general description of the model, in section 5.3, in which we describe the initial situation of our model, so the individuals, families and services existent, the supply and demand of assistance and their matching. Moreover, we explain which options are left to the user of the model, so what can be changed before running the model, and how the results are shown and analyzed, both in Netlogo and Excel.

The last section, section 5.4, is dedicated to a punctual explanation of the code of the model. First, we describe the main procedures included in the `setup`, that sets the initial situation. Then, we explain the main procedure, called `go`, in which the supply and demand of assistance are expressed and matched. Finally, we conclude with a brief description of the code used to run the pre-established experiments, which are used to study different levels of public supply of long-term care services.

5.2 The survey ICESmo

ICESmo (Survey on income and living condition in the province of Modena) is a local survey conducted by CAPP, the Center of Analysis of Public Policies of the University of Modena and Reggio Emilia. The survey aims to explore the economic and social condition of the families of the municipality of Modena. Moreover, the survey analyzes

the use of public services in favor of elderly people and children. Similar surveys has been conducted also in Toscana, in the local councils of Bolzano and Trento and in the area of Canavese (Piemonte).

The researchers of CAPP had two main motivations for conducting the study. Firstly, the rising interest for the analysis of micro-founded data, given the insufficiency of data provided by the—although valid—analyses of ISTAT and Bank of Italy. The CAPP group has therefore decided to invest in the production of *ad hoc* data, rather than operating on the interpretation of already existing figures. Secondly, the importance of the local features for the interpretation and the design of economic policies. CAPP's researchers maintain that this is essential given the tendency to the decentralization of policy-making, which urges a precise analysis of the local context.

The CAPP group decided to make use of direct interviews conducted in the place of living of the families part of the surveys. The interviewers made some of the questions to the family as a whole, while others to the individual members. Moreover, some adjunctive questions are directed only to those members who answered in a specific way to the preliminary questions. It might happen as well that some sections of the survey can be left blank if the family does not satisfy some requirements.

The researchers of CAPP designed the sections concerning the income and the wealth of the family—which are the core of the survey—in an analogous way with respect to the survey over the balance sheets of the Italian families (*Indagine sui Bilanci delle Famiglie Italiane*) conducted by the Bank of Italy. This allows to confront the local and the national data. Moreover, ICESmo is partially comparable also with the *IT-silc* survey conducted by ISTAT and with the national population census.

The CAPP group has conducted 3 ICESmo surveys so far. The researchers has realized the first study in 2002. The survey involved 1235 families, which have been administered a questionnaire composed of 17 sections. The second survey has been realized in 2006, involving 2034 families, which has been given 16-sections questionnaire plus a form to fill without the presence of the interviewer. Even if the researchers held the main structure of the first survey, in the following studies they have changed or substitute some questions and added new sections. In particular, in the second survey they have introduced a new section concerning the health and the self-filled form, which is composed of subjective questions and of the “model SF12”. The latter is a model developed to analyze the subjective perception of personal health. The researchers has held these elements in the third survey, ICESmo3, dated 2012. Moreover, they have enriched with new sections the analysis.

With respect to the first survey, ICESmo2 has covered a larger sample of families, and researchers have tried to maintain this new scope of the analysis also in ICESmo3. The repetition of the surveys has allowed the researchers to deepen the analysis of the changes in the citizens' economic condition and well being during time. Moreover, this has been possible thanks to the comparison with the national data from the Bank of Italy.

The CAPP group has used the information obtained through the surveys to implement some microsimulations, especially on local taxation, and to support the analysis

and the design of local policies. The scope and the complexity of the questionnaire has allowed the realization of researches over several themes. Some examples include: the wealth distribution, the access to public services, the social mobility, the gender analysis and the condition of families with children, as well as the intergenerational relationships.

The results of these surveys have been presented in several seminars and workshops. Moreover, the researchers of CAPP have collected and commented the data in two volumes: [Baldini et al. \(2004\)](#) and [Baldini et al. \(2010\)](#).

For our model, we use the information collected by ICESmo3. The sections of the questionnaire considered are reported in Appendix 2. In particular, we use the general information contained in section B, the educational level (section C) and the professional condition (section D). The sections E, F, H have been used by the CAPP in order to calculate the wage and the equivalised household income, variables that we include in our models. The section I is entirely dedicate to people who need assistance, whereas section M contains information about the unpaid work and section Q the ones related to the health status.

5.3 Description of the model

5.3.1 Initial situation

The initial population of the model corresponds to the sample of the survey ICESmo3 and so it is composed by 4960 individuals, grouped in 2020 families.

ICESmo3 is a very rich survey: 213 questions are proposed to the families, for a total of 529 variables. Among all the information collected by the survey, only the ones which are useful for the study of the long term care of elderly are kept into consideration in building the model. In particular, the initial characteristics of the individuals are:

- socio-demographic: gender, age, relation with the head of the family and birthplace;
- economic: professional condition, weekly hours of paid work, weekly hours of unpaid work, equivalised household income and the coefficient that allows to obtain it;
- specifically related to the long term care: invalidity, limitations in the daily activities, the presence of an in-house nurse.

After having characterized all the individuals, we focused on the share of old people. The problem is to classify the eventual level of dependency of the elderly, since it is clear that there is a great difference between the assistance required by an individual incapable of even the simplest quotidian tasks and the one of someone almost fully self-sufficient, but who needs help for some minor activities (for instance, bringing the groceries up the stairs). We decide to classify the level of dependency in 3 categories: high, medium and low. The old people who need a continuous assistance require a care giver 24 hours per day, the elderly with a medium level of dependency require 5 hours of assistance per day and, finally, the ones with the lowest level of assistance need a care giver for 1 hour per

day. Relating to the level of dependency and the health status, the survey provides some useful information. The interviewees, in fact, were asked whether they are invalid and, in this case, the certified percentage of invalidity; if they are already assisted, regularly or occasionally, and whether they have some limitations in the daily life activities, that are divided in severe and slight limitations. Combining these information, we assign the high level of dependency to those elderly who are already regularly assisted. The medium level of assistance required is assigned to the share of old people that is already assisted, but only for some hours per day, and to those who are invalid and face severe limitations in their daily life activities. Finally, the population aged 64 or more with the lowest level of dependency is characterized by the presence of some limitations, without any certified level of invalidity. Then, some of the families in which there is an old person with some level of dependency is linked to a random family with no elderly; these families are supposed to be the next generation of the elderly and to be linked with them by some kind of familiar relation. Finally, we subtract from the income of elders the eventual public contributions received, in order to simulate their presence or absence exogenously.

The share of the elderly population of ICESmo3 was slightly under represented if compared to the data collected by Istat. Indeed, in the survey conducted by the CAPP the population aged 65 or more represents the 19,3% of the total sample, while, according to the census of Istat, they are 21,3%. This is mainly due to the fact that is much more difficult to involve in a voluntary survey the elderly population, because they are generally more cautious in receiving the interviewer in their house or because they are not able any more to answer all the questions of the questionnaire. This is one of the typical problems of collecting data, the so called *selection bias*. Since the care of the elderly is the topic of this dissertation, and consequently the elderly are the main agents of the model, we create other 125 individuals aged 65 or more in order to match national statistics. Since the already mentioned difficulties in meeting the old people are greater with elders living alone and with some kind of limitation, we assume that they are the only member of their family. Yet, assuming that they are alone in the world would be a clearly unrealistic assumption for most of them, so we link some of them to a random family in which there are no other elders.

Their level of dependency is then determined according to the proportion of the sample population, slightly increasing the percentage of people with severe limitations. Since we have seen in the first two chapters that the health status in the last period of life presents many differences between women and men, the proportion of the level dependency in the sample population is calculated by gender. The other characteristic assigned is the equivalised household income, that in this case corresponds to the individual income, as the elders created are alone by assumption. In order to calculate it, we make use of normal distribution with, as expected value and variance, the sample mean and variance of the corresponding characteristic of elderly of the sample. In particular, we calculate the mean and the variance of the equivalised household income of elders who live alone, dividing them by gender.

These modifications of the sample led to an initial population of 5085 agents grouped

in 2325 families. Between them, the 21.3% are aged more than 64 and 528 elderly people require some level of assistance. It could seem that the share of elderly population in need of assistance is much higher than what reported by other national statistics, but we have to keep in mind that our definition of people in need of assistance is wider than the one usually adopted. In fact, we decided to include also those elders who require a very low level of assistance, which is not essential for their living, but that allow them to live a dignified life. Indeed, if we exclude them, we end up with 243 elders who require a medium or high level of assistance, a number which is in line with the national statistics.

With regard to the family as a whole, the characteristics are mainly related to its composition. Indeed, the variables assigned to the families are the number of members, the number of children and elderly and the eventual presence of a person who needs assistance. Moreover, the families linked to an old dependent person are identified with a specific variable.

For all the agents who do not require assistance, it is calculated how many hours they can dedicate to the eventual assistance of an elderly. Indeed, for each person we subtract from the 24 hours available in a day the daily hours of work, 2 hours for eating, 8 hours for sleeping and the hours dedicated to housework and to the eventual care of children.

In the first version of the model, the other agents created were the care givers or *badanti*. According to [Iori and Russo \(2007\)](#), the estimated number of care givers in Modena with a regular contract of work are 10401. However, as already mentioned, this segment of market is characterized by a great amount of black work, so that the IRS estimates that the declared workers in this sector represents only the 40% of the total care givers. In the first version of the model, both types of workers were kept into considerations and, in order to respect the sample size of the initial population, 187 professional care givers were created. Moreover, we assume that half of the care givers created work full-time, while the other half is divided between those who work part-time and those who move to the house of the assisted person, offering an assistance of 24 hours. In the final version, however, we decide not to create any domestic assistant. The reason is that it seems reasonable to assume the market of domestic assistance to be in equilibrium, so that there is no shortage of *badanti*. Since the model does not focus on the market of private domestic assistance, we assume that every family who wants to employ a *badante* can find one. The cost of a private domestic assistant is fixed, in our model, at 850 Euros per month if the *badante* offer a continuous assistance. In addition to this amount, we have to consider some money (we hypothesized around 200 Euros) for eating so that an elderly who wants to hire a private domestic assistant needs about 12,600 Euros per month. For those elders who need around 5 hours per day of assistance, the annual cost of a *badante* lowers to 8,500 Euros, whereas the elders with slight limitations must have about 3,500 Euros in order to afford a private domestic assistant for 1 hour per day.

Regarding the residential homes, Modena offers various types of services, as already explained in section 3.2. For simplicity, only two kind of representative structures are

created in the model, both public and private. The first kind of structure is the residential home that accommodates the old people who need a continuous assistance. In the model, we create a public residential home and a private one, which are supposed to be representative of all the residential homes that offer a high level of assistance. Following the data available, presented in chapter 3, in our model the public residential home has a total cost of about 45,000 Euros per year, the 60% of the total cost is paid by consumers (so 18,067) and the other 40% is the public quota, that corresponds to 27,000 per year for each place. We have seen that private residential homes present a lower total cost with respect to those managed by private entities, but, since the difference is relatively low and we cannot determine it precisely, we assume that the total cost is the same as the one of public residential homes. In this case, however, the consumers pay all the cost, so that they pay about 45,000 per year. In the initial setting of the model, the total amount of beds available for the residential home managed by the public sector is fixed at 24, while the places available in the private one are 4, so that to respect the sample size of the initial population.

The other type of public service for the elderly care is the daily centre that aims at old people with a lower level of assistance needed. This kind of structure offers to the elders a place in which they can socialize with other people through a wide range of activities organized by the centre, eat the lunch and being assisted by professional care givers whenever is required. As for the residential home, also in this case the initial number of places available in the model is calculated on the basis of the formal daily centre certified in Modena and the sample size population of the survey, so that there are only 4 places available. With respect to this service it is important to notice that, in addition to the formal daily centers existing in Modena, there are many other informal places which offer a similar service and are not kept into consideration in the model, as churches and voluntary associations. The cost for a day center is, on average, of 29 Euros per day paid by elders plus 21 Euros of public quota. This means that those elders who are assisted in a day center spend about 10,500 Euros per year, whereas the public expenditure is about 7,000 Euros.

In the final version of the model the places available in both semi residential and residential homes can be decided by the user.

5.3.2 Supply and demand of assistance

Summing up what we said in section 5.3.1, at this point of the model we have the elders who need some level of assistance, their relatives, both the ones who live with them and the ones who represent the next generation, and the private and public services offered, namely the (semi)residential homes.

The process through which the elders express the demand of assistance and supply and demand are matched is quite complex. The process is slightly different depending on the level of assistance required, so that we start describing the mechanism followed by those elders who need a high level of assistance and then we outline the differences for the other elders.

The figure 5.1 illustrate the main steps of the process for those who have severe limitations. As the conditions cross themselves various times during the process and, depending on them, elders follow different paths, in the figure some questions are repeated. This seems to us, however, the clearest way to illustrate the process.

At first, if the elders do not live alone, they ask their family to assist them. In fact, we assume that elders would prefer, if it is possible, to keep living in their own home, assisted by one of their relatives. If there is someone in their families who is aged between 18 and 80, has enough hours available to assist the elderly and does not need himself assistance, then he accepts to offer elderly care in the 80% of the cases if she is a woman or in the 70% of the cases if he is a man. This reflects the fact that women spend, on average, more hours than men in the unpaid care work, in Italy especially.

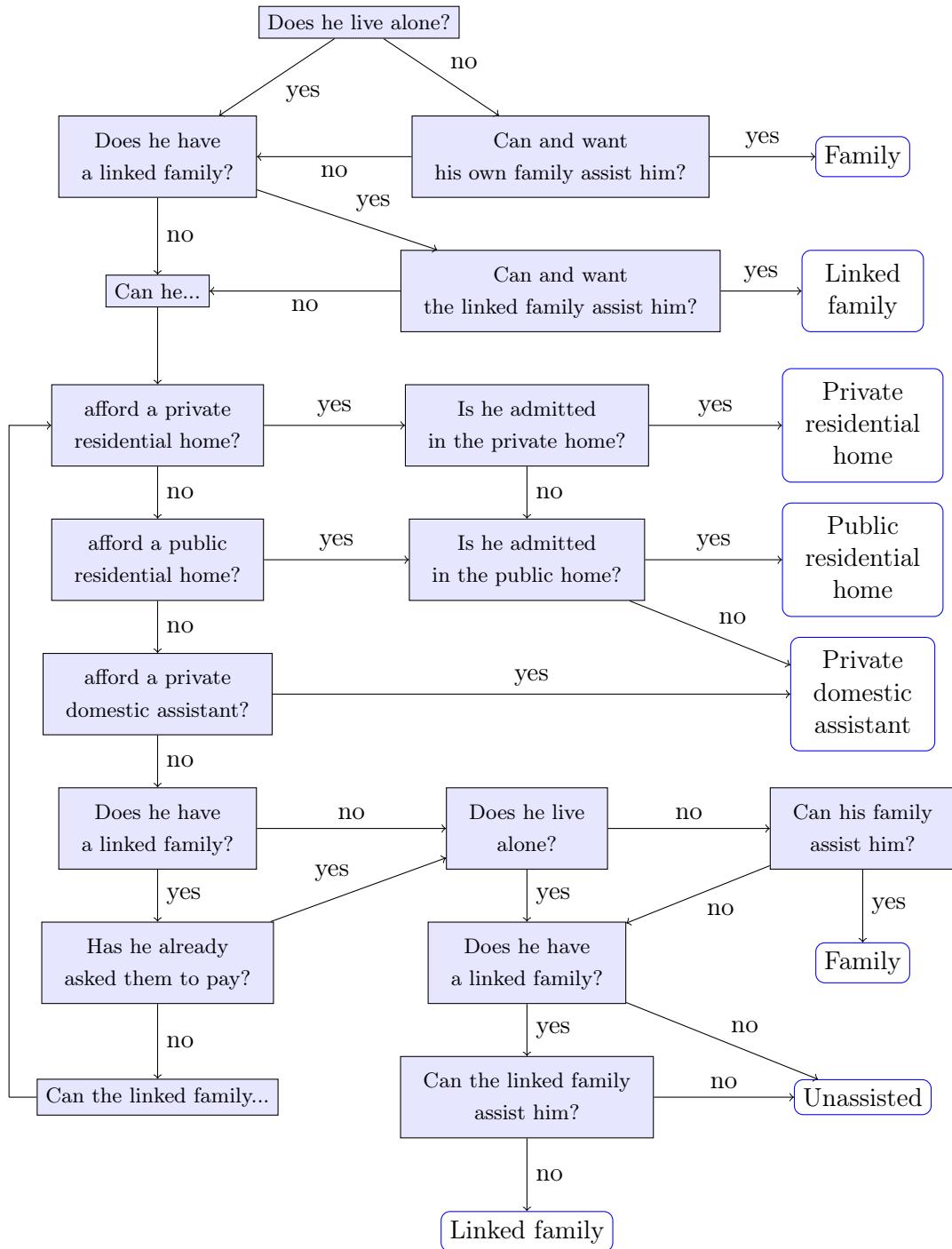
Then, the elders who live alone or those who have not found anyone in their own family who can and want to assist them, if they have children, they ask to their linked family to be assisted. The requirements are the same as in the previous as, but the probability of accepting to take care of the elderly are much lower, both because of the distance and because we assume that young people with their own family, with respect to the wife or the husband of the elderly, are less willing to spend their days assisting the old relative. Therefore, the probability of accepting the task is 20% for women and 10% for men.

Those elders that, for any reasons, have not found any relatives who assist them, apply for formal LTC services. Starting from private residential homes, that are the most expensive, the elders evaluate, together with their families, if they can afford a year in a nursing home. If the answer is positive, they apply for it, in the opposite case they do the same reasoning with the public residential home. Finally, if they cannot afford a public nursing home but their incomes allow them to employ a private domestic assistant, they hire one. Depending on the places available, some elders might apply for a private or public residential home and not be admitted. In this case, they automatically apply for the following service in order of cost, as they can for sure afford it. To clarify this point, suppose that an elderly apply for private residential home and he is not admitted. Since he could afford the private nursing home, he can surely afford to pay for the public one and he directly send his request.

The elders who cannot paid for the LTC services or the *badanti*, ask again to their linked families, which have refused to assist them when they were asked, whether they can help them to pay the services. In the model, the household income of the elderly and the one of his linked family are put together and, after having considered that part of the income is necessary for the living of all other relatives, they verify if they can afford to pay one of the services offered. The process is the same as the one in which is the elderly himself who evaluates if he can afford it and, eventually, apply for it.

After all these procedures, there might be that some elders are still unassisted. In this case, if the elders who need assistance have some relatives, either living with them or member of the linked family, their relatives are *force* to take care of the elderly, but only if they have the possibility to do so. This means that those families which at first refused to assist the elderly, although they could, now, that there are no other alternatives for

Figure 5.1: The process through which the elders with severe limitations try to find assistance.



the old parent, accept to take care of him.

Finally, the families that do not have the possibility to help the elderly in need of assistance leave him unassisted. Luckily for us, in Italy there are not many elders with severe limitations who do not find any kind of assistance, neither formal or informal, but a relatively large number of elders is assisted by friends, volunteers, associations and churches. Since in our model we do not keep into consideration this kind of assistance, it is not surprising that a small part of the elders remains unassisted and we can certainly imagine that some of them can benefit from the voluntary assistance.

What is left to explain is the mechanism of admission in the residential homes. Starting with the private one, we assume that the elders who have applied for it are admitted beginning with the richest one and continuing in decreasing order until all the places available have been assigned. Regarding the public one, the criterion is exactly the opposite: the first elders admitted are those who can afford the services but who show the lowest household income, until the residential home finish the places available. In the public residential home, moreover, the priority is given to the elders who do not have any relatives.

The process for elders with a medium level of assistance required, fixed at 5 hours of assistance per day, follows the same steps of the one just described. The difference is in the service aimed at them, the day center rather than the residential home. In fact, if the elders do not find any relatives who can and is willing to assist them, they see if they can afford the day center, which costs about 10,500 Euros per year, and, if the answer is positive, they apply for it. Again, the priority is given to the elders who have not relatives, starting from the one with the lowest household income. Moreover, as they require less hours of assistance and, therefore, taking care of them is not a task as demanding as in the case of 24 hours of assistance, we remove from the requirements of the eligible relatives the maximum age, previously fixed at 80. So, the requirements for relatives in order to be chosen as informal assistants for the elders are: being aged 18 or more, not requiring assistance themselves and having enough hours available to assist the elderly.

Regarding those who require only 1 hour of assistance per day, we decide to enlarge even more the criterion for the eligibility of relatives who are asked to assist the elders. We admit, in fact, also the relatives who require a low level of assistance to become assistant. The result is that we allow for the possibility that a couple of elders in which both require a low level of assistance can take care of themselves in a reciprocal way. We assume that they can hire a private domestic assistant only in the case they have a household income higher than the average of the population and, in particular, if they are in the two highest deciles of equivalised household income. Nevertheless, if at the end of the process they are unassisted and they can afford a private domestic assistant, although not in the highest deciles, they can hire one.

5.3.3 What can be decided by the user?

The user is allowed to set some variables of the model before starting the process. The variables that can easily be modified in the interface are:

- a) the places available in the (semi)residential homes, both private and public;
- b) the quota of the total cost of public (semi)residential homes paid by the consumers;
- c) include the public contributions (the *indennità di accompagnamento*);
- d) simulate a generalized decrease of incomes;
- e) change the female participation to the labor force.

First of all, it is possible to set the places offered by the (semi)residential homes. The maximum number that can be selected corresponds to the number of elders who can access this service. So, for example, the elders who need a high level of assistance are 125 and they can be admitted in the private or in the public residential home, so that the maximum number of places offered by those structures is 125. Clearly, if the maximum number is selected, there will be a place for each elders who applies for it.

The user can as well choose which percentage of the total cost of the service is paid by consumers and, consequently, the public quota. For simplicity, the quota can be incremented by 10%, so that the user can choose 0%, 10%, 20% and so on. Of course, if the consumers' quota is the 100% of the total cost, it is the same as the private residential one, whereas if the quota is fixed at 0%, the service is completely free for the consumers and enterily public.

The third option allows to include the *indennità di accompagnamento*, which means that every agents who is eligible for this public contribution (those who have a certified invalidity and are aged 65 or more) receive 492,97 per month. Since agents make their decisions on annual basis, we add to their yearly income about 5,900 Euros.

Moreover, the user could be interested in simulating a decrease of incomes for several possible reasons, but the most reasonable, in our opinion, is to remove the gap between the average income of Modena and the average Italian income, or just the one of the cities located in a specific area of interest, given that Modena is a particularly rich city. This is made reducing the household income of all agents by the same percentage, choosen by the user.

The last option available for the user is to change the female employment rate. In section 2.5 we outlined that the unpaid care work is not equally distributed between women and men and this is true especially in Italy, where the time spent by women almost double the one spent by men, at least until the elderly age. We have also seen (figure 2.8) that there is a negative correlation between labor force participation and unpaid care

work, so that it could be interesting to see what happens to the system of long-term care for elders if more (or less) women decide to start working. In the model, the decision of entering into the labor market produces two effects on the personal characteristics of the agents. From one hand, they have less hours available to assist their elders and, to be more specific, 40 hours less per week, which are the hours spent on working. This will lower the potential supply of assistance. From the other hand, however, they increase their incomes by the amount of the wage received, which leads to a greater number of people who can afford to pay the formal LTC services for the old relatives. In order to decide the wage of each person who starts working, we make use of the normal distribution using, as mean and variance, the mean and variance of the sample, dividing it by gender and educational level.

In addition to these options, it is possible to run some pre-established experiments. The reason is that, if we want to study the model, we have to run the model many times with the same setting in order to reduce the variability and obtain significant results. Then, we may want to change the options selected at the beginning and observe how these changes affect the results of the model. Some aspects of the model that we may want to analyze needs to repeat these operations so many times that we decided it would be better to let the computer working for us, just pushing a button in the interface. The pre-established experiments that regard the elders who need a high level of assistance are:

- 1) vary the quota paid by the consumers from 100% to 0, keeping the places offered in the residential homes at the actual level, so 25 places offered;
- 2) vary the places offered from 0 to 125 (with increment of 10), keeping the quota paid by consumer at the actual level, so 40% of the total cost;
- 3) vary both the quota paid by the consumer and the places offered, starting from quota 100 and places offered 0 to quota 0 and places 125, so that to obtain all the possible combinations of quotas and places offered. The results, that can be read directly in Netlogo or analyzed in Excel, regard only the elders in need of 24 hours of assistance per day.

For the elders who need a medium level of assistance, it is possible to run the same experiments. The differences are only in the actual level of consumers' quota and places offered, which are, respectively the 58% and 5 places offered. For these experiments, clearly, the results will regard only the elders in need of 24 hours or those who need 5 hours of assistance, and not all the elders in need of assistance.

5.3.4 Looking at the results of the model

As we have said in the previous section, the user can set some single variables before starting the process as well as run the pre-established experiments.

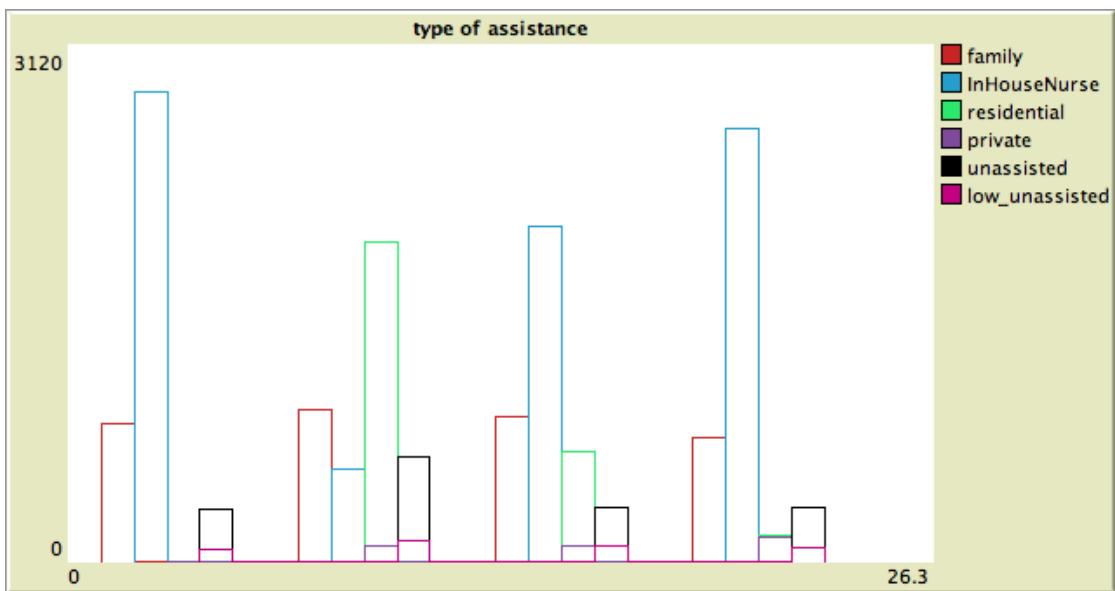


Figure 5.2: An example of the graph showing the type of assistance found with different initial settings.

If only some single variables are set, we can just look at the portion of the interface that we see when we open the program.

The main variables that can be observed at the end of the process are the kind of assistance found by elders and the expenditures. In particular, we can observe how the elders are divided by those who are assisted by relatives, those assisted by private domestic assistants, the ones admitted to a (semi)residential home and, finally, the elders who have not found any assistance. These variables are shown in a graph, figure 5.2, in which, each time that we run the model, one bar for each kind of assistance received is drawn. As we aggregate the variables of interest for all the elders, so summing the variables for those who need a high, medium and low level of assistance, we report in the graph the number of hours that families, residential home and private assistants spend taking care of the elders, so that to reflect the difference in the amount of hours of assistance needed. Every time the model is run without a `setup`, four more bars appear in the graph, so that the results can be compared.

Regarding the expenditures, it is possible to observe both the public and the private expenditures and the total amount spent in LTC services. The private expenditures are obtained as the sum of the amount paid by elders for the (semi)residential homes and the cost of the domestic assistants employed. The public expenses, on the other hand, include the eventual cash transfers (*indennità di accompagnamento*) and the public quota of the total cost of (semi)residential homes. These variables are shown in a graph analogous to the previous one, reported in figure 5.3, with all the value expressed in thousands

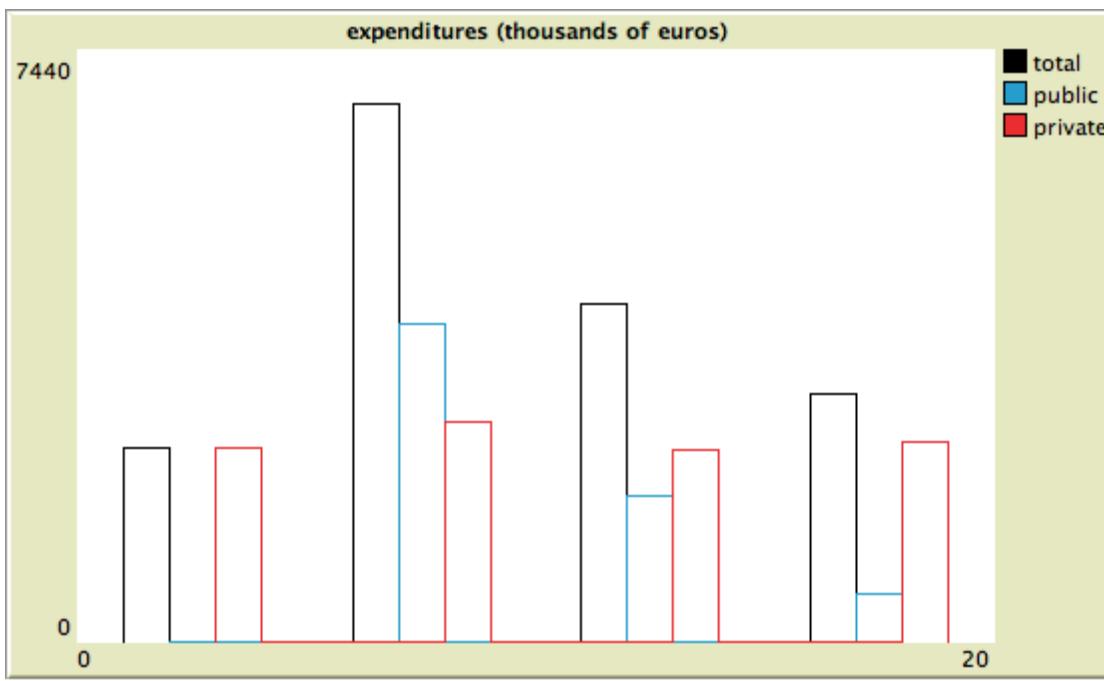


Figure 5.3: An example of the graph showing the expenditures with different initial settings.

of Euros. The first bar represents the total expenditures, the blue bar the consumers expenses and the red one represents the public expenditures.

On the other hand, if we run the pre-established experiment, we can look at the two graphs already mentioned as well as at the other graphs located on the right portion of the interface, that are reported in figure 5.4. In particular, the two main graphs, showing the type of assistance found and the expenditures, now display only the values about the share of elders that we are analyzing in the pre-established experiment. So, if the experiment that we run focuses only on the elders who need a high level of assistance, the bars that we see in two graphs at the end of the experiment will regard only those elders. The other graphs, on the right part of the interface, illustrate separately each variable of interest, so that we have a graph for the unassisted elders, another one for the elders assisted in the residential home and one for those who employ a domestic assistant. In addition, we have a graph for the elders assisted by relatives, in which we distinguish the families that spontaneously take care of the elders from the ones who are *forced* to assist them when the elders do not find any other solution. Finally, we draw in a graph the private expenditures, divided between the ones aimed at paying the domestic assistants and the ones for the residential homes, the public one and the total expenditures which are the sum of the other two.

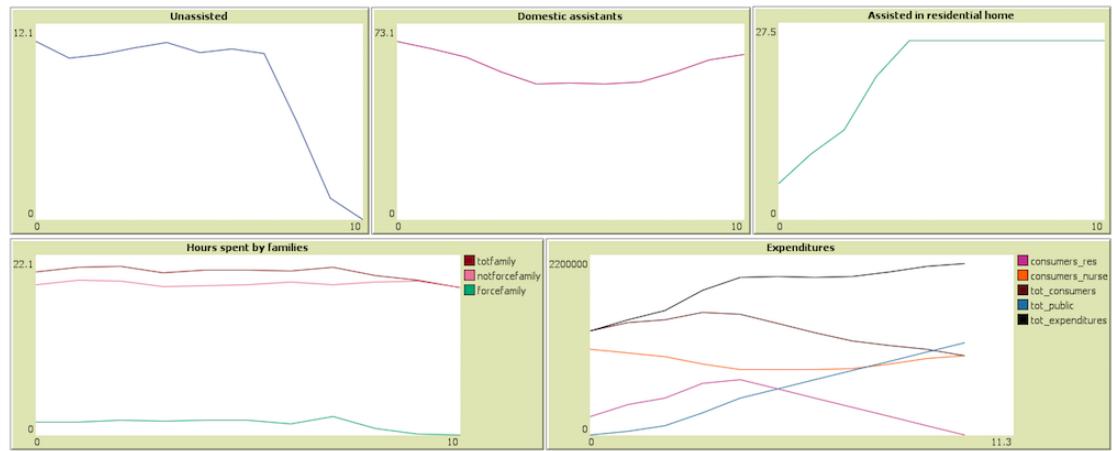


Figure 5.4: The right portion of the interface, dedicated to the pre-established experiments.

Table 5.1: Variables of agents, read from Stata

| Variables | Variable Type | Meaning |
|---------------------------|---------------|--|
| <code>id</code> | numeric | agents' identification number |
| <code>famid</code> | numeric | families' identification number |
| <code>nip</code> | numeric | identification number in Stata (combined with codfam) |
| <code>gender</code> | dummy | gender |
| <code>age</code> | numeric | age |
| <code>agecl6</code> | category | age grouped in 6 classes |
| <code>educ4</code> | category | educational level |
| <code>cond10</code> | category | professional condition grouped in 10 categories |
| <code>weeklyhour</code> | numeric | weekly hours of paid work |
| <code>income</code> | numeric | equivalised household income |
| <code>m11</code> | numeric | weekly hours of childcare |
| <code>m21</code> | numeric | weekly hours of care of cohabitant relatives |
| <code>m31</code> | numeric | weekly hours of care of non-cohabitant relatives |
| <code>m41</code> | numeric | weekly hours dedicated to housework |
| <code>q7</code> | category | eventual limitations in the ADLs |
| <code>q1</code> | dummy | invalid people |
| <code>q1perc</code> | numeric | certified percentage of invalidity |
| <code>contribution</code> | numeric | amount of public contributions received |
| <code>coefficient</code> | numeric | coefficient to obtain the equivalised household income |

5.4 Explaining the code

In section 5.3 we described the content of the model, but we did not say anything about the implementation of the model in Netlogo, which is the focus of this section.

In Netlogo, before starting with the main procedures, it is necessary to specify what kind of agents we will create, their characteristics and the variables that are not assigned to agents but regard the model as a whole.

In our model, we have two kind of agents: people and (semi)residential homes. Therefore, we created two groups of agents with different characteristics, the so called `breeds`:

```
breed [agents agent]
breed [ResidentialHomes ResidentialHome]
```

Each `breeds` have some specific characteristics, which are the agents' variables. They are listed and briefly explained in table 5.4 and table 5.4.

Regarding the other type of agents, the (semi) residential homes, they have only four variables, as shown in table 5.2.

The patches represent families, so that all members of a family are located on the same patch which has those variables that regard the family as a whole. It is possible to see the name of those variables and their explanation in table 5.4.

Finally, we created two types of undirected links:

Table 5.2: Variables of agents, built in Netlogo

| Variables | Type | Meaning |
|----------------------------------|---------|---|
| <code>youngassisted</code> | dummy | young person who need assistance |
| <code>oldassisted</code> | numeric | level of assistance needed (0 - 3) |
| <code>alone</code> | dummy | old person who lives alone |
| <code>family</code> | numeric | linked families |
| <code>nowork</code> | dummy | people who do not work |
| <code>hours_available</code> | numeric | hours available for assisting a elderly |
| <code>receive_contr</code> | dummy | elders who receive public contributions |
| <code>need</code> | numeric | hours of assistance needed |
| <code>my_FamilyCare</code> | dummy | elders assisted by a cohabitant relative |
| <code>out_FamilyCare</code> | dummy | elders assisted by a non-cohabitant relative |
| <code>PHome_request</code> | dummy | elders who apply for a private home |
| <code>Home_request</code> | numeric | elders who apply for a public home (24h, 5h) |
| <code>InHouseNurse</code> | numeric | elders assisted by a domestic assistant (24h, 5h, 1h) |
| <code>Home_found</code> | dummy | elders admitted in the public home |
| <code>unassisted</code> | dummy | unassisted elders |
| <code>familyassisting</code> | dummy | relatives who assist some elders |
| <code>old_family</code> | dummy | family of old people, at least one needs assistance |
| <code>income_withold</code> | numeric | elderly's income plus income of the linked family |
| <code>i_after_PHome</code> | numeric | income less the cost of the private home |
| <code>i_after_Home</code> | numeric | income less the cost of the public home |
| <code>i_after_Nurse</code> | numeric | income less the cost of the domestic assistant |
| <code>PHome_notaffordable</code> | dummy | elders who cannot afford a public home |
| <code>Home_notaffordable</code> | dummy | elders who cannot afford a private home |
| <code>Nurse_notaffordable</code> | dummy | elders who cannot afford a domestic assistant |
| <code>wage</code> | numeric | wage received entering into the labor market |
| <code>enter_laborforce</code> | dummy | people who enter into the labor market |
| <code>exit_laborforce</code> | dummy | people who exit from the labor market |
| <code>cash_benefit</code> | dummy | elders who start receiving public contributions |

Table 5.3: Variables of (semi)residential homes, built in Netlogo.

| Variables | Type | Meaning |
|----------------------------------|------------|--|
| <code>public</code> | dummy | 1 for the public home and zero for the private one |
| <code>assistance</code> | alphabetic | level of assistance offered |
| <code>places</code> | numeric | places available |
| <code>supply</code> | numeric | hours of assistance offered |
| <code>Nurse_notaffordable</code> | dummy | families with an elderly in need of assistance |

Table 5.4: Variables of patches

| | Type | Meaning |
|-----------------------------------|----------|--|
| Variables read from Stata | | |
| <code>pfamid</code> | numeric | family's identification number |
| <code>yeq</code> | numeric | equivalised household income |
| <code>decileyeq</code> | numeric | deciles of equivalised household income |
| <code>nmemb</code> | numeric | number of family members |
| <code>nold</code> | numeric | number of old family members |
| <code>i1</code> | category | type of assistance received |
| Variables built in Netlogo | | |
| <code>yassisted</code> | dummy | families with a young disable person |
| <code>oassisted</code> | dummy | families with an elderly in need of assistance |
| <code>pfamily</code> | numeric | identification number of linked families |
| <code>younger_families</code> | dummy | families of people aged less than 65 |

```
undirected-link-breed [FamilyCare-links FamilyCare-link]
undirected-link-breed [assistance-links assistance-link]
```

The first one is used to link those elders who are assisted by a relative to the relative who takes care of them, whereas the second one link the elders admitted to a residential home to the residential home.

Finally, we created the so called *global* variables, the variables that are not assigned to agents or patches. They are used to count the number of old people assisted for each type of assistance received and the private and public expenditure for LTC services.

The code is then divided in four procedures:

- 1) **setup**, to make the model start for the first time;
- 2) **restart**, to reset both the model and the interface;
- 3) **go**, to run the model;
- 4) **reset**, to reset the model keeping the previous results.

In the following part of this section we will explain the code of each procedure.

5.4.1 Setup and restart

The models built in Netlogo usually start with the procedure `setup`, which create the artificial world. In our model this procedure re-create the sample of the survey ICESmo3, so that the agents are grouped in families and keep all the characteristics which are useful in our model. Moreover, since the share of the elderly population of ICESmo3 was slightly under represented if compared to the data collected by Istat, mainly due to the so called *selection bias*, with the `setup` we add to the population other elders. Finally, we create the residential homes and assign to the agents some variables, based on the information collected by the survey, which will be useful in the procedure `go`.

We choose as agents of our model the individuals of ICESmo3. This was not the only possibility, as the survey collects information both on the individual level and the family level, so that it could have also been possible to choose as agent the family as a whole. However, since for our analysis we need individual characteristics and family structures, we decide to represent the individual as agents and families as patches. Therefore, all members of a family are single agents located on the same patch.

Families and individuals

For the simplicity of the code, we start with the creation of the families. In order to transmit the information collected by ICESmo3 and contained in a database opened in Stata to the agents of our model, we export from Stata a text file with the extension `.raw` containing all the useful characteristics of the sample separated by spaces. Each row contains the information of a specific family, whereas each column is a variable that we want to assign to the families. In the first column of the text file we find the families' identification numbers, that we called `pfamid`. Initially, we ask all patches to set their color green. Then, we start a cycle that allows patches to *read* the variables of the corresponding family from the external file. The code is:

```
file-open "famvar2020.raw"
while [not file-at-end?]
[ask one-of patches with [pcolor = 59 and pfamid = 0]
 [set pc当地 13 set pfamid file-read set yeq file-read
  set decileyeq file-read set nmemb file-read
  set nold file-read set i1 file-read]]
file-close
```

With the command `file-open` Netlogo opens the text file named "famvar2020.raw". Note that, at the beginning of the cycle, all patches are green (color 59) and without an identification number, as in Netlogo all variables have value zero by default. So, we ask a random green patch which has not yet an identification number, so with `pfamid= 0`, to change its color from green to bordeaux (color 13), to take the identification number written in the text file and then all the other characteristics. Each time we ask a patch to set a variable `file-read`, we are asking it to read the following number in the same row

of the text file, so that the number of variables that it reads must be equal to number of columns of the text file. Once the first patch has read all the characteristics of the family that represents, the cycle starts again asking another random patch to do the same. Since the patches that already have their variables are bordeaux and with an identification number, we avoid the risk to ask the same patch to do it two times. When also the last row of the file has been read, the cycle stops and we close the text file with the command `file-close`.

Since the families of ICESmo3 are 2020, at the end of the cycle we have 2020 bordeaux patches, each one with an identification number and the characteristics of the corresponding family.

For the creation of agents we export from Stata a text file containing all the individual characteristics of interest and we write in Netlogo a code similar to the previous one in order to assign those variables to the agents. First of all we create 4960 agents, which is the number of individuals of the sample. By default, Netlogo assigns a *name* to each agent created: the *name* is the variable called `who` with value zero for the first agent created and, in our case, the value 4959 for the last one. We set a temporary variable call `d` and, after having opened the text file containing all the individual variables, we ask the agent `d`, so the first agent created since at the beginning we set `d = 0`, to set its color, shape and size, to read from the external file the individual and the family identification numbers and then all the other characteristics. Finally, we set the variable `d` as `d + 1`, so that the second time that the cycle starts it is asked the agent 1 to run the same code. The procedure is repeated until the end of the file, so that until all agents have the characteristics of the corresponding individuals of the sample. At the end of the process, reported below, we can identify each person by the variable `id` and, through the variable `famid`, we also know to which family they belong to.

```
let d 0
file-open "all.raw"
while [not file-at-end?] [ask agent (d)
  [set color black set shape "person" set size 1.2
   set id file-read set famid file-read set gender file-read
   set age file-read set agecl6 file-read set educ4 file-read
   set cond10 file-read set weeklyhour file-read
   set m11 file-read set m21 file-read set m31 file-read
   set m41 file-read set q7 file-read set q1 file-read
   set q1perc file-read set coefficient file-read]
  set d d + 1]
file-close
```

Finally, we ask all agents to move to the patch with the variable `pfamid` equal to the agents' variable `famid`, so that all members of the same family move to the patch that represents that family.

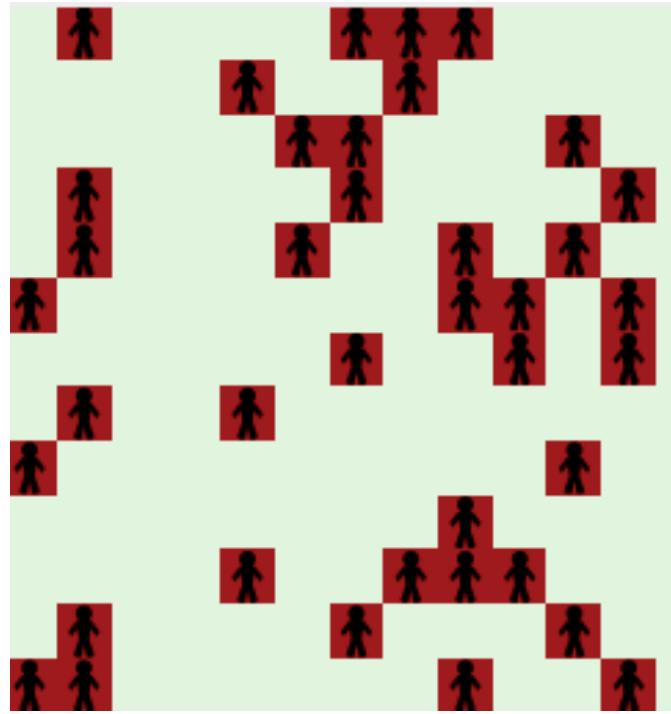


Figure 5.5: Part of the monitor after the creation of families and individuals.

Although we will not use the monitor to show the results of the model, it might be useful to see how it looks in order to clarify the procedures just described. Figure 5.5 shows part of the monitor after the creation of families and individuals. Note that on each red patch are located all the members of one family, but, since they are superimposed, we see only one of them.

Level of assistance needed

As we explained in section 5.3.1, after the creation of agents and families, we focus on the share of elders who need assistance. We classify the level of assistance needed in three levels: high, medium and low. We assign the high level of dependency to those elderly who are already regularly assisted. The medium level of assistance required is assigned to the share of old people that is already assisted, but only for some hours per day, and to those who are invalid and face severe limitations in their daily life activities. Finally, the population aged 64 or more with the lowest level of dependency is characterized by the presence of some limitations, without any certified level of invalidity.

In order to implement this procedure in our model, we first have to exclude the young disable people and their families, as our analysis only focus on the elderly population. Therefore, we assign the dummy variable *youngassisted* to young people who need

assistance and the variable **yassisted** to the patches representing their families.

We also have another problem: we know which families have one assisted member, but we are not able to identify precisely who is. To overcome the problem, we assume that if in those family there is a an invalid person, that person is the assisted one, whereas, if none is invalid, the assisted one is the oldest member. Therefore, we ask those patches that represent families, in which there are at least one elderly, a person already assisted (variable **i1** = 1) and not a young invalid, to ask the member who is old and invalid (**q1** = 1) to set the variable **oldassisted** equal one. If there is no person with these features, the patch ask the oldest member to set the variable **oldassisted** equal one. The code is:

```
ask patches with [pcolor = 13 and yassisted = 0 and i1 = 1]
[if any? turtles-here with [agecl6 > 4]
[ifelse any? agents-here with [q1 = 1 and agecl6 > 4]
[ask agents-here with [q1 = 1 and agecl6 > 4] [set oldassisted 1]]
[ask max-n-of 1 agents-here [age] [set oldassisted 1]]]]
```

We do the same in order to identify the elders who need a medium level of assistance, substituting in the code **i1** = 1 with **i1** = 2. In fact, the variable **i1** takes the value 1 for those families in which a member is assisted during all day and value 2 if a member is assisted only some hours per day. Therefore, we ask the families in which there is someone assisted some hours per day and at least one old person, to set the variable **oldassisted** equal two for the old and invalid member, or the oldest one. Moreover, we add to the elders which require 5 hours of assistance per day also those elders who are not assisted, but that have some limitations in the daily living activities (variable **q7** = 1,2) and some percentage of certified invalidity.

Finally, we assign the variable **oldassisted** with value 3 to those elders who need a low level of assistance, who are the ones that have some limitations in the ADLs and are not invalid. The result is that we can identify from now on the level of assistance needed by each elderly looking at the values taken by the variable **oldassisted**. If **oldassisted** equals 1, the agent needs 24 hours of assistance, if the value is 2 the agent needs a medium level of assistance, whereas the value 3 is assigned to those need only 1 hour of assistance per day.

In order to simplify the code for the other procedures, we assign a dummy variable called **oassisted** to the patches on which there is a elderly who needs assistance and the variable **alone** to the elders, both those who need assistance and those who do not, who live alone.

Completing the initial setting

In our model, at this point, there are 4960 agents, 958 of them are elders and they are divided between those who need assistance (three levels) and those who do not. We

now want to make the sample representative of all the elderly population of Modena, so that we have to add other 125 elders. In fact, adding this number of elders leads to a total population of 5085 people, with 1083 elders, which represent exactly the 21.3% of Modena population.

Since these 125 elders were not included in the sample of ICESmo3, we know nothing about them. We decide to consider them elders who live alone, so that it is not necessary to add other agents as their relatives. This seems to us a reasonable assumption, besides the simplest one, as the elders who live alone are usually less willing to admit the interviewer into their house and so they are likely to be underrepresented in the survey. Other variables are assigned using the information that regard the agents already created, making use of normal distribution for the income.

Therefore, we first calculate the percentage of elders who need assistance by gender and level of assistance required. Then we ask 125 patches with color green, so that they have no agents on them, to create one blue agent each, who will be automatically located on that patch (this is done using the command **sprout**).

We assign to the agents just created the level of assistance needed following the same proportion of the first elders created, but, since most of the elders who did not accept to participate to the survey were probably the ones who need more assistance, we add a 10% to the percentage of elders with severe limitations, subtracting it those who need only 1 hour of assistance per day.

Finally, we calculate the mean and the standard deviation (in Netlogo the command **random-normal** requires the standard deviation instead of the variance) of the income of the elders of the sample who live alone, dividing them by gender. This is the code for assigning the income (in the code is **yeq**) to female elders:

```
let mean_yeq_women_alone
  (mean [income] of agents with [alone = 1 and gender = 0])

let dev_yeq_women_alone
  (standard-deviation [income] of agents with [alone = 1 and gender = 0])

ask agents with [color = blue and gender = 0] [set income
  (random-normal (mean_yeq_women_alone) (dev_yeq_women_alone))]
```

Since assuming that all the new elders created have no relatives in the all Municipality would be a clearly unrealistic assumption, we link the 60% of them to a random family in which all members are aged less than 65, which are supposed to be the families created by their children. Also in this case, we exclude those families in which there is a young disable person assigning the dummy variable **younger_families** to all the other families.

As we want to use the links of Netlogo for matching demand and supply of assistance, we prefer not to abuse of this instrument and to use, instead, a variable called **family** that takes the same value for the elderly who lives alone and the linked family.

The code, reported below, starts with a cycle that repeats the command written inside the parentheses until the 60% of the new elders (the excluded are 45) have a

linked family. Every time that the cycle is run, we ask one random young family to ask one random elderly, between the new added, to set the value of the variable **family** as the value of the variable **pfamid** of the patch that is asking, where **pfamid** is the family's identification number. The same patch asks the agents located on it, the members of that family, to set the same value for the variable **family**, so that, at the end, both the elderly and all the members of the linked family have the same **family** value. In order to identify the linked families and to avoid to ask more than once the same family to run the code, before the end of the cycle we ask them to set **younger_families** equal 2.

```
while [(count agents with [color = blue and family = 0]) > 45]
[ask one-of patches with [younger_families = 1]
[ask one-of agents with [color = blue and family = 0]
[set family [pfamid] of myself]
ask agents-here [set family [pfamid] of myself]
set younger_families 2]]
```

Regarding the elders of the sample of ICESmo3, they are grouped in families, but it is not possible to know if they have other relatives in the Municipality. As for the ones added to the model, we want that also the 70% of the elders of the sample have a linked family, representing the younger relatives. So, we run the same code as the previous one with the only difference that we consider not only the elders of the sample who live alone, but all people of those families in which all the members are aged more than 64. In this way we allow also old couple to have a linked family.

As we want to exogenously simulate the public contributions for LTC, we also decide to remove the actual contributions received by elders. Since from the survey ICESmo3 we know exactly who are the elders who receive some public contributions and the annual amount, we just have to ask those agents to subtract their contributions from the equivalised household income, using the variable **coefficientin** order to equvalise the individual earnings.

At the end of the procedure **setup**, we create the residential and semi-residential homes, which are the other agents of our model. As for the elders added to the model, we ask green patches to create the homes using the command **sprout**, so that the homes are located on a patch that does not represent any families. In order to distinguish the public residential home from the private one, we use the dummy variable **public** that takes value 1 for the public home and value 0 for the private one. The variable **assistance**, on the other hand, takes value "high" for the residential homes and "low" for the semi-residential one. Here is reported the code for the creation of the public residential home:

```
ask one-of patches with [pcolor = 59]
[sprout-ResidentialHomes 1
[set public 1 set shape "house" set size 3
set color 77 set assistance "high"]]
```

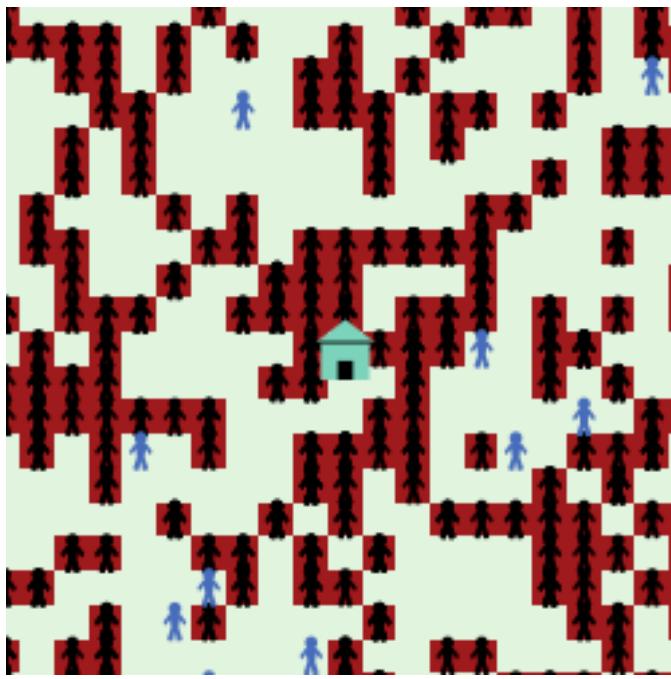


Figure 5.6: Part of the monitor at the end of the procedure **setup**.

We can see how the monitor looks like at the end of the procedure **setup** looking at figure 5.6. The blue agents are the elders added to the ones of the sample of ICESmo3 and the house is one of the (semi)residential homes.

The procedure **setup** is necessary but relatively slow and, in particular when it is necessary to run the model several times, we prefer to do it only the first time after having opened the model, and then use the procedure **restart**. Indeed, the latter procedure produces the same result as **setup**, but it is much faster.

At the end of the procedure **setup**, we export a file, that we called “setting”, with the extension **.csv** containing all the information of our model at this step. The procedure **restart** just imports that file, recreating the same setting. The code is quite simple:

```
export-world "setting.csv"
import-world "setting.csv"
```

5.4.2 Go and reset

The procedure **go** is the main procedure of our model. Firstly, we change the initial setting depending on which options the user chooses in the interface, briefly explained in section 5.4.3. Then, we calculate the hours of assistance needed and the potential supply; the elders express the demand of assistance and supply and demand are matched. Finally,

we update the interface in order to observe the results.

Codify the choices of the user

Before running the model, we have to modify the initial setting depending on the choices of the user in the interface.

First of all, we set the places offered by the residential home and the consumers' quota for the public (semi)residential homes, as they are set in the interface.

Then, we codify the generalized reduction of income. If the option is selected, we ask all agents to subtract from their income the percentage of reduction choosen in the interface. The code is:

```
if reduce_income [ask agents
[set income (income - (income / 100 * (how_much_%)))]]
```

The second option that can be selected by the user is the inclusion of the public contributions. In this case, we ask all agents who are eligible, so the ones aged more than 64 and 100% invalid, to adding to their income about 5,900 Euros. In fact, in 2012 the *indennità di accompagnamento* was 492,97 Euros per month, but since agents in our model make decision on annual basis, we multiply that amount for twelve months. Again, since the income is the equivalised household income, we multiply this amount by the coefficient of the OCSE scale.

The most complicated option is the one regarding the female employment rate. We set three different levels of female employment rate: the actual one, which is around 73%, a medium one equal to 55%, which is the Italian one, and a low one at 40%, that corresponds to the one of South Italy. In the case the user leaves the female employment rate at the actual level, we do not change anything. On the other hand, when we want to simulate the medium (55%) female employment rate, as well as the low one, we have first of all to calculate the mean and the standard deviation of the hourly wage of women, in our sample, who are already working, for each educational level. For simplicity, we calculate these values in Stata and write them in Netlogo. We report the code in order to show the values (in Euros):

```
let mean_educ_1_wage (14.15)      let dev_educ_1_wage (14.9)
let mean_educ_2_wage (18.20)      let dev_educ_2_wage (15.04)
let mean_educ_3_wage (23.24)      let dev_educ_3_wage (28.33)
let mean_educ_4_wage (28.99)      let dev_educ_4_wage (31.94)
```

Then, we ask all agents to set the dummy variable `noworkequal` to 0 if they work. At this point, if the option "medium" female employment rate is selected, we ask some of the women who work to exit the labor force, in order to obtain only 55% of working women. So, we ask them to set the dummy variable `exit_laborforce` equal to 1, so that we can

identify them, the variable `weeklyhour` equal to 0, which are the weekly hours spent on working, and we assign them, using the normal distribution, the wage based on their educational level. We finally subtract the wage received in one year (hourly wage * 40 weekly hours * 51 weeks) to the equivalised household income of all the members of the family, multiplying it by the OCSE coefficient. The code is reported below.

```
if lfp = "full" [
ask n-of (number) agents with [gender = 0 and nowork = 0 and age > 18 and age < 65]
[set exit_laborforce 1 set nowork 1 set weeklyhour 0
 if educ4 = 1 [set wage (random-normal (mean_educ_1_wage) (dev_educ_1_wage))]
 if educ4 = 2 [set wage (random-normal (mean_educ_2_wage) (dev_educ_2_wage))]
 if educ4 = 3 [set wage (random-normal (mean_educ_3_wage) (dev_educ_3_wage))]
 if educ4 = 4 [set wage (random-normal (mean_educ_4_wage) (dev_educ_4_wage))]
 set income (income - (wage * 40 * 51 * coefficient))
 ask agents-here [set income [income] of myself ]]]
```

If the option “low” female employment rate is selected, the only differences in the code are that we ask more women to stop working, so that the ones who work are, finally, the 40%.

Finally, in order to keep trace of the choices made in the interface, which is useful when we want to compare the results of different settings, we write them in the output window. In order to do so, we use the command `output-type`, which allows to write different words on the same line, putting the words that we want to write between inverted commas and following the choices made. Here an example of what we write regarding the employment rate:

```
output-type ". Women employment rate: "
if lfp = "full" [output-type "full"]
if lfp = "actual" [output-type "actual"]
if lfp = "low" [output-type "low"]
```

Potential supply of assistance

The potential supply of assistance, in our model, is obtained as the sum of the hours of assistance offered by the (semi)residential homes, the ones offered by private domestic assistants and the hours that the relatives of the elders do not spend doing other activities.

As we already said, we assume the market of domestic assistance to be in equilibrium, so that there is no shortage of *badanti*. Since the model does not focus on the market of private domestic assistance, we assume that every family who wants to employ a *badante* can find one. Therefore, we do not calculate the potential supply of private domestic assistance as it is assumed to be potentially infinite.

Regarding the supply of (semi)residential homes, we ask each of them to set the variable `places` equal to the number of places set in the interface by the user and the variable `supply` as number of places available multiplied by the daily hours offered, which are 24 for the residential homes and 5 for the semi-residential one. We report the simple code of the public residential home:

```

ask one-of ResidentialHomes with [assistance = "high" and public = 1]
[set places (places_ResidentialHome24) set supply (places * 24)]

```

Finally, for the potential supply of informal care offered by relatives, we calculate how many hours they have left in one day (`hours_available`) after having subtracted the daily hours of work, the hours spent caring the eventual children (`m11`) and the ones spent doing housework (`m41`), all information collected by the survey. Moreover, as it is possible to see in the code reported below, we subtract 8 hours for sleeping and 2 hours for eating per day. Note that we avoid to ask those people that need assistance themselves, both the young and the old ones.

```

ask agents with [oldassisted = 0 and youngassisted = 0]
[set hours_available (24 - ((weeklyhour + m11 + m41 + 56 + 14) / 7))]

```

Expressing the demand of assistance

Now that we know how many hours of assistance the elders need, having set the level of assistance required in the setup, we have to express their demand of assistance.

We start with the ones who require an high level of assistance. First of all, we set three variables that tells us if they can afford the services aimed at them, which are the public and private residential homes that offer 24 hours of assistance and the private domestic assistants. So, we ask these elders to set the variable `PHome_notaffordable` equal 1 if the cost of the private residential home, which is about 45,000 Euros, is greater than their income. We do the same for the public residential home (variable `Home_notaffordable`), that costs about 18,000 Euros, and for private domestic assistants (variable `Nurse_notaffordable`), whose cost is 12,600 Euros.

Having assumed that elders would prefer, if it is possible, to keep living in their own home assisted by one of their relatives, at first they their families to assist them. Of course, this is possible only for the elders who do not live alone. When they ask their cohabitant relatives, they first verify if there is someone between their relatives who can assist them, which means, in our model, someone who is aged between 18 and 80, does not need assistance himself and does not work. The last criterion is due to the fact that these elders need 24 hours of assistance per day, so the assisting person should be always present at home. Even if there is someone with these characteristics, nothing says that he will accept to assist the elderly. So, we ask a random relative if he wants to take care of the fragile old person and the request is accepted in the 80% of the cases if she is a woman and or in the 70% of the cases if he is a man. This difference reflects the fact that women spend, on average, more hours than men in the unpaid care work. When they accept to take care of the elderly, they create an undirected link called `FamilyCare-link` between them. In addition, the elderly who found a relative who is willing to assist him set the dummy variable `my_FamilyCare` equal 1, whereas the dummy variable `familyassisting` is assigned to that relative. The code is:

```

ask agents with [oldassisted = 1 and alone = 0]
[if any? agents-here with [oldassisted = 0 and age < 80 and age > 18

```

```

and nowork = 1 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 and age < 80 and age > 18
    and nowork = 1 and familyassisting = 0] [let a random-float 1
    if gender = 0 and a < 0.8 [create-FamilyCare-link-with myself
        set familyassisting 1 ask link-neighbors [set my_FamilyCare 1]]
    if gender = 1 and a < 0.7 [create-FamilyCare-link-with myself
        set familyassisting 1 ask link-neighbors [set my_FamilyCare 1]]]]]

```

If the elders live alone or they have not found assistance from their cohabitant relatives, they try with their linked families. Again, since not all the elders have a linked family, we exclude from the process, through the variable `family`, those elders who have not other relatives in the Municipality. The criterions of eligibility are the same as before, but the probabilities that the relative accepts to take care of them is much lower: women accept with a probability of 20% and men in the 10% of the cases. We decide to lower the probabilities since it seems reasonable to us that a younger family, in which there can also be children, is less willing to take care of an elderly for 24 hours per day. As The code, very similar to the previous one, is reported below. Note that we avoid the criterion of being aged less than 80 since in the linked families none is above 64 years old and we substitute the variable `my_FamilyCare` with `out_FamilyCare`.

```

ask agents with [oldassisted = 1 and my_FamilyCare = 0 and family != 0]
[ask one-of other agents with [family = [family] of myself and
famid != [famid] of myself]
[if any? agents-here with [oldassisted = 0 and nowork = 1
and age > 18 and familyassisting = 0] [ask one-of agents-here with
[oldassisted = 0 and nowork = 1 and age > 18 and familyassisting = 0]
[let b random-float 1
if gender = 0 and b < 0.2 [create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 1] set familyassisting 1
ask link-neighbors [set out_FamilyCare 1]]
if gender = 1 and b < 0.1 [create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 1] set familyassisting 1
ask link-neighbors [set out_FamilyCare 1]]]]]

```

At this point, we have some elders with an high level of assistance required assisted by a relative, who can live with them or being a member of the linked family. The elders who have not yet found assistance, because their relatives could not or would not assist them or because they have not even asked, since they are alone, now apply for a residential home or employ a domestic assistant. In particular, if they can afford a private residential home (remember that in that case the variable `PHome_notaffordable` takes value 0), they apply for it, setting the variable `PHome_request` equal 24, which are the hours of assistance needed. In the same way, if they cannot afford the private one but they have enough money to pay the public residential home, they apply for it setting the variable `Home_request` equal 24. Finally, if their income is greater than 12,600 Euros, they employ a private domestic assistant setting the variable `InHouseNurse` equal to 24.

In this case, they directly employ a *badante* as we assume there is no shortage of domestic assistants.

Some elders, however, cannot even afford to pay a domestic assistant. If they have a linked family, which refused to assist them, they ask a member of the linked family if the family can help him to pay a formal LTC service. Therefore, we put together the income of the elderly who needs assistance and the one of the linked family in the variable `income_withold` and, for each formal kind of assistance, starting with the most expensive, we compare the cost of the service and the total income. If the cost of the service is lower than the 20% of the total income, because we have to consider that part of that income is necessary for the other members of the family, the linked family is willing to pay the service and the elderly applies for it. As it will be clear later, those elders who apply for a residential home, even if they will not be admitted, will be certainly assisted in another way, and in particular by domestic assistants, as they can for sure afford them. On the other hand, the elders who do not apply for any services will not necessarily be unassisted, since they have one last chance. The code of this mechanism is:

```
ask agents with
[oldassisted = 1 and my_FamilyCare = 0 and out_FamilyCare = 0]
[ifelse PHome_notaffordable = 0 [set PHome_request 24]
[ifelse Home_notaffordable = 0 [set Home_request 24]
[ifelse Nurse_notaffordable = 0 [set InHouseNurse 24]
[if family != 0 [ask one-of other agents
with [family = [family] of myself and famid != [famid] of myself]
[set income_withold (income + [income] of myself)
ifelse 45167 < (income_withold / 100 * 20)
[ask myself [set PHome_request 24]]
[ifelse 18067 < (income_withold / 100 * 20)
[ask myself [set Home_request 24]]
[if 12600 < (income_withold / 100 * 20)
[ask myself [set InHouseNurse 24]]]]]]]]]
```

The process is then repeated for the elders with a medium level of assistance needed and for the ones who need 1 hour of assistance per day, with a very similar code that we avoid to report here, as it is possible to read the entire code in the appendix. Nevertheless, we spend some words to outline the small differences between these processes.

Regarding the elders with a medium level of assistance needed, their relatives are eligible for assisting the elderly if they are aged more than 18 and do not need assistance themselves, as in the previous case, but now we substitute the criterion of being unemployed with the one of having at least 5 hours available, which are the hours of assistance required. This is valid both for the cohabitant relatives and for the members of the linked family. Moreover, the only service aimed at this group of elders is the semi-residential home, so that they apply for it, setting `Home_request` equal to 5, if their income is greater than about 10,500 Euros. If they have more than about 8,500 Euros, they employ a private domestic assistant, in the opposite case they ask their linked family

to pay for them the semi-residential home or the *badante*, following the same procedure illustrated above.

The elders with a low level of assistance required are more likely to find assistance, even if the only formal LTC assistance is represented by the *badanti*. Indeed, they can be assisted by the relatives who are more than 18 years old, who has at least one hour available and that does not require assistance themselves or require just one hour of assistance per day. Broadening the criterions allows to have a couple of old people in which they both require assistance, but in which they are able to take care of each other. The other difference is that even if they can afford private domestic assistants, they do not necessarily employ them. In fact, since their need of assistance is so low that they can live alone, although with some difficulties, we assume that they employ a domestic assistant only if they are in the two highest deciles of income, so if the variable `decileyeq` takes a value greater than 8. Following the same reasoning, the linked family will pay for a *badante* only if the cost represents less than the 8% of the total income. This last part of the code is:

```
ask agents with
[oldassisted = 3 and my_FamilyCare = 0 and out_FamilyCare = 0]
[ifelse [decileyeq] of patch-here > 8 [set InHouseNurse 1]
[ask one-of other agents with
[family = [family] of myself and famid != [famid] of myself]
[set income_withhold (income + [income] of myself)
if 3560 < (income_withhold / 100 * 8)
[ask myself [set InHouseNurse 1]]]]]
```

Matching supply and demand

Summing up, at this point we have those elders assisted by one of their cohabitant relatives, some others are assisted by a member of the linked family, still others have employed a domestic assistant. The remaining part of the elders in need of assistance is divided between those who have applied for a (semi)residential home and those who have not.

We start explaining how the elders who applied for a LTC service are selected and then we will describe the last step of the process.

The private residential home accepts the elders who have applied for it starting from the richest one and stopping when all the places available are assigned. In order to do this, we start a cycle that keeps running until there are both places available and elders who have applied and have not yet been admitted. Every time the cycle runs, we ask the private residential home to ask the richest elderly applying for this service to create a link called `assistance-link` with the residential home. Then, the residential home subtracts a place from the places available and the elderly set the variable `Home_found` equal to 2. Finally, those elders who have applied for the residential home and have not been admitted, directly apply for the public residential home, that they can afford as it

is less expensive than the private one.

For the public residential home the process is similar, but it begins from the poorest elderly, which is identified with the command `min-one-of agentset [income]`, and gives the priority to those elders who have no relatives in the Municipality. When an elderly is admitted, he sets the variable `Home_found` equal to 1, instead of taking value 2 as in the case of the private residential home. Again, since people who can afford a public residential home can also afford a domestic assistant, they directly employ a *badante* if not admitted.

The code, very similar to the one written for the private home, but a little more complicated, is reported below.

```

while [any? ResidentialHomes with
[assistance = "high" and public = 1 and places > 0]
and any? agents with [Home_request = 24 and Home_found = 0]]
[ask ResidentialHomes with [assistance = "high" and public = 1]
[ifelse any? agents with
[Home_request = 24 and Home_found = 0 and alone = 1 and family = 0]
[ask min-one-of agents with [Home_request = 24 and Home_found = 0] [income]
[create-assistance-link-with myself move-to myself
set Home_found 1] set places (places - 1)]
[ask min-one-of agents with [Home_request = 24 and Home_found = 0] [income]
[create-assistance-link-with myself move-to myself
set Home_found 1] set places (places - 1)]]
ask agents with [Home_request = 24 and Home_found = 0]
[set InHouseNurse 24]
```

Regarding the semi-residential home the process is exactly the same as the one reported above, so we avoid to explain it again. At the end of the process we assign the variable `unassisted` with value 1 to those elders who have not found yet any kind of assistance, either from relatives or services or domestic assistants. In particular, they are those who have not found any relatives willing to assist them and have not enough money to pay for LTC services or *badanti*, as well as their linked family to pay for them.

As we have seen, when elders express their demand at first, they ask their relatives to assist them and the relatives accept if they both can and want to do it. However, it seems reasonable to us to assume that, if at the end of the process some elders are still unassisted and some relatives have enough hours available to assist them, they are forced to take care of the elders in need of assistance, rather than leave them in a difficult situation. Therefore, we repeat the code that we use when elders ask their families for the first time, removing the probability of being accepted. Indeed, if their relatives satisfy the requirements, which means that they can assist them, they do it whether they are willing to or not. If the elderly finds a cohabitant relative who takes care of him, he sets the variable `my_FamilyCare` equal 2, so that it is possible to identify which families accept the task at the first request and those who are forced to accept it because they have no

alternative. Of course, keeping these situations separated has policy implications: the first request is not considered in the demand of assistance (it is potential or unexpressed demand) since the elders may have the economic capability of paying services and they just prefer not to do it, whereas in the second case they express their needs in the market, but they have not enough money to support their demand, so that they cannot satisfy their needs in the market. We report the code only for the elders who need a high level of assistance. When the elderly asks his own family, the code is:

```
ask agents with [oldassisted = 1 and alone = 0 and unassisted = 1]
[if any? agents-here with [oldassisted = 0 and age < 80 and
age > 18 and nowork = 1 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 and age < 80 and
age > 18 and nowork = 1 and familyassisting = 0]
[create-FamilyCare-link-with myself set familyassisting 1
ask link-neighbors [set my_FamilyCare 2]]]
```

The code is similar for asking the linked family to take care of them and it is reported below. Note that again there will be more women than men assisting elders, as we ask to the agent with the minimum value of the variable `gender`, which takes value 0 for women and 1 for men, to accept the task.

```
ask agents with [oldassisted = 1 and my_FamilyCare = 0
and unassisted = 1 and family != 0]
[ask one-of agents-on one-of patches with [pfamid = [family] of myself]
[if any? agents-here with [nowork = 1 and age > 18 and familyassisting = 0]
[ask min-n-of 1 agents-here with
[nowork = 1 and age > 18 and familyassisting = 0] [gender]
[create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 1]
set familyassisting 1 ask link-neighbors [set out_FamilyCare 2]]]]]
```

5.4.3 Pre-established experiments

As we have said in the previous chapter, in particular in the subsection 5.3.3, it is possible to run some pre-established experiments. If we want to study the model, in fact, not only we have to run the model many times with the same setting in order to reduce the variability and obtain significant results, but also we may want to change the options selected at the beginning and observe how these changes affect the results of the model. Therefore, we make the model doing these operations automatically, and we observe the final results, which are already the average results of each particular setting.

We just describe the code of one experiment, as they are all quite simple to set and very similar between each other. We choose to describe the experiment in which the places offered by the public residential home are set at the actual level and we change the consumers' quota for the elders who need a high level of assistance.

First of all, we create a procedure, called `go_exp`, which is very similar to the the procedure `go` described above, but includes only those procedures that regard the elders who need a high level of assistance. However, before the other procedures, we want to set the consumers' quota so that they directly decrease without any further intervention. So, we set a variable called `t` that counts the times that the code has been run. As it is possible to see in the code reported below, if the variable `t` is lower or equal to the number of times we want to run the code with the same setting (`times_exp`) multiplied by a number (one for the first quota set, two for the second one and so on) we set the consumers' quota at 100%. If we want to obtain the average result from 30 experiments with the same initial setting, what we are asking with this code is to set the quota at 100 for the first 30 times, then decrease the quota at 90 for the following 30 times, and so on until quota zero.

```
ifelse t <= (times_exp * 1) [set quota_consumers% 100]
[ifelse t <= (times_exp * 2) [set quota_consumers% 90]
...
[ifelse t <= (times_exp * 10) [set quota_consumers% 10]
[if t <= (times_exp * 11) [set quota_consumers% 0]]]]]]]]]]]
```

After every 30 times that the code is run, we calculate the average result for each variable of interest and display it in the command center, through the command `output-type`. Then we update the plots in the interface, showing only the results that regard the elders who need a high level of assistance. Clearly, we have to make the code running until the end of the experiment, so until the quota set is zero. Therefore, we create a procedure called `go_experiment`, which is the one that we see in the interface, that simply repeat the procedures `go_exp` and `reset` for each level of consumers' quota, so 11, multiplied by the times we want to run the experiment.

Chapter 6

Simulations and results

6.1 Introduction

Among all the possibilities offered by the model, we decide to study mainly two aspects of the elderly-care: the impact of different levels of public supply of long-term care services on the elders who need a high and medium level of assistance required and the impact of changes of the female employment rate on all the elders who need assistance.

In this chapter, therefore, we describe the simulations systematically run and the results obtained. Remember that some variables are set randomly or partially randomly in the code: we link some of the family of elders, chosen randomly, with a random young family, we assign the income of the elders created out of the dataset using a normal distribution and the relatives accept to take care of elders following different percentages. So, every time we run the model we obtain slightly different results that depend on these random choices. In order to obtain significant results, we decide to run the model 30 times and to calculate the average result for each variable.

We start showing the results obtained by setting all the values at their actual levels, in section 6.2, in order to give an idea of the results of the model without experimenting different settings.

Section 6.3 is dedicated to the simulations of different public policies regarding the (semi)residential homes. In particular, in subsection 6.3.1, we change the places offered by the public residential home keeping the same price, whereas in subsection 6.3.2, we keep the places offered at the actual level changing the price paid by consumers. In subsection 6.3.3 we run the model changing both places and consumers' quota of the residential home, so that to obtain all the combinations between places offered and prices. Finally, in the subsection 6.3.4 we run the same experiments on the daily center, so considering only the elders who need a medium level of assistance.

We then study the effects of three different levels of female unemployment rate consid-

ering all the elders who need assistance, dividing them by the level of assistance required. The results of this simulations are reported in section 6.4.

Finally, we conclude summing up the results that we obtained in section 6.5.

The variables studied, for all the simulations, are the percentage of unassisted elders, the one of elders assisted by relatives and by private domestic assistants and the elders admitted into a (semi)residential home. Moreover, we observe the public expenditures and the private ones, sometimes divided between those necessary to employ domestic assistants and those paid for the (semi)residential homes.

6.2 Setting the actual situation

First of all, we want to show the results given by the model setting all the variables at the actual levels. Therefore, we set the places of the public residential home at 25, the ones of the semi-residential home at 5 as well as the places offered by the private residential home. The consumers' quota for the residential and semi-residential homes are, respectively, the 40% and the 58% of their total cost. We keep the female employment rate as well as the income at the actual level and include cash transfers. In Netlogo, the setting is:



We run the model 30 times and calculate the average result for each variable of interest. The results of the only first 6 simulations, for reasons of clarity, are illustrated in the figures 6.1 and 6.2, which also give an idea of the variability of the model.

On average, between the elders who need some level of assistance, which in our model are 528, around the 33% is assisted by relatives. At a first look , the number of elders assisted by relatives could seem very high, but it is important to keep in mind that we also include the elders who need only one hour of assistance per day, which are likely to be assisted by relatives.

We observe that both the public residential homes and the daily center have assigned all the places available, so that 30 elders are assisted in one of the public (semi)residential homes. The private one, on the other hand, accommodates only 4 elders and so it has one place available which is not assigned as anyone else can afford it.

More than half of the elders (57%) employ a domestic assistant and the unassisted ones are only the 4% of the total elders in need of assistance. We will see in the next sections that the percentage of unassisted elders considerably increases if we consider only the elders with a high level of assistance required, as their assistance is either more

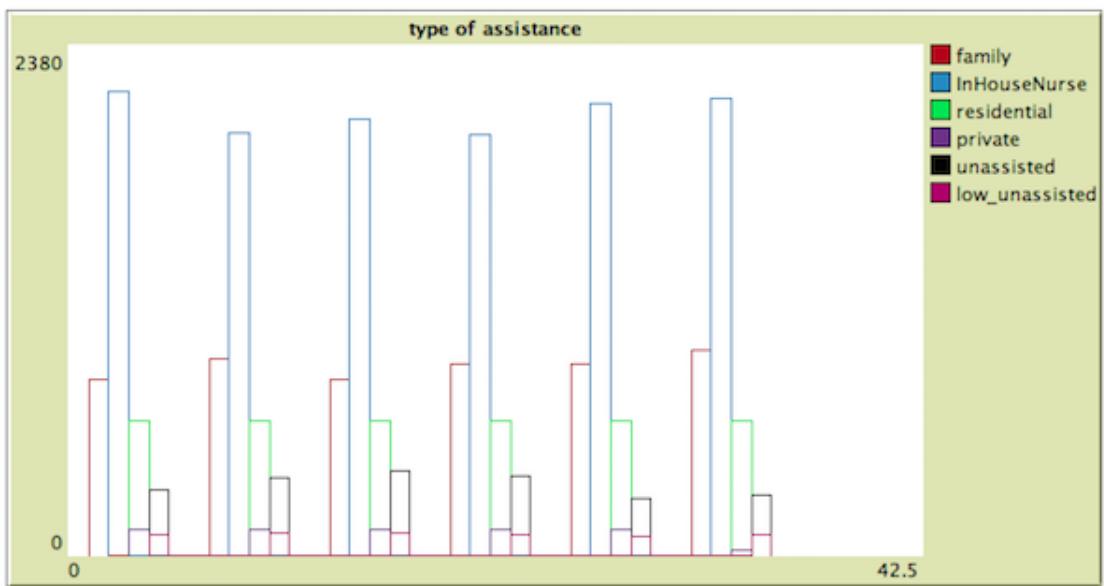


Figure 6.1: Results for type of assistance for six simulations run.

expensive or more time consuming.

Considering the expenditures, we can see in 6.2 that the private ones always exceed the public expenditures. In particular, consumers spend about 1800 thousands of Euros for the domestic assistants and about 630 thousands for the (semi)residential home, for an average total expenditure of 2432 thousands of Euros. The public expenditure results to be, in my model, about 1790 thousands of Euros.

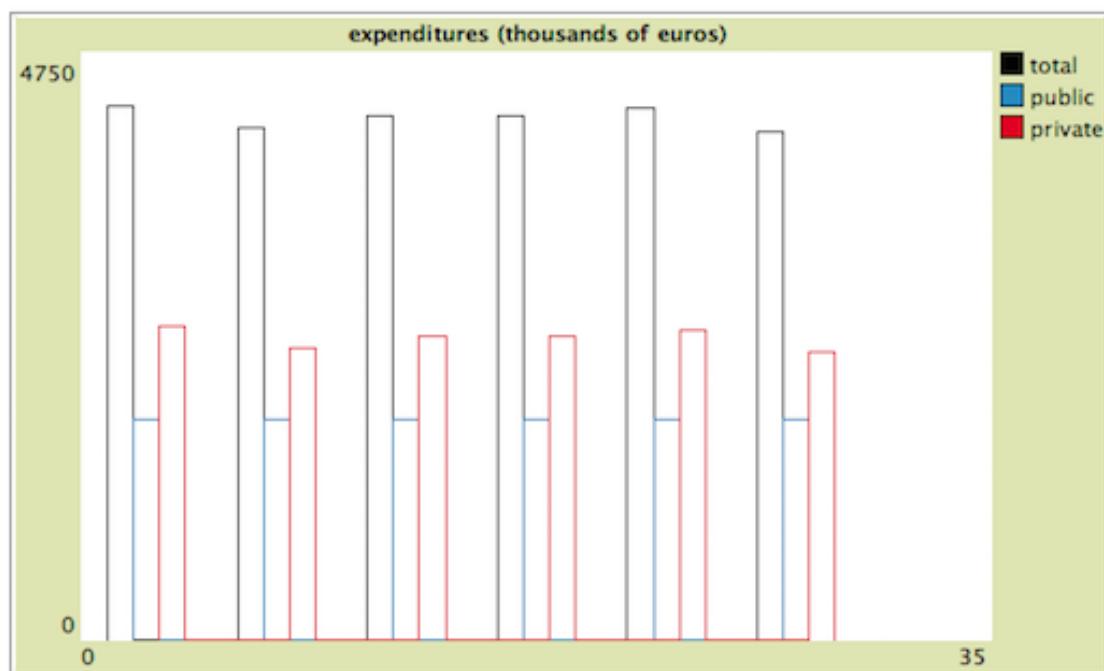


Figure 6.2: Results for the LTC expenditures for six simulations run.

6.3 Simulate different public policies

6.3.1 Changing the places available of the residential home

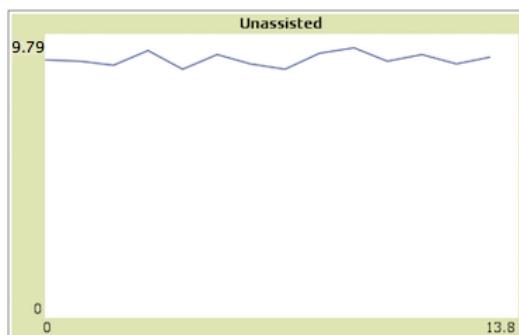
We start with changing the places offered by the public residential home for the elders who need a high level of assistance. Since we want to isolate the effect of changes of places as much as possible, we set the places offered by the private residential home at zero and we do not include the cash transfers. We keep the remaining part of the initial setting as in the actual situation, so we set the quota paid by consumers at 40%, the female employment rate at the actual level and we do not reduce the income.

As this is one of the pre-established experiment, we can select which experiment we want to run, so we choose "places" for `Experiment_n` and set the times that we want to run the code (`times_exp`) at 30. Then, we run the experiment pushing the button `experiment`.

In the code we set the initial places offered by the public residential home at 0, so without public services. Then, after the code has been run 30 times, we observe in the command center the average results and, automatically, the places are increased to 5 and the code is run other 30 times. This sequence goes on increasing the places offered by 10 until 125 places are offered, so that to have one place for each elders who can, potentially, apply for it. At the end, we can read the average results in Netlogo and in Excel. In Netlogo we can observe the numeric results in the command center and look at the graphs, which regard now only the elders with a high level of assistance needed. In Excel we can import the file saved with the extension `.csv` and analyze the results.

Let us now consider the results of this experiment.

First of all, let us consider the effect of an increase of the places offered by the public residential home on the unassisted elders. From the graph below, we clearly see that there is basically no effect on the number of unassisted people: the percentage oscillates between 8 and 9% for each level of capacity.



It is worth to point out that an increase in the public supply of services, with a consequent increase in public expenditures, do not improve the situation of those elders who cannot find any kind of assistance, which is, anyway, perfectly explainable in our model. In fact, the unassisted elders are those who are not assisted by relatives and cannot afford

neither the residential home nor the private domestic assistants. Remember that, at the actual level of consumers' quota, those who apply for the residential home but are not admitted because of a shortage of places, can surely afford a *badante*, as it is a cheaper option. Therefore, increasing the number of places without decreasing the price do not allow more people to find assistance and the number of unassisted remains the same.

Also the number of elders assisted by their relatives do not change, as when they first ask their own family or the linked family they always have between the 10% and the 20% of probability to be accepted and, if they ask them again at the end of the process, it is because both the elders and their families could not afford any formal services. Therefore, the number of assisted by relatives is, in part, independent from the public supply of services and, in part, a direct consequence of not being able to pay for the services, condition that does not change increasing the places offered.

On the other hand, an increase of places offered clearly increases the number of elders assisted in the residential home. In fact, those elders who apply for it and, when there are few places available, are not admitted, are likely to be admitted when places double or triple. The residential home is then full until the places offered are 65, whereas, after this level, there are not more than 70 people who apply for it. This is due to the fact that no more than 70 people, considering also their families, can afford the residential home, which implies that it makes no sense offering more than 70 places with the actual price.

Nevertheless, those who initially are not admitted in the residential home and some of those cannot afford it, can still employ a private domestic assistants. Consequently, we observe that the percentage of elders assisted by the *badanti* decreases as the places offered increase and it stabilizes between 15% and 16% of the elders who need a high level of assistance when the places offered are more than 65.

In figure 6.3 we can see how elders are divided between the type of assistance found, for each level of places offered. The black bars represent the unassisted elders and the red ones the assisted by relatives, which are always at the same level. Looking at the green bars, representing the number of elders in the residential homes, we clearly see a gradual increase until about 70 people, when the places offered are more than 65, and then it stabilizes. On the contrary, the percentage of elders who employ a domestic assistant, represented by the blue bars, constantly decreases until the number of people in the residential home are more or less 70 and then it stabilizes at 15-16%.

Considering the effect of an increase of places on the expenditures, we see in figure 6.4 that the public expenditures, the blue bars, are zero when there are no places offered and considerably increase as more elders are assisted in the residential home until about 1850 thousands of euros. The private expenditures, represented by the red bars, slightly increase as the assisted by private domestic assistants decrease entering into the

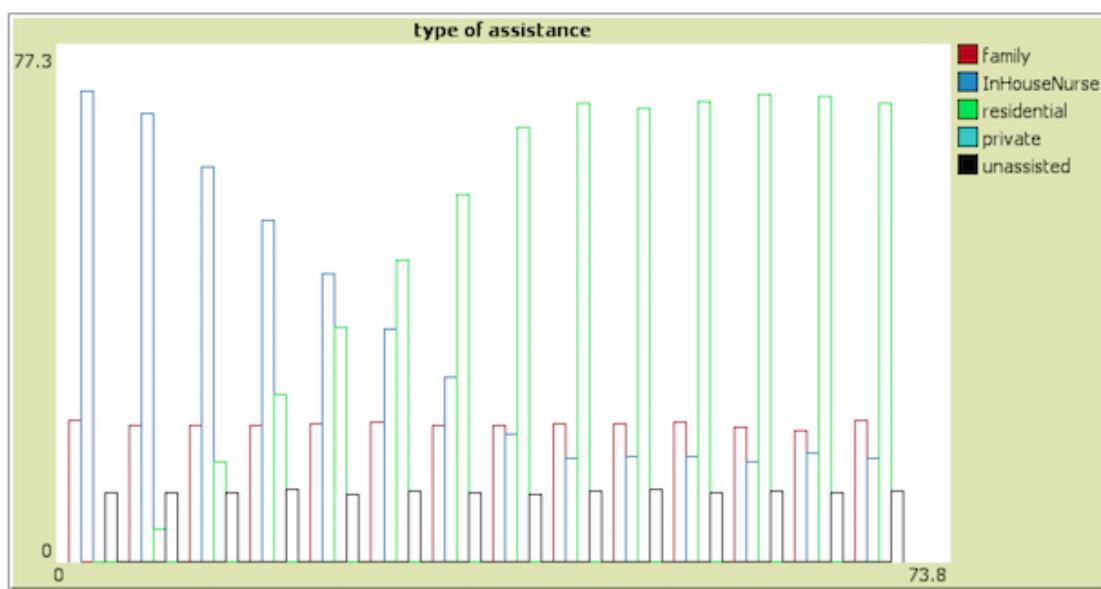


Figure 6.3: Elders who need 24 hours of assistance by type of assistance found, as the places of residential home increase.

residential home, which costs more if the consumers' quota is fixed at the 40% of the total cost. As a consequence, the total expenditures increase mainly due to the higher public expenditures, and, for a small part, to the slightly increase of the private expenses.

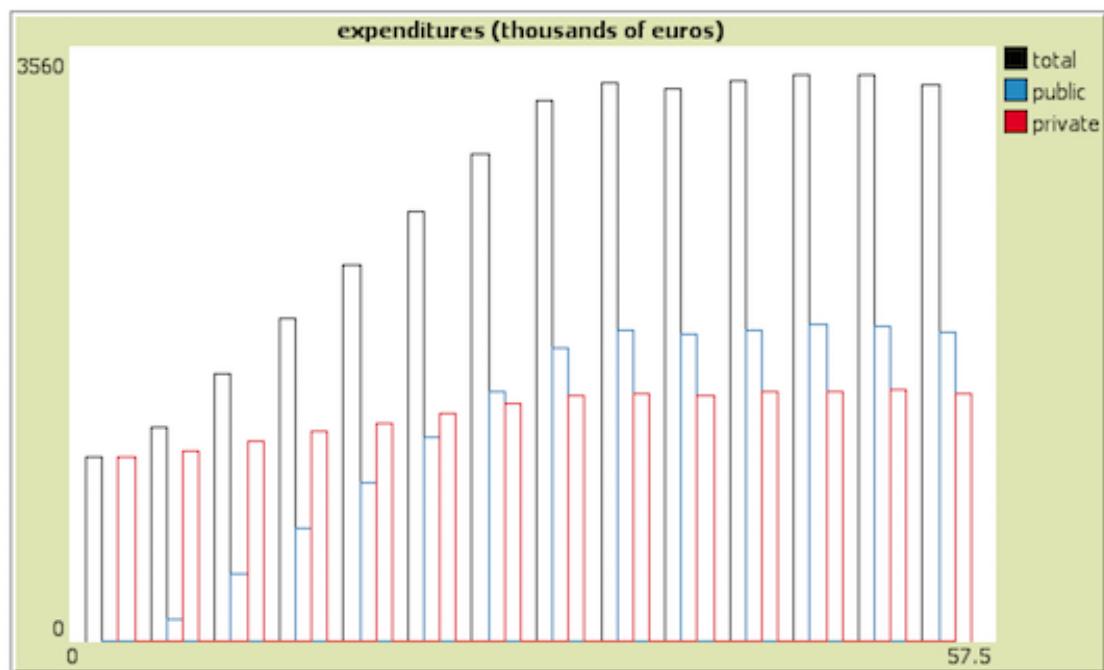


Figure 6.4: Private, public and total expenditures as the places of residential home increase.

6.3.2 Changing the consumers' quota of the residential home

We now run a similar experiment keeping the places offered at the actual level, so 25 places, and changing the consumers' quota starting from 100% and decreasing it by ten until 0%. As in the previous experiment, we set the places offered by the private residential home at zero and we do not include the cash transfers; the female employment rate is fixed at the actual level and we do not reduce the income.

Then, we choose 1 for `Experiment_n` and set the times that we want to run the code (`times_exp`) at 30. Finally, we run the experiment pushing the button `experiment`. For the first 30 times, the consumers' quota is fixed at 100% while places are 25 and we can observe in the command center the average results of this combination of quota and places. After that, the quota is fixed at 90% and the code is run other 30 times and the process goes on until the residential home is completely free for the consumers quota 0).

Again, we start considering what happens at the unassisted elders who need a high level of assistance. Looking at the graph reported below, we see that decreasing the consumers' quota, keeping the places available at 25, does not change the number of unassisted until quota 30, whereas, below that price, the percentage of unassisted elders considerably decreases until zero, when the residential home is completely free. In fact, as the price of the residential home decreases more elders can afford it, but, until the price of the residential home is higher than the cost of employing a domestic assistants, those who cannot afford a domestic assistants are not able to pay for the residential home and they are precisely the 8-9% of the elders represented in the left part of the graph. When the quota is set at 30%, the price of the residential home is slightly higher than the one of domestic assistants and quotas 20, 10 and clearly 0 correspond to a lower price. Therefore, when the consumers' quota is below the 30%, the elders that before could not afford neither the private domestic assistant nor the residential home, can now apply for the public service and are likely to be admitted as the residential home gives the priority, after the elders without relatives, to the ones with the lower income. Consequently, after quota 30, the percentage of unassisted elders decreases until none is left unassisted, as we see in the right part of the graph.



As we pointed out describing the previous experiment, the number of elders assisted by relatives is partially independent from these kinds of public policies and partially

consequence of the number of unassisted. So, in this case, the number of assisted by relatives slightly decreases as the percentage of unassisted elders decreases, after quota 30. In particular, the amount of families who are willing to take care of elders independently from their possibility of paying for a formal service are always between 18% and 19%, whereas the families who are forced to assist the elders at the end of the process, if they have not found any kind of assistance, are reduced from 2% to 0. Clearly the reason is that, if the relatives have not accepted to take of elders at the beginning, more and more elders can apply for the residential home as the price lowers, so that they do not ask their relatives again at the end of the process.

Looking at the assisted in the residential home, we see that we keep the number of places offered at 25, but, when the price is too high, the residential home is not full. In particular, the elders assisted in the residential home are only 5 when the consumers' quota is 100% and increases until 25, so until the residential home cannot admit anyone else, at quota 60%. When the price is lower more elders can afford this service, but there are not enough places, so the number of elders assisted in the residential home is always 25. It is important to notice, however, that even if the number of elders in the residential home is always the same after quota 60, they are not always the same individuals. In fact, since the residential home gives priority to those with a lower income, as the quota decreases the elders who apply for the first time have a lower income than the ones who applied also when the quota was higher, and they take the places of the previous ones.

Keeping in mind this process, we can consider now the effect of decreasing the price of the residential home on the assisted by private domestic assistants. When the quota is fixed at 100%, the 66% of the elders who need a high level of assistance employ a *badante*. Then, this percentage increases as the elders in the residential home increase, so at quota 60 the 51% of elders are assisted by a private domestic assistant. The percentage of elders who employ a domestic assistant remains constant until quota 30, whereas, when the price of the residential home is lower than the cost of a *badante*, below quota 30, the percentage increases again. The reason is that those elders who have been unassisted until this moment can now afford the residential home and, as we explained above, they take the place of the elders who were previously accommodated in the residential home, which, in turn, employ a domestic assistants. In other words, below quota 30, there is a shift from unassisted to assisted in the residential home and from the residential home to private domestic assistants. When the residential home is completely free, the percentage of assisted by private domestic assistants is about 62%, so it is lower than the first observed at quota 100%. In fact, we have two opposite effects: the decrease of unassisted, through the mechanism just described, increases the number of elders assisted by domestic assistants, but the elders assisted in the residential home increase from 5 to 25 when the price is equal to, respectively, the 100% and 0% of the total cost, decreasing the number of elders who employ a *badante*. As the second one prevails, the percentage of elders assisted by domestic assistants is lower at quota 0 than the one observed at quota 100.

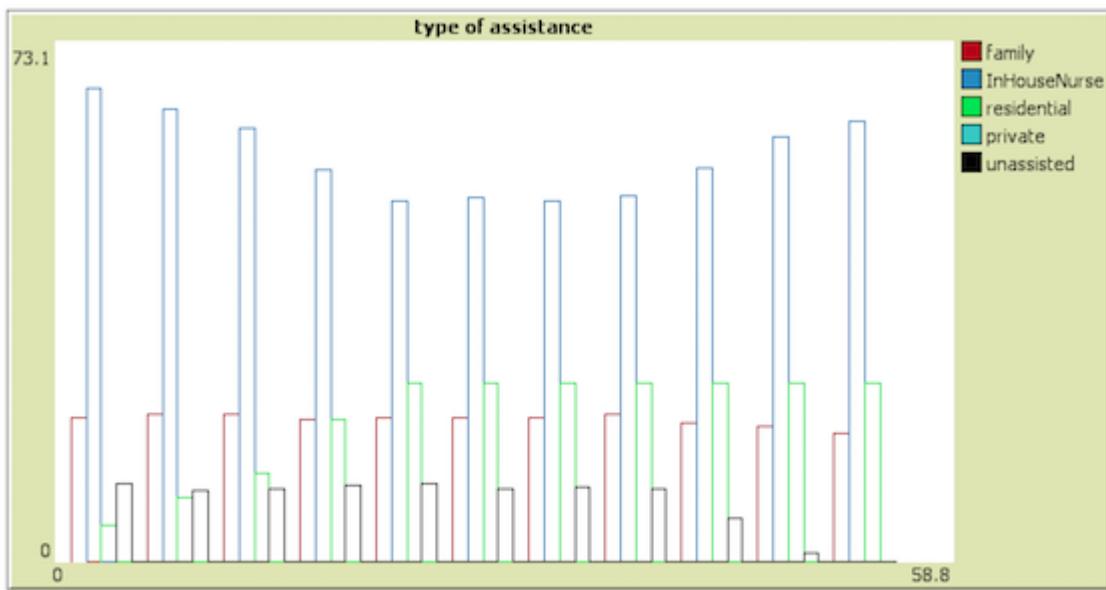


Figure 6.5: Elders who need 24 hours of assistance by type of assistance found, as the consumers' quota of the residential home decreases.

In figure 6.5 are represented the percentage of elders divided by the type of assistance found, for each level of consumers' quota. Note that the quota is 100% on the left of the graph and decrease until 0 in the right part of the graph. The black bars, representing the unassisted, as well as the red ones, which indicate the elders assisted by families, decrease only when we set quota 20, 10 and zero, on the right of the graph. The elders assisted in the residential home, represented by the green bars, increase until quota 60 and then stabilize at 25, which are exactly the places offered. The blue bars, finally, clearly describe the trend of the assisted by *badanti*, as they decrease until quota 60, then stabilize and start increasing again after quota 30.

Considering the expenditures for LTC services, we can see from figure 6.6 that the public expenditures increase both because the elders accommodated in the residential home increase (until 25) as the price decreases and also because the public quota increases from 0 to 100. The maximum amount is represented by the last blue bar on the right and it is about 1130 thousands of Euros. The private expenditures, on the other hand, increase until quota 70, as more elders pay for the residential home and less private domestic assistants, which represent a cheaper option, are employed. Then, they keep decreasing reflecting the lower price of the residential home until 975 thousands of euros. The black bars, finally, represent the total expenditures, which do not need any further explanation being the sum of the private and public expenses.

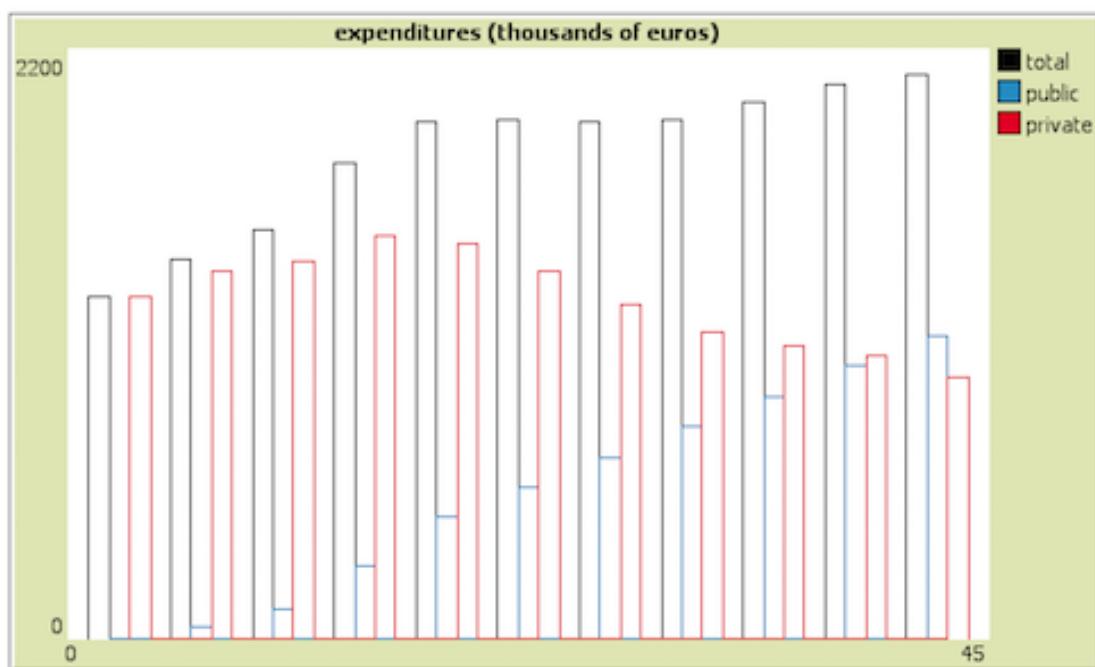


Figure 6.6: Private, public and total expenditures as the consumers' quota of the residential home decreases.

6.3.3 Changing both places and quotas of the residential home

After the two experiments described, we decide to run another experiment with all the combinations between places offered and prices of the residential home paid by consumers. Of course, it includes the previous two experiments, but we can now verify if the trends observed in the cases previously analyzed are replicated for each level of places offered and of consumers' quota and, especially, find the most efficient mix for specific targets of public policies.

First of all, we set the places offered by the private residential home at zero and we do not include the cash transfers; the female employment rate is fixed at the actual level and we do not reduce the income. Then, we set the times that we want to run the code (`times_exp`) at 30. Finally, we run the experiment pushing the button `table_high`. At the beginning, we set in the code the number of places offered by the residential home at 0 and the code is run 30 times for each level of consumers' quota, starting from 100% to 0%. Then, automatically, the places offered are increased to 5, then 15, 25 and so on until 125 and, for each of these level of places offered, the code is run 30 times for each price paid by consumers. Therefore, at the end of the experiment, we obtain the average results of the variables of interest for each combination set. Given the high number of combinations and variables, we decide not to illustrate the results using graphs, but we summarized them in the following table.

| Analyzed Variables | Quota (%) | Places Offered by the residential home | | | | | | | | | | | | | |
|---------------------|-----------|--|--------|--------|--------|--------|--------|--------|----------|--------|--------|--------|--------|--------|--------|
| | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | 105 | 115 | 125 |
| not assisted (%) | 100 | 9% | 8% | 9% | 9% | 9% | 9% | 9% | 9% | 9% | 8% | 8% | 9% | 8% | 9% |
| residential (v.a.) | | 0 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| private assist. (%) | | 71% | 68% | 67% | 66% | 67% | 67% | 67% | 65% | 67% | 68% | 67% | 67% | 66% | 66% |
| forced family (%) | | 1,7% | 2,1% | 1,7% | 1,8% | 1,7% | 1,6% | 2,0% | 2,0% | 1,7% | 1,7% | 2,3% | 1,7% | 1,9% | 1,8% |
| private exp. | | 1119,3 | 1263,9 | 1267,3 | 1282,6 | 1299,5 | 1262,0 | 1272,5 | 1240,9 | 1287,1 | 1296,0 | 1298,7 | 1279,6 | 1269,6 | 1270,4 |
| public exp. | | 0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| total exp. | | 1119,3 | 1263,9 | 1267,3 | 1282,6 | 1299,5 | 1262,0 | 1272,5 | 1240,9 | 1287,1 | 1296,0 | 1298,7 | 1279,6 | 1269,6 | 1270,4 |
| not assisted (%) | 90 | 9% | 9% | 9% | 9% | 9% | 8% | 9% | 9% | 9% | 9% | 9% | 9% | 9% | 9% |
| residential (v.a.) | | 0 | 5 | 8 | 8 | 9 | 9 | 9 | 8 | 9 | 9 | 9 | 9 | 9 | 9 |
| private assist. (%) | | 71% | 66% | 64% | 64% | 64% | 64% | 63% | 64% | 64% | 63% | 64% | 64% | 64% | 64% |
| forced family (%) | | 1,6% | 1,6% | 2,3% | 1,7% | 1,6% | 2,1% | 2,1% | 1,7% | 1,6% | 1,4% | 1,8% | 1,9% | 1,9% | 1,9% |
| private exp. | | 1112,6 | 1240,5 | 1337,5 | 1344,4 | 1367,5 | 1355,2 | 1343,9 | 1331,7 | 1378,8 | 1376,4 | 1352,0 | 1370,0 | 1347,2 | 1369,6 |
| public exp. | | 0 | 22,3 | 36,3 | 37,9 | 40,5 | 39,0 | 39,1 | 36,4 | 41,9 | 40,7 | 39,3 | 40,5 | 38,4 | 39,9 |
| total exp. | | 1112,6 | 1262,7 | 1373,8 | 1382,4 | 1408,0 | 1394,2 | 1383,1 | 1368,1 | 1420,7 | 1417,0 | 1391,3 | 1410,5 | 1385,6 | 1409,5 |
| not assisted (%) | 80 | 9% | 8% | 9% | 9% | 8% | 8% | 8% | 9% | 8% | 9% | 9% | 9% | 9% | 9% |
| residential (v.a.) | | 0 | 5 | 13 | 12 | 13 | 12 | 12 | 13 | 12 | 12 | 13 | 13 | 13 | 13 |
| private assist. (%) | | 71% | 67% | 60% | 61% | 61% | 60% | 61% | 61% | 61% | 61% | 61% | 60% | 61% | 61% |
| forced family (%) | | 2,2% | 1,8% | 1,8% | 1,8% | 1,8% | 2,0% | 1,6% | 1,9% | 2,2% | 1,7% | 1,7% | 1,6% | 2,2% | 2,2% |
| private exp. | | 1113,4 | 1238,6 | 1414,7 | 1406,1 | 1411,5 | 1385,3 | 1406,0 | 1415,2 | 1396,5 | 1395,0 | 1390,1 | 1421,0 | 1419,5 | 1417,1 |
| public exp. | | 0 | 45,2 | 115,6 | 109,6 | 114,4 | 108,4 | 109,9 | 114,7 | 107,2 | 108,1 | 107,8 | 115,6 | 116,8 | 113,5 |
| total exp. | | 1113,4 | 1288,8 | 1530,3 | 1515,7 | 1525,9 | 1493,7 | 1516,0 | 1530,0 | 1503,7 | 1503,1 | 1497,9 | 1536,6 | 1536,3 | 1530,7 |
| not assisted (%) | 70 | 9% | 9% | 8% | 8% | 9% | 9% | 9% | 9% | 8% | 9% | 9% | 9% | 9% | 9% |
| residential (v.a.) | | 0 | 5 | 15 | 20 | 20 | 21 | 20 | 19 | 20 | 20 | 20 | 20 | 20 | 19 |
| private assist. (%) | | 71% | 67% | 59% | 55% | 55% | 53% | 55% | 55% | 55% | 55% | 54% | 54% | 56% | 54% |
| forced family (%) | | 1,8% | 1,7% | 2,3% | 1,9% | 1,7% | 1,7% | 1,7% | 1,9% | 1,5% | 1,7% | 1,7% | 1,8% | 2,5% | 2,5% |
| private exp. | | 1110,9 | 1208,9 | 1405,2 | 1499,0 | 1494,1 | 1517,9 | 1497,3 | 1475,6 | 1504,5 | 1495,0 | 1492,1 | 1499,3 | 1493,5 | 1461,1 |
| public exp. | | 0 | 67,8 | 201,9 | 269,6 | 267,4 | 290,0 | 267,8 | 260,2 | 274,2 | 272,8 | 275,5 | 275,5 | 265,1 | 262,4 |
| total exp. | | 1110,9 | 1276,7 | 1607,1 | 1768,6 | 1761,5 | 1807,8 | 1765,1 | 1735,8 | 1778,7 | 1767,8 | 1767,6 | 1774,8 | 1758,6 | 1723,6 |
| not assisted (%) | 60 | 9% | 9% | 8% | 8% | 9% | 9% | 8% | 9% | 9% | 9% | 9% | 9% | 9% | 9% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 32 | 33 | 33 | 33 | 33 | 33 | 32 | 33 | 33 | 33 |
| private assist. (%) | | 70% | 66% | 59% | 51% | 45% | 45% | 44% | 45% | 45% | 44% | 45% | 45% | 45% | 44% |
| forced family (%) | | 1,9% | 1,5% | 2,1% | 1,8% | 1,7% | 1,4% | 1,4% | 1,7% | 1,8% | 1,9% | 1,7% | 2,2% | 1,6% | 1,7% |
| private exp. | | 1106,3 | 1173,3 | 1335,1 | 1482,2 | 1572,9 | 1591,4 | 1605,8 | 1602,0 | 1589,8 | 1595,0 | 1587,6 | 1563,2 | 1594,6 | 1587,7 |
| public exp. | | 0 | 90,3 | 271,0 | 451,7 | 571,5 | 587,2 | 604,0 | 592,6 | 588,4 | 601,0 | 586,6 | 570,9 | 589,6 | 596,2 |
| total exp. | | 1106,3 | 1263,7 | 1606,1 | 1933,9 | 2144,5 | 2178,6 | 2209,8 | 2194,6 | 2178,2 | 2196,0 | 2174,1 | 2134,1 | 2184,2 | 2183,9 |
| not assisted (%) | 50 | 8% | 8% | 8% | 8% | 9% | 9% | 9% | 9% | 9% | 9% | 9% | 9% | 9% | 9% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 51 | 51 | 52 | 50 | 51 | 50 | 51 | 51 |
| private assist. (%) | | 70% | 67% | 59% | 52% | 43% | 34% | 30% | 31% | 29% | 30% | 30% | 31% | 30% | 30% |
| forced family (%) | | 2,1% | 1,6% | 2,2% | 1,4% | 1,8% | 1,8% | 1,7% | 1,7% | 1,6% | 2,0% | 1,7% | 2,0% | 1,9% | 1,9% |
| private exp. | | 1109,2 | 1174,7 | 1261,1 | 1377,1 | 1466,6 | 1553,6 | 1623,4 | 1622,6 | 1629,6 | 1605,5 | 1627,1 | 1637,9 | 1597,3 | 1630,6 |
| public exp. | | 0 | 112,9 | 338,8 | 564,6 | 790,4 | 1014,8 | 1151,8 | 1140,5 | 1171,3 | 1129,2 | 1152,5 | 1150,3 | 1126,9 | 1151,0 |
| total exp. | | 1109,2 | 1287,6 | 1599,8 | 1942,3 | 2257,0 | 2568,4 | 2775,2 | 2763,1 | 2800,9 | 2734,6 | 2779,6 | 2788,1 | 2724,2 | 2781,7 |
| not assisted (%) | 40 | 9% | 9% | 8% | 9% | 9% | 9% | 9% | 9% | 8% | 9% | 9% | 8% | 9% | 9% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 70 | 70 | 68 | 69 | 68 | 68 |
| private assist. (%) | | 70% | 67% | 59% | 51% | 43% | 35% | 27% | 19% | 16% | 15% | 16% | 16% | 16% | 16% |
| forced family (%) | | 2,0% | 1,3% | 1,9% | 1,5% | 2,1% | 1,5% | 1,9% | 2,0% | 1,8% | 1,7% | 1,8% | 2,1% | 2,2% | 2,2% |
| private exp. | | 1108,8 | 1149,6 | 1201,7 | 1261,9 | 1302,2 | 1359,4 | 1416,6 | 1477,3 | 1517,4 | 1501,7 | 1483,5 | 1505,7 | 1478,1 | 1476,7 |
| public exp. | | 0 | 135,5 | 406,5 | 677,5 | 948,5 | 1219,5 | 1490,5 | 1756,1 | 1907,0 | 1887,1 | 1849,1 | 1879,9 | 1847,3 | 1844,6 |
| total exp. | | 1108,8 | 1285,1 | 1608,2 | 1939,4 | 2250,7 | 2578,9 | 2907,1 | 3233,4 | 3424,4 | 3388,7 | 3332,6 | 3385,5 | 3325,4 | 3321,3 |
| not assisted (%) | 30 | 9% | 8% | 8% | 8% | 9% | 9% | 9% | 8% | 9% | 8% | 9% | 9% | 9% | 9% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 84 | 88 | 86 | 87 | 87 |
| private assist. (%) | | 72% | 67% | 59% | 52% | 42% | 34% | 26% | 19% | 11% | 3% | 1% | 2% | 2% | 1% |
| forced family (%) | | 1,9% | 1,8% | 1,6% | 1,7% | 1,8% | 2,1% | 2,0% | 1,6% | 1,7% | 2,2% | 1,8% | 1,8% | 2,1% | 2,1% |
| private exp. | | 1126,9 | 1124,9 | 1133,1 | 1152,3 | 1142,9 | 1141,9 | 1155,6 | 1184,4 | 1182,6 | 1186,0 | 1218,7 | 1192,3 | 1194,5 | 1202,5 |
| public exp. | | 0 | 158,1 | 474,3 | 790,4 | 1106,6 | 1422,8 | 1738,9 | 2055,1 | 2371,3 | 2652,7 | 2790,7 | 2724,3 | 2725,4 | 2755,9 |
| total exp. | | 1126,9 | 1283,0 | 1607,4 | 1942,7 | 2249,5 | 2564,7 | 2894,5 | 3239,5 | 3553,8 | 3838,7 | 4009,4 | 3916,7 | 3919,9 | 3958,5 |
| not assisted (%) | 20 | 9% | 7% | 5% | 5% | 5% | 5% | 5% | 5% | 6% | 5% | 5% | 5% | 5% | 5% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 94 | 94 | 94 | 95 |
| private assist. (%) | | 70% | 70% | 64% | 55% | 47% | 40% | 31% | 23% | 15% | 8% | 1% | 0% | 0% | 0% |
| forced family (%) | | 2,0% | 1,3% | 0,7% | 0,6% | 0,6% | 0,9% | 0,7% | 1,1% | 0,8% | 0,5% | 0,9% | 0,8% | 0,7% | 0,6% |
| private exp. | | 1103,3 | 1145,1 | 1140,6 | 1096,1 | 1060,0 | 1029,8 | 984,9 | 956,4 | 914,0 | 885,9 | 860,0 | 850,0 | 853,1 | 857,3 |
| public exp. | | 0 | 180,7 | 542,0 | 903,3 | 1264,7 | 1626,0 | 1987,3 | 2348,7 | 2710,0 | 3071,4 | 3392,9 | 3400,2 | 3412,2 | 3429,1 |
| total exp. | | 1103,3 | 1325,8 | 1682,6 | 1999,4 | 2324,7 | 2655,8 | 2972,2 | 3305,0 | 3624,0 | 3957,2 | 4252,9 | 4250,2 | 4265,3 | 4286,3 |
| not assisted (%) | 30 | 10% | 5% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | 100 | 99 | 100 |
| private assist. (%) | | 70% | 70% | 68% | 61% | 53% | 44% | 36% | 28% | 20% | 12% | 4% | 0% | 0% | 0% |
| forced family (%) | | 1,9% | 1,4% | 0,3% | 0,1% | 0,1% | 0,1% | 0,1% | 0,2% | 0,2% | 0,1% | 0,2% | 0,3% | 0,2% | 0,1% |
| private exp. | | 1108,0 | 1126,3 | 1136,7 | 1067,6 | 990,9 | 892,9 | 817,5 | 741,3 | 652,5 | 575,0 | 493,2 | 452,0 | 449,1 | 452,1 |
| public exp. | | 0 | 203,3 | 609,8 | 1016,3 | 1422,8 | 1829,3 | 2235,8 | 2642,3 | 3048,8 | 3455,3 | 3860,4 | 4067,7 | 4042,0 | 4069,1 |
| total exp. | | 1108,0 | 1329,6 | 1746,4 | 2083,8 | 2413,7 | 2722,2 | 3053,3 | 3383,6 | 3701,3 | 4030,3 | 4353,6 | 4519,7 | 4491,1 | 4521,2 |
| not assisted (%) | 0 | 9% | 6% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | 101 | 101 | 101 |
| private assist. (%) | | 71% | 70% | 69% | 61% | 54% | 44% | 37% | 29% | 22% | 13% | 6% | 0% | 0% | 0% |
| forced family (%) | | 1,9% | 1,7% | 0,1% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
| private exp. | | 1118,0 | 1100,0 | 1090,7 | 957,6 | 843,4 | 700,6 | 582,1 | 461,2 | 344,8 | 207,1 | 88,2 | 3,8 | 0,0 | 0,0 |
| public exp. | | 0 | 225,8 | 677,5 | 1129,2 | 1580,8 | 2032,5 | 2484,2 | 2935,9</ | | | | | | |

The upper left corner of the table represents an nonexistent public presence: there are no places available and consumers of the residential home sustain the entire cost of the service. It is the situation in which the supply of LTC services is, in fact, entirely private. The more we look toward the right part of the table, the more places are offered, whereas as we scroll down we see the consumers' quota reducing. So, the right corner on the bottom of the table represents a very high public presence: the places offered are enough to cover the needs of all elders with a high level of assistance required and the residential home is completely free. The combination of the actual level of places offered (25) and the actual consumers' quota (40%) is the square underlined in the table. Note that the value corresponding at the elders assisted in the residential home are expressed in absolute value, so that we can see if the places offered are entirely filled, whereas the value of the expenditures are expressed in thousands of Euros. The remaining values, as reported in the table, are expressed as percentages calculated on the total number of elders who need 24 hours of assistance.

We can now deepen the analysis looking at the single variables, in order to verify if the trends found for the previous two experiments are replicated for each row and column.

We start considering the percentage of unassisted. In the first experiment, in which given quota 40 we progressively change the places offered, we have seen that the percentage of unassisted was always at 8-9%, independently from the number of places offered (see figure 6.3).

Looking at the table, first row for each consumers' quota, we see that this result is the same for all the consumers' quota until the 30% of the total cost. Below that price, in fact, the unassisted elders start decreasing until zero, for the reasons explained in section ???. With the exception of zero places offered for the three lowest quotas, for obvious reasons, we can see that again this percentage is independent from the places available, as the problem is the price rather than the quantity.

The elders assisted in the residential home, represented in the lightest green rows, increase diagonally as more places are offered and lower is the cost. If the cost of the residential home is entirely sustained by consumers, we see that no more than 5 people apply for it, even when the places offered are 125. At the price equal to the 70% of the total cost, the residential home is full when it can accommodate 15 elders, whereas if the quota is fixed at 50%, the residential home is full until 45 places are offered and no more. It should be clear now that, after the point in which the residential home is full for each consumers' quota, it makes no sense to increase the places offered without lowering the price, as the places are not assigned.

Considering the elders who employ a private domestic assistant, we can notice from the table that for each level of consumers' quota their percentage decreases as more places are offered by the residential home, due to the fact that the elders in need of 24 hours of assistance, in our model, prefer the residential home with respect to domestic assistants.

It is more difficult to understand what happens with regard to the elders assisted by *badanti* when the price of the residential home decreases, for each level of places offered. In fact, we have seen in the subsection 6.3.2 that in the case of 25 places offered, the percentage of elders who employ a private domestic assistant decreases until quota 60, then stabilizes until quota 30 and below that price increases again, due to the shifts from unassisted to assisted in residential home and from residential home to private domestic assistants. We observe the same result when the places offered are between 5 and 95, but not for the other levels of places offered. Of course, when zero places are offered by the residential home nothing changes when the price decreases. When more than 95 places are offered, on the other hand, the percentage of elders assisted by private domestic assistants constantly decreases as the consumers' quota lowers. The reason because it does not increase when the price is below the 30% of the total cost is that the residential home is never full, even when it is completely free. In fact, in our model, we assume that a change in the public supply of long-term care services does not change the probability of being assisted by relatives who accept to take care of the elderly in a spontaneous way. Therefore, independently from the number of places offered and the cost, about the 20% of the elders do not express their demand of services and it is assisted by relatives. It follows that we do not observe any shift from unassisted to residential home and from residential home to domestic assistants for a number of places offered greater than 95 and the percentage of elders who employ a domestic assistant keep decreasing until quota zero.

If the share of elders assisted by the relatives who are willing to take care of them never changes, this is not true for the ones who *force* their relatives to assist them once they have not found any other solution. The values are represented in the rows that we called "forced family" and we can see that are strictly correlated with the percentage of unassisted. The percentage is always about the 2% until the price is equal to the 30% of the total cost of the residential home, then decreases as the percentage of unassisted elders decreases. This is not surprising since, if the elders are admitted in the residential home or employ a private domestic assistant, they do not ask again their relatives. So, when the unassisted are zero, none is forced to take care of the elderly.

The expenditures for the LTC services are represented in the table by the blue rows. The public expenditures clearly increase as more elders are assisted in the residential home and the lower is price paid by consumers. The private expenses, on the other hand, depends on the number of assisted in residential home, the consumers' quota and the percentage of elders who employ a domestic assistant. We have already pointed out, in the subsection 6.3.2, that the private expenditures increase until quota 70 due to the increasing number of elders in residential home and the decreasing share of elders assisted by a *badante*, whereas decrease below that price reflecting the lower cost of the residential home. This is true for any level of places offered. Nevertheless, when the price is higher or equal to the 30% of the total cost, the private expenditures increase as more places are offered, whereas it decreases below quota 30. For these prices, indeed, the residential home is cheaper than employing a domestic assistant, so that, as the places offered in-

crease and the residential home is full because many elders can afford it, the shift from domestic assistant to the residential home makes the private expenditures decrease. The total expenditures, finally, are the sum of the public and the private ones.

Even if we cannot say that a combinations is better than another one in absolute terms, we can evaluate them regarding specific targets. In order to clarify how this table can be used to find the most efficient mix, for our model, to reach specific targets of public policies, we know proceed with two examples. The first target is to guarantee that all elders in need of 24 hours of assistance per day find assistance, the second one is to find the most efficient combinations in case a the policy maker wants to cut the public expenditures.

Guarantee assistance to all elders in need of 24 hours of assistance per day

Looking at the table, we can see that there are many possibilities which guarantee assistance to all elders. In particular, if the consumers' quota is zero and the places offered are more than 5, we have seen that there are no unassisted elders. Between these combinations of places and consumers' quota, we can find the most efficient looking at the one which requires the lowest public expenditure.

Following the results of our model, the most efficient mix for this target corresponds to 15 places offered and quota 0, so that all the cost of the residential home is sustained by the public expenditure. It is particularly interesting as we can see in the table that the public expenditures would be exactly the same as the actual one, about 680 thousands of Euros, and the private expenses would be even lower with respect to the current ones: 1090 against 1260 thousands of Euros. Moreover, as there are no unassisted elders, also the relatives forced to take care of the elderly are almost zero.

This combination seems, indeed, much better than the actual one. Nevertheless, we see that in the actual situation the 51% of elders in need of a high level of assistance employs a *badante*, whereas lowering the cost of the public residential home to zero and decreasing the places offered to 15 increases the percentage of elders assisted by domestic assistants at the 69%. This could be seen as a drawback of this particular public policy if it is true that the domestic assistants are generally low qualified and for the most part without a regular contract. Anyway, the conclusion is that offering 15 places completely free in the residential home is, in our model, an efficient policy for the target chosen.

A reduction of the public expenditures for LTC services

Also in this case there are many possibilities to reduce the public expenditures, depending on the size of the reduction that the policy maker wants to obtain. We list three combinations of places and prices which lead to different reductions of the public expenditures, underlining the drawbacks that emerge from the simulation.

The first one is to increase the price of the residential home from the actual one to the one corresponding to quota 60, keeping the places offered at 25. The higher price leads to a reduction of the 33% of public expenditures, as we reduce them from

about 680 to 450 thousands of Euros. This cut of the expenses, as we can see in the table, does not change neither the percentage of unassisted elders (between 8-9%) nor the number of elders who employ a private domestic assistant. However, it seems to slightly increase the percentage of elders who *force* their relatives to assist them and clearly increases the private expenditures. Therefore, this combination allows to reduce the public expenditures by one third not changing the situation, but it shifts almost entirely the cost on the consumers.

A higher reduction can be obtained offering 15 places in the residential home, setting the consumers' quota at 70%. This measure more than halves the public expenditures, which from 680 thousands of Euros lower to about 200, but it presents more drawbacks. In our model, in fact, even if the percentage of unassisted does not change, the 7% more of elders employ a domestic assistants and the ones assisted by forced relatives increase by about 1 percentage point. The private expenditures also increase, but the cost is not entirely shifted on consumers as the policy also worsen the situation of the elders in need of 24 hours of assistance.

Finally, if the places offered are only 5 and the consumers' quota is fixed at the 80% of the total cost, we observe that public expenditures are relatively very low (45,000 Euros) and that the change produced is a shift from residential home to private domestic assistants, which take care of the 67% of the elders.

6.3.4 Changing both places and quotas of the daily center

We run the same experiment changing places and quotas of the daily center, so we focus on the elders who need 5 hours of assistance per day.

First of all, we set the female employment rate at the actual level, we do not reduce the income and we do not include the cash transfers. As we are analyzing the elders who need 5 hours of assistance per day, it does not matter how many places and which quota we fix for the residential home, since the results regard only those in need of a high level of assistance. Then, we set the times that we want to run the code (`times_exp`) at 30. Finally, we run the experiment pushing the button `table_medium`.

As in the previous experiment, at the beginning we set in the code the number of places offered by the daily center at 0 and the code is run 30 times for each level of consumers' quota, starting from 100% to 0%. Then, automatically, the places offered are increased to 5, then 15, 25 and so on until 118 and, for each of these level of places offered, the code is run 30 times for each price paid by consumers. At the end of the experiment, we obtain the average results of the variables of interest for each combination set. Again, we summarized the results in the following table.

| Analyzed Variables | Quota (%) | Places offered by the daily center | | | | | | | | | | | | |
|---------------------|-----------|------------------------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | 105 | 118 |
| not assisted (%) | 100 | 1,9% | 2,1% | 1,8% | 2,1% | 1,7% | 1,4% | 1,4% | 1,7% | 1,7% | 1,8% | 2,0% | 2,3% | 1,3% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 44,9 | 48,6 | 49,7 | 49,4 | 49,3 | 49,6 | 48,2 | 48,9 |
| private assist. (%) | | 68% | 63% | 55% | 45% | 38% | 29% | 25% | 25% | 25% | 25% | 25% | 25% | 26% |
| forced family (%) | | 1,7% | 1,6% | 1,5% | 1,8% | 1,6% | 1,8% | 1,9% | 1,7% | 1,6% | 1,7% | 1,7% | 1,4% | 2,1% |
| private exp. | | 686,5 | 725,0 | 831,9 | 911,8 | 1022,6 | 1112,2 | 1141,6 | 1163,6 | 1159,7 | 1153,5 | 1154,9 | 1136,0 | 1150,2 |
| public exp. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| total exp. | | 686,5 | 725,0 | 831,9 | 911,8 | 1022,6 | 1112,2 | 1141,6 | 1163,6 | 1159,7 | 1153,5 | 1154,9 | 1136,0 | 1150,2 |
| not assisted (%) | 90 | 1,8% | 1,5% | 1,9% | 1,6% | 1,7% | 1,7% | 2,1% | 1,9% | 1,8% | 2,1% | 1,6% | 1,6% | 1,8% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 53,2 | 55,4 | 54,9 | 54,5 | 56,2 | 54,6 | 54,2 |
| private assist. (%) | | 68% | 63% | 55% | 46% | 37% | 29% | 22% | 20% | 21% | 21% | 20% | 20% | 21% |
| forced family (%) | | 1,5% | 1,7% | 1,6% | 1,8% | 1,5% | 2,3% | 1,6% | 1,8% | 1,7% | 1,8% | 1,8% | 1,8% | 1,7% |
| private exp. | | 684,5 | 721,1 | 801,4 | 878,2 | 951,6 | 1030,2 | 1093,2 | 1113,9 | 1113,4 | 1104,6 | 1124,8 | 1101,6 | 1107,1 |
| public exp. | | 0 | 9,1 | 27,4 | 45,6 | 63,9 | 82,1 | 97,1 | 101,0 | 100,1 | 99,4 | 102,5 | 99,7 | 98,9 |
| total exp. | | 684,5 | 730,2 | 828,7 | 923,8 | 1015,5 | 1112,3 | 1190,3 | 1214,9 | 1213,6 | 1204,0 | 1227,2 | 1201,3 | 1206,0 |
| not assisted (%) | 80 | 2,2% | 2,0% | 1,7% | 2,2% | 1,6% | 1,7% | 1,4% | 1,7% | 1,7% | 1,5% | 1,5% | 2,1% | 1,6% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 54,9 | 60,3 | 61,3 | 62,7 | 62,8 | 62,9 | 62,1 |
| private assist. (%) | | 67% | 62% | 53% | 45% | 38% | 29% | 20% | 16% | 14% | 15% | 14% | 15% | 14% |
| forced family (%) | | 2,0% | 1,6% | 1,7% | 2,0% | 1,6% | 1,7% | 2,2% | 2,2% | 1,9% | 1,7% | 1,8% | 1,8% | 2,0% |
| private exp. | | 677,0 | 704,5 | 760,5 | 822,9 | 894,6 | 954,4 | 1007,0 | 1037,1 | 1040,6 | 1063,4 | 1061,8 | 1066,7 | 1050,8 |
| public exp. | | 0 | 18,2 | 54,7 | 91,2 | 127,7 | 164,2 | 200,3 | 220,0 | 223,6 | 228,9 | 229,2 | 229,5 | 226,5 |
| total exp. | | 677,0 | 722,7 | 815,3 | 914,1 | 1022,4 | 1118,6 | 1207,3 | 1257,1 | 1264,2 | 1292,4 | 1291,0 | 1296,3 | 1277,3 |
| not assisted (%) | 70 | 1,8% | 1,8% | 1,6% | 1,8% | 1,9% | 1,6% | 1,7% | 1,7% | 1,6% | 1,7% | 1,5% | 1,8% | 1,9% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 64,6 | 69,4 | 70,2 | 68,9 | 70,4 | 68 |
| private assist. (%) | | 67% | 62% | 54% | 47% | 38% | 29% | 21% | 13% | 9% | 9% | 9% | 9% | 9% |
| forced family (%) | | 1,6% | 1,8% | 1,9% | 1,6% | 1,8% | 1,8% | 1,7% | 1,6% | 2,0% | 1,9% | 1,6% | 1,3% | 2,1% |
| private exp. | | 682,2 | 695,4 | 739,5 | 794,1 | 827,6 | 868,6 | 919,8 | 952,8 | 973,0 | 986,2 | 973,0 | 987,6 | 955,1 |
| public exp. | | 0 | 27,4 | 82,1 | 136,8 | 191,6 | 246,3 | 301,0 | 353,6 | 380,0 | 384,2 | 377,1 | 385,3 | 372,4 |
| total exp. | | 682,2 | 722,7 | 821,6 | 931,0 | 1019,2 | 1114,9 | 1220,9 | 1306,4 | 1353,0 | 1370,4 | 1350,2 | 1372,9 | 1327,5 |
| not assisted (%) | 60 | 1,8% | 1,7% | 2,2% | 1,8% | 1,7% | 1,5% | 1,9% | 2,0% | 1,7% | 1,5% | 2,0% | 1,6% | 1,5% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 71,6 | 73,3 | 71,8 | 72,5 | 73,5 |
| private assist. (%) | | 66% | 63% | 54% | 45% | 38% | 30% | 20% | 12% | 6% | 5% | 6% | 5% | 5% |
| forced family (%) | | 2,1% | 1,9% | 1,9% | 1,7% | 1,7% | 1,5% | 1,7% | 1,7% | 1,9% | 1,7% | 1,9% | 1,7% | 1,7% |
| private exp. | | 673,0 | 690,8 | 712,4 | 728,2 | 763,2 | 794,8 | 808,6 | 830,9 | 841,1 | 855,4 | 845,2 | 849,5 | 856,4 |
| public exp. | | 0 | 36,5 | 109,5 | 182,5 | 255,4 | 328,4 | 401,4 | 474,1 | 522,5 | 534,9 | 523,8 | 529,1 | 536,2 |
| total exp. | | 673,0 | 727,3 | 821,8 | 910,6 | 1018,6 | 1123,2 | 1210,0 | 1305,0 | 1363,6 | 1390,3 | 1369,0 | 1378,6 | 1392,5 |
| not assisted (%) | 50 | 1,9% | 1,9% | 2,0% | 1,9% | 1,4% | 1,7% | 2,0% | 1,5% | 1,8% | 1,7% | 1,7% | 1,7% | 1,8% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 74,1 | 76 | 76,2 | 77,1 | 76,8 |
| private assist. (%) | | 67% | 64% | 54% | 46% | 39% | 29% | 19% | 13% | 4% | 2% | 2% | 2% | 2% |
| forced family (%) | | 2,2% | 1,7% | 1,9% | 1,3% | 1,7% | 1,8% | 1,8% | 1,9% | 1,6% | 2,0% | 1,9% | 1,4% | 1,7% |
| private exp. | | 678,5 | 690,6 | 685,6 | 694,3 | 709,7 | 702,6 | 693,3 | 722,4 | 711,5 | 715,4 | 715,2 | 724,3 | 721,2 |
| public exp. | | 0 | 45,6 | 136,8 | 228,1 | 319,3 | 410,5 | 501,7 | 593,0 | 676,3 | 693,6 | 694,8 | 703,6 | 700,3 |
| total exp. | | 678,5 | 736,2 | 822,4 | 922,4 | 1028,9 | 1113,2 | 1195,1 | 1315,4 | 1387,8 | 1409,0 | 1410,0 | 1427,9 | 1421,5 |
| not assisted (%) | 40 | 2,0% | 1,2% | 1,6% | 1,2% | 1,0% | 1,1% | 1,1% | 1,2% | 1,2% | 1,1% | 0,9% | 1,3% | 1,0% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 80,2 | 81 | 81,3 | 82,2 |
| private assist. (%) | | 67% | 63% | 54% | 47% | 40% | 30% | 22% | 14% | 5% | 0% | 0% | 0% | 0% |
| forced family (%) | | 1,8% | 1,9% | 1,9% | 1,1% | 1,1% | 1,3% | 1,2% | 0,9% | 1,2% | 1,3% | 1,4% | 0,7% | 1,1% |
| private exp. | | 675,9 | 676,0 | 658,2 | 654,7 | 656,1 | 632,3 | 622,2 | 613,6 | 600,1 | 586,4 | 591,1 | 593,1 | 599,9 |
| public exp. | | 0 | 54,7 | 164,2 | 273,7 | 383,1 | 492,6 | 602,1 | 711,6 | 820,7 | 877,9 | 886,7 | 889,6 | 899,8 |
| total exp. | | 675,9 | 730,8 | 822,4 | 928,4 | 1039,2 | 1124,9 | 1224,3 | 1325,1 | 1420,8 | 1464,4 | 1477,8 | 1482,7 | 1499,7 |
| not assisted (%) | 30 | 2,5% | 1,0% | 1,1% | 0,5% | 0,8% | 0,6% | 0,4% | 0,4% | 0,5% | 0,5% | 0,5% | 0,4% | 0,3% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 74,9 | 82,3 | 82,5 | 81,1 | 82,2 |
| private assist. (%) | | 67% | 65% | 56% | 49% | 40% | 31% | 23% | 16% | 6% | 0% | 0% | 0% | 0% |
| forced family (%) | | 1,7% | 1,7% | 1,7% | 0,6% | 0,6% | 0,7% | 0,6% | 0,6% | 0,6% | 0,4% | 0,3% | 0,4% | 0,6% |
| private exp. | | 675,3 | 683,5 | 651,2 | 629,7 | 594,8 | 559,9 | 534,7 | 518,5 | 470,4 | 453,4 | 451,6 | 443,7 | 450,1 |
| public exp. | | 0 | 63,9 | 191,6 | 319,3 | 447,0 | 574,7 | 702,4 | 830,1 | 956,6 | 1050,7 | 1053,6 | 1035,3 | 1050,2 |
| total exp. | | 675,3 | 747,4 | 842,8 | 949,0 | 1041,8 | 1134,6 | 1237,2 | 1348,6 | 1427,0 | 1504,1 | 1505,2 | 1479,1 | 1500,3 |
| not assisted (%) | 20 | 2,4% | 0,8% | 0,5% | 0,3% | 0,2% | 0,4% | 0,2% | 0,1% | 0,3% | 0,1% | 0,3% | 0,2% | 0,1% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 82,7 | 82,5 | 82,2 | 83,3 |
| private assist. (%) | | 66% | 64% | 56% | 48% | 40% | 32% | 24% | 16% | 7% | 0% | 0% | 0% | 0% |
| forced family (%) | | 2,1% | 2,1% | 1,8% | 0,4% | 0,2% | 0,2% | 0,1% | 0,2% | 0,2% | 0,2% | 0,1% | 0,1% | 0,1% |
| private exp. | | 668,2 | 662,6 | 623,2 | 574,7 | 532,1 | 484,4 | 440,4 | 395,3 | 339,8 | 305,5 | 301,2 | 299,9 | 303,8 |
| public exp. | | 0 | 73,0 | 218,9 | 364,9 | 510,9 | 656,8 | 802,8 | 948,7 | 1094,7 | 1207,1 | 1204,7 | 1199,8 | 1215,4 |
| total exp. | | 668,2 | 735,6 | 842,2 | 939,6 | 1043,0 | 1141,2 | 1243,2 | 1344,0 | 1434,5 | 1512,6 | 1505,8 | 1499,7 | 1519,2 |
| not assisted (%) | 10 | 1,9% | 0,3% | 0,6% | 0,1% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 82,4 | 83,6 | 83,2 | 82,8 |
| private assist. (%) | | 67% | 64% | 54% | 50% | 42% | 33% | 23% | 15% | 7% | 0% | 0% | 0% | 0% |
| forced family (%) | | 2,1% | 1,9% | 2,1% | 0,3% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
| private exp. | | 677,9 | 662,1 | 576,1 | 549,1 | 485,4 | 413,8 | 332,9 | 271,0 | 211,0 | 154,3 | 152,6 | 151,7 | 151,0 |
| public exp. | | 0 | 82,1 | 246,3 | 410,5 | 574,7 | 738,9 | 903,1 | 1067,3 | 1231,5 | 1352,5 | 1373,3 | 1365,6 | 1359,1 |
| total exp. | | 677,9 | 744,2 | 822,4 | 959,6 | 1060,2 | 1152,7 | 1236,0 | 1338,3 | 1442,6 | 1506,8 | 1525,9 | 1517,4 | 1510,1 |
| not assisted (%) | 0 | 2,1% | 0,5% | 0,8% | 0,2% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
| residential (v.a.) | | 0 | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 83,4 | 84,3 | 82,7 | 84,1 |
| private assist. (%) | | 67% | 65% | 55% | 49% | 41% | 33% | 24% | 16% | 7% | 1% | 0% | 0% | 0% |
| forced family (%) | | 2,0% | 2,0% | 1,8% | 0,2% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
| private exp. | | 678,5 | 655,3 | 554,2 | 498,0 | 411,8 | 333,9 | 244,0 | 160,7 | 72,5 | 8,0 | 0,0 | 0,0 | 0,0 |
| public exp. | | 0 | 91,2 | 273,7 | 456,1 | 638,6 | 821,0 | 1003,5 | 1185,9 | 1368,4 | 1521,0 | 1537,4 | 1508,3 | 1535,0 |
| total exp. | | 678,5 | 746,5 | 827,9 | 954,2 | 1050,4 | 1155,0 | 1247,5 | 1346,6 | 1440,8 | 1529,0 | 1537,4 | 1508,3 | 1535,0 |

The table should be read as the previous one: so we find an inexistent public presence at the upper left corner, whereas a completely free and consistent public supply at the bottom of the table, when places are 118 and the quota is fixed at 0.

Since the underlying mechanisms are the same as the ones explained in section 6.3.3, we do not repeat them in great detail and we just limit to underline the differences.

We see from the table that the percentage of unassisted does not change when we increase the places available, without changing the quotas, as they are those elders who cannot afford neither the daily center nor the private assistants. However, they are considerably less than the unassisted elders who need 24 hours of assistance, due to the fact that the daily center and the private domestic assistants are less expensive (the private assistant is employed only for 5 hours per day) and that more relatives have the time to assist them. On the other hand, we can notice that decreasing the quota paid by the consumers decrease the percentage of unassisted, but it happens only below quota 40. In fact, if the price of the daily center is fixed below the 50% of the total cost, the daily center is cheaper than the private assistants and more and more elders will find one type of assistance.

Both the unassisted elders and those who *force* their relatives to assist them are almost zero at quota 20 and zero at quota 10.

The daily center is full until 45 places are offered when the consumers have to pay the full cost of it and, as before, diagonally increase as the quota lowers and places increase. Independently from the quota, the daily center is never full if it offers more than 75 places, as around 30 elders who need a medium level of assistance are assisted by relatives.

At a first look, the elders assisted by private domestic assistants seem to decrease as the consumers' quota decreases. However, if we look at the column corresponding to 55 places offered, we can notice that they slightly decrease before increasing below quota 50. This can suggest a mechanism that is similar to the one analyzed for the residential home in the previous section, which is in this case not very marked.

6.4 Simulate different female employment rate

We want now to analyze the effects of changes in the female employment rate on the variables of interest regarding all the elders who need assistance.

Form one hand, in fact, an higher female employment rate decreases the time available of women and consequently their possibility to assist the elders. On the other hand, it increases the household income and so their economic capability to pay for the formal services. If the first effect prevails, more elders will be left unassisted, whereas, if the increase of income prevails, there will be a decrease of unassisted elders, as more of them will be able to employ a private domestic assistant.

We set the places offered by the (semi)residential homes at the actual level, as well as the consumers' quotas. As before, we do not include cash transfers and do not reduce the income, but we set the female employment rate as "low", so at the 40%. This is, in

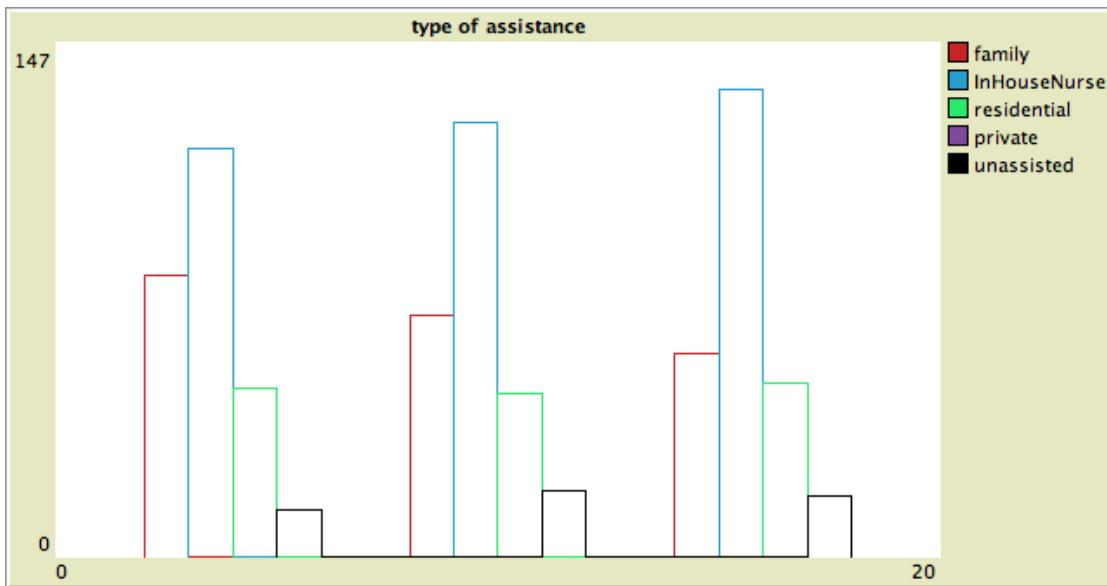


Figure 6.7: Hours of assistance received by elders, by type of assistance found and level of female employment rate.

fact, the female employment rate of the South of Italy, which is much lower than the one of Modena.

We run the experiment 15 times and, after that, we set the female employment rate at 55%, which is the one of Italy in general. Finally, we repeat the experiments other 15 times fixing the female employment rate at the actual level of Modena, which is the 73%.

We report in figure 6.7 the graph showing the type of assistants found aggregating all elders who need assistance. As already mentioned, when we aggregate all the elders in need of assistance, we show the hours spent to assist them by relatives, domestic assistants, (semi)residential homes and the ones in which elders are not assisted, so that to reflect the differences between their needs.

From the figure we can notice that the hours spent by relatives considerably decrease as more women work and that they are almost entirely substituted by private domestic assistance. The number of elders assisted in (semi)residential homes do not change since, at their actual level of places and quotas, the residential homes and the daily center are already full when the female employment rate is low. Looking at the black bars, the unassisted, we see that they slightly increases as the more women decide to work, but the increment is very low, about 0.5%.

Therefore, we can conclude that, when we consider all the elderly population, an increase of the female employment rate decreases the percentage of elders assisted by family by almost the same amount of the increase of elders assisted by private domestic assistants and so the two opposite effects almost nullify each other. However, as the

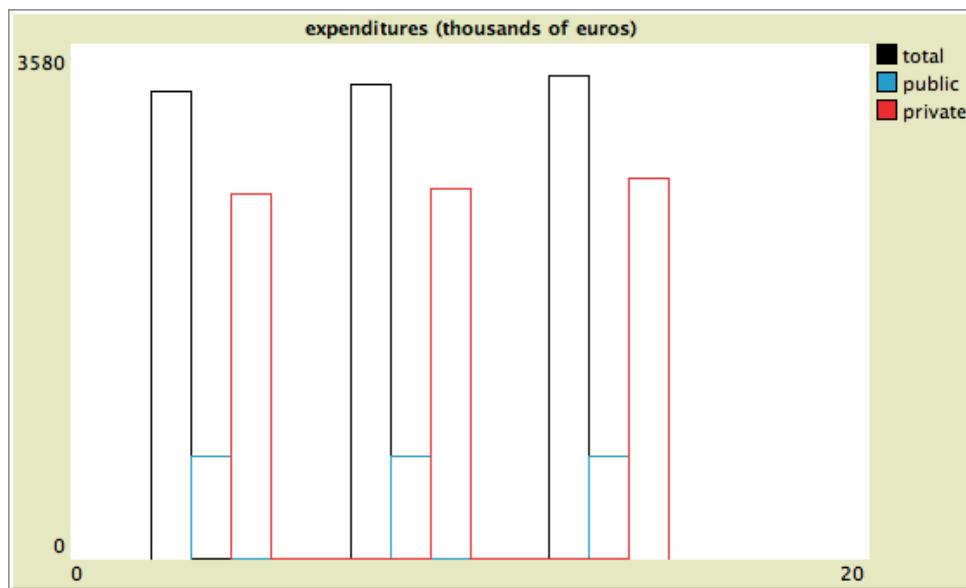


Figure 6.8: Private, public and total expenditures, by level of female employment rate.

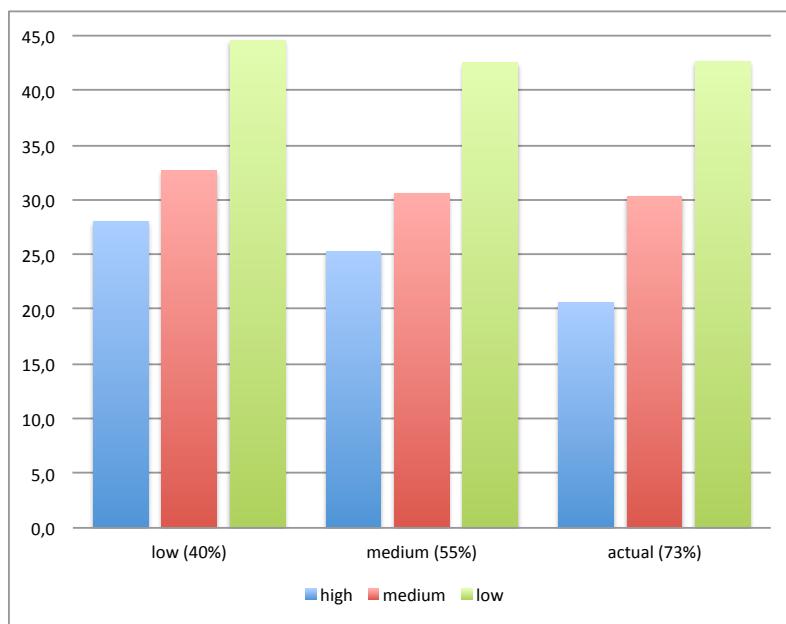
decrease of family assistance is not entirely compensated by the increase of private assistance, we see that the elders unassisted slightly increase as the female employment rate increases.

In figure 6.8 is reported the graph showing private, public and total expenditures. Of course, as the public supply of services does not change, neither the public expenditures change when the female employment rate increases. The private ones, on the other hand, slightly increase reflecting the higher request for private domestic assistants and the total expenditures clearly follow the private ones.

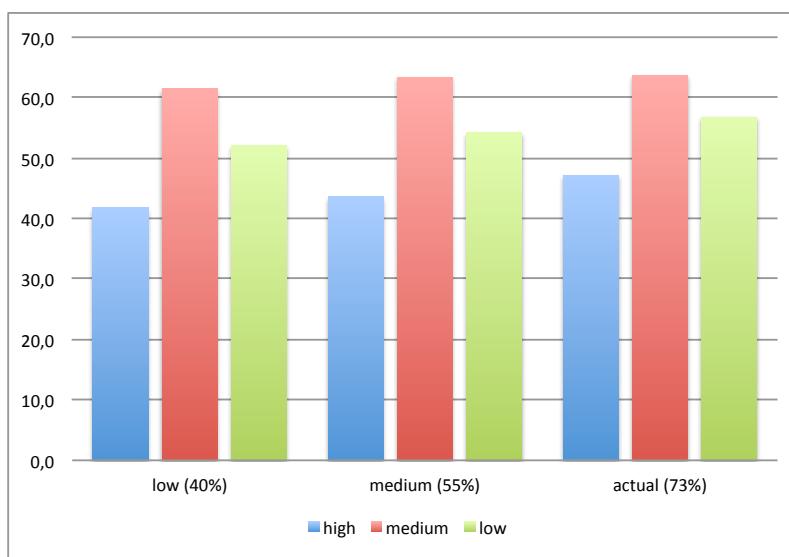
We can now disaggregate the results for the level of assistance needed by elders and the type of assistance found.

We start from the elders assisted by relatives, dividing them by those who need a high, medium and low level of assistance. From the graph reported below, we see that the elders assisted by relatives who need a high level of assistance, represented by the blue bars, decrease considerably when the female employment rate increases, due to the fact that they need 24 hours of assistance per day, so that only the relatives who do not work can assist them.

The elders who need 5 or 1 hours of assistance per day and are assisted by relatives, on the other hand, decrease considerably less than the ones who require a high level of assistance, as they can be assisted also by the relatives that work.



Looking at the elders who employ a private domestic assistant, we have previously seen that they, in general, increase as the female employment rate increases. Again, this is more evident from the elders who need a high level of assistance than for the others, as it represents the shift from family to private domestic assistants. This result is shown in the following figure, which illustrates the elders assisted by domestic assistants, divided by those who need a high, medium and low level of assistance.



Finally, we consider the unassisted elders. If we look at the figure below, we clearly see that the unassisted elders who require a high level of assistance considerably increase

as the female employment rate increases from the 40% to the 73%, whereas the unassisted elders who need 5 hours of assistance slightly increase and the ones with a low level of assistance even decrease, although only by 0.2%.

These results show that an increase of female employment rate has a very small effect on the percentage of unassisted elders who require a medium or low level of assistance, whereas it produces a higher impact on those who require 24 hours of assistance, with the 8.8% left unassisted when the female employment rate is at the actual level, so at 73%.

This is not a surprising result, but, together with the results obtained in the previous experiments, it can suggest that as the female employment rate increases, the higher income of those families in which women start working is not enough to compensate the reduction of the relatives' time available. Therefore, it would be probably necessary to lower the price of the residential home in order to keep unchanged the percentage of unassisted elders who require a high level of assistance, whereas the price of the daily center allows to have almost the same percentage of unassisted elders for the three levels of female employment rate. Nevertheless, this suggestion needs to be verified with further experiments, which can be run in the model changing the consumers' quota of the residential home for each levels of female employment rate.

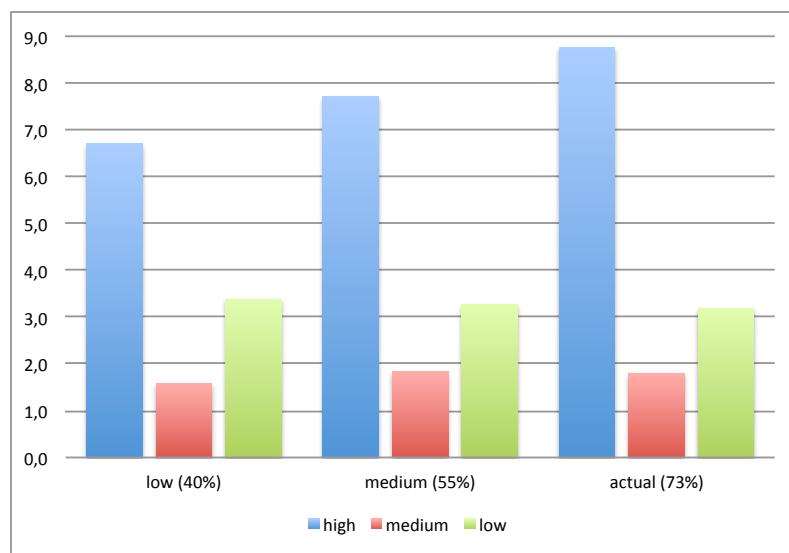


Table 6.1: Results of the actual situation and of changes in the female employment rate

| Analyzed variables | Actual Situation | Female employment rate (FER) |
|---------------------------------|-----------------------------------|---|
| Elders considered | elders who need 24h of assistance | elders who need 5h of assistance |
| Assisted by relatives | around the 33% | decrease as the FER increases; more for the high assisted elders |
| Assisted by domestic assistants | around the 57% | increase as the FER increases; more for the high assisted elders |
| Assisted in (semi)residential | exactly 30 elders (5.7%) | unchanged |
| Unassisted | around the 4% | increase as the FER increases; more for the high assisted elders, slightly decrease for the low assisted ones |
| Private Expenditures | around 2430 thousands of Euros | slightly increase as the FER increases |
| Public Expenditures | around 1790 thousands of Euros | unchanged |

6.5 Summing up the results

In this last section we just want to summarize the results obtained in the previous experiments.

In table 6.1 , we briefly report the results of our model when all the values are set at their actual level (first column) and when we change the female employment rate (second column) from 40% to 55% and, finally, to 73%, which is the actual one.

In table 6.2, we summarize the results of the simulations in which we change both the places offered and the consumers' quotas of the residential home and the daily center.

Table 6.2: Results of changing consumers' quota and places of the residential home and the daily center

| Analyzed variables | Residential home | Daily center |
|---------------------------------|---|---|
| Elders considered | All elders who need assistance | All elders who need assistance, dividing them by level of assistance required |
| Assisted by relatives | slightly decrease as places increase and price decreases | slightly decrease as places increase and price decreases |
| Assisted by domestic assistants | unchanged as places increase, decrease as the price decreases | unchanged as places increase, decrease as the price decreases |
| Assisted in (semi)residential | increase as places increase and the price lowers, until 100 places | increase as places increase and the price lowers, until 90 places |
| Unassisted | unchanged as places increase, decrease as the price decrease (below quota 30) | unchanged as places increase, decrease as the price decrease (below quota 50) |
| Private Expenditures | increase as more places are filled (at a higher quota) and more private assistants are employed | increase as more places are filled (at a higher quota) and more private assistants are employed |
| Public Expenditures | increase as places increase (and are filled) and the price decreases | increase as places increase (and are filled) and the price decreases |

Chapter 7

Conclusions

The aim of this work is to study the elderly care considering, from one hand, both the expressed and potential demand of assistance and, from the other hand, both the formal and the informal supply of long-term elderly care. In particular, we focused on two aspects: the public supply of LTC services and the relation between the female employment rate and the assistance of elders. Our analysis focuses on Modena population, as we used data collected by the local survey ICESmo3, but we tried to show some tendencies of elderly care that can be generally extended.

To this purpose, we have initially described various contributions from the literature on the subject, considering both the Italian situation, in chapter 2, and specific characteristics of the district of Modena, in chapter 3. After having briefly introduced the problem of Italian ageing population, we described the most important services offered to the elders in need of assistance, which are the public and private (semi)residential homes, the public domiciliary assistance, namely ADI and SAD, the cash benefits and the private domestic assistance (the *badanti*). Moreover, we discussed the role that family, and women especially, plays in the elderly care.

We have seen that the (semi)residential home are usually aimed at non-self sufficient elders and accommodate less than 5% of people aged more than 64. The domiciliary assistance provides, on average, only 20 hours of assistance per elderly in one year, covering the 4% of the old population. It is then clear that most part of the elderly care is performed by relatives and private domestic assistants, which are often low qualified and employed without a regular contract. We outlined the territorial differences in the distribution of these services over the country and the problems that arise when we try to analyze the assistance of fragile elders, mainly due to the lack of multidimensional data including all aspects of the elderly care.

For the study of this subject, we have decided to build a model which can be considered a mix between a microsimulation and an agent-based model. In fact, as we explained in chapter 4, it presents a high empirical content, which is typical of the microsimulation approach, but shares with ABMs the importance of the interaction between agents.

Even if we assign characteristics to the agents of our model on the basis of the data collected by ICESmo3, in the model we have the possibility of choosing those features

that are most influential in the assistance of the elderly population. In particular, our model, described in chapter 5, can analyze different outcomes resulting from different values of supply of public (semi)residential homes, different prices of such residential homes, the public cash transfers, the general level of income and the level of female employment rate. These operations are necessary as Modena is a very rich city, with a great presence of public services and a high employment rate.

In chapter 6 we presented the main results that emerge from our model. The results, the endogenous variables determined by the features listed above, include various, multidimensional aspects: the private and public expenditures, but also time spent by relatives assisting the elders and the percentage of population which remains unassisted.

Regarding the public supply of LTC services, we have presented the average results of our model derived from more than 150 combinations of places offered by (semi)residential homes and quotas of the total cost paid by families. These results are summarized in two tables (page 94 and 99) that allows to study how the analyzed variables variate in relation with the different combinations of public policies.

In particular, we observe that the number of unassisted is, on average, unaffected by an increase of places available in the (semi)residential homes, since those who are excluded at first are those who cannot afford to pay neither the residential home nor the private domestic assistants.

Therefore, the only appropriate measure to reduce the share of unassisted elders is to lower the quota paid by the families of elders below the cost of the private domestic assistant. With such price, even if the places available are reduced with respect to the actual situation, more elders can find assistance, either being admitted in a residential home or employing a *badante*. This is due to the fact that the (semi)residential homes give priority to the elders alone and to those with a lower income, so that lowering the price allows poorer elders to take the place of the ones with a higher income, which will employ a private domestic assistants.

In general, the two tables obtained can be used for an evaluation of different public policies and allow to select the best combinations for specific policy targets. For example, it is possible to individuate among the combinations of places and prices that guarantees that no elders are left unassisted the one that minimizes public expenditures, or the total ones.

With respect to the impact of the female employment rate on elderly care, we tried to understand if an increase of women participating at the labor market would lead to an improvement of the elderly care, as the higher income allows to pay for formal services, or whether the decrease of time available to dedicate to the assistance of elders would increase the percentage of unassisted.

Modena presents a very high female employment rate, which seems to be, according to the data of ICESm03, one of the highest ones between the OECD countries. Therefore, we decided to simulate the situation resulting from other two lower levels of female employment beside the actual one, which is 73%, and that correspond to the average Italian one (around 55%) and the rate of South Italy (around 42%).

From the model it results that to an high female employment rate corresponds, as

expected, a lower percentage of elders assisted by relatives in favor of an higher number of elders employing a private domestic assistant.

It is interesting to notice that to an high female employment rate is also associated a higher number of unassisted elders. This means that the effect of a decrease in the time that families can dedicate to elderly care is stronger than the effect of the increased income, which could permit the purchase of services in the market. This is valid especially for the elders who require a high level of assistance.

There are many possible further lines of research based on the framework developed in this dissertation.

One possibility is to analyze the effect of exogenous shocks to the income and the employment rate of the whole population in order to simulate the worsening of the general economic situation.

Another possible line of research is to analyze the effects of the introduction of different kinds of public policies with respect to the ones that we have considered. In this way we could compare the public system of LTC services in Modena with other welfare systems in Europe or in other countries.

Finally, it could be interesting to refine the assumption regarding the decision of families on providing direct assistance to the relatives. This could be backed by empirical research and could underline the impact of the social relationship and family cohesion on the welfare Italian system.

Chapter 8

Appendix 1: the code

```

--includes ["contributions.nls"]

globals [
    assisted_by_family assisted_in_residential assisted_in_private_residential
    assisted_by_InHouseNurse tot_unassisted

    high_assisted_by_family high_assisted_in_residential
    high_assisted_by_InHouseNurse high_unassisted

    medium_assisted_by_family medium_assisted_in_residential
    medium_assisted_by_InHouseNurse medium_unassisted

    low_assisted_by_family low_assisted_in_residential
    low_assisted_by_InHouseNurse low_unassisted

    public_expenditures_high_residential public_expenditures_low_residential
    public_expenditures_cash_transfers total_public_expenditure
    private_expenditure_badanti private_expenditure_residential
    total_private_expenditure total_expenditure

    time_family time_InHouseNurse time_residential hoursneeded_unsatisfied

    cost_public_res quota_consumers% set_places
    cost_Nurse_high cost_Nurse_medium cost_Nurse_low
    cost_daily_center quota_D_consumers%

    tot_highunassisted tot_highfamily tot_highfam_force tot_highfam_notforce
    tot_highres tot_highnurse tot_consumers_res tot_consumers_nurse
    tot_consumers tot_public_res
    tot_mediumunassisted tot_mediumfamily tot_mediumfam_force
    tot_mediumfam_notforce tot_mediumres tot_mediumnurse

    experiments experiments1 experiment experiment2 t p h]

breed [agents agent]
breed [ResidentialHomes ResidentialHome]

undirected-link-breed [FamilyCare-links FamilyCare-link]
undirected-link-breed [assistance-links assistance-link]

agents-own [
    id famid nip parent gender age agecl6 educ4 cond10 weeklyhour
    m11 m21 m31 m41 q7 q1 q1perc contribution
    youngassisted oldassisted alone family nowork hours_available receive_contr
    need my_FamilyCare out_FamilyCare PHome_request Home_request
    InHouseNurse Home_found unassisted
]

```

```

familyassisting old_family income income_withold
i_after_PHome i_after_Home i_after_Nurse Home_notaffordable
PHome_notaffordable Nurse_notaffordable
coefficient wage enter_laborforce exit_laborforce cash_benefit]

ResidentialHomes-own [public assistance places supply]

patches-own [
  pfamid birthplhead yeq decileyeq nmemb nchild nmin nold nounp i1 sqrtm
  yassisted oassisted pfamily younger_families pcontribution]

to setup

clear-all
world
variable
public_contribution
identify
export-world "setting.csv"

end

to restart

import-world "setting.csv"

end

to go

otheragents
interface
needs_and_offer
cost
demand_high_assisted
demand_medium_assisted
demand_low_assisted
offer_Care_high
offer_Care_medium
countunassisted1
force_family_care_high
force_family_care_medium
force_family_care_low
countunassisted
update_interface
plots

```

```

end

to reset

clear-patches
clear-turtles
world
variable
public_contribution
identify
set experiments experiments + 1
set experiments1 experiments1 + 1

end

to world

ask patches [set pcolor 59]

file-open "famvar2020.raw"
while [not file-at-end?]
[ask one-of patches with [pcolor = 59 and pfamid = 0]
[set pcolor 13 set pfamid file-read set birthplhead file-read
set yeq file-read set decileyeq file-read set nmemb file-read
set nchild file-read set nmin file-read set nold file-read set nounp file-read
set i1 file-read set sqrmt file-read]]
file-close

end

to variable

create-agents 4960

let d 0
file-open "all.raw"
while [not file-at-end?] [ask agent (d)
[set color black set shape "person" set size 1.2 set id file-read
set famid file-read set nip file-read set parent file-read set gender file-read
set maritalstat file-read set age file-read set agecl6 file-read
set birthpl file-read set citizen file-read set educ4 file-read
set cond10 file-read set weeklyhour file-read set m11 file-read
set m21 file-read set m31 file-read set m41 file-read set q7 file-read
set q1 file-read set q1perc file-read] set d d + 1]
file-close

```

```

let s 1
file-open "coefficient.raw"
while [not file-at-end?] [ask agents with [id = s]
[let f file-read set coefficient file-read] set s s + 1]
file-close

let myPatches patches with [pcolor = 13]
ask agents [move-to one-of myPatches with [pfamid = [famid] of myself]]

ask one-of patches with [pfamid = 1024]
[set pc当地 59 ask agents-here [die]]

end

to identify

ask agents [if q1 = 1 and agecl6 < 5 [set youngassisted 1]]
ask patches with [pcolor = 13 and i1 != 3]
[if any? agents-here with [youngassisted = 1] [set yassisted 1]]

ask patches with [pcolor = 13 and yassisted = 0 and i1 = 1]
[if any? turtles-here with [agecl6 > 4]
[ifelse any? agents-here with [q1 = 1 and agecl6 > 4]
[ask agents-here with [q1 = 1 and agecl6 > 4] [set oldassisted 1]]
[ask max-n-of 1 agents-here [age] [set oldassisted 1]]]

ask patches with [pcolor = 13 and yassisted = 0 and i1 = 2]
[if any? turtles-here with [agecl6 > 4]
[ifelse any? agents-here with [q1 = 1 and agecl6 > 4]
[ask agents-here with [q1 = 1 and agecl6 > 4] [set oldassisted 2]]
[ask max-n-of 1 agents-here [age] [set oldassisted 2]]]

ask patches with [pcolor = 13 and i1 = 3]
[if any? agents-here with [q7 > 0 and q7 < 3 and agecl6 > 4]
[ask agents-here with [q7 > 0 and q7 < 3 and agecl6 > 4]
[ifelse q1 = 1 [set oldassisted 2] [set oldassisted 3]]]

ask patches with [pcolor = 13] [if any? agents-here with [oldassisted != 0]
[set oassisted 1]]

ask agents with [agecl6 > 4] [if [nmemb] of patch-here = 1 [set alone 1]]

end

to otheragents

let perchighassisted
((count agents with [oldassisted = 1] / count agents with [oldassisted != 0]) * 100)

```

```

let percmediumassisted
((count agents with [oldassisted = 2] / count agents with [oldassisted != 0]) * 100)
let perclowassisted
((count agents with [oldassisted = 3] / count agents with [oldassisted != 0]) * 100)

let perchighassisted_men
((count agents with [oldassisted = 1 and gender = 1] /
count agents with [oldassisted = 1]) * 100)
let percmediumassisted_men
((count agents with [oldassisted = 2 and gender = 1] /
count agents with [oldassisted = 2]) * 100)
let perclowassisted_men ((count agents with [oldassisted = 3 and gender = 1] /
count agents with [oldassisted = 3]) * 100)

let mean_yeq_women_alone
(mean [income] of agents with [alone = 1 and gender = 0])
let mean_yeq_men_alone
(mean [income] of agents with [alone = 1 and gender = 1])

let dev_yeq_women_alone
(standard-deviation [income] of agents with [alone = 1 and gender = 0])
let dev_yeq_men_alone
(standard-deviation [income] of agents with [alone = 1 and gender = 1])

ask n-of 125 patches with [pcolor = 59] [sprout-agents 1
[set color blue set shape "person" set size 1.2 set alone 1 set coefficient 1]]

ask n-of (round ((125 / 100) * (perchighassisted + 10))) agents
with [color = blue] [set oldassisted 1]
ask n-of (round (count agents
with [color = blue and oldassisted = 1]) / 100 * perchighassisted_men)
agents with [color = blue and oldassisted = 1] [set gender 1]

ask n-of (round ((125 / 100) * percmediumassisted)) agents
with [color = blue and oldassisted = 0] [set oldassisted 2]
ask n-of (round (count agents
with [color = blue and oldassisted = 2]) / 100 * percmediumassisted_men)
agents with [color = blue and oldassisted = 2] [set gender 1]

ask n-of (round ((125 / 100) * (perclowassisted - 10))) agents
with [color = blue and oldassisted = 0] [set oldassisted 3]
ask n-of (round (count agents
with [color = blue and oldassisted = 3]) / 100 * perclowassisted_men)
agents with [color = blue and oldassisted = 3] [set gender 1]

ask agents with [color = blue and gender = 0]
[set income (max (list 2000
(random-normal (mean_yeq_women_alone) (dev_yeq_women_alone))))]
ask agents with [color = blue and gender = 1]

```

```

[set income (max (list 2000
(random-normal (mean_yeq_men_alone) (dev_yeq_men_alone)))]]

ask patches with [pcolor = 13 and oassisted = 0 and yassisted = 0]
[if all? agents-here [agecl6 < 5] [set younger_families 1]]

while [(count agents with [color = blue and family = 0]) > 45]
[ask one-of patches with [younger_families = 1]
[ask one-of agents with [color = blue and family = 0]
[set family [pfamid] of myself] ask agents-here [set family [pfamid] of myself]
set younger_families 2]]

ask patches with [oassisted = 1] [if all? agents-here [agecl6 > 4]
[set pc当地 yellow]]
ask agents-on patches with [pcolor = yellow] [set old_family 1]

while [(count patches with [pcolor = yellow]) > 80]
[ask one-of patches with [younger_families = 1]
[ask agents-on one-of patches with [pcolor = yellow]
[set family [pfamid] of myself set old_family 2
ask patch-here [set pc当地 13]
ask agents-here [set family [pfamid] of myself]
set younger_families 2]]
ask patches with [pcolor = yellow] [set pc当地 13]

ask one-of patches with [pcolor = 59] [sprout-ResidentialHomes 1
[set public 1 set shape "house" set size 2 set color 77 set assistance "high"]]
ask one-of patches with [pcolor = 59] [sprout-ResidentialHomes 1
[set public 1 set shape "house" set size 2 set color 77 set assistance "low"]]

ask one-of patches with [pcolor = 59] [sprout-ResidentialHomes 1
[set public 0 set shape "house" set size 2 set color 77 set assistance "high"]]

end

to interface

ask agents with [cond10 = 7 or cond10 = 8 or cond10 = 9] [set nowork 1]

let mean_educ_1_wage 14.15 let dev_educ_1_wage (14.9)
let mean_educ_2_wage 18.2 let dev_educ_2_wage (15.04)
let mean_educ_3_wage 23.24 let dev_educ_3_wage (28.33)
let mean_educ_4_wage 28.99 let dev_educ_4_wage (31.94)

let in_lfp (count agents with
[gender = 0 and age > 18 and age < 65 and nowork = 0])

```

```

if lfp = "medium" [
  ask n-of (int (24 * (in_lfp / 100))) agents with
  [gender = 0 and nowork = 0 and age > 18 and age < 65]
  [set exit_laborforce 1 set nowork 1
    if educ4 = 1 [set wage
      (random-normal (mean_educ_1_wage) (dev_educ_1_wage))]
    if educ4 = 2 [set wage
      (random-normal (mean_educ_2_wage) (dev_educ_2_wage))]
    if educ4 = 3 [set wage
      (random-normal (mean_educ_3_wage) (dev_educ_3_wage))]
    if educ4 = 4 [set wage
      (random-normal (mean_educ_4_wage) (dev_educ_4_wage))]
    set income (max (list 2000
      (income - (wage * weeklyhour * 51 / coefficient)))) set weeklyhour 0
    ask agents-here [set income [income] of myself]]]

if lfp = "low" [
  ask n-of (int (45 * (in_lfp / 100))) agents with
  [gender = 0 and nowork = 0 and age > 18 and age < 65]
  [set exit_laborforce 1 set nowork 1 ;33 perché 73(actual) - 40
    if educ4 = 1 [set wage
      (random-normal (mean_educ_1_wage) (dev_educ_1_wage))]
    if educ4 = 2 [set wage
      (random-normal (mean_educ_2_wage) (dev_educ_2_wage))]
    if educ4 = 3 [set wage
      (random-normal (mean_educ_3_wage) (dev_educ_3_wage))]
    if educ4 = 4 [set wage
      (random-normal (mean_educ_4_wage) (dev_educ_4_wage))]
    set income (max (list 2000
      (income - (wage * weeklyhour * 51 / coefficient)))) set weeklyhour 0
    ask agents-here [set income [income] of myself]]]

if reduce_income [ask agents
  [set income (income - (income / 100 * (how_much_%)))]]

if cash_transfer [ask agents with [q1perc = 100 and age > 64]
  [set income (income + (5915.64 / coefficient)) set cash_benefit 1
  ask agents-here [set income [income] of myself ]]]]

end

to needs_and_offer

  ask agents with [oldassisted != 0] [ifelse oldassisted = 1 [set need 24]
    [ifelse oldassisted = 2 [set need 5] [set need 1]]]
  set TotNeed (sum [need] of agents with [oldassisted != 0])
  ask agents with [oldassisted = 0 and youngassisted = 0]
  [set hours_available (24 - ((weeklyhour + m11 + m41 + 56 + 14) / 7))]
```

```

ask one-of ResidentialHomes with [assistance = "low"]
[set places (places_ResidentialHome5) set supply (places * 5)]
ask one-of ResidentialHomes with [assistance = "high" and public = 1]
[set places (places_ResidentialHome24) set supply (places * 24)]
ask one-of ResidentialHomes with [public = 0]
[set places (places_private_ResidentialHome24)]

set supplyResidentialHomes (sum [supply] of ResidentialHomes)

end

to cost

set cost_public_res (45167 / 100 * quota_consumers_%) 
set cost_daily_center (18245 / 100 * quota_D_consumers_%) 
set cost_Nurse_high 12600 
set cost_Nurse_medium 8592 
set cost_Nurse_low 3560 

end

to demand_high_assisted

ask agents with [oldassisted = 1] [set i_after_PHome (income - 45167)
if i_after_PHome < 0 [set PHome_notaffordable 1]
  set i_after_Home (income - cost_public_res) if i_after_Home < 0
  [set Home_notaffordable 1]
  set i_after_Nurse (income - cost_Nurse_high)
  if i_after_Nurse < 0 [set Nurse_notaffordable 1] ]

ask agents with [oldassisted = 1 and alone = 0]
[if any? agents-here with [oldassisted = 0 and age < 80 and age > 18
and nowork = 1 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 and age < 80
and age > 18 and nowork = 1 and familyassisting = 0]
[let a random-float 1 if gender = 0 and a < 0.8
[create-FamilyCare-link-with myself set familyassisting 1
ask link-neighbors [set my_FamilyCare 1]]
if gender = 1 and a < 0.7 [create-FamilyCare-link-with myself
set familyassisting 1 ask link-neighbors [set my_FamilyCare 1]]]]]

ask agents with [oldassisted = 1 and my_FamilyCare = 0 and family != 0]
[ask one-of other agents with
[family = [family] of myself and famid != [famid] of myself]
[if any? agents-here with
[oldassisted = 0 and nowork = 1 and age > 18 and familyassisting = 0]
[ask one-of agents-here with
[oldassisted = 0 and nowork = 1 and age > 18 and familyassisting = 0]

```

```

[let b random-float 1 if gender = 0 and b < 0.2
[create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 1] set familyassisting 1
ask link-neighbors [set out_FamilyCare 1]]
if gender = 1 and b < 0.1 [create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 1] set familyassisting 1
ask link-neighbors [set out_FamilyCare 1]]]]]

ask agents with
[oldassisted = 1 and my_FamilyCare = 0 and out_FamilyCare = 0]
[ifelse PHome_notaffordable = 0 [set PHome_request 24]
[ifelse Home_notaffordable = 0 [set Home_request 24]
[ifelse Nurse_notaffordable = 0 [set InHouseNurse 24]
[if family != 0 [ask one-of other agents with
[family = [family] of myself and famid != [famid] of myself]
[set income_withhold (income + [income] of myself)
ifelse 45167 < (income_withhold / 100 * 20)
[ask myself [set PHome_request 24]
[ifelse cost_public_res < (income_withhold / 100 * 20)
[ask myself [set Home_request 24]
[if cost_Nurse_high < (income_withhold / 100 * 20)
[ask myself [set InHouseNurse 24] ]]]]]]]]

end

to demand_medium_assisted

ask agents with [oldassisted = 2]
[set i_after_Nurse (income - cost_Nurse_medium) if i_after_Nurse < 0
[set Nurse_notaffordable 1]
set i_after_Home (income - cost_daily_center) if i_after_Home < 0
[set Home_notaffordable 1]]

ask agents with [oldassisted = 2 and alone = 0]
[if any? agents-here with
[oldassisted = 0 and age > 18 and hours_available > 5 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 and age > 18
and hours_available > 5 and familyassisting = 0]
[let a random-float 1 if gender = 0 and a < 0.8
[create-FamilyCare-link-with myself set familyassisting 1 ask link-neighbors
[set my_FamilyCare 1]]
if gender = 1 and a < 0.7 [create-FamilyCare-link-with myself
set familyassisting 1 ask link-neighbors [set my_FamilyCare 1]]]]]

ask agents with [oldassisted = 2 and my_FamilyCare = 0 and family != 0]
[ask one-of other agents with
[family = [family] of myself and famid != [famid] of myself]
[if any? agents-here with [hours_available > 5 and age > 18
and familyassisting = 0] [ask one-of agents-here with

```

```

[hours_available > 5 and age > 18 and familyassisting = 0]
[let b random-float 1 if gender = 0 and b < 0.2
[create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 2]
set familyassisting 1 ask link-neighbors [set out_FamilyCare 1]]
if gender = 1 and b < 0.1 [create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 2] set familyassisting 1
ask link-neighbors [set out_FamilyCare 1]]]]]

ask agents with
[oldassisted = 2 and my_FamilyCare = 0 and out_FamilyCare = 0]
[ifelse Home_notaffordable = 0 [set Home_request 5]
[ifelse Nurse_notaffordable = 0 [set InHouseNurse 5]
[ask one-of other agents with
[family = [family] of myself and famid != [famid] of myself]
[set income_withhold (income + [income] of myself)
ifelse cost_daily_center < (income_withhold / 100 * 20)
[ask myself [set Home_request 5]
[if cost_Nurse_medium < (income_withhold / 100 * 20)
[ask myself [set InHouseNurse 5] ]]]]]]

end

to demand_low_assisted

ask agents with [oldassisted = 3]
[set i_after_Nurse (income - cost_Nurse_low)
if i_after_Nurse < 0 [set Nurse_notaffordable 1]]

ask agents with [oldassisted = 3 and alone = 0]
[if any? agents-here with [oldassisted = 0 or oldassisted = 3
and age > 18 and hours_available > 1 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 or oldassisted = 3
and age > 18 and hours_available > 1 and familyassisting = 0]
[let a random-float 1 if gender = 0 and a < 0.8 [create-FamilyCare-link-with
myself set familyassisting 1 ask link-neighbors [set my_FamilyCare 1]]
if gender = 1 and a < 0.7
[create-FamilyCare-link-with myself set familyassisting 1
ask link-neighbors [set my_FamilyCare 1]]]]]

ask agents with [oldassisted = 3 and my_FamilyCare = 0 and family != 0]
[ask one-of other agents with
[family = [family] of myself and famid != [famid] of myself]
[if any? agents-here with [hours_available > 5 and age > 18
and familyassisting = 0] [ask one-of agents-here with
[hours_available > 1 and age > 18 and familyassisting = 0]
[let b random-float 1 if gender = 0 and b < 0.2
[create-FamilyCare-link-with one-of agents with

```

```

[family = [family] of myself and oldassisted = 3 and my_FamilyCare = 0]
set familyassisting 1 ask link-neighbors [set out_FamilyCare 1]]
if gender = 1 and b < 0.1 [create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 3 and my_FamilyCare = 0]
set familyassisting 1 ask link-neighbors [set out_FamilyCare 1]]]]]

ask agents with [oldassisted = 3 and my_FamilyCare = 0
and out_FamilyCare = 0] [ifelse [decileyeq] of patch-here > 8
[set InHouseNurse 1]
[ask one-of other agents
with [family = [family] of myself and famid != [famid] of myself]
[set income_withhold (income + [income] of myself)
if cost_Nurse_low < (income_withhold / 100 * 8)
[ask myself [set InHouseNurse 1]]]]]

end

to offer_Care_high

while [any? ResidentialHomes with [public = 0 and places > 0]
and any? agents with [PHome_request = 24 and Home_found = 0]]
[ask ResidentialHomes with [public = 0] [ask max-one-of agents with
[PHome_request = 24 and Home_found = 0] [income]
[create-assistance-link-with myself move-to myself set Home_found 2]
set places (places - 1)]]
ask agents with [PHome_request = 24 and Home_found = 0]
[set Home_request 24]

while [any? ResidentialHomes with
[assistance = "high" and public = 1 and places > 0]
and any? agents with [Home_request = 24 and Home_found = 0]]
[ask ResidentialHomes with [assistance = "high" and public = 1]
[ifelse any? agents with
[Home_request = 24 and Home_found = 0 and alone = 1 and family = 0]
[ask min-one-of agents with [Home_request = 24 and Home_found = 0]
[income] [create-assistance-link-with myself move-to myself
set Home_found 1] set places (places - 1)] [ask min-one-of agents with
[Home_request = 24 and Home_found = 0] [income]
[create-assistance-link-with myself move-to myself set Home_found 1]
set places (places - 1)] ]]

ask agents with [Home_request = 24 and Home_found = 0]
[if Nurse_notaffordable = 0 [set InHouseNurse 24]]

end

to offer_Care_medium

while [any? ResidentialHomes with [assistance = "low" and places > 0]

```

```

and any? agents with [Home_request = 5 and Home_found = 0]]
[ask ResidentialHomes with [assistance = "low"]]
[ifelse any? agents with [Home_request = 5 and Home_found = 0
and alone = 1 and family = 0]
[ask min-one-of agents with [Home_request = 5 and Home_found = 0
and alone = 1 and family = 0] [income]
[create-assistance-link-with myself set Home_found 1] set places (places - 1)]
[ask min-one-of agents with [Home_request = 5 and Home_found = 0] [income]
[create-assistance-link-with myself set Home_found 1] set places (places - 1)]]

ask agents with [Home_request = 5 and Home_found = 0]
[if Nurse_notaffordable = 0 [set InHouseNurse 5]]

end

to countunassisted1

ask agents with [oldassisted != 0 and my_FamilyCare = 0
and out_FamilyCare = 0 and Home_found = 0 and InHouseNurse = 0]
[set unassisted 1]

end

to force_family_care_high

ask agents with [oldassisted = 1 and alone = 0 and unassisted = 1]
[if any? agents-here with [oldassisted = 0 and age < 80 and age > 18
and nowork = 1 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 and age < 80
and age > 18 and nowork = 1 and familyassisting = 0]
[create-FamilyCare-link-with myself set familyassisting 1
ask link-neighbors [set my_FamilyCare 2]]]

ask agents with [oldassisted = 1 and my_FamilyCare = 0
and unassisted = 1 and family != 0]
[ask one-of agents-on one-of patches with [pfamid = [family] of myself]
[if any? agents-here with [nowork = 1 and age > 18 and familyassisting = 0]
[ask min-n-of 1 agents-here with
[nowork = 1 and age > 18 and familyassisting = 0] [gender]
[create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 1]
set familyassisting 1 ask link-neighbors [set out_FamilyCare 2]]]]]

end

to force_family_care_medium

```

```

ask agents with [oldassisted = 2 and alone = 0 and unassisted = 1]
[if any? agents-here with [oldassisted = 0 and age > 18
and hours_available > 5 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 and age > 18
and hours_available > 5 and familyassisting = 0]
[create-FamilyCare-link-with myself set familyassisting 1
ask link-neighbors [set my_FamilyCare 2]]]

ask agents with [oldassisted = 2 and my_FamilyCare = 0
and unassisted = 1 and family != 0]
[ask one-of agents-on one-of patches with [pfamid = [family] of myself]
[if any? agents-here with [hours_available > 5 and age > 18
and familyassisting = 0] [ask min-n-of (1) agents-here with
[hours_available > 5 and age > 18 and familyassisting = 0] [gender]
[create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 2] set familyassisting 1
ask link-neighbors [set out_FamilyCare 2]]]]]

end

to force_family_care_low

ask agents with [oldassisted = 3 and alone = 0 and unassisted = 1]
[if any? agents-here with [oldassisted = 0 or oldassisted = 3 and age > 18
and hours_available > 1 and familyassisting = 0]
[ask one-of agents-here with [oldassisted = 0 or oldassisted = 3
and age > 18 and hours_available > 1 and familyassisting = 0]
[create-FamilyCare-link-with myself set familyassisting 1
ask link-neighbors [set my_FamilyCare 1]]]

ask agents with [oldassisted = 3 and my_FamilyCare = 0
and unassisted = 1 and family != 0]
[ask one-of agents-on one-of patches with [pfamid = [family] of myself]
[if any? agents-here with [hours_available > 5 and age > 18
and familyassisting = 0] [ask min-n-of (1) agents-here with
[hours_available > 1 and age > 18 and familyassisting = 0] [gender]
[create-FamilyCare-link-with one-of agents with
[family = [family] of myself and oldassisted = 3] set familyassisting 1
ask link-neighbors [set out_FamilyCare 2]]]]]

ask agents with [oldassisted = 3 and my_FamilyCare = 0
and out_FamilyCare = 0] [if 3560 < (income / 100 * 30) [set InHouseNurse 1]]

end

to countunassisted

```

```

ask agents with [oldassisted != 0 and my_FamilyCare = 0
and out_FamilyCare = 0 and Home_found = 0 and InHouseNurse = 0]
[set unassisted 2]

end

to update_interface

set assisted_by_family
(count agents with [out_FamilyCare != 0 or my_FamilyCare != 0])

set assisted_in_residential
(count agents with [Home_found = 1])
set assisted_in_private_residential (count agents with [Home_found = 2])

set assisted_by_InHouseNurse (count agents with [InHouseNurse != 0])

set tot_unassisted (count agents with [unassisted = 2])

set high_assisted_by_family
(count agents with [out_FamilyCare != 0 or my_FamilyCare != 0
and oldassisted = 1])
set high_assisted_in_residential (count agents with
[oldassisted = 1 and Home_found = 1])
set high_assisted_in_private_residential (count agents with
[oldassisted = 1 and Home_found = 2])
set high_assisted_by_InHouseNurse (count agents
with [oldassisted = 1 and InHouseNurse != 0])
set high_unassisted (count agents with [oldassisted = 1 and unassisted != 0])

set medium_assisted_by_family (count agents
with [out_FamilyCare != 0 or my_FamilyCare != 0 and oldassisted = 2])
set medium_assisted_in_residential (count agents
with [oldassisted = 2 and Home_found = 1])
set medium_assisted_by_InHouseNurse (count agents
with [oldassisted = 2 and InHouseNurse != 0])
set medium_unassisted (count agents
with [oldassisted = 2 and unassisted != 0])

set low_assisted_by_family (count agents
with [out_FamilyCare != 0 or my_FamilyCare != 0 and oldassisted = 3])
set low_assisted_in_residential (count agents
with [oldassisted = 3 and Home_found = 1])
set low_assisted_by_InHouseNurse (count agents
with [oldassisted = 3 and InHouseNurse != 0])
set low_unassisted (count agents with [oldassisted = 3 and unassisted != 0])

```

```

set public_expenditures_high_residential round(count agents
with [Home_found = 1 and oldassisted = 1] *
((45167 / 100) * (100 - quota_consumers_%) ) 

set public_expenditures_low_residential
round(count agents with [Home_found = 1 and oldassisted = 2] *
((18245 / 100) * (100 - quota_D_consumers_%) ) 
set public_expenditures_cash_transfers
round(count agents with [cash_benefit = 1] * 5915.64 ) 

set total_public_expenditure
(round((public_expenditures_high_residential +
public_expenditures_high_residential + public_expenditures_cash_transfers)
/ 1000)) 

set private_expenditure_badanti (((count agents with [oldassisted = 1
and InHouseNurse = 24 and cash_benefit = 0] * cost_Nurse_high)
+ (count agents with [oldassisted = 1 and InHouseNurse = 24
and cash_benefit = 1] * (cost_Nurse_high - 5915.64))
+ (count agents with [oldassisted = 2 and InHouseNurse = 5
and cash_benefit = 0] * cost_Nurse_medium)
+ (count agents with [oldassisted = 2 and InHouseNurse = 5
and cash_benefit = 1] * (cost_Nurse_medium - 5915.64))
+ (count agents with [oldassisted = 3 and InHouseNurse = 1
and cash_benefit = 0] * cost_Nurse_low)
+ (count agents with [oldassisted = 3 and InHouseNurse = 1
and cash_benefit = 1] * (cost_Nurse_low - 5915.64)))) 

set private_expenditure_residential ( (count agents with [oldassisted = 1
and Home_found = 2 and cash_benefit = 0] * 45167)
+ (count agents with [oldassisted = 1 and Home_found = 2
and cash_benefit = 1] * (45167 - 5915.64))
+ (count agents with [oldassisted = 1 and Home_found = 1
and cash_benefit = 0] * cost_public_res)
+ (count agents with [oldassisted = 1 and Home_found = 1
and cash_benefit = 1] * (cost_public_res - 5915.64))
+ (count agents with [oldassisted = 2 and Home_found = 1
and cash_benefit = 0] * 10580)
+ (count agents with [oldassisted = 2 and Home_found = 1
and cash_benefit = 1] * (10580 - 5915.64))) 

set total_private_expenditure (round((private_expenditure_residential +
private_expenditure_badanti) / 1000))

set total_expenditure (round(total_private_expenditure +
total_public_expenditure))

set time_family ( (high_assisted_by_family * 24) +
(medium_assisted_by_family * 5) + (low_assisted_by_family * 1) )

```

```

set time_InHouseNurse ( (high_assisted_by_InHouseNurse * 24) +
(medium_assisted_by_InHouseNurse * 5) +
(low_assisted_by_InHouseNurse * 1) )
set time_residential ( (high_assisted_in_residential * 24) +
(medium_assisted_in_residential * 5) )
set hoursneeded_unsatisfied ( (high_unassisted * 24) +
(medium_unassisted * 5) + (low_unassisted * 1) )

set experiment experiment + 1
output-type (experiment) output-type ")"
output-type "Places residential homes: private: "
output-type (places_private_ResidentialHome24)
output-type "; public: " output-type (places_ResidentialHome24)
output-type "; public(5h): " output-type (places_ResidentialHome5)
output-type ". Women labor force participation: "
if lfp = "full" [output-type "full"] if lfp = "actual" [output-type "actual"]
if lfp = "low" [output-type "low"]
output-type "; Reduce income of " ifelse reduce_income
[output-type (how_much_%) output-type "%"] [output-type "0%"]
output-type "; Cash transfers: " ifelse cash_transfer [output-print "yes"]
[output-print "no"]

output-type (assisted_by_family_%) output-type "; "
output-type (assisted_in_residential_%) output-type "; "
output-type (assisted_in_private_residential_%) output-type "; "
output-type (assisted_by_InHouseNurse_%) output-type "; "
output-type (tot_unassisted_%) output-type "; "
output-type (round((private_expenditure_badanti)/ 1000)) output-type "; "
output-type (round((private_expenditure_residential)/ 1000)) output-type "; "
output-type (total_private_expenditure) output-type "; "
output-type (total_public_expenditure) output-print ". "

end

to plots

setup-plots

set-current-plot "type of assistance"
set experiments experiments + 1
set-current-plot-pen "family" plotxy experiments time_family

set experiments experiments + 1
set-current-plot-pen "InHouseNurse" plotxy experiments time_InHouseNurse

set experiments experiments + 1
set-current-plot-pen "residential" plotxy experiments time_residential
set-current-plot-pen "private" plotxy experiments

```

```

(high_assisted_in_private_residential * 24)

set experiments experiments + 1
set-current-plot-pen "unassisted" plotxy experiments hoursneeded_unsatisfied
set-current-plot-pen "low_unassisted" plotxy experiments (low_unassisted * 1)
set experiments experiments + 1

set-current-plot "expenditures (thousands of euros)"
set experiments1 experiments1 + 1
set-current-plot-pen "total" plotxy experiments1 total_expenditure

set experiments1 experiments1 + 1
set-current-plot-pen "public" plotxy experiments1 total_public_expenditure

set experiments1 experiments1 + 1
set-current-plot-pen "private" plotxy experiments1 total_private_expenditure
set experiments1 experiments1 + 1

update-plots

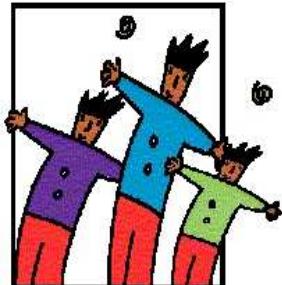
export-output "result.csv"
export-interface "interface.png"

end

```

Chapter 9

Appendix 2: ICES*mo3*



UNIVERSITÀ DEGLI STUDI
DI MODENA E REGGIO EMILIA

ICESmo 3^a edizione

Indagine sulle condizioni economiche e sociali delle famiglie nella provincia di Modena

| A cura dell'intervistatore | |
|---|---|
| COMUNE DI: | Codice Comune: <input type="text"/> |
| NOME E COGNOME INTERVISTATORE: | Codice Famiglia: <input type="text"/> |
| ESITO CONTATTO: 1. Intervista realizzata 2. Rifiuto 3. Non reperibile | Codice Intervistatore: <input type="text"/> Codice Esito: <input type="checkbox"/> |

Segreto statistico e tutela della riservatezza

I dati raccolti nell'ambito della presente rilevazione sono tutelati dal segreto statistico e sottoposti alle regole stabilite, a tutela della riservatezza, dal Regolamento CE n. 322/97, dalla legge n. 675/96 e successive modifiche e integrazioni. Essi possono essere esternati o comunicati soltanto in forma aggregata, secondo modalità che rendano non identificabili gli interessati, ai sensi dell'art. 9 del d. lgs. n. 322/89, come modificato dall'art. 12 del d. lgs. n. 281/99, nonché secondo le forme e nel rispetto dei limiti previsti dall'art. 22 del Regolamento di attuazione. I dati possono essere utilizzati solo per scopi statistici, in base a quanto stabilito dall'art. 9 del d. lgs. 322/89.
Tutte le risposte fornite sono protette dalla legge sulla tutela della riservatezza (d.lgs. n. 196 del 30/6/2003) I dati raccolti saranno utilizzati soltanto a fini statistici, pubblicandoli sotto forma di tabelle e in modo tale che non vi sia alcun riferimento individuale. Tutte le persone che lavorano alla ricerca sono tenute al segreto d'ufficio.

B. NOTIZIE RELATIVE AI COMPONENTI DELLA FAMIGLIA
 (riferirsi alla situazione attuale)

B1) Di quanti componenti è composta attualmente la famiglia?

Per ciascun componente, può indicare:

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Nome: (ordinare i componenti capofamiglia, coniuge/convivente, altre persone in ordine decrescente di età) | | | | | | | | |
| B2) E' presente all'intervista? | | | | | | | | |
| 1. Sì | 1 <input type="checkbox"/> |
| 2. No | 2 <input type="checkbox"/> |
| B2.1) Panel 2006 (var. in entrata) | | | | | | | | |
| 1. Nato | <input type="checkbox"/> |
| 2. Nuovo ingresso | | | | | | | | |
| 3. Nuovo capofamiglia | | | | | | | | |
| 4. 2+3 | | | | | | | | |
| B2.2) Domiciliato altrove | 1 <input type="checkbox"/> |
| B3) Sesso | | | | | | | | |
| 1. Uomo..... | 1 <input type="checkbox"/> |
| 2. Donna..... | 2 <input type="checkbox"/> |
| B4) Relazione con il capofamiglia | | | | | | | | |
| B5) Data di nascita | giorno B5.1 | <input type="checkbox"/> |
| mese B5.2 | | <input type="checkbox"/> |
| anno B5.3 | | | <input type="checkbox"/> |
| B6) Luogo di nascita | | | | | | | | |
| (sigla provincia se in Italia o codice stato se stato estero) | | | | | | | | |
| B7) Cittadinanza | | | | | | | | |
| 1. Italiana..... | 1 <input type="checkbox"/> |
| 2. Unione Europea..... | 2 <input type="checkbox"/> |
| 3. Extraeuropea..... | 3 <input type="checkbox"/> |
| B8) Da quale anno risiede stabilmente in questo comune? | | | | | | | | |
| B9) Se trasferito, da quale | | | | | | | | |
| Comune (codice) B9.1 | <input type="checkbox"/> |
| Provincia (sigla) B9.2 | <input type="checkbox"/> |
| Paese estero (codice) B9.3 | <input type="checkbox"/> |
| B10) Stato civile | | | | | | | | |
| 1. Celibe/nubile..... | 1 <input type="checkbox"/> |
| 2. Coniugato/a..... | 2 <input type="checkbox"/> |
| 3. Separato/divorziato..... | 3 <input type="checkbox"/> |
| 4. Vedovo/a..... | 4 <input type="checkbox"/> |

B4) Relazione con il capofamiglia

- 1 = Capofamiglia
- 2 = Coniuge del capofamiglia
- 3 = Convivente del capofamiglia
- 4 = Figlio/a del capofamiglia e del coniuge/convivente
- 5 = Figlio/a del solo capofamiglia
- 6 = Figlio/a del solo coniuge/convivente
- 7 = Genitore (o coniuge del genitore) del capofamiglia o del coniuge/convivente
- 8 = Suocero/a del capofamiglia o del coniuge/convivente
- 9 = Fratello/sorella del capofamiglia
- 10 = Fratello/sorella del coniuge/convivente
- 11 = Coniuge del fratello/sorella del capofamiglia o del coniuge/convivente
- 12 = Genero/nuora del capofamiglia e/o del coniuge/convivente
- 13 = Nipote (figlio/a di un figlio/a) del capofamiglia e/o del coniuge/convivente
- 14 = Nipote (figlio/a di un fratello/sorella) del capofamiglia o del coniuge/convivente
- 15 = Altro parente del capofamiglia e/o del coniuge/convivente
- 16 = Altra persona convivente senza legami di parentela

C. ESPERIENZA SCOLASTICA
solo per il nati prima del 01/01/1998 (15 anni e più nel 2012)
(riferirsi alla situazione attuale)

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| C1) Qual è il titolo di studio più alto da lei conseguito? | | | | | |
| 1. Nessuno..... | <input type="checkbox"/> |
| 2. Licenza elementare..... | <input type="checkbox"/> |
| 3. Avviamento..... | <input type="checkbox"/> |
| 4. Licenza media..... | <input type="checkbox"/> |
| 5. Qualifica professionale | <input type="checkbox"/> |
| 6. Diploma media superiore..... | <input type="checkbox"/> |
| 7. Post maturità non universitario..... (conservatorio, accademia belle arti, ecc.) | <input type="checkbox"/> |
| 8. Laurea triennale o diploma universitario | <input type="checkbox"/> |
| 9. Laurea specialistica (vecchio ordinamento, specialistica, magistrale, ciclo unico) | <input type="checkbox"/> |
| 10. Post-laurea (special.ne, perfez.to, master)..... | <input type="checkbox"/> |
| 11. Dottorato | <input type="checkbox"/> |
| C2) Se sta frequentando o ha frequentato la scuola media superiore, di che tipo di scuola si tratta? | | | | | |
| 1. Istituto professionale..... | <input type="checkbox"/> |
| 2. Istituto tecnico commerciale..... | <input type="checkbox"/> |
| 3. Istituto tecnico industriale | <input type="checkbox"/> |
| 4. Altri istituti tecnici (geometri, agrario, ecc.) | <input type="checkbox"/> |
| 5. Liceo classico..... | <input type="checkbox"/> |
| 6. Liceo scientifico..... | <input type="checkbox"/> |
| 7. Liceo linguistico..... | <input type="checkbox"/> |
| 8. Liceo artistico e istituti d'arte..... | <input type="checkbox"/> |
| 9. Magistrali/Liceo socio-pedagogico..... | <input type="checkbox"/> |
| 10. Altro | <input type="checkbox"/> |
| C3) Se ha frequentato la scuola media superiore, in quale anno si è diplomato o ha abbandonato gli studi? | anno | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| C4) Se ha frequentato l'università (7-11 dom.C1) in quale anno ha conseguito il titolo di studio più elevato o ha abbandonato gli studi? | anno | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

D. CONDIZIONE PROFESSIONALE
solo per il nati prima del 01/01/1998 (15 anni e più nel 2012)
(riferirsi alla situazione attuale e a quella del gennaio 2008)

| NIP Numero identificazione personale | 1 Capo Famiglia | | 2 | | 3 | | 4 | | 5 | |
|--|-----------------|------|------|------|------|------|------|------|------|------|
| | 2012 | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 | 2008 |
| D1) Qual è la sua attuale condizione professionale e qual era a gennaio 2008?* | | | | | | | | | | |
| <i>Occupato** cartellino</i> | | | | | | | | | | |
| 1. Operaio..... | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. Impiegato..... | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| 3. Insegnante..... | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ |
| 4. Impiegato direttivo/quadro | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ |
| 5. Dirigente, alto funzionario, preside, direttore didattico, magistrato, docente universitario..... | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ |
| 6. Lavoratore atipico..... | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ |
| 7. Libero professionista | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ |
| 8. Imprenditore individuale..... | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ |
| 9. Lavoratore autonomo o artigiano..... | 9 □ | 9 □ | 9 □ | 9 □ | 9 □ | 9 □ | 9 □ | 9 □ | 9 □ | 9 □ |
| 10. Titolare o coadiuvante di impresa familiare..... | 10 □ | 10 □ | 10 □ | 10 □ | 10 □ | 10 □ | 10 □ | 10 □ | 10 □ | 10 □ |
| 11. Socio o gestore di società..... | 11 □ | 11 □ | 11 □ | 11 □ | 11 □ | 11 □ | 11 □ | 11 □ | 11 □ | 11 □ |
| <i>In cerca di occupazione</i> | | | | | | | | | | |
| 12. Disoccupato***..... | 12 □ | 12 □ | 12 □ | 12 □ | 12 □ | 12 □ | 12 □ | 12 □ | 12 □ | 12 □ |
| 13. In cerca di prima occupazione..... | 13 □ | 13 □ | 13 □ | 13 □ | 13 □ | 13 □ | 13 □ | 13 □ | 13 □ | 13 □ |
| <i>Inattivo</i> | | | | | | | | | | |
| 14. Benestante..... | 14 □ | 14 □ | 14 □ | 14 □ | 14 □ | 14 □ | 14 □ | 14 □ | 14 □ | 14 □ |
| 15. Pensionato da lavoro..... | 15 □ | 15 □ | 15 □ | 15 □ | 15 □ | 15 □ | 15 □ | 15 □ | 15 □ | 15 □ |
| 16. Pensionato non da lavoro (invalidità, reversibilità, sociale) | 16 □ | 16 □ | 16 □ | 16 □ | 16 □ | 16 □ | 16 □ | 16 □ | 16 □ | 16 □ |
| 17. Inabile al lavoro (senza pensione)..... | 17 □ | 17 □ | 17 □ | 17 □ | 17 □ | 17 □ | 17 □ | 17 □ | 17 □ | 17 □ |
| 18. Militare di leva, volontario (servizio civile).... | 18 □ | 18 □ | 18 □ | 18 □ | 18 □ | 18 □ | 18 □ | 18 □ | 18 □ | 18 □ |
| 19. Casalinga..... | 19 □ | 19 □ | 19 □ | 19 □ | 19 □ | 19 □ | 19 □ | 19 □ | 19 □ | 19 □ |
| 20. Studente universitario (7-11 dom. C1)..... | 20 □ | 20 □ | 20 □ | 20 □ | 20 □ | 20 □ | 20 □ | 20 □ | 20 □ | 20 □ |
| 21. Studente | 21 □ | 21 □ | 21 □ | 21 □ | 21 □ | 21 □ | 21 □ | 21 □ | 21 □ | 21 □ |
| 22. Altro (specificare) | 22 □ | 22 □ | 22 □ | 22 □ | 22 □ | 22 □ | 22 □ | 22 □ | 22 □ | 22 □ |

***D1) Condizione professionale**

6. **Lavoratore atipico:** chi lavora con contratti di collaborazione coordinata/continuativa,

collaborazione a progetto, collaborazione occasionale, associazione in partecipazione, Partita Iva monocommittente.

7. **Libero professionista:** chi esercita per conto proprio una professione o un'arte liberale.

8. **Imprenditore individuale:** chi gestisce in proprio un'azienda impiegando prevalentemente personale dipendente.

9. **Lavoratore autonomo:** chi gestisce un'azienda nella quale impiega prevalentemente la propria opera manuale.

10. **Titolare o coadiuvante di impresa familiare:** chi gestisce un'azienda dove viene impiegata prevalentemente l'opera manuale propria o di familiari che collaborano alla conduzione dell'attività.

11. **Socio o gestore di società:** chi possiede azioni/quote di società di capitale o di persone e presta in queste un'attività di lavoro o amministrativa.

****Occupato:** si considerano tra gli Occupati i lavoratori dipendenti in Cassa Integrazione Ordinaria (in deroga o non), in Cassa Integrazione Straordinaria (in deroga o non) o con Contratto di solidarietà (in deroga o non). (per questi casi compilare anche la dom. D8)

*****Disoccupato:** all'interno dei Disoccupati sono presenti anche gli Iscritti alle Liste di mobilità (per questi casi compilare anche la dom. D10).

E. REDDITI E LAVORO
solo per il nati prima del 01/01/1998 (15 anni e più nel 2012)

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| E1) Nel 2011, ha riscosso redditi da: <i>cartellino</i> (sono possibili più redditi per ogni Nip) | | | | | |
| 1. Lavoro dipendente (vai dom. E2).....E1.1 | 1 <input type="checkbox"/> |
| 2. Lavoro atipico (vai dom. E14).....E1.2 | 2 <input type="checkbox"/> |
| 3. Lavoro indipendente (vai dom. E23).....E1.3 | 3 <input type="checkbox"/> |
| 4. Pensione (vai dom. E34)E1.4 | 4 <input type="checkbox"/> |
| 5. Trasferimenti e redditi non altrove considerati (vai dom. E41).....E1.5 | 5 <input type="checkbox"/> |
| 6. Nessun redditoE1.6 | 6 <input type="checkbox"/> |
| REDDITI DA LAVORO DIPENDENTE | | | | | |
| E2) Nel 2011, il lavoro svolto come lavoratore dipendente era la sua attività: | | | | | |
| 1. Principale..... | 1 <input type="checkbox"/> |
| 2. Secondaria..... | 2 <input type="checkbox"/> |
| E3) Era un lavoro: | | | | | |
| 1. A tempo pieno..... | 1 <input type="checkbox"/> |
| 2. Part-time..... | 2 <input type="checkbox"/> |
| E4) Che tipo di contratto aveva? | | | | | |
| 1. Apprendistato/Formazione-lavoro..... | 1 <input type="checkbox"/> |
| 2. Interinale | 2 <input type="checkbox"/> |
| 3. Stagionale | 3 <input type="checkbox"/> |
| 4. Lavoro a domicilio | 4 <input type="checkbox"/> |
| 5. Tempo determinato | 5 <input type="checkbox"/> |
| 6. Tempo indeterminato | 6 <input type="checkbox"/> |
| 7. Altro (specificare) | 7 <input type="checkbox"/> |
| E5) Nel 2011, quanti mesi ha lavorato come lavoratore dipendente? (incluse le ferie) mesi | 1 <input type="checkbox"/> |
| E6) Nei mesi in cui ha lavorato, nel corso del 2011, come dipendente, quante ore ha lavorato in media alla settimana? ore (escluse le ore di straordinario) | 1 <input type="checkbox"/> |
| E7) Nei mesi in cui ha lavorato, nel corso del 2011, come dipendente, quante ore di straordinario ha fatto in media alla settimana? ore | 1 <input type="checkbox"/> |
| E8) Mantenendo la sua retribuzione oraria, quante ore vorrebbe lavorare in media alla settimana? ore | 1 <input type="checkbox"/> |
| E9) Nel 2011, ha percepito assegni familiari? | | | | | |
| 1. Sì | 1 <input type="checkbox"/> |
| 2. No | 2 <input type="checkbox"/> |

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|---|--------------------|-------|-------|-------|-------|
| E10) Nel 2011, come dipendente, qual è stata la sua retribuzione netta mensile? (compresi assegni familiari e al netto di imposte e contributi) euro | □□□□ | □□□□□ | □□□□□ | □□□□□ | □□□□□ |
| E11) Nel 2011, come dipendente, quante mensilità di stipendio ha ricevuto? mesi | □□ | □□ | □□ | □□ | □□ |
| E12) Nel 2011, ha ricevuto integrazioni di reddito? (ticket mensa, viaggi premio, auto, ecc.) (escluso l'alloggio) | | | | | |
| 1. Sì | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. No | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| Se Si, per quale ammontare complessivo? | | | | | |
| migliaia di euro (000) E12.1 | □□, □ | □□, □ | □□, □ | □□, □ | □□, □ |
| E13) Nel 2011, quante persone erano stabilmente occupate nell'azienda in cui lavorava? | | | | | |
| 1. fino a 4 addetti..... | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. 5-15 addetti..... | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| 3. 16-30 addetti..... | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ |
| 4. 31-49 addetti..... | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ |
| 5. 50-99 addetti..... | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ |
| 6. 100-499 addetti..... | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ |
| 7. 500 e oltre | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ |
| 8. Non applicabile (pubblica amministrazione, sanità, scuola, banche, assicurazioni) | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ |
| REDDITI DA LAVORO ATIPICO | | | | | |
| E14) Nel 2011, il lavoro svolto come lavoratore atipico/collaboratore era la sua attività: | | | | | |
| 1. Principale..... | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. Secondaria..... | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| E15) Era un lavoro: | | | | | |
| 1. A tempo pieno..... | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. Part-time..... | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| E16) Che tipo di contratto aveva? | | | | | |
| 1. Collaborazione a progetto o co.co.co. | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. Collaborazione occasionale..... | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| 3. Entrambe (1+2)..... | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ |
| 4. Associazione in partecipazione..... | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ |
| 5. Partita Iva monocommittente | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ |
| 6. Altro (specificare) | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ |
| E17) Nel 2011, come lavoratore atipico, quanti mesi ha lavorato? (incluse le ferie) mesi | □□ | □□ | □□ | □□ | □□ |
| Di cui: feriemesi E17.1 | □□ | □□ | □□ | □□ | □□ |
| E18) Nei mesi in cui ha lavorato, nel corso del 2011, come lavoratore atipico, quante ore ha lavorato in media alla settimana? ore | □□ | □□ | □□ | □□ | □□ |

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| E19) Mantenendo la sua retribuzione oraria, quante ore vorrebbe lavorare in media alla settimana? ore | <input type="checkbox"/> |
| E20) Nel 2011, come lavoratore atipico, qual è stata la sua retribuzione netta mensile? (al netto delle imposte) euro | <input type="checkbox"/> |
| 1. Collaborazione a progetto o co.co.co.....E20.1 | <input type="checkbox"/> |
| 2. Collaborazione occasionale.....E20.2 | <input type="checkbox"/> |
| 3. Altri contrattiE20.3 | <input type="checkbox"/> |
| E21) Con quale periodicità le venivano pagati i compensi? una sola risposta | | | | | |
| 1. Mensilmente | <input type="checkbox"/> |
| 2. Periodicamente (bimestre, trimestre, ecc.)..... | <input type="checkbox"/> |
| 3. Occasionalmente | <input type="checkbox"/> |
| E22) Nel 2011, quante persone erano stabilmente occupate nell'azienda per cui lavorava? | | | | | |
| 1. fino a 4 addetti..... | <input type="checkbox"/> |
| 2. 5-15 addetti..... | <input type="checkbox"/> |
| 3. 16-30 addetti..... | <input type="checkbox"/> |
| 4. 31-49 addetti..... | <input type="checkbox"/> |
| 5. 50-99 addetti..... | <input type="checkbox"/> |
| 6. 100-499 addetti..... | <input type="checkbox"/> |
| 7. 500 e oltre | <input type="checkbox"/> |
| 8. Non applicabile (pubblica amministrazione, sanità, scuola, banche, assicurazioni) | <input type="checkbox"/> |
| REDDITI DA LAVORO INDIPENDENTE | | | | | |
| E23) Nel 2011, il lavoro svolto come lavoratore indipendente era la sua attività: | | | | | |
| 1. Principale..... | <input type="checkbox"/> |
| 2. Secondaria..... | <input type="checkbox"/> |
| E24) Era un lavoro: | | | | | |
| 1. A tempo pieno..... | <input type="checkbox"/> |
| 2. Part-time..... | <input type="checkbox"/> |
| E25) Sta continuando l'attività di un suo familiare? | | | | | |
| 1. Sì | <input type="checkbox"/> |
| 2. No | <input type="checkbox"/> |
| E26) Nel 2011, come lavoratore indipendente, quanti mesi ha lavorato? (incluse le ferie) mesi | <input type="checkbox"/> |
| E27 Nei mesi in cui ha lavorato, nel corso del 2011, come indipendente, quante ore ha lavorato in media alla settimana? ore | <input type="checkbox"/> |

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|--|--------------------|------|------|------|------|
| E28) Mantenendo il suo reddito orario, quante ore vorrebbe lavorare in media alla settimana? ore | □□ | □□ | □□ | □□ | □□ |
| <i>Per tutti gli indipendenti, escluso i soci/gestori di società (11 dom. D1)</i> | | | | | |
| E29) Nel 2011, come lavoratore indipendente, qual è stato il reddito mensile netto?* (al netto delle imposte) euro | □□□□ | □□□□ | □□□□ | □□□□ | □□□□ |
| <i>Solo per i soci/gestori di società (11 dom. D1)</i> | | | | | |
| E30) Nel 2011, quanto ha ricevuto come compenso fisso per l'attività svolta? (al netto delle imposte) migliaia di euro (000) | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| E31) Nel 2011, qual è stato l'ammontare degli utili distribuiti a lei personalmente? (al netto delle imposte) migliaia di euro (000) | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| <i>Per tutti i lavoratori indipendenti</i> | | | | | |
| E32) Nel 2011, quante persone erano stabilmente occupate nell'azienda in cui lavorava? | | | | | |
| 1. fino a 4 addetti..... | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. 5-15 addetti..... | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| 3. 16-30 addetti..... | 3 □ | 3 □ | 3 □ | 3 □ | 3 □ |
| 4. 31-49 addetti..... | 4 □ | 4 □ | 4 □ | 4 □ | 4 □ |
| 5. 50-99 addetti..... | 5 □ | 5 □ | 5 □ | 5 □ | 5 □ |
| 6. 100-499 addetti..... | 6 □ | 6 □ | 6 □ | 6 □ | 6 □ |
| 7. 500 e oltre | 7 □ | 7 □ | 7 □ | 7 □ | 7 □ |
| 8. Non applicabile (pubblica amministrazione, sanità, scuola, banche, assicurazioni) | 8 □ | 8 □ | 8 □ | 8 □ | 8 □ |
| E33) Da gennaio 2008 ad oggi, a causa della crisi, ha avuto dei periodi nei quali, pur lavorando, non ha potuto percepire un reddito? | | | | | |
| 1. Sì | 1 □ | 1 □ | 1 □ | 1 □ | 1 □ |
| 2. No | 2 □ | 2 □ | 2 □ | 2 □ | 2 □ |
| Se Sì, per quanti mesi complessivi mesi E33.1 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |

*E29) **Reddito mensile netto** = Ricavi (da vendita di prodotti o servizi al netto di IVA e Proventi diversi) - Costi (spese di manutenzione ordinaria, acquisto di materie prime o merci, compensi di personale dipendente, spese correnti, affitto locali, imposte e altri oneri fiscali, interessi passivi, canoni di leasing con esclusione di ammortamenti/accantonamenti).

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| REDDITI DA PENSIONE | | | | | |
| E34) Nel 2011, quante pensioni ha percepito? | | | | | |
| Numero pensioni | <input type="checkbox"/> |
| <i>Considerare le 3 principali cartellini</i> | | | | | |
| E35) Quali enti le pagano la pensione?* | | | | | |
| Pensione n. 1 E35.1 | <input type="checkbox"/> |
| Pensione n. 2 E35.2 | <input type="checkbox"/> |
| Pensione n. 3 E35.3 | <input type="checkbox"/> |
| E36) Che tipo di pensione percepisce??* | | | | | |
| Pensione n. 1 E36.1 | <input type="checkbox"/> |
| Pensione n. 2 E36.2 | <input type="checkbox"/> |
| Pensione n. 3 E36.3 | <input type="checkbox"/> |
| E37) Da quale anno percepisce questa pensione? | | | | | |
| Pensione n. 1.....anno.....E37.1 | <input type="checkbox"/> |
| Pensione n. 2.....anno.....E37.2 | <input type="checkbox"/> |
| Pensione n. 3.....anno.....E37.3 | <input type="checkbox"/> |
| E38) Nel 2011, quanto ha percepito di pensione al mese? | | | | | |
| Pensione n. 1.....euro.....E38.1 | <input type="checkbox"/> |
| Pensione n. 2.....euro.....E38.2 | <input type="checkbox"/> |
| Pensione n. 3.....euro.....E38.3 | <input type="checkbox"/> |
| E39) Nel 2011, quante mensilità di pensione ha percepito? | | | | | |
| Pensione n. 1.....numero mensilità.....E39.1 | <input type="checkbox"/> |
| Pensione n. 2.....numero mensilità.....E39.2 | <input type="checkbox"/> |
| Pensione n. 3.....numero mensilità.....E39.3 | <input type="checkbox"/> |
| E40) Nel 2011, ha ricevuto arretrati di pensione, oltre alle normali mensilità? | | | | | |
| 1. Sì | <input type="checkbox"/> |
| 2. No | <input type="checkbox"/> |
| Se Sì, per quale importo complessivo? | | | | | |
| Pensione n. 1 migliaia di euro (000).....E40.1 | <input type="checkbox"/> |
| Pensione n. 2 migliaia di euro (000).....E40.2 | <input type="checkbox"/> |
| Pensione n. 3 migliaia di euro (000).....E40.3 | <input type="checkbox"/> |

*E35) Enti che pagano la pensione = 1.Inps; 2. Inpdap; 3. Stato; 4. Inail; 5. Enti privati italiani; 6. Enti esteri; 7. Altro.

**E36) Che tipo di pensione percepisce = 11 Da lavoro per vecchiaia; 12 Da lavoro per anzianità;
 2. Sociale (assistenza); 3. Invalidità civile; 4. Invalidità Inps;
 5. Di reversibilità; 6. Di guerra; 7. Da contribuzione volontaria;
 8. Pensione estera; 9. Altro.

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|--|------------------------|------|------|------|------|
| TRASFERIMENTI E ALTRI REDDITI <i>cartellino</i> | | | | | |
| E41) Nel 2011, ha riscosso uno o più dei seguenti trasferimenti pubblici e per quale importo complessivo? | | | | | |
| (al netto delle imposte) | migliaia di euro (000) | | | | |
| 1. Assegni di disoccupazione, Cig, mobilità..... E41.1 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 2. Assegni familiari o altri per carichi familiari... E41.2 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 3. Indennità di accompagnamento o assegni di cura..... E41.3 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 4. Contributo per pagamento affitto, E41.4 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 5. Sussidi dal Comune per il pagamento di bollette, trasporto pubblico, mensa scolastica E41.5 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 6. Altri trasferimenti da enti pubblici E41.6 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| E42) Nel 2011, ha ricevuto? | | | | | |
| (al netto delle imposte) | migliaia di euro (000) | | | | |
| 1. Assegni per alimenti, E42.1 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 2. Borse di studio, E42.2 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 3. Regali in denaro da non conviventi E42.3 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 4. Prestiti in denaro da non conviventi E42.4 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 5. Redditi da liquidazione del lavoro (Tfr) E42.5 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 6. Altri redditi da lavoro (lavoro non regolare, baby sitting, ripetizioni, ecc.) E42.6 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 7. Altri redditi da vincite E42.7 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 8. Altri redditi (escluso gli affitti)..... E42.8 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| E43) Nel 2011, ha corrisposto? | | | | | |
| | migliaia di euro (000) | | | | |
| 1. Assegni per alimenti E43.1 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 2. Regali in denaro a non conviventi E43.2 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 3. Prestiti in denaro a non conviventi E43.3 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| 4. Contributi per servizi residenziali e socio-sanitari per familiari non autosufficienti..... E43.4 | □□,□ | □□,□ | □□,□ | □□,□ | □□,□ |
| PER TUTTI I PERCETTORI DI REDDITO | | | | | |
| E44) Supponga che il suo reddito imponibile IRPEF aumenti di 100 euro, è in grado di dire su questi 100 euro quanto pagherà di IRPEF? | | | | | |
| | euro | □□ | □□ | □□ | □□ |
| Non sa | E44.1 | 1 □ | 1 □ | 1 □ | 1 □ |

G. ALTRI BENI IMMOBILI (abitazioni, altri fabbricati, terreni)
(riferirsi alla situazione attuale)

| PER TUTTI | | | | |
|--|------|--|----------------------------|--|
| G1) La famiglia possiede beni immobili diversi dall'abitazione principale? (di cui è proprietaria anche parzialmente) | | G5) Che superficie totale hanno i beni immobili e, a suo giudizio, a quanto potrebbero essere venduti?* | | |
| 1. Sì..... | | 1 <input type="checkbox"/> | <i>Immobile</i> | Superficie totale mq. migliaia di euro (000) |
| 2. No (vai alla sezione successiva)..... | | 2 <input type="checkbox"/> | 1° G5.1 | ██████ G5.11 █████ |
| Se Sì, quanti sono complessivamente? | | G1.1 | 2° G5.2 | ██████ G5.22 █████ |
| | | | 3° G5.3 | ██████ G5.33 █████ |
| | | | 4° G5.4 | ██████ G5.44 █████ |
| (per i terreni superficie in ettari: 1 ettaro=10mila mq.) | | | | |
| SE SI | | | | |
| G2) Che tipo di beni immobili possiede la famiglia? | | | | |
| <i>Immobili ordinati per valore</i> | | 1° G2.1 | 2° G2.2 | 3° G2.3 |
| | | 4° G2.4 | | |
| a. Altre abitazioni (per villeggiatura, in affitto, ecc.) | | | | |
| 1. nel comune..... | | 1 <input type="checkbox"/> | 1 <input type="checkbox"/> | 1 <input type="checkbox"/> |
| 2. fuori comune..... | | 2 <input type="checkbox"/> | 2 <input type="checkbox"/> | 2 <input type="checkbox"/> |
| b. Altri fabbricati (capannoni industriali, locali commerciali, uffici, garage, box, ecc.) | | | | |
| 3. nel comune..... | | 3 <input type="checkbox"/> | 3 <input type="checkbox"/> | 3 <input type="checkbox"/> |
| 4. fuori comune..... | | 4 <input type="checkbox"/> | 4 <input type="checkbox"/> | 4 <input type="checkbox"/> |
| c. Terreni agricoli (con o senza fabbricati) e non agricoli | | | | |
| 5. nel comune..... | | 5 <input type="checkbox"/> | 5 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 6. fuori comune..... | | 6 <input type="checkbox"/> | 6 <input type="checkbox"/> | 6 <input type="checkbox"/> |
| G3) A quali usi sono destinati i beni immobili? | | | | |
| <i>Immobili ordinati per valore</i> | | 1° G3.1 | 2° G3.2 | 3° G3.3 |
| | | 4° G3.4 | | |
| 1. Affittato | | | | |
| 1 <input type="checkbox"/> | | 1 <input type="checkbox"/> | 1 <input type="checkbox"/> | 1 <input type="checkbox"/> |
| 2. Ad uso gratuito a familiari e non | | | | |
| 2 <input type="checkbox"/> | | 2 <input type="checkbox"/> | 2 <input type="checkbox"/> | 2 <input type="checkbox"/> |
| 3. Seconda casa (per uso proprio, villeggiatura, ecc.) | | | | |
| 3 <input type="checkbox"/> | | 3 <input type="checkbox"/> | 3 <input type="checkbox"/> | 3 <input type="checkbox"/> |
| 4. Per attività lavorative familiari ... | | | | |
| 4 <input type="checkbox"/> | | 4 <input type="checkbox"/> | 4 <input type="checkbox"/> | 4 <input type="checkbox"/> |
| 5. Coltivato direttamente | | | | |
| 5 <input type="checkbox"/> | | 5 <input type="checkbox"/> | 5 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 6. Immobile sfitto o terreno incolto | | | | |
| 6 <input type="checkbox"/> | | 6 <input type="checkbox"/> | 6 <input type="checkbox"/> | 6 <input type="checkbox"/> |
| G4) In quale percentuale, la famiglia è proprietaria dei beni immobili? | | | | |
| <i>Immobile</i> | | % | | |
| 1° | G4.1 | █████ | | |
| 2° | G4.2 | █████ | | |
| 3° | G4.3 | █████ | | |
| 4° | G4.4 | █████ | | |
| G5) Che superficie totale hanno i beni immobili e, a suo giudizio, a quanto potrebbero essere venduti?* | | | | |
| G6) Nel 2011, quanto ha pagato complessivamente di ICI per i beni immobili posseduti dalla sua famiglia? | | | | |
| (diversi dall'abitazione principale) | | euro | ████████ | |
| SE DATI IN AFFITTO | | | | |
| G7) A quanto ammonta l'affitto mensile percepito?* | | | | |
| (escluse le spese di condominio, riscaldamento, ecc.) | | | | |
| <i>Immobile</i> | | euro | | |
| 1° | G7.1 | ██████ | | |
| 2° | G7.2 | ██████ | | |
| 3° | G7.3 | ██████ | | |
| 4° | G7.4 | ██████ | | |
| SE NON SONO DATI IN AFFITTO | | | | |
| G8) Se volesse affittare gli immobili o i terreni, quale canone mensile di affitto potrebbe ottenere?* | | | | |
| <i>Immobile</i> | | euro | | |
| 1° | G8.1 | ██████ | | |
| 2° | G8.2 | ██████ | | |
| 3° | G8.3 | ██████ | | |
| 4° | G8.4 | ██████ | | |

***G5, G7, G8)** Indicare la superficie e il valore complessivo del bene, indipendentemente dalla quota posseduta dalla famiglia. Indicare l'affitto complessivamente percepito o che potrebbe essere percepito per l'intero bene, indipendentemente dalla quota posseduta dalla famiglia.

H. RICCHEZZA FAMILIARE
(riferirsi alla situazione attuale)

| PER TUTTI | | | | | | | | | | | | | | | | | | | |
|---|--|-----------------------------|------------------------------|------------------------------------|----------------------------|---|----------------------------|---------------------------------|---|-----------------------------------|----------------------------|---------------------------|----------------------------|--------------------------------|----------------------------|-----------------------------|---------------------------|--|-----|
| <p>H1) Attualmente a quanto ammonta il patrimonio finanziario della famiglia nel suo complesso? (depositi bancari e non, titoli, fondi comuni, ecc.)</p> <p style="text-align: right;">migliaia di euro (000) H1.1 <input type="text"/></p> <p style="text-align: right;">cartellino classe H1.2 <input type="text"/></p> | <p>H6) Nel passato, la sua famiglia ha ricevuto eredità o donazioni?</p> <p>1. Sì 1 <input type="checkbox"/> 2. No. 2 <input type="checkbox"/></p> <p>Se Sì, quale percentuale dell'attuale patrimonio immobiliare e finanziario della famiglia rappresentano? quota % H6.1 <input type="text"/></p> <p>a quanto ammonta il valore dell'eredità o della donazione più importante? classe H6.2 <input type="text"/></p> <p>in quale anno l'ha ricevuta? anno H6.3 <input type="text"/></p> | | | | | | | | | | | | | | | | | | |
| <p>H2) Come è suddiviso il patrimonio finanziario tra:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <th style="text-align: left;">cartellino</th> <th style="text-align: right;">quota %</th> </tr> <tr> <td>1. Depositi bancari e postali.....</td> <td style="text-align: right;">H2.1 <input type="text"/></td> </tr> <tr> <td>2. Titoli pubblici (Bot, Cct, Btp).....</td> <td style="text-align: right;">H2.2 <input type="text"/></td> </tr> <tr> <td>3. Obbligazioni private.....</td> <td style="text-align: right;">H2.3 <input type="text"/></td> </tr> <tr> <td>4. Azioni o quote di società.....</td> <td style="text-align: right;">H2.4 <input type="text"/></td> </tr> <tr> <td>5. Fondi comuni.....</td> <td style="text-align: right;">H2.5 <input type="text"/></td> </tr> <tr> <td>6. Prestiti a cooperative.....</td> <td style="text-align: right;">H2.6 <input type="text"/></td> </tr> <tr> <td>7. Altro (specificare).....</td> <td style="text-align: right;">H2.7 <input type="text"/></td> </tr> <tr> <td></td> <td style="text-align: right;">100</td> </tr> </table> | | cartellino | quota % | 1. Depositi bancari e postali..... | H2.1 <input type="text"/> | 2. Titoli pubblici (Bot, Cct, Btp)..... | H2.2 <input type="text"/> | 3. Obbligazioni private..... | H2.3 <input type="text"/> | 4. Azioni o quote di società..... | H2.4 <input type="text"/> | 5. Fondi comuni..... | H2.5 <input type="text"/> | 6. Prestiti a cooperative..... | H2.6 <input type="text"/> | 7. Altro (specificare)..... | H2.7 <input type="text"/> | | 100 |
| cartellino | quota % | | | | | | | | | | | | | | | | | | |
| 1. Depositi bancari e postali..... | H2.1 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 2. Titoli pubblici (Bot, Cct, Btp)..... | H2.2 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 3. Obbligazioni private..... | H2.3 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 4. Azioni o quote di società..... | H2.4 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 5. Fondi comuni..... | H2.5 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 6. Prestiti a cooperative..... | H2.6 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 7. Altro (specificare)..... | H2.7 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| | 100 | | | | | | | | | | | | | | | | | | |
| <p>H3) Attualmente, la sua famiglia ha crediti o debiti nei confronti di persone non conviventi?</p> <p>1. Crediti nei confronti di non conviventi..... H3.1 <input type="checkbox"/> 2. Debiti nei confronti di non conviventi..... H3.2 <input type="checkbox"/> 3. Nessuno H3.3 <input type="checkbox"/></p> <p>Se ha crediti o debiti, per quale ammontare?</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">Per esigenze della famiglia</td> <td style="text-align: right;">Per l'attività professionale</td> </tr> <tr> <td style="text-align: right;">H3.4 <input type="text"/></td> <td style="text-align: right;">H3.6 <input type="text"/></td> </tr> <tr> <td colspan="2" style="text-align: right;">migliaia di euro (000)</td> </tr> <tr> <td style="text-align: right;">Debiti</td> <td style="text-align: right;">H3.5 <input type="text"/> H3.7 <input type="text"/></td> </tr> <tr> <td colspan="2" style="text-align: right;">euro (.000)</td> </tr> </table> | | Per esigenze della famiglia | Per l'attività professionale | H3.4 <input type="text"/> | H3.6 <input type="text"/> | migliaia di euro (000) | | Debiti | H3.5 <input type="text"/> H3.7 <input type="text"/> | euro (.000) | | | | | | | | | |
| Per esigenze della famiglia | Per l'attività professionale | | | | | | | | | | | | | | | | | | |
| H3.4 <input type="text"/> | H3.6 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| migliaia di euro (000) | | | | | | | | | | | | | | | | | | | |
| Debiti | H3.5 <input type="text"/> H3.7 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| euro (.000) | | | | | | | | | | | | | | | | | | | |
| <p>H4) Attualmente, la sua famiglia ha debiti nei confronti di banche o finanziarie? (compresi i mutui)</p> <p>1. Per acquisto o ristrutturazione di immobili..... H4.1 <input type="checkbox"/> 2. Per acquisto di altri beni (auto, arredo, ecc.)... H4.2 <input type="checkbox"/> 3. Per l'attività professionale H4.3 <input type="checkbox"/> 4. Nessuno..... H4.4 <input type="checkbox"/></p> <p>Se ha debiti, per quale ammontare? migliaia di euro (000)</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">1. Per immobili.....</td> <td style="text-align: right;">H4.11 <input type="text"/></td> </tr> <tr> <td style="text-align: right;">2. Per altri beni</td> <td style="text-align: right;">H4.21 <input type="text"/></td> </tr> <tr> <td style="text-align: right;">3. Per attività professionale.....</td> <td style="text-align: right;">H4.31 <input type="text"/></td> </tr> </table> | | 1. Per immobili..... | H4.11 <input type="text"/> | 2. Per altri beni | H4.21 <input type="text"/> | 3. Per attività professionale..... | H4.31 <input type="text"/> | | | | | | | | | | | | |
| 1. Per immobili..... | H4.11 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 2. Per altri beni | H4.21 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| 3. Per attività professionale..... | H4.31 <input type="text"/> | | | | | | | | | | | | | | | | | | |
| <p>H5) Attualmente, la famiglia sta pagando un mutuo per l'abitazione principale?</p> <p>1. Sì 1 <input type="checkbox"/> 2. No. 2 <input type="checkbox"/></p> <p>Se Sì, a quanto ammonta la rata annuale? migliaia di euro (000) H5.1 <input type="text"/></p> | | | | | | | | | | | | | | | | | | | |
| <p>H7) Il reddito a disposizione della sua famiglia, permette di arrivare alla fine del mese:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <th style="text-align: left;">cartellino</th> <th></th> </tr> <tr> <td>1. Con molta difficoltà.....</td> <td style="text-align: right;">1 <input type="checkbox"/></td> </tr> <tr> <td>2. Con difficoltà.....</td> <td style="text-align: right;">2 <input type="checkbox"/></td> </tr> <tr> <td>3. Con qualche difficoltà</td> <td style="text-align: right;">3 <input type="checkbox"/></td> </tr> <tr> <td>4. Abbastanza facilmente</td> <td style="text-align: right;">4 <input type="checkbox"/></td> </tr> <tr> <td>5. Facilmente</td> <td style="text-align: right;">5 <input type="checkbox"/></td> </tr> <tr> <td>6. Molto facilmente</td> <td style="text-align: right;">6 <input type="checkbox"/></td> </tr> </table> | | cartellino | | 1. Con molta difficoltà..... | 1 <input type="checkbox"/> | 2. Con difficoltà..... | 2 <input type="checkbox"/> | 3. Con qualche difficoltà | 3 <input type="checkbox"/> | 4. Abbastanza facilmente | 4 <input type="checkbox"/> | 5. Facilmente | 5 <input type="checkbox"/> | 6. Molto facilmente | 6 <input type="checkbox"/> | | | | |
| cartellino | | | | | | | | | | | | | | | | | | | |
| 1. Con molta difficoltà..... | 1 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 2. Con difficoltà..... | 2 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 3. Con qualche difficoltà | 3 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 4. Abbastanza facilmente | 4 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 5. Facilmente | 5 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 6. Molto facilmente | 6 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| <p>H8) Nel 2011, quanto la sua famiglia è riuscita a risparmiare?</p> <p style="text-align: right;">migliaia di euro (000) H8.1 <input type="text"/> cartellino classe H8.2 <input type="text"/></p> | | | | | | | | | | | | | | | | | | | |
| <p>H9) A suo parere, quanto ci vuole al mese per una famiglia come la sua per vivere senza lussi, ma senza privarsi del necessario?</p> <p style="text-align: right;">euro <input type="text"/></p> | | | | | | | | | | | | | | | | | | | |
| <p>H10) Rispetto a 3 anni fa, ritiene che la condizione economica della sua famiglia sia:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <th style="text-align: left;">cartellino</th> <th></th> </tr> <tr> <td>1. Molto migliorata</td> <td style="text-align: right;">1 <input type="checkbox"/></td> </tr> <tr> <td>2. Migliorata</td> <td style="text-align: right;">2 <input type="checkbox"/></td> </tr> <tr> <td>3. Stabile</td> <td style="text-align: right;">3 <input type="checkbox"/></td> </tr> <tr> <td>4. Peggiorata</td> <td style="text-align: right;">4 <input type="checkbox"/></td> </tr> <tr> <td>5. Molto peggiorata</td> <td style="text-align: right;">5 <input type="checkbox"/></td> </tr> </table> | | cartellino | | 1. Molto migliorata | 1 <input type="checkbox"/> | 2. Migliorata | 2 <input type="checkbox"/> | 3. Stabile | 3 <input type="checkbox"/> | 4. Peggiorata | 4 <input type="checkbox"/> | 5. Molto peggiorata | 5 <input type="checkbox"/> | | | | | | |
| cartellino | | | | | | | | | | | | | | | | | | | |
| 1. Molto migliorata | 1 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 2. Migliorata | 2 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 3. Stabile | 3 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 4. Peggiorata | 4 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 5. Molto peggiorata | 5 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| <p>H11) E' soddisfatto della condizione economica della sua famiglia?</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <th style="text-align: left;">cartellino</th> <th></th> </tr> <tr> <td>1. Per nulla.....</td> <td style="text-align: right;">1 <input type="checkbox"/></td> </tr> <tr> <td>2. Poco</td> <td style="text-align: right;">2 <input type="checkbox"/></td> </tr> <tr> <td>3. Abbastanza</td> <td style="text-align: right;">3 <input type="checkbox"/></td> </tr> <tr> <td>4. Molto</td> <td style="text-align: right;">4 <input type="checkbox"/></td> </tr> <tr> <td>5. Moltissimo</td> <td style="text-align: right;">5 <input type="checkbox"/></td> </tr> </table> | | cartellino | | 1. Per nulla..... | 1 <input type="checkbox"/> | 2. Poco | 2 <input type="checkbox"/> | 3. Abbastanza | 3 <input type="checkbox"/> | 4. Molto | 4 <input type="checkbox"/> | 5. Moltissimo | 5 <input type="checkbox"/> | | | | | | |
| cartellino | | | | | | | | | | | | | | | | | | | |
| 1. Per nulla..... | 1 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 2. Poco | 2 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 3. Abbastanza | 3 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 4. Molto | 4 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| 5. Moltissimo | 5 <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |

| PER TUTTI | | | | | | |
|--|----------------------------|--------------------------|---|---------------------------------------|--------------------------------|----------------------------|
| H12) La sua famiglia, se volesse, potrebbe permettersi: | | | H16) Dal 2008 ad oggi, per effetto della crisi (ovvero in seguito alla riduzione dei redditi dell'attività lavorativa e/o imprenditoriale), la sua famiglia ha dovuto chiedere un prestito o un aiuto economico a parenti o amici? | | | |
| <i>cartellino</i> | | | | | | |
| | Sì | No | | | | |
| 1. Una settimana di vacanza all'anno lontano da casa | H12.1 | <input type="checkbox"/> | <input type="checkbox"/> | 1. Si, l'ho ottenuto | <input type="checkbox"/> | |
| 2. Di mangiare carne, pollo o pesce (o equivalente vegetariano) almeno ogni due giorni | H12.2 | <input type="checkbox"/> | <input type="checkbox"/> | 2. Si, non l'ho ottenuto | <input type="checkbox"/> | |
| 3. Di riscaldare adeguatamente l'abitazione in cui vive | H12.3 | <input type="checkbox"/> | <input type="checkbox"/> | 3. No | | |
| H13) Nel 2011, ci sono stati momenti o periodi in cui la sua famiglia è stata in arretrato con il pagamento di: | | | H17) Dal 2008 ad oggi, per effetto della crisi (ovvero in seguito alla riduzione dei redditi dell'attività lavorativa e/o imprenditoriale), la sua famiglia ha dovuto chiedere un prestito a banche o finanziarie? | | | |
| <i>cartellino</i> | | | | | | |
| 1 | 2 o + | Mai | 1 | 2 o + | 3. No | |
| volta | volte | | volta | volte | | |
| 1. Bollette (gas, luce, acqua, ecc.) | H13.1 | <input type="checkbox"/> | <input type="checkbox"/> | 1. Per esigenze della famiglia | H16.1 <input type="checkbox"/> | |
| 2. Affitto abitazione in cui vive | H13.2 | <input type="checkbox"/> | <input type="checkbox"/> | 2. Per l'attività professionale | H16.2 <input type="checkbox"/> | |
| 3. Rate del mutuo/prestitti per la casa | H13.3 | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| 4. Altri debiti | H13.4 | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| H14) La sua famiglia sarebbe in grado di far fronte a spese impreviste di un ammontare di circa 800 euro con risorse proprie? | | | H18) Dal 2008 ad oggi, i risparmi della sua famiglia sono stati utilizzati per ricapitalizzare l'impresa di famiglia o sostenere l'attività professionale di alcuni dei suoi componenti? | | | |
| 1. Sì | 1 <input type="checkbox"/> | | 1. Si | 1 <input type="checkbox"/> | | |
| 2. No | 2 <input type="checkbox"/> | | 2. No | 2 <input type="checkbox"/> | | |
| H15) Quali dei seguenti beni possiede la sua famiglia: | | | H19) Dal 2008 ad oggi, i risparmi della sua famiglia sono stati utilizzati per far fronte alle spese ordinarie** della vita quotidiana della famiglia? | | | |
| <i>cartellino</i> | | | | | | |
| Sì | No, | No, | 1 | 2 o + | 3. No | |
| | non pos- | per altri | volta | volte | | |
| | siamo | motivi | | | | |
| | permessi | | | | | |
| | tercelo | | | | | |
| 1. Lavatrice | H15.1 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. Si | 1 <input type="checkbox"/> |
| 2. Frigorifero | H15.2 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. No | 2 <input type="checkbox"/> |
| 3. Lavastoviglie | H15.3 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 4. Telefono (fisso o cellulare) | H15.4 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 5. Telegiornale a colori | H15.5 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 6. Antenna parabolica | H15.6 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 7. Videocamera | H15.7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 8. Videoregistratore/lettore dvd | H15.8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 9. Personal computer | H15.9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 10. Accesso a internet | H15.10 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 11. Auto | H15.11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| indicare il n°di auto H15.111 <input type="checkbox"/> | | | migliaia di euro (000) H18.1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| | | | cartellino classe H18.2 <input type="checkbox"/> | | | |

H1), H6), H8), H18), H19) Classe di appartenenza

- | | | |
|-----------------------|-------------------------|------------------------------|
| 1 = 0 | 6 = 6.001-8.000 euro | 11 = 70.001-150.000 euro |
| 2 = fino a 1.000 euro | 7 = 8.001-12.000 euro | 12 = 151.001-300.000 euro |
| 3 = 1.001-2.000 euro | 8 = 12.001-18.000 euro | 13 = 300.001-500.000 euro |
| 4 = 2.001-4.000 euro | 9 = 18.001-35.000 euro | 14 = 500.001-1.000.000 euro |
| 5 = 4.001-6.000 euro | 10 = 35.001-70.000 euro | 15 = oltre 1 milione di euro |

I. SERVIZI PER ANZIANI E PORTATORI DI HANDICAP
 (riferirsi alla situazione attuale)

| PER TUTTI | SE SI |
|---|--|
| I1) Fra i componenti della famiglia vi sono persone nate prima del 01/01/1947 (66 e più nel 2012) o portatori di handicap che necessitano di particolare assistenza? <p>1. Sì, in modo continuativo..... 1 <input type="checkbox"/> 2. Sì, in modo saltuario..... 2 <input type="checkbox"/> 3. No (vai alla sezione successiva) 3 <input type="checkbox"/></p> | NIP familiari bisognosi <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> I3) Se accuditi da familiari non conviventi (dom.I2.1), quale tipo di parentela esiste tra la persona bisognosa e il familiare non convivente? 1. Sorella 2. Fratello 3. Figlia 4. Figlio I3.1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 5. Nuora 6. Genero I3.2 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 7. Altri parenti I3.3 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| I2) Per i familiari bisognosi, la famiglia si avvale di qualcuno dei seguenti aiuti? cartellino NIP familiari bisognosi <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 1. Familiari conviventi e non conviventi (nip 9) anche dom. I3 NIP familiari che lo assistono I2.1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> I2.2 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> I2.3 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Ore al giorno..... I2.4 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Giorni a settimana..... I2.5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 2. Servizi pubblici o convenzionati Ore al giorno..... I2.6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Giorni a settimana I2.7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Spesa media mensile euro I2.8 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 3. Servizi privati Ore al giorno..... I2.9 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Giorni a settimana I2.10 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Spesa media mensile euro I2.11 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 4. Persona retribuita (badante) Ore al giorno..... I2.12 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Giorni a settimana..... I2.13 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Spesa media mensile euro I2.14 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Convivente 1. Sì 2. No I2.15 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | I4) La sua famiglia ha mai valutato l'opportunità di ricoverare in una struttura protetta il familiare bisognoso? cartellino vedi sotto* I4 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> I5) Considerando nel complesso gli aiuti e i servizi utilizzati, ritiene che il familiare bisognoso sia adeguatamente accudito? 1. Si 2. No I5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

*I4)

- 1. Sì, è già inserito in una struttura
- 2. Sì, siamo in lista di attesa
- 3. Sì, ma costava troppo e abbiamo rinunciato
- 4. Sì, ma la soluzione trovata non era adeguata
- 5. No, vogliamo mantenere la domiciliarità
- 6. No, non possiamo permettercelo
- 7. No, per ora non è necessario

M. LAVORO NON PAGATO DI CURA E DOMESTICO
solo per il capofamiglia e il coniuge/convivente o la coppia di generazione centrale
(riferirsi alla situazione attuale)

| | <i>NIP Capofamiglia</i> | | <i>NIP Coniuge/convivente</i> | |
|--|-------------------------|-------------------------------|-------------------------------|-----------------------|
| | □ | □ | □ | □ |
| M1) Quante ore dedica in media alla settimana alle seguenti attività? | <i>Ore effettive</i> | <i>Ore desiderate</i> | <i>Ore effettive</i> | <i>Ore desiderate</i> |
| ore settimanali <i>cartellino</i> | | | | |
| 1. Cura dei figli minori, fino ai 14 anni..... | M1.11 □□ | M1.12 □□ | M1.11 □□ | M1.12 □□ |
| 2. Cura di altri parenti presenti nel nucleo familiare..... | M1.21 □□ | M1.22 □□ | M1.21 □□ | M1.22 □□ |
| 3. Cura e lavoro domestico di altri parenti <u>non</u> presenti nel nucleo familiare..... | M1.31 □□ | M1.32 □□ | M1.31 □□ | M1.32 □□ |
| 4. Lavoro domestico..... (lavare, stirare, cucinare, pulire, ecc.) | M1.41 □□ | M1.42 □□ | M1.41 □□ | M1.42 □□ |
| 5. Sonno | M1.51 □□ | M1.52 □□ | M1.51 □□ | M1.52 □□ |
| 6. Tempo libero | M1.61 □□ | M1.62 □□ | M1.61 □□ | M1.62 □□ |
| M2) Quante ore di lavoro domestico sono svolte in media alla settimana da: | | | <i>Ore settimanali</i> | |
| 1. Colf..... | | | M2.1 | □□ |
| 2. Altri componenti del nucleo familiare (diversi dal partner) | | | M2.2 | □□ |
| 3. Parenti non conviventi..... | | | M2.3 | □□ |
| | <i>NIP Capofamiglia</i> | <i>NIP Coniuge/convivente</i> | | |
| M3) A che età è uscito definitivamente dalla famiglia di origine? | □ | □ | | |
| | □ | □ | | |
| M4) Qual è il motivo principale per cui è uscito dalla famiglia di origine? <i>una sola risposta cartellino</i> | | | | |
| 1. Per esigenze di studio | 1 □ | | 1 □ | |
| 2. Per esigenze di lavoro | 2 □ | | 2 □ | |
| 3. Per matrimonio | 3 □ | | 3 □ | |
| 4. Per convivenza | 4 □ | | 4 □ | |
| 5. Per vivere per conto proprio..... | 5 □ | | 5 □ | |
| M5) A che età si è sposato o ha iniziato una convivenza? (per la prima volta) | □□ | | □□ | |
| M6) A che età ha avuto il primo figlio? | □□ | □□ | | |
| Non ha figli | M6.1 | 1 □ | 1 □ | |

Q. SALUTE
solo per i nati prima del 01/01/1998 (15 anni e più nel 2012)

| NIP Numero identificazione personale | 1 Capo Famiglia | 2 | 3 | 4 | 5 |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Q1) Le è riconosciuta una condizione di invalidità? | | | | | |
| 1. Sì..... | 1 <input type="checkbox"/> |
| 2. No..... | 2 <input type="checkbox"/> |
| Se Sì, in quale percentuale? Q1.1 | █████% | █████% | █████% | █████% | █████% |
| Q2) Lei ha qualche forma di esenzione dal pagamento delle prestazioni sanitarie? | | | | | |
| 1. Sì, per patologia (malattia cronica o invalidità) | 1 <input type="checkbox"/> |
| 2. Sì, per altro motivo (fascia 0: esenzione per reddito fino a 36mila euro; o altro) | 2 <input type="checkbox"/> |
| 3. No | 3 <input type="checkbox"/> |
| 4. Non so..... | 4 <input type="checkbox"/> |
| Q3) Negli ultimi 12 mesi, ha fatto ricorso al Pronto Soccorso? | | | | | |
| 1. Sì..... | 1 <input type="checkbox"/> |
| 2. No..... | 2 <input type="checkbox"/> |
| Se Sì, quante volte? Q3.1 | ██ | ██ | ██ | ██ | ██ |
| quante volte ha pagato il ticket? Q3.2 | ██ | ██ | ██ | ██ | ██ |
| Q4) Negli ultimi 12 mesi è stato ricoverato per almeno una notte in un ospedale pubblico o privato? | | | | | |
| 1. Sì..... | 1 <input type="checkbox"/> |
| 2. No..... | 2 <input type="checkbox"/> |
| Se Sì, per quante notti? Q4.1 | ██ | ██ | ██ | ██ | ██ |
| Q5) Può indicare la sua statura attuale? cm. | ████ | ████ | ████ | ████ | ████ |
| Q6) Può indicare il suo peso attuale?* kg. | ████ | ████ | ████ | ████ | ████ |
| Q7) A causa di problemi di salute, ha delle limitazioni, che durano da almeno 6 mesi, nello svolgere le abituali attività della vita quotidiana? | | | | | |
| 1. Sì, gravi..... | 1 <input type="checkbox"/> |
| 2. Sì, ma non gravi | 2 <input type="checkbox"/> |
| 3. No..... | 3 <input type="checkbox"/> |
| Q8) Negli ultimi 12 mesi, quante visite specialistiche ha effettuato? | | | | | |
| (escluso il dentista)n° Q8.1 | ██ | ██ | ██ | ██ | ██ |
| Di cui: privaten° Q8.2 | ██ | ██ | ██ | ██ | ██ |
| Q9) Negli ultimi 12 mesi, le è capitato di dover rinunciare a cure mediche per motivi economici? | | | | | |
| 1. Sì..... | 1 <input type="checkbox"/> |
| 2. No..... | 2 <input type="checkbox"/> |

*Q6) Le donne in attesa di un bambino devono indicare il proprio peso prima della gravidanza.

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