

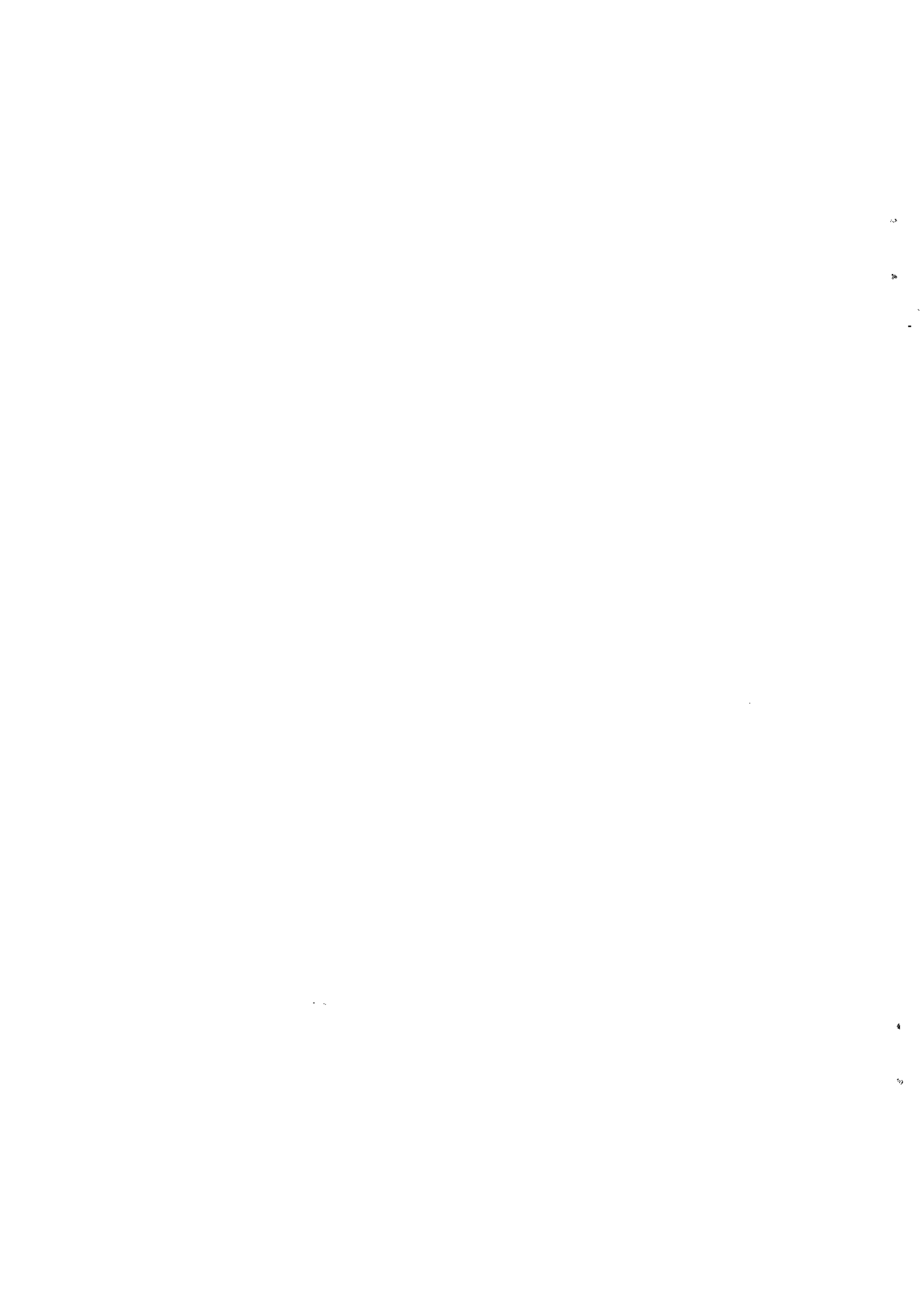
## Serie Research Memoranda

### Modeling the Determinants of the Use of Care Services by the Elderly: a Study on Extramural Services in the Netherlands

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## Abstract

A common characteristic of the EC countries is a general tendency towards an aging society. This demographic change is expected to have among others important consequences for the use of care services: the EC countries have all become aware of, on the one hand, the expected increase of use of care services for the elderly and the related increase of public expenditures and, on the other hand, the limited public budgets. Therefore, the aim of care services policy in the EC countries is to make the provision of these services compatible with financial limitations on public budgets.

After a brief overview of the different policy responses regarding care services for the elderly in the EC countries, this paper will be focussed on the recent Dutch care services policy, i.e. the substitution policy. In short, the substitution policy aims to reduce public expenditures for care services for the elderly by a shift from expensive intramural care services to semi-mural and extramural care services, under the condition of an equal quality level of services. In addition to this shift in the public services themselves, the Dutch government tries to realize a shift from public to private and/or (semi-) informal service provisions (including self-help).

After an analysis of the potential and the problems involved in the substitution strategy for these care services, we will focus our attention on the demand side. The purpose of this paper is to test the feasibility of the substitution strategy. For this purpose, a logit model will be developed and estimated in order to identify factors that may be significant in determining whether a selected elderly person is likely to use extramural care services. Given the results from this empirical analysis, the paper will be concluded with some reflective remarks.



## 1. Introduction

In recent years we have witnessed an increasing awareness of drastic demographic changes in most Western societies. Birth rates are falling, while the average age is rising significantly. This causes the so-called 'silver revolution', which means that the number of elderly (the 'silver generation') will increase in size, while at the same time they will also grow much older (see Vollering, 1991). This 'double aging' process will not only have far reaching social consequences, but will also create enormous consequences for the economy (cf. Van Praag, 1989). To some extent the foundations and achievements of a modern welfare state are at stake here: the social security system (including public pension schemes) may increasingly be put under severe stress, the compulsory retirement age (65) may be threatened, while also the increasing costs of public provisions for rising number of elderly may become incompatible with limited government budgets.

In the present paper we will mainly focus attention on care provisions for the 'silver generation'. Various countries have recognized the implications of the 'double aging' process for the span of public services to be provided to the elderly. In a cross-national comparative study on the size, nature and adjustments in the public care systems for the elderly (see Nijkamp et al., 1990; Wilderom et al., 1991) it was found that most countries of the European Community (with the exception of Portugal and Ireland) are more or less exhibiting the same demographic evolution. However, the policy responses to the demographic revolution are sometimes entirely different; most countries tend to find their own ways in coping with the consequences of this demographic change for public provisions. In Nijkamp et al. (1991) a survey has been given of innovative policy measures which are being planned in order to reconcile the 'silver revolution' with limited public budgets. Some examples and conclusions from the latter study will be given here below.

The high costs of residential services, especially of intramural care, have caused many EC countries to shift towards new ambulatory and non-ambulatory community services and informal services for the aged, stimulated by the governments or by private initiatives. For instance, in West-Germany, Greece, Ireland, Italy and the UK, placement of elderly people with relative or non-relative persons willing to care for them ("boarding-out") instead of stationary treatment by conventional, intramural housing services is initiated.

Further, de-institutionalizing elderly people requires complementary care services to meet the needs of these semi-independent elderly. Examples are meals on wheels in Luxembourg among others, 24 hour home help services and 24 hour district nursing in Denmark among others, day care in hospitals and in old age homes in Belgium among others, hospital care at home or home-nursing in France among others and sheltered housing in Ireland among others. These innovations provide the possibility to prevent or delay permanent stay in intramural institutions, to relieve the informal or principal caregivers and/or to promote the integration of elderly in their local environments.

Also institutional changes concerning intramural innovations in the provision of services for the elderly are noticed. For instance, in Ireland community lodgings are set up for those elderly for whom ordinary private accomodation was no longer suitable or available. Furthermore, dependances of nursing homes are established in the Netherlands.

Caused by the complexity and heterogeneity, i.e. separatism in the

care system, many countries are coping with insufficient cooperation and integration between (formal as well as between formal and informal) services (e.g., in Belgium, France, Ireland, the Netherlands and UK) resulting, for instance, in misallocation of clients and services themselves. Therefore, local initiatives of integrated elderly are being taken in order to overcome the limited coordination between suppliers of services (accommodation, care and nursing) as well as the misallocation of clients, to provide the right care in the right place for the elderly in need of such support (i.e., tailored care for the elderly) and to reduce costs. In addition, the above mentioned study shows that coordination itself can result in the generation of innovative services, thereby improving the integration of new initiatives (e.g., in France).

Finally, it appears that in some countries (e.g., in Denmark and France) the national government plays an important and active role in the reconstruction and renovation of old buildings for elderly in order to enable the elderly to live as long as possible in their own homes.

Summarizing, it may be stated that considerable institutional changes in services for the elderly in the EC are taking place. For instance, most countries in the EC are facing a trend of de-institutionalization (e.g., the Netherlands, West-Germany and Ireland) and decentralization (e.g., Italy, West-Germany, France, Greece, Spain and the UK). In some countries, a tendency towards central planning of elderly services exists, implemented by national governments becoming more aware of the rapidly changing demographic situation (e.g., in Luxembourg and Portugal). In other countries a clear division of the housing and service functions (e.g., Denmark) is noticed.

Although in some countries (e.g., Portugal) the low level of service provision is an important reason for innovative initiatives, a main finding from cross-national comparative studies in Europe is that many innovative residential and community services aim to maintain the elderly in their own environment as long as possible and to cut the high costs of traditional services for the aged.

It is also noteworthy that innovation is a context-specific phenomenon in the area of elderly care in Europe. Certain new initiatives or policies which were as yet unknown in some countries, and hence may be regarded as innovations, are already common in other countries. In addition, there appears to be a wide spectrum of backgrounds and appearances of innovative behaviour in the provision of services to the elderly in Europe. Most of such innovative responses do not come about automatically, but are a result of stimuli from the outside. As indicated above, one such stimulus is the increasing tendency for de-centralisation and de-regulation which was triggered off by various institutional changes.

Finally, although the public sector is becoming aware of the pressing demographic situation and is acting more alert, the current institutional changes or innovations do not sufficiently solve the existing problems in the care-service provision for the elderly. Therefore, Nijkamp et al. (1991) conclude that national government have to cooperate with private enterprises to initiate several innovations.

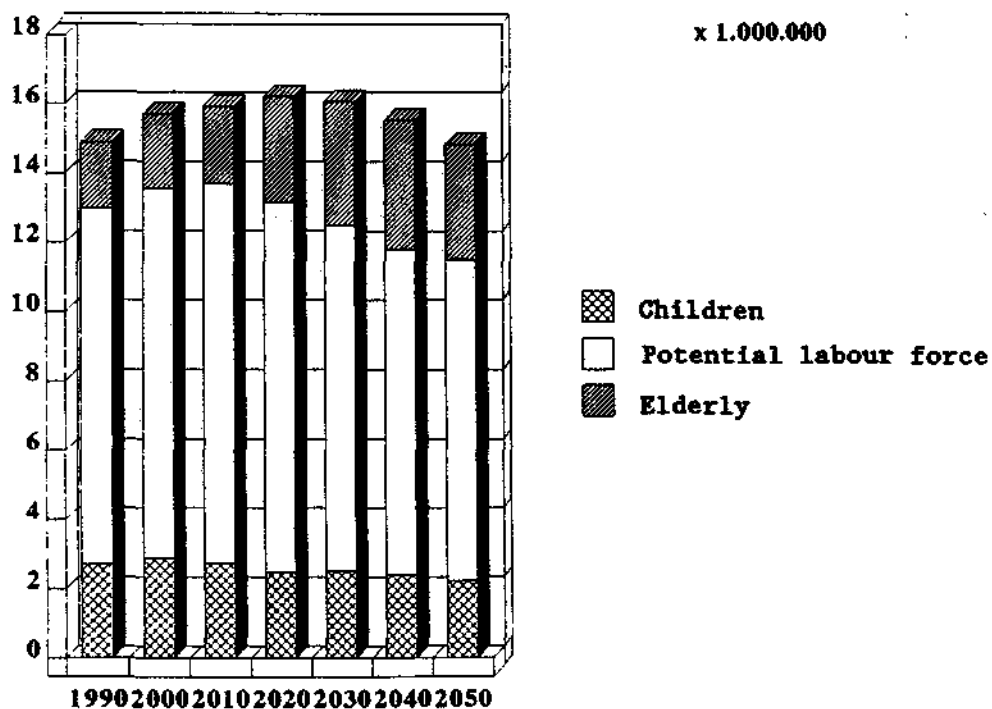
Thus policy responses in various countries show entirely different patterns. Though all of them try to economize on the costs of the provisions for the elderly, the socio-cultural circumstances in different countries tend to lead to significant differences in care systems for the 'silver generation'.

In the present paper we will orient ourselves to some recent Dutch policy developments regarding care systems for the elderly (see also Fokkema, 1990 and Vollerling, 1991). The aim of care services policy in the Netherlands is to make the provision of these services compatible with financial limitations on public budgets. This leads essentially to a cost-effectiveness problem, where the same quality of services (though in a different configuration) has to be offered at lower costs. This choice problem incorporates essentially a substitution between different components of the care service system. After an analysis of the potential and the problems involved in the substitution strategy for these care services, we will turn to the demand side. Based on individual surveys, a discrete choice model will be developed in order to test the feasibility of the substitution strategy. Given the results from this empirical analysis, the paper will be concluded with some reflective remarks.

## 2. The Substitution Strategy for Care Services for the Elderly in the Netherlands

At present the population size in the Netherlands is still steadily increasing (mainly due to immigration), but at a decreasing rate. It is expected that from the year 2020 onward the population size will decline in absolute numbers. The demographic evolution is illustrated in Figure 1, which shows clearly the increase in the elderly cohort (65 years and over) vis-à-vis the youth cohort. It is expected that in the year 2035 the share of the elderly will have doubled with respect to its share in 1990: by then one out of every four persons will belong to the elderly cohort.

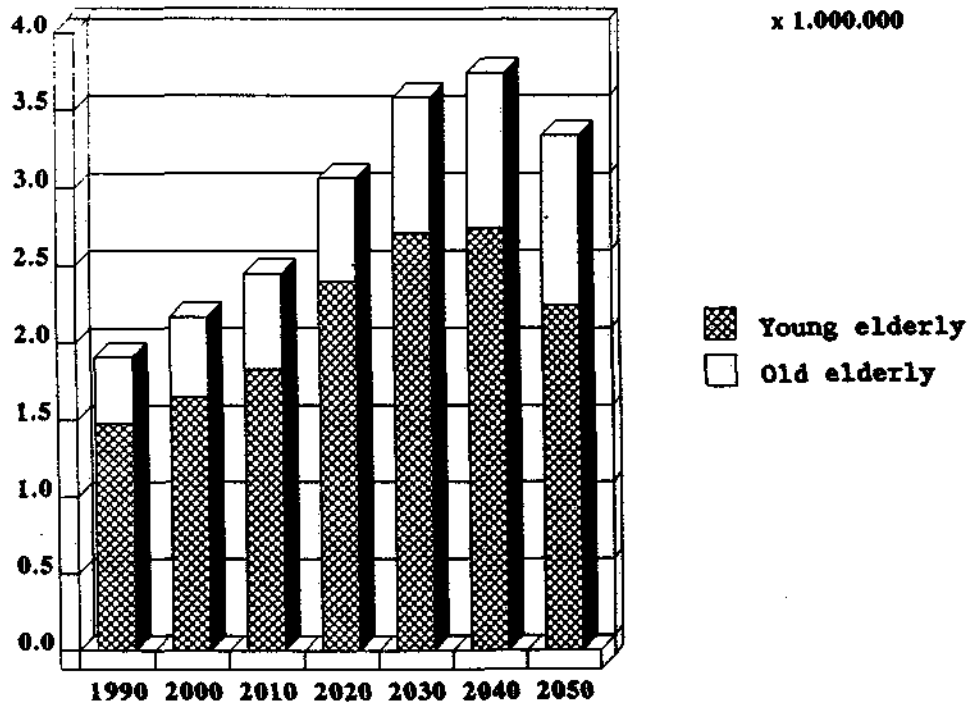
Figure 1. Demographic evolution of the Netherlands.



Source: CBS (central projection variant).

The importance of the 'double aging' phenomenon in the Netherlands can be clearly illustrated by means of Figure 2, which presents the demographic evolution of the elderly, subdivided in 'young elderly' (age 65-79) and 'old elderly' (age 80+).

Figure 2. Subdivision of the elderly cohort in the Netherlands.



Source: CBS.

Usually, the economic implications of the above demographic evolution are regarded as problematic (such as the increased demand for public provisions for the elderly, e.g. medical care, nursing; the pressure on current pension schemes etc.).

However, some positive consequences are to be mentioned as well (see Klaassen and Van der Vlist, 1990); examples are: the relatively high spending power of the future elderly; levelling out of various peak phenomena in consumption patterns (e.g., shopping, traffic, recreation and tourism); a relatively low degree of social costs etc.

Nevertheless, the financial consequences of the 'double aging' process for public expenditures may be fairly dramatic, as is reflected in Table 1.



Table 1. Growth in public expenditures as a result of demographic changes in the Netherlands (1985 - 2000).

(x 1 mln. Dutch guilders)

	1985	2000	Growth
Hospitals	8.480	11.166	32 %
Nursing homes	3.490	5.099	46 %
Old age homes	2.270	4.201	85 %
General practitioners	970	1.057	9 %
District nursing	640	768	20 %
Home help	1.330	1.729	30 %
<b>Total</b>	<b>17.180</b>	<b>24.020</b>	<b>40 %</b>

Source: Ministry of Welfare, Public Health and Cultural Affairs (1986, p. 23).

This table shows that - in case of no changes in current policies - public expenditures for socio-medical care will rise by approximately 40 percent in order to meet the needs of the elderly in the year 2000. It should be noted however, in these data, future changes in income, price levels and other structural variables are not taken into consideration. Different forms of care services (e.g., semi-informal professional help) might of course affect the price level for care provisions, while improvements in the future income positions of elderly might lead to a higher own financial contribution of the elderly for the services needed. Finally, changes in the structure of public policy (e.g., privatisation of parts of the care service system) may also have drastic implications for the government expenditures related to the 'silver revolution'. In this context the so-called 'substitution policy' is relevant.

Substitution policy is defined here as a strategy to reduce public expenditures for care services for the elderly by a shift from expensive intramural care services to semi-mural and extramural care services, under the condition of an equal quality level of services. Besides a shift in the public services themselves, the substitution strategy may also include a shift from public to private and/or (semi-) informal service provisions (including self-help). Thus this cost-effectiveness strategy requires an optimal tuning of public and private initiatives, and takes for granted that elderly are to be regarded as 'normal' citizens who want to stay as long as possible independent and in their own residential environment. This requires a tailor-made care service system, in which structural care provisions are increasingly substituted for ad hoc necessary care functions. The main question is however whether it is possible to design a cost-effective package of care services and/or functions which fulfil the need of the heterogeneous class of the elderly (see also the so-called Package model developed by Vollerling, 1991).

Various studies have in the past years been undertaken in order to assess the implications and limitations of this substitution policy in the Netherlands (e.g., Coolen 1984; Goewie 1987; Hoeksma 1985; Houben 1984;

Mootz et al. 1986; Pommer and Wiebrens 1984; Remmen 1985; Timmermans 1983; Van der Vlist 1984). Despite variations in the results of these studies, the common finding is that the substitution potential is highest in old age homes: approximately 30 to 40 percent of the capacity of old age homes might be replaced by (mainly) extramural care.

Although such findings are interesting, it has to be recognized that these supply-oriented studies have hardly paid attention to the detailed and specific needs of various elderly groups. The cost-effectiveness approaches were particularly focussed on the costs of various types of facilities for the elderly, but were not based on the needs of the elderly (the demand side), which are very heterogeneous in nature. Apart from field experiments (described in Fokkema, 1990), it is thus also necessary to carry out empirical research on the demand for care services and/or functions by the elderly. This will be described in the next section.

### 3. Empirical Analysis of the Needs of the Elderly: The Data

As mentioned above, it is necessary to have detailed insight into the individual heterogeneous needs of the 'silver generation' in order to find out whether substitution strategies are feasible. In the framework of our research, micro information on individual characteristics, motives, and needs of the elderly could be extracted from a large survey held in 1987 by the Dutch Social and Cultural Planning Bureau (SCP), called AVO (Aanvullend Voorzieningengebruik Onderzoek, or in English: Complementary Public Services Survey). This nation-wide survey includes information on the use of various types of social and cultural services by both households and household members. This survey covers also a considerable share of the elderly population.

However, in the sample, persons in nursing homes, psychiatric hospitals, homes for mentally ill are not included. In addition, although it was tried to take into consideration persons in old age homes in the survey, they are missing almost completely. As a result, given the aim of our research, the following selection of the respondents of the AVO'87 has taken place: only those respondents who are living on their own and only those households with at least one household member in the age group 55 years or older are taken into consideration. In order to deal with the household level, necessary for this research, for each household the household member with the highest disability is selected, under the condition that this person was 55 years or older.

In order to obtain a first rough impression of the selected respondents, this section examines some features of them, namely age, gender, household composition, civil status, type of housing, educational level and net household income (see Table 2).

From Table 2 it can be seen that most of the respondents are younger than 70 years of age. This number decreases faster as the respondents are 80 years of age or older. The ratio between the number of men and the number of women is almost equal. Further, about half of the respondents still live together with their partner and/or other family. Half of the respondents is still married, followed by a large group of widows/widowers. Respondents who are divorced and unmarried each form a very small group. Table 2 shows also that the respondents mainly live in a 'normal' house, especially in a single-family dwelling; only 9 % of the respondents lives in a retirement home. The educational level of the respondents is on the whole not very high; most of them only have received general elementary

education followed by no professional training.

For the definition of the net household income, the social minimum is used as a basis. This social minimum is not one fixed amount but is dependent on the household composition; people who live alone have a lower social minimum than people who live together. Because the classes of income are expressed in terms of relative variations in relation to this minimum, a certain correction for the household composition could take place. At first sight, it is noticeable to find that on the one hand a large part of the respondents is dependent on this social minimum, but on the other hand a quite large part of the respondents has a considerable net household income and is therefore to a (much) lesser extent dependent on this social minimum. Nevertheless, it should be considered that about 40 % of the respondents have not yet reached the retirement age.

Table 2. General features of the respondents.

	n (=837)	%		n (=837)	%
<u>Age</u>			<u>Gender</u>		
55-59 yr	159	19.0	male	419	50.1
60-64 yr	167	20.0	female	418	49.9
65-69 yr	184	22.0	<u>Household composition</u>		
70-74 yr	127	15.2	living alone	409	48.9
75-79 yr	124	14.8	living together	428	51.1
80-84 yr	58	6.9	<u>Type of housing</u>		
85-89 yr	13	1.6	single-family dwelling	488	58.3
90+ yr	5	0.6	flat/apartment	251	30.0
<u>Civil status</u>			retirement home	77	9.2
married	420	50.2	apartment in a building	15	1.8
divorced	56	6.7	for commercial purposes		
widowhood	283	33.8	rest	6	0.7
unmarried	78	9.3	<u>Net household income</u>		
<u>Educational level</u>			<u>Distance from social minimum</u>		
General education:			until 105%	330	39.4
none	68	8.1	105-125%	119	14.2
elementary education	521	62.2	125-150%	113	13.5
secondary education	149	17.8	150-200%	136	16.2
higher education	73	8.7	from 200%	139	16.6
academic education	26	3.1	<u>Professional training:</u>		
none			none	516	61.6
technical and vocational training for 12-16 years old			technical and vocational training for 12-16 years old	78	9.3
technical and vocational training for 16-18 years old			technical and vocational training for 16-18 years old	92	11.0
technical and vocational training for 18+			technical and vocational training for 18+	151	18.0

The starting point of our research will be to test the hypothesis that respondents use extramural care services because they actually need this care. To be able to test this starting point, it is necessary to determine the actual use of one or more extramural care services as well as the need of care for each respondent before these two can be brought in relation with each other. In contrast to the actual use of extramural care services (which was given in the survey), the need for care of each respondent should be derived. An indication for the need for care may be the extent of disability, mainly because this approach is used by other investigations in the Netherlands.

The extent of disability determines the living conditions of elderly to a considerable extent. As one gets older, one increasingly meets physical restrictions leading to the inability to do various daily vital activities independently anymore. On the basis of the survey, we will make a distinction between:

- the number of 'Instrumental Activities of Daily Living' (IADL) activities where the respondent finds difficulties; examples of IADL-handicaps are areas like shopping, preparing warm meals, putting clean sheets on the bed, doing the laundry, doing light household work (dusting, washing up, and so on) and doing heavy household work (mopping (down)/swabbing, cleaning windows with a leather, and so on);
- the number of 'Activities of Daily Living' (ADL) activities where the respondent finds difficulties (the so-called ADL-handicaps), viz. to eat and to drink, to sit down and to get up, to get in and out of bed, to dress and undress/to put on and pull off shoes, to move to another room on the same floor, to go up and down the stairs, to leave and enter the house, to move outdoors, to wash the face and hands, to wash the whole body, to make use of the toilet and to walk ten minutes without stopping.

After some numerical operations based on this number of IADL- and ADL-handicaps, a compound index can be formulated for each respondent, the so-called CADL-index. This CADL-index indicates the nature and the seriousness of the total need for care of the respondent and is subdivided into four classes, running from class zero (a good ability) up to class three (a very serious disability); see for details Fokkema (1990). Table 3 shows the CADL-indices of the respondents.

Table 3. The classes of disability of the respondents.

Class	n	%
0 (no)	566	67.6
1 (moderate)	193	23.1
2 (serious)	62	7.4
3 (very serious)	16	1.9
Total	837	100.0

Table 3 shows that more than two-thirds of the respondents suffers neither IADL- nor ADL-handicaps. More than one-fifth has moderate ability-handicaps, i.e. one has difficulties with one or more IADL-activities, but is (still) able to do the ADL-activities by him/herself. Serious ability-handicaps, i.e one has difficulties with one, two or three ADL-activities and/or with a large number of IADL-activities, can be found by more than 7 % of the respondents. Only a low number of respondents (2 %) has very serious ability-handicaps and they cannot do (can do no more) at least four ADL-activities independent, regardless of how many IADL-activities they still are able to do.

Next, the obtained ability-classes, which is an indication for the need for care of the respondents, will be brought into relation with the actual use of extramural care services by the respondents. The use of these care services is subdivided into the following groups:

1. Use of home help
2. Use of district nursing and
3. Use of home help as well as district nursing

In this enumerative list an implicit order is made, the so-called care-continuum, running from 'light' to 'heavy' extramural care services. Herewith, it is supposed that elderly, if their need for care increases, will sooner use the 'more heavy' care services. In the next table, the degree to which the respondents use these extramural care services is represented.

Table 4. Extent of use of extramural care services by the respondents.

	n	%
No use	752	89.8
Home help	62	7.4
District nursing	9	1.1
Home help as well as district nursing	14	1.7
Total	837	100.0

Almost 90 % of the respondents appear to make no use of one or more of these care services. More than 7 % makes use of home help and a small number (1 %) uses district nursing. Also it appears that only a small number of the respondents (almost 2 %) uses both types of care services.

Finally, the extent of use of extramural care services is brought into relation with the need of care of the respondents, in the way determined before. The results, detailed by nature as well as divided only according to use or no use, are represented in the figures 3 and 4.

Figure 3. Relation between need for care and actual use of extramural care services (in percentages).

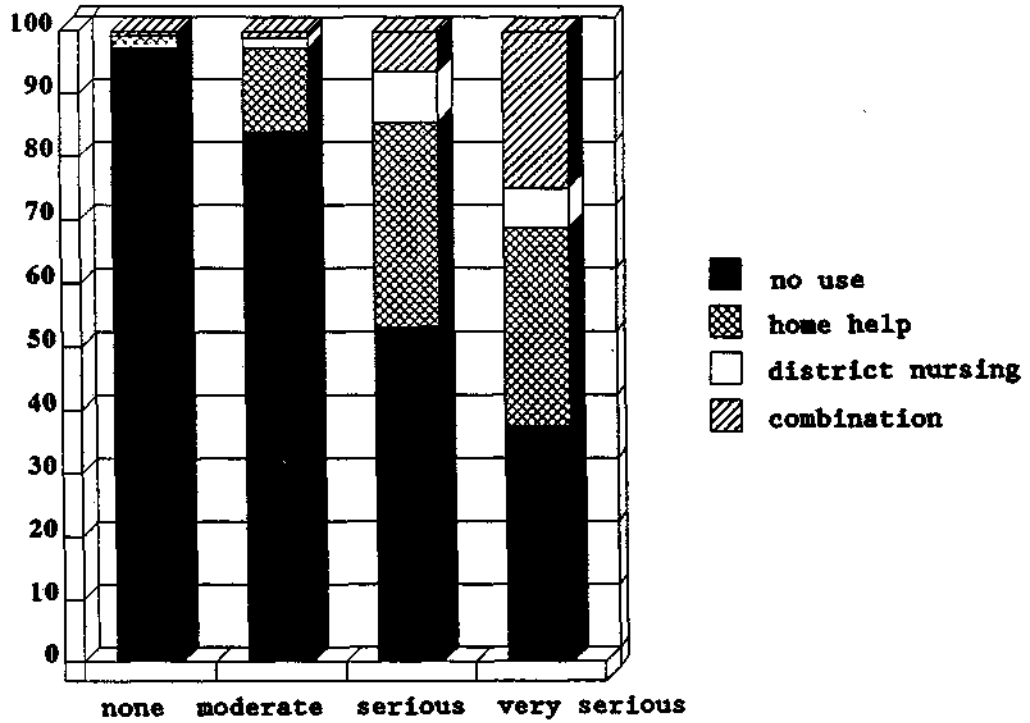
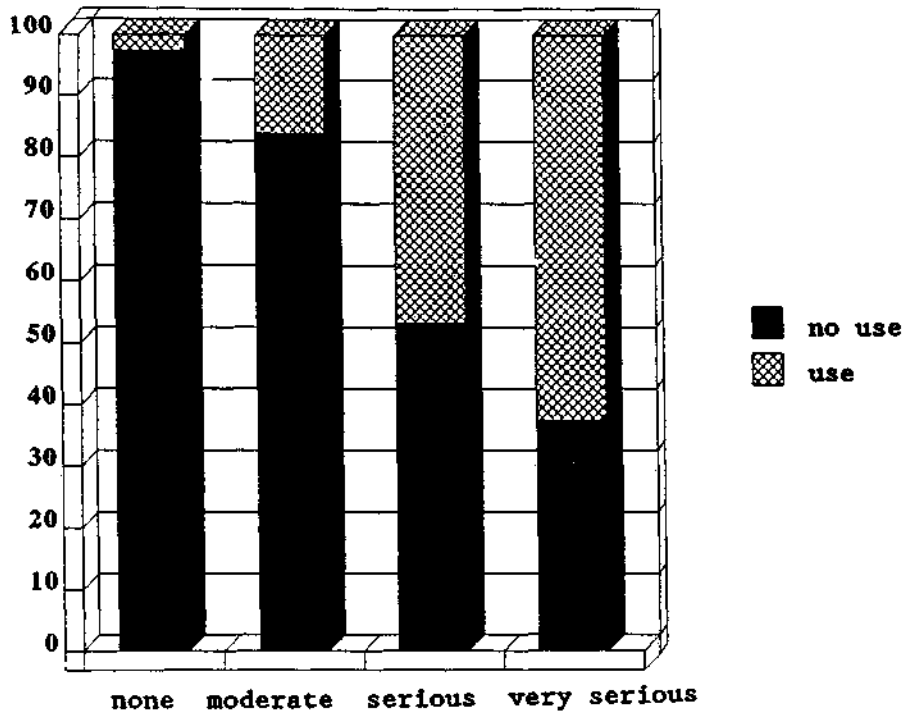


Figure 4. Relation between need for care and use of care services (in percentages).



In accordance with the expectation specified above, elderly use relatively more (or more heavy) extramural care services if they have more ability-handicaps: 97 % of the elderly without ability-handicaps makes no use of extramural care services; only 38 % of the elderly with very serious ability-handicaps does not use extramural care services. When we take into consideration elderly with moderate ability-handicaps who use (one) extramural care service(s), it concerns here mainly the home help; this is caused by the fact that the notion of 'moderate ability-handicaps' implies that these elderly have difficulties with one or more IADL-activities, so that especially home help care is needed to cope with these difficulties. For home help as well as district nursing it can be concluded that the use of these care services increases if elderly have more ability-handicaps, although one uses home help far more often than district nursing.

Also for the combined use of both types of care services it appears that the use increases if elderly have more ability-handicaps. This is especially true for elderly with very serious ability-handicaps (25 %).

On the other side, the figures show for instance that elderly who do not have any ability-handicaps, nevertheless make use of home help as well as district nursing and, for instance, elderly who have very serious ability-handicaps nevertheless make no use of extramural care services. In other words, of the elderly with the same ability-handicaps it appears that some make use and some make no use of extramural care services. As a result, we may conclude that using extramural care services is not solely determined by the nature and seriousness of the ability-handicaps of elderly, but probably also other factors play a key role. This conclusion is of eminent importance for the government; if the conclusion would be that using extramural care services is only exclusively determined by the extent of disability, then possibilities to influence qualitatively the supply are small for the government. In that case, the government could only continue to try to improve the health of elderly or to try to prevent (or to delay) the ability-handicaps of elderly.

In short, substitution is possible to some degree. Then, if the government aims to reduce the use of such care services, it is necessary to know which other factors (besides the extent of disability) influence the use of extramural care services.

To give finally an answer to the question which factors - and to what extent - determine whether or not elderly use extramural care services, we have used in our empirical analysis an adjusted version of the model of Andersen and Newman (1973).

These researchers were the first ones who have worked out a model of determinants of a large number of, intramural as well as extramural, care services. Andersen and Newman made a distinction into three types of factors:

1. 'Need for care factors' or 'illness level'.

These factors give an indication of the need for use, such as illness, handicaps and physical inabilities;

2. 'Predisposing factors'.

Andersen and Newman emphasize that certain people will sooner be inclined to use care services than others. As principal factors can be mentioned age, gender, civil status, education, occupation, number of persons in household, belief, values and rules with regard to health and illness and attitude with respect to care services;

3. 'Enabling factors'.

These factors give an indication of the possibility that someone has to use a care service. The most important factors are income, form of

health cost insurance, accessibility of care services, price of care services and attainability of care services.

In addition, Andersen and Newman have found indications that also other factors may have some influence on the use of care services, like incidental use of supplemented care services (for instance, physiotherapy), knowledge of care services and need of information about care services.

In the light of our research, from this model only those factors are examined a) which are expected to have an influence on the use of these care services and b) about which data are available in the above survey. In addition, some other factors are included of which it is supposed they also may give an indication of the three types of factors, mentioned in the model of Andersen and Newman. Finally, this has led to the selection of the following factors:

1. 'Need for care factors':
  - extent of disability;
  - suffering from a chronic disease or handicap;
  - need for permanent domestic household help;
2. 'Predisposing factors':
  - age;
  - gender;
  - household composition;
  - use of informal help;
  - use of private help;
  - education received;
  - year of construction of the house;
  - type of housing;
3. 'Enabling factors':
  - net household income;
  - ownership of the house.

These factors will be indicated as features of elderly; their expected and actual impact will be discussed below.

#### 4. Empirical Analysis of the Needs of the Elderly: A Discrete Choice Model

In recent years various attempts have been made to provide an explanatory model for the use of services by the elderly, usually based on a logit model for individual survey data. Some examples will be discussed here.

O'Shea and Corcoran (1989) focused attention on two groups of elderly persons, viz. elderly persons who had been identified by the relevant health professional as either being on the margins of domiciliary or institutional care. A logit regression was carried out in order to test for significant factors that might be important in determining the current placement of those elderly persons. Because the quality of care of health status outcomes were assumed to be invariant between regimes of care and because the elderly persons were also assumed to be indifferent between care in either regime, decisions about placement of elderly could therefore be made on the basis of cost differences between regimes.



The aim of the dissertation of Vollering (1991) was to give insight into the consequences of the aging of the population in the Netherlands for the use of care services for the elderly. A multinomial logit model was developed and estimated - the Package model - in order to offer insight into the determining factors (i.e., individual characteristics of the elderly population) that affect single and simultaneous use of care services for the elderly. The most important explanatory variable for the use of the package appeared to be the disability of the person. Also economic variables and variables referring to the household size and disability of household members contributed to the explanatory power of this model.

In Vollering and Nijkamp (1991), a conceptual model was developed in order to analyse the demand for amenities for the elderly, followed by an empirical application - on the basis of a multinomial logit model - to the Dutch province of Zeeland. In this study, a distinction between two choice categories of living arrangements for the elderly households were made: living on their own and living in an old age home. Particular attention was given to the question whether the demand for amenities for the elderly was price-determined or essentially the result of 'forced' decisions. The results of the estimation showed that the degree of disability was apparently the major decisive factor for the use of services. The price did not play a significant role.

In the framework of our analysis of the substitution potential of different types of service systems a binary logit model has been developed for various categories of the elderly, viz. those using extramural care services and those who do not. The following explanatory variables have been included in this discrete choice model for extramural services:

A. Extent of disability:

- 0 no disability-handicaps
- 1 moderate disability-handicaps
- 2 serious disability-handicaps
- 3 very serious disability-handicaps

Assumption: if the qualitative nature and seriousness of disability-handicaps increases, one will sooner use extramural care services.  
Expected sign: positive.

B. Suffering from a chronic disease or handicap:

- 0 no chronic disease or handicap
- 1 chronic disease or handicap

Assumption: if one has a chronic disease or handicap, one will sooner use extramural care services.  
Expected sign: positive.

C. Need for permanent household help:

- 0 no need of permanent household help
- 1 need of permanent household help

Assumption: if one has reported to have to rely on household help

permanently, this is an indication of the extent to which the ability to do one or more household activities independently is restricted and, therefore, one will sooner use extramural care services.  
Expected sign: positive.

D. Age:

55, 56 etc.

Assumption: if one is older, (s)he will sooner be inclined to use extramural care services.  
Expected sign: positive.

E. Gender:

0 male  
1 female

Assumption: given the fact that women have a higher life expectancy than men and that elderly, if they are older, are more inclined to use extramural care services (see also: age), then it may be assumed that the sign will be positive.

On the other hand, as a result of a traditional role pattern, men are less able to do normal household tasks; therefore, single men will sooner be inclined to use care services, especially home help, which could lead to the assumption that the sign will be negative.

However, given the expectation that the number of single women will be larger than the number of single men, the assumption will be that women will sooner use extramural care services than men.

Expected sign is: positive.

F. Household composition:

0 single  
1 living together with partner and/or other family

Assumption: if one is single, (s)he will be more inclined to use extramural care services than elderly who are still living together; a respondent of the latter group can be easier helped in his or her necessary need of care partially by partner and/or other family.

Expected sign: negative.

G. Use of informal help:

0 no informal help  
1 informal help

Assumption: if one uses informal help, (s)he will (have to) make less use of extramural care services.

Expected sign: negative.

H. Use of private help:

0 no private help  
1 private help

Assumption: if one uses private help, (s)he will (have to) make less use of extramural care services.

Expected sign: negative.

I. Education received:

- 0 no professional training
- 1 professional training/technical and vocational training for 12-16 years old
- 2 professional training/technical and vocational training for 16-18 years old
- 3 professional training/technical and vocational training for 18+ years old
- 4 academic education

Assumption: in general, it is assumed that elderly who have received a higher education, and as a result a higher level of social status, usually have a better health than elderly with a lower level of education. In addition, elderly of advanced years generally have received a lower level of education. At point D, the age, it is already supposed that if one is older, (s)he will sooner be inclined to use extramural care services.

Finally, if the education received is higher, generally also the income will be higher. Research has demonstrated that elderly with a higher income will make less appeal to extramural care services than elderly with a lower level of income (see point L).

The foregoing suggests a negative sign.

On the other hand, research has demonstrated that elderly with a higher level of education will sooner be inclined to use extramural care services than elderly with a lower level of education, especially as a result of the fact that they are better informed about available care services. This would suppose a positive sign.

We assume that a higher weight is attributed to the aspects which suggest a negative sign.

Expected sign: negative.

J. Year of construction of the house:

- 1 before 1930
- 2 1930-1944
- 3 1945-1969
- 4 1970-1979
- 5 1980-on

Assumption: if the house is older, the equipment will be of lower quality, especially in regard to shower and/or bath, isolation and accessibility of the house and therefore, elderly will sooner be inclined to use extramural care services.

Expected sign: negative.

K. Type of housing:

- 0 'normal' house
- 1 retirement home

Assumption: if one lives in a retirement home, generally this is an

indication of using extramural care services. Elderly in these conditions are mostly people who have more need of care than elderly who live in a 'normal' house. In addition, as a result of greater accessibility to care services obtained of such retirement homes, these elderly will sooner use care services.

Expected sign: positive.

L. Net household income:

Distance of social minimum

- 0 until 105 %
- 1 105 - 125 %
- 2 125 - 150 %
- 3 150 - 200 %
- 4 from 200 %

Assumption: research has demonstrated that elderly with a low level of income generally make sooner use of subsidized care services than elderly with a higher level of income. Because of a larger financial range, the latter group of elderly has more opportunities to be able to use non-formal care services and to choose their own solutions, such as to take a taxi, to eat outside the door, to take on a paid cleaning lady and to adjust the house. When this financial range is not available, they will be forced sooner to use subsidized care services.

Expected sign: negative.

M. Ownership of the house:

- 0 no owner of the house
- 1 owner of the house

Assumption: elderly who are owners of their own (often fully paid-for) house have a financial advantage compared to elderly who rent their house. Because of this financial advantage, opportunities that make them able to provide for their own need of care are described in the previous point (net household income).

Expected sign: negative.

By applying now a logit analysis to all above data contained in the AVO survey, the following results were obtained (see Table 5). It was allowed to test all variables simultaneous because they are not highly mutually correlated. The highest measured (negative) correlation exists between the variables 'household composition' and 'gender' (-0.5581).

As was already expected, the results demonstrate that 'the extent of disability of elderly' play a key role in the explanation why elderly use home help and/or district nursing, i.e. the extramural care services which are considered in this research.

In addition, the factors 'need for permanent household help', 'age', 'household composition', 'use of informal and private help', appears to be the other relevant explanatory variables according to the logit analysis.

In other words, the logit analysis has demonstrated that the probability that elderly use extramural care services is higher as their disability-handicaps are more multiple and more serious, as they are in the situation that they need permanent household help, as they are older, if they live alone and if they do not use c.q. are unable to use informal and

private help.

Thus, the remaining features appear to play no key role and only the 'education received' variable appears to have the sign previously assumed.

Table 5. Use of extramural care services (logit analysis).

Feature	B	Sign
Extent of disability	1.14873**	+
Suffering from a chronic disease/handicap	0.31963	+
Need for permanent household help	4.06745**	+
Age	0.07769**	+
Gender	0.10340	-
Household composition	1.33404**	-
Use of informal help	2.26680**	-
Use of private help	2.61758**	-
Education received	0.08363	-
Year of construction of the house	0.31736	+
Type of housing	0.28052	-
Net household income	0.13678	+
Ownership of the house	0.27560	+
Constant	9.89769**	-

\*\* : significant at a 1 percent level

The features which belong to the type 'enabling factors', viz. the 'household income' and 'ownership of the house', have shown to play no key role. The assumption of both features was that if an elderly person has a better financial position, then (s)he, in case if the care is needed, is able to and will sooner use non-formal care services, such as private help.

On the other hand, the factor 'use of private help' appears to play a key role: when an elder person uses private help, (s)he uses extramural care services to a lesser degree. Because private help, in comparison with extramural care services, is generally more expensive, it is plausible to suppose that users of private help mostly have a better financial position. Conversely, it may be supposed that elderly with a better financial position have more opportunities to use private help than elderly with a lesser financial position. Therefore, the latter group will sooner (be forced to) use extramural care services.

Assuming that the highest choice probability actually determines the choice, on the basis of the above (significant) explanatory features this choice can be predicted for each elderly person. Then, the predicted choices can be compared with the actually observed choices (see Table 6). In an idealized situation, all predicted choices would be equal to the actually observed choices.

Table 6. Confrontation of actually observed choices and predicted choices.

Predicted choices	Actually observed choices	
	No use	Use
No use	737 ( 98.0)	31 ( 36.5)
Use	15 ( 2.0)	54 ( 63.5)
Total	752 (100.0)	85 (100.0)

Table 6 shows that 98 % of the elderly who do not use extramural care services are classified correctly. On basis of their (specific) features, the other 2 % falls in the other, 'wrong' category. Of the elderly who use extramural care services, 64 % is correctly explained. Although the other persons (36 %) should not use these care services given their features, they do use these care services.

## 5. Conclusions

As in many other European countries, the number of elderly in the Netherlands will continue to grow in the future and especially the older elderly within the elderly population.

Because in general elderly need more physical, psychological and mental care, as a result of this demographic development, among others, the use of care services and related public expenditures is expected to increase drastically. For some years, the Dutch government has attempted by means of the substitution policy to generate a shift from expensive intramural care services to less expensive semi-mural and extramural care services in order to reduce the expected public expenditures. In addition, as a consequence of this policy, elderly are to be stimulated to live longer on their own, which is mostly also the desire of the elderly. Besides this shift, the government aims for a shift from public to private and/or (semi-) informal service provisions (including self-help).

In the past years, several supply-oriented studies have been carried out in order to provide insight into the implications and limitations of this substitution policy. Because these studies were mainly focussed on the costs of various types of care services for the elderly, they have rarely paid attention to the demand side, i.e. the needs of the elderly.

Therefore, in our research we have presented insight into the individual heterogeneous needs of the elderly. The purpose of this paper was to find out whether substitution strategies are feasible.

For this purpose, on the basis of a survey, the need of care of the elderly, which was derived from the extent of disability, was connected with the use of extramural care services. It was demonstrated that some

respondents did not use extramural care services in spite of having (very) serious ability-handicaps. This is in contrast to the majority of the respondents with the same ability-handicaps, who did make use of these care services. In addition, some respondents used extramural care services, although they had no or only slight ability-handicaps. This is also a contrast to the great majority of the respondents with the same ability-handicaps who did not use these care services.

These findings have led to the conclusion that some extent of substitution is possible. In order to give an indication in which way the government may be able to influence this shift, it is important to obtain an answer to the question which other features of the elderly, besides the extent of disability, play a key role in determining whether an elderly person is likely to use or to do not use extramural care services. Therefore, a logit model was developed and estimated. In addition to the factor 'extent of disability', also the factors 'age', 'household composition', 'need for permanent household help' and 'use of informal help and private help' appeared to play a key role.

In the light of this result we can conclude that the Dutch government is able to influence this shift and hence to economize on the costs for the elderly. In this context, it is relevant to focus preventive actions with regard to overall health status, stimulating (c.q. promoting) new types of living arrangement (e.g., communal forms), stimulating (c.q. promoting) volunteer work and improving the financial position of (the future) elderly.

It seems plausible that price determinants would have to play a key role in the use of care services. It is noteworthy that in the Netherlands the price of extramural care services is an income-based price: a person with a high income pays in general more for the use of extramural care services than another person with less income, while there is an (absolute) maximum contribution for extramural care services per week. Consequently, a person with a high income who needs many hours of care will choose extramural care services in stead of private help (i.e., the cheaper one). Unfortunately, the relevant data for this interesting question were not available in our data set, so that this hypothesis cannot be tested.

Finally, it should be noted that our research has departed from the current users of care services, so that elderly who do not (yet) receive help but probably need these care services in the future, are ignored. As an indication for the need of care, the extent of disability has been used. A more reliable indication might be obtained if, besides the extent of disability, also features like (beginning) dementia, forgetfulness and feelings of loneliness and fear could be considered, but unfortunately, these data were not available. A final remark is in order here: the focus of our research was on the demand side. Because the supply side may impose limitations on the intensity of use, it might be relevant in further research to take the supply side also into consideration.

## References

- Andersen, R. and J. Newman, Societal and Individual Determinants of Medical Care Utilization in the United States, Milbank Memorial Fund Quarterly, vol. 15, 1973, pp 95-124
- CBS, Bevolkingsprognose voor Nederland 1988-2050, SDU-uitgeverij, The Hague, 1989
- Coolen, J.A.I., Mogelijke Substitutie tussen Intramurale en Extramurale Zorg; een Verkenning vanuit een Behoeftenbenadering, Tijdschrift voor Gerontologie en Geriatrie, vol. 15, 1984, pp 115-124
- Fokkema, C.M., Substitutie met het Oog op de Toekomst, Master's Thesis, Dept of Economics, Free University, Amsterdam, 1990
- Goewie, M.H.R., Gezinsverzorging, een Alternatief voor het Verzorgingstehuis?, Nederlands Instituut voor Maatschappelijk Werk Onderzoek, The Hague, 1987
- Hoeksma, B.H., Van Intramurale naar meer Extramurale Zorg voor Ouderen; een Onderzoek in de Gemeente Hengelo (O), Enschede, 1985
- Houben, P.P.J., F. Wind and H. Moeskops, Woonbehoeften van Ouderen Gepeild: Nieuwe Pijlers voor Beleid, Federatie Landelijke Samenwerking Bejaardenhuizenorganisaties, The Hague, 1984
- Klaassen, L.H., and J.A. van der Vlist, Senior Citizens: A Burden? De Economist, vol. 138, no. 3, 1990, pp 302-320
- Ministry of Welfare, Public Health and Cultural Affairs, Zorg voor Later, Zorg van Nu, Rijswijk, 1986
- Mootz, M., J. Timmermans, I. Schoemakers-Salkinoja, and J. Helsing-Wagner, Samenhang in de Zorg: Substitutiemogelijkheden op een Viertal Terreinen, Sociaal en Cultureel Planbureau, Rijswijk, no. 35, 1986
- Nijkamp, P., J. Pacolet, H. Spinnewijn, A. Vollering, C. Wilderom and S. Winters, Services for the Elderly in the EC, HIVA, Catholic University, Leuven, 1990
- Nijkamp, P., S. Rosdorff, and C. Wilderom, Innovative Service Provision for the Elderly; a European Perspective, Environment and Planning C: Government & Policy, vol. 9, 1991, pp 267-279
- O'Shea, E., and R. Corcoran, The Placement of Elderly Persons: A Logit Estimation and Cost Analysis, Economic and Social Review, vol. 20, no. 3, 1989, pp 219-241
- Pommer, E., and C. Wiebrens, Kosten en Financiering van Bejaardenvoorzieningen 1981-1991, Sociaal en Cultureel Planbureau, Rijswijk, no. 39, 1984



Praag, B.M.S. van, The Notion of Population Economics, Journal of Population Economics, vol. 1, no. 1, 1988, pp 3-16

Remmen, J.W.M., Bejaardenoordbewoners of Verpleeghuispatiënten?: een Onderzoek naar de Verschillen en Overeenkomsten in Gezondheidstoestand tussen Bejaardenoordbewoners en Bejaarde Chronische Patiënten in Verpleeghuizen voor Somatische Zieken, Uitgeverij Stubeg, Hoogezand, 1985

Rosdorff, S., Tailor-Made Services for the Silver Generation, Master's Thesis, Dept of Economics, Free University, Amsterdam, 1990

Timmermans, J., Samenhangen in de Zorg voor Ouderen, Sociaal en Cultureel Planbureau, Rijswijk, no. 2, 1983

Vlist, J.A. van der, Oud en Zelfstandig: Deelonderzoek III de Behoeftte aan Bijzondere Vormen van Huisvesting voor Ouderen in Zeeland, Nederlands Economisch Instituut, Rotterdam, 1984

Vlist, J.A. van der, Oud en Zelfstandig: Toepassing van Maatschappelijke Kosten-batenanalyse op de Huisvesting van Ouderen, Economisch Statistische Berichten, 1984, pp 890-894

Vollering, J.M.C., Care Services for the Elderly in the Netherlands: the PACKAGE model, Ph.D. Diss., Free University, Amsterdam, 1991

Vollering, A., and P. Nijkamp, The Demand for Amenities by the Elderly, Environment and Planning B: Planning and Design, vol. 18, 1991, pp 315-325

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