The Dutch Virtual Census of 2001

Analysis and Methodology

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Due to rounding, some totals may not correspond with the sum of the separate figures.

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Preface

Under the aegis of the United Nations, most countries in the world conduct national population and housing censuses once every ten years. Some 30 European countries, including the Netherlands, produced identical census tables on 2001. Eventually such census tables will yield a comprehensive socio-demographic and socio-economic view of Europe.

Economic activity is a central issue in this book. The authors, most of whom work at Statistics Netherlands [1)], discuss the economic activities of families, differences according to family size and composition, individual activity status by region, age, education level and branch of economic activity. There are separate chapters on the economic activities of young people and people of retirement age. The economic activities, levels of education and occupation of foreigners from various countries of origin are compared with each other and with the native Dutch population.

Several chapters provide details on the urban developments and social imbalances in the cities of the EU Urban Audit, on the complex relationships between cities and their peri-urban areas, and on commuting.

The 2001 Census is compared with earlier Dutch population censuses from as far back as 1795. Furthermore, the Dutch Census is compared with the Census results of eight other European countries.

Data from many different sources were combined to produce the Dutch Census Tables of 2001.
Since the last census based on a complete enumeration was held, in 1971, the willingness of the population to participate has fallen sharply. Statistics Netherlands has found an alternative in the shape of the Virtual Census, using a combination of available registers and surveys. This puts the Netherlands in a unique position in the European Census Round. The Virtual Census is cheaper, comparable with earlier Dutch censuses, and more socially acceptable.

In the last decade Statistics Netherlands has acquired more and more experience with using data from various administrative registers for statistical purposes. This has enabled Statistics Netherlands to develop the Social Statistical Database (SSD). The SSD contains coherent and detailed demographic and socio-economic statistical information on persons and households, for which the population register forms the backbone. In addition, sample surveys are used for information that is not available from registers, such as education level and occupation. The SSD is the main source for the 2001 Census.

Compared with the 1991 Census Round, Eurostat and other international organisations required more detailed information for 2001. To meet the requirement of overall numerical consistency in the set of census tables, statistical methodologists at Statistics Netherlands developed a new estimation method: repeated weighting. It is based on the repeated application of a regression method, and it guarantees that the combination of survey and register information results in consistent estimates. The method is discussed in the last chapters of this book.

Classifications, definitions and all census tables can be found on the website of Statistics Netherlands [2]. The book is intended for researchers at universities, research institutes or statistical agencies, policy makers and the interested general public. I would like to thank the editors Rita Gircour, Marijke Hartgers and Eric Schulte Nordholt for their contribution.

G. van der Veen, Director-General of Statistics Netherlands

Voorburg, July 2004.

[1] Special thanks to Jessica Chamberlain from the Office for National Statistics in the UK for her contribution to chapter 12.

[2] http://www.cbs.nl/en/publications/articles/General/census–2001/census–2001.htm

1. Introduction to the Dutch Virtual Census of 2001

Eric Schulte Nordholt

Data from many different sources were combined to produce the Dutch Census Tables of 2001. Since the last census based on a complete enumeration was held in 1971, the willingness of the population to participate has fallen sharply. Statistics Netherlands found an alternative in the Virtual Census, using available registers and surveys. The Virtual Census is cheaper, comparable to earlier Dutch censuses, and more socially acceptable. The Netherlands takes up a unique position in the European Census Round. The table results are not only comparable with the earlier Dutch censuses but also with those of the other countries in the 2001 Census Round.

The part on analysis in this book deals with the following topics: key figures, families, working people, young people, seniors, foreign people, and commuting. A historical comparison with earlier Dutch censuses is made and regional distributions are discussed with special attention to ten major cities in the Netherlands. Finally, the results of the 2001 Census in the Netherlands are compared with the results in other European countries.

The part on methodology deals with the input, throughput and output phases placing special emphasis on how the new methodology of repeated weighting was applied in producing the set of census tables.

1.1 Introduction

In 2003 data were combined to produce the Dutch 2001 census tables. In the Netherlands this was not done by interviewing inhabitants in a complete enumeration, but by using data that Statistics Netherlands already had available. This way, the Dutch tax payer got a much lower census bill. The costs for a traditional census would be about three hundred million euros, while the costs made now are 'only' about three million. The estimate includes the costs for all preparatory work such as developing a new methodology and accompanying software. The costs of the registers are not included, but the analyses of the results are. Registers are not kept up-to-date for censuses but for other purposes. Saving money on census costs is only possible in countries that have sufficient register information. As an example we can compare the costs of the Dutch virtual census with the costs of the traditional census that was held in Canada. In Canada the census costs amounted to approximately 450 million euros. Canada has about 31.6 million inhabitants, twice as many as the Netherlands. Statistics Canada justifies the huge census costs by pointing out the enormous implications of the

census results for the distribution of money among regions. Moreover, a virtual census would be impossible in Canada because of the lack of sufficient register data.

The 2001 Census relates to forty extensive tables. Twenty-eight are about the Netherlands as a whole, nine are at the COROP level (NUTS 3) and three at municipal level (NUTS 5). The forty tables fall into a number of groups. Eight tables concern housing, two tables concern commuting and the other thirty tables are demographic tables, relating to occupation, level of education and economic activity. Additionally, demographic, housing and labour figures are compiled at sub-city district level for ten large cities that participate in Urban Audit II (Statistics Netherlands, 2003). These ten large cities are Amsterdam, Rotterdam, The Hague, Utrecht, Eindhoven, Tilburg, Groningen, Enschede, Arnhem and Heerlen.

Except the financial aspect, other important differences exist between a traditional census and the virtual census conducted in the Netherlands. In spite of the mandatory character of a traditional census, a certain part of the population will not participate (unit non-response) and the part that does participate will not answer some questions (item non-response). Correcting non-response by weighting and imputation techniques is well worth trying. A well-known problem with traditional censuses is that participation is limited and selective. Traditional correction methods fall short of the need to be able to publish reliable results. The last traditional census in the Netherlands (in 1971) met with much privacy objections against the collection of integral information about the population living in the Netherlands. This increased the non-response problem and the expectation was that non-response would be even higher if another traditional census were held in the Netherlands (Corbey, 1994). There are almost no objections to a virtual census and the non-response problem only plays a role in the surveys of which the data are used. If non-response can be corrected in a survey, it will certainly be possible to correct for the selectivity of that survey in the census where it is used.

The virtual census in the Netherlands was off to a later start than in other countries where a traditional census was conducted. It did not make sense to really start the 2001 Census Project until all sources were available; some registers were available relatively late. Nevertheless, the Netherlands was quicker with the compilation of the forty census tables than most of the other countries that participated in the 2001 Census Round. In fact, the Netherlands was one of the first to send the complete set of forty tables to Eurostat, which co-ordinated the contributions of all European Union (EU) member states, accession countries and European Free Trade Association (EFTA) member states. The Netherlands had the advantage that the incoming census forms did not need to be checked and corrected. However, one must realise that for some variables only sample information is available, which implies that it was impossible to meet the level of detail required in some Dutch tables.

An interesting option for the future is to use small area estimation techniques to estimate the cell values that could not be estimated adequately. A theoretical framework for small area estimation can be found in Rao (2003). The ONS studied the application of this technique in the context of its Neighbourhood Statistics Programme. This is a major initiative to bring together and make widely available statistics on a small area level.
In each case of implementation of indirect small area estimates particular attention was paid to model specification. Some experimental synthetic estimates were published in the United Kingdom and others are undergoing a process of evaluation. Possibly, the techniques of repeated weighting and small area estimation can be combined in the 2011 Census Round.

Currently, the advantages of the virtual census in cost and non-response problems amply make up for the loss of some detail compared to a traditional census. Moreover, not all information required will always be available for the users in traditional censuses. This is because traditional correction methods such as weighting and imputation sometimes do not correct for limited and selective participation. This means no reliable results can be published for some of the cells in the set of tables. One may wonder why simply applying mass imputation (filling in valid values for all missing scores) is not taken into account to overcome these problems. An important advantage of mass imputation is that once the records are imputed, any user will be able to reproduce results when using the same imputed file.
However, mass imputation is not a viable strategy for raising survey outcomes to population totals. There are not enough degrees of freedom to sustain a sufficiently rich imputation model accounting for all significant data patterns between sample and register variables. Only if the interest is in totals of subsets of the population defined by the explanatory variables in the model, the imputation approach leads to approximately design-unbiased and hence reliable estimates (at least if the variances are reasonably small) (Kroese and Renssen, 2000).

The Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) have more variables available in registers than the Netherlands. So the problem of insufficient detail in the outcome does not play a major role there. Moreover, some Nordic countries conduct a (limited) enumeration for variables missing in the registers. Most of the other countries are in a similar position as the Netherlands where some variables relevant for the census can be found in registers, while other variables are available on a sample basis only. That's why much interest exists in the Dutch approach to combine registers and surveys and to use modern statistical techniques and accompanying software to compile the tables.
In September 2003 three colleagues of the ONS visited Statistics Netherlands to learn more about the Dutch approach. It is of course crucial that statistical bureaus may make use of registers that are relevant for the Census. For Statistics

Netherlands this was laid down in the new statistical law of 2003. Nevertheless, in the years to come Statistics Netherlands will have to establish good contacts with register holders. Timely deliveries with relevant variables for Statistics Netherlands are crucial for statistical production.

The reason why Statistics Netherlands has compiled the set of tables is based on a gentlemen's agreement. In 1991 the Census Act was rescinded, officially cancelling Statistics Netherlands obligation to hold a census once every ten years (Corbey, 1994). There is no European obligation to supply census data, but it is almost inconceivable that the Netherlands would not compile census data for the international organisations just like all other European countries do. Eurostat has a co-ordinating role in collecting harmonised data on the EU and a duty to make international comparisons of the outcome.

It will be several years before all countries participating in the 2001 Census Round sent their final set of tables to Eurostat. Therefore, Statistics Netherlands took the initiative to compare the 2001 results of a limited number of European countries. The results of the Dutch 2001 Census were also compared to earlier Dutch censuses. Such work has been carried out in the past as well. The data compiled on 1981 and 1991 were much less detailed than the set of tables of the 2001 census. The 1991 Dutch census was largely based on a register count of the population in combination with the Labour Force Survey 1991 and the Housing Demand Survey 1989/1990. Contrary to 1981 and 1991, Statistics Netherlands has published census information over 2001 on the municipal level.

1.2 Method of compiling

The current virtual census relates to 2001. The backbone of the census is the central Population Register (PR), which is the combination of all municipal population registers. PR data of 1 January 2001 were used as the basis for the set of tables. The set of tables focuses on frequency counts and not on quantitative information. The SSD datasets on 2001 (the Social Statistical Database include integrated microdata on employees and self-employed) were not available on time for the 2001 census. Therefore, we used datasets of 2000 that were available in the beginning of 2003 to deduce the individual data of the end 2000 as an approximation for the situation on 1 January 2001. Different variables, such as occupation and level of education, were obtained from the Labour Force Survey (LFS). The variable job size was obtained from the large Survey on Employment and Earnings (SEE). To obtain sufficient records, information on persons from the LFS 2000 and the LFS 2001 was combined. For the housing tables we used PR data of 1 January 2001, the Housing Register 2001 and the Survey on Housing Conditions (SHC) 2000. For the tables on commuting we used the PR data of 2000 and 2001, the SEE 2000 and the SSD datasets of 2000.

Some variables of the PR and SSD datasets are available on an integral basis. Examples are age, sex, marital and employment status. Survey variables are only available for a part of the population. Examples are the highest level of education attained (LFS) and whether someone rents or owns the property they live in (SHC). We guaranteed consistency among the tables by using the technique of repeated weighting. The method of repeated weighting has been described extensively in Houbiers et al. (2003). It is based on the repeated application of the regression estimator and generates a new set of weights for each table estimated. The results of five simulation studies testing various aspects of repeated weighting can be found in Van Duin and Snijders (2003). When using repeated weighting, the weights of the records in the microdata are adapted in such a way that a new table estimate is consistent with all earlier table estimates.

To apply the technique of repeated weighting we used the latest version of the software package VRD developed by Statistics Netherlands. The letters VRD stand for Vullen (Filling) Reference Database and the aim of the application is to fill and manage the reference database. The main functions of VRD are the estimating of tables via repeated weighting, adding these tables to the reference database, and withdrawing aggregates from the reference database. Under the condition of small, independent samples, the variances of the table values can also be estimated. The estimating of the tables does not occur in VRD itself, but takes place in Bascula 4.0 automatically without the VRD-user seeing this explicitly. Estimating the tables and the variances can be done in the batch or interactively.

To be able to estimate every table as accurately as possible, every estimate is based on the largest possible number of records. Tables that contain register variables only, are counted from the registers. Tables that contain at least one variable from a survey are estimated from the largest possible combination of registers and surveys. The combination of registers and surveys form blocks from which the census tables have been estimated. By way of illustration six blocks have been displayed below on basis of which the census tables for the economic active population (employed and unemployed together) were estimated.

1. The register block.
2. The NACE block (all records from the register block for which the international code for economic activity NACE is known, and also the non-employed).
3. The SEE block.
4. The cross-section between NACE and SEE blocks.
5. The Economic Activity block (in fact this is the LFS block, supplemented with information on the employed and retired).
6. The LFS block.

Blocks 2 up to and including 6 were compiled on the basis of survey data. To produce estimates for the complete population, weights have to be determined. These weights depend on:
– the precise composition of the block concerned (one or more surveys);
– the design of the survey(s);
– the non-response correction of the survey(s);
– the reduction of the variance by means of auxiliary information;
– the reaching of consistency.

Complete consistency is not always possible, for example if too many restrictions were imposed. In some cases complete consistency is possible, but it leads to a very large variation in the weights and thus increases variance drastically. In those cases it is better to restrict the detail that is published.

In compiling the census tables we adapted the weights of the blocks at every VRD turn by means of all relevant register counts and the tables estimated earlier from the blocks. This way, all tables are mutually consistent. Every table has to be calculated from the largest block from which the table can be determined. If all tables are estimated this way with the correct weights, the tables' results are mutually consistent. By starting every time from the largest block, the most detailed possible census tables have been achieved.

The figures of the 2001 census relate to persons living in the Netherlands on 1 January 2001 (counting unit persons). The persons who were living in the Netherlands at the beginning of that day according to the PR were 'counted' in the virtual census. Most of the Dutch population lives in private households, the others are part of institutional households. The number of employees in the tables relate to the end of the year 2000 for which 22 December 2000 was used as reference date to fix the number of jobs of employees in the Netherlands. It was impossible to have a reference day in 2001 for the number of employees since the SSD datasets 2001 were not available on time to use in the 2001 census. The SSD data used registers information on the jobs of employees. If an employee holds several jobs at the same time, he or she can appear several times in the employee register. In the set of tables the features of the main job are used, in which the main job of an employee has been defined as the job with the highest gross wage for the social insurances.

The 2001 census was compiled partly on the basis of sample data. Therefore, margins of inaccuracy have to be taken into account for some results of the 2001 census. Because of the reliability of the results, rules of thumb are being applied for cell values that are based on a sample from the census population. The exact margins of inaccuracy cannot be given because of composing blocks from the surveys and the complex design of these surveys. The rules of thumb have been deduced on the basis of the assumptions that the two LFS datasets (for 2000 and 2001) form one sample

and that the 'inclusion probabilities' for this sample were given by the block weights of the LFS block. The rules of thumb for records of observations from the LFS run as follows:

– Table cells based on less than 10 persons are always suppressed.
– Table cells based on 25 or more persons are always published.
– Table cells based on 10–24 persons are only published if they form a part of a breakdown (by age or sex), in which no cells based on less than 10 persons occur, and at least 50 percent of the cells in the breakdown have more than 25 persons. The threshold of 25 persons corresponds to an estimated relative inaccuracy of at most 20 percent (i.e. the estimated margins amount to 40 percent at most).

The rules of thumb for records from the SHC are of the same form. However, somewhat higher threshold values are applied because of the fact that the sample size of the SHC is somewhat more limited than the one of the LFS. For table cells with households or dwellings as counting unit, analogous rules of thumb are applied for the Dutch Census.

1.3 *Key results of the 2001 census in the Netherlands*

1.3.1 Population by sex, age and type of household

At the start of 2001 a total of 16.0 million people were living in the Netherlands, 7.9 million male and 8.1 million female. In the age categories 0–14 and 15–74 year there were some more males than females, but in the category 75 year and older there were almost twice as many women than men. Most people live in private households. More than 200 thousand people lived in institutional households, such as health care institutions and institutions for retired and elderly people. About 36 percent of this group was male and 64 percent female. Of the people in institutional households 57 percent was over 75. This group is dominated by women. More information about the population by sex, age and type of household can be found in table 1.1.

1.3.2 Population by economic activity

At the start of 2001 just under half of the people living in the Netherlands belonged to the economically active population (labour force). The working labour force included 7.4 million people: 6.8 million are employees and 0.6 million self-employed. The unemployed labour force comprised almost 200 thousand people. In the organisational set-up of the census, employees, the self-employed and unemployed are mutually exclusive categories. Self-employed people who also work a number of hours a week for pay are counted as employees. Someone in the

Table 1.1
Population by sex, type of household and age group

Sex and type of household	All ages	Age group		
		0–14	15–74	75+
Total population	15,985,538	2,977,283	12,036,171	972,084
Male	7,909,052	1,522,811	6,047,425	338,816
Female	8,076,486	1,454,472	5,988,746	633,268
Population in private households	15,766,606	2,970,545	11,947,996	848,065
Male	7,829,914	1,518,611	5,998,189	313,114
Female	7,936,692	1,451,934	5,949,807	534,951
Population in institutional households	218,932	6,738	88,175	124,019
Male	79,138	4,200	49,236	25,702
Female	139,794	2,538	38,939	98,317

working labour force cannot be unemployed at the same time. The number of unemployed is estimated on the basis of sample information.

Of the economically active population 58 percent was male, while of the economically inactive population 58 percent was female. The economically inactive include attendants at educational institutions, retired people and people engaged in family duties. The number of housewives is more than 18 times the number of househusbands. More information about the population by sex, age and type of household can be found in table 1.2.

Working population by branch of economic activity
The 7.4 million members of the working population can be divided by branch of economic activity by means of the NACE code (Nomenclature statistique des Activités économiques dans la Communauté Européenne). For an employee who

Table 1.2
Population by economic activity and sex

Economic activity	Total	Male	Female
Economic active population	7,586,914	4,388,239	3,198,675
Working	7,394,777	4,287,967	3,106,810
Employed	6,786,511	3,883,813	2,902,698
Self-employed	608,266	404,154	204,112
Unemployed	192,137	100,272	91,865
Economic inactive population	8,398,624	3,520,813	4,877,811
15–74	4,449,257	1,659,186	2,790,071
Attendant at educational institutions	640,446	342,934	297,512
Retired	1,355,940	620,493	735,447
Engaged in family duties	1,270,420	65,821	1,204,599
Other economically inactive	1,182,451	629,938	552,513

has more than one job we took the features of his or her main job. In the context of the Dutch census, the main job of a person has been defined as the job that yielded the highest wage for the social insurances in 2000. Counted this way, the Netherlands had 0.2 million people working in agriculture and fishing, 1.5 million in manufacturing and construction and 5.7 million in services at the start of 2001. Of those working in services, 3.5 million worked in commercial services and over 2.1 million in non-commercial services.

Employees by working hours

An interesting phenomenon is how many hours a week employees work in their main job. Of the almost 6.8 million employees in the Netherlands 4.2 million employees work full-time (over 35 hours a week), 1.8 million employees have a long part-time job (less than 35 hours, but at least 15 hours a week) and 0.8 million have a short part-time job (less than 15 hours per week). Of those working full-time 77 percent is male, while of the part-timers 75 percent is female. More information about the working hours of employees can be found in table 1.3.

Table 1.3
Employees by working hours and sex

Employees by working hours	Total	Male	Female
Employees	6,786,511	3,883,813	2,902,698
Full-time (≥35 hours a week)	4,222,228	3,236,504	985,724
Part-time total	2,564,283	647,309	1,916,974
Long part-time (15–<35 hours a week)	1,793,656	419,071	1,374,585
Short part-time (<15 hours a week)	770,627	228,238	542,389

1.3.3 Working population by occupation

Working people can be classified by occupation by means of the International Standard Classification of Occupations (ISCO).

For men the most common occupation categories in 2001 were:
– professionals;
– legislators, senior officials and managers;
– craft and related trades workers.

For women the occupation categories were:
– technicians and associate professionals;
– clerks;
– service workers and shop and market sales workers.

More information about the working population by occupation can be found in table 1.4.

Table 1.4
Working population by occupation and sex

Working population by occupation	Total	Male	Female
Working population	7,394,777	4,287,967	3,106,810
Legislators, senior officials and managers (1)	926,631	695,563	231,068
Professionals (2)	1,205,163	705,357	499,805
Technicians and associate professionals (3)	1,248,759	607,819	640,939
Clerks (4)	841,219	271,862	569,358
Service workers and shop and market sales workers (5)	800,629	259,173	541,456
Skilled agricultural and fishery workers (6)	105,256	78,280	26,976
Craft and related trades workers (7)	712,093	677,256	34,837
Plant and machine operators and assemblers (8)	446,722	398,845	47,877
Elementary occupations (9)	522,901	272,435	250,467
Armed forces (0)	37,032	34,227	2,805
Occupation unknown (99)	548,374	287,151	261,223

1.3.4 Population by level of education

The population living in the Netherlands can be classified by level of education by means of the International Standard Classification of Education (ISCED). Actually, it is the highest level of educational attainment that determines the category by which a person is classified in the ISCED. Below the Dutch educational system is listed according to the ISCED categories.

International Standard Classiscifation of Education – ISCED

level	label	to compare with Dutch education
0/1	(pre)primary	'basisschool'
2	lower secondary	'vmbo'; 'vbo'; 'mavo'; 'lbo'
3	upper secondary	
3c		'vakopleiding bol/bbl'; 'mbo < 3 jaar'
3b		*not in Dutch education*
3a		'havo/vwo'; 'mbo 3/4 jaar'; 'middenkaderopleiding bol/bbl'
4	post secondary	'specialistenopleiding bol/bbl'; 'hbo < 2 jaar'
5/6	tertiary	
5b		'hbo 2–< 4 jaar'
5a		'hbo ≥ 4 jaar'; 'wo'; 'post-hbo'
6		'opleiding tot graad van doctor'

Of the 12.0 million people aged between 15 and 75 years the most common level of education is the secondary level. The number of people with a tertiary level of education is larger than the number of people with a primary level of education. For the group aged over 75 the secondary level is also the most common, but there are also considerably more people with primary than with a tertiary level of education. More information about the population by level of education can be found in table 1.5.

Table 1.5
Population by level of education and age group

Population by level of education	All ages	Age group		
		0–14	15–74	75+
Total population	15,985,538	2,977,283	12,036,171	972,084
No education at all	1,244,031	1,244,031	0	0
Pre-primary education (ISCED 0)	1,370,511	1,198,580	154,832	17,098
Primary education (ISCED 1)	2,787,104	534,672	1,825,655	426,778
Lower secondary education (ISCED 2)	3,145,529		2,924,405	221,125
Upper secondary education (ISCED 3c)	2,711,384		2,566,372	145,012
Upper secondary education (ISCED 3b)				
Upper secondary education (ISCED 3a)	1,873,656		1,828,072	45,584
Post secondary non-tertiary education (ISCED 4)	483,684		468,699	14,985
First stage of tertiary education (ISCED 5b)	247,194		238,029	9,165
First stage of tertiary education (ISCED 5a)	2,081,590		1,992,670	88,920
Second stage of tertiary education (ISCED 6)	32,760		31,082	1,678
Education unknown	8,094	0	6,356	1,738

1.4 The 2001 census compared to earlier Dutch censuses

The first census in the Netherlands was held in 1795 for the purpose of establishing voting constituencies. At that time the united provinces of the Netherlands were still a republic and the borders were different from the current borders. After Napoleon the Netherlands became a kingdom and once every ten years a census was held. The first census in the Kingdom of the Netherlands was held in 1829. Before Statistics Netherlands was established, another six censuses were held in 1839, 1849, 1859, 1869, 1879 and 1889 under the responsibility of the Ministry of the Interior. In 1899 Statistics Netherlands was established and was put directly in charge of the eighth census. In the 20th century six more traditional censuses were carried out in 1909, 1920, 1930, 1947, 1960 and 1971. The three most recent censuses (1981, 1991 and 2001) were not based on a complete enumeration but on registers and surveys available for Statistics Netherlands.

Originally, the censuses had two aims. First, they were meant to correct errors in the municipal population registers. Second, they were used to get extra information about the socio-economic phenomena in the country. Since the Netherlands

conducts a register-based census, the first aim no longer exists. Also, the quality of the central Population Register (PR), which unites all municipality population registers, has improved considerably over time. This is because the incentive for municipalities to keep their population registers up-to-date is the allocation of central government funds among municipalities. This is mainly based on the population size according to the local registers. Another reason is that it is extremely difficult to function in Dutch society without being included in the PR. So both municipalities and citizens have enough incentives to keep the PR of good quality. The second aim is still valid and many census results are published in a historical or international context. Currently, census data are popular for comparisons between countries.

Table 1.6 presents some key results of the Dutch Censuses in the period 1829–2001. Remarkable is the ageing of the Dutch population, especially in the post-war period.

Table 1.6
Population by age group in the period 1829–2001

Census		All ages	Age group		
Number	Year		0–19	20–64	65+
		x 1,000	*in % of the total population*		
1	1829	2,613.3	44	50	5
2	1839	2,860.6	45	50	5
3	1849	3,056.9	43	53	5
4	1859	3,309.1	42	53	5
5	1869	3,579.5	43	52	6
6	1879	4,012.7	44	50	5
7	1889	4,511.4	45	49	6
8	1899	5,104.1	44	50	6
9	1909	5,858.2	44	50	6
10	1920	6,865.3	42	52	6
11	1930	7,935.6	40	54	6
12	1947	9,625.5	38	55	7
13	1960	11,462.0	39	53	9
14	1971	13,060.1	36	54	10
15	1981	14,216.9	31	57	12
16	1991	15,070.0	25	62	13
17	2001	15,985.5	24	62	14

1.5 *Conclusions*

The virtual census has proved to be a successful concept in the Netherlands. It has many advantages compared to traditional censuses. The costs are now considerably lower and nevertheless data on the Netherlands have come available that could be compared to results of earlier Dutch censuses and to the results of other countries that took part in the 2001 Census Round. It was the third time that the Netherlands

conducted a virtual census. However, the Dutch data that have been compiled on 1981 and 1991 were of a much more limited character than the set of tables of the 2001 census. Moreover, they were largely based on a register count of the population in combination with the then existing surveys about the labour force and housing conditions.

The technique of repeated weighting has been used successfully to produce a consistent set of tables for the 2001 census. Every table was calculated from the largest block from which the table could be determined. All tables have been estimated this way for the 2001 census with the correct weights, and therefore the tables' results are mutually consistent. By starting every time from the largest block, the most detailed possible census tables have been achieved. Before compiling tables with this new technique, micro integration of the different sources in the SSD remains important. In the micro-integration process the data are checked and incorrect data are adapted. It is strongly believed that micro-integrated data will provide more reliable results, because they are based on a maximum amount of information. Also the coverage of subpopulations will be better, because when data are missing in one source, another source can be used. Another advantage of micro-integration and repeated weighting is that there is no reason for confusion among users of statistical information anymore, because there will be one figure on each socio-economic phenomenon, instead of several figures depending on which sources have been used.

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2. *Families at work*

Marijke Hartgers

According to the 2001 Census the 6.9 million private households in the Netherlands comprise on average 2.3 members, of whom slightly over one is economically active. Age and sex are the main factors that determine whether or not a person is economically active; type of household plays a roll as well. Single women are the least economically active, primarily because many of them have reached the senior ages. The same goes for married men and women without resident children. Older women, with or without children, generally do not have paid work as often as older men. They are of a generation that stopped working once they had children and did not return to work when the children got older. Women in unmarried couples without resident children are on average quite young. Often both partners work before they start a family. And many keep working afterwards, because traditions have changed. Employment rates for women with young children are quite high; higher than for married women with older children. In families with children the traditional one-income model, the breadwinners model where only the father works full-time, has gradually been overtaken by the double-income model. In the Netherlands this double-income model is in fact a one-and-a-half-income model, since the man tends to work full-time and the woman part-time. About 85 percent of single parents are single mothers. Their employment rates are quite low, especially when the children are not yet in school.

2.1 *Introduction*

The Dutch Census of 2001 counted almost 16 million people. Most live in private households. Only a small fraction (1%) of the population lives in institutional households, mostly in old age homes or in health care institutions. This chapter will focus on private households, which consist of one or more persons sharing the same address and providing for their own daily needs.

According to the Census of 2001 the Netherlands has 6.9 million private households. The average number of persons in a private household is 2.3. The average household size varies between the different types of household. Table 2.1 shows that non-family households average slightly over one person. Non-family households mainly consist of singles; only two percent of this type of household comprises more than one person; for example some friends, or siblings. A family household averages 3.0 persons per household. A family household is one where two members of the household have a steady relationship, that is, when either they are spouses or partners, or where children live at the parental home - including grown-up children. As expected, the

average size of households consisting of a couple without children is about 2; to be exact it is 2.02. This is because some households have other people living there as well, for example a mother, foster children, or a boarder. Married couples with children form the largest households (4.0 persons), even compared with unmarried couples with children. More than half of all cohabiting couples with children consist of a couple and one child, whereas married couples with one child make up only one third. Cohabitation is a relatively recent phenomenon and the partners quite often marry in the end. Single parent households comprise a single mother or father with her/his child or children and sometimes someone else. Some single parents are widowed, most are divorced (Schapendonk-Maas, 2002). There are far more households with single mothers than single fathers, mainly because mothers are often given custody after a divorce (De Graaf, 2001). Only 15 percent of the single parent households is run by a single father. Single father households are on the average smaller than single mother households (2.4 versus 2.6 persons per household). Seven out of ten single fathers live together with only one child.

Table 2.1
Private households by type, size and economic activity

	Number of households	Number of persons	Average number of members	
			total	economically active
	x 1,000			*%*
Private households	6,866	15,767	2.3	48
Non family	2,354	2,428	1.0	48
one person male	1,044	1,044	1.0	63
one person female	1,262	1,262	1.0	36
multiperson	47	121	2.6	53
Family	4,512	13,325	3.0	48
Couple without children	2,026	4,092	2.0	49
married	1,531	3,097	2.0	39
cohabiting	496	995	2.0	81
Couple with children	2,090	8,210	3.9	49
married	1,911	7,568	4.0	49
cohabiting	178	642	3.6	48
Single parent	396	1,023	2.6	39
single mother	335	876	2.6	36
single father	61	147	2.4	55
Householdtype not stated		14		

The proportion of economically active persons per type of household is shown in table 2.1. An economically active person is either employed, or unemployed but actively searching for work. The total number of economically active persons constitutes the labour force. In the Dutch Census of 2001 a person only can be

employed between 16 and 75 years of age. Unemployment can only occur in the age group 16–64 [1]. When the average number of economically active members is compared with the average number of household members, there turn out to be differences between the types of household. These differences can mostly be attributed to age structure.

No one is economically active in about half of the one person households. This is because many singles belong to the senior population, who are mostly retired. This is especially true among female singles, of whom about 45 percent is over 65 years of age. On the other end of the spectre there are singles who are not economically active because they are young. Some 22 percent is under 30 and many are still studying (see chapter 4).

There is also a difference between the degree of economic activity of married and unmarried couples without children. Twice as many unmarried partners as spouses are economically active. Here age is also the main factor. Partners without children are generally much younger than married couples without children (35 versus 58). The average of 58 years means that the children have left home and many married couples have gone into (early) retirement. Moreover, many women in the older age groups traditionally stopped working once they got children. And they stayed at home even after the children had left (Martin and Kats, 2003; Portegijs et al., 2002). Most partners without children are of a different generation, one where both men and women normally have paid jobs. Moreover they do not have children (yet), which can also be an explanation for the high number of economically active members. But when the couples with children are considered, it is obvious that many parents both work. From table 2.1 this is not entirely clear, because it need not be the parents who are economically active; other household members, such as employed children, count in the average as well. This matter will be discussed in more detail in the rest of the chapter.

2.2 *Economic activity of household members*

Per type of private household, the members can be divided into their position in the household. More than half of the members of private households are part of a couple (married or cohabitant), almost 30 percent are children living at the parental home and 15 percent live alone. Single parents make up only 2 percent of the persons living in private households, as do members of multi-person households and boarders. Furthermore, there are more single women than single men and more single mothers than single fathers, whereas more male than female children live at the parental home. Girls leave the parental home at an earlier age than boys; this is confirmed by their average age: the average age of male resident children is 13 and of female resident children 11 (see table 2.2).

Table 2.2
Average age by type and household position

	Total	Position in the household									
		single		partner		single parent		child		other	
		male	female	male	female	male	female	male	female	male	female
	x 1,000	*average age*									
Total private households	15,767	43	56	48	46	52	45	13	11	40	46
Non family	2,428	43	56							38	42
one person	2,307	43	56								
multiperson	121									38	42
Family	13,325			48	46	52	45	13	11	43	49
Couple without children	4,092			53	51					45	52
married	3,097			59	57					45	52
cohabiting	995			36	35					43	47
Couple with children	8,210			44	41			12	11	44	50
married	7,568			44	41			12	11	44	50
cohabiting	642			38	36			8	7	42	45
Single parent	1,023					52	45	17	14	31	37
Householdtype not stated	14							8	8		

Comparatively more male than female children live at the parental home, but the difference is greater for some types of households than for others. As table 2.2 shows this may mainly be the effect of age differences between the types of household. Children living in single parent households show the largest difference in male and female resident children (56.1% of the children is male), whereas children of unmarried couples show the smallest difference (52.2% of the children is male). As far as age is concerned, unmarried couples with children are generally the youngest families; the average age of the children is 7, versus 12 for the children with married parents. Children in single parent households are generally much older, with an average age of 16. And the large difference between the average age of male en female children in this type of household (17 versus 14), makes it clear that many daughters already left home.

The economic status of people aged 16–64, by their position in the private household is shown in figure 2.1. In table 2.3 the economic activity rate is shown by household position and age. The economic activity rate is the number of economically active persons (employed and unemployed together) as a percentage of the total population concerned. Because there is a large difference between the activity rates of men and women, the economic status will be discussed for men and women separately. Furthermore discussion is limited to the 16–64 age bracket. By definition children under 16 do not work, and only few persons over 64 are employed. No one can be unemployed over 65 according to Dutch law. The non-employed part of the

total population is either going to school, went into early retirement, is engaged in family duties, or is otherwise economically inactive.

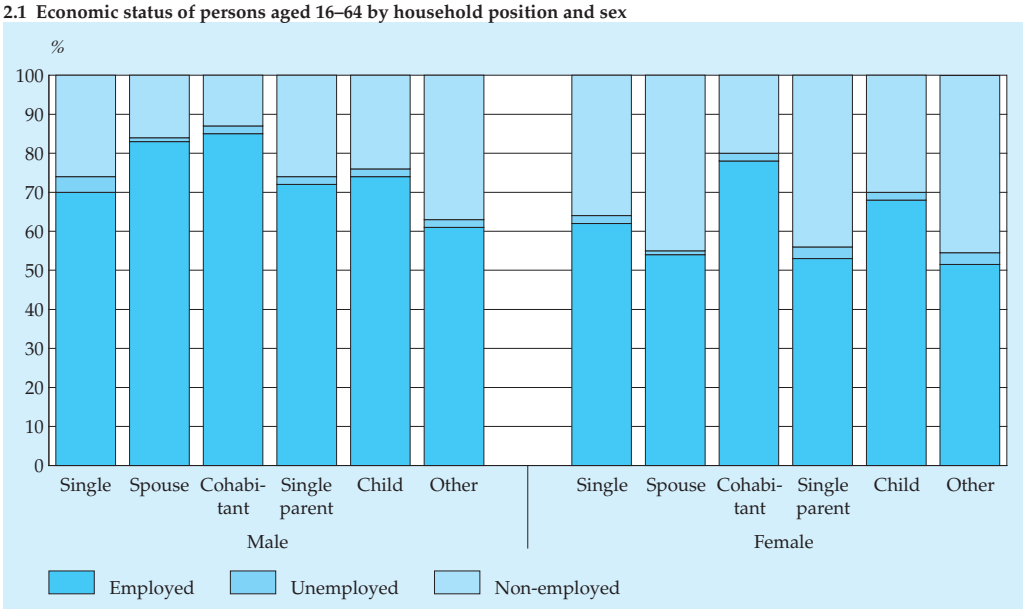
Table 2.3
Economic activity rate by household position and age

	Population in private households	Position in the household					
		single	spouse	cohabitant	single parent	child	other
	%						
Men (age 16–64)	81	74	84	87	74	76	63
Age group							
16–19	62	47	70	48	50	63	48
20–24	80	70	88	82	54	83	66
25–29	89	82	94	93	66	87	73
30–34	91	84	94	94	73	85	69
35–39	91	81	95	90	79	85	67
40–44	90	80	94	88	82	81	72
45–49	89	74	93	84	82	81	68
50–54	85	70	89	81	79	78	68
55–59	71	56	75	66	65	66	54
60–64	28	24	29	28	28	23	24
Women (age 16–64)	61	64	55	79	55	70	55
Age group							
16–19	62	57	34	63	14	63	55
20–24	76	70	61	84	27	81	67
25–29	79	85	72	88	40	82	75
30–34	73	85	69	84	51	74	70
35–39	69	83	66	80	61	72	57
40–44	67	76	66	77	65	70	54
45–49	64	68	62	74	66	69	62
50–54	52	58	50	63	57	63	43
55–59	34	40	32	42	38	51	29
60–64	10	12	9	12	14	17	11

About 81 percent of the male population aged 16–64 is economically active, versus 61 percent of the female population. The economic activity rates vary with household position and age. In general the activity rate of men is highest for the ages 25–54, after they have finished school and before they retire. For women the top of the activity rate is reached between 20 and 34. In this age group most women have finished their studies, and the majority did not yet start a family or kept on working if they did.

With an overall activity rate of 87 percent the unmarried male partners are the most active; but this is largely due to their relatively young age. When age is considered, the married men win in every age group; 94 percent of them are economically active between 25 and 44 years of age. Relatively low activity rates by men are shown among the 'other' household members and the young single fathers.

2.1 Economic status of persons aged 16–64 by household position and sex



For women in general, the unmarried partners are again the most active group; about 79 percent is economically active. The top is 88 percent in the age group 25–29. For every age group their activity rate is relatively high, but in the age bracket 30–39 the female singles have a slightly higher activity rate. When they are in the senior age groups and live in with their parents children are also more economically active, as they generally take care of their elderly parents. In contrast to the activity rate of male spouses, the activity rate of female spouses is quite low. Their overall activity rate is 55 percent, equal to that of single mothers and 'other' household members. The relatively low activity rate of female spouses in the older age groups is striking. This is still the effect of the old Dutch tradition where women stopped working as soon as they had children (Portegijs et al., 2002). Even when the children had grown up, their mothers stayed at home.

Single mothers show by far the lowest activity rates in the youngest age groups. They often encounter difficulties with child care when their children are young, and their financial position is usually not great (Latten, 2003). Some women who are not employed receive alimony from their ex-husbands, others are totally dependent on social security. As single mothers and more importantly their children grow older their activity rate increases sharply.

The lowest activity rates are found in the senior age groups, starting at the age of 50. Depending on their position in the household, only 23 to 29 percent of the male population, and 9 to 17 percent of the female population between 60 and 64 years of age are still economically active (see also chapter 5).

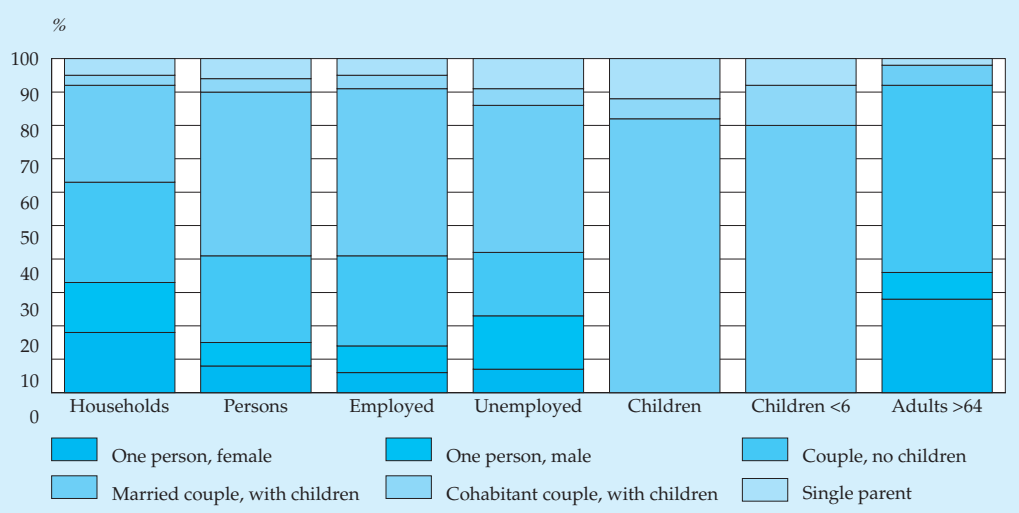
Until now, the labour force as a whole is discussed; that is, the employed and the unemployed persons taken together in the economically active population. As figure 2.1 shows, the vast majority of the labour force is employed. Fortunately only a small fraction (2.5%) of the economically active population aged 16–64 is unemployed and actively looking for a job. When the total population aged 16–64 is considered, only 1.8% is unemployed. Unemployment is relatively high under school-leavers; in the youngest age group (age 16–19) 4.5 percent of the economically active boys and 5.7 percent of the economically active girls are unemployed. And, whereas unemployment drops by age (30–64) for men, female unemployment is relatively high in the age groups 35–54. When household position is considered, the low unemployment rate of married men (1.3%) and cohabiting (2.2%) and married women (2.5%) is remarkable. Single men have a relatively high unemployment rate in every age group (overall 4.9%), but especially in the youngest groups. Single mothers and 'other' female members of private households show the highest overall unemployment rates (5.0% and 5.7%). Their economic activity rates are relatively low. Taking into account their high unemployment rates, the employment rate (percentage employed of total population) will be even lower.

2.3 *Economic activity within households*

The previous section showed the economic status of persons with a specific household position. It is interesting to know how the economically active persons are distributed over the different types of households. That is why in this section the different types of households with their specific members are analysed.

Figure 2.2 shows the distributions of households, totals, employed and unemployed persons. As background information it also gives the distribution of children living at the parental home (in total and below the age of 6) and that of the senior population aged over 65. The first bar shows that one third of the households consists of a single person, just under one third consists of couples without children and just over one third of families with children. Furthermore there are slightly more households with a couple and children than there are households with a couple without children (31% versus 30%). Cohabitants with children represent only a small part in the total number of households (3%). In the second bar the distribution is quite different. Here the population in the households is the subject. Type of households with a below average number of persons get a relatively smaller part of the bar (for example one-person households) than larger types of household (families with children). The distribution in the other bars can best be compared to the second bar (persons), as they all have the number of persons as their subject. In this way, the relative contribution of each type of household to the subjects under consideration can be analysed.

2.2 Distribution of households, persons, employed and unemployed persons, children and seniors over type of private household [1]



[1] Persons in multi-person households (121 thousand) and persons of whom the household type could not be stated (14 thousand) are not taken into account in this figure.

The distribution of the employed persons over the different types of household at this level of aggregation is fairly representative for the total population; only small deviations can be spotted. The distribution of the unemployed persons shows a quite different picture.

The findings about the one-person households on the subject of economic activity are, of course, the same as the ones in the previous section about singles. New in the current section is that they are compared with other households instead of persons. The contribution of single women to the labour force (employed and unemployed persons) with 6 percent is a little less than expected given their share in the total population of 8 percent. However, given the overrepresentation of single women in the senior age groups (28% of the over 65 year olds) one would expect an even lower contribution in the labour force. This is compensated by the group of young single women overrepresented in the labour force. The male singles show a different picture. They are slightly more often employed (8%), and by far more often unemployed (16%) than their presence in the total population (7%). As was stated in the previous section, especially young single men are unemployed.

The proportion of couples without children in the total of employed persons is 27 percent, slightly more than their share in the total population (26%); their share in the unemployed population is relatively small (19%). Since the members of these households are overrepresented in the senior population (55% of the age group over

65), it can be concluded that the younger couples are doing very well on the labour market. Something similar goes for married couples with children. The share of married people with children in the employed labour force is 49 percent and 42 percent in the unemployed population. Their presence in the total population is 48 percent. Eighty percent of all children live in households with married couples. This means that married parents are employed substantially more than average and unemployed well below the average. Unmarried couples with children make up only a small part of the total population (4%). Their representation in the employed population is similarly small, but they are slightly more unemployed (5%). This type of household consists of a more than average number of young children. Single parent households are a bit less employed (5%) and more unemployed (9%) than their relative presence in the total population (6%).

2.4 *Families and work*

In the Netherlands, traditionally men were breadwinners and women stayed at home to do the housekeeping and care for their husband and their children. As a result of the relatively high wages and a tax system that stimulated one breadwinner per household to support a whole family, there was no direct incentive for housewives to have a paid job (Banning, 2004). In general women used to be employed for only a short period of their lives: after they left school and before they started a family. According to the Census of 1971, only 15 percent of the married women was employed; 83 percent were housewives (Berends and Boelmans-Kleinjan, 1979). Since the 1970s the views on paid work for married women and especially for women with small children have gradually changed. This change was influenced by the women liberation movement, new technical innovations that made housekeeping less time consuming, economic factors, an expansion of the professional child care and better parental leave facilities (Banning, 2004; Martin and Kats, 2003; Portegijs et al., 2002). With the emancipation of women and the expected decline of the potential labour force, the labour participation of women, including mothers, is expected to further increase (Latten, 2003).

In the last decades more and more women kept their paid jobs once they became mothers. In the early 1970s, 23 percent of the mothers kept working after the birth of their first child, versus 73 percent of the mothers in the late nineties (Portegijs et al., 2002). However, the new mothers did reduce their working hours. The amount of part-time work for women increased drastically (Beckers, 2003; Martin and Kats, 2003; Portegijs et al., 2002). So the ideas about working mothers changed from 'mothers should be at home at all times' to 'mothers can have a paid job, but not full-time; they should be able to spend enough time with their children'. The expansion of the possibilities to work part-time together with a moderate expansion of the professional child care facilities encouraged this.

At the same time women became more highly educated, so their earnings went up which made it more attractive to keep working. The higher educated women are, the higher their employment rate, but also the higher their full-time ratio (see chapter 3 and Reemers, 2003). Analysis of the Dutch Labour Force Survey (Reemers, 2003) shows that the number of couples in which both partners are employed increased at the expense of couples in which one partner has a full-time job in the last decade. This mainly occurred in families with young children and in most cases one of the partners works full-time and the other part-time. This so called 'one-and-a-half-income-model' has become a very common feature in the Netherlands. In 96 percent of the cases the male partner works full-time and the female partner has a part-time job.

The tables 2.4 and 2.5 show figures from the Dutch Census of 2001 about the economic status of families with and without children per type of household and age of the youngest child. In about half of the married couples without children no one is employed. As we stated before, the average age of married couples is 58. Table 2.4 shows that 37 percent of these households have at least one spouse aged over 65, so many are retired. This is confirmed by the figures in table 2.5. At least one spouse is retired in more than one third of the families with a married couple without minors living at the parental home. The average age of cohabiting couples without children is much lower (35). In about seven out of ten of these households both partners work. Most are still young and may start a family in the future. Relatively many do not have jobs since they are still finishing their studies.

In most couples with children there is at least one person employed (see table 2.4). Married couples with children are in general somewhat older than cohabiting couples with children, and so are their children. In 63 percent of the unmarried parent families the youngest child is under 6 years of age, whereas in 24 percent of

Table 2.4
Families: number of members employed and presence of seniors and resident children

	Average size of household	Number of members employed				Presence of children (age youngest child)			Presence of seniors (age ≥65)
		0	1	2	≥3	<6	6–<18	≥18	
		%							
Families									
Couple without children									
married	2.0	49	24	27	0				37
cohabiting	2.0	11	20	69	0				7
Couple with children									
married	4.0	4	28	48	19	35	41	24	4
cohabiting	3.6	7	28	58	7	63	30	7	1
Single parent									
single mother	2.6	33	49	15	4	23	44	33	12
single father	2.4	15	49	29	7	6	38	56	15

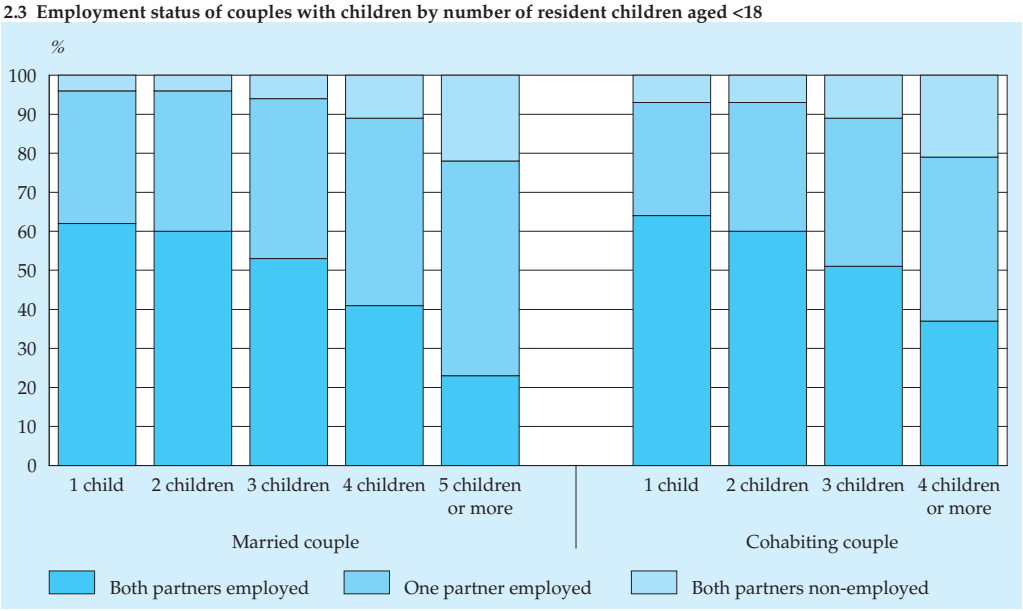
Table 2.5
Economic status of families by age of youngest child

	Children aged <18 living at the parental home		
	no	yes, with age youngest child	
		<6	6–<18
Type of household	*%*		
Married couple, of whom:			
both partners employed	30	58	57
one partner employed	27	36	37
at least one partner retired	37	0	1
Cohabiting couple, of whom:			
both partners employed	68	63	58
one partner employed	20	30	33
at least one partner retired	9	0	1
Single mother; mother employed		40	60
Single father; father employed		69	76

the married couples have children over 18. Many of these older children are employed themselves, as can be concluded from the fact that in 19 percent of the latter households three or more members are employed. From table 2.5 the married and cohabiting couples with children below the age of 18 living at the parental home can be compared. In families in which the parents are married, the breadwinner model is slightly more standard (36%–37%) than in families in which the parents cohabit (30%–33%). This difference can be attributed mostly to age structure. Both parents are employed in over half of the households with a couple and children under 18. In most of these households the one-and-a-half-income-model applies. Among cohabiting couples where the youngest child is under 6 both parents work more often than in the other types in which the children are older. An explanation may be that younger people tend to break traditions first (Martin and Katz, 2003). Furthermore, as figure 2.3 shows, there is an inverse relationship between the number of children living at the parental home and the employment rates of both married and unmarried parents. Families with a married couple gradually change from a predominantly double income model (61%) into a mainly single income model (54%).

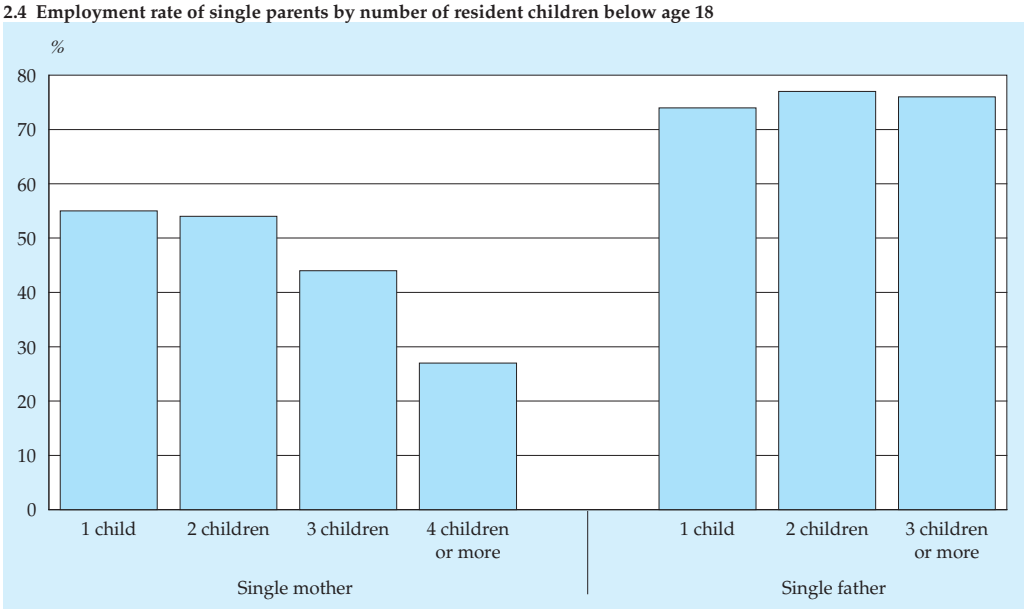
In single parent households the resident children are generally much older than the children living with both their parents, especially in single father households. In 56 percent of the single father households the youngest resident child is over 18 (see table 2.4). And many children are employed, since two or more persons are employed in 26 percent of the single father families (versus 19% of the single mother families). The average age of single fathers themselves is 52, versus 45 for single mothers. A fair number of single parents with older children living in the parental

2.3 Employment status of couples with children by number of resident children aged <18



home are retired. When the focus is on the single parent families with only resident children under 18 (table 2.5), very few retired single parents remain. Table 2.5 demonstrates that single mothers with children in the youngest age group (<6) are the least employed (employment rate is 40%). They often encounter difficulties with child care when their children are still very young. Single mothers with a youngest

2.4 Employment rate of single parents by number of resident children below age 18

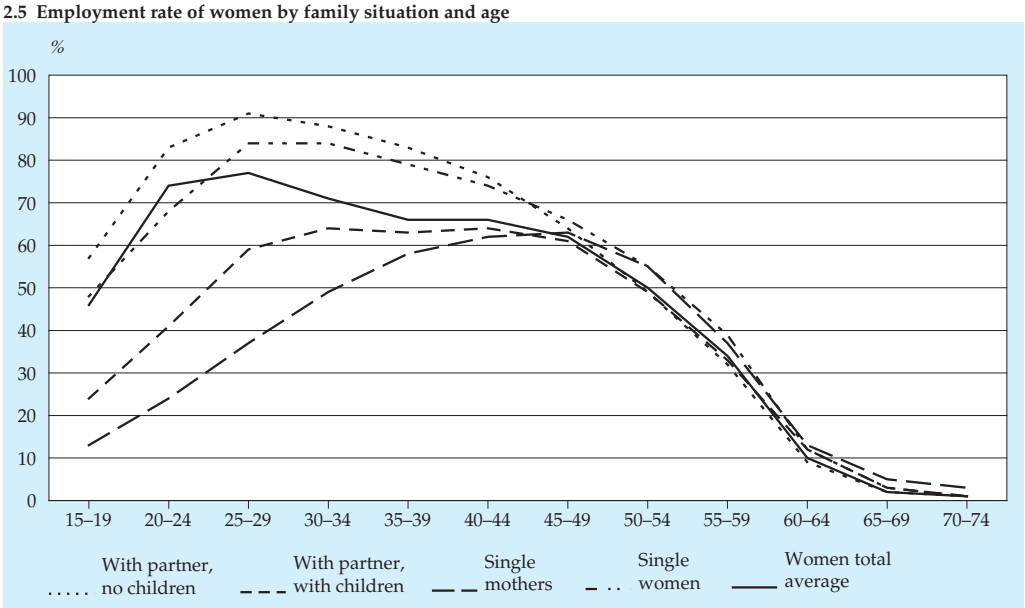


child aged 6–17 have an employment rate of 60 percent. Single fathers, irrespective of the age of their children, are more often employed than single mothers (69% and 76%). Furthermore, they do not show such a large difference in the employment rates dependent on the age of their youngest child, or the number of minors they have to support. Figure 2.4 gives a good illustration of the latter. As the employment rate of single mothers is already low compared to that of the single fathers, the more children there are in the parental single mother home the lower the employment rate (55%–27%). The employment rates of single fathers, on the other hand, do not seem to be influenced by the number of their resident children, it remains fairly stable (74%, 77%, 76%). These differences can only partly be attributed to the higher average age of the resident children of the single fathers (see table 2.2).

2.5 *Women and work*

In this section the focus is on women, and especially on mothers with and without a partner. Figure 2.5 shows the employment rates for women by their family situation and age. The employment rate for women (including some 'other' women like resident children) until the ages 25–29 is mainly determined by women without children. Few women have children at a young age. Until the age of 25–29 all the employment rates increase. Then the overall employment rate of women starts to decline. This goes together with a decline in the ratios for women without children. The decline, however, is influenced by the fact that more women start to belong to

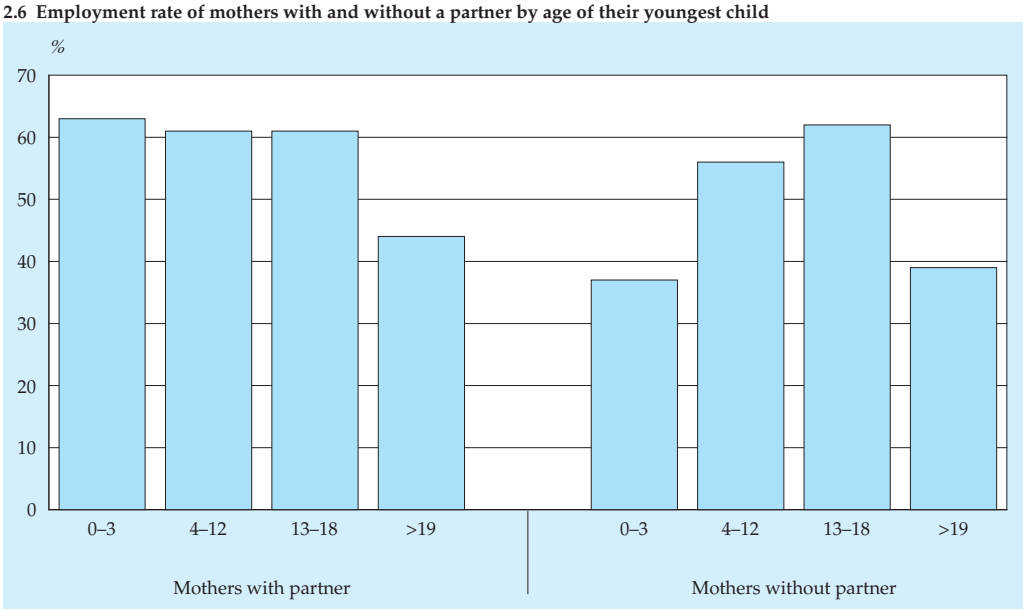
2.5 Employment rate of women by family situation and age



one of the categories with children, and these categories have lower employment rates. Whereas the ratios for women without children gradually decline, the rates of the mothers are flattening, until they come together at the age 45–49. From there on the rates of the women of the different family backgrounds decline at approximately the same pace to a nearly zero ratio at the age of 65; only single women and single mothers have a slightly higher employment rate until the age of 60. The figure clearly shows that having children at home is an important factor in reducing the employment rate of women, but the figure also shows that traditions are changing. More women, also with young children, are employed in the younger age groups than in the age groups between 45 and 54. In comparing these figures with the older age groups, we have to realise that early retirement is starting and also male employment rates are strongly declining at these senior ages (see chapters 3 and 5).

Furthermore, figure 2.5 shows that single mothers with children have the lowest employment rates until they reach the age of 45. Obviously, the combination of work and the care for children is much harder without a partner. In figure 2.6 the employment rates of mothers with and without a partner are compared by the age of their youngest child. Single mothers with children that are not yet in school (age 0–3) have by far the lowest employment rate. Professional child care is expensive and work does not always bring a lot of extra income. When the children get older and go to school, single mothers get more opportunities to go to work. Moreover, many live on social security and must look for a job once their children go to school. The low rates for mothers with resident children over 18 are the consequence of

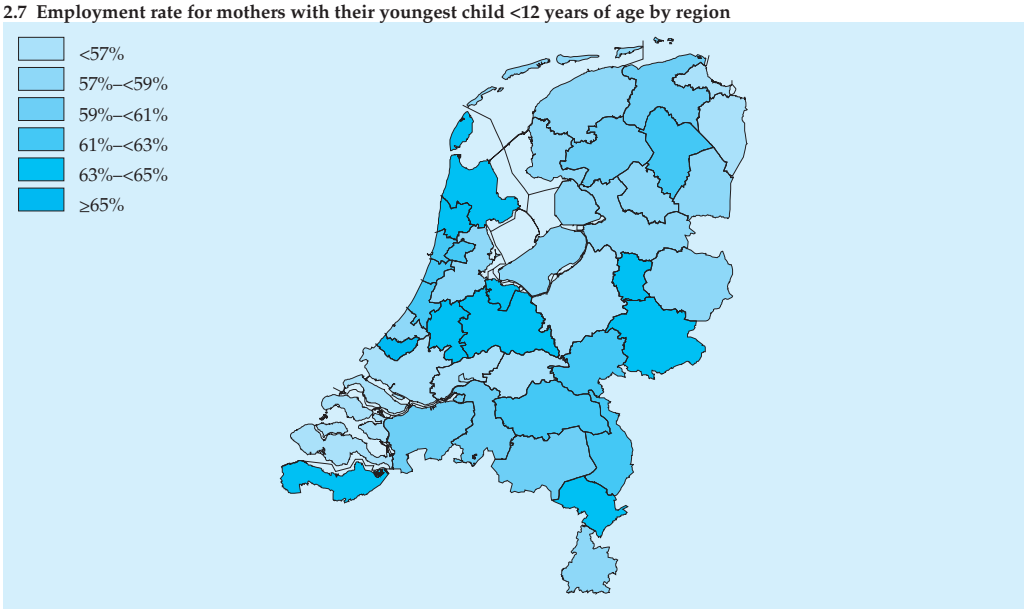
2.6 Employment rate of mothers with and without a partner by age of their youngest child



tradition. When they were young and had children the standard practice was to quit their jobs. The fact that mothers with a partner and a youngest child aged between 0–3 are more often employed than other mothers is even more evidence that they broke with tradition. Moreover, the economic boom of the late nineties helped young mothers to stay at work; employers were very willing to offer young mothers a part-time job.

In figure 2.7 the employment rates of mothers, with and without a partner, with their youngest resident child below the age of 12 is shown at the NUTS 3 level (COROP-regions). The Netherlands consists of forty NUTS 3 regions, each completely contained within one of the twelve provinces (see chapter 11). The average employment rate for mothers with a youngest child below the age of 12 is 60 percent. Low rates (below 57%) are found in the north east of the Netherlands along the German border. In these regions the overall employment rate for men and women is low as well (see chapter 3). Other regions with low employment rates for mothers with young children lie in the 'bible belt'; the region from the south-west, via the mid-south to the east-central part of the Netherlands. In these regions there are more religious people than average. Furthermore, the relatively low rates around the large cities (Amsterdam and Rotterdam) can be explained by the higher concentrations of people with a non-western foreign background (see chapter 6). The highest employment rates for the mothers are located mainly in the suburbs and around cities with universities. With 67 percent the region around Delft (near Rotterdam) has by far the highest ratio. Delft is a university city and in the regions around Delft there is a lot of horticulture under glass.

2.7 Employment rate for mothers with their youngest child <12 years of age by region



Annotation

1) Contrary to the definition of Statistics Netherlands for the labour force in the Netherlands, the Census of 2001 uses the international definition of labour force. So there is no bottom limit as to the number of hours worked per week; everyone who works, even for only one hour a week, or searches actively for work belongs to the labour force and is considered to be economically active. Furthermore, for the Census of 2001 choices had to be made as to which category of economic status a person had to be assigned. Persons below the age of 16 all have been assigned to either 'attendant at an educational institution' (age 4–15) or 'other not economic active' (<4 years). Persons 75 years and older all have been assigned to the economic status 'retired'. Persons in the age group 65–74 cannot be unemployed; if they were not employed, they have been assigned to the category 'retired' as well. More information about this topic can be found in chapter 13.

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3. Working people: what they do, who they are and where they live

Marijke Hartgers and José Gouweleeuw

According to the Census of 2001, 62 percent of the population in the Netherlands between the ages 16 and 74 are employed. Most are employees (92%). Three out of four employed persons are aged between 25 and 54. Native men have by far the highest employment rate. The branches of economic acivity employing most people are 'Wholesale and retail trade', 'Real estate, renting and business activities' and 'Manufacturing'. Dutch women used to stop working after their children were born, but since the 1970s the employment rate for women has increased from 25 tot 53 percent. Most women work part-time (62%). The branch of economic activity in which they work most is 'Health and social work'. Men and especially women have a higher employment rate as their education level increases. Professionals have by far the highest education level attained: 78 percent have finished tertiary education. The employed population is not spread evenly over the Netherlands. Relatively many live in the centre of the country and few on the periphery.

3.1 Key figures

The Dutch Census of 2001 counted 7.4 million employed persons on a total population of 16.0 million inhabitants. In fact there were probably a few more persons with a (small) job, because the group of employed persons was limited to the 16–74 year-olds for the census. Going to school full-time is compulsory for children under 16 in the Netherlands so their main activity is 'attendant at educational institutions'. Children aged 14 and 15 can actually have a small job, but the law restricts when and how long they can work and in what kind of jobs. For example, they can deliver flyers once or twice a week. People over 75 years occasionally have paid work, but their number is negligible, so in the 2001 Census their current activity is 'retired'.

Table 3.1 shows that over three in four employed persons are aged between 25 and 54. Younger people usually go to school or university. Many older persons stopped working. Only a small fraction of the population over 65 does paid work since everyone is entitled to a pension at the age of 65. In some branches of economic activity the entitlement age is lower, but all persons who lived in the Netherlands for several years are entitled to pension benefits according to the Old Age Pension Act as soon as they reach the age of 65. The benefits barely pay for the cost of living, but most people who worked have a supplementing pension. In the older age groups

there are remarkably few women with a job because in the past the Netherlands had a strong tradition of stay-at-home housewives. Only in the last 20 years more and more young mothers kept working after their children were born (Martin and Kats, 2003; Portegijs et al., 2002). In section 3.4 this subject will be dealt with in more detail. Older people are discussed in chapter 5.

Most employed persons are employees (see table 3.1). Only 8 percent have their own company with or without personnel [1]. The average age of employees is 37; this is 7.5 years younger than the average age of self-employed people. The share of the self-employed in the total number of employed people increases with age. Nearly half of the few people still working after age 65 has their own company. This is mainly attributed to the fact that most employees retire at 65 or before, whereas self-employed people tend to keep working after their official retirement age. This issue is discussed in chapter 5.

Table 3.1
Employed persons 16–74 years of age: employment status and age

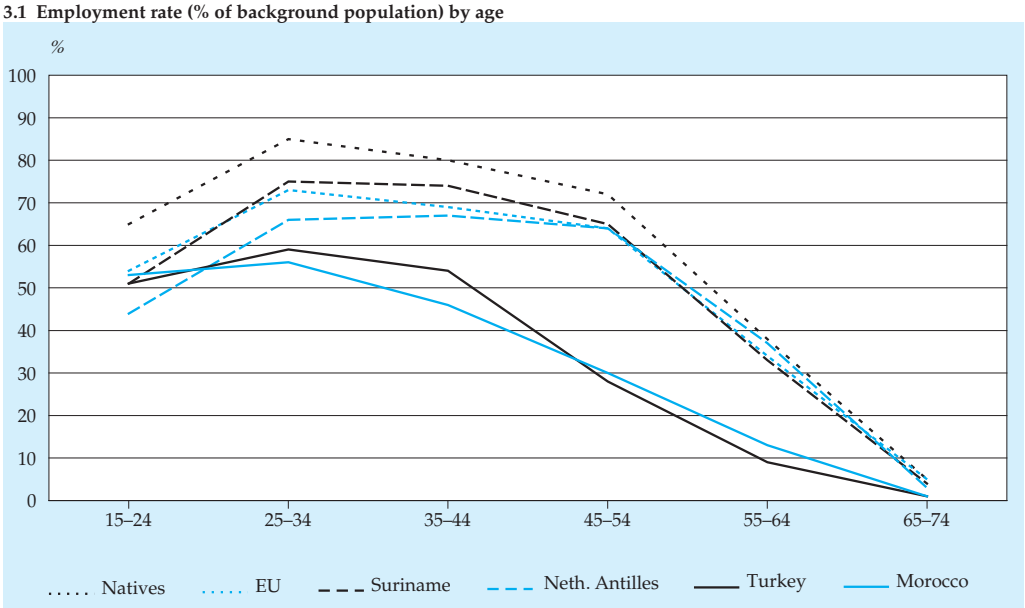
	Population (16–74 years)	Employed			
		in % of age group	absolute	Employee	Self-employed
				in % of employed	in % of employed
	x 1,000		*x 1,000*		
Total (16–74)	11,848	62	7,395	92	8
Age group					
16–24	1,705	68	1,158	99	1
25–34	2,436	81	1,965	94	6
35–44	2,563	77	1,976	91	9
45–54	2,324	71	1,640	90	10
55–64	1,618	37	594	83	17
65–74	1,202	5	61	54	46
Average age (16–74)	42.4		37.8	37.2	44.7

Employed people can also be classified according to their native or foreign background. Someone has a foreign background when at least one of the parents is born outside the Netherlands; they themselves may be born in the Netherlands. Within the group of employed persons 15 percent has a foreign background. Many originate from the EU, Turkey, Morocco, Netherlands Antilles, Suriname. The Netherlands Antilles and Suriname are former colonies of the Netherlands. Many labour migrants from Turkey and Morocco have immigrated to the Netherlands since the 1960s.

Figure 3.1 shows the percentages of employed persons with native and foreign backgrounds. The native population has the highest percentage of employed persons for all age groups. Non-Dutch EU-citizens and Surinamese people have a relatively high percentage of employed persons. Non-Dutch EU-citizens mostly come from backgrounds quite similar to that of the native population. The percentage of employed Surinamese people is almost as high as that of the native Dutch. This is largely due to the Surinamese women: 59 percent is employed, versus only 53 percent of the women in the native population. The lowest percentage of employed persons is found among the Turkish and Moroccan men and women. Compared to the native population they have relatively more unemployed people and housewives. Finally, the Antilleans have the lowest percentage of employed persons among the 15–24 age group. This is mainly due to the relatively large percentage of students in this age group. The Netherlands Antilles virtually have no schools at the tertiary level so their young people come to the Netherlands to study. See chapter 6.

In the remainder of this chapter we will discuss different aspects concerning the jobs of employed people, their personal features, and their place of residence. In section 3.2 we discuss job size and branch of economic activity. Education level is considered in section 3.3, while section 3.4 describes occupation in relation with age and educational attainment. The difference between male and female workers is the focus of section 3.5. Finally, section 3.6 addresses the places of residence of employed persons.

3.1 Employment rate (% of background population) by age



3.2 *Job characteristics*

The job characteristics considered in this section are branch of economic activity and job size. First, we describe the division of the branch of economic activity into 15 different groups, based on the codes A to O [2)] from the NACE classification. Some key figures for these groups are included in table 3.2. The branch that occurs most is 'Wholesale and retail trade; repair' (NACE G). Approximately half of this group is employed in retail.
'Real estate, renting and business activities' (NACE K) is another frequently occurring branch of economic activity. More than one quarter is employed in 'labour recruitment' (temporary employment agencies). The branch of economic activity that occurs least of all in the Netherlands is 'Fishing' (NACE B), with less than 0.1 percent of all employed persons.

Employed men and women are concentrated in different branches of economic activity. For example 'Construction' (NACE F) is a male-dominated branch, whereas 'Health and social work' (NACE N) is female dominated. The difference between male and female workers will be elaborated in section 3.5.

Table 3.2
Employed persons by branch of economic activity and job size

	Average age	Employed	Self-employed	Employee		
				full-time	long part-time	short part-time
	in years	*x 1,000*	*%*			
Total	37.9	7,395	8	57	24	10
Branch of economic activity [1)]						
A. Agriculture, hunting and forestry	40.9	218	53	31	9	8
B. Fishing	38.2	3	48	39	6	7
C. Mining and quarrying	42.2	10	1	90	8	2
D. Manufacturing	39.4	1,003	3	81	13	3
E. Electricity, gas and water supply	45.0	35	0	84	15	0
F. Construction	38.2	410	13	80	5	2
G. Wholesale and retail trade; repair	34.9	1,285	10	53	19	18
H. Hotels and restaurants	32.6	265	15	34	23	28
I. Transport, storage and communication	38.6	471	5	72	14	8
J. Financial intermediation	37.7	275	2	73	22	2
K. Real estate, renting and business act.	35.4	1,217	8	56	23	12
L. Public administration and defence	41.3	491	0	74	24	2
M. Education	42.7	419	2	46	43	9
N. Health and social work	39.0	929	4	26	56	15
O. Other community, social and pers. service act.	37.6	304	18	43	26	13

[1)] In the original NACE–classification the codes P (NACE 95) and Q (NACE 99) occur as well. The number of employed persons in these categories is small. Employed persons working in these branches, as well as a small number of people for whom the NACE-code was unknown, are attributed proportionally to the other NACE-codes.

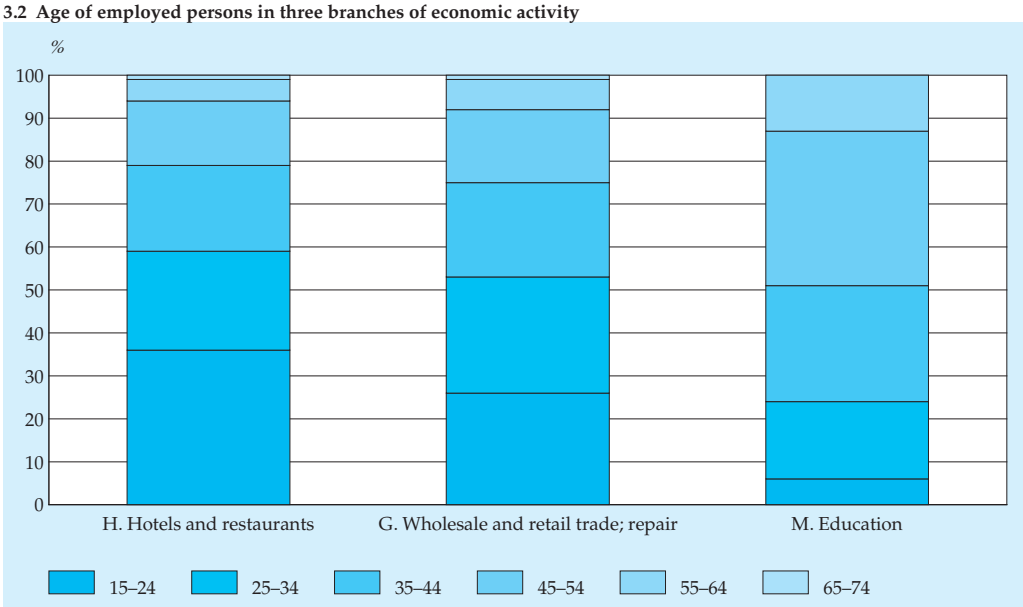
Employed persons are either employees or self-employed. More than half of the people that work in 'Agriculture, hunting and forestry' (NACE A) is self-employed. And almost half of the employed persons in 'Fishing' (NACE B) are. Many people working in agriculture own a farm. All persons in 'Public administration and defence' (NACE L) and 'Electricity, gas and water supply' (NACE E) are employees. For the first branch of economic activity this is obvious, the second was a public enterprise in 2001 and therefore had no self-employed persons.

We divided employees into three groups based on working hours. Full-timers work 35 hours a week or more. Persons with a short part-time job work less than 15 hours a week. Employees who work between 15 and 35 hours have a long part-time job. In the Netherlands, over half of all employees work full-time. Compared with other European countries the Netherlands has the highest percentage of part-timers, both men and women. As is described in section 3.5, women are the champion in part-time work, far outnumbering Dutch men (Martin and Kats, 2003; Portegijs et al., 2002; Wielers and van der Meer, 2003).

The distribution of employees over full-time, long and short part-time jobs varies from one branch of economic activity to another, as table 3.2 shows. The largest group of part-time workers is in 'Health and social work' (NACE N), where three quarters of the employees work part-time (long or short). This is directly related to the fact that this economic activity is female dominated. Men working in this branch work part-time more than average as well. Another branch with many part-time working employees is 'Hotels and restaurants' (NACE H), which has the largest percentage of short part-time workers of all. This is probably because many students work short part-time jobs in hotels or restaurants. Working students are discussed in chapter 4. 'Construction' (NACE F) and 'Mining and quarrying' (NACE C) are branches where more than 90 percent of the employees works full-time. One explanation is that the branches are male dominated.

The average age of employed persons can be considered for each branch (see table 3.2). The branches with the lowest and highest average age are considered more closely in figure 3.2. The lowest average age (32.6) is in 'Hotels and restaurants' (NACE H), where about one third of the employed persons is between 15 and 24 years old. This group contains many students with short part-time jobs. Another group with a low average age (34.9) is 'Wholesale and retail trade' (NACE G). More than half of the employed persons in this branch is under 35, and about a quarter is aged between 15 and 24. This group probably also includes many students with part-time jobs. It is known that many young people work in shops as salespersons, cashiers or stock clerks (Lucassen, 2003).
A branch with the high average age of 42.7 is 'Education' (NACE M). Note that this branch has comparatively many persons aged 45-54, and very few people under 24. People normally don't finish their teacher training until they are at least 21.

3.2 Age of employed persons in three branches of economic activity



'Electricity, gas and water supply' (NACE E) is the branch with the highest average age (45.0). Since this group involves less than one percent of all employed persons, it is not considered further.

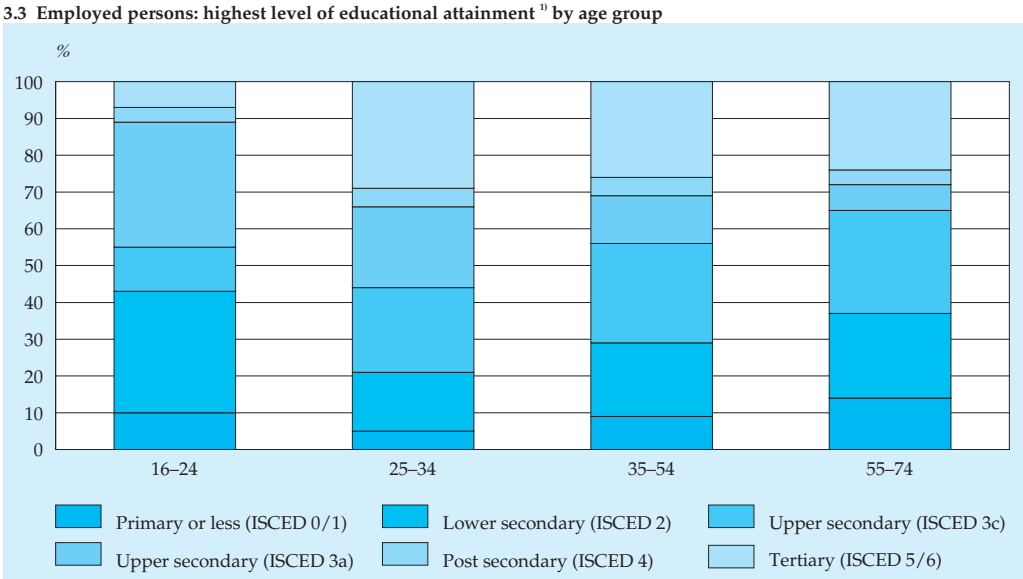
3.3 *Educational attainment*

The International Standard Classification of Education (ISCED) is used to classify the Dutch Census population according to the highest level of education they completed. The ISCED ranges from the pre-primary level (ISCED-0) to the tertiary levels (ISCED-5 and -6). The ISCED scheme in chapter 1 shows that some levels can be subdivided; ISCED level 3b is not used in the Netherlands.

The overall level of education attained by the employed persons is higher than that of retired and other non-employed people. This is true for men and women in every age group. Figure 3.6 (section 3.5) shows this for men and women separately.

Figure 3.3 shows the division into the highest levels of education attained by employed persons for four age groups. Many among the youngest age group (16–24) did not yet finish school: an above average proportion finished education at the 'lower secondary' and 'upper secondary, a' level, whereas the levels 'upper secondary, c' and 'tertiary' are below average. Many young people work and go to school at the same time (see chapter 4). The youngest, aged 16–19 years, mostly do

3.3 Employed persons: highest level of educational attainment [1] by age group



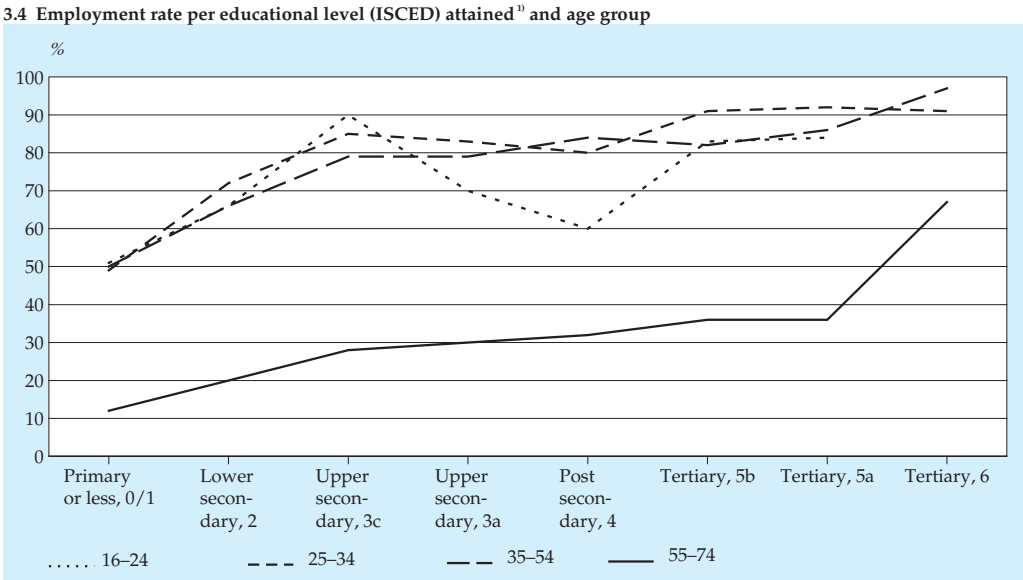
[1] The category primary or less (ISCED 0/1) includes a small number of education level unknown.

short part-time work. In general, their schoolwork takes up more time than their paid job.

Considering the age groups from 25 years upwards, the upgrading of the Dutch working population is clear. As age increases so does the proportion with lower levels of education ('upper secondary, c' and lower), while the proportion with higher levels of educational attainment ('upper secondary, a' and up) decreases. Note that the age group 25–34 includes some people who have not yet finished their studies (especially men, as can be seen in figure 3.5). Therefore, the upgrading of the Dutch working force will even become more evident.

A clear relationship exists between the level of education attained and the proportion of employed persons. The higher the attainment level, the higher the employment rate. On average 62 percent of the population between 16 and 74 years of age is employed. When the level of education attained is taken into account, it varies between 35 percent for the (pre)primary level (ISCED-0/1) and 88 percent for the highest tertiary level (ISCED-6). When age is considered (see figure 3.4) the same relationship can be observed, whereby the employment rate is much lower for the oldest age group (55–74 years) than for the other age groups for every level of education attained. The sharp rise in the employment rate for the oldest age group at the tertiary education level (ISCED-6) is quite remarkable. Not many people reach this level, and the percentage of people with this level in the age group 55–74 is even lower. The age groups 25–34 and 35–54 show the highest employment rate for most

3.4 Employment rate per educational level (ISCED) attained [1] and age group



[1] The category primary or less (ISCED 0/1) includes a small number of education level unknown.

levels of education attained. The age group 16–24 behaves somewhat erratic, with a sharp dip at the ISCED levels 3a and 4. This is because young people who complete ISCED level 3c, 5b and 5a generally enter the labour market, whereas young people who complete levels 2, 3a and 4 will generally continue their studies. Moreover, in figure 3.4 there is no observation for the highest ISCED level (ISCED-6) for the youngest age group since it is rare to encounter someone with a PhD under 25.

3.4 Occupation

Occupation is classified according to the International Classification of Occupation (ISCO). Table 3.3 shows the division of the employed persons into ten different groups of occupation with their average age and the percentage of persons with a low (primary or less), respectively high (tertiary) level of education attained. Two groups are very small: the armed forces (ISCO-0) and the skilled agricultural and fishery workers (ISCO-6) count no more than one percent of the employed persons. The largest occupational groups are those of the professionals (ISCO-2) and the technicians and associate professionals (ISCO-3). Together with the group of legislators, senior officials and managers (ISCO-1) these groups of occupations have the highest proportion of highly educated people. Almost eight out of ten professionals have finished tertiary education. It will be no surprise to see that the workers in the elementary occupations (ISCO-9) on average have a low level of educational attainment. More than one quarter did not complete more than primary education.

Table 3.3
Occupation, age and highest level of educational attainment

	Total	Average age in years	Level of educational attainment	
			primary or less	tertiary
			%	
Total population 16–74 years *(x 1,000)*	11,848	42.4	16	19
Employed persons *(x 1,000)*	7,395	37.8	9	24
	%			
Occupation				
Legislators, senior officials and managers (ISCO-1)	13	42.4	5	30
Professionals (ISCO-2)	16	40.4	1	78
Technicians and associate professionals (ISCO-3)	17	37.7	2	23
Clerks (ISCO-4)	11	36.3	6	10
Service workers and shop and market sales workers (ISCO-5)	11	33.8	9	6
Skilled agricultural and fishery workers (ISCO-6)	1	35.2	20	2
Craft and relative workers (ISCO-7)	10	36.8	12	2
Plant and machine operators and assemblers (ISCO-8)	6	38.6	20	3
Elementary occupations (ISCO-9)	7	35.6	27	2
Armed forces (ISCO-0)	1	34.7	2	15
Occupation unknown	7	36.1		
Unemployed persons *(x 1,000)*	192	35.6	23	15
Economically inactive *(x 1,000)*	4,261	50.6	27	11

The average age of the employed persons per occupational group varies between 33.8 and 42.4. The youngest workers belong to the group service workers and shop and market sales workers (ISCO-5). Many 15–24 year-olds work as personal service workers in restaurants and shops. Chapter 4 shows that most of these young workers still go to school as well. On average the oldest occupational group is that of legislators, senior officials and managers (ISCO-1), whereas the only other occupational group with an average age over 40 is that of the professionals (ISCO-2). Both groups of occupation demand a high level of education, as can be seen in table 3.3. No less than 78 percent of the professionals finished tertiary level. Since tertiary education and becoming, for example, a university professor takes years, there are few young people with this occupation. Becoming a manager or senior official (ISCO-1) also demands experience. Furthermore the observed high average age for these occupations is in accordance with the findings in the previous section (3.3), where it was stated that the higher the education level, the higher the employment rate, especially in the older age groups.

In some occupations certain age groups are overrepresented. Many 15–24 year-olds work in restaurants as waiters or bartenders, or in shops as salespersons or cashiers. The youngest (15–19 years of age) often have very small jobs, for example delivering

flyers once or twice a week (Lucassen, 2003). Persons aged between 25 and 34 are more than average engaged in business (computer or otherwise), finance and sales, stock clerks and as machine operators. There are many managers in the group aged 35–54. Whereas 45 percent of all employed persons belongs to this age group, almost two thirds of all managers are of this age. This age group also contains many professionals, especially in health (medical doctors, dentists, veterinarians or pharmacists) and education (especially teachers in primary and secondary education). Associated professionals in the area of customs, tax and police work (for example customs inspectors and social benefits or tax officials) are also mainly in the age of 35–54. Older people (55–74 years of age) are often directors or chief executives, managers of small enterprises, teaching professional in higher education, or caretakers of buildings.

3.5 *The male and female workforce*

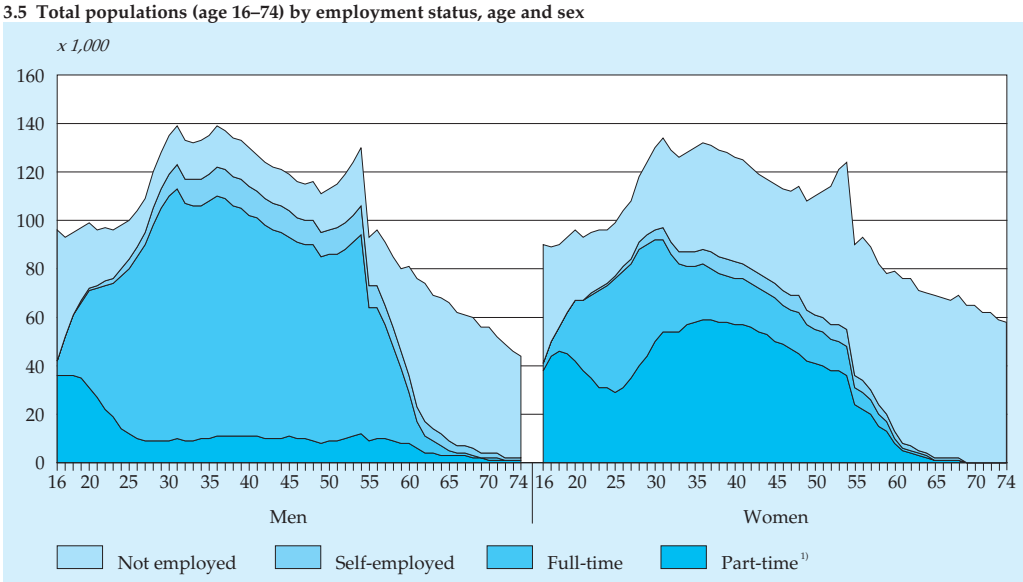
Dutch men and women differ in many characteristics with regard to work. The most striking difference is the amount of paid work men and women do. Dutch women less often have a job and when they have a job they often work part-time (see figure 3.5). As table 3.4 shows, more than two thirds of all men aged between 16 and 74 are employed, versus slightly more than half of the women in that age bracket. The difference with respect to full-time versus part-time work is even greater. In every age group over 50 percent of all employed women work part-time, versus 15 percent for the average male worker.

Table 3.4
Employed persons (age 16–74) by sex and job size

	Men	Women	In % of total population		% part-time employees [1)]	
			men	women	men	women
	x 1,000		*%*			
Total (16–74)	4,288	3,107	72	53	15	62
Age group						
16–24	599	559	69	67	43	63
25–34	1,079	886	87	74	9	51
35–44	1,146	830	88	66	9	69
45–54	1,001	639	85	56	10	67
55–64	413	182	51	23	17	64
65–74	49	12	9	2	38	51
Average age (16–74)	38.8	36.4				

[1)] Persons with a part–time job work less than 35 hours a week.

3.5 Total populations (age 16–74) by employment status, age and sex



1) Part-time workers work less than 35 hours a week.

In figure 3.5 the total population between 16 and 74 years of age is shown by employment status, age and sex. In the overall picture, the courses of the male en female population are very clear. The post-World War II baby boomers catch the eye, at the age of 54. The figure demonstrates that the employment rate of men is higher than that of women: the category 'not employed' is much more extensive for women. An overwhelming majority of women work less than 35 hours a week. Furthermore it shows that men are slightly more often self-employed than women (7 percent of the employed women versus 9 percent of the employed men).

When age is taken into account, figure 3.5 shows the following features. Few in the youngest age groups have quit school at a relatively early age and work in a full-time job; this is expanding with age. Most of the youngest age group are still going to school or university; this decreases with age. Many pupils and students have part-time jobs on the side. Between the ages of 20 and 25 the amount of part-time work gradually decreases in favour of full-time work. Around the age of 25 most young people have finished their education and are working full-time. Only a couple of years later many start a family. Most men keep on working full-time, whereas the women cut down on their working hours to be able to take care of their children. The figure shows that from the age of 26 more and more women work in part-time jobs. Once they are working part-time they keep on working part-time, even when their children leave home. Most men keep working full-time until just before retirement age. At the end of their working career men and women gradually go into (early) retirement (see also chapter 5).

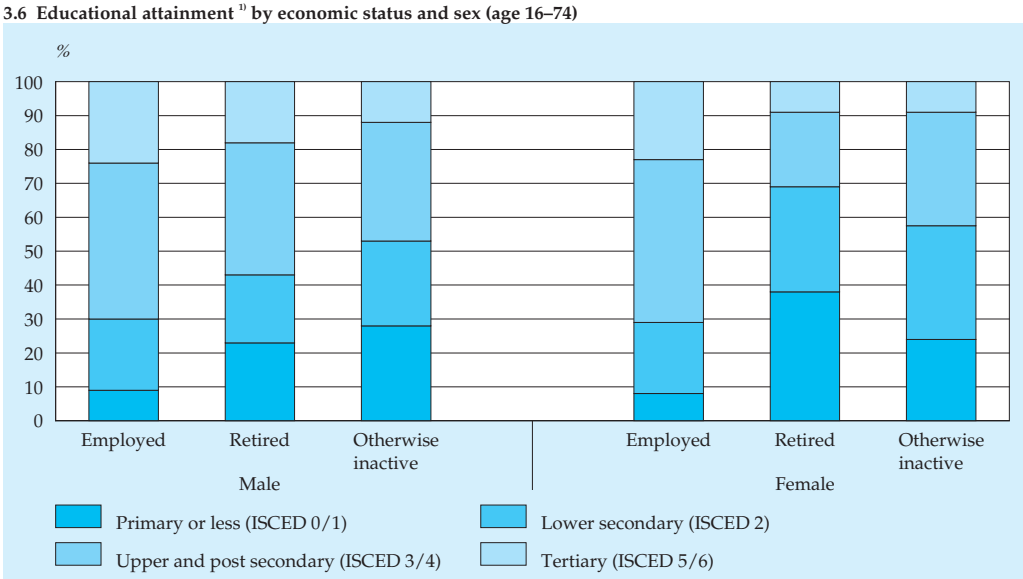
With the huge number of women working part-time, the Netherlands is said to have the first part-time labour force in the world (Wielers and van der Meer, 2003). But how did this come about? Before the 1970s most women stopped working as soon as they had children. The Dutch tradition of non-working housewives was very strong. A mother should be at home with the children and to do the housekeeping. With the women's liberation movement, the new technical innovations that made housekeeping less time consuming and the expanding possibilities for professional child care, as well as economic factors and financial stimuli, the tradition began to buckle (Banning, 2004; Martin and Kats, 2003). The employment rate for women increased from 25 percent in 1971 (Berends and Boelmans-Kleinjan, 1979) to 53 percent in 2001. This enormous increase can be attributed primarily to the enormous growth in part-time employment. The shortage of day-care centres for the children almost forced new mothers to work part-time, but part-time work also gave them the opportunity to combine work and children. And even nowadays, when facilities for child day-care are no longer as scarce as before, part-time work continues to grow (Beckers, 2003; Portegijs, 2002).

Other remarkable differences between men and women show up when occupation, branch of economic activity and educational attainment are considered together with age and employment status. Whereas female employees are on average younger than their male colleagues, there is hardly any difference in the average age of men and women who own a company of their own. Self-employed women can be found more than average in the branche 'Other community, social and personal services activities' (NACE O). About 19 percent of the employed women in that branch is self-employed. Many own a hairdressing or beauty salon. In the hotel and restaurant business more men and women own their own company than average, but the men beat the women in this respect (19% versus 12%). In agriculture over 50 percent of both men and women are self-employed.

Many occupations are either typical male or female. Typical male occupations are director and chief executive; professional and associated professional in physics and engineering (physicist, chemist, architect, engineer, technician, computer designer, analyst and programmer); craft and related trades worker (miner, builder, bricklayer, carpenter, plumber, pipe fitter); plant and machine operator and assembler with the exception of machine operator in the textile industry; building caretaker and window cleaner. Many female-dominated occupations lay in the field of life science and health, personal care, education and clerical work. Typical female occupations are: nurse, midwife, medical assistant, dietician, teacher in pre-primary, primary and special education, social worker, child-care worker, host, beautician, hairdresser, secretary, clerk, cashier and receptionist.

In section 3.3 we stated that the overall educational attainment of employed persons is higher than both the retired and the other non-employed persons. In figure 3.6 we

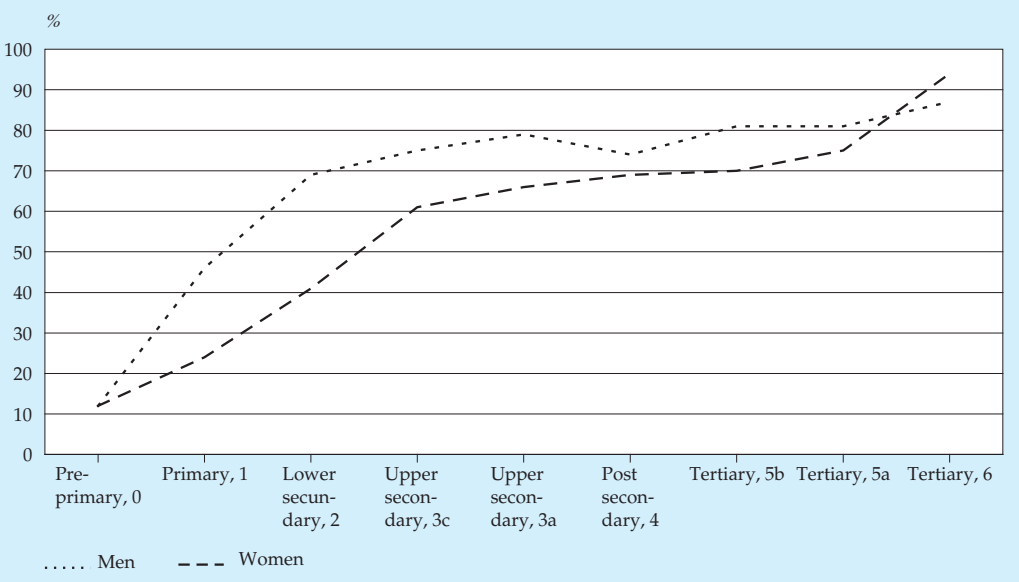
3.6 Educational attainment [1] by economic status and sex (age 16–74)



[1] Primary or less (ISCED 0/1) includes a small number of education level unknown.

show this for men and women separately. The division of employed persons into four levels of educational attainment shows no big difference between men and women. In the other groups of economic status, men and women are less well

3.7 Employment rate for men and women by education level (ISCED) attained



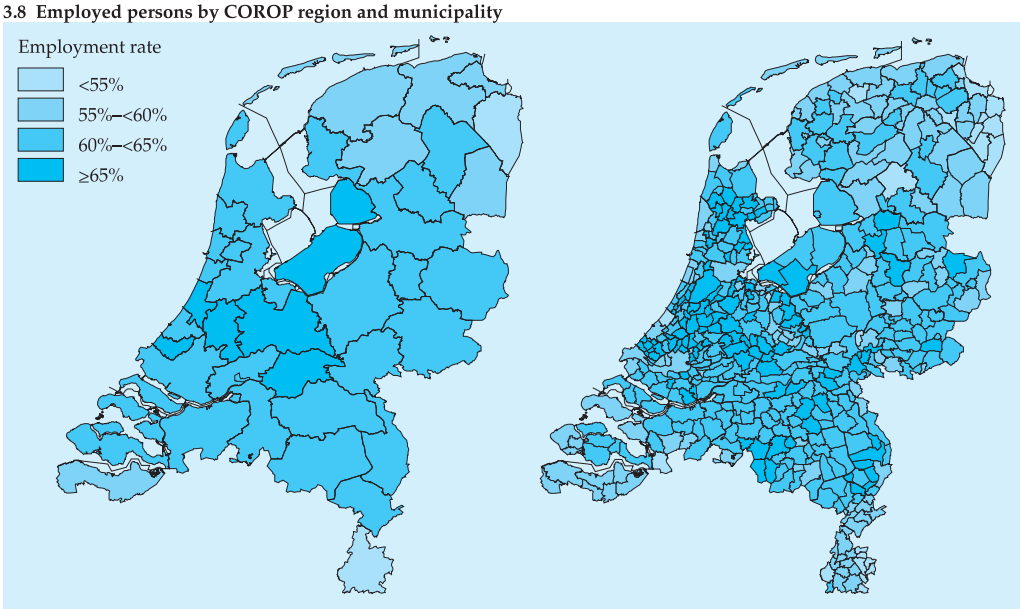
educated. Especially retired women show a relatively low education level, whereas retired men are more highly educated than both retired women and other persons without work. This reflects the fact that women traditionally did not get the opportunity to study. It was not considered worth while because they would get married and have children soon. The gender gap in education is still seen in the group of other non-employed persons as well. Employed women made up for the difference in education level. It is interesting that the relationship between the level of education attained and the employment rate is stronger for women than for men (see figure 3.7). The higher the level of education attained, the higher the employment rate. At the highest education level a higher percentage of women than men is employed!

3.6 Work at the regional level

In this section we consider where the employed population resides, at the regional levels NUTS 3 and NUTS 5 [3)]. The Netherlands consists of 40 NUTS 3 regions (called COROP regions) each of which is completely contained within one of the twelve provinces. Furthermore the NUTS 3 regions contain a number of complete NUTS 5 regions. The COROP regions differ with respect to the number of inhabitants in the age of 15 to 74: from almost 40,000 in Delfzijl e.o. (in the north) to about 1 million in Groot-Rijnmond (around Rotterdam). For a more extensive description on COROP regions, see chapter 11 and Vliegen (1999). Within a COROP-region, we will sometimes consider the different NUTS 5 areas. A NUTS 5 area is the lowest administrative level of the municipality. They differ even more with respect to the number of inhabitants in the age of 15 to 74, from less than one thousand on the island of Schiermonnikoog to almost 600,000 in Amsterdam. In 2001 there were 504 municipalities in the Netherlands. This number is diminishing over time because of municipal border changes. More information about ten large municipalities in the Netherlands can be found in chapters 8, 9 and 10.

The map on the left hand side of figure 3.8 shows the percentage of employed persons per COROP region (employment rate). The COROP regions with a low employment rate are all located at the periphery of the Netherlands. The regions with a high rate are located at the centre of the country. The map on the right hand side zooms in on the municipal level. There is a strong concentration of municipalities with a high employment rate in the centre of the country. This includes some cities where a lot of the commuters live who work in one of the four large cities and their agglomerations (see chapter 11). It is striking that three of these four cities (Amsterdam, Rotterdam and The Hague) themselves have a rather low employment rate. Other municipalities with low employment rates are also located at the periphery of the country.

3.8 Employed persons by COROP region and municipality



The regions with the lowest employment rates are Oost-Groningen (in the north-east) and Zuid-Limburg (in the south). These are both border regions. When the municipalities within Oost-Groningen and Zuid-Limburg are considered, we see that those with the lowest employment rates are located close to the border. Persons in Zuid-Limburg sometimes have a job in Belgium or Germany. These jobs were not counted in the census, and people working across the border may be incorrectly classified as not employed. Oost-Groningen also borders on Germany, but neither Northern Germany nor Oost-Groningen offer many possibilities for employment. As a consequence, people move away from this area to look for work elsewhere, and the older people remain. The Census tables show that Zuid-Limburg has more unemployed persons and persons at educational institutions than average as well. This last fact is probably due to the University of Maastricht, located in Zuid-Limburg. Both areas have slightly more retired persons than average in the Netherlands.

The COROP region with the highest employment rate (67.5%) is the central region of Flevoland, with much new land reclaimed from the sea in the 20th century. In this 'new land' the age structure of the inhabitants is different than in other parts of the country. The proportion of older inhabitants is low and there are relatively many young and middle aged inhabitants. The high employment rate of Flevoland is caused by a high percentage of employees; the percentage of self-employed persons equals the national average. Among the employees, Flevoland has one of the highest percentages of full-time male as well as female workers. Relatively few persons

work part-time. A possible explanation is the fact that the population in Flevoland (total as well as employed) is relatively young. The average age of the employed persons in Flevoland equals 37.0 years. Within Flevoland, Almere is the city with the highest percentage of employed persons. The working population in Almere is again relatively young, with an average age of 36.8 years.

A COROP region with an even younger working population than Flevoland, is Overig Groningen, where the average age is 36.8. The percentage of employees that work part-time is above average in this region. Moreover, the percentage of pupils and students is relatively high. The employment rate in Overig Groningen, however, is relatively low (59.9%). The city of Groningen is largely responsible for the behaviour of this COROP region. The city has a university, explaining the many students. Furthermore, the average age of the employed persons in the city of Groningen is only 34.6, probably because many students have a (part-time) job. More aspects of the city of Groningen are described in chapter 8.

Oost-Zuid-Holland is a COROP region that has almost as many employed persons as Flevoland (67.4%). Most municipalities in this region have a high employment rate. The area is an attractive residence area for people who work in the Randstad, but do not want to live in one of the large cities. For more information in the employment rates in the cities, respectively their agglomeration, the reader is referred to the chapters 8 and 9.

Employed persons can be divided into employees and self-employed persons. Zuidwest-Friesland (in the north) is the COROP region with the largest percentage of self-employed persons. A further study shows that four out of the six municipalities in this region (Nijefurd, Wûnseradiel, Wymbritseradiel and Gaasterlân-Sleat) indeed have a larger percentage self-employed persons than average. When the NACE-code in these four rural districts is studied, it turns out that the percentage of persons in the primary sector (Agriculture and Fishing) is three to four times the national average. There are many farmers among the self-employed.

Another COROP region that attracts attention is Groot-Amsterdam. This could be considered the most emancipated region. Groot-Amsterdam has the highest percentage of full-timers among its female employees, and the highest percentage of part-timers among its male employees.

There are also a few municipalities that attract attention. First of all Vaals in the south-west point of Zuid-Limburg has the lowest employment rate (33.7%). It is located on the Dutch/German/Belgian border. The municipality with the lowest employment rate that is not located at the border, is Rozendaal near Arnhem (51.2 percent), where many retired people live, about 1.5 times the national average.

Moreover, the average age of the employed persons there is 43.4 years, which is relatively old. Voorhout in the Randstad has the highest employment rate (71.8%). Its employed persons are relatively young, with an average age of 37.7. Voorhout has the highest percentage of employed women in the Netherlands. The percentage of employed men is also high; there are only seven municipalities with a higher percentage.

Annotations

1) The number of self-employed persons is actually somewhat higher. In the Census only those self-employed persons are counted who did not have a job as employee at the same time.
2) In the original NACE-classification the codes P (NACE 95) en Q (NACE 99) occur as well. The number of employed persons in these categories is very small. Employed persons working in these branches, as well as a small number of people for whom the NACE-code was unknown, are attributed proportionally to the other NACE-codes.
3) NUTS 5 is the forerunner of LAU 2 (Local Administration Unit).

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4. Young people and their economic activities

Marjolijn Trijssenaar and Marijke Hartgers

According to the Dutch Census of 2001, the young population (16–29 years of age) consists of over 2.8 million people. More than half of this population are employees. Full-time students (with or without job) account for over one third of this population. Self-employed and unemployed persons are rather small groups at this age. The most important occupation for young men is construction work and for young women office work. Students with a job on the side work mainly in sales, as cleaners or waiters. Young men and women work mostly in trade, business activities (employment agencies), hotels and restaurants. This is followed by manufacturing and construction for men and health care and social work for women. Men mainly work in full-time jobs (71 percent) whereas only 45 percent of female employees do. Employees and students with a job have the highest attained level of education, whereas persons engaged in family duties or otherwise economically inactive have the lowest attained level of education.

4.1 Introduction

Several tables of the Census of 2001 (see http://www.cbs.nl/en/publications/articles/general/census-2001/census-2001.htm) concern the economic status of persons. At the most detailed level, economic status divides the population into seven different categories: employee, self-employed, unemployed, attending educational institutions, retired, engaged in family duties, and otherwise economically inactive. The categories are disjoint, so each person can be assigned to only one category. In practice, however, many people combine two or more economic activities: for example a housewife and mother with a part-time job. This means that choices have to be made about assigning economic status. The Census Programme Guidelines (Eurostat, 1999) are not very clear on how to deal with this problem, so Statistics Netherlands defined some priority rules in order to be able to make unambiguous choices. These rules are presented in detail in chapter 13, section 5. A consequence of these rules is that pupils and students who attend full-time regular education and have a job on the side are all regarded as employees. Even if the job they do takes very little time, for example delivering flyers once a week.

In this chapter we consider the population of young people aged 16–29. In this age group a person can be attending full-time education while, at the same time, having a job. In this chapter we profoundly analyse the data of the Dutch census in this

respect. The employees aged between 16 and 29 were divided into employees who do and employees who do not 'receive systematic instruction at any level of education, and attend full-time any regular educational institution'. The total population of young people from 16–29 years of age can be split into seven groups:

1. those who are employees, hereafter called real employees;
2. those who combine full-time education with a job, hereafter called students with a job;
3. those who are self-employed;
4. those who attend full-time education only, hereafter called students without job;
5. those who are unemployed;
6. those who are engaged in family duties and
7. those who are otherwise economically inactive.

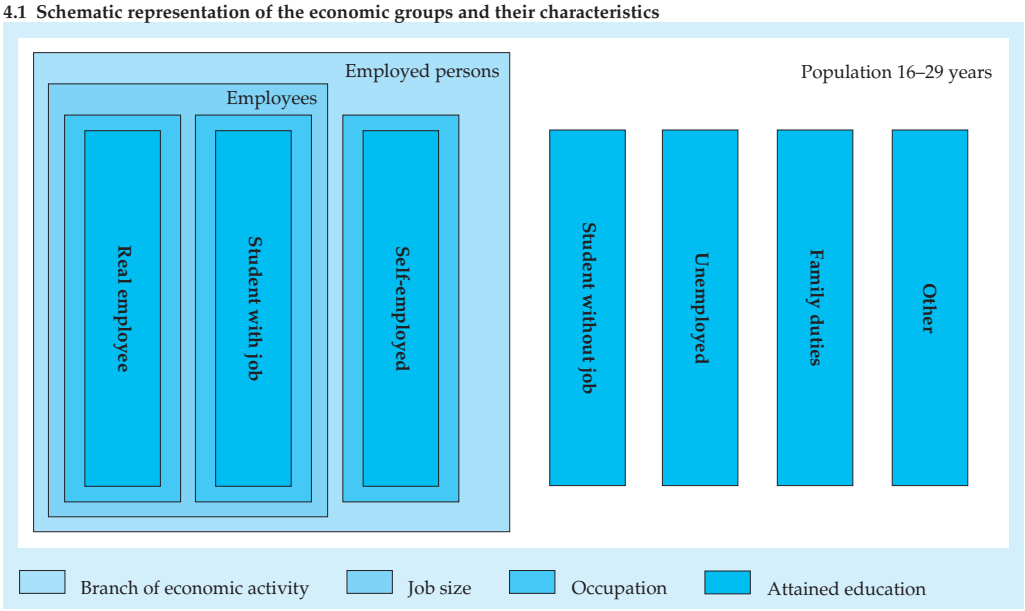
The first aim of these analyses is to get a picture of the total number of young people attending full-time regular education. There is no register of these persons, or the economically inactive population in general. The subpopulation of full-time attendants at educational institutions has therefore to be estimated by making use of the Labour Force Survey (LFS). In this chapter we also consider employees who attend full-time education. In this group we find mainly students with a job on the side (2. students with a job). The Netherlands had some 1.0 million full-time students (2. and 4.) in the age of 16–29 years, according to the Census of 2001. In regular LFS publications the number of students was estimated at 1.4 million for 2001, but one has to realize that the LFS includes part-time students (approximately 300 thousand) and people taking short courses and all kinds of training (approximately 150 thousand) [1)].

Intuitively, a pupil or student who attends full-time education and has a small job should be labelled as a pupil or student and not as an employee. On the other hand, it is hard to imagine that someone with a full-time job has enough time to successfully attend full-time education. That is why in further analyses the different groups are studied in more detail. Information about the branch of economic activity, the occupation, the education level attained so far, and job size will be considered. Gender and age group will be taken into account as well.

4.2 *Introduction into the analysis*

The boundaries of 16 and 29 years were chosen for the following reasons. Up to the age of 15 education is compulsory. So under 16-year-olds are by definition classified as 'attending full-time education without a job', see also chapter 13. Over age 31, people cannot have the economic status 'attending full-time education without a job' according to the Dutch statistical definitions; therefore they are not relevant for this study. We have also excluded age 30 in this study because there are very few

4.1 Schematic representation of the economic groups and their characteristics



persons of that age in full-time education, with or without a job. Moreover, it was somewhat more convenient to use an upper limit of 29 years.

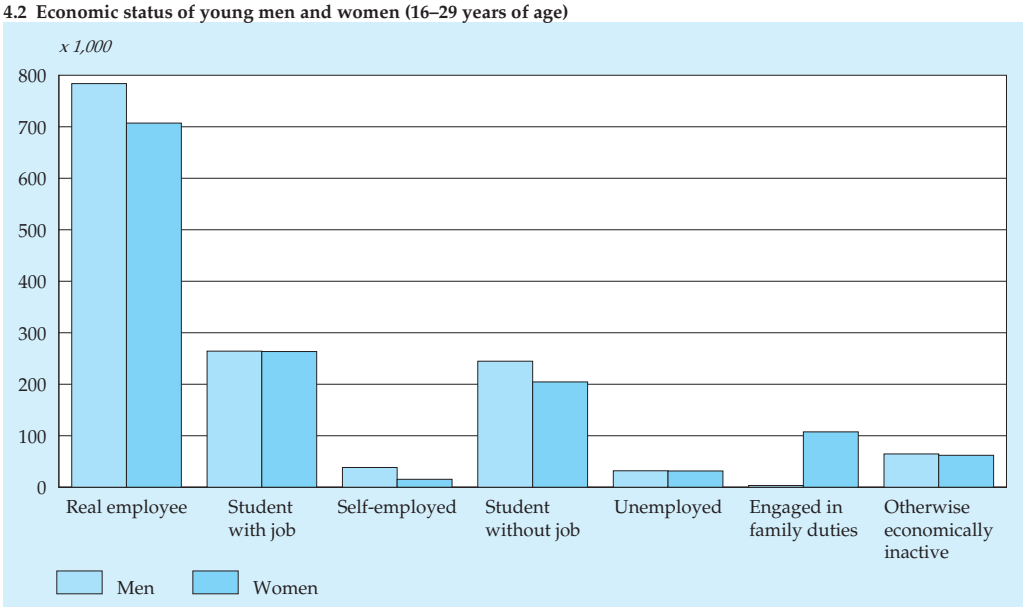
Figure 4.1 schematically shows the economic groups and the characteristics that are known for each. The branch of economic activity is known of the group of employed persons as a whole, not of the individual groups. Job size is known of the group of employees as a whole. Occupation of employed persons and attained education are known of the separate groups.

Note that only the group of employees has been split into people who attend full-time education and people who don't. This cannot be done for self-employed persons. Some of them may also be students who have their own business; for example an ICT student who does freelance software development. However, we cannot discern self-employed students from 'real' self-employed people. Theoretically, we may therefore underestimate the number of students and overestimate the number of 'real' self-employed persons. However, as the group of self-employed persons is relatively small, there cannot be much effect on the size of the student population.

4.3 *Economic status*

The Dutch Census of 2001 counts over 2.8 million persons in the age of 16 to 29 years. There are slightly more men than women in this age group (50.7 percent versus 49.3). Figure 4.2 shows the economic status of this group.

4.2 Economic status of young men and women (16–29 years of age)



More than half the population of 16–29 year-olds are real employees. Second most important are students with and without jobs. All students together account for over one third of the population. More than half of the students has a job; this corresponds with results of the Labour Force Survey (Lucassen, 2003). Self-employed persons and unemployed persons are rather insignificant groups at this age, only 2 percent per group. Somewhat more important are persons engaged in family duties (mostly women) and the persons who are otherwise economically inactive (equally divided between men and women). Looking from the employment angle: three-quarter of the population is employed, of whom three-quarter as real employees, one-quarter as students with a job on the side, and a few percent as self-employed. Figure 4.2 shows that more men than women are employees, and also that more men than women attend full-time education. There are significantly more men than women self-employed. Where are these 'missing' women? They form the group 'engaged in family duties'!

Table 4.1 shows the economic status of separate age groups for men and women. Notable is the group of persons engaged in family duties, where the number of men is negligible in each age group and the number of women grows steadily; from 1 percent of the women aged 16–19 years to 14 percent of the women of 25–29. In the oldest age group, the women engaged in family duties are the second largest group, after the real employees. The students with or without jobs decline steadily with age, as expected. The number of employees grows with age. This is due to the number of real employees that increases strongly with age, whereas the number of students with jobs declines.

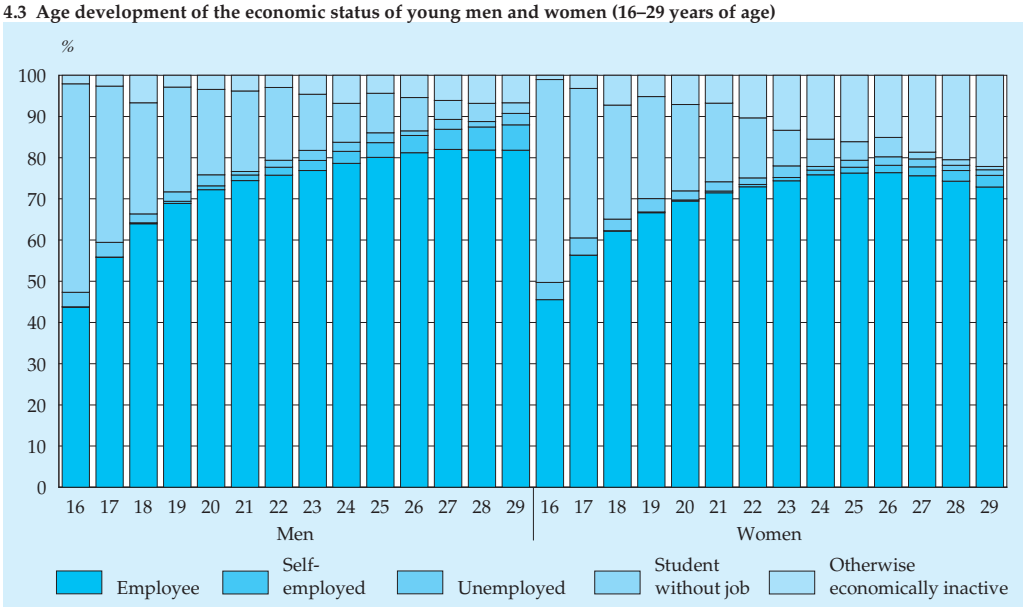
Table 4.1
Young persons (16–29 years of age): economic status by age group

	Population (age 16–29)	Employed persons			Student without job	Un-employed	Engaged in family duties	Otherwise economically inactive
		Employee		Self-employed				
		Real employee	Student with job					
	1	2	3	4	5	6	7	8
	x 1,000	*in % of age group*						
Total	2,823	53	19	2	16	2	4	4
Men	1,431	55	18	3	17	2	0	5
16–19	380	22	36	0	35	3	0	4
20–24	487	54	22	2	16	2	0	4
25–29	564	77	4	5	6	2	0	5
Women	1,392	51	19	1	15	2	8	4
16–19	362	17	41	0	34	4	1	3
20–24	476	52	21	1	14	2	6	5
25–29	554	72	3	2	2	2	14	5

Figure 4.3 shows the age development of the economic status of young men and women. The categories of economic status in this figure correspond with the following columns in table 4.1: employees (column 2 and 3), self-employed persons (column 4), students without jobs (column 5), unemployed persons (column 6), otherwise economically inactive persons (column 7 and 8). Some features stand out. The number of self-employed persons grows steadily with age, and for every age more men than women are self-employed. The share of employees grows steadily; at least for men. For women there is a maximum at the mid-twenties: after that age the share of employees declines and especially the share of 'otherwise economically inactive' grows. There are more male than female employees at every age, and the difference becomes larger as age increases. The same applies for the group in full-time education. Complementary to this, more women than men are in 'otherwise economically inactive, including family duties'. The gap grows, especially from the early twenties onward, because of women becoming housewives, see also chapter 3.

Exactly at age 18, there is a sudden, little but significant peak in men and women being otherwise economically inactive. There is a matching little dip in number of students without jobs at 18. This may well be due to youngsters who take a gap year after completing their secondary education; taking the opportunity to make a trip around the world, do some volunteer work or be active otherwise before entering further education. It cannot be compulsory military service, as the draft in The

4.3 Age development of the economic status of young men and women (16–29 years of age)



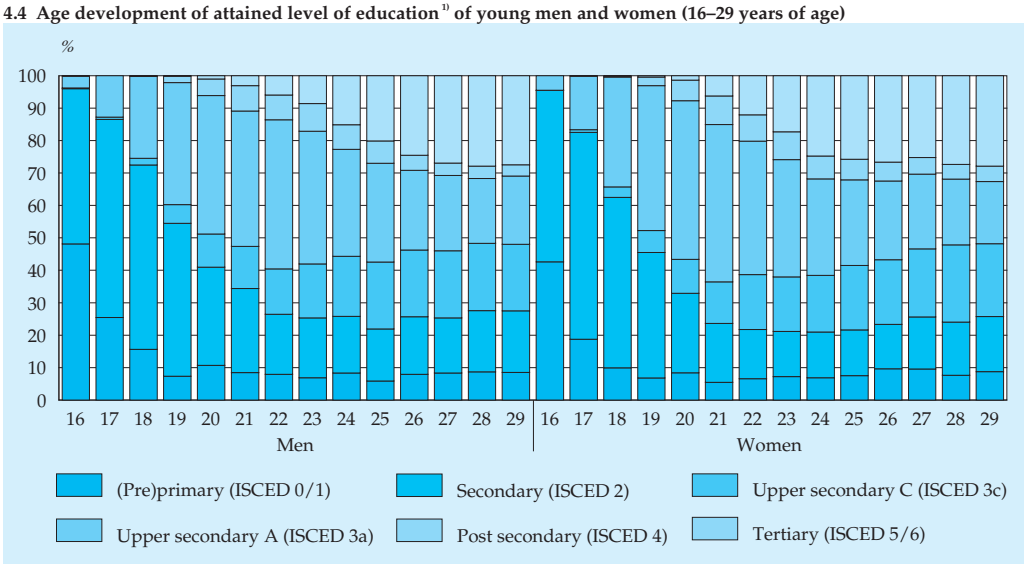
Netherlands has been repealed in 1996. At age 24, the same feature occurs with men. This is likely due to graduating students, who, having completed their tertiary education, take a gap year before entering the labour market.

4.4 *Attained level of education*

The level of education attained by the population of 16–29 is described in this section. The education level of the Dutch Census population is classified by the ISCED (International Standard Classification of Education), see also chapter 1. For real employees, the actual attained level will often be their final level of education. For students, the final level of education will often be higher than the actually attained level. Figure 4.4 shows the age development of actually attained education. It is interesting that women have a higher achieved level of education than men, at every age up to 26 years. The gap is most pronounced at younger ages. However, at 29 the final education level is equal for men and women, so women complete their studies more quickly.

The attained level of education in the highest age group (25–29 years) is shown for every economic status group, in figures 4.5 and 4.6. It is very interesting that women have a higher level of education than men for every economic status group except students without a job. Furthermore, we see that students with jobs have the highest education level while students without jobs have a somewhat lower education level. Unemployed persons and real employees come next, both having about the same

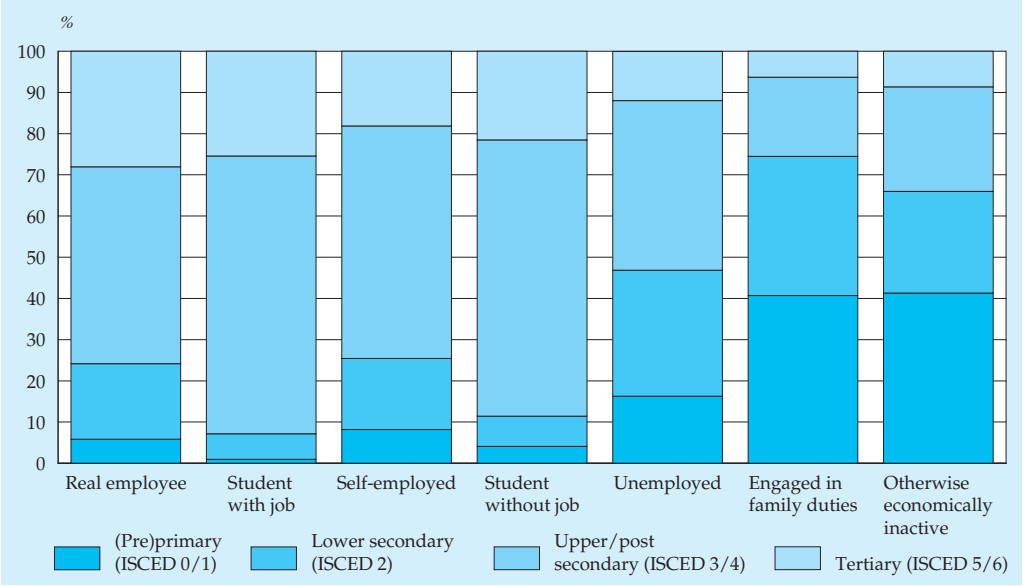
4.4 Age development of attained level of education [1] of young men and women (16–29 years of age)



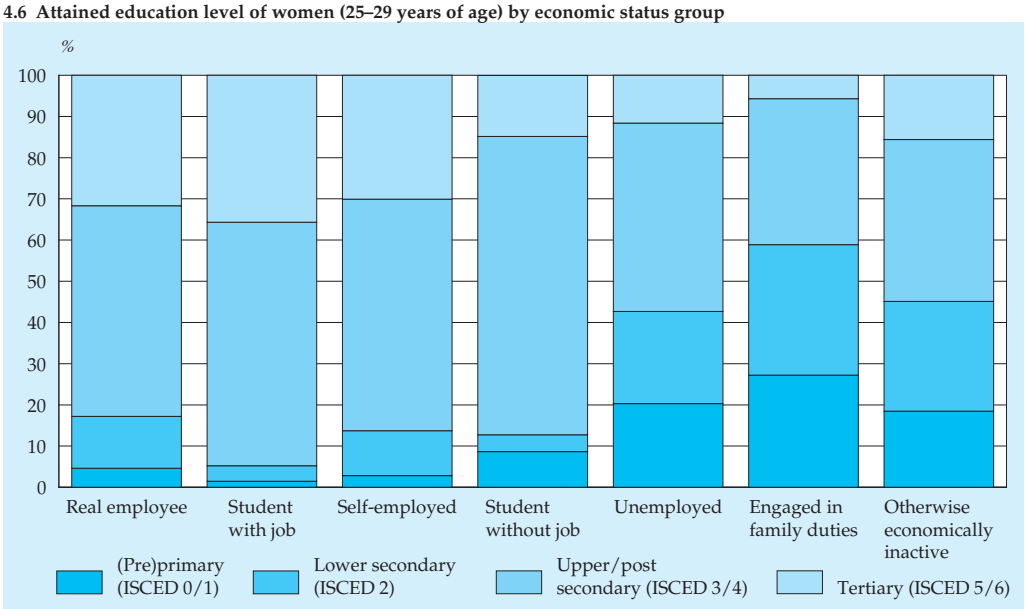
[1] The persons with 'unknown attained education level' are left out in the figure. This group concerns only 642 persons on a population of over 2.8 million persons, and is therefore neglected here.

level of education. Self-employed persons have a lower education level than the employees. Finally, persons engaged in family duties or otherwise economically inactive have the lowest education attainment level. The very large difference between men and women in these two groups is interesting. Whereas women still

4.5 Attained education level of men (25–29 years of age) by economic status group



4.6 Attained education level of women (25–29 years of age) by economic status group



have about the same level of education as unemployed persons, men have a dramatically lower level of education. Some 40 percent only has primary education. This will mainly be drop-outs, leaving school without any diploma.

The younger age groups are not shown in a figure. The middle age group shows the same trends as the highest age group, but the general level of education is somewhat lower, as expected. In the youngest age group, in general there are no large differences between the economic status groups, as expected: people up to 19 generally cannot finish more than upper secondary level. In most categories some 20 percent or less has primary education, some 50–60 percent has lower secondary level and the rest has upper or post secondary level. So, in the youngest group there is no large difference between real employees, students with a job, and students without a job. In general, women have a higher education level than men. However, a small group of 3,000 women engaged in family duties in the youngest age group have a very low level of attained education: over 60 percent only has attained primary level, and 34 percent has lower secondary level.

4.5 *Occupation*

Occupation is classified according to the International Classification of Occupation (ISCO), see also chapter 1. Occupation is known for real employees, students with a job, and self-employed persons (column 2, 3 and 4 from table 4.1). It is striking that

self-employed persons, students with jobs, and real employees all have different typical occupations.

For the small group of self-employed persons, the most typical occupation and by far the most prevailing is general manager or director, both for men and women. It is very likely that these persons have set up their own small business and, whatever the line of work, call themselves 'director'. The second most important occupation for self-employed men is in construction, such as plasterers, plumbers etc. For women, the second most important occupation is in personal service, such as hairdressers, beauticians etc. For self-employed men and women, occupations such as journalists, writers, musicians, actors, painters etc. are abundantly present. Less imaginative occupations such as financial and administrative associate professionals are also important for both groups. Finally, many women work as doctors, dentists, pharmacists, physiotherapists etc.

Students with a job on the side typically work in sales, as cleaners, waiters, in offices, as cashiers and at counters. This agrees with results of the Labour Force Survey (Lucassen, 2003). Men also work as freight handlers, mail carriers and sorters, computer assistants, engineering technicians, or as market gardeners. Women often work as assistants in health care.

For the group of young real employees, there is a different distribution pattern over the occupations: men are more evenly distributed among the occupations, where women tend to have specific occupations. The armed forces are characteristic: there are hardly any women in the armed forces, whereas there is a substantial number of men. Typical occupations for men are in building and related crafts; such as bricklayers, concrete workers, roofers, plumbers, plasterers, painters etc. So this is an important set of occupations for self-employed men and for real employees. Next in importance for real employees are mechanics in machinery and motor vehicles, followed by metal workers and electrical mechanics. Again, financial and administrative occupations are important, as they are for self-employed men. Finally, men hold many jobs as engineering technicians, equipment operators and drivers of all kind of vehicles. Women work mainly in the office, often as secretaries. Like for men, financial and administrative occupations are important. Personal service, especially child care and personal care at home or institutions are typical jobs for female employees. Again sales are important, especially in shops. Women also work a lot in health care and associated occupations, like doctor's or dentist's assistants, physiotherapists, midwives and nurses. Finally, many women work as business professionals, such as accountants.

Concluding: the occupations of self-employed persons are much more like the occupations of real employees than like the occupations of students with jobs. This is true for men and women.

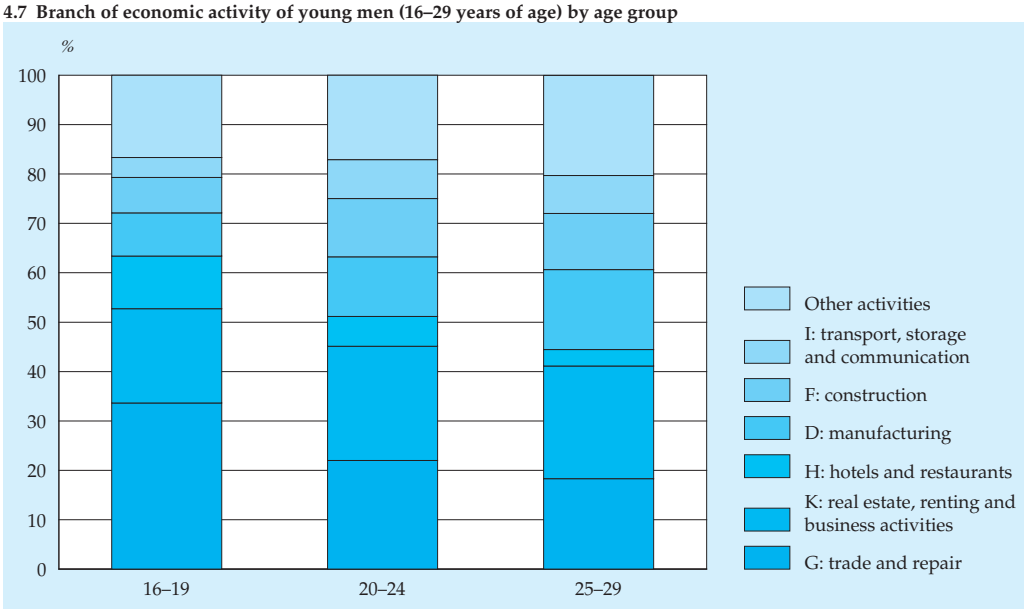
4.6 *Branch of economic activity*

This section describes the branches of economic activity in which young people work. In the census, the branch of economic activity is classified by the NACE-classification (Nomenclature statistique des Activités économiques dans la Communauté Européenne), see also chapter 1. The group of employed persons is analysed as a whole (column 2, 3 and 4 from table 4.1). However, keeping in mind that only a small fraction is self-employed, the branch of economic activity will say most about the group of employees, whether attending education or not.

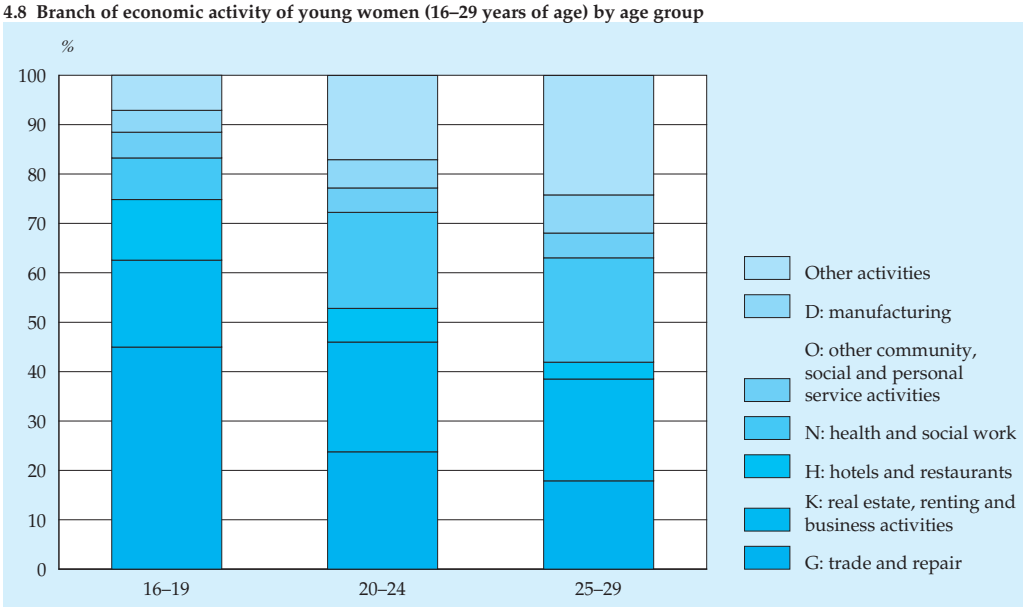
Figures 4.7 and 4.8 show the six most important branches of economic activity for men and for women. These are the six branches where the largest number of men aged 16 to 29 work, and the six branches where the largest number of women of 16 to 29 work. The industries are put in order of their importance at the youngest group, in order to see the shift in economic activity as age progresses.

For the youngest age group, we see that trade, business activities and catering are most important, both for men and women. This is as expected: pupils and students (the majority at this age) typically work in shops, restaurants and via temp agencies. The conclusion that temporary jobs are important for young people is supported by a Dutch study which states that half the temporary workers are aged 15 to 24, and some 44 percent of the workers are people with a job on the side, usually students (ECORYS-NEI, 2003).

4.7 Branch of economic activity of young men (16–29 years of age) by age group



4.8 Branch of economic activity of young women (16–29 years of age) by age group



For men, other important branches are manufacturing, construction and transport. The fact that the share of these three branches grows with age points to the fact that this will be 'real employees' and not students. Looking in more detail at economic activity: typical activities for young men (16–24) are retail, working via temporary agencies, building constructions and installations, in restaurants, selling motor vehicles, transport on land, accounting and bookkeeping, and horticulture. For the somewhat older men building constructions and installations is very important; next comes work via temp agencies. Retail sale in specialised stores, transport on land, wholesale of machineries and supplies, and accounting and bookkeeping become even more important at this age. New important activities for this age group are software consultancy and supply, government administration and financial intermediation.

For the youngest age group of women, the three most important activities are the same as for men. But the next important activities are very specific for women: health care and social work, and personal services. The share of health care increases with age, whereas the share of personal service activities stays rather stable with age. This may indicate a higher level of education required for health care, compared with personal service activities. Looking in more detail: typical economic activities for young women (aged 16–24) are in the first place retail in stores. A difference with men is that women work much more in selling personal care products and pharmaceutical articles, and in food, beverage and tobacco stores. Work via temporary agencies, in restaurants and accounting and bookkeeping are also

important activities. Health care is mainly human health care. The older women mostly do social work, health care, via temp agencies, in bookkeeping and accounting and in retail stores. Another major activity, not shown in the figure, is education.

The fact that the share of trade and catering decreases with age indicates that these are typical student jobs. The share of business increases with age: this may be caused by the fact that jobs via temporary agencies become even more important for somewhat older students and others. It is known that one third of the temporary workers uses temporary jobs as stepping stone onto a regular job (ECORYS-NEI, 2003).

Women tend to engage in more different economic activities than men as they become older. In contrast, at a younger age they tend to have fewer different activities than men. With men, there is not such a strong age effect: the six largest economic activities account for some 80 percent at all ages.

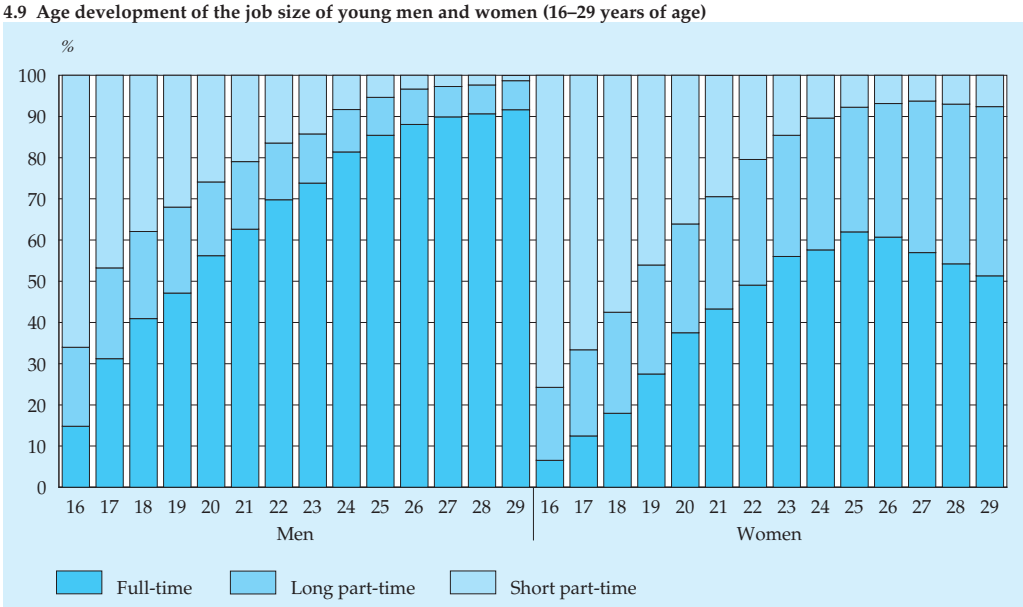
It is interesting that the gap in economic activities between men and women grows as age increases. We see more 'male' economic activities such as manufacturing and construction, and more 'female' economic activities such as health care, social work and personal service. But for all age groups business activities and trade are the most important for both men and women.

4.7 *Job size*

The jobs of young employees (column 2 and 3 together from table 4.1) are classified into three job sizes: full-time (35 hours work per week or more), long part-time (15–<35 hours per week) and short part-time (less than 15 hours per week). The employees cannot be divided into real employees and students with jobs.

Figure 4.9 shows the job sizes for all ages. We see a substantial disparity between men and women. This disparity grows with age. More and more men take full-time jobs as age increases. However, the number of women with full-time jobs decreases after their mid-twenties. Instead, their number of long part-time jobs grows. This pattern of shifting from full-time to long part-time jobs extends well into their mid-thirties.
Many women who have children tend to reduce their working week. This is also facilitated by Dutch law: a government employee, for example, has the right to shorten his or her working week, as long as this does not interfere with business too much. We see that men do not take this opportunity as often as women until they have reached 30. However after 30, the share of full-time jobs decreases also for men, see chapter 3.

4.9 Age development of the job size of young men and women (16–29 years of age)



About the difference between real employees and students with a job we can conclude that it is unlikely that a full-time student has a full-time job, so it is most likely that full-time jobs are taken by the real employees. Students are most likely to have short part-time jobs, possibly long part-time jobs, or full-time jobs for a short

Table 4.2
Young employees (16–29 years of age): job size and economic status by age group

	Population employees (age 16–29)	Job size			Economic status	
		Full-time job	Long part-time job	Short part-time job	Real employee	Student with job
	x 1,000	*in % of age group*				
Total	2,020	59	21	20	74	26
Men	1,048	71	13	16	75	25
16–19	221	36	21	44	39	61
20–24	368	69	14	17	71	29
25–29	459	89	8	3	95	5
Women	971	45	31	24	73	27
16–19	209	17	23	60	29	71
20–24	347	49	29	22	71	29
25–29	416	57	36	7	96	4

period of time. Table 4.2 shows that the number of full-time jobs of men is more than 90 percent of the number of real employees, in all age groups. For women, the number of full-time jobs is only about 60 percent of the number of real employees. So, male real employees generally have a full-time job, whereas female real employees have a part-time job in 40 percent of the cases. In general there are more students with a job than short part-time jobs, in every age group except women aged 25–29. This means that a number of students has a long part-time job or full-time job, which holds for relatively more men than women.

Annotations

[1)] The authors are very grateful to Jo van Cruchten for his comparative analysis of the Census 2001 results on education with the results of the regular Labour Force Survey publications.

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5. *Active ageing: the senior labour force from work to retirement*

Wijnand Advokaat and Frank Linder

Dutch society is faced with an ageing population. Due to lower fertility rates, particularly in the past three decades, the group of young people is declining fast. The population in the upper ages is increasing sharply. Between 1947 and 2001 the share of the 50–64 age group in the total population has grown from 13 to 18 percent. The younger ones are part of the post-war baby boom. In the same period the 65+ generation has doubled from 7 to 14 percent, due to falling mortality rates as result of the improved health care. Ageing has become a key issue on the political agenda. Today, the topic of 'active ageing' receives much attention. A special seminar was organised on Active Ageing Statistics in 2002 (Eurostat, 2002). It is a wide-ranging concept varying from such post-retirement activities as keeping fit to incentives to keep the population economically active at an older age.

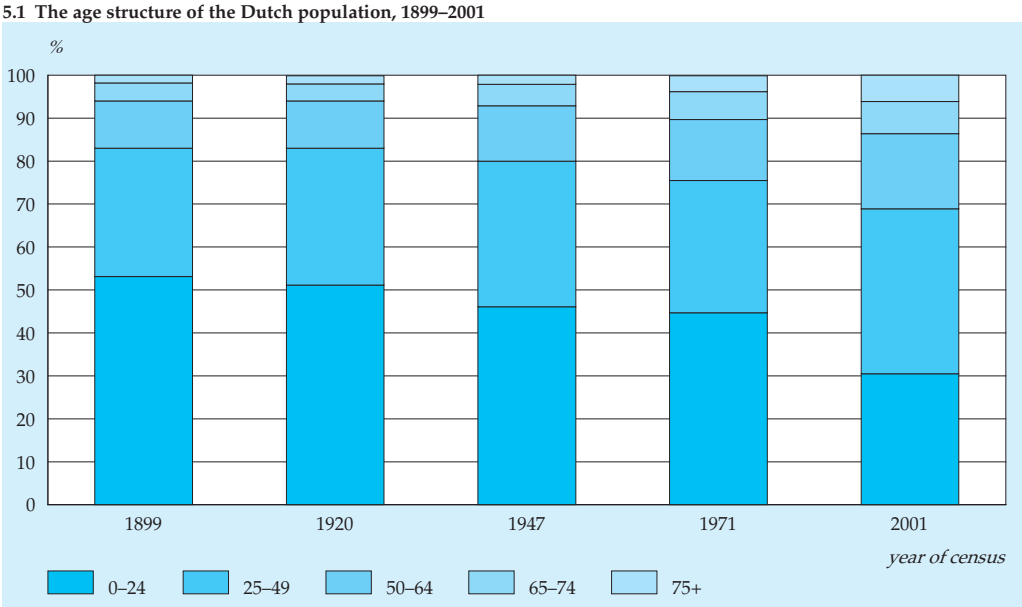
This chapter focuses on the senior labour force: the economically active population aged fifty to mid-seventy. Questions addressed are: What is the economic activity rate of seniors? How did the senior population and its activity rate develop during the last century? Where does the senior labour force stand in a European perspective?

5.1 Introduction

The 20th century saw a remarkable upward shift in the age structure of the Dutch population, as shown in figure 5.1. The population shares for ages under 25 have clearly declined from 1899 to 2001. While in 1899 a little more than half of the population was below age 25, in 2001 the younger generation accounts for just 30 percent of the total population. The ageing of the population manifests itself by the increasing population shares of all the age classes above age 25, particularly in the upper ranges. Whereas in 1899 about 15 percent of all persons belonged to the senior population in the age class 50–74, in 2001 it was 25 percent.

This chapter will deal with the effect of the ageing of the Dutch population on economic activity. The economically active population, or labour force, comprises all employed or unemployed persons who supply labour for the Gross Domestic Product (GDP), the production of goods and services. A key question is how the labour force participation of senior, the middle ages and the youngest generations develops in an ageing society. Nowadays there is a large 'potential' senior labour force. Their actual economic activity is determined by factors such as health, financial

5.1 The age structure of the Dutch population, 1899–2001



situation, up-to-date employable skills, possibilities of working less so they can be employed longer, the demand for leisure, (early) retirement schemes, and last but not least the situation of the national economy. For example, in times of recession an employer may be inclined to dismiss less productive senior employees first.

In this chapter section 5.2 describes the main characteristics of the senior population as a whole. Section 5.3 discusses the senior labour force from a historical perspective. Section 5.4 makes an inter-European comparison between the results of the Dutch census and those of some selected European countries. In the closing section 5.5 some concluding remarks are made.

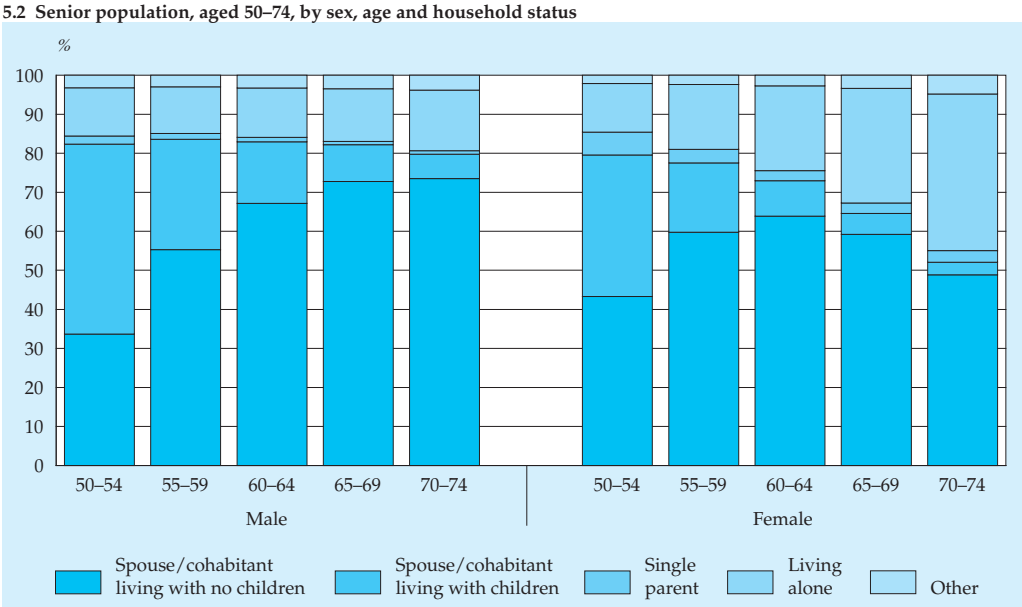
5.2 *Main characteristics of the senior population of 2001*

The senior population, as treated in this chapter, is defined as the population in the 50–74 age group [1)]. The age of 55 is considered by many as a more suitable minimum age for seniors, but when comparisons are to be made with the past, information on economic activity in the 50–64 age group is often the finest available.

Demography

In 2001 there were about 4 million senior citizens (of age 50–74) in the Netherlands, which is one quarter of total population. About 49 percent of the senior population

5.2 Senior population, aged 50–74, by sex, age and household status



was male and 51 percent female. Well over three quarters of the seniors was living together as spouse or cohabitant, 3 percent was single parent and 18 percent was living alone. Almost three out of four partners had no children in their household. Figure 5.2 shows that the distribution in household status was certainly not homogeneous within the 50–74 age group. Younger seniors often had children living at home, which older seniors had far less. Many older women were living alone, a lot of them widowed. The life expectancy for women is higher than for men.

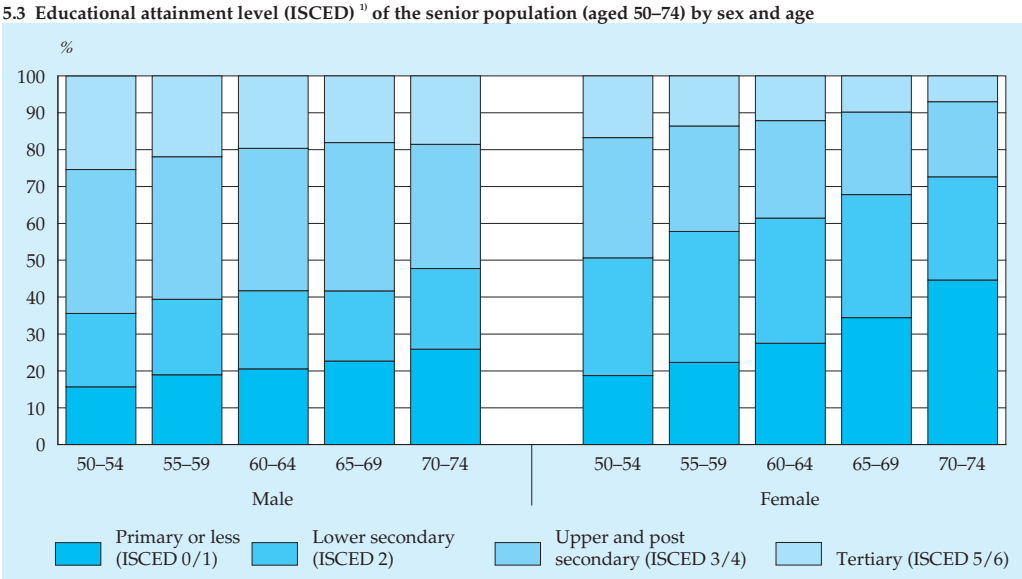
The majority (91%) of the senior population was born in the Netherlands and 9 percent abroad. From the foreign-born citizens one third was of Asian descent, mostly from Indonesia: the former Dutch East Indies. Another third was born in the rest of Europe. Only 2 percent of the seniors held foreign citizenship, compared to 4 percent of the total population.

Educational attainment

The education levels in the census are classified according to the ISCED (International Standard Classification of Education), which is presented in chapter 1. Just 0.1% of the senior population (age 55–74) has an unknown education level. In the presentation in the figures they are not shown separately, but taken together with seniors with primary education or less.

In 2001 male seniors were on average more highly educated than female seniors (see figure 5.3). The education level descended with age, the more so in the case of

5.3 Educational attainment level (ISCED) [1] of the senior population (aged 50–74) by sex and age



[1] The category primary or less (ISCED 0/1) includes a small amount of unknown education level.

women. A remarkable fact is that the highest attained education level for more than 50 percent of the female seniors was lower secondary education.

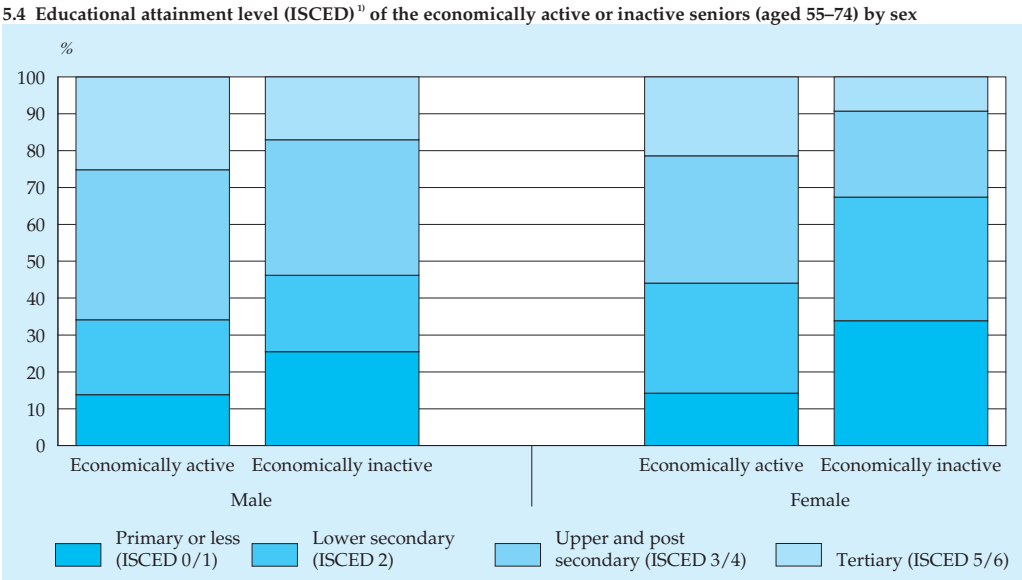
Economically active seniors were on the average more highly educated than their economically inactive counterparts. The differences in educational attainment level were more significant in the case of the female seniors, as is demonstrated in figure 5.4. Two out of three economically active male seniors (aged 55–74) completed upper or post secondary education, or higher, against 54 percent of the economically inactive. Around 56 percent of the economically active female seniors had attained at least an upper or post secondary education level, whereas only 33 percent of the economically inactive females had that level of education. In the economically inactive population one out of four men and one out of three women only had primary education while 14 percent of both sexes in the economically active population did.

The relationship between economic activity or inactivity and educational attainment can also be viewed from the perspective of each education level. Figure 5.5 shows how rewarding education is, in the sense that more highly educated seniors tend to be more active. In fact this applies to all ages, as is stated in chapter 3.

Economic activity

Fifty percent of the male seniors (age 50–74) was economically active in 2001. Their female counterparts had a much lower activity rate at 24 percent (see table 5.1 and

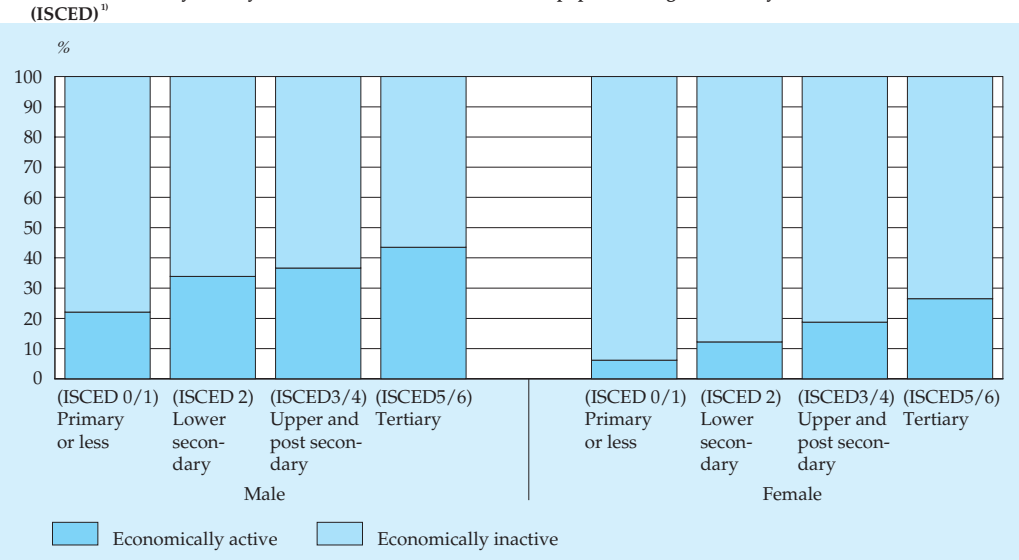
5.4 Educational attainment level (ISCED)[1] of the economically active or inactive seniors (aged 55–74) by sex



[1] The category primary or less (ISCED 0/1) includes a small amount of unknown education level.

figure 5.6). The three lowest sections in the bar diagram of figure 5.6, employees, self-employed, unemployed, together represent the economically active population. The remaining part indicates the economically inactive population. No more than

5.5 Economic inactivity-activity ratio for the senior male and female population (aged 55–74) by educational attainment level (ISCED)[1]



[1] The category primary or less (ISCED 0/1) includes a small amount of unknown education level.

Table 5.1
Economic activity of senior population (aged 50–74) by sex and age

	Economic activity rate	Total population	Economically active				Economically inactive			
			total	employee	self-employed	unemployed[1]	total	retired[2]	engaged in family duties[1]	other economically inactive[1]
Men	%	*x 1,000*								
Age group										
50–54	85	600.6	509.8	444.5	55.4	9.9	90.8		9.2	81.6
55–59	71	443.8	315.7	270.7	39.9	5.1	128.0	16.5	8.3	103.2
60–64	28	368.6	103.9	73.4	28.8	1.7	264.7	98.8	13.5	152.5
65–69	11	306.4	33.9	18.5	15.4		272.4	272.4		
70–74	6	248.2	15.3	7.7	7.7		232.8	232.8		
Total (50–74)	50	1,967.5	978.8	814.8	147.2	16.7	988.7	620.5	31.0	337.3
Women										
Age group										
50–54	52	581.1	300.0	258.2	32.7	9.2	281.1		188.4	92.7
55–59	34	431.3	146.6	123.1	21.2	2.3	284.7	26.1	177.8	80.9
60–64	10	373.9	38.2	27.6	9.7	0.9	335.8	73.1	173.6	89.1
65–69	2	337.4	8.2	5.0	3.2		329.3	329.3		
70–74	1	310.4	3.3	1.9	1.5		307.0	307.0		
Total (50–74)	24	2,034.2	496.3	415.7	68.2	12.4	1,537.8	735.4	539.7	262.7

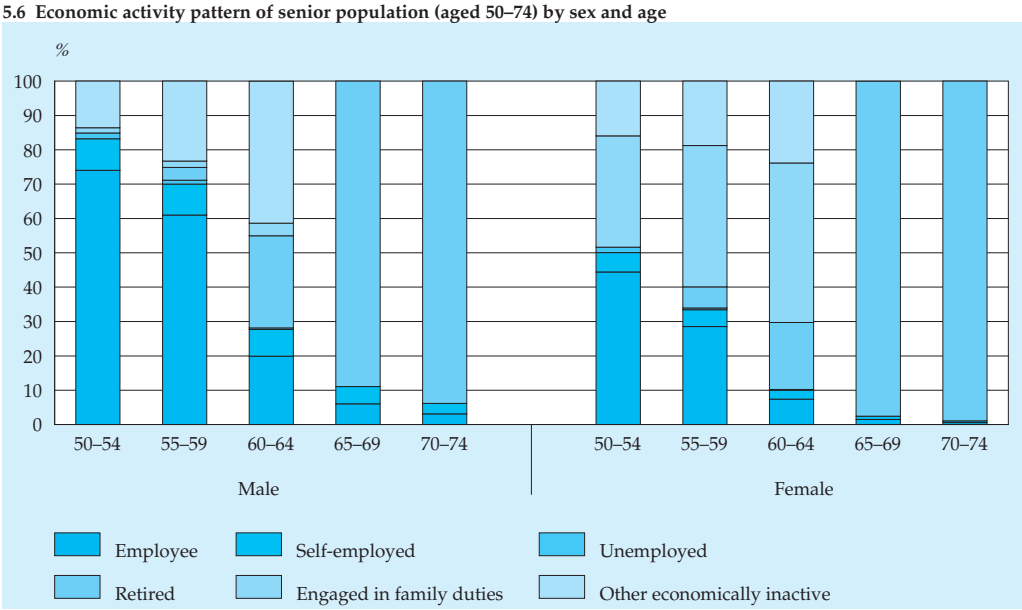
[1] Persons over 65 who are not employed are by definition retired.
[2] By definition the retirement age is over 55.

2 percent of all the economically active seniors was unemployed. However, one has to realize that people over 65 cannot be unemployed by definition. So, seniors had an employment rate almost equal to their economic activity rate. About 83 percent of the senior economically active men was employee and 15 percent was self-employed. This pattern appears to be almost the same for women: 84 percent was employee and 14 percent was self-employed. As was stated in chapter 3, older self-employed persons have a higher share in the employed population than younger ones.

In 2001 the average economic activity rate of men in their fifties was almost 80 percent, but the rate rapidly decreased when their sixties approached. In the age group of 65–74 nearly 10 percent was still economically active, and about half of them was self-employed. The economic activity rate of senior women also fell as they got older. About 44 percent of women aged 50–59 were economically active, while only 10 percent remained economically active at the ages 60–64. Between the age of 65 and 74 their activity rate had dropped to less than 2 percent. The economically inactive women under 65 were mostly engaged in family duties.

About 63 percent of the economically inactive senior male population (age 50–74) was retired in 2001, 3 percent was engaged in family duties and 34 percent was

5.6 Economic activity pattern of senior population (aged 50–74) by sex and age



'other economically inactive'. Notice that until the age of 65 the share of the 'other economically inactive' males was increasing with age. Analysis of the Social Statistical Database (see chapter 13) indicates that more than 50 percent of the economically inactive men (excluding pensioners) in the age of 55–64 received disablement benefits, about 10 percent social assistance benefits, and almost 15 percent unemployment benefits. Until 2003 people on unemployment benefits aged over 57.5 were not obliged to look for work. Therefore they were considered economically inactive.

Of the economically inactive senior female population (age 50–74) 48 percent was retired, 35 percent engaged in family duties and 17 percent 'other economically inactive'. About 20 percent of the economically inactive women aged 55–64 who were not yet retired had disablement benefits, and around 10 percent were on social assistance or unemployment benefits.

Branch of economic activity

The branch of economic activity in which the employed population works is classified according to the NACE-classification (Nomenclature statistique des Activités économiques dans la Communauté Européenne).

Table 5.2 shows that the three branches in which the senior population most frequently worked in 2001 were: the primary sector, with agriculture as an

Table 5.2
Branch of economic activity (NACE) by sex and age

		Men					Women				
		age 50–54	age 55–59	age 60–64	age 65–69	age 70–74	age 50–54	age 55–59	age 60–64	age 65–69	age 70–74
NACE major groups [1]		%									
A-B	Agriculture, hunting and forestry, fishing (NACE 01–05)	3	4	10	20	22	3	5	9	13	13
C-D	Mining and quarrying, manufacturing (NACE 10–37)	20	22	16	7	8	7	7	7	7	8
E-F	Electricity, gas and water supply, construction (NACE 40–45)	11	11	7	5	4	2	2	2	2	2
G	Wholesale and retail trade; repair (NACE 50–52)	13	14	18	21	20	16	17	20	23	23
H	Hotels and restaurants (NACE 55)	2	1	2	3	3	4	4	4	5	6
I	Transport, storage and communication (NACE 60–64)	9	8	6	8	8	4	3	3	4	4
J	Financial intermediation (NACE 65–67)	4	3	3	2	2	3	2	2	2	3
K	Real estate, renting and business activities (NACE 70–74)	11	11	15	20	20	13	12	14	22	20
L	Public administration and defence (NACE 75)	11	10	8	3	2	5	5	5	3	3
M	Education (NACE 80)	8	8	7	2	1	11	11	10	2	2
N	Health and social work (NACE 85)	5	5	4	3	3	28	26	14	7	6
O	Other community, social and personal service activities (NACE 90–93)	3	3	5	6	7	5	6	8	10	10
A-O	Total	100	100	100	100	100	100	100	100	100	100

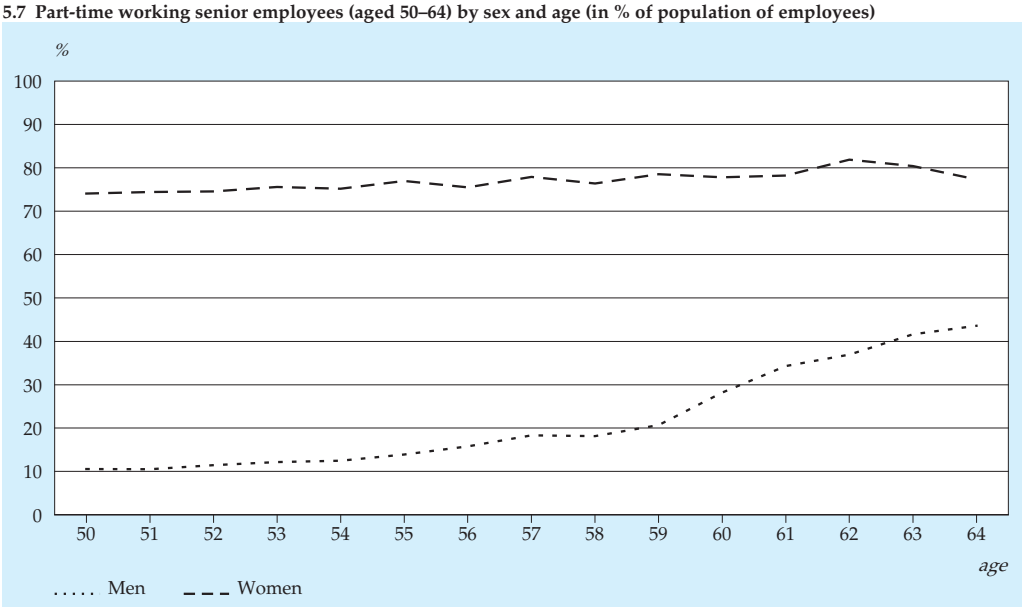
[1] Employed persons in NACE 95 or NACE 99 (very limited number), or of whom the major branch of economic activity is unknown, are attributed proportionally to NACE 01–93.

important activity (NACE 01–05), wholesale and retail trade (NACE 50–52) and real estate, renting and business activities (NACE 70–74). Below the age of 65 many male seniors were also active in mining, quarrying and manufacturing (NACE 10–37), and many female seniors in the branch of health and social work (NACE 85). In the upper senior ages (65–74) agricultural activities (farmers) and real estate, renting and business activities were definitely more significant than at earlier ages. The reason is that self-employed persons over 65 are relatively often in the labour force (see figure 5.6), and self-employed persons differ from employees in the branch in which they work.

Working hours

It is interesting to see in figure 5.7 that in 2001 the part-time rate (percentage of employees working less than 35 hours a week) of men went up slowly from 10 percent for persons aged 50 to around 40 percent at the age of 64. Probably there were quite a few men who cut their working hours in anticipation of their retirement. About 70 percent of male employees over 65 worked part-time. Between

5.7 Part-time working senior employees (aged 50–64) by sex and age (in % of population of employees)

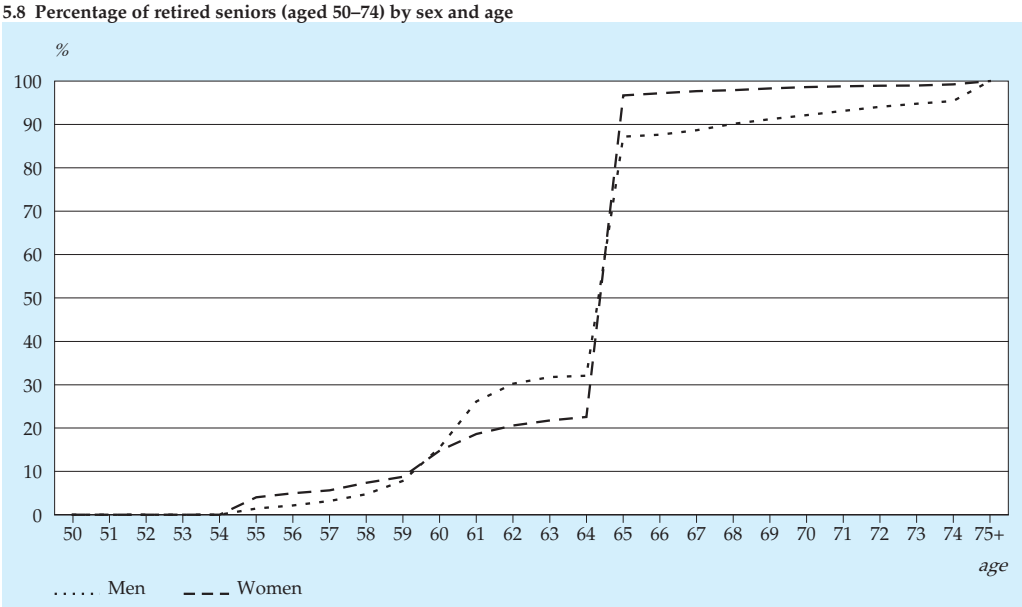


70 and 80 percent of employed women aged 50–64 had a part-time job. At ages 65 to 74, the part-time rate was even higher.

Retirement

According to the Dutch Census Guidelines of 2001, people can only be retired from the age of 55. However, in 2001, only few people under 60 appeared to have retired early. Retiring really started once seniors reached their sixties, as figure 5.8 shows. Most people retired at 65, the institutional age at which residents in the Netherlands are eligible for their first benefits under the Old Age Pension Act. [2)] Many labour agreements specify 65 as the retirement age at which employees get their official pension in addition to the State Old Age Pension Act benefits. A minority continued working after 65; women less often than men. Self-employed persons, such as farmers, are not stopped by an artificial boundary age of 65. Maybe they consider their old age provisions insufficient. Therefore, they keep their enterprise as long as their health allows them to, or until they can hand it down or sell it. Some people prefer to keep working a few days a week because it is a form of active ageing that gives them satisfaction. Moreover, some like the social environment in which they work. Especially people with small pensions welcome the supplementary income. Notice in figure 5.8, that between the age of 60 and 64 women have a lower retirement percentage than men, whereas it is just the other way round when they turn 65. This is because many women under 65 never earned a wage, but were engaged in family duties (see also table 5.1). Some women may have worked without being insured for early retirement pensions, or they are unemployed or disabled.

5.8 Percentage of retired seniors (aged 50–74) by sex and age

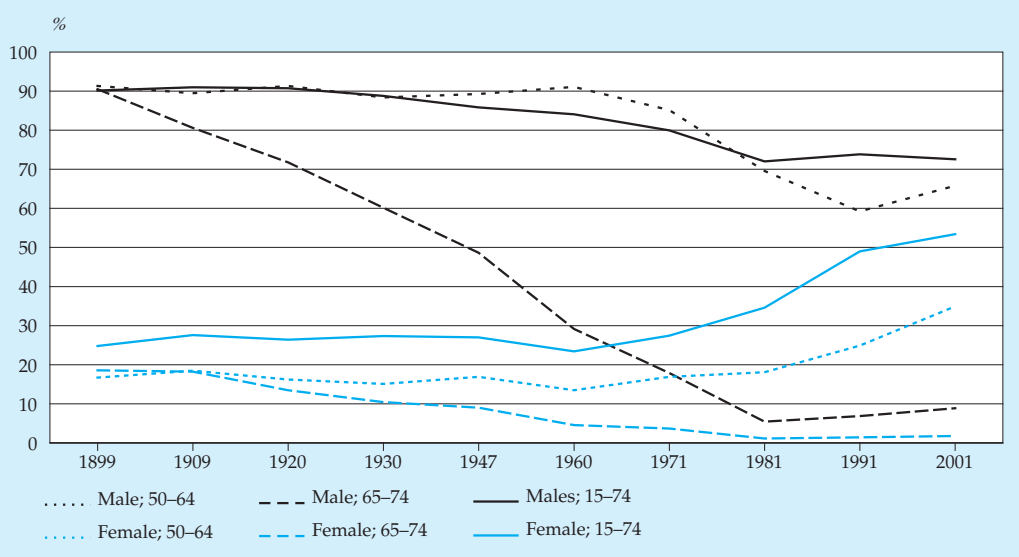


5.3 *The senior labour force in a historical perspective*

Within the last century there has been quite a development in the economic activity rate of the Dutch population, and in particular in that of the senior population. Figure 5.9 shows the economic activity trend for the senior population (age 50–74) as measured in all censuses between 1899 and 2001. As reference for comparison the figure includes the trend for the economically active population as a whole. [3)]

At the beginning of the 20th century the male economic activity rate was quite high, even at the senior ages. Just over 90 percent of men aged 50–74 were included in the labour force in 1899, when pension schemes were scarce. Therefore, breadwinners had to keep working as long as their health permitted. If earning an income was no longer possible, they had to live on their savings, the support of their families, or, in the worst case poor-relief. Before the Second World War more and more companies came with pensions schemes for their workers, but in 1947 only 23 percent of the 65+ generation benefited from such pension schemes. The great breakthrough came in 1956 when the Old age Pensions Act came into force (Van Gerwen, 2000). Now almost every citizen over 65, regardless of income level, had a guaranteed minimum income from old-age pension benefits. Figure 5.9 visualises this; according to the census results the male activity rate in the 65–74 age group dropped from 49 percent in 1947 to 29 percent in 1960. The average annual decrease in the period of 1947–1960 was 1.5 percent, against 0.7 percent in the period 1930–1947. But even after 1960 the decrease continued. The rate fell below 10 percent in 1981, after which a slight increase is perceptible.

5.9 Economic activity rate of senior population per age class, 1899–2001 [1] (in %)

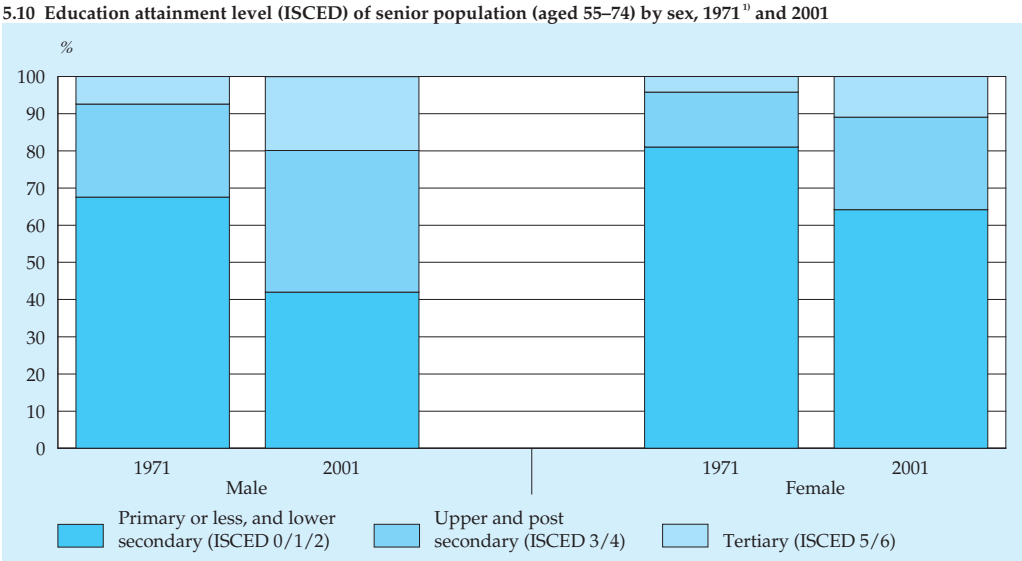


[1] Source 1899–1971: Statistics Netherlands (2001) and Statline; Source 1981: Eurostat (1988); Source 1991: Eurostat (1996).

Notice that until 1971 the activity rate of the men aged 50–64 was quite stable; around 90 percent. In the seventies and eighties their activity rate dropped remarkably to its lowest point of almost 60 percent in 1991. The Netherlands was faced with a recession as a result of the oil crisis in the seventies. The economic recovery in the mid-eighties was followed by another relapse at the end of the eighties, though it was brief and less severe. Senior workers were the main victims of these hard times. Because of their relatively high wage costs and their declining productivity they were the first eligible for dismissal. So, in order to cut back their staff, many employers offered senior workers attractive early retirement plans. These early retirement settlements for their redundant staff were negotiated settlements with the unions and social security authorities. The expense was partly shifted on to social security by way of unemployment and disablement benefits, and a part was to be contributed by the employers themselves (Aarts and de Jong, 1990; Kerkhofs and Lindeboom, 1999; Lindeboom, 1999). The advantage for employees was that the decline in their income was limited, and for the employers that discharge costs were low. The seniors who received unemployment or disablement benefits as part of an early retirement arrangement are classified for the census as 'other economically inactive' rather than retired, because it is not an official retirement income. Actually it can be considered as hidden unemployment.

The Dutch economy picked up again in the early nineties, and so did the economic activity rate. Higher production levels stimulated the demand for labour, and therefore employers were less inclined to let even their oldest and most expensive

5.10 Education attainment level (ISCED) of senior population (aged 55–74) by sex, 1971 [1] and 2001



[1] Source 1971: Vis (1981). In 1971 the ISCED classification did not exist yet. For the purpose of this figure the education classification of 1971 is transformed into ISCED levels.

workers go. At the same time government policy supported active ageing measures and encouraged seniors to stay in the labour force longer. This means that less attractive early retirement schemes were offered. Seniors were allowed to leave the labour force early, but much more at their own expense.

The economic activity rate of women during the century is quite a different story. Until the 1970s the activity rate fluctuated between 20 and 30 percent. Most women who worked were living alone and were breadwinners. Many working women were married but did not have children (yet). The stereotypical family was one where the father was the breadwinner and the mother took care of the children. From the early 1970s this pattern changed under the influence of the women's liberation movement. More and more women, also those with children, felt they had a right to work. An increasing number of child care facilities, and a greater supply of part-time jobs made it easier for women to do so. Another change was that women became more highly educated because it was more widely accepted that they had the right to study. This equipped them for intellectually demanding jobs. The first generation of the women who experienced these changes in the nineteen seventies now mostly belong to the senior population. The average education level of senior women is therefore higher in 2001 than in 1971. Figure 5.10 shows that the education level of male and female seniors has increased between 1971 and 2001.

The increased labour force participation of the younger female generations had its effect on the activity rate of the female seniors at the beginning of the 21st century.

The women who started their careers in the nineteen seventies are the young female seniors (age 50–64) of today, and contrary to the previous generations they often work until they retire. Their economic activity rate was 35 percent in 2001, higher than ever before, and certainly higher than the 17 percent of 1971. The female 65–74 age group behaved differently. They almost all took advantage of the pension schemes that became effective throughout the century. Only 1 to 2 percent kept working.

Table 5.3
Population and labour force (economically active population) by sex and age, 1947 and 2001

	1947		2001	
	Total population	Economically active population	Total population	Economically active population
Men	%			
Age group				
15–49	74	78	67	78
50–64	19	19	23	21
65–74	7	4	9	1
Total (15–74)	100	100	100	100
Women				
Age group				
15–49	74	86	66	84
50–64	19	11	23	15
65–74	7	2	11	0
Total (15–74)	100	100	100	100

Source 1947: Statistics Netherlands (2001).

One effect of the ageing population is that an increasing share of the labour force is in the hands of a diminishing group of young and middle-aged people, as table 5.3 shows. In 1947 some 74 percent of the male Dutch population consisted of citizens in the ages 15–49, which had a 78 percent share in the male labour force. In 2001 the economically active men in the ages 15–49 once more represented 78 percent of male labour force, but now they were reduced to 67 percent of total population. Something similar can be said about women aged 15–49. The trend that more women were getting economically active in recent decades partly counteracted the threat of a shrinking labour force. So, an important conclusion is that seniors have transferred economic activity to the younger generations. The labour force has therefore been ageing less in the last fifty years than the population itself.

5.4 *The Netherlands and the other European countries*

How does the Dutch senior labour force compare with that of other European countries? Are there striking differences or similarities? To find out, the Dutch Census results will be compared with the results of other European countries that had their census ready and were so kind to send us their census table set. The comparison will comprise the following countries, in geographical order: The Netherlands (NL, reference country), Norway (NO), Sweden (SE), Finland (FI), Estonia (EE), United Kingdom (UK), Switzerland (CH), Slovenia (SI) and Greece (GR).

Demography

In all the above-mentioned European countries the population of the 50–74 aged generation comprises 24 to 28 percent of total population, or 33 to 37 percent of the population of 15–74 years old (see table 5.4). The differences between the countries are rather small. In the Netherlands the older population has a relative low share in total population. One of the causes is that the post-war baby boom lasted much longer than in several other European countries.

Table 5.4
Share of the 50–74-year generation in selected European countries

	Population			Share population aged 50–74 in	
	total	age 15–74	age 50–74	total population	population aged 15–74
	x 1,000			*%*	
The Netherlands	15,986	12,036	4,002	25	33
Norway	4,521	3,208	1,086	24	34
Sweden	8,883	6,461	2,416	27	37
Finland	5,181	3,904	1,432	28	37
Estonia	1,370	1,046	373	27	36
United Kingdom	58,789	43,280	15,196	26	35
Switzerland	7,288	5,513	1,881	26	34
Slovenia	1,964	1,554	526	27	34
Greece	10,934	8,614	3,056	28	35

Economic activity rate

The economic activity rate of the senior population in the EU differs from country to country. The male and female activity rates will be discussed separately because of their different patterns. The patterns are presented in table 5.5, and in the figures 5.11 and 5.12. For review purposes the presentation in the figures is restricted to six countries.

Table 5.5
Economic activity rate of men and women of 50 years and older by age in selected European countries

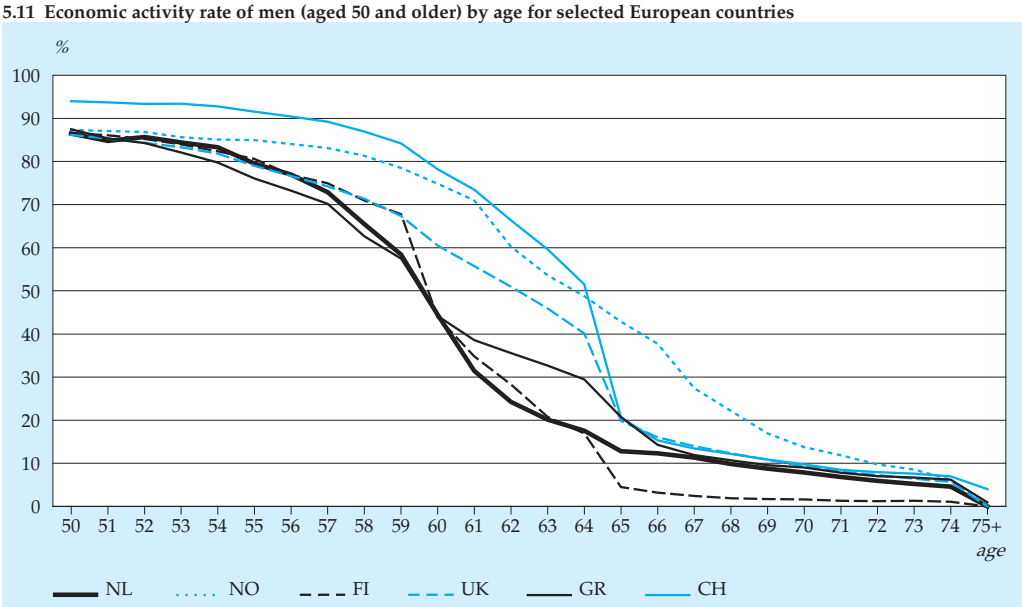
	Men									Women								
	NL	NO	SE	FI	EE	UK	CH	SI	GR	NL	NO	SE	FI	EE	UK	CH	SI	GR
	%																	
Age																		
50	86	87	88	87	83	86	94	91	87	58	81	85	88	84	74	76	84	45
53	84	86	86	84	81	83	93	85	82	49	77	84	86	79	69	72	49	37
55	80	85	85	81	77	79	92	80	76	41	74	82	83	74	63	68	26	31
57	73	83	82	75	73	74	89	72	70	34	71	78	78	61	57	63	16	25
59	58	79	76	68	64	67	84	34	57	25	66	72	70	40	48	57	6	21
61	31	71	65	35	57	56	73	17	39	12	58	59	32	27	29	46	3	13
63	20	54	47	21	31	46	60	7	33	7	41	39	16	20	21	17	2	11
64	18	49	40	17	27	40	51	4	29	5	35	31	13	18	18	15	2	10
65	13	43	29	4	22	20	21	.	21	3	30	20	3	16	11	9	.	6
66	12	38	12	3	18	16	15	2	14	3	25	6	2	12	9	8	1	4
67	11	27	10	2	17	14	13	2	12	2	16	5	2	10	8	7	1	4
70	8	14	6	2	11	9	10	1	9	1	7	2	2	5	5	5	1	3
73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75+		0	1	0	2	.	4	.	1		0	0	0	1	.	2	.	0

The 50–55 age range features a very gradually diminishing economic activity rate for men as well as for women in all countries. There is one exception; the women in Slovenia. After the age of 52, their activity rate drops quite abruptly from 79 percent to 26 percent at the age of 55. Notice that Dutch, Greek, and also the Slovenian women over 53 show much lower activity rates than women from other countries.

From the age of 55 the differences in the activity patterns between the countries become quite striking. While the economic activity diminishes gradually for men in Norway, Sweden, the United Kingdom and Switzerland, the decrease in other countries is much faster. Most of the differences can be explained by institutional factors, of which the eligibility for unemployment and disability benefits, and early retirement pensions are the most important (see OECD, 1999, 2001a, 2001b and 2003).

In Norway early retirement schemes are scarce and the official retirement age is 67. Therefore, economic activity levels for both men and women are still substantial compared to other countries. In Finland the national pension system provides old-age, disability, unemployment and survivor pensions. Unemployed persons aged 55–59 can be eligible for a benefit scheme called 'pipeline towards an unemployment pension'. In the Netherlands there has been easy access to disability benefits for a long time, especially in a depressed labour market. This and the early retirement possibilities in many branches of industry have resulted in low levels of economic activity. In Greece the ample possibilities of early retirement at a relatively young age, together with the low number of working years needed for eligibility for

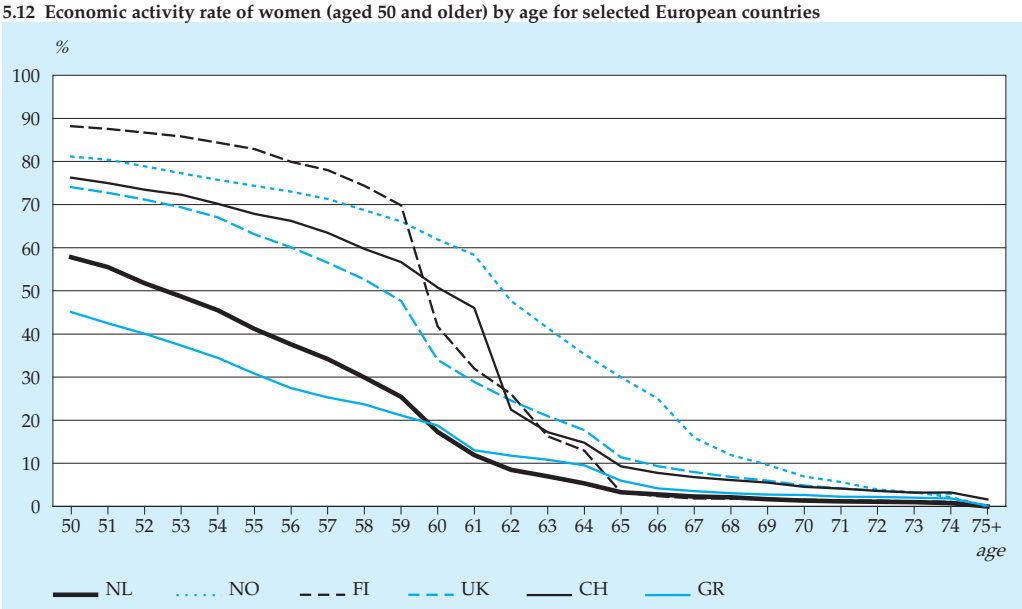
5.11 Economic activity rate of men (aged 50 and older) by age for selected European countries



pensions, explain the low activity levels. All these institutional factors are clearly reflected in the census figures shown. Beyond the official retirement age, which is 65 for most countries, economic activity rates start to converge to low levels. The exception is Norway, where economic activity is relatively high even over the official retirement age of 67.

There are striking differences between the patterns of female and male activity rates in the countries under consideration. Notice the spread of the activity levels, which is greater for women around 50. The female activity rates in most countries go down gradually until age 60. From the age of about 60 onwards the female economic activity lines of the European countries start converging. Norway shows a continuous relatively high activity rate until the official retirement age of 67, and in Sweden (not in the figure) the activity rate stays relatively high until 65. The Netherlands, Greece and Slovenia (Slovenia is not presented in the figure) exhibit quite a different pattern of female economic activity. Activity is much lower than in other countries, and drops at a steady pace. The other countries do not reach these low levels before the age of 65, Norway does not even far beyond that age. Decreases well beyond the average occur in the Netherlands at the age of 60, and in Greece where the official retirement age for women is 60, at the transition of 60 to 61. In the United Kingdom, the Netherlands and Finland activity decreases faster at 60. In the UK the official retirement age for women is also 60. From the age of 61 to 62 the female labour force shrinks considerably in Switzerland, in line with the retirement age of 62 years.

5.12 Economic activity rate of women (aged 50 and older) by age for selected European countries



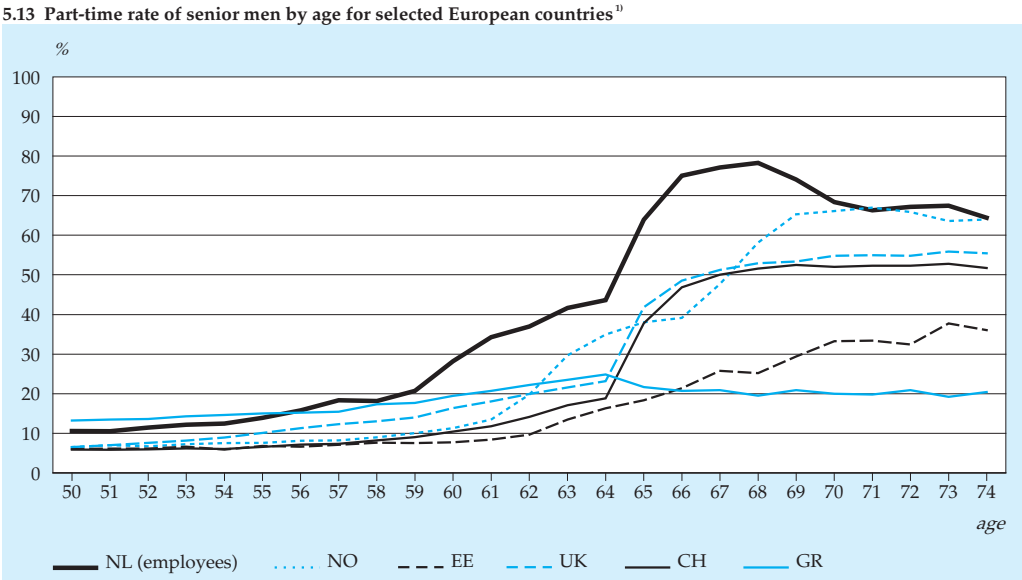
When comparing the economic activity rates in the different countries we should bear in mind that economic activity is not to be confused with employment; economic activity being the sum of employment and unemployment. For example, the Finnish women in the 50–57 age group are the highest in ranking for economic activity, but in employment rate the Swedish women rank first. Unemployment in Finland, Estonia and Slovenia is higher than in the other countries under review.

Part-time work

In section 5.2 we saw that an increasing number of senior male Dutch employees reduce their working hours with advancing years. In several other European countries we see the same phenomenon [4]. We analyze it by means of the so-called part-time rate, the percentage of people working part-time (less than 35 hours a week) in the employed population. For the Netherlands part-time data, and therefore also the part-time rates, are only available for employees.

From age 50 to around 60 the male part-time rate rises moderately in all countries; in the Netherlands a bit faster than in the other countries under consideration, (see figure 5.13). At about 60 the pace starts to accelerate in most countries. In the Netherlands this happens at the age of 59 and once again at 64, in Norway at 61, in Estonia at 62, and in the United Kingdom and Switzerland at the age of 64. From the age of 59 the Dutch male part-time rate is by far the highest of all countries: it goes up to almost 80 percent. In Greece there is not much difference in part-time rates at high or low senior ages. In Switzerland and the United Kingdom part-time working is

5.13 Part-time rate of senior men by age for selected European countries [1)]



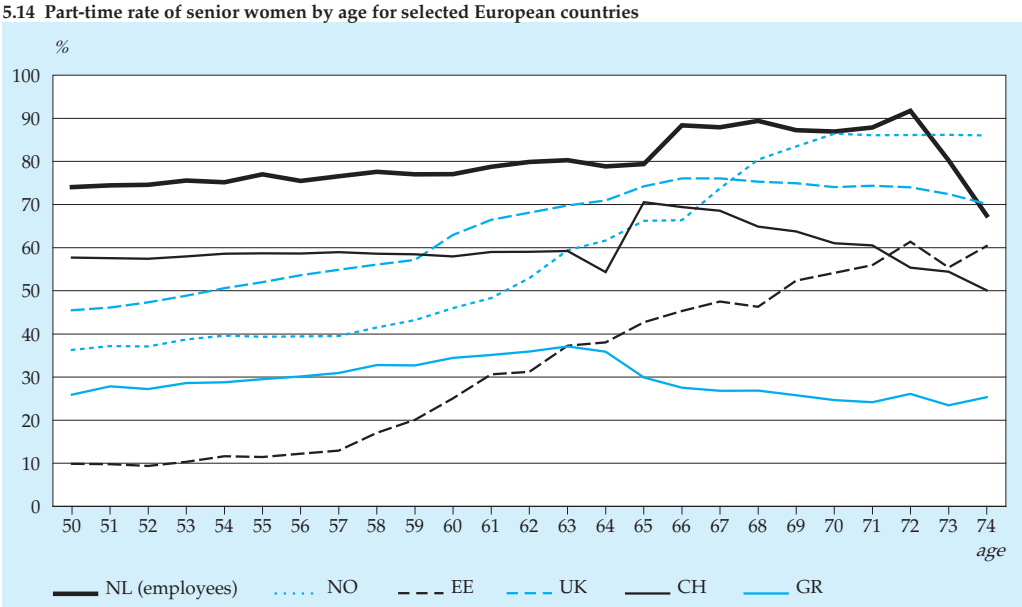
[1)] No results on part-time activities were available for Sweden and Finland.

really becoming an important phenomenon when the normal retirement age of 65 has been passed. In Slovenia (not shown in figure 5.13) the part-time rate is extremely low, no more than 1 percent.

The question is whether there is some relation between the part-time rate (figure 5.13) and the employment rate. For most countries the employment rate is approximately equal to economic activity. One could theorize that an increase in (possibilities to) working part-time should slow down the decrease of the employment rate as people get older. People may no longer be mentally and physically capable of having a full-time job, but they may still have the power to do a part-time job. In the Netherlands this seems to be the case from the age of 59–60 and up, because increasing part-time rates are accompanied with a gentle downward slope of the employment rate line. This is in contrast with Norway, where from 61 years onwards the steeply rising part-time rate is accompanied by an even steeper declining employment rate. So from this data selection we cannot infer an unambiguous relationship between employment and part-time work.

In all countries part-time work is much more widespread among women than among men, (see figure 5.14). The pattern we see at the age of 50 was established around 40 and remains stable until about 57 when rates start to rise in most countries. The strongest rise is in Estonia, where the part-time rate goes up from the lowest level at 50 (10%) to a mid-position (60%) at 74. In Norway too a considerable rise occurs, from 36% to 86%. The divergence between countries is very high for all

5.14 Part-time rate of senior women by age for selected European countries



ages, quite different from the male pattern, and illustrative of the respective national traditions. At the age of 50 men show part-time rates varying from 6 to 13%, whereas women in the different European countries have a spread in part-time rates between 10 and 74 percent (except for Slovenia, not shown in figure 5.14, where part-time rate is at most 1%). The Dutch female employees have by far the highest part-time rate of all countries at all ages, reflecting a traditional attachment to the central position of the housewife in the Dutch family. There is no longer much objection to women with children working outside the home. Still most women work part-time, and spend a part of the week in housekeeping, and taking care of their children and other relatives.

Employees versus the self-employed (non-employees)

More self-employed persons in the Netherlands keep working longer than employees. Over the age of 65 just under half of the employed population consists of self-employed persons. What is the situation in other European countries? Table 5.6 shows this.

Many countries exhibit a pattern similar to that of the Netherlands, for example the United Kingdom. In Norway and Sweden the share of self-employed and other non-employees is also increasing with age, however, it is lower than in the Netherlands and the UK. In Finland with a strong decline in economic activity rates in the age range of 60–65 it seems that many employees retire, whereas relatively more self-employed persons keep working. This pattern changes abruptly at the age

Table 5.6
Share of self-employed persons (non-employees) in the employed population by age in selected European countries

	NL	NO	SE	FI	EE [1]	UK	CH	SI	GR
	%								
Age									
50	11	9	9	15	8	16	26	13	42
55	13	9	10	15	7	19	27	15	52
60	19	11	11	18	6	22	32	29	68
61	27	11	12	20	6	23	34	35	69
62	33	13	13	22	5	24	40	39	73
63	36	14	16	33	5	25	45	44	75
64	38	15	19	37	5	26	48		77
65	47	17	16	17	5	35	62		66
66	43	18	28	14	5	37	67		61
67	42	25	30	11	5	38	68	57	62
68	44	24	31	7	5	39	70	67	61
69	45	21	30	10	6	39	72		59
70	46	23	31	8	7	41	74		59
74	54	28	31	4	6	41	77		55

[1] In Estonia the employment status is unknown for 3% of the employed population.

of 65. In Estonia the percentage of self-employed persons has always been low, and it remains low in the older ages. In Switzerland more self-employed persons (more than two out of three) remain employed in the older senior ages than in any other country. Slovenia cannot present data for all of the ages for reasons of privacy protection, but its pattern looks very similar to that of Switzerland. In Greece the share of self-employed people has traditionally been relatively high from an early age and it is even higher in the senior ages. So, the conclusion is that in most of the selected European countries more employees than other employed persons retire at earlier ages.

5.5 *Concluding remarks*

The ageing of the Dutch population has consequences for its labour force. There are fewer young and middle-aged people to produce goods and deliver services. Active ageing, or incentives to keep seniors economically active as they get older, is one of the solutions to this problem. In an economic boom companies and services may get understaffed, so older people may be stimulated to work longer and postpone retirement. This is done by offering them part-time work and by making pension schemes financially less attractive. This could be experienced in the nineteen nineties, although on a modest base. After a thirty year decrease in senior male economic activity an inversion took place: from 1991 to 2001 the activity rate of males of age 50–64 went up from 59 to 66 percent.

Nevertheless, when compared to several other European countries, economic activity in the senior age range is still low in the Netherlands. Many seniors want leisure, and if they can afford it, they retire before they reach 65. Another reason why activity is so low is an inheritance of the early nineteen nineties. This was just before the economic recovery, when still many early retirement settlements were arranged by the employers for their redundant aged workers. In fact this represents hidden unemployment instead of retirement.

The age distribution of the economically active population has in fact not changed very much since 1947, which implicitly means that seniors have transferred economic activity to the younger generations. An important conclusion is that the stability in the age composition of the labour force is not so much due to active ageing, but that it is actually much more caused by the rise of economically active women in recent decades.
Changing social attitudes in these years made it acceptable for women to enter the labour market. Child care facilities and more part-time jobs made it easier for them to do so. The Netherlands can even be considered as a European part-time work champion for women in all ages from 35 on, with part-time rates over 70 percent. Senior men also have, as far as can be extracted from the available data, the highest part-time rates of Europe.

Annotations

1) However, not in all cases statistical information can be provided on the senior 50–74 age group. This is because in some sources only deviating age classifications are available, such as '50–64' and '65+', or '35–54' and '55–74'. Whenever it is necessary to depart from the standard definition it will be indicated.
2) The Old Age Pension Act provides state benefits to every citizen in the Netherlands of 65 years or older, independent of nationality, and under the condition that he or she has been living in the Netherlands between the age of fifteen and sixty-five. People who resided abroad face a 2 percent cut in their benefits for every year they lived outside the Netherlands.
3) The economic activity rate is the percentage of economically active persons in an age group. Because of lack of comparable statistical information over the years, the age groups are sometimes classified slightly differently. For example: the economic activity rate for the 15–74 age group in the period 1899–1960 is determined as the number of economically active persons aged 14+ divided by population aged 14–74. The economic activity rate for the 65–74 age group in the same period is determined as the number of economically active persons aged 65+ divided by population aged 65–74. Mind that there is only a marginal number of economically active persons of 75 years or older.
4) No results on part-time activities were available for Sweden and Finland.

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6. Foreigners at work

José Gouweleeuw and Carel Harmsen

Educational attainment is the key factor in explaining the main economic activities and occupations of foreigners. This is the main result of the analysis of the foreign workforce based on the Dutch Census of 2001. About 15 percent of the Dutch workforce consists of foreigners. This chapter focuses mainly on the native Dutch population in comparison with the Turkish and Moroccan, Surinamese, Antilleans and Aruban populations.

About 60 percent of the native population has upper secondary level or higher as their highest educational attainment level. For the Turks and Moroccans, this holds only for about 20 percent, while the Surinamese and Antilleans take a half way position with 40 percent.

For comparable levels of educational attainment, the main economic activities and occupation levels are about the same for natives and foreigners. When zooming in some differences appear. The second generation foreigners do a little bit better than the first generation. The positions women, including native Dutch women, acquire on the labour market are not as high as those of men of comparable educational attainment.

Apart from educational attainment differences in occupation between the Turkish and Moroccan first generations versus the Surinamese and the Antilleans and Arubans seem related to their command of the Dutch language. Differences in main economic activity seem related to cultural background. The employment rate among Turks and Moroccans is low because many first generation Turkish and Moroccan women are housewives. In contrast, the employment rate among Surinamese and Antillean women is high, because women play a pivotal role in their families not only socially but also economically.

6.1 Introduction

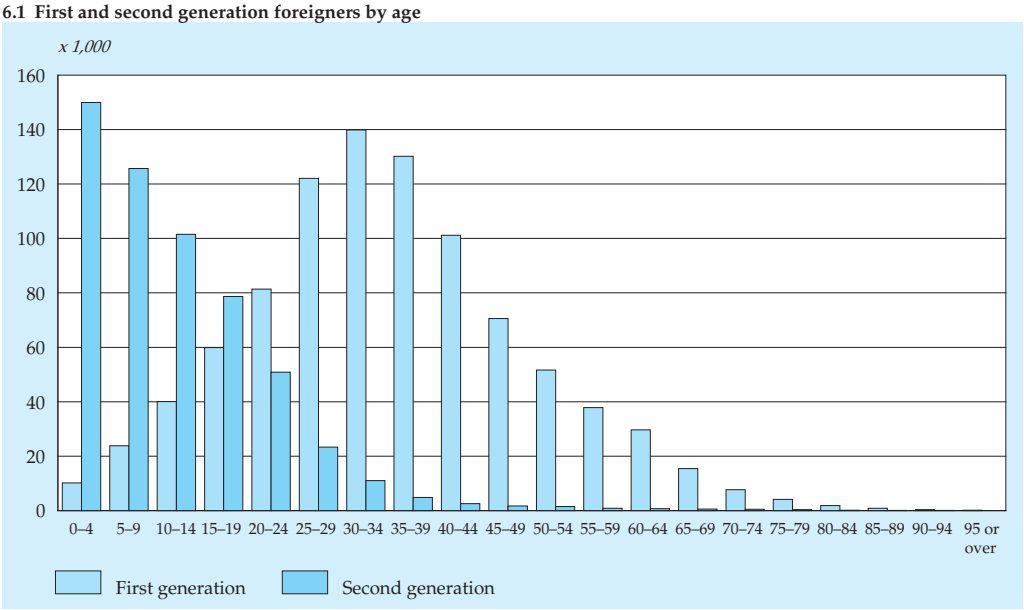
In the Netherlands about 18 percent of the population can be classified as 'foreigners'. Foreigners are defined as persons of whom at least one parent is born abroad. A distinction is made between first and second generation foreigners. A first generation foreigner is a foreign born person with at least one parent born abroad, a second generation foreigner is a person born in the Netherlands with at least one parent born abroad. Foreigners can be further divided into western and non-western; western foreigners come from Europe (excluding Turkey), North America, Indonesia and Japan, and non-western foreigners come from Turkey, Africa, Latin America and the rest of Asia. The main foreign populations in the Netherlands, and focus of this chapter, are Turks, Moroccans, Surinamese, Antilleans and Arubans and non-Dutch EU-citizens. Turks, Moroccans, Surinamese, Antilleans and Arubans form one third of the foreign population of the Netherlands. The first and second generation foreigners from the other EU countries form about a

quarter of the foreign population. In the remainder of this chapter, Antilleans and Arubans will be referred to as Antilleans.

Although the Netherlands has a long history of incorporating foreigners in Dutch society, the influx of workers from other countries is relatively recent. In the 1960s and early 1970s Dutch companies recruited foreign workers from Mediterranean countries. A great many male workers came, first from Spain and Italy, later from Turkey and Morocco. The labour migration of Turks and Moroccans was followed by family reunification.
The migration from Suriname in the mid 1970s and early 1980s is related to the fact that Suriname, a former Dutch colony, became independent in 1975. Many Surinamese people came to the Netherlands because they lacked trust in the economic and political future of Suriname. For a long time, most Antilleans came to the Netherlands to study. From the mid 1980s onwards economic reasons also became an important factor in their migration from the Netherlands Antilles (Harmsen et al., 1991). There are various reasons for the presence of first and second generation non-Dutch EU-citizens in the Netherlands. Labour migration is important, German women in the 1920s, Spaniards and Italians in the 1960s, the British in the early 1990s. Marriage migration is also an important factor, especially among Germans and Belgians (Sprangers, 1994).

In this chapter the population under consideration is the potential workforce. Therefore, only the population aged 15 to 74 years is taken into account. This

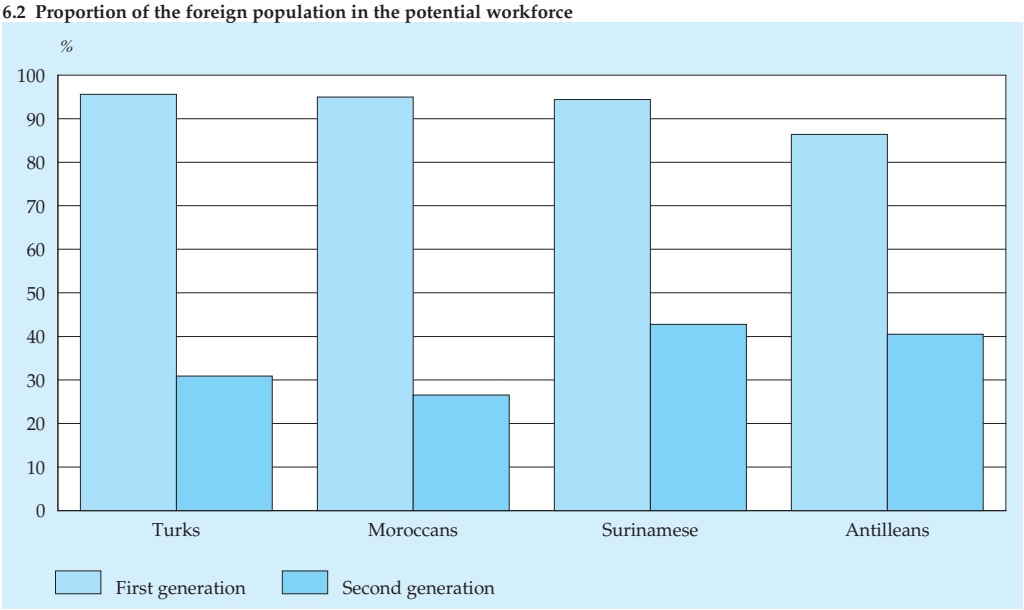
6.1 First and second generation foreigners by age



includes about three quarters of the foreign population. There is a marked difference between the age structure of the first and the second generation non-western foreigners (figure 6.1). The second generation consists of many young people. The potential workforce among the first generation foreigners is well above the level of the native population, whereas at this point in time only between 30 and 40 percent of the second generation (figure 6.2) belongs to the potential workforce. This implies that a large number of second generation foreigners will enter the labour market in the years to come.

The information presented in this chapter is partly based on the Dutch Labour Force Survey. Therefore, it is partly based on estimates. In some cases information could not be provided because of an insufficient number of observations. For a theoretical background on this, the reader is referred to chapter 14. The remainder of this chapter is organised as follows. In section 6.2 the educational attainment levels of the native population and the first and second generation of Turks, Moroccans, Surinamese, Antilleans and non-Dutch EU-citizens are compared. This is followed by a comparison of the main economic activity in section 6.3. Section 6.4 examines the relation between the level of occupation and the highest level of educational attainment for the first and second generation of foreigners, and section 6.5 zooms in on the occupations by foreigners. Section 6.6 presents some points for discussion.

6.2 Proportion of the foreign population in the potential workforce

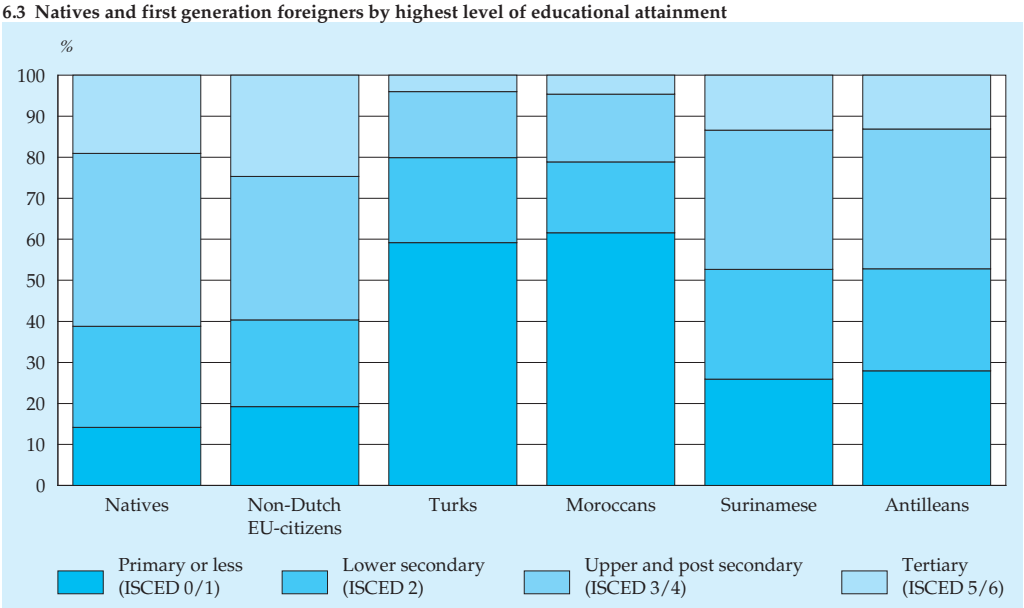


6.2 *Educational attainment by foreigners*

There is a strong relation between the highest level of education someone has attained and their job. In order to gain a better understanding of foreigners at work, it is necessary to consider the highest level of education they attained in comparison to the native population. In the Dutch Census, the educational attainment of the population is classified by the International Standard Classification of Education (ISCED). The ISCED ranges from the pre-primary level (ISCED-0) to the tertiary levels (ISCED-5 and -6). For a complete overview of ISCED levels, the reader is referred to chapter 1. In the remainder of this chapter the category primary or less (ISCED 0/1) includes a small group of persons of which the level of education is unknown.

First, the level of educational attainment of the native population is compared to that of the first generation non-Dutch EU-citizens, Turks, Moroccans, Surinamese and Antilleans. This is illustrated in figure 6.3. The native population has the highest level of educational attainment, closely followed by the non-Dutch EU-citizens. Note that the non-Dutch EU-citizens mostly come from a similar western background as the native population. Figure 6.3 shows that the percentage of non-Dutch EU-citizens with a tertiary level of education, and with a primary level or less, is higher than among the native Dutch population. The overall level of educational attainment of the two backgrounds is more or less comparable.

6.3 Natives and first generation foreigners by highest level of educational attainment

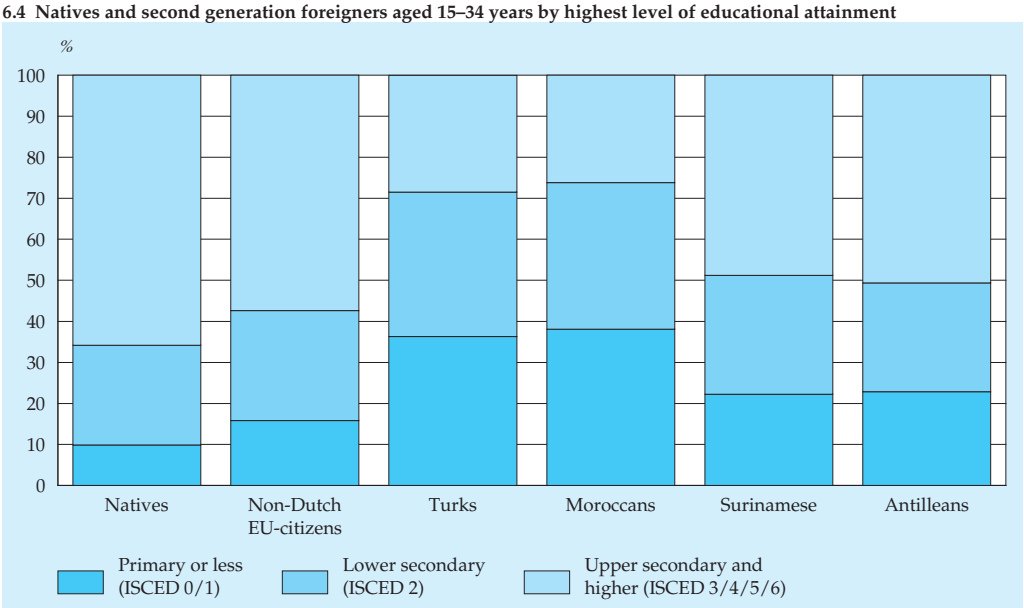


The first generation Turks and Moroccans on average have the lowest educational attainment. This holds true for men and women. The older first generations of Turkish and Moroccan men immigrated to the Netherlands in the 1960s and 1970s when the Netherlands wanted cheap unskilled labour. Gijsberts (2003) attributed the lower education level to the fact that the first generation Turks and Moroccans had their education largely in their country of origin. Additionally, problems with the Dutch language explain the lower education level. The first generation Surinamese and Antilleans are right between the native Dutch and non-Dutch EU-citizens and the Turks and Moroccans.

When the educational attainment of the second generation of foreigners is considered, it is assumed that the difference with natives decreases, see for example Gijsberts (2003). As figure 6.1 shows, the second generation Turks, Moroccans, Surinamese and Antilleans are almost all younger than 35 years of age. Therefore, in figure 6.4 the natives and the non-Dutch EU-citizens are restricted to this age group as well. Note that the tertiary level has disappeared as a separate category due to lack of observations. Since the second generation foreigners are all relatively young, they have not yet finished their tertiary education.

The general picture of the second generation is similar to that of the first generation: the native population has the highest average level of educational attainment, followed by the non-Dutch EU-citizens. Turks and Moroccans have the lowest average level, and the Surinamese and Antilleans take an intermediate position.

6.4 Natives and second generation foreigners aged 15–34 years by highest level of educational attainment

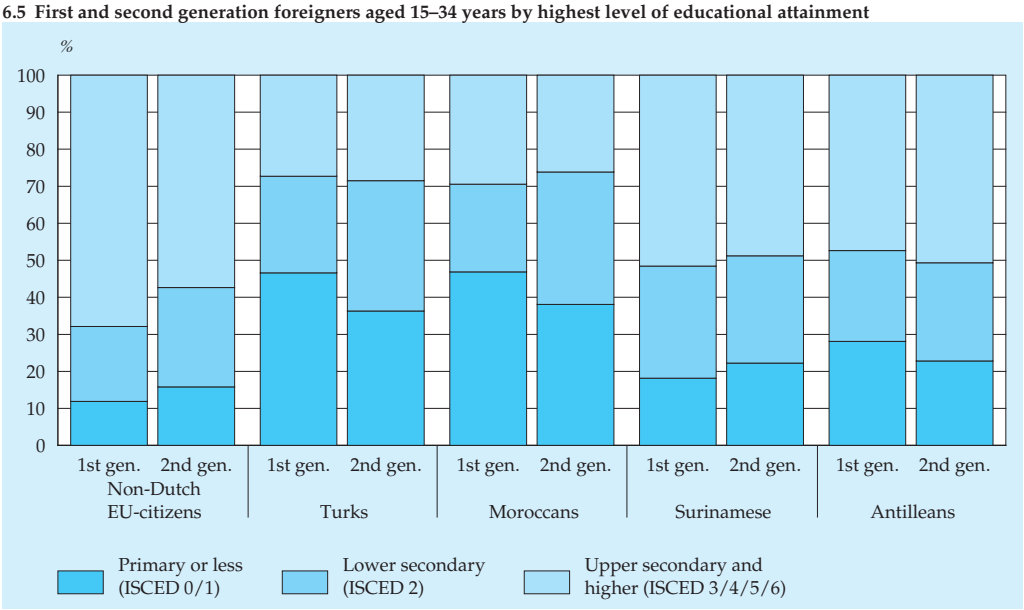


In figure 6.5 the first and second generation of foreigners are compared as to their educational attainment. Again, in order to make a fair comparison, the first generation is restricted to persons under 35 (as is the second generation non-Dutch EU-citizens). The second generation is only slightly better educated than the first generation, except the non-Dutch EU-citizens whose second generation has a lower educational attainment than the first. This picture is probably a little distorted since many persons are still studying, especially among the second generation. This will be shown in section 6.3. The difference in educational attainment will be more pronounced once the second generation finishes their education.

When men and women are considered separately, it turns out that men in the second generation on the average have a lower educational attainment level than the first generation. Again this can be explained by the fact that many second generation men are still studying. The second generation women, with the exception of non-Dutch EU-citizens, have a higher education level than the first generation, even though many women are still going to school (see section 6.3).

In conclusion, the native population has the highest average educational attainment level. They are closely followed by the non-Dutch EU-citizens where the first generation is better educated than the second. Next come the Surinamese and Antilleans, where the second generation has a slightly higher education level than the first. This is hardly visible in figure 6.5, but the distinction will probably be stronger when everyone in this group has finished their education. The lowest

6.5 First and second generation foreigners aged 15–34 years by highest level of educational attainment



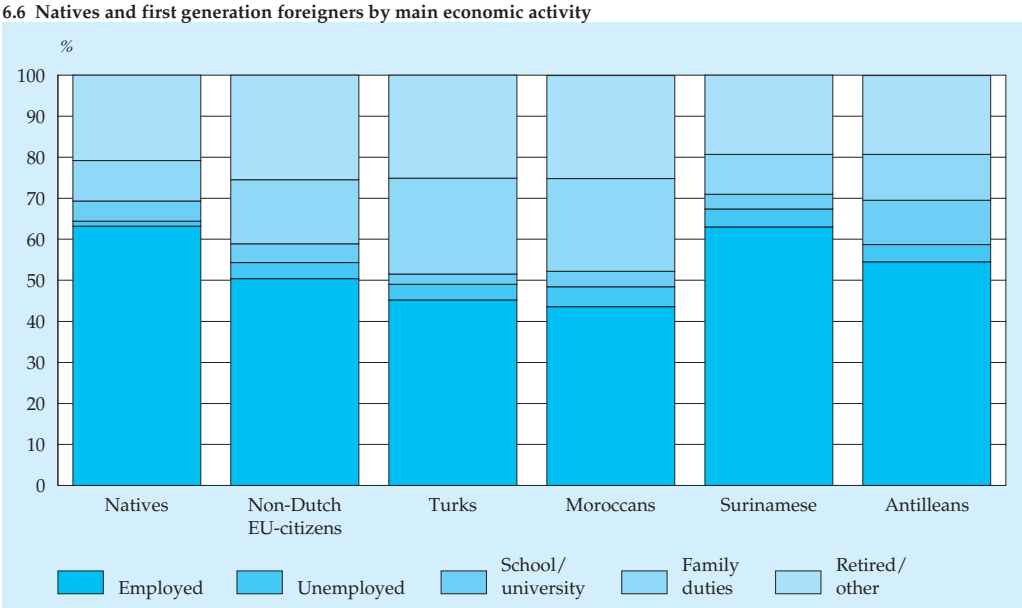
education level is that of the Turks and Moroccans, where the second generation is slightly better educated than the first. Note that the population is restricted to persons aged 15–34 to make a fair comparison. The second generation Turks, Moroccans, Surinamese and Antilleans are almost all younger than 35.

6.3 *What foreigners do*

In chapter 3, it has already been argued that the native population has the highest employment rate, followed by the non-Dutch EU-citizens and the Surinamese. The lowest employment rate occurs among Turks and Moroccans, while the Antilleans take an intermediate position. In this chapter, a distinction is made between the first and second generation foreigners. First the native population is compared to the first generation foreigners (see figure 6.6).

Figure 6.6 shows that the highest employment rate corresponds to the native Dutch (63.2%), closely followed by the first generation of Surinamese (63.0%). Surinamese women over 35 have a high employment rate compared to native women in the same age group. About one quarter of the Surinamese women are single mothers (Schapendonk-Maas, 2002) and have to support their family. Turks and Moroccans have the lowest employment rate (about 45%). This holds for men and women in both age groups (under and over 35). First generation Turkish and Moroccan men who came as 'guest workers', often became unemployed or unable to work due to

6.6 Natives and first generation foreigners by main economic activity



the economic restructure of the 1970s and 1980s (Dagevos, 2003a). The employment rate of the first generation Turkish and Moroccan women over 35 years is less than half that of the natives. This issue is further addressed later in this section. Both Antilleans and non-Dutch EU-citizens take an intermediate position where the employment rate is concerned.

The percentage of people engaged in family duties is the highest for the first generation Turks and Moroccans, who have a very traditional family life where the women stay at home to take care of the family and housekeeping. The percentage of Turkish and Moroccan women over 35 engaged in family duties is more than twice that of the native women: 24 percent among native women versus 52 percent for Turkish and 63 percent for Moroccan women. For women under 35 years the difference is even greater: the percentage of Turkish or Moroccan housewives is about five times that of native Dutch women. A major contribution is made by the so-called import brides. Many Moroccan and Turkish men like traditional wives, and look for brides in their country of origin (Groen, 2004). Also many Turks and Moroccans are married to someone from their country of origin (Hooghiemstra, 2003). When these wives immigrate to the Netherlands, they are first generation foreigners. The percentage of persons engaged in family duties further shows that the lowest percentage is found among the Surinamese. This is mainly because many Surinamese women over 35 are employed.

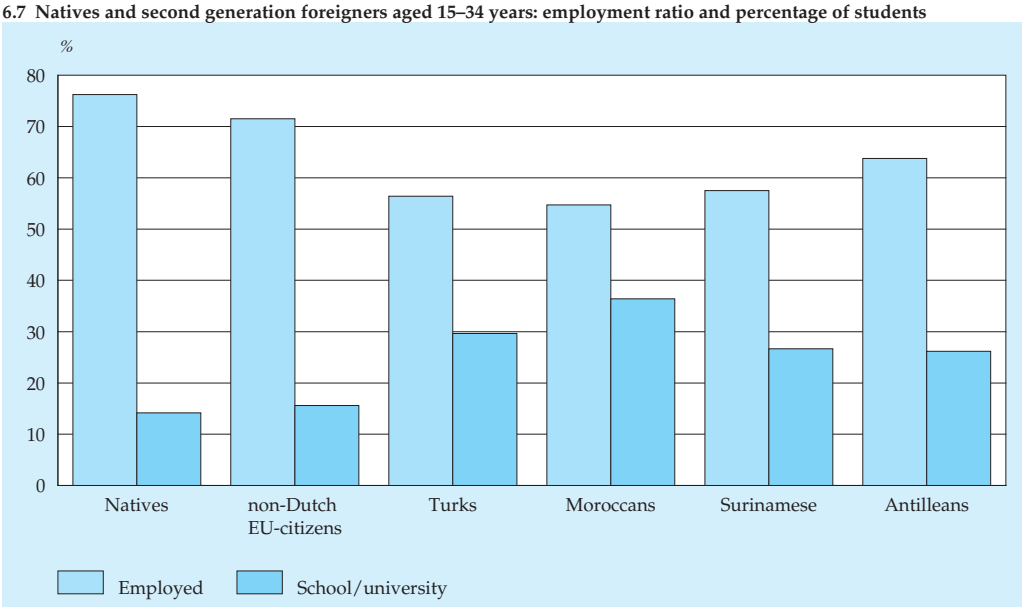
The Antilleans have the highest percentage of students. As was described in chapter 3 this is because the Netherlands Antilles have virtually no educational institutions at the tertiary level. Therefore, many young Antilleans come to the Netherlands to study. The percentage of students among Antillean women is somewhat larger than among Antillean men.

A small percentage of the native population is unemployed. This percentage is about three to four times as large for the first generation foreigners, irrespective of their country of origin. Note that it is still a small percentage as a part of the total population.

The only available indicators to compare the native to the second generation of foreigner population are the employment rate and the percentage of students. There are not enough observations of the other categories to make reliable estimates. Since the second generation Turks, Moroccans, Surinamese and Antilleans are almost all under 35, the native and non-Dutch EU-citizens have to be restricted to this age group as well in order to make a fair comparison.

Figure 6.7 indicates that the native population has the highest employment ratio, followed by the non-Dutch EU-citizens. The relatively low employment rate and the high percentage of students of the second generation Turks, Moroccans, Surinamese

6.7 Natives and second generation foreigners aged 15–34 years: employment ratio and percentage of students

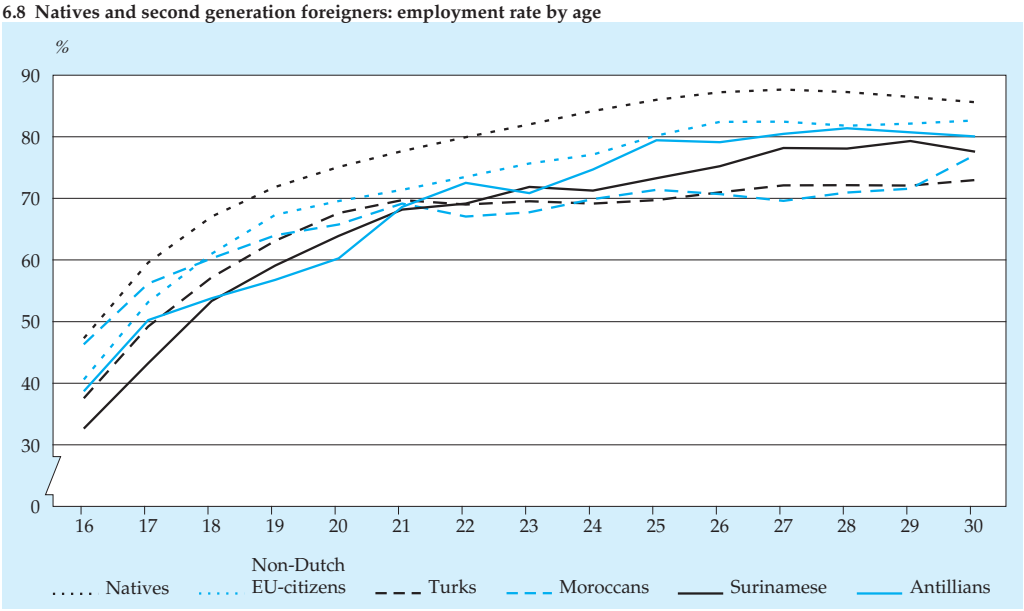


and Antilleans can probably be explained by their age structure, as described in section 6.1 there are relatively many 15–19 year-olds among the second generation Turks, Moroccans, Surinamese and Antilleans. The second generation Moroccans have the lowest employment rate, the only one where the women have a higher employment rate than the men. Moroccans also have the highest percentage of male and female students. For Moroccan women finishing education is a means to escape forced marriage (Hooghiemstra, 2003).

In figure 6.8, the employment rate for the native population and the five different countries of origin are plotted against age. Detailed table information on the economic status of foreigners can be found on the internet at http://www.cbs.nl/en/publications/articles/general/census-2001/census-2001.htm. The employment rates for the 16 and 17 year olds of all backgrounds are relatively close together. Since the employment rate generally increases with age, the low value for the second generation Turks, Moroccans, Surinamese and Antilleans as a whole is indeed partly due to the many young people in this group. Note that the employment rate of the natives decreases slightly after the age of 27. This is completely due to women: the employment rate of native women decreases from 27 years onwards, whereas the employment rate of native men stays stable.

The difference in the employment rate between the natives and the second generation Moroccans increases with age. This effect becomes even stronger when the women are considered separately. The employment rate of second generation

6.8 Natives and second generation foreigners: employment rate by age



Moroccan women under 21 is close to that of the native women in the same age group, and for some ages it is even somewhat higher. The employment rate of the second generation Moroccan women, however, decreases after the age of 21, whereas that of the native women continues to increase until age 27. For the second generation Turkish population, the employment rate behaves similar to that of the Moroccans. The only difference is that the employment rate of second generation Turkish women is at least 10 percent lower than that of native women under 21.

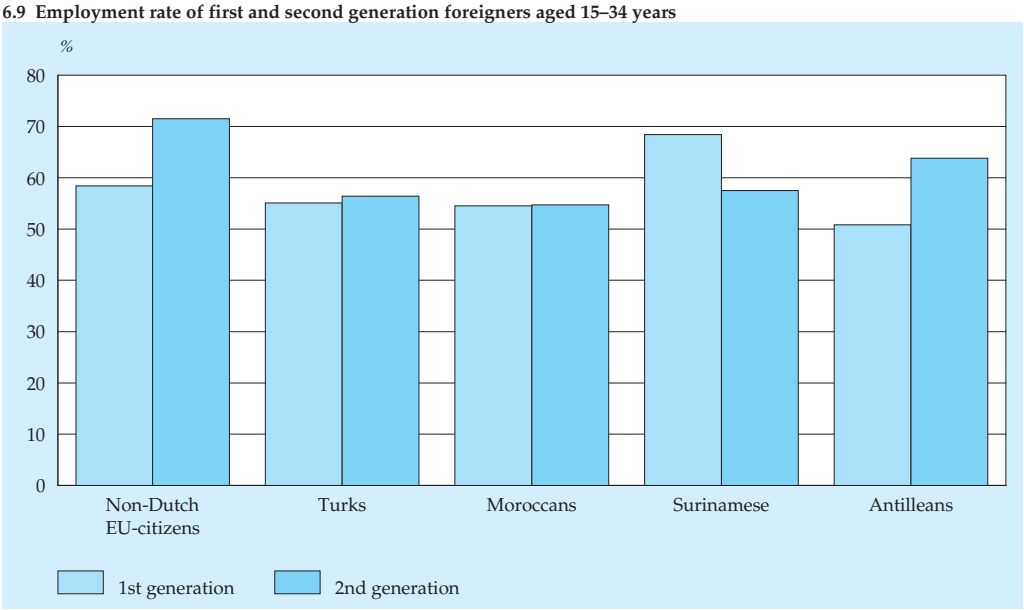
For the second generation non-Dutch EU-citizens, the difference in employment rate with native men and women is about the same for all age groups. The second generation Surinamese and Antilleans have the lowest employment rate among the persons under 21. From that age on, the employment rates from the second generation Surinamese and Antilleans continue to increase, eventually exceeding that of the second generation Turks and Moroccans. The employment rate of the second generation Antilleans is higher than that of the second generation Surinamese for persons over 21. For the second generation Surinamese women, it is only after the age of 26 that their employment rate exceeds that of the second generation Turkish and Moroccan women. The employment rate of the second generation Surinamese women continues to increase to the same level as that of the native women. For the second generation Antillean women, the employment rate is higher than that of second generation Turkish and Moroccan women from 23 years onwards.

Figure 6.9 compares the employment rate for the first and second generation. As before, the non-Dutch EU-citizens and the first generation Turks, Moroccans, Surinamese and Antilleans are restricted to persons under 35 years of age in order to make a fair comparison. The employment rate of the first generation of non-Dutch EU-citizens and Antilleans is lower than that of the second generation. The Surinamese are the only group for which the first generation has a higher employment rate than the second. This is mainly because many Surinamese women of the first generation are employed.

The relatively high employment rate for the second generation is mainly caused by the women. The second generation women have a higher employment rate than the first generation with the same background, except Surinamese women. The percentage of students among second generation Turkish, Moroccan and Surinamese women is higher so the employment rate is lower than for the first generation. Many first generation Surinamese women are working, and many first generation Turkish and Moroccan women are engaged in family duties.

First generation foreign men generally have a higher employment rate, while the second generation men has a larger percentage of students (except the non-Dutch EU-citizens and Antilleans). This can be explained by the fact that the second generation is younger and often still in school.

6.9 Employment rate of first and second generation foreigners aged 15–34 years

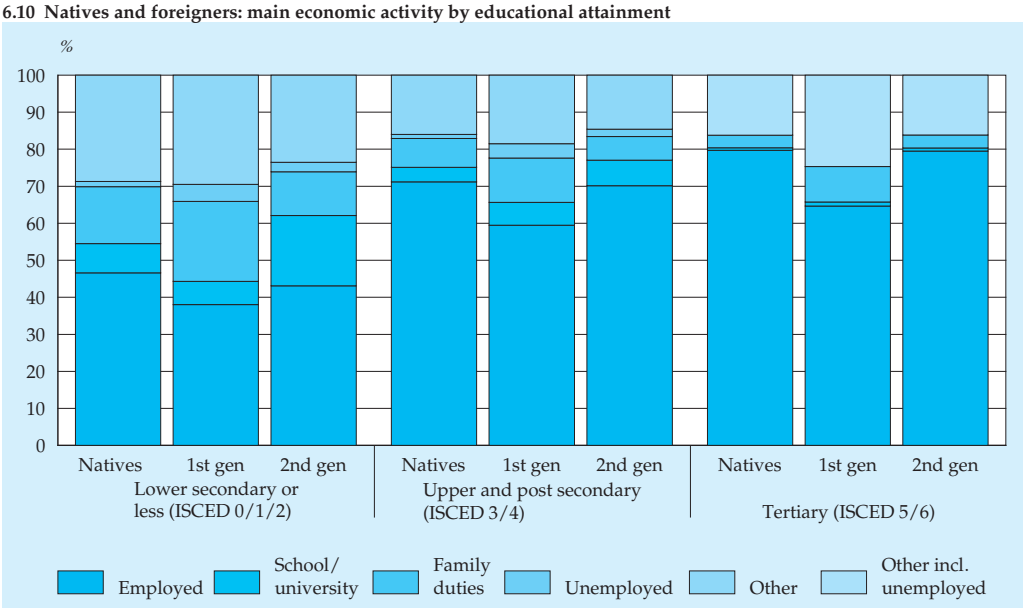


Finally, the different levels of educational attainment influence the main economic activity of the native population and first and second generation foreigners alike. It is not possible to distinguish between the different countries of origin or age groups since there are not enough observations. The results can be found in figure 6.10. For persons with a tertiary level of education attained, it is impossible to distinguish a separate category of unemployed persons due to lack of observations for the second generation. Therefore, this category is combined with the category other.

Note that as their education level increases, the second generation increasingly resembles the natives in distribution over main economic activity. For the lowest and middle levels of educational attainment, the second generation has relatively more people in school or university and fewer employed persons. This is mainly due to the age effect: the second generation consists of relatively many young people.

The first generation has a relatively large percentage of persons engaged in family duties even among the people with tertiary education. Furthermore, the first generation has the highest percentage of unemployed. It is striking that the first generation has a far lower employment rate even among persons with a tertiary education level.

6.10 Natives and foreigners: main economic activity by educational attainment



6.4 *Occupation level by education level*

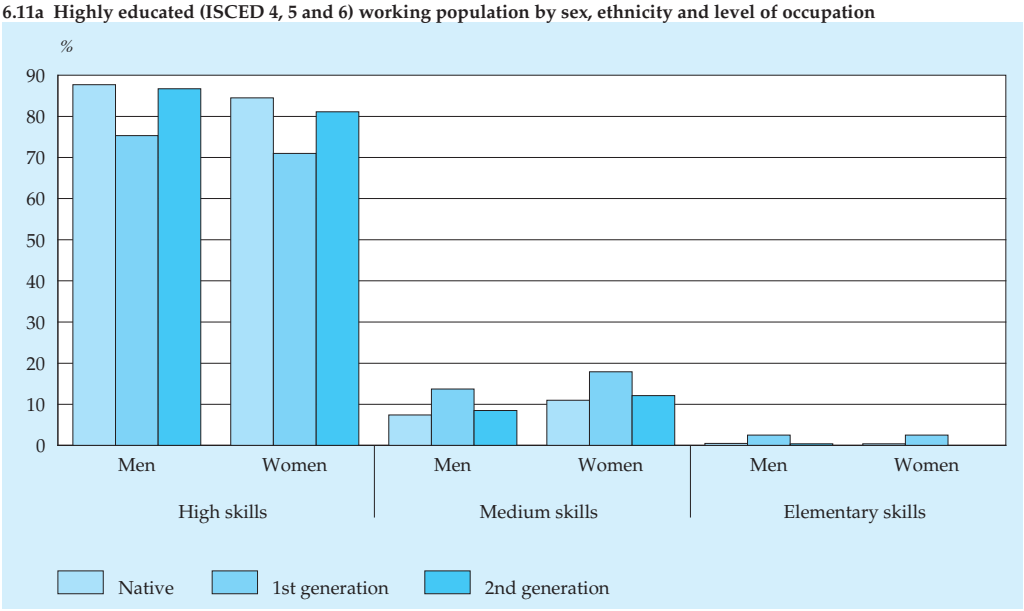
The position of (non-western) foreigners on the labour market is coloured mainly by inadequate or non-matching skills. When controlling for education level it becomes clear that, given a certain level of education, foreigners occupy almost the same level of jobs as natives do. Especially the second generation is almost even. Occupation is classified according to the International Standard Classification of Occupation (ISCO). ISCO divides occupation into 10 groups, as described in chapter 1. In this section, occupation is subdivided into three groups: occupations that require a high level of skills (ISCO 1, 2 and 3), occupations that require a medium level of skills (ISCO 0, 4, 5, 6, 7 and 8) and occupations that require a low level of skills (ISCO 9). This division was suggested in ILO, table 1, page 3 (1990). There it was remarked that it is impossible to assign a level of skills to ISCO 0 and 1. We decided to assign the highest level of skills to ISCO 1, since most persons occupied in ISCO 1 have the highest educational attainment level. Similarly, we decided to assign a medium level of skills to ISCO 0, since this educational level is the most common for people in ISCO 0. Moreover, the number of persons in ISCO 0 is only a small percentage of the employed population, as table 3.3 demonstrates. In the figures in section 6.4 and 6.5 the population with an unknown level of occupation is not shown separately.

More than 85 percent of all highly educated native men, that is men with post secondary level and higher (ISCED 4, 5 and 6), work in jobs that require a high level of skills. For first generation foreigners this applies to three quarters of this group, whereas for second generation foreigners the relationship between education and level of occupation is almost the same as for natives. For women this is almost the same (figure 6.11a). When zooming in on the occupational structure of the highly educated, it becomes clear that men work twice as often as women in the highest levels of occupation (legislators, senior officials and managers, ISCO 1), while women work twice as often at the lowest levels within the higher occupations (technicians and assistant professionals, ISCO 3).

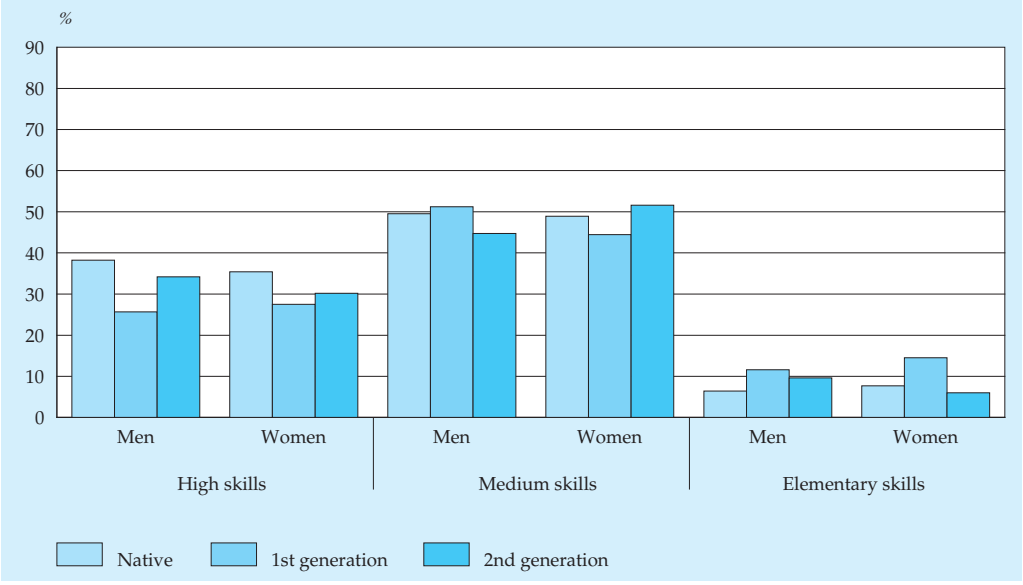
Half of the population with a medium level of education (lower and upper secondary; ISCED 2 and 3) has a job that requires an equivalent level of skills (figure 6.11b). This is almost the same for men and women. Differences occur for occupations that require higher skill levels. Almost 40 percent of native men with a medium level of education holds a job that requires a higher level of skills. This applies for only one quarter of the first generation foreigners and one third of the second generation. About the same proportion of women are in this group, but again they are less prominent at the top (legislators, senior officials and managers, ISCO 1). Dagevos (2003b) attributes this to suboptimal use of skills. The proportion of first generation foreigners employed in occupations that require elementary skill is twice is high as that of natives. To a lesser extent this also the case for

second generation foreigners. This could imply suboptimal use of skills, since the highest level of education attained is the same for everyone in the population considered.

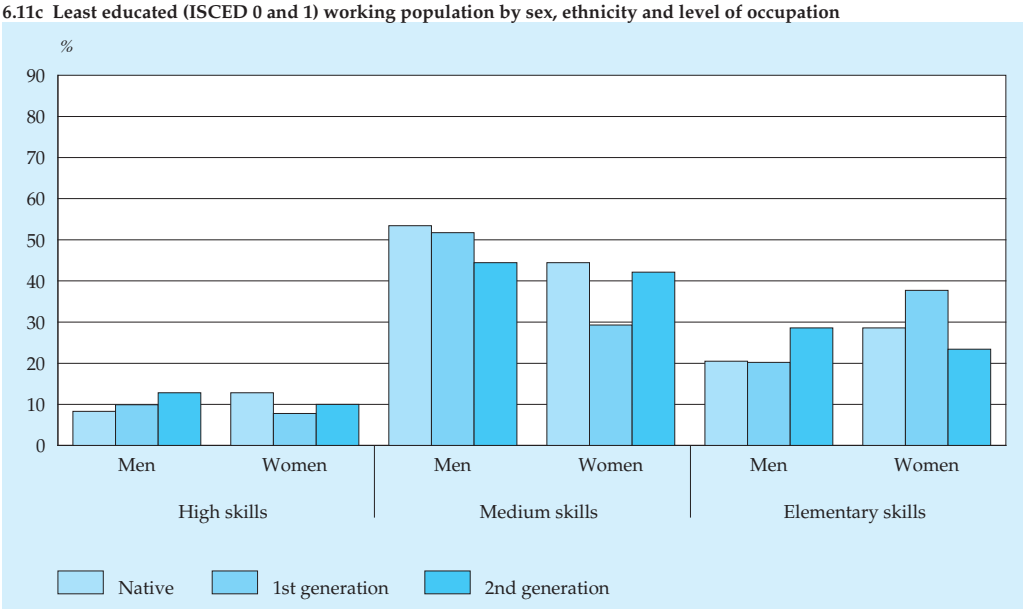
6.11a Highly educated (ISCED 4, 5 and 6) working population by sex, ethnicity and level of occupation



6.11b Medium educated (ISCED 2 and 3) working population by sex, ethnicity and level of occupation



6.11c Least educated (ISCED 0 and 1) working population by sex, ethnicity and level of occupation



About 20 percent of the less educated native men work in elementary occupations (figure 6.11c). For native women this is about one third. The proportion of second generation foreign men is higher than the proportion of first generation men in elementary occupations. Since the second generation is relatively young, this may be due to students with part-time jobs. The proportion of first generation women in elementary occupations is significantly higher than for the second generation women. For the less educated native and first generation foreign men and women there is the same sex difference in occupation as for the medium-level. The exception is formed by second generation of less educated men, who are working in the same professions as second generation foreign women. A reason for this may be that second generation foreigners are more often employed in temporary employment agencies.

6.5 *Turks, Moroccans, Surinamese and Antilleans by occupation*

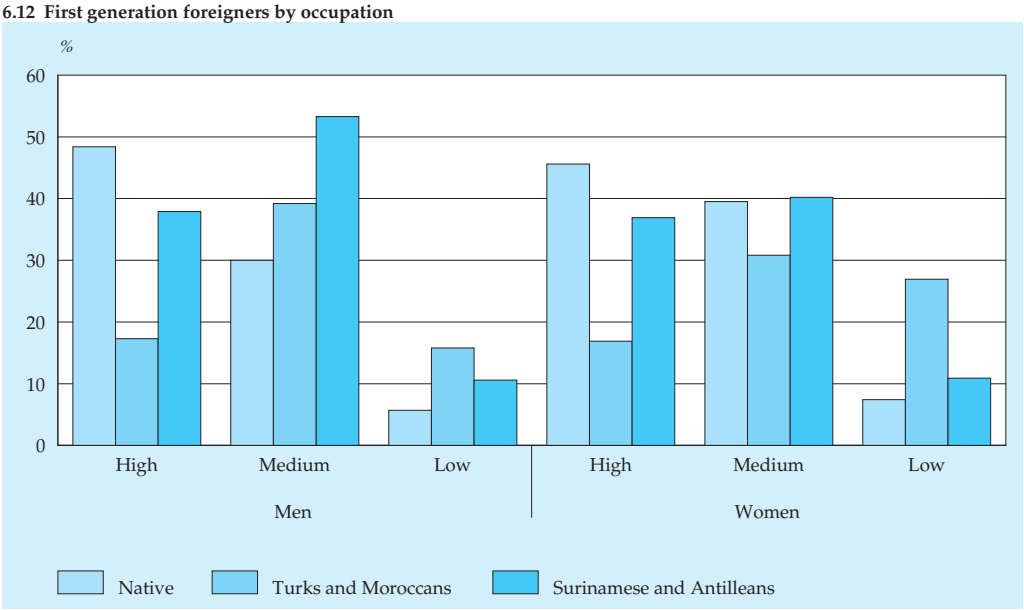
In this section the analysis is shifted towards the foreign groups that form the focus of this chapter and the occupations they hold. Unfortunately, the available data did not permit an analysis of education level. Per level of occupation various comparisons are made between and among natives, Turks and Moroccans, and Surinamese and Antilleans. Figures 6.12 to 6.15 depict the main comparisons.

Higher level occupations (ISCO 1, 2 and 3)

About half of the native men work in jobs that require a high level of skills, as do about 40 percent of Surinamese and Antillean and less than 20 percent of Turkish and Moroccan men. In general the proportion of women occupied in jobs that require higher skills is slightly lower than the proportion of men. Surinamese and Antilleans are the exception to this rule. In general, within the higher level occupations, women have a highest percentage among the technicians and assistant professional (irrespective of background), whereas men generally have the highest percentage among the legislators, senior officials and managers. Again the Surinamese and Antilleans are the exception, since their men with a high level occupation mainly work as technicians and associate professionals (ISCO 3).

When comparing the first generation under 35 and the second generation, which are almost all under 35, the first impression is that the proportion of the second generation in a higher job is markedly smaller than that of the first generation. One explanation is that many in the second generation have not yet completed their education (see also sections 6.1 and 6.3). Therefore, it is not directly observable that the second generation actually does better than the first. The information on the population by occupation and education in the previous section has clearly shown that the second generation does do better than the first. Men and women over 35 generally have better jobs than those under 35. Surinamese men are the only exception in showing a higher proportion of second generation men in the higher occupations. Relatively few first generation Antilleans under 35 have a high level

6.12 First generation foreigners by occupation



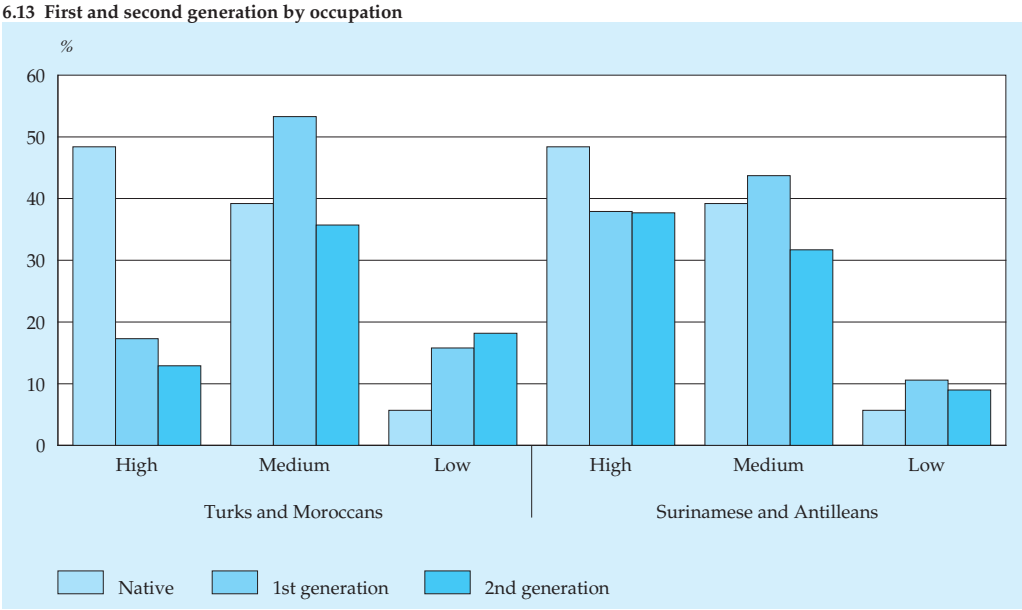
occupation, which may be because more less well educated Antilleans came to the Netherlands in the 1990s than before that date.

Medium-level occupations (ISCO 0 and 4, 5, 6, 7 and 8)
Forty to fifty percent of the foreign men have a medium-level job. For Moroccan and especially Turkish men the proportion is higher. The proportion of foreign women in medium-level jobs is lower than for men. Moroccan and Turkish women hold even less medium-level occupations, which has to do with their low general level of education (see also section 6.2). For men there is no big difference between the first generations under and over 35. For women under 35 the proportion of the first generation in medium jobs is higher, especially for Turkish women and even more for Moroccan women. The explanation is that young Turkish and Moroccan women very often have had more years of formal education.

The proportion of second generation Antillean and Surinamese men in medium-level jobs is about the same as for the first generation under 35. For Turkish and Moroccan men the proportion of first generation men under 35 in medium-level jobs is much lower than for the second generation. This applies also for Turkish and Moroccan women. Remarkably few Antillean first generation women are in medium-level jobs, which may be related to their high proportion of unknown jobs.

When zooming in on the various categories of the medium-level occupations it turns out that men work in different categories than women. Women dominate

6.13 First and second generation by occupation

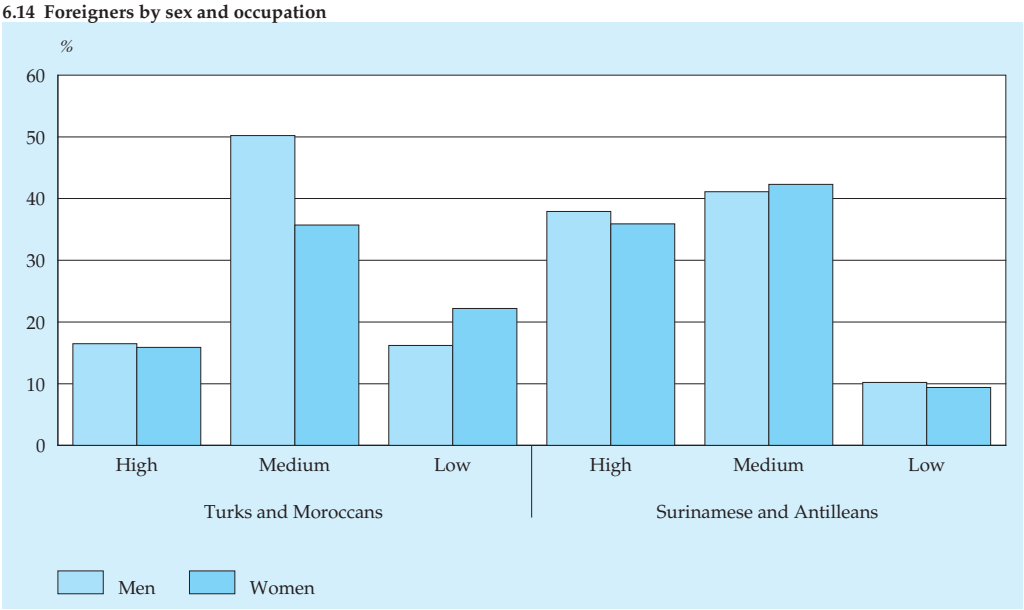


clerical jobs, services and sales in shop and markets (ISCO 4 and 5). Men work more often in craft and related trades, and as plant and machine operators and assemblers (ISCO 7 and 8). This phenomenon can be observed for all backgrounds studied here.

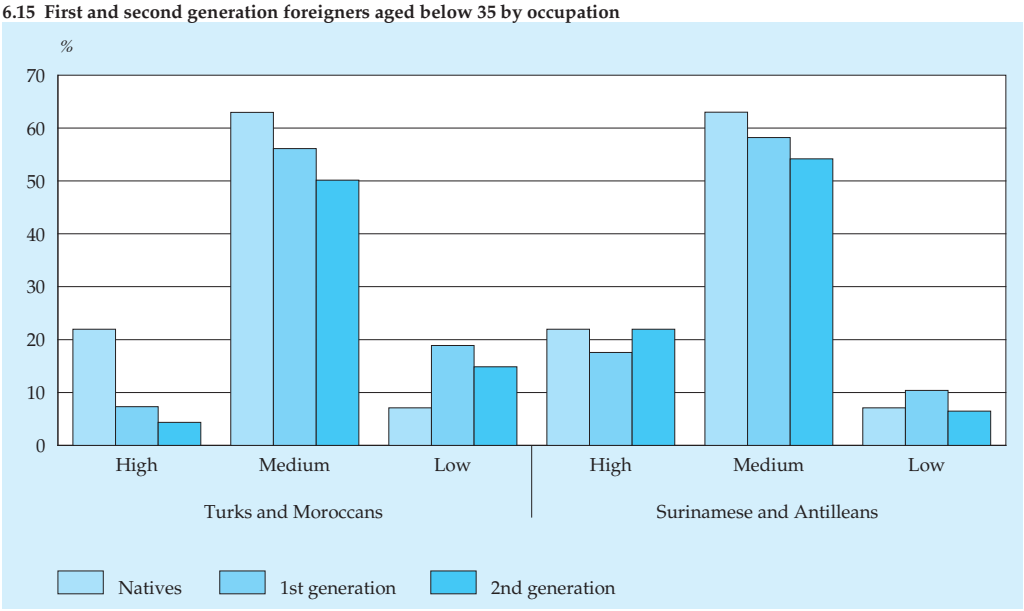
The proportion of Surinamese and Antilleans in clerical jobs (ISCO 4) is higher than average, whereas the proportion of Turks and Moroccans is below average. There is some logic to this. Quite a few Antilleans know Dutch and in Suriname Dutch is a native language. So Antilleans and Surinamese are better equipped for administrative jobs. Among the service workers and shop and market sales workers (ISCO 5) Surinamese men (first and second generation) and second generation Antillean women are represented above average. With the exception of second generation Moroccan women, all Turks and Moroccans work more than average as skilled workers in agriculture and fisheries (for example in greenhouses) (ISCO 6).

In general craft and related trades (ISCO 7) are men's jobs. The proportion of first generation Turks and Antilleans working there is higher than average. The proportion of second generation in these kinds of occupations is generally lower but the relative differences between the foreign groups shown here remain. Men also work as plant and machine operators and assemblers (ISCO 8). Many first generation Turks and Moroccans have this kind of occupation, but the second generation dominate the field much less. This has to do with the migration history (first generation) and age structure of the Turkish and Moroccan population (second generation).

6.14 Foreigners by sex and occupation



6.15 First and second generation foreigners aged below 35 by occupation



Lower-level occupations (ISCO 9)

About 6 percent of the native men and 7 percent of the native women is occupied in low-level jobs. The proportion is almost twice as high among first generation employed Turkish and Moroccan men. For first generation employed Turkish and Moroccan women the proportion is about four times as high. Zooming in on the Turkish and Moroccan women reveals that about a quarter below the age of 35 are occupied in elementary occupations. Over the age of 35, almost one third of the employed Turkish and almost half of the employed Moroccan women has an elementary occupation. This has everything to do with the fact that few of them received a formal education. Similar to Turkish and Moroccan men, almost twice as many first generation Surinamese and Antillean men have elementary jobs as native men. For the women in elementary jobs the proportions is only 1.5 times that of native women.

6.6 Discussion

It is a popular notion that foreigners in Dutch society work less and are more often unemployed than the native population. Figures 6.6 and 6.7 which show the lower employment ratio of foreigners compared to natives and 6.8 which shows the lower

employment rates of foreigners in every age group support this view. Even people of the second generation, whom one might expect to behave more like natives, do not seem to do too well when analyzing figure 6.9, with some exceptions. So there is more than enough reason to be suspicious about the motivation of foreigners on the Dutch labour market.

However, the key factor in explaining how well foreigners do in Dutch society is their educational attainment. As figure 6.10 shows, second generation foreigners do about as well as natives when they have the same level of education attained. Level of education is the main discriminating factor.

Less than half of the less educated population is employed versus about 80 percent of the highly educated population. The percentage of employed persons for the second generation by education level is about the same as for the native Dutch. The first generation does slightly less well. This difference can presumably be attributed to cultural factors.
Family duties play a more important role in the life of first generation female foreigners. Relative newcomers on the Dutch labour market also have to climb higher mountains before acquiring a job, such as learning the Dutch language and creating networks.

When at work, foreigners given the level of education, occupy jobs that require about the same level of skills as natives (figure 6.11a, b, c). Again second generation foreigners do somewhat better than the first generation, for the same reasons as mentioned above. The conclusion from these figures is that women do less well given their education level, whether they are foreign or not. This is a long standing phenomenon in almost every society, which can be attributed to such factors as staying home to look after children and having part-time jobs.

Having made clear how important education is for acquiring a sound position on the Dutch labour market, the educational attainment of foreigners was considered. It follows from figure 6.3 and 6.4 that about 60 percent of the native population has obtained upper secondary education or higher. For first generation Turks and Moroccans this is about 20 percent. The first generation Surinamese and Antilleans hold an intermediary position with 50 percent. The second generation does slightly better than the first: about 30 percent of second generation Turks and Moroccans have lower secondary education. Additionally, many second generation kids are still in school, which will eventually upgrade the level of education attained by the second generation. From this we can conclude that the second generation will do better on the Dutch labour market, because their education is better adapted to the needs of Dutch society. Furthermore, it is very worthwhile for society and for foreign and native individuals alike, to invest in a good education because it is the key to a successful career.

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7. The Dutch Virtual Census of 2001 compared to previous censuses

Jacques van Maarseveen [1)]

The Dutch Virtual Census of 2001, based on a Social Statistical Database (SSD), does not stand on its own. This new type of census builds on a rich tradition of classical population censuses carried out from 1795–1971. These censuses contain very detailed data about specific categories, which is why historians are greatly interested in digitising all previous census data. For the European Union censuses of 1981 and 1991, Statistics Netherlands provided alternative data consisting of a combination of register data and survey data, but without numerical consistency and without detailed information about regions and specific categories. The virtual census continued the combined data provision, but now by compiling consistent data at a very detailed level. In this way the virtual census is a continuation of the classical type of census.
This chapter deals with some historical aspects of the classical population census, such as the goals, the concept of population, the use of the census for analysis, the present digitising of all published data for analytical studies, and last but not least some comparisons of the census data of 2001 with earlier censuses and the alternative data of 1981 and 1991.

7.1 The classical population censuses

General history
The population censuses of 1795–1971 are characterised by integral collection, uniform questionnaires, and a legal obligation to provide information. Data on each inhabitant were collected door to door by enumerators. The Census of 1795 was only carried out for administrative purposes. The basis for the Dutch population censuses was formed by the Royal Decree of 1829, eventually superseded by the 1879 Census Law (1879). This Decree stipulated that there would be a General Population Census in the Netherlands in 1829 and every ten years from then on (Methorst, 1899). And that a special Royal Decree would specify the official contents of each census, right before the census would take place. On account of World War II the planned Census of 1940 was not carried out.

The Law of 9 July 1970 formed the basis for the later censuses. Special attention was paid to the confidentiality of data (Law of 1970). Nevertheless, the discussion around privacy protection became a media event in 1970. Automation which allowed the government to create large-scale data files was felt as threatening. Statistics Netherlands, always a strong advocate of privacy protection, was taken

more or less by surprise by all this commotion. The census was delayed. The political pressure led to measures to limit address and name linking and checks of the population registers were no longer allowed where foreigners were concerned. The legal basis itself was not affected and the 1971 census took place as usual. Nevertheless, the history of the censuses took a decisive turn right then and there.

It was the first time in 1971 that non-response affected the integral character of the census. It was not yet insurmountable in 1971 with 0.2 percent non-response, but during the preparations of the 1981 census the non-response was expected to be 26 percent. This was unacceptably high and led first to postponement and then to abolition in 1991 (Dulk and Maarseveen, 1999).

Obligations for the European Union forced the Netherlands to provide substitute information from the population registers and large-scale surveys. Detailed regional differentiation at the sub-municipal level and for subgroups in the population, however, became impossible.

Population size assessments

All censuses had two main objectives: to assess the population size and distinct categories of the population on a certain date, and to check the data of the administrative population registers against those of the census. These were two separate matters. The first objective focused on the supply of statistical information. The second objective made it possible for the municipal authorities to construct population registers and keep them up to date, so it was administrative. The history of the census has largely been determined by this double objective, as the census in 1971 and the period after show.

In all censuses since 1899, the assessment of the *de jure* population was the central point. The *de jure* population consists of people with their usual residence in a certain municipality (Methorst, 1899). They 'ought' to be entered in one of the population registers, irrespective of whether they were present in their residence on the moment of the enumeration (Royal Decree, 1947). Also people who were temporarily absent (e.g. seamen) were counted as residents of the municipality where they were entered in the population register. Foreigners who were in the Netherlands temporarily were excluded from the census, as were diplomats and others enjoying diplomatic immunity. Persons who were temporarily in a foreign country but registered in a Dutch municipality were included in the census population. The residents of homes and institutions – the institutional population – were counted in every census.

The *de facto* population is the actual population present in a municipality at the time of the enumeration itself, although the usual residence could be another municipality. This concept was used in some censuses in the 19th century, but was abandoned by

1879. Although the concept *de jure* population was used in the post World War II censuses, the parliamentary debate on the 1971 census led to a correction of this concept: foreigners should be counted when they are entered in the population register. This way of counting was also applied to the alternative data for 1981 and 1991, and for the 2001 Census. The demographic data are based on the population registers, and persons not included in the registrations were not counted in the census data.

Verification of the population registers

One key objective of the census was the construction, checking and updating of the population register on the basis of the records used in the census. From 1850 on, the municipalities were under the obligation to keep the data obtained by the censuses up to date. In all subsequent censuses the objective to check and update the population registers returned. The censuses focused on all persons who 'ought' to be entered in the population register. This was especially important when the registers were checked. The strong protests around the 1971 census were mainly directed against these checks. It was felt that the census was used for non-statistical purposes, and that the guarantees for privacy protection were insufficient. In particular the questionnaire, consisting of a booklet with punch cards, caused much resistance. There was the fear for far-reaching government control. Besides there was no general privacy law yet and the one that came into force was late, namely in 1988 (Nobel, 1999).

This issue came up again during the preparations for the 1981 census. In the 1979 proposal to amend the Census Law, the verification of the population registers was cancelled. The existing population registers now formed the basis for the enumeration, and deviations from them should no longer be included in the statistical results (Dulk and Maarseveen, 1999).

7.2 *The data files of the censuses as sources for analysis*

7.2.1 Themes

The significance of the classical censuses is greater than the assessment of the population size and checking the population registers. These censuses describe the demographic, social and economic population structures, which yields a wealth of information on many issues in the course of time. Again and again Statistics Netherlands received requests to collect data about new issues in the census. The policy was always to safeguard the collection of essential data on the demographic, social and economic structure.

In spite of the vast variety of data obtained by means of the censuses, a number of central themes recurred every time. Since the main purpose was to describe the

demographic and social structure of the population, all censuses had a set questionnaire design including the following characteristics of the respondent:
– name (family name and first names);
– address;
– household composition (single, family);
– date of birth (age) and place of birth;
– marital status;
– nationality;
– religion;
– occupation;
– housing conditions.

From a concise, simple set of questions in 1829, the design became more elaborate with each census, especially with respect to such variables as household, employment, working and housing conditions. The detailed questions were usually intended to improve the quality of the answers. In the 1849 census labour force was first included as a theme, and in the 1899 census it was housing conditions. Later this was gradually expanded to a point that a housing census was added to the population census. At times physical handicaps was included. The censuses of 1920 and 1930 also focussed on marital fertility and educational attainment. These two themes reflected the growing need of the government for statistical data to govern social life, which led to independent statistics on fertility within marriage and university graduates (Dulk and Maarseveen, 1999).

Because of the advancing industrialisation and mechanisation it was important to gain insight in the quality of the potential labour force. Therefore the education level of the whole labour population was observed from 1960 onwards and listed in full. In the 1971 census the observation of educational attainment was extended to the population outside the labour force. In this way it was possible to do sociological research on the relationship between the education level of the parents and the choice of school for the children. People attending education were asked what type of school they attended, and university students were asked what they studied. This illustrates the ambition to obtain information from the census in order to gain insight in the structure of the society in a coherent and detailed manner.

Other new themes, such as commuter traffic and social welfare, also reflected developments in society. It was important to know more about the relationship between housing and work because of the growing use of cars: the distance between home and work increased and traffic problems became more serious. There was even a question asking about parking cars at night (in one's own garage, out on the street, and so on). The theme social welfare was embodied in the censuses of 1960 and 1971 and was closely connected with the welfare state. Therefore, policy information was needed on the principal sources of income (labour, wealth, old-age

pension, and social benefits). Questions about the wage level and later the income level were meant to determine social class more precisely. However, it was not the intention to measure income distribution (Dulk and Maarseveen, 1999). (Cf.: A Century of Statistics at www.cbs.nl).

Except the variable 'religion' the Census of 2001 contains the general demographic items. Since 1994 religion is no longer part of the population registers. From that year on, data on religion have been collected and stored in the database SILA of the Dutch churches. The variable religion is also part of some inquiries carried out by Statistics Netherlands. Besides, the Census of 2001 contains more detailed information on nationality and ethnicity than previous censuses.

7.2.2 Digitising census data

The wealth of statistical information from the censuses is reflected in the fact that the census publications are among the most frequently used within the library of Statistics Netherlands. Therefore Statistics Netherlands, at its centennial in 1999, digitized all the published data of the censuses 1795–1971 in a medium version (Statistics Netherlands 1999b). This means that all pages of the publications were scanned and put on CD-Rom (cf. Doorn et al., 1999). This project was set up in close cooperation with the Netherlands Institute for Scientific Information Services (NIWI), an institute of the Royal Netherlands Academy of Arts and Sciences (KNAW).
Consulting the over-used original census publications is no longer as necessary as it was, which makes conservation of the publications easier. At the same time the very detailed aggregate data of the 1899 census were digitized and stored in a database, which can be analysed through CBS StatLine.

Also in cooperation with NIWI and with a grant from the Netherlands Organisation for Scientific Research (NWO) the aggregate data of all other population censuses are now being digitized within a new research project 'Life Courses in Context' (LCC). Although only the aggregate data from the censuses 1795–1947 are published, it concerns detailed data on geographical and social categories which can be used as background information. The existing micro data files of the last two traditional censuses of 1960 and 1971 will also be made available for research (see: www.volkstellingen.nl). By the end of 2004 the first results of this project will be available. The census data will provide information on the social and regional context of the life course data collected by the International Institute for Social History (IISG), the other participant in the LCC project. This institute collects individual data by means of 'Historical Sample of the Netherlands' (HSN). These data, derived from the municipal registers, are stored in a database which can be used for historical and social research on themes like social mobility, households, labour force, health, migration etc. Historical demographic research in particular

can benefit greatly from the digitized data from population registers and the traditional censuses.

7.2.3 Analysis of the census data

The publications of the previous censuses mainly contain tables, some methodological information and sometimes several general descriptive analyses. With the help of census data, life tables have been calculated for the period 1849–1930. However, comparisons of the results of censuses with those of the previous censuses were very concise and mostly confined to the previous census. One of the publications on the 1960 Census includes a detailed analysis of the censuses data on occupation in the period 1849–1960 (cf. Maarseveen, 2004). Automation and the observation of more variables in the 1960s expanded the possibilities of analysis. For instance, Statistics Netherlands in cooperation with the universities published seventeen studies on the Census of 1971 including subjects such as household composition, divorced and widowed persons, education level, urbanisation, employment of women, young people, ageing population, etc.

Oomens made the data on population comparable for the censuses of the 19th century (Oomens, 1989). Oomens and De Bakker (1994 and 1997) also made a detailed analysis of the censuses on occupation 1849–1990 and published comparable data for this period. We used these data with some corrections published in a recent study of the national accounts of the 19th century (Smits et al, 2000).

An example of the possibilities for historical analysis is given by the digitised version of the Census of 1899. [2)] All published data are stored in a database which can be analysed with StatLine (Nederland, 2001).
In addition to explanations about digitising and the methodological aspects of the census, analyses are made about:
– the growth of the Dutch population in the 19th century;
– church and religion;
– foreigners;
– the social structure;
– the structure of the citizenship;
– the development of the employment;
– the situation in the provinces;
– regional classification (cluster analysis).

The regional spread of the Dutch population was a recurrent theme in the censuses. The population censuses refer to the Netherlands' territory as a whole. As integral surveys they are excellent sources for analysis and research, in which smaller and larger regions or groups were objects of research. The Census of 2001 also contains

very detailed data, mostly integrally collected. This census is therefore also a source that enables analysis of detailed groups and regions and as such it is a continuation of the previous traditional censuses.

7.3 *The 2001 census data compared*

Comparing the results of the Virtual Census of 2001 with those of previous censuses is not without problems. There are differences in concepts, classifications, census periods, variables, observation methods, processing, and publication. Recent studies show how much detailed research is required to correct the previous data before we can make comparisons over time ((cf. Oomens, 1989; Oomens and Bakker1994; Horlings, 1995; Smits et al., 2000). Comparing the data of the 2001 Census with earlier censuses we use the results of these studies in addition to the regular publications of Statistics Netherlands (cf. Statistics Netherlands 1978, 1982, 1982a, 1982b). The data of the 1981 and 1991 censuses are published by Eurostat (1988 and 1996). Eurostat also published the results of the Dutch Census of 1971 (Statistical Office, 1977). Because its results were based on provisional data compiled for Eurostat, there are small differences with the definitive data published by Statistics Netherlands. In this chapter we use the definitive data.

We restrict the comparison to the main results on three topics: demography, households, and the economically active population. Because of the many differences of the variables used in the censuses, not all the published data could be used. For some variables the comparison is therefore restricted to the data of the second half of the 20th century. More detailed results with data of the censuses 1795–2001 can be read on the internet: http://www.cbs.nl/en/publications/articles/general/census-2001/census-2001.htm.

7.3.1 Population

The first integral enumeration of the Dutch population was carried out in 1795, at the time of the Batavian Republic under Napoleonic influence. The new centralised administration wanted quantitative information for a new electoral system. This census contained only data about the population size, divided into electoral regions. In 1807 and 1814 censuses were carried out with a very limited administrative aim. The first general census classical style was dictated by a Royal Decree in 1829. From then on censuses were to take place every ten years.
During the first efforts to obtain a statistical description of the Dutch population as a whole, the data were requested from the municipalities, and checked and collected during tours of inspection. There was no systematic approach, and there were different ways of answering the questions. As a consequence the results were not always plausible.

At the international level the census developed as a major observation instrument as well. Therefore it is not surprising that the organisation and the data gathering and processing methods followed a set pattern when Statistics Netherlands was asked to carry out the 1899 census. The bureau could build on this working method.

Comparing the results of the censuses for a period of two centuries, we will restrict ourselves to the key topics. First of all we present the general demographic aspects. The Censuses 1795 and 1814 counted 2,092,978 and 2,211,470 inhabitants (Oomens, 1989). The population size, as is shown in table 7.1, increased spectacularly in two centuries (about 7.5 times).

Table 7.1
Population by age group 1829–2001

Census	Total	Age group			
		0–19	20–39	40–59	60+
	x 1,000	*%*			
1795 [1]	2,093.0				
1814 [1]	2,211.5				
1829 [2]	2,613.3	44.3	29.7	20.4	5.3
1839 [2]	2,860.6	44.5	29.6	20.7	5.2
1849	3,056.9	42.7	30.9	18.8	7.7
1859	3,309.1	42.1	31.0	18.9	8.0
1869	3,579.5	42.5	29.3	19.7	8.4
1879	4,012.7	44.3	27.7	19.4	8.6
1889	4,511.4	44.7	27.8	18.4	9.2
1899	5,104.1	44.4	28.9	17.5	9.2
1909	5,858.2	44.0	29.2	17.8	9.0
1920	6,865.3	42.4	29.7	19.0	8.8
1930	7,935.6	40.0	30.9	19.6	9.4
1947	9,625.5	37.7	30.2	21.4	10.7
1960	11,462.0	38.6	26.9	21.7	12.7
1971	13,060.1	35.7	28.3	21.4	14.6
1981	14,216.9	30.7	32.0	21.3	16.0
1991	15,070.0	25.0	33.0	24.5	17.4
2001	15,985.5	24.4	29.6	27.7	18.2

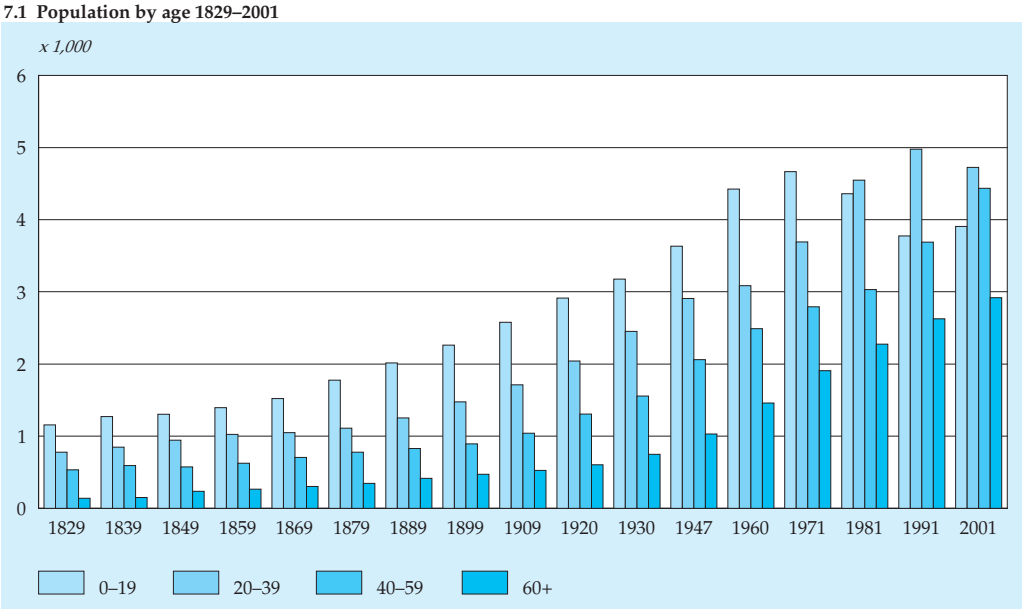
[1] No data of the age of people are available.
[2] 1829 relates to 1 Jan.1830; 1839 to 1 Jan. 1840. In Census 1829 and 1839 age group 40–59 relates to 40–64 and age group 60+ to 65+.

Sources: Oomens, 1989. Statistics Netherlands, 1982. Eurostat, 1988 and 1996. SSD, 2001.

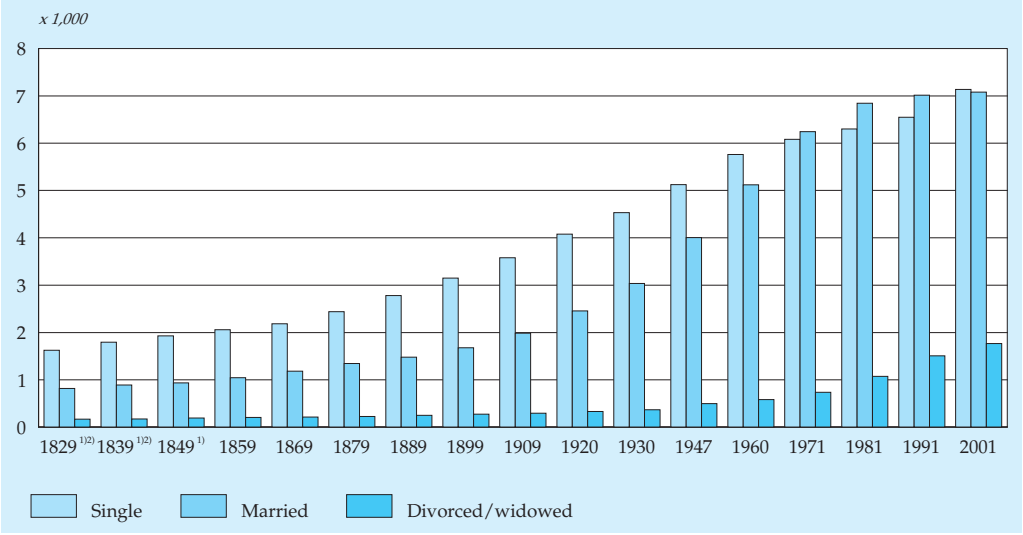
There is a remarkable change in the age composition of the population in the 20th century. In 1829 44.3 percent of the population belonged to the age group 0–19 year, versus 24.4 percent in 2001. After the World War II people reached advanced ages. While 7.7 percent of the population was over 60 in 1849 it had reached 18.2 percent in 2001. From about 1870 the average realised life expectancy of the Dutch population has strongly increased (Poppel, 2001). This is mainly the result of the falling mortality among babies and children. In 1850 the average realised life expectancy of men was 38.3 and of women 40.4, but in 2001 these ages were 72.0 and 78.3.

It took about fifty years before the number of inhabitants increased from two to three million. From three to four million took almost thirty years and from four to five million twenty years. The fastest growth of population was during the 1950s and 1960s with an increase of one million in six years. This was caused by the baby boom (Poppel, 2001).

7.1 Population by age 1829–2001



7.2 Population by marital status 1829–2001



[1] Divorced are included in the catogory 'single'.
[2] The figures relate to the situation of 1 Jan. 1830 and 1840.

Another aspect is the marital status of the population. Relatively more people are married and more divorced or widowed. Furthermore there has been a striking increase in divorced or widowed people during the last decades (Figure 7.2). The share of singles has strongly decreased from 62.3 percent in 1829 to 44.7 in 2001. And an increase can be observed of married and divorced or widowed persons. In 1829 some 31 percent was married versus over 44 percent in 2001. From 1920 until 1981 the percentage of married people gradually increased, after 1981 it started to decrease slightly.

7.3.2 Nationality

The population censuses are an important source of data about the foreigners in the country. The variable nationality did not become part of the population census until 1889. Van Eijl and Lucassen (2001) demonstrate in a recent historical study that the collection of statistical data on foreigners by means of the previous censuses is problematic because of the differences in the observation methods. Each census had its own way of counting and categorising.

Differences are mostly caused by cuts in the finances necessary for carrying out the census and agreements with other countries about delivering data on foreign inhabitants. Therefore we restrict the comparison to the period 1971–2001. For this period we can also make a comparison about the non-nationals in the Netherlands who have a nationality of another country of the European Union.

Table 7.2
Population by nationality 1971–2001

	1971	1981	1991	2001
	x 1,000			
Total population	13,060.1	14,216.9	15,070.0	15,985.5
Nationals	12,805.3	13,727.2	14,357.0	15,317.9
Non-nationals	254.8	489.8	713.0	667.6
	%			
Nationals	98.0	96.6	95.3	95.8
Non-nationals	2.0	3.4	4.7	4.2
of wich				
Males	64.1	57.6	55.0	51.6
Females	35.9	42.4	45.0	48.4
European Union	53.6	32.6	25.0	30.2
Other countries [1)]	46.4	67.4	75.0	69.8

[1)] Incl. stateless and unknown.

Sources: Statistics Netherlands, 1978; Eurostat 1988, 1996. SSD 2001.

Table 7.3
Non-nationals by continent in 1971 and 2001

	1971		2001	
	x 1,000	%	x 1,000	%
Europe	181.5	71.2	338.0	50.6
Africa	23.4	9.2	139.6	20.9
America	10.0	3.9	37.4	5.6
Asia, Oceania	15.9	6.2	65.3	9.8
Stateless/Unknown	24.0	9.4	87.2	13.1
Total	254.8	100	667.6	100

Sources: Statistics Netherlands, 1978; SSD 2001.

Until 1971, with exception of the 1930 Census, no more than two percent of the population had another nationality than Dutch (Eijl and Lucassen, 2001). Table 7.2 shows that this was still the case in 1971. Between 1889 and 1971 foreigners mostly came from the surrounding countries. From 1889–1930 the majority was German and more than a quarter Belgian. The exception was 1930 when this percentage fell to 15 percent because of the increase of foreigners coming from the south of Europe. From the sixties on more and more people from Southern Europe, Turkey and Africa immigrated to the Netherlands (Table 7.3).

In 1971 more than seventy percent of the non-nationals was of European origin. Thirty years later this percentage was down to fifty. Especially the number of people from Turkey and Morocco increased. Looking at the period 1971–2001 it is striking to see an increase of non-nationals in the period 1971–1991 from 2 to 4.7 percent, followed in 1991–2001 by a decrease to 4.2 percent (Table 7.2). This decrease in 1991–2001 is due to new regulations on changing nationality.

There is also a remarkable relative decrease in the share of people from the European Union, although in absolute figures the number increased from almost 137 thousand in 1971 to 201 thousand in 2001 (Table 7.4). As for the composition in 1971, most EU citizens came from Germany (27.5 percent), Spain (20.5 percent), Belgium (17.5 percent) and Italy (12.9 percent). Germans had the same percentage in 2001, while the share of Belgium decreased to 12.8 percent and Spain to 8.5 percent. On the other hand the share of English persons has increased from 9.5 percent in 1971 to 20.5 percent in 2001.

The non-nationals from outside the European Union mostly came from Morocco and Turkey. During the sixties the Netherlands had a labour shortage particularly in the food, textile and metal industries. Until 1973 the Dutch government actively

Table 7.4
Non-nationals from the European Union (excl. the Netherlands)

	1971	1981	1991	2001
European Union	136,615	159,643	178,000	201,557
	%			
Belgium	17.2	13.7	13.5	12.8
Denmark	0.5	0.6	1.1	1.3
Germany	27.5	24.0	25.8	27.2
Greece	2.7	2.1	2.8	2.8
Spain	20.5	13.6	9.6	8.5
France	2.4	3.5	5.1	6.6
Ireland	0.2	1.3	2.2	2.0
Italy	12.9	12.7	9.6	9.1
Luxembourg	0.2	0.0	0.0	0.2
Austria	2.2	1.9	1.7	1.7
Portugal	4.1	5.2	4.5	4.8
Finland [1)]			0.6	1.0
Sweden	0.5	0.9	1.1	1.5
United Kingdom	9.1	20.4	22.5	20.5

[1)] Finland. In 1971 and 1981 no separate data available.

Sources: Statistics Netherlands, 1978; Eurostat 1988, 1996. SSD, 2001.

recruited workers from Morocco and Turkey. In the seventies and eighties many of these foreign workers became immigrants because of the bad economical situation in their own country. Their families then joined them (Lucassen, 1995).

The number of Moroccans and Turks increased strongly in the period 1971–1991 (Table 7.5). In 2001 their numbers have decreased sharply. This is due to changes in Dutch legislation in the period 1992–1997 (Tas, 2000). Between 1 January 1992 and 1 October 1997 foreigners could opt for naturalization while retaining their original nationality. Many Moroccans and Turks used this opportunity.

Table 7.5
Non-nationals from Morocco and Turkey 1971–2001

	1971	1981	1991	2001
	x 1,000			
Morocco	21.6	83.1	160.0	111.4
Turkey	30.3	140.9	209.0	100.8

Sources: Statistics Netherlands, 1978; Eurostat 1988, 1996. SSD 2001.

7.3.4 Households

The Dutch economy flourished from the fifties until the oil crisis of 1973. In the years after 1973 economic growth deteriorated into stagflation. Inflation, unemployment and budgetary deficits were hot issues until the early nineties. Prosperity profoundly changed the way of life: income levels rose, which made more consumption possible. There was a huge increase in mass consumption, especially of luxury goods; houses became more comfortable; there was an enormous growth of the consumption of new goods and services; mobility increased (tourism) etc. In the meantime, ideas about marriage and family also changed.

Against this background the structure of households changed in the second half of the 20th century. In spite of the fast population growth, the number of persons living in institutional households fell from 263 thousand in 1960 to 218 thousand in 2001. In 1960 2.3 percent lived in this type of household, in 2001 only 1.4 percent. Since 1960 fewer people live in military barracks, boarding schools, and monasteries. Although the ageing population has strongly increased since the sixties, this is not the case for the number of people living in old peoples homes. Before 1971 old peoples homes were places where people retired and lived. The growing number of aged people and the growing costs of the institutions in the early seventies meant that cost cutting policies were introduced. People are no longer admitted just because they are old but also because they need help (Statistics Netherlands, 1994).

Table 7.6
Institutional and private household

Census	Total population	Living in institutional household	Private households			
			Total	of which		Total number of persons in private households
				Family household	Non-family household [1]	
	abs.	*%*	*abs.*	*%*		*abs.*
1960	11,461,964	2.3	3,129,570	85.0	15.0	11,199,306
1971	13,060,120	2.3	4,036,665	80.5	19.5	12,754,325
1981	14,216,944	2.1	5,011,051	72.7	27.3	13,911,685
1991 [2]	15,068,000	1.8	6,159,000	62.3	37.7	14,797,000
2001	15,985,538	1.4	6,866,302	65.7	34.3	15,766,606

[1] In 2001 not married couples are excluded in non-family households and incorporated in family households.
[2] Two-year average.

Sources: Statistics Netherlands 1982b. Eurostat 1988, 1996. SSD 2001.

The share of people living in family households diminished from 85 percent in 1960 to about 66 percent in 2001. More persons are living in non-family households. The total number of private households doubled in the period 1960–2001 whereas the population increased by about 40 percent. Moreover, the composition of private households changed strongly. Most striking is the growth of one-person households from 470 thousand in 1960 to more than 2.3 million in 2001 (tabel 7.7). This has to do with a process of individualisation. Two or more family households have practically disappeared and are therefore no longer counted separately in 1991 and 2001.

The average household size has decreased since the beginning of the 20th century. Together with the growth in prosperity after the World War II, the average household size diminished rapidly. Since the sixties the number of children per family household (the fertility rate) has diminished (cf. Corver et al, 1979). Besides,

Table 7.7
Private Household by type 1960–2001

	1960	1971	1981	1991 [1)]	2001
Total number of households	3,129,570	4,036,665	5,011,051	6,159,000	6,866,302
Non family household	469,911	785,395	1,367,135	2,321,000	2,354,169
one person household	373,520	682,795	1,144,179	1,845,000	2,306,767
female	256,473	257,461	718,041	1,075,000	1,262,363
male	117,047	425,334	426,138	770,000	1,044,404
multiperson household [2)]	96,391	102,600	222,956	476,000	47,402
One family household	2,606,841	3,204,705	3,633,946	3,838,000	4,512,133
Two or more families household [3)]	52,818	46,565	9,970		

[1)] Two-year average.
[2)] In 2001 not married couples are excluded in multiperson households and incorporated in one family households.
[3)] In 1991 and 2001 the category 'two or more families household' was not observed separately, but is also incorporated in that of 'one family household'.

Sources: Statistics Netherlands 1982b. Eurostat 1988, 1996. SSD 2001.

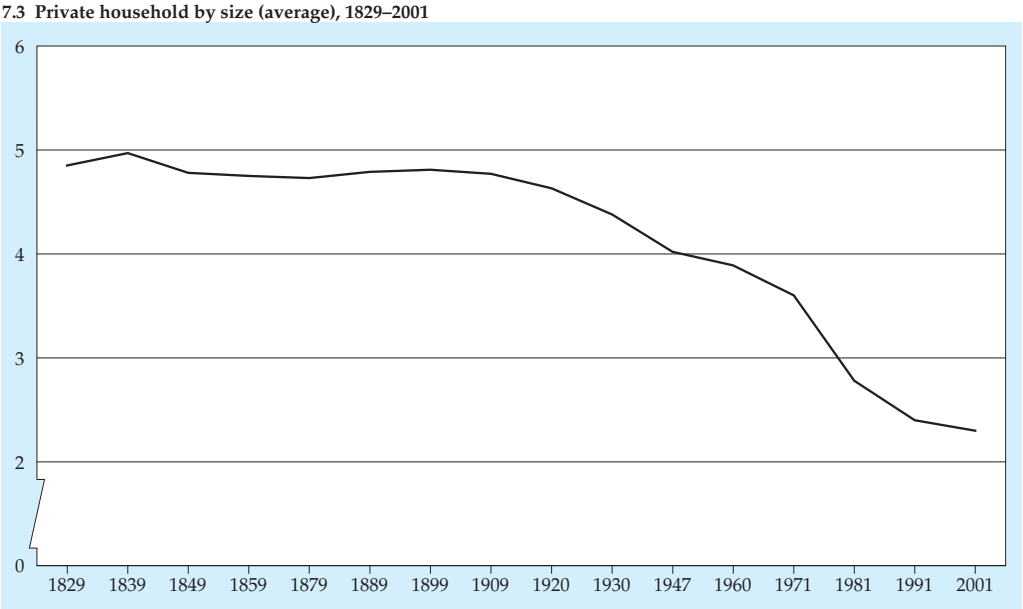
Table 7.8
Private households by size (average) 1829–2001 [1)]

Census	Average	Census	Average
1829	4.85	1920	4.63
1839	4.97	1930	4.38
1849	4.78	1947	4.02
1859	4.75	1960	3.89
1879	4.73	1971	3.60
1889	4.79	1981	2.78
1899	4.81	1991	2.40
1909	4.77	2001	2.30

[1)] No data of household size are available for 1869.

Sources: Population Censuses 1829–1971; Eurostat, 1988 and 1996. SSD 2001. Corver et al., 1979.

7.3 Private household by size (average), 1829–2001



children are leaving their parents' home earlier and live alone longer. Since 1899 the average of household size has dropped from 4.8 to 2.3 in 2001 (Table 7.8). Specifically worth mentioning is the decline from 1947 on, when the average size still was 4.0. Besides the reduced number of children there is also the disappearance of practically all domestic servants.

7.3.5 Economically active persons

The censuses of 1849 and 1859 were the first with questions on occupation. There was no sharp distinction yet of the economically active and non-active labour force. The decision whether one did or did not belong to the labour force was left up to the respondents themselves. According to the first explanatory notes, the labour force consisted of persons who provided for themselves or others. Persons who were supported by others (such as children, spouses, physically handicapped or old people), and persons who lived on their fortune or pension or savings and did not have a job, constituted the jobless.

Up to 1947 the population was divided into two parts: the labour force and the remaining population (the jobless). Since the censuses of 1947 the primary division of the population was:
– active labour force;
– temporarily not active labour force;
– remaining population (jobless people). [3)]

Table 7.9
Economic active population by sex, 1947, 1981 and 2001 [1)]

	1947		1981		2001	
	Males	Females	Males	Females	Males	Females
	%					
Active	61.0	19.5	53.4	25.4	55.5	39.6
Inactive	39.0	80.5	46.6	74.6	44.5	60.4

[1)] Active population: total empolyed and unemployed persons.

Sources: Population Census 1947. Eurostat 1988, 1996.

There is a striking increase in the participation in economical activities of women after 1960. Until the early sixties women working in the civil service were dismissed when they got married because of then existing legislation. Many enterprises had the same practice. As a consequence relatively few women were economically active. The participation of women increased gradually. In 1947 19.5 percent of the female population was economically active and in 2001 twice as many (Table 7.9).

When we focus on economically active people in the period 1849–1960, women formed about a quarter of the economically active population; the percentage increased to 42 percent in 2001. One reason to abolish the law on married female civil servants was the shortage of labour in the sixties. Another reason was the rise of new ideas about marriage, family life and child care. The government only began to stimulate women to participate in economic activities in 1986 (Heemskerk, 1995).

Table 7.10
Economically active population 1849–2001

	Total	Male	Female
		%	
1849	1,270,764	71.2	28.8
1859	1,344,667	73.1	26.9
1889	1,760,022	74.5	25.5
1899	2,026,956	74.1	25.9
1909	2,325,725	74.1	25.9
1920	2,720,527	76.9	23.1
1930	3,170,613	76.2	23.8
1947	3,866,445	75.6	24.4
1960	4,219,813	76.8	23.2
1971	4,788,855	74.1	25.9
1981	5,585,407	67.5	32.5
1991	7,077,000	60.2	39.8
2001	7,586,914	57.8	42.2

Sources: Oomens and Bakker, 1994. Statistics Netherlands, 1982a. Eurostat 1988, 1996. SSD 2001.

There were enormous structural changes in the labour force when divided into the economic sectors agriculture, industry and services (the primary, secondary and tertiary sectors). The Dutch economy developed from mainly agricultural and commercial in the first half of the 19th century to a more diversified economy with an increasingly important industry. Gradually the *sector agriculture* lost ground to industry and services. The population working in the primary sector declined from about 43 percent in 1807 to 34 percent in 1899 (cf. Horlings 2001). From then on this was gradually halved until 1930 and since then agriculture has diminished to just a few percent in 2001. This does not mean that the agricultural output has diminished. Quite the contrary. Mechanisation, rationalisation and intensifying of farming and cattle breeding increased the production of this sector enormously. During the second half of the 20th century, particularly after the oil crisis of 1973, agriculture was a dynamic and strong growth sector of the Dutch economy (Zanden and Griffiths, 1989). This is based on data about the productivity. The calculation of productivity requires among others data about the number of working days, the working hours and the length of a working day. However, these data formed no part of the censuses.

In the mid 19th century the share of the population working in the *sector industry* was 31 percent (Table 7.10). Since then this share has gradually increased, reaching a peak in 1960 when the share was nearly 44 percent. From then on the share has declined to about 20 percent in 2001. After World War II the industry sector, supported by government policy, has contributed much to the economic growth in the fifties and sixties. This stagnated after the oil crisis of 1973 after which employment in many branches of industry declined. Energy and capital intensive industries became very vulnerable because of the oil crisis (Zanden and Griffiths, 1989). The textile, clothing, and footwear industries were no longer able to compete with industries abroad. They lost much of employment, which decreased from 130 thousand man-years in 1973 to 45 thousand in 1985.

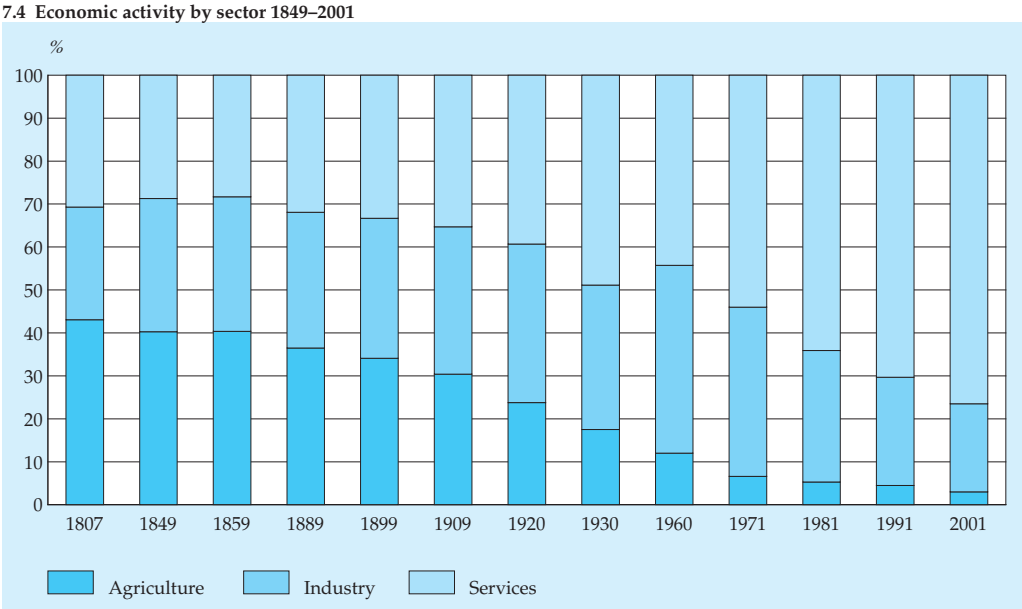
Table 7.11
Economic activity by sector 1807–2001 [1)]

	Agriculture	Industry	Services
1807	43.1	26.2	30.8
1849	40.3	31.0	28.7
1859	40.4	31.3	28.3
1889	36.5	31.6	31.9
1899	34.1	32.6	33.3
1909	30.4	34.3	35.4
1920	23.8	36.9	39.3
1930	17.5	33.6	48.9
1960	12.0	43.7	44.3
1971	6.6	39.4	54.0
1981	5.3	30.6	64.1
1991	4.5	25.2	70.3
2001	3.0	20.5	76.5

[1)] Employed persons exclusive casual labourers.

Sources: Oomens and Bakker, 1994. Horlings, 1995. Smits et al. 2000. Eurostat, 1988 and 1996. SSD 2001.

7.4 Economic activity by sector 1849–2001



Although employment in the *services sector* shows a gradual growth in the 20th century, the growth as a whole is spectacular. Around 1900 one third of the working population was employed in this sector and hundred years later more than a three quarters. Commercial services (trade and transport) traditionally held an important place in the Dutch economy (Zanden and Griffiths, 1989). The expansion of employment from the beginning of the 20th century concerns not only traditional commercial services but also banking and insurances and particularly government-financed services such as education, medical care and social services.

7.4 *Concluding remarks*

Population censuses are the most important sources to describe the development of the social population structure over a long period. However, historical comparisons that can sketch a consistent picture for a period of two centuries are not easy. They are hampered by the differences in method (e.g. definitions, classifications, observation period etc.) and differences of processing and publishing data. This concerns the variables household and occupation in particular.

During the last fifteen years much research has been done to make census data comparable. Oomens, former Director of Statistics Netherlands, who thoroughly analysed the population censuses of the 19th century laid a solid basis (Oomens, 1989). Together with De Bakker he made also comparable data of the working

population. The latter are corrected for some items by Horlings (1995). Censuses with data about the working population provide insight in the changes of the size and structure of this category. They do not provide data about working hours and earnings, needed for calculation of the economic results of the labour input. Nevertheless comparable data can show the development of the employment of the different branches and of the direction of the economic growth process.

We sketched the above outline using these comparable data for the period 1795–1960. For the period 1971–2001 we used the results of the regular publications of Statistics Netherlands and Eurostat [4)].

Remarkable results of this sketch are:
- the huge growth of the population from 2 million inhabitants in 1795 to nearly 16 million in 2001;
- the ageing of the people with nearly 8 percent 60+ in 1849 and more than 18 percent in 2001;
- the increase of divorced and widowed people in the last decades;
- the increase of non-nationals after 1960, in particular of persons from Morocco and Turkey;
- the drastic change in household structure after Wold War II with a strong growth of one-person households;
- the increase after 1960 of women in the working population;
- the decline of employment in agriculture and the growth of the services sector.

The sketched outline can of course be specified. The digitisation of the census data can be used for more detailed analyses. The integral observation method of the censuses makes many kinds of analysis possible of small and regional groups, which can add nuance to the picture sketched above.
For more detailed data we refer to: http://www.cbs.nl/en/publications/articles/general/census-2001/census-2001.htm.

Annotations

1) The author is very grateful to Marco Stöcker for his technical assistance.
2) Cf. the different analyses of the digitised Census 1899 about subjects as for instance 'social structure' by Mandemakers, 'region' by Vliegen and by Boonstra, 'religion' by Knippenberg in: Nederland een eeuw geleden geteld, 2001; cf.: Statistics Netherlands, 1999a.
3) Until 1947 censuses with data on occupation do not contain information about unemployment. From Census 1947 jobless persons were asked if they were temporarily not working. But changes of the definition of unemployment hamper a

consistent long-term historical comparison. This requires detailed historical research.

4) We did not use the data published by the Statistical Offfice of the European Communities, later called Eurostat, in: 'Censuses of population 1968–1971' (Statistical Office,1977). Because these data are based on a 10 percent sample, there are small differences with the definitive published data.

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8. Large and medium-sized cities compared Some results of the Urban Audit II

Mathieu Vliegen

In the last decades, urban development, economic restructuring and social exclusion in cities have attracted the attention of policy makers in the Netherlands as well as in the European Union. Various initiatives at the national and the international level came out of that awareness. Examples are the Major Cities Policies by the Dutch government and the URBAN Community Initiative by the European Commission. The European Commission has launched the Urban Audit project to gain more insight into the economic potential and the social imbalances of the European cities. The direct aim of the project is to obtain statistical information on a consistent pan-European basis over a wide range of themes. The 1998 pilot project was followed up in 2002 by Urban Audit II: a data collection on three spatial levels by the National Statistical Offices and Eurostat. This chapter presents the main findings on census and census-related topics for the Dutch Urban Audit II cities as such. Chapter 9 reviews some of those main findings for those cities and their peri-urban areas, and chapter 10 for their sub-city districts.

8.1 Introduction

In the last decade, urban development has become a topic of growing importance at the European level (European Commission, 1997 and 1998; Committee of the Regions, 1999). On the one hand cities are key sources of economic development; on the other they face large social imbalances. The European Commission's growing awareness of urban development should be seen in the context of the EU Regional Policy. The main priority of this policy is to improve social and economic cohesion in the European Union by seeking to reduce disparities between European regions. The Structural Funds are its main policy instrument, making the urban areas specific policy targets for the first time in the period 2000–2006 (European Union, 1999). Then there is the URBAN Community Initiative which has run parallel to Objectives 1 and 2 of the Structural Funds since 1994. It focuses mainly on the small urban neighbourhoods (European Commission, 2004).

In 1998 the European Commission launched a project in order to collect data from European urban agglomerations, called the 'Urban Audit'. It was designed as a pilot project to test the feasibility of obtaining and presenting information on a consistent pan-European basis for a wide range of indicators at the level of the cities, their

wider urban areas and their sub-city districts. The pilot project was carried out by a consortium of private contractors and finished in 2000 (http://europa.eu.int/comm/regional_policy/urban2/urban/audit/src/intro.html).

After a thorough evaluation of the pilot results, the Commission decided to launch a follow-up project called Urban Audit II. The aim of Urban Audit II is to measure the economic situation and, more generally, the quality of life in European cities. It is also to facilitate the exchange of information between cities facing similar challenges and opportunities. Unlike the pilot project, Urban Audit II gives a great deal of prominence to Eurostat and the National Statistical Offices in the European Union for the actual data collection. The National Statistical Offices act as co-ordinators for their member states in this project, while Eurostat (the Statistical Office of the European Union) acts as the co-ordinator at the European level.

The direct purpose of the Urban Audit II is to collect comparable statistics at the European level on a large number of variables for a range of topics at three spatial levels: the administrative city, the larger urban zone and the sub-city district. The variables cover nine themes of investigation, namely demography, social aspects, economic aspects, civic involvement, training & education, environment, travel & transport, information society, and culture & recreation. Those themes are important for the European Commission's priorities on sustainable development, knowledge economy, demographic profiles, services and local administration.

Data had to be collected about 330 variables at the city level, about 170 variables at the level of the larger urban zones, and about 30 variables at the level of the sub-city district. The European Commission, in collaboration with the National Statistical Offices and Eurostat selected the cities for which the data were collected. In total, they selected about 190 cities in the member states and about 70 cities in the Accession Countries. These are the large cities and a sample of medium-sized cities.

In this chapter we present the main findings for the ten Urban Audit II cities selected in the Netherlands. All statistics collected for this audit can be downloaded from the website of Statistics Netherlands (http://www.cbs.nl/en/publications/articles/regional/urban-audit-II.htm). Unfortunately, it is impossible to review all nine Urban Audit II themes in this chapter. The topics covered are restricted to those covered by traditional censuses and some census-related topics, such as income disparities.

Section 8.2 details the organisation of the Urban Audit II project in the Netherlands and the most relevant data sources used. Section 8.3 describes some details about the cities selected. Section 8.4 reviews the major findings for the cities. The chapter concludes with some final remarks.

8.2 *Organisation of the Urban Audit II and data sources*

The Urban Audit II in the Netherlands was implemented by Statistics Netherlands in close co-operation with the Netherlands City Network of Departments for Research and Statistics. The Department for Research and Statistics of the City of Amsterdam co-ordinated the work of the participating cities in the network. Statistics Netherlands took care of the basic collection of statistical data and the Netherlands City Network of the collection of data that were not available at Statistics Netherlands.

The Dutch Ministry of the Interior strongly supported the implementation of the Urban Audit II project, among others by sending letters of endorsement to the mayors and aldermen of the selected cities (Ministry of The Interior, 2002). The interest of the Ministry of The Interior in the success of the Urban Audit II in the Netherlands is explained by the Dutch government policies on urban renewal. These Major Cities Policies (Grote Stedenbeleid), started in the nineties. The Major Cities Policies deal with the four major cities (Amsterdam, Rotterdam, The Hague, and Utrecht) and twenty-six medium-sized cities. The objectives of the Major Cities Policies for 1999–2004 focus on the labour market, economic activities, education, competitiveness and accessibility of the city, housing, surroundings, social infrastructure, safety and inner-city concentration.

The Dutch part of the Urban Audit II project started in autumn 2002 and was finished by summer 2003. A great number of data sources were used to deliver the statistics required. The findings presented in this chapter, and in chapters 9 and 10, mostly used the same datasets as those used for the compilation of the Census Tables 2001. These sources are: the Municipal Population Registers with data of 1 January 2001; the Labour Force Survey with estimated three-yearly averages for the period 2000–2002; the Dwelling Register with data of 1 January 2001; the Housing Demand Survey with estimated data for the year 2000; the Survey on Employment and Earnings with data of the fourth quarter of 2000; the tax register for persons with entrepreneurial income with data of 1 January 2001, and a large-scale sample of the Tax Register with income data of persons of fifteen years or older for the year 2000.

Contrary to the methodology used for the compilation of the Census Tables 2001 the various data sources used in the Urban Audit II were not integrated at the micro-data level. The technique of repeated weighting for the Census Tables was not used either. Consequently, the results from both projects may differ. Two reasons can be mentioned for the lack of tuning of these projects. First, the Urban Audit II project was more comprehensive than the compilation project of the Census Tables, as the sketch of topics presented above shows. Second, and more importantly, there was a timeliness problem. The Urban Audit II project had to start and finish earlier than the census project due to the availability of personnel.

8.3 *The Urban Audit II cities*

The administrative unit of the city is the most important spatial level in Urban Audit II. In contrast with the Urban Audit pilot that covered only large cities in the European Union, Urban Audit II focuses also on medium-sized cities in order to get also more insight into the economic situation and the quality of life in those cities.

The administrative unit of the city – the large as well as the medium-sized city – corresponds to the lowest administrative level of the municipality in the Netherlands. In consultation with the Netherlands City Network of Departments for Research and Statistics and the Ministry of The Interior, Statistics Netherlands proposed a list of ten cities for participation in the Urban Audit II, to which the European Commission agreed. This list contained the four large cities with over 250 thousand inhabitants and a sample of six medium-sized cities with less than 250 thousand inhabitants.

The large cities are: Amsterdam, Rotterdam, The Hague and Utrecht, in the western part of the country. The six medium-sized cities were selected for their geographical spread. The six medium-sized cities are: Groningen (located in the northern part of the country), Enschede and Arnhem (in the east), Tilburg and Eindhoven (in the south) and Heerlen (in the south-east).

The four large cities differ considerably in surface area and in the number of inhabitants. Rotterdam has the largest land area while Amsterdam has most inhabitants. Restricting oneself to the number of inhabitants as the indicator used in the Urban Audit for the qualification we see a big difference between the four large cities (Table 8.1). Amsterdam is the largest city with 735 thousands inhabitants; Rotterdam, the second largest, has twenty percent fewer people than Amsterdam; The Hague, the third largest, has forty percent less; and Utrecht, the smallest, has 65 percent fewer inhabitants than Amsterdam. The Hague is by far the most densely populated of the four large cities. It neither has any substantial rural area in comparison to the other three large cities, nor any substantial area for industrial purposes in comparison to Rotterdam.

The difference between the smallest large city of Utrecht and the largest medium-sized cities of Eindhoven and Tilburg is relatively small. The number of inhabitants in the latter is only about twenty to twenty-five percent less. Moreover, there is much less difference in the number of inhabitants of the six medium-sized cities than among the four large cities. Arnhem – the fifth medium-sized city – only has about thirty percent fewer inhabitants than Eindhoven. The difference between Eindhoven and Heerlen – the only city with less than one hundred thousand inhabitants – is larger, namely slight more than half. The relatively low population densities of Tilburg, Enschede and Arnhem in comparison to the other three

Table 8.1
Large and medium-sized cities: area land, inhabitants and dwellings

	Area land	Population		Dwellings	Average occupancy per occupied dwelling
		absolute	per km² area land		
	km²	*x 1,000*		*x 1,000*	
Large cities					
Amsterdam	165.0	735	4,452	382	2.2
Rotterdam	206.5	595	2,883	293	2.0
The Hague	67.6	442	6,544	221	2.1
Utrecht	95.7	256	2,679	117	2.2
Medium-sized cities					
Eindhoven	87.2	203	2,333	98	2.1
Tilburg	116.4	196	1,682	85	2.3
Groningen	79.6	174	2,189	97	1.8
Enschede	141.1	150	1,066	67	2.3
Arnhem	98.2	139	1,419	66	2.1
Heerlen	45.0	95	2,114	46	2.1

medium-sized cities have to be largely imputed to the presence of extensive rural areas in those cities.

The average occupancy per occupied dwelling does not differ very much between the ten cities, namely from 1.8 to 2.3 persons on average per occupied dwelling. The highest as well as the lowest occupancy is found in medium-sized cities: the highest rates are in Tilburg and Enschede and the lowest rate in Groningen.

8.4 *Large and medium-sized Urban Audit II cities compared*

The enlargement of the Urban Audit II with the medium-sized cities enables us not only to compare the ten Urban Audit II cities as such, but also to compare the large with the medium-sized cities with regard to the main findings. An interesting question is of course whether the large cities differ notably from the medium-sized cities, and if so, to what extent they differ from each other.

8.4.1 Population and households

Since the 1960s there has been a major move to suburbs and rural areas in the Netherlands. More prosperous households, particularly those with children, left the cities to take up their residence in the suburbs or in the more rural surrounding. The cities were confronted with a strong inflow of migrants, particularly from non-EU countries (Netherlands Bureau for Economic Policy Analysis, 2000). Moreover, the individualization process in the second half of the twentieth century led to a

weakening of family bonds. This is expressed in a growing number of divorces and an increasing number of one-person households, particularly in the cities. All these developments brought about a lot of changes in the composition of city populations.

The effects of the migrant inflow in the cities in the Urban Audit project are indicated by the number of inhabitants with a non-EU nationality and the number of nationals born abroad. Here there are striking difference between the medium-sized and the three largest cities in particular. Almost one out of ten inhabitants in Amsterdam, Rotterdam and The Hague has a non-EU passport, and almost one out of five inhabitants with a Dutch nationality was born abroad (Table 8.2). The share of these two population groups in the medium-sized cities is considerably lower: between two and five percent of the inhabitants have non-EU passports, and between seven and ten percent of the population with the Dutch nationality was born abroad. The city of Utrecht occupies a position between the three largest cities and the medium-sized cities. It resembles the three large ones with respect to the share of the non-EU nationals (seven percent) and the medium-sized cities with respect to its share of nationals born abroad (ten percent).

Indications of the effects of the individualization process on the household structure in the cities are the number of one-person and single parent households. About half of the households in all four large cities are one-person households. The share of the one-person households in the medium-sized cities is about ten percent points less (Table 8.2), except for Groningen. Here the share of one-person households equals nearly that of Amsterdam.

Also more single parent households are living in the large cities than in the medium-sized cities. The only exception is Utrecht. The share of the single parent households in the three largest cities amounts to about seven percent, while it amounts to about four percent in Utrecht and in the medium-sized cities.

The individualization process also dropped the birth rate, resulting in a slow decrease in the working-age population, and a slowly increasing number of elderly people. Those developments have consequences for the old-age dependency rate or the grey pressure. The number of people over 65 relative to the population aged 15–64 is slowly but steadily growing at the national level. There are also considerable differences in the grey pressure between the ten Urban Audit cities (Table 8.2). The lowest rates are found in Amsterdam and Utrecht and in the medium-sized city of Groningen. There are about six inhabitants aged 15–64 in those cities for every person of retirement age. The highest grey pressure level is found in the smallest medium-sized city of Heerlen. The inhabitants aged 65 and over in this city amount to 25 percent of the population of working age. Between Amsterdam, Utrecht and Groningen on the one hand and Heerlen at the other, two other groups of cities can be distinguished. The first group consists of Rotterdam and The Hague

Table 8.2
Some population and households characteristics

	Non-EU nationals	Nationals born abroad	One-person households	Single parent households	Inhabitants aged 65 or beyond
	in % of total population		*in % of total households*		*per 100 inhabitants aged 15–64*
Large cities					
Amsterdam	8.9	18.1	55.1	6.9	16.6
Rotterdam	7.8	17.6	46.7	7.1	22.2
The Hague	7.7	17.8	49.7	6.1	22.7
Utrecht	6.6	10.1	51.9	3.5	16.4
Medium-sized cities					
Eindhoven	4.7	8.3	41.8	3.6	22.2
Tilburg	4.1	7.7	38.0	4.2	17.8
Groningen	2.2	7.0	56.9	4.0	16.5
Enschede	4.0	8.8	40.5	3.6	19.9
Arnhem	4.9	10.1	44.5	4.4	18.8
Heerlen	3.0	7.0	38.6	4.2	25.2

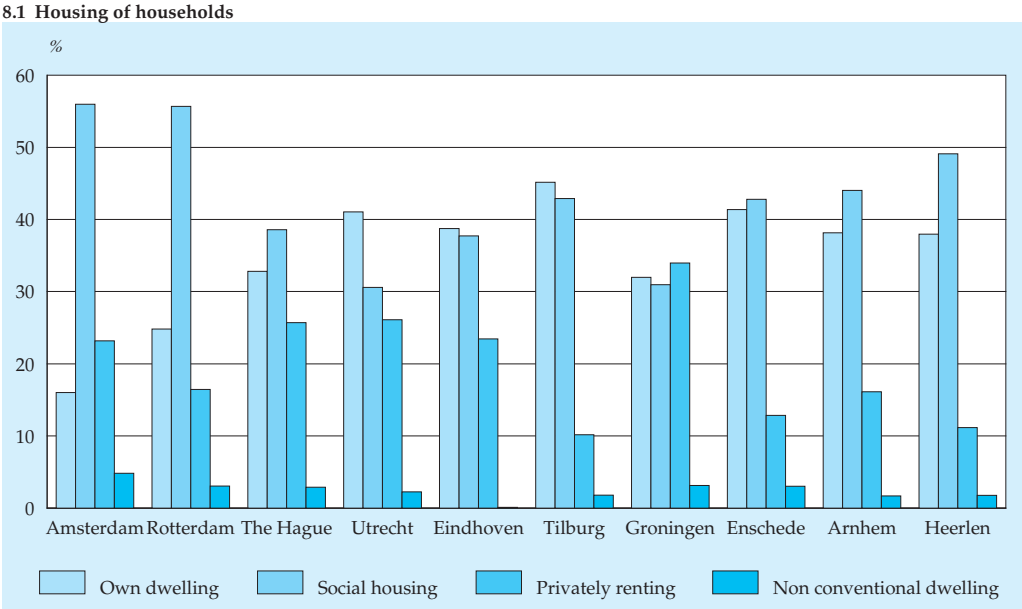
and the medium-sized city of Eindhoven where grey pressure is more than twenty percent. The second group consists of the medium-sized cities of Tilburg, Enschede and Arnhem, where grey pressure is less than twenty percent.

8.4.2 Housing

The dwelling stock in the cities is generally of a lesser quality than the national average. Quality indicators used include, among others, the proportion of dwellings owned, one-family dwellings, social rent and the construction period of a dwelling. Housing quality in the cities is lower, since there are fewer dwellings owned, fewer one-family dwellings, more social rent housing and more 'old' dwellings (Netherlands Bureau for Economic Policy Analysis, 2000).

The Urban Audit cities differ substantially with regard to the housing quality indicators, as can be inferred from the housing of households (Figure 8.1). Fewer households living in Amsterdam, Rotterdam, Then Hague and in the medium-sized city of Groningen own their home than in the other cities. There are relatively few households that own their own house in Amsterdam and Rotterdam: only one out of six households in Amsterdam and one out of four households in Rotterdam. The situation is a little better in The Hague and in Groningen, where one out of three households owns the dwelling they live in. Tilburg has the highest home ownership rate with 45 percent of the households living in their own home.

8.1 Housing of households



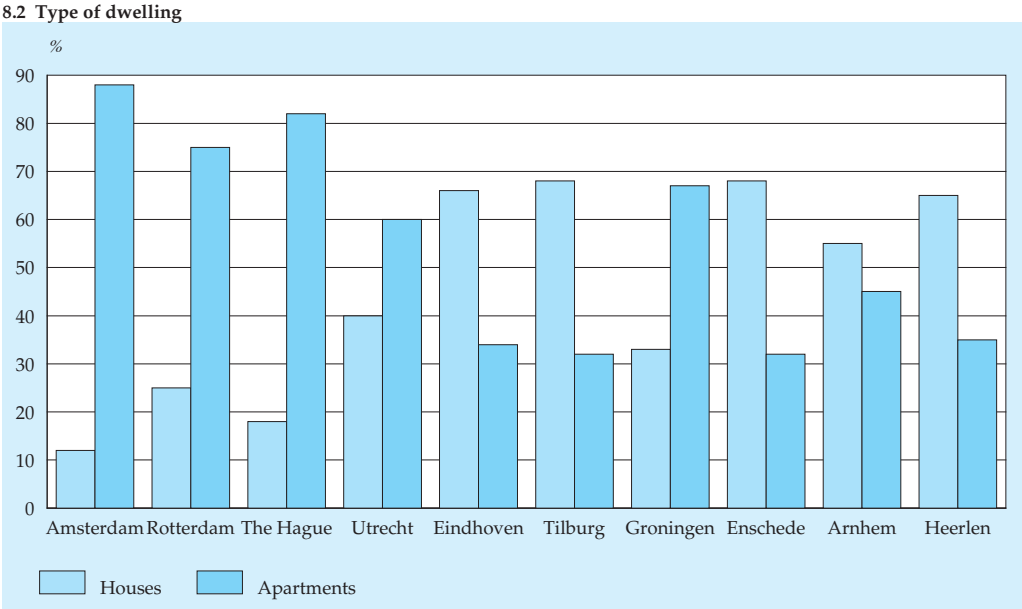
Social rent housing is a very important in Amsterdam and Rotterdam, but also in the medium-sized city of Heerlen. More than half of all households in Amsterdam and Rotterdam live in social rent housing; and just under half do in Heerlen. Arnhem, Enschede, Tilburg, The Hague and Eindhoven also have relatively many households in social rent housing. It is less important in Utrecht and Groningen where three out of ten households live in such dwellings.

Privately renting is most popular in Groningen where one out of three households rents privately. The phenomenon of privately rented housing also occurs relatively often in The Hague, Utrecht and Amsterdam as well as in the medium-sized city of Eindhoven. It is less important in the other cities, especially Tilburg and Heerlen.

The Urban Audit cities differ even more from each other on the quality indicator of the type of dwelling: houses versus apartments (Figure 8.2). Most dwellings in the four big cities and in Groningen are apartments. The greatest number of apartments is found in Amsterdam, The Hague and Rotterdam. In Amsterdam almost nine out of ten dwellings are apartments; in The Hague it is about four out of five and in Rotterdam three out of four dwellings.

Houses constitute the majority of dwellings in the medium-sized cities, with exception of Groningen. Houses or one-family dwellings are particularly found in those cities that developed during the rapidly growing industrialization of the Netherlands, such as Eindhoven, Tilburg, Enschede and Heerlen.

8.2 Type of dwelling



8.4.3 Labour market

Three indicators will be examined with respect to the labour participation of the population of the Urban Audit cities, namely the employment rate, the unemployment rate and part-time work (Table 8.3). The employment rate of the male inhabitants does not differ very much between the ten cities. In all cities almost eight out of ten men of working age belong to the economically active population. It varies between 77 and 82 percent.

A greater difference is found in the employment rate of the female population, which varies by more than ten percent points among the ten Urban Audit cities, between 58 and 71 percent. Looking at both employment rates together, Heerlen and Enschede show the lowest employment rates and Utrecht and Arnhem the highest.

The share of unemployed people within the economically active population varies four percent points for the male and five percent points for the female population of the ten cities. The highest unemployment rate both for men and women is found in Groningen, Arnhem and Rotterdam. The other cities show employment rates of between three and four percent for both sexes.

Part-time employment is widespread in the Netherlands. It is very popular among women. In Amsterdam (52 percent) and in Rotterdam and The Hague (55 percent) women do less part-time work than in the other cities. Women work part-time

Table 8.3
Labour participation rate

	Employment		Unemployment		Part-time employment	
	Male	Female	Male	Female	Male	Female
	in % of residents aged 15–64		*in % of economically active population*		*in % of employed persons*	
Large cities						
Amsterdam	80	66	4	4	26	52
Rotterdam	77	63	6	5	19	55
The Hague	81	65	3	4	18	55
Utrecht	81	71	3	3	28	63
Medium-sized cities						
Eindhoven	80	67	3	4	17	64
Tilburg	82	65	4	2	17	71
Groningen	79	71	7	6	33	67
Enschede	77	61	4	4	22	67
Arnhem	82	71	5	7	18	63
Heerlen	78	58	4	4	16	65

relatively often in Tilburg (71 percent) and in Groningen and Enschede (67 percent). Part-time work is less popular among the economically active male population. It is relatively high in Groningen (33 percent) and in Utrecht (28 percent) and Amsterdam (26 percent). In the other cities part-time employment among men varies from 22 percent in Enschede to 16 percent in Heerlen.

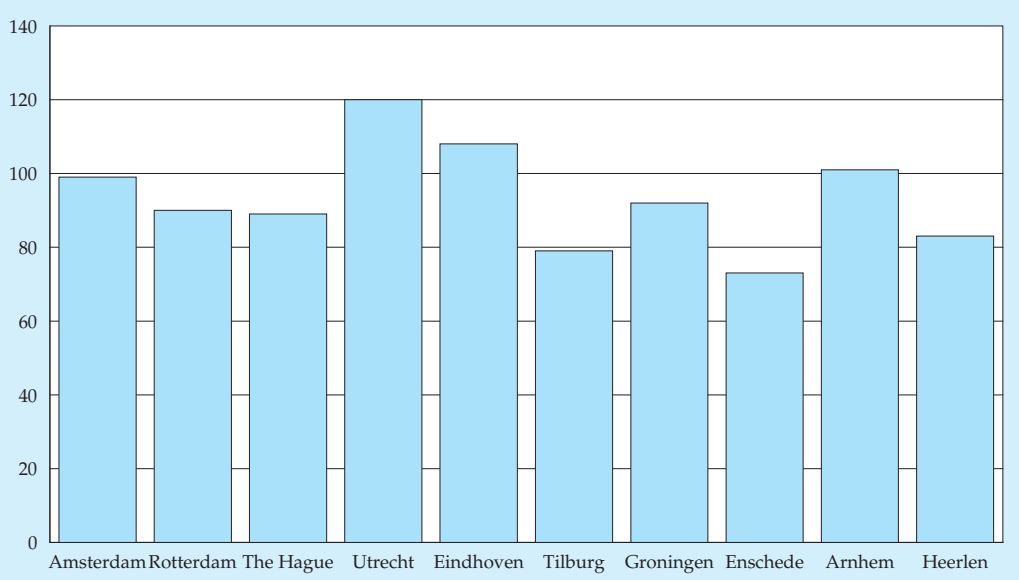
8.4.4 Economic activity

Jobs are concentrated in the cities that are centres of economic activity. However, there is no linear relationship between the number of jobs in a city and the number of its inhabitants of working age. There are more inhabitants of working age in Tilburg, for example, than in Groningen, but Groningen has more jobs. The same holds for the cities of Enschede and Arnhem: Enschede has a larger population of working age but Arnhem has more jobs.

An indicator of a city's economic strength is the ratio of a city's number of jobs to its population of working age. Relatively economically strong cities in this respect are the large cities of Utrecht and Amsterdam and the medium-sized cities of Eindhoven and Arnhem (Figure 8.3). The number of jobs in Amsterdam is almost equal to its working age population, while the number of jobs in Utrecht, Eindhoven and Arnhem outnumbers their working age population. In Utrecht, for example, one finds twelve jobs per ten inhabitants of working age.

Enschede, Tilburg and Heerlen, on the other hand, have the weakest economic position among the ten Urban Audit cities. A substantial gap exists between the

8.3 Number of jobs per 100 inhabitants aged 15–64



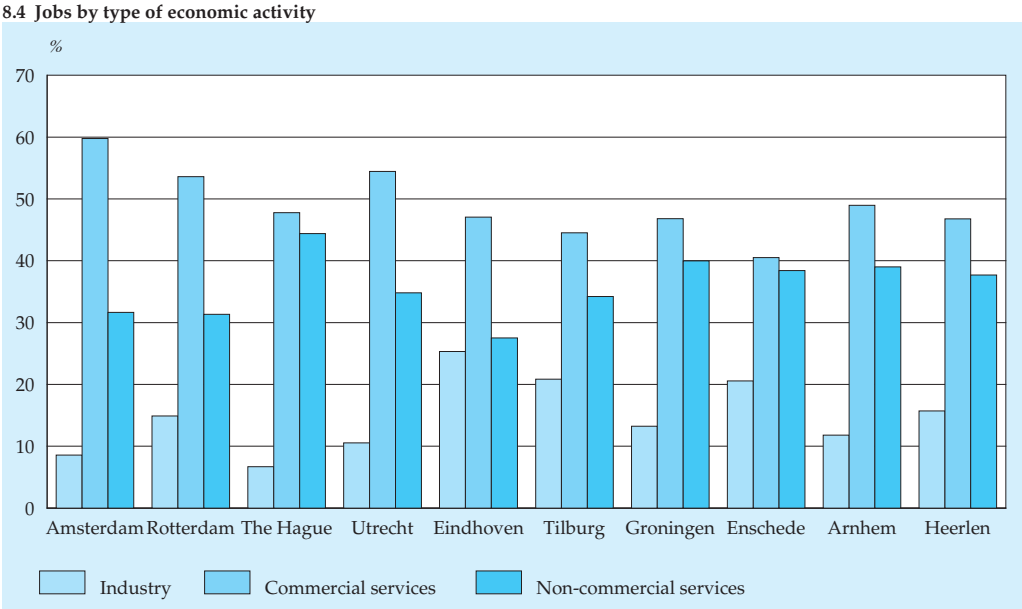
number of jobs located in those cities and their working age population. In Enschede, for example, one finds only about seven jobs per ten inhabitants of working age.

The economic structure of economic activity varies from city to city. Some cities are specialised in a certain economic activity. Interesting differences between the ten Urban Audit cities can be observed in this respect (Figure 8.4). Industrial activities are still mainly found in Eindhoven, Tilburg and Enschede: in Eindhoven one quarter of all jobs, and in Tilburg and Enschede one fifth of all jobs. Industrial activities are almost negligible in The Hague and Amsterdam in comparison to their other economic activities.

Amsterdam is very strong in commercial services, as are Rotterdam and Utrecht: more than half of all jobs. Financial intermediation and business activities within this economic sector are located mostly in Amsterdam and Utrecht; transport and communication activities in Rotterdam (seaport!). Employment in trade, hotels and restaurants is also strongly represented in Amsterdam.

Unsurprisingly, the highest number of jobs in the non-commercial sector is in The Hague, the seat of government. Such jobs are also frequent in Groningen, Arnhem, Enschede and Heerlen. Jobs in the non-commercial sector are less numerous in Eindhoven, Amsterdam and Rotterdam.

8.4 Jobs by type of economic activity

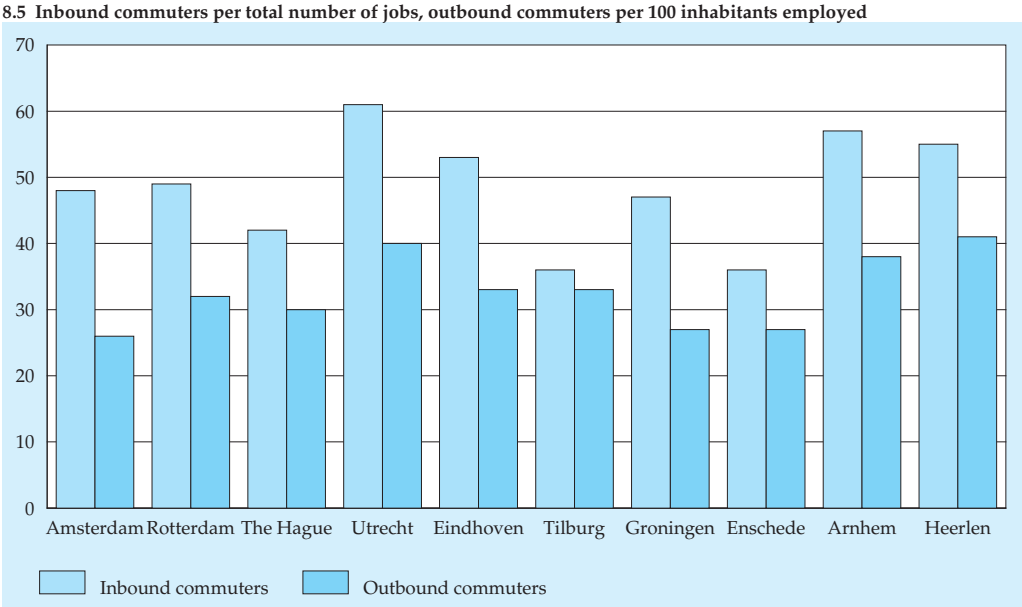


8.4.5 Commuting

Cities always attract people from outside the city who take many of the jobs. The extent to which cities attract people living elsewhere but commuting into the city depends on many factors, such as the kind and level of jobs the city offers, the city's accessibility by car and/or public transport, the number and kind of jobs in the neighbouring towns, etc. Cities are also interesting places to live for people working elsewhere.

Another indicator of a city's economic strength is the ratio of inbound commuters to the city's total number of jobs in comparison to the ratio of a city's residential population commuting out of the city to its employed labour force. Looking at both ratios for the ten Urban Audit cities a first striking observation is that the three cities with the highest ratio between inbound commuters and total number of jobs – Utrecht, Arnhem and Heerlen – also have the highest ratio between outbound commuters and their employed labour force (Figure 8.5). More than half of the jobs in these three cities employ people living outside these cities, while two out of five of their employed inhabitants are working outside the city. On the other hand, Enschede not only has a low inbound commuter ratio, but also the lowest outbound commuter ratio. More than one third of the city's jobs is held by people living outside Enschede, while just over one quarter of its employed inhabitants works outside the city.

8.5 Inbound commuters per total number of jobs, outbound commuters per 100 inhabitants employed

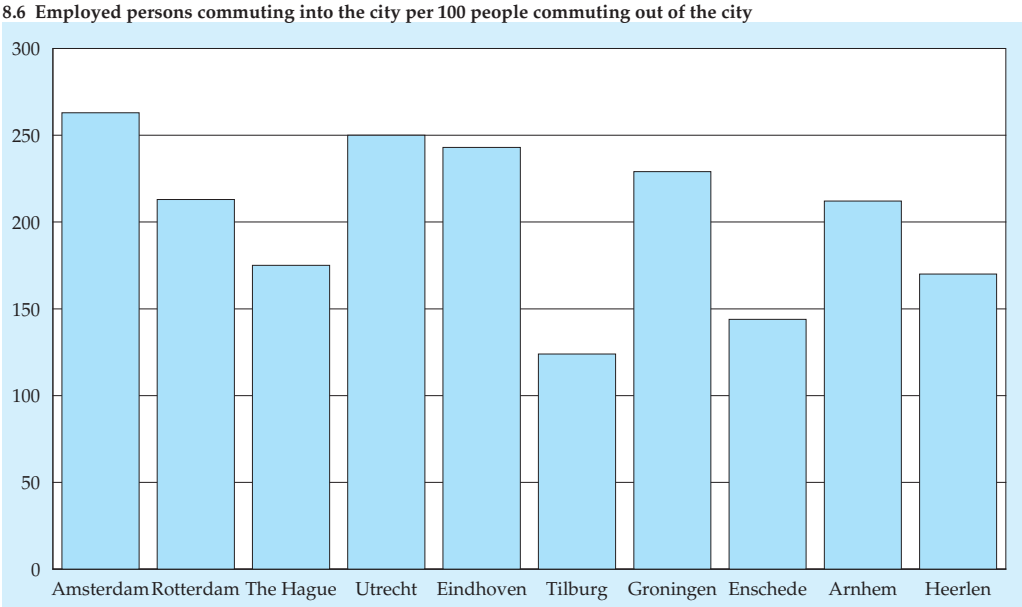


Looking more closely at the difference between both ratios, one finds the largest differences in Amsterdam and Utrecht and in the medium-sized cities of Eindhoven, Groningen and Arnhem. The difference between the inbound and outbound commuter ratio varies from 22 points in Amsterdam to 19 points in Arnhem. From a commuting viewpoint these cities therefore have a relatively strong economic position. The medium-sized cities of Tilburg and Enschede, on the other hand, are the weakest centres of economic activity. The difference between their in and outbound commuter ratio is only three points in Tilburg and nine points in Enschede.

The relative economic strength of a city in terms of in and outbound commuters can also be assessed as a ratio between both quantities. An economically strong city will attract persons from outside its own boundaries as much as possible and keep its working age population at the same time from commuting outside the city. It can be considered a relatively strong centre of economic activity when the ratio between its inbound and outbound commuters is high. It can be considered a relatively weak centre of economic activity, when that ratio is low, under the condition that the inbound commuters should still outnumber its outbound commuters.

This way of indicating the relatively economic strength of a city yields almost similar results as in the previous indicator (Figure 8.6). The highest ratios are found for Amsterdam, Utrecht and Rotterdam as well as for the medium-sized cities of Eindhoven, Groningen and Arnhem. In Amsterdam, for example, 26 people

8.6 Employed persons commuting into the city per 100 people commuting out of the city



commute into the city for every ten employed inhabitant commuting away from the city. In Arnhem one finds twenty-one inbound commuters for every ten outbound commuters. The medium-sized cities of Tilburg and Enschede score the lowest in this respect. There are only twelve people in Tilburg and fourteen people in Enschede commuting into the city for every ten employed inhabitants commuting outside the city.

Closely related to commuting is the phenomenon of journeys to work. The most important questions about the journeys to work are: How long does it take to get from the residential address in the city to the workplace? And which mode of transport is used for the journey to the workplace?

As expected, there are interesting differences between the ten Urban Audit cities in this respect. It turns out that the inhabitants of the four large cities take longer to get to work than the inhabitants of the medium-sized cities (Table 8.4). Their journeys take them on average over half an hour. From the medium-sized cities the inhabitants of Eindhoven, Arnhem and Groningen travel on average for half an hour, while the inhabitants of the other medium-sized cities take less than 25 minutes.

There are also striking differences with regard to the question of the mode of transport used in their journeys to work. The inhabitants of the four large cities use public transport more than the corresponding journeys by the inhabitants in the

Table 8.4
Journeys to work: average time and mode of transport

	Average time	Mode of transport			
		Car	Public transport	Bicycle	Foot or other
	minutes	*in % of all journeys to work*			
Large cities					
Amsterdam	38	42	31	21	7
Rotterdam	33	54	25	13	8
The Hague	34	43	29	21	7
Utrecht	38	49	25	21	5
Medium-sized cities					
Eindhoven	29	62	7	25	6
Tilburg	24	59	5	28	8
Groningen	27	51	8	34	6
Enschede	24	59	5	31	6
Arnhem	28	59	14	19	8
Heerlen	22	74	7	10	9

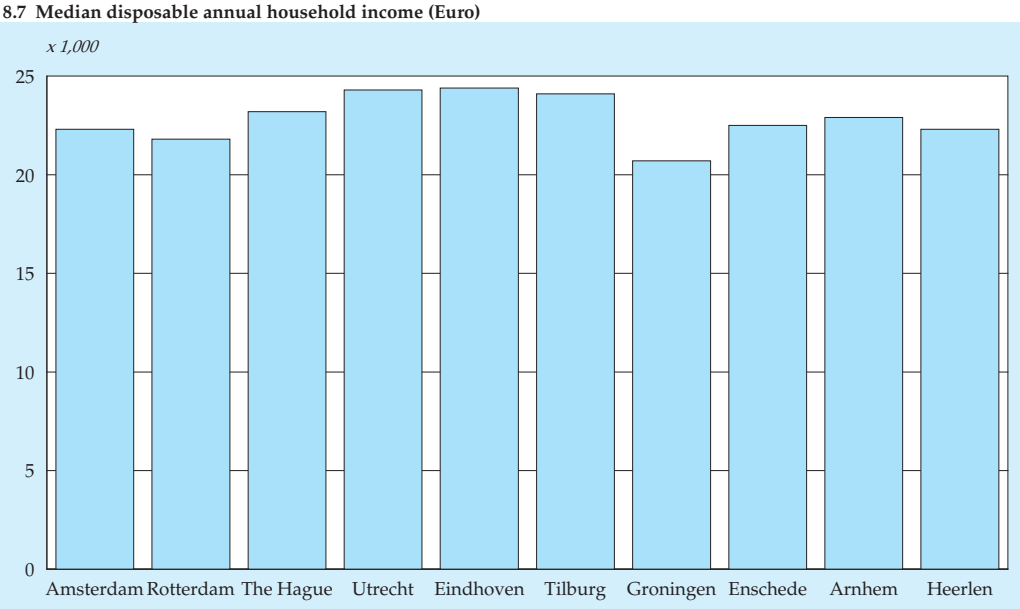
medium-sized cities. A quarter or more of all journeys in the four large cities is made by public transport. Amongst the medium-sized cities public transport is only of any importance in Arnhem.

However, the car is still the most preferred mode of transport to work in all cities. In seven cities the absolute majority of all journeys to work is by car. The only cities where this is not the case are Amsterdam, The Hague and Utrecht. Almost three quarter of the journeys to work are made by car in Heerlen. Bicycles are also popular as mode of transport in Eindhoven, Tilburg, Groningen and Enschede.

8.4.6 Income disparities

Cities differ also in income and wealth of their inhabitants. There are numerous reasons for such differences that are well outside the scope of this chapter. The only question that can be answered here is the extent to which income disparities exist between the ten Urban Audit cities. Those disparities relate to the median disposable annual income of households as well as to households belonging to a specific income category. The disposable income consists of the income from primary sources (wages and salaries including benefits paid by the employer for sickness, unemployment and disablement, profits, received transfers and income from property) minus contributions to social security and other paid transfers (taxes on wage, salary, income and property included) [1].

8.7 Median disposable annual household income (Euro)

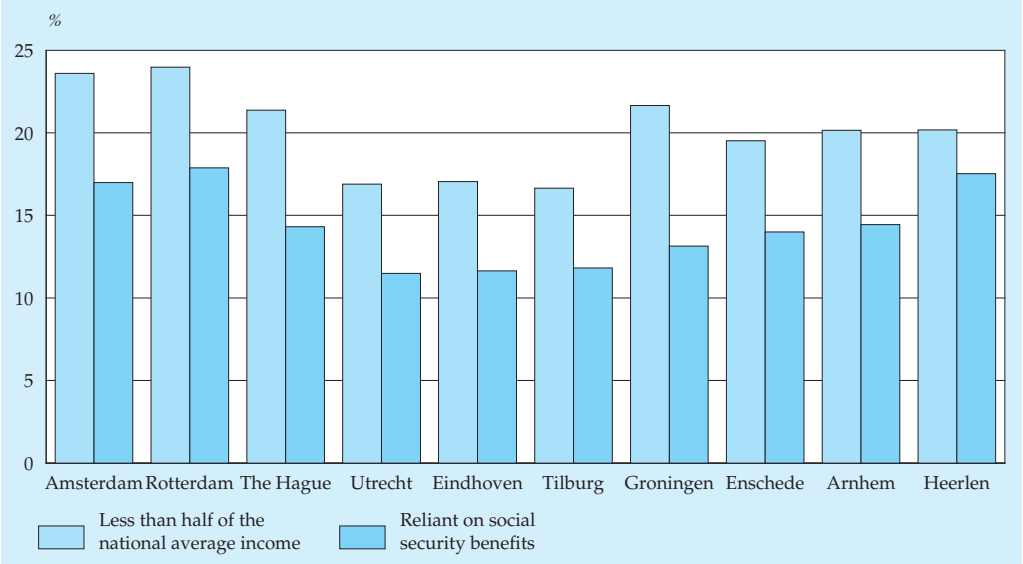


The median disposable annual household income varies considerably between the ten Urban Audit cities: from € 24,400 in Eindhoven to € 20,700 in Groningen (Figure 8.7). In other words, a household in this income category living in Eindhoven can spend about twenty percent more than a similar household in Groningen. The median disposable annual household income is also quite high in Utrecht and Tilburg and, although to a lesser extent, in The Hague and Arnhem. Amsterdam and Rotterdam belong to a group of cities with a lower median disposable annual household income – together with the medium-sized cities of Enschede and Heerlen. Groningen has the lowest median disposable annual household income.

The households belonging to a specific income category, for which information is available in the Urban Audit, are twofold, namely the households with less than half of the national average income (mean income) and the households reliant on social benefits. Both types of households can be characterized as households at risk of poverty.

The lowest proportion of households with less than half of the national average income are found in the three cities with the highest median available household income mentioned above, namely Utrecht, Eindhoven and Tilburg: one out of six households (Figure 8.8). The highest proportion of such households is found in Amsterdam and Rotterdam, namely one out of four households. In the other cities it is one out of five. There is a relatively high proportion of such households in

8.8 **Proportion of households with less than half of the national average income, and households reliant on social security benefits**



The Hague, in spite of the relatively high median annual household income. This points to a very unequal inner-city income distribution.

Almost the same variation between the cities can be found with regard to the proportion of households that is reliant on social security benefits. The lowest proportion, about one out of nine households, is again found in Utrecht, Eindhoven and Tilburg (Figure 8.8). The highest proportion of households reliant on social security benefits, about one out of six households, is also again found in Amsterdam and Rotterdam, but also in the medium-sized city of Heerlen.

8.4.7 Educational qualifications

Education and training are important for the further economic growth of a city as well as the position of its economically active inhabitants. Looking at the educational qualifications of the working-age population in the ten cities yields striking differences between them (Figure 8.9). The main variations in the educational qualifications of the inhabitants between the cities are found at the levels of primary or lower secondary education (ISCED levels 1 and 2) and at the level of the tertiary education (ISCED levels 5 and 6).

The highest proportion of inhabitants of working age with only primary or a lower secondary education is found in Rotterdam and the medium-sized city of Heerlen. Almost half their working age population only has primary education or lower

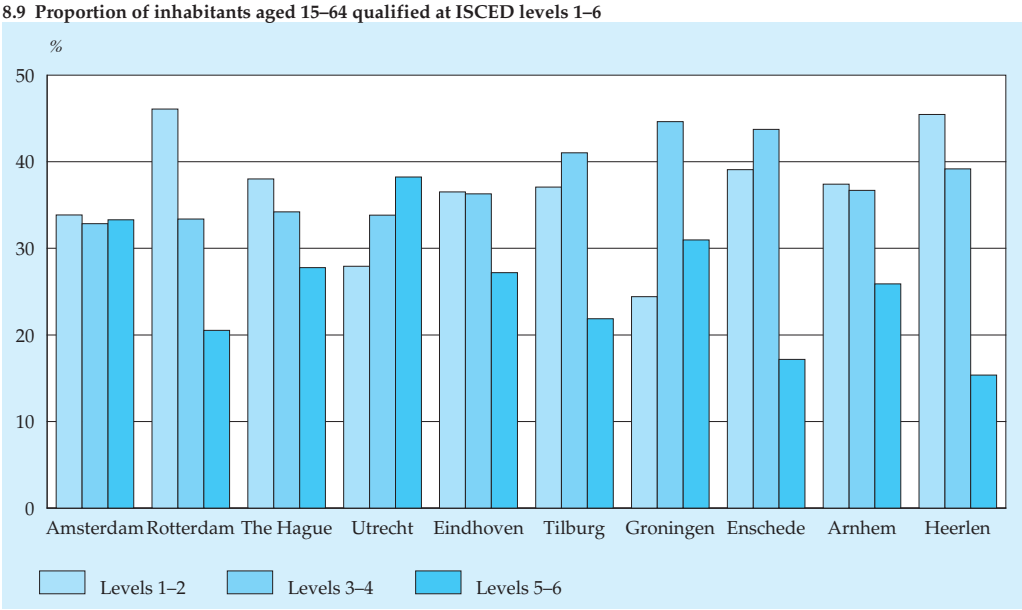
secondary education certificate. Groningen and Utrecht have the lowest proportion of less educated inhabitants. About one quarter of the working age population in these two cities only has primary education or lower secondary education certificate. The number of inhabitants of working age in the other cities with this level of education varies from one-third to four out of ten.

The highest proportions of the working age population with a tertiary education (ISCED levels 5 and 6) are found in Utrecht and Amsterdam and in the medium-sized city of Groningen. One third or more of their working-age population has a tertiary education certificate. In The Hague, Eindhoven and Arnhem about one out of four working age inhabitants has such a certificate; in Rotterdam and Tilburg about one out of five. The lowest proportion of people with a tertiary education certificate is found in Heerlen and Enschede with about one out of six people.

The highest proportions of working-age inhabitants with a higher secondary education are found in the medium-sized cities. The range of those inhabitants varies from 36 percent in Eindhoven to 45 percent in Groningen. Only one third of the working age population in the four large cities has finished higher secondary education.

To get an impression of the ranking of the various cities with regard to the educational qualifications of their inhabitants, the distribution of those inhabitants over the ISCED categories has been reweighed according to their numbering [2].

8.9 Proportion of inhabitants aged 15–64 qualified at ISCED levels 1–6



Based on the weighting the large cities of Utrecht and Amsterdam as well as the medium-sized city of Groningen turn out to have by far the highest educationally qualified working age population. They are followed by The Hague, Arnhem and Eindhoven. The third group consists of the cities of Tilburg and Enschede. The cities with the lowest educational qualifications of the working age population are Rotterdam and Heerlen.

8.5 Some concluding remarks

At the beginning of section 4 the question was raised whether the large Urban Audit cities differ notably from their medium-sized counterparts with regard to the main findings of the Urban Audit II, and if so, to what extent. After studying the various topics, the final conclusion must be that they differ in some respects, but not all. Moreover, the large cities differ among themselves, as do the medium-sized cities. The main conclusions are the following.

The three largest cities (Amsterdam, Rotterdam and The Hague) house more migrants than the fourth large city (Utrecht) and all medium-sized cities. Specific household types (one-person and single parent households) are also overrepresented in the three largest cities, but that is also the case in the medium-sized city of Groningen. The grey pressure in two large cities (Amsterdam and Utrecht) is smaller than in all medium-sized cities. The grey pressure in the two other large cities (Rotterdam and The Hague) on the other hand is higher than the grey pressure in almost all medium-sized cities.

The housing in the three largest cities (Amsterdam, Rotterdam and The Hague) is of far less quality than the housing in the other Urban Audit cities. The housing in Utrecht, on the other hand, is of a better quality than in some of the medium-sized cities, like Groningen and Arnhem. The best housing quality is found in Tilburg.

The labour participation rate in two of the large cities (The Hague and Utrecht) is better than in all medium-sized cities. However, the participation rate in Rotterdam is as low as in the medium-sized cities with the lowest participation (Groningen and Enschede). Two of the four large cities, namely Amsterdam and Utrecht, have the strongest economic position, but the economic position of the medium-sized city of Eindhoven is just as strong. The other two large cities (The Hague and Rotterdam) are behind two of the medium-sized cities, namely Groningen and Arnhem.

The difference between the four large cities is by far the largest with regard to the prosperity of their households. Amsterdam and Rotterdam are the least prosperous cities. Utrecht, on the other hand, is the most prosperous, although that city must share that position with the two medium-sized cities of Eindhoven and Tilburg.

The large cities of Amsterdam and Utrecht have the highest educationally qualified working age population, although they have to share this position with the medium-sized city of Groningen. On the other hand, one of the other two large cities, namely Rotterdam, has the lowest educationally qualified working age population within its boundaries. It shares this position with the smallest medium-sized city of Heerlen.

The final conclusion should, therefore, be that the large cities and especially the three largest ones differ demographically and qua housing from the medium-sized cities. Greater variations between the large cities in relation to each other and with respect to the medium-sized cities exist with regard to the labour market, the economic activity, the income situation and the educational qualifications of their inhabitants.

Annotations

1) The definition of disposable income used does not include all components. Excluded from the list given by The Canberra Group (Expert Group on Household Income Statistics, 2001) are the following. From the employee income: profit sharing including stock options (1.3), allowances payable for working in remote locations etc, where part of conditions of employment (1.4), and (partly) goods and services provided to employee as part of employment package (1.7). From the income self-employment: goods and services produced for barter, less costs of inputs (2.3) and goods produced for home consumption, less costs of inputs (2.4). From the current transfers received: (partly) regular inter-household cash transfers received (5.5) and regular support received from non-profit making institutions such as charities (5.6). From current transfers paid: employers' social insurance contributions (7.1), employees' social insurance contributions (7.2), (partly) regular inter-household cash transfers (7.5) and regular cash transfers to charities (7.6).
2) The weights attached to the various levels are the following: 1.5 for the ISCED level 1 and 2, 3.5 for the ISCED levels 3 and 4 and 5.5 for the ISCED level 5 and 6.

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9. Cities in relation to their peri-urban areas Some results of the Urban Audit II

Mathieu Vliegen

The statistical data in the Urban Audit II were collected at three spatial levels: the administrative city, the larger urban zone and the sub-city district. In this chapter the focus is on the relationship between the cities and the larger urban zones of which they are part. How do the cities form the centre of the larger urban zones and their surrounding or peri-urban areas? What are the differences between the ten Urban audit II cities in their relation to their peri-urban area?

9.1 Introduction

Cities play a major role in their surroundings. The built-up area of cities often exceeds their original administrative boundaries in the course of time. Cities and separate settlements melt into urban agglomerations. Moreover, the process of suburbanisation may lead to large urban areas. In this process, households and enterprises will settle into their surrounding area of the cities, but remain oriented towards the cities as centres of economic activity and of public and socio-cultural facilities. Therefore, statistical data were collected in the Urban Audit II on the larger urban zones in order to gain insight in how the city functions as the centre of such areas. The statistical data collection on the larger urban zones was restricted to about 170 variables relevant for the relation of the city to its larger urban zone.

In this chapter we review the main findings of the Urban Audit II at the spatial level of the larger urban zone. The focus is not on the larger urban zones as such, but rather on the interrelationship of the city and its peri-urban area within those zones. The main findings are restricted to a few census and census-related topics, like in chapter 8, where the methodology and the data sources were already described. All statistical data collected at the spatial level of the larger urban zones can be downloaded from the website of Statistics Netherlands (http://www.cbs.nl/en/publications/articles/regional/urban-audit-II.htm).

Before presenting the major findings, section 9.2 will discuss the delimitation of the larger urban zones of the Urban Audit cities. Section 9.3 provides details about the components city and peri-urban area from the urbanisation perspective. Section 9.4 reviews the results on their relationships. This is followed by the concluding remarks.

9.2 *Delimitation of the larger urban zones*

The target definition of the larger urban zones is functional: they consist of a city and its surrounding area or peri-urban area, both interconnected by various interrelations, in particular in the labour and housing market. Since various different practices of delimitation exist in the EU member states (Pumain et all, 1992), it was decided to approximate the larger urban zones in the Urban Audit II project by existing regions at the NUTS level 3, if possible. Every member state should perform an analysis in order (a) to ascertain whether or not NUTS 3 regions might be a proxy for the larger urban zones and (b) if so, which NUTS 3 region or regions are the best proxy. The last part of the analysis should be on population shares with a threshold of fifty percent. NUTS 3 regions of which more than one half of the population is living in a functional area, are dominated by that area and, consequently, those regions are accepted as a proxy for the larger urban zones (Carlquist, 2002).

The NUTS 3 regions in the Netherlands are the COROP regions – a statistically based subdivision of the Dutch territory into 40 regions. The COROP regions were delineated in the early nineteen seventies using data on commuter flows as the main criterion (Vliegen, 1999). Two kinds of data sources were used for the proxy-analysis. The main source was a map with the boundaries of the urban regions and those of the COROP regions in which the Urban Audit cities are located (Map 9.1).

Map 9.1 Urban Audit cities, urban regions and COROP regions

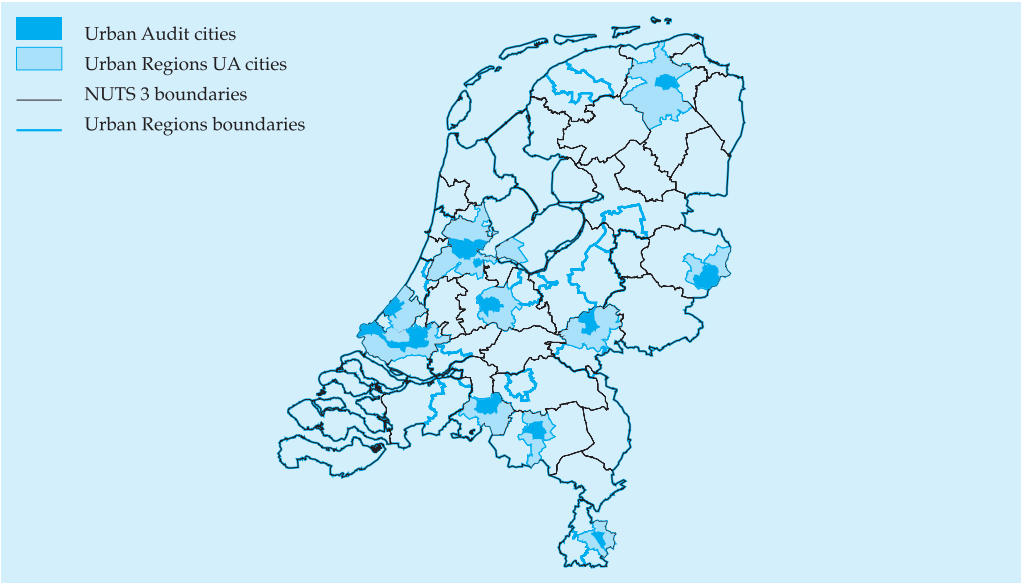


Table 9.1
Larger urban zones (LUZ) of the Urban Audit cities

	Urban Audit Cities	Population larger urban zones	Living in functional urban area [1]
		x 1,000	*in % of population LUZ*
COROP-regions large cities			
Groot-Amsterdam / Zaanstreek	Amsterdam	1,320	99
Groot-Rijnmond	Rotterdam	1,345	93
Agglomeratie The Hague / Delft en Westland	The Hague	955	99
Utrecht	Utrecht	1,118	51
COROP-regions medium-sized cities			
Zuidoost-Noord-Brabant	Eindhoven	714	68
Midden-Noord-Brabant	Tilburg	444	64
Overig Groningen	Groningen	360	96
Twente	Enschede	609	54
Arnhem/Nijmegen	Arnhem	696	54
Zuid-Limburg	Heerlen	648	45

[1] Living in urban region or in a local unit not belonging to an urban region but focussing one-sidedly on the Urban Audit city.

The urban regions were delineated not long before the start of the Urban Audit II project (Vliegen, 2004a and 2004b). The other source was data on inter-municipal commuting flows. Those data were used to determine those local units in a COROP region that do not belong to an urban region, but that have nevertheless a one-sided orientation on the Urban Audit city concerned [1].

In the final proxy-analysis two kinds of percentages were calculated. First, the percentage of the population in a COROP region living in the urban region of an Urban Audit city, and, secondly, the percentage of the population in a COROP region living in local units in that COROP region that do not belong to the urban region of an Urban Audit city, but which have nevertheless a one-sided orientation to that city. Finally, both percentages together were used to define the relevant COROP region(s) as proxies for the larger urban zones (Statistics Netherlands, 2003).

The analysis showed that two COROP regions had to be accepted as a proxy for the larger urban zones of the large cities of Amsterdam and The Hague. Almost the entire population of both COROP regions lives in the functional area of those cities (Table 9.1). The analysis showed, moreover, that the COROP regions 'Groot-Rijnmond' and 'Overig Groningen' are also quite good proxies; Groot-Rijnmond for Rotterdam and 'Overig Groningen' for the medium-sized city of Groningen. The

COROP region 'Zuid-Limburg', on the other hand, is not a good proxy for the larger urban zone of the medium-sized city of Heerlen, since it fails the threshold of fifty percent population share. However, it was still accepted as a proxy for the larger urban zone of the city of Heerlen since it dominates this COROP region in terms of population share. The other five COROP regions could be accepted as proxies for the larger urban zones of the other cities, since their population share living in a functional area of the city varied from 51 percent for Utrecht to 68 percent for Eindhoven.

9.3 Components of the larger urban zones: city and peri-urban area

A larger urban zone consists of two components: the city as the centre and the peri-urban area where the population focuses on that city. There are striking differences in the components of the larger urban zones of the ten Urban Audit cities from an urbanisation viewpoint, demonstrated by the ratio of the population of the cities and the peri-urban areas that lives in an urbanised area within the larger urban zones (Table 9.2). The population living in an urbanised area has been defined here as the population living in grid squares of 500 x 500 meter of the national grid with an address density of the surrounding area of 1,500 addresses or more per km^2 (Van de Stadt and Vliegen, 1993) [2].

The figures in table 9.2 show that four types of larger urban zones can be distinguished in terms of the urbanisation level of their components. They are:

a. the larger urban zones of the three large cities: Amsterdam, Rotterdam and The Hague. The cities are highly urbanised, as are their peri-urban areas. More than nine out of ten residents of these cities live in an urbanised area, while at least five out of ten inhabitants of their peri-urban area do so;
b. the larger urban zone of the fourth large city: Utrecht. City and peri-urban area are not as urbanised as in the three largest cities, but they are still more urbanised than the component parts of the larger zones of the medium-sized cities. This can be inferred from the ratio of inhabitants living in an urbanised area in both units;
c. the larger urban zones of the medium-sized cities of Eindhoven, Tilburg and Groningen. These cities are less urbanised than Utrecht, but more urbanised than the three other medium-sized cities, as can be inferred from the ratio of their residents living in an urbanised area. The peri-urban areas, however, qualify as rural since the proportion of the inhabitants of those areas living in an urbanised area is very low.
d. the larger urban zones of the medium-sized cities of Enschede, Arnhem and Heerlen. These cities are the least urbanised of the other Urban Audit cities, as can be inferred from the proportion of their residents living in an urbanized area. The peri-urban areas, however, are still rural areas to a certain extent but less so than the peri- urban areas of the preceding cities.

Table 9.2
Larger urban zones and their component parts: proportion of urban population

	Urban population larger urban zone	Urban population city	Urban population peri-urban area
Larger urban zones (LUZ)	*in % population larger urban zone*	*in % population city*	*in % population peri-urban area*
LUZ large cities			
Amsterdam	76	97	50
Rotterdam	69	92	51
The Hague	80	97	66
Utrecht	48	86	37
LUZ medium-sized cities			
Eindhoven	32	75	15
Tilburg	36	70	9
Groningen	39	76	5
Enschede	30	61	20
Arnhem	36	62	30
Heerlen	33	52	29

In the next section we explore whether these different internal structure of the various larger urban zones affects the extent to which the respective cities differ from their peri-urban area in population and household structure, housing aspects, labour market and economic activity, income disparities and educational qualifications.

9.4 *Cities in relation to their peri-urban areas*

Cities and their surrounding areas differ in many respects. The process of suburbanisation has led to a different household composition in the surrounding area caused by the lower quality housing stock in the cities and the selective migration of well-to-do-households and families with children to the suburbs and the surrounding rural areas. The selective migration out of and into the cities also effects the labour market, particularly in the large cities. The effects were twofold. Households that left the large city commute from the suburbs to the city since they kept working there. Unemployment in the large cities is more prevalent among less educated people because changes in the city's economy require more highly educated people. Unemployment in the large cities was reinforced by the selective immigration of less educated foreigners (van der Wouden, 1996). The question arises, therefore, whether differences between the Urban Audit cities exist in their relation to their peri-urban areas, and if so, whether those differences follow the lines dividing the four types of larger zones.

9.4.1 Population and households

The share of inhabitants with a non-EU nationality and foreign-born citizens is higher in all ten Urban Audit cities than in their peri-urban area. The effects of migrant inflow are particularly notable in the highly urbanized zones of Amsterdam, Rotterdam and The Hague (Table 9.3). Inhabitants with a non-EU passport are overrepresented in the cities of these three larger zones compared to their peri-urban areas by about five to six percent points. Dutch citizens who are born abroad are even more overrepresented in the cities of these three larger urban zones, namely by more than ten percent points.

Looking at the difference between both spatial units in the other larger urban zones Utrecht occupies an intermediary position between the three large cities and the medium-sized cities with respect to the overrepresentation of residents with a non-EU nationality. Its position with regard to Dutch foreign-born residents, however, is similar to the larger urban zones of the medium-sized cities.

Non-EU nationals and nationals born abroad are less overrepresented in the cities of the larger urban zones of the medium-sized cities. There are, however, differences between those cities in relation to their peri-urban areas. There is almost no overrepresentation in Groningen and Heerlen relative to their peri-urban area in the proportion of non-EU nationalities. The overrepresentation in the other medium-sized cities amounts to two or three percent points. Dutch citizens born abroad are overrepresented by four to five percent points in the peri-urban area in the large city of Utrecht and in all medium-sized cities except Heerlen. The overrepresentation of this population group in this city relative to its hinterland is limited to just two percent points.

One-person households are overrepresented in all Urban Audit cities in comparison to their peri-urban areas (Table 9.3). The biggest difference between city and peri-urban area (thirty percent points) is found in the larger zone of Groningen – the zone with the most rural peri-urban area. Noteworthy, however, is that the two other larger urban zones with a rural peri-urban area (the zones of Eindhoven and Tilburg) are not characterized by such an overrepresentation of one-person households in the cities. The overrepresentation in the two cities equals the overrepresentation in the cities of the highly urbanised zones of Rotterdam (nineteen percent points) and The Hague (fifteen percent points) and the one in the city of the larger urban zone of Enschede (also fifteen percent points) that has a less rural peri-urban area. One-person households are also largely overrepresented in the cities of Amsterdam (24 percent points) and Utrecht (22 percent points) in comparison to their peri-urban area. The lowest difference in one-person households between city and peri-urban area is found in the larger zone of Heerlen.

Table 9.3
City and peri-urban area: difference in population and household characteristics

	Non-EU Nationals	Nationals born abroad	One-person households	Single parent households	Inhabitants aged 65 or beyond
Larger urban zones (LUZ)	*in % of total population*		*in % of all households*		*per 100 inhabitants aged 15–64*
LUZ large cities					
Amsterdam	6.1	11.2	24.2	3.2	–2.8
Rotterdam	5.6	11.6	18.8	3.6	2.5
The Hague	4.6	10.1	15.4	2.4	2.1
Utrecht	4.2	4.8	22.3	0.3	–2.4
LUZ medium-sized cities					
Eindhoven	2.9	4.8	17.7	1.1	4.1
Tilburg	2.5	4.5	15.9	1.7	–0.6
Groningen	0.9	4.1	30.2	1.0	–5.1
Enschede	2.2	4.6	15.4	1.1	–1.2
Arnhem	3.0	5.1	11.5	1.2	–0.8
Heerlen	0.8	2.1	7.4	1.0	2.3

An overrepresentation of single parent households in the city relative to its peri-urban area is worth mentioning solely in the larger urban zones of the three large cities Amsterdam, Rotterdam and The Hague. It varies from four percent points in the larger zone of Rotterdam to two percent points in the larger zone of The Hague, versus about one percent point in the other larger urban zones.

Interesting differences between city and peri-urban area can be observed in the various larger urban zones with regard to the grey pressure, i.e. the number of people aged over 65 compared to the population of 15–64 (Table 9.3). The larger urban zones of the four large cities have more grey pressure in the cities than in the peri-urban area of Rotterdam and The Hague, and a lower rate in the cities than in the peri-urban area of Amsterdam and Utrecht.

The larger urban zones of the medium-sized cities show a differentiated picture. A higher old-age dependency rate in the city compared to that in the peri-urban area is found in the larger urban zones of Eindhoven and Heerlen; a lower rate in the other medium-sized cities. The difference in the lower rate of the cities and their urban areas is not large, only to about one percent point. The only exception is the larger urban zone of Groningen where the difference in grey pressure amounts to five percent points.

9.4.2 Housing

The dwelling stock in the cities is generally of a lesser quality than the dwelling stock at the national level. Chapter 8 showed that the ten Urban Audit cities differ

Table 9.4
City and peri-urban area: difference in housing of households

	Households owning their own dwelling	Households in social housing	Households in privately rented housing	Households in non-conventional dwelling
Larger urban zones (LUZ)	*%*			
LUZ large cities				
Amsterdam	–35	18	14	3
Rotterdam	–29	18	10	1
The Hague	–22	8	11	2
Utrecht	–16	–1	16	0
LUZ medium-sized cities				
Eindhoven	–26	12	16	–2
Tilburg	–22	19	4	0
Groningen	–39	9	29	1
Enschede	–17	12	4	1
Arnhem	–12	8	5	–1
Heerlen	–17	16	0	0

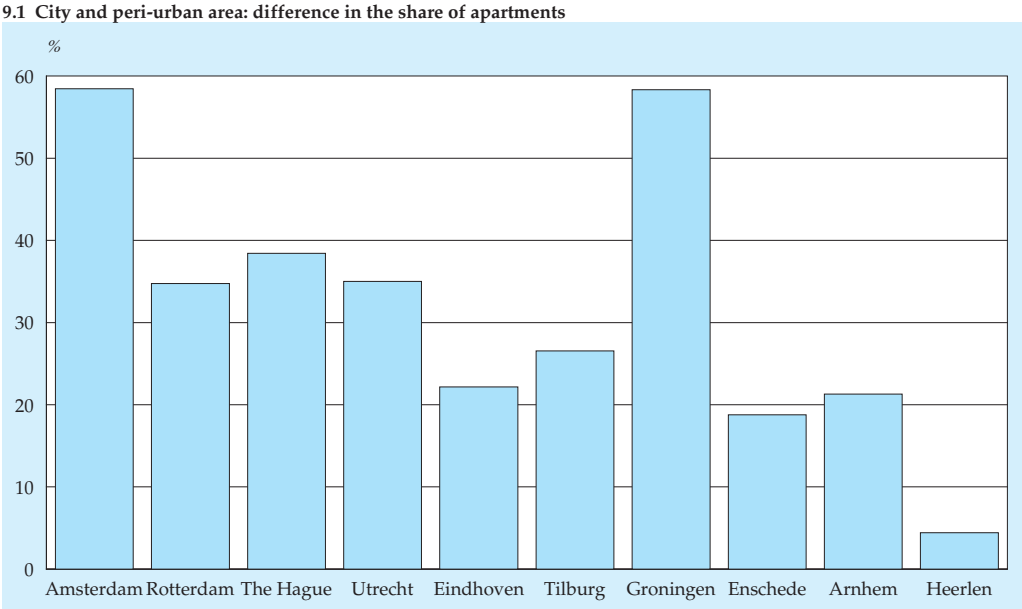
substantially with regard to the various quality indicators. The question here is how the housing quality in the cities differs from that in their peri-urban area.

The largest differences between city and peri-urban area with regard to owning homes are found in the larger urban zones of Amsterdam and Groningen (Table 9.4). The smallest differences can be observed in the larger zones of Utrecht, Enschede, Heerlen and Arnhem. It is noteworthy that the differences cut across the four groups of larger urban zones distinguished above with regard to their urban structure.

Social housing varies more between city and peri-urban area in the larger urban zones of Amsterdam, Rotterdam, Tilburg and Heerlen. This observation corresponds more or less with the finding in chapter 8 that social housing is very important in the four cities. No difference between city and peri-urban area can be observed in the larger urban zone of Utrecht, while the smallest differences between city and peri-urban area are found in the larger urban zones of The Hague, Arnhem and Groningen.

The private renting difference between city and peri-urban area varies most in the larger zone of Groningen. This observation is not surprising since private renting is popular in the city of Groningen, as shown in chapter 8. There is no or hardly any difference between city and per-urban area in the larger urban zones of Heerlen, Tilburg, Enschede and Arnhem. There are almost no differences between city and peri-urban area with respect to the households living in a non-conventional dwelling with a conceivable exception of the larger zones of Amsterdam and The Hague.

9.1 City and peri-urban area: difference in the share of apartments



It is also not unexpected to find more apartments and fewer houses in the ten Urban Audit cities than in their peri-urban areas (Figure 9.1). The difference between the various cities and their peri-urban areas is rather striking. The largest difference is found in the larger urban zones of Amsterdam and Groningen. The apartments in those cities are overrepresented by almost sixty percent points.

A substantially smaller overrepresentation of apartments in the cities can be observed in the larger zones of the other three large cities of Rotterdam, The Hague and Utrecht. It amounts to around 35 percent points. Almost no difference is found for Heerlen. The difference between city and hinterland amounts to about twenty percent points in the other larger urban zones.

9.4.3 Labour market

Two indicators are available at the level of the larger urban zones to examine the relationship between city and peri-urban area with respect to the labour supply, namely the participation rate and the unemployment rate.
It is interesting to observe that the city's male residents have a lower participation rate than the male population of the corresponding peri-urban area in almost all larger urban zones (Table 9.5). That is particularly the case in the larger urban zones of the four large cities and in the zone of Enschede. There is almost no difference between city and peri-urban area in the larger urban zones of Heerlen, Arnhem and Groningen.

Table 9.5
City and peri-urban area: difference in activity rate and unemployment rate

	Activity rate		Unemployment rate	
	Male	Female	Male	Female
Larger urban zones (LUZ)	*in % of inhabitants aged 15–64*		*in % of economically active population*	
LUZ large cities				
Amsterdam	–5	–5	1	1
Rotterdam	–5	–2	3	1
The Hague	–7	–2	4	2
Utrecht	–6	1	1	0
LUZ medium-sized cities				
Eindhoven	–4	3	1	1
Tilburg	–2	–3	3	0
Groningen	–1	8	4	0
Enschede	–7	–3	2	0
Arnhem	–1	4	3	4
Heerlen	0	–3	1	0

That situation shows much more variation for the female population. In some larger urban zones the participation rate of city women is higher than that of the female population in the peri-urban area; the opposite situation is true in other larger urban zones. Women in the cities participate more than women in the corresponding peri-urban area of Groningen, Arnhem, Eindhoven and Utrecht. The difference between city and peri-urban area is particularly striking in the larger urban zone of Groningen, where the participation rate in the city is eight percent points higher than in its peri-urban area. The opposite tendency can be observed in the larger urban zones of the other three large cities and of Tilburg, Enschede and Heerlen. The largest difference is found in the larger zone of Amsterdam. Women living in the peri-urban area there have a five percent higher participation rate than women living in Amsterdam itself. The smallest difference can be observed in the larger urban zones of Rotterdam and The Hague.

The unemployment rates for the male population in all cities are higher than in the corresponding peri-urban area. The largest difference between city and surrounding area is found in the larger urban zones of The Hague and Groningen; the smallest difference is in the larger urban zones of Amsterdam, Utrecht, Eindhoven and Heerlen.

The situation of the women differs again from that of the men. The unemployment rates for women are only higher in the cities in half of the corresponding larger urban zones. The largest difference of four percent points is found in the larger zone of Arnhem. The other differences are found in the larger urban zones of the three largest cities and in the Eindhoven area. No difference is found in the larger urban zones of the city of Utrecht, Tilburg, Groningen, Enschede and Heerlen.

9.4.4 Economic activity

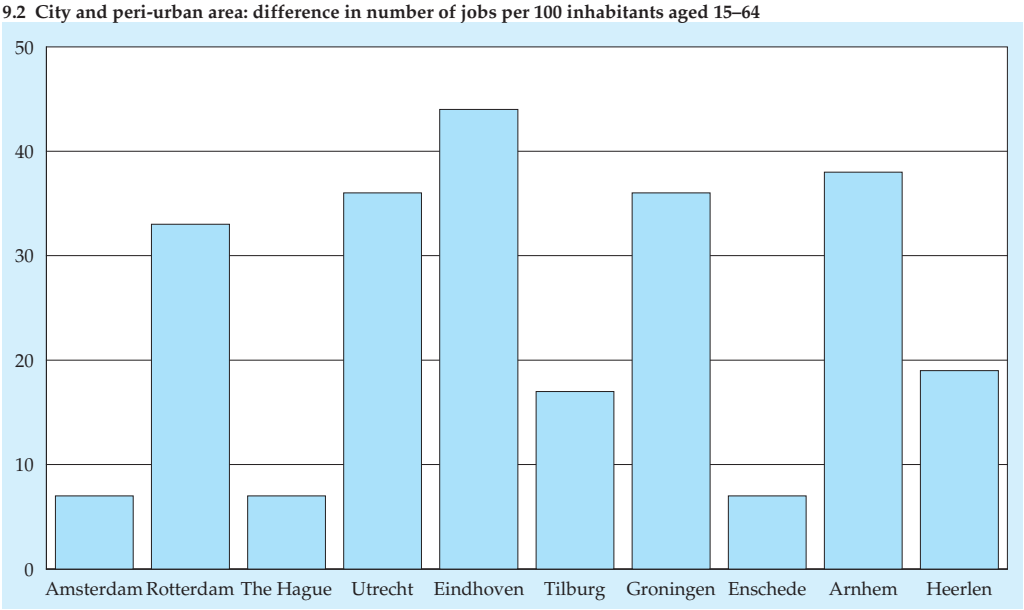
Cities are centres of economic activity for their surrounding area, but not all Urban Audit cities function in the same manner as the comparison of the data on the number of jobs per 100 residents for the cities and their peri-urban areas shows. The cities all show a higher ratio between the numbers of jobs to its resident population than the peri-urban areas. The differences, however, are quite large in the various larger urban zones (Figure 9.2).

The largest difference exists in the larger urban zones of Eindhoven (44 percent points), Arnhem (38 percent points), Groningen and Utrecht (36 percent points each) and Rotterdam (33 percent points). These cities are huge centres of economic activity for their peri-urban area in comparison to the other six cities. Lesser centres of economic activity for their per-urban area are Heerlen (19 percent points) and Tilburg (17 percent points). The position of Amsterdam, The Hague and Enschede with respect to their peri-urban area is remarkable. A lot of economic activity takes place in the peri-urban area of these cities. There is almost no overrepresentation of the number of jobs per 100 persons of working age in those three cities compared with their peri-urban areas.

9.4.5 Income disparities

The quality of life in the socio-economic sphere seems to be better in the peri-urban areas than in the cities themselves when quality is measured by the various Urban

9.2 City and peri-urban area: difference in number of jobs per 100 inhabitants aged 15–64



Audit income indicators. This conclusion can be drawn from the existing disparities between the cities and their peri-urban areas of the median disposable annual household income [3)], the share of households with less than half of the national average income and households reliant on social security benefits. The median disposable annual household income is lower and the share of both other household types is higher in the cities than in their corresponding peri-urban area (Table 9.6).

However, there are considerable differences between the various Urban Audit cities and their peri-urban areas in the income disparity indicators. The amount of the median disposable annual household income in Amsterdam, for example, is € 6,300 less than the income of the corresponding household category in the peri-urban area of this city. The difference in the median disposable annual household income in Heerlen, on the other hand, is only € 2,700 less than in the peri-urban area of that city. Large differences between city and peri-urban area with regard to this household income category are also found in the larger urban zones of the other three large cities and in the larger urban zone of Groningen. A relatively small difference is found in the larger urban zones of Eindhoven and Arnhem, besides the larger urban zone of Heerlen.

The variation in the differences between city and peri-urban area is not as large with regard to the share of households living on less than half of the average national income and on social security benefits (Table 9.6). Both types of households at risk of poverty are more overrepresented in the three largest cities in comparison to their peri-urban area than in the other cities. The overrepresentation of households with less than half of the average national income in the three largest cities varies from

Table 9.6
City and peri-urban area: difference in income disparities

	Median disposable annual household income	Households with less than half of the national income	Households reliant on social security benefits
Larger urban zones (LUZ)	*euro*	*in % of total households*	
LUZ large cities			
Amsterdam	–6,300	9	7
Rotterdam	–5,700	12	8
The Hague	–5,000	11	9
Utrecht	–5,100	6	4
LUZ medium-sized cities			
Eindhoven	–3,100	5	2
Tilburg	–3,900	5	4
Groningen	–4,700	7	3
Enschede	–3,600	6	4
Arnhem	–3,100	6	4
Heerlen	–2,700	5	4

nine to twelve percent points, whilst that overrepresentation in the other cities varies between five and seven percent points. Households reliant on social security benefits are overrepresented by seven to nine percent points for the three large cities and between two and four percent points in the other cities in comparison to their corresponding peri-urban areas.

9.4.6 Educational qualifications

Analysing the educational qualifications of the working age population in the cities in relation to their corresponding peri-urban area population one finds a number of interesting trends. First, there are more working age inhabitants with a tertiary education in the cities than in their corresponding peri-urban areas. The only exception is Heerlen, where the population with a tertiary education is more numerous in the peri-urban area than in the city. The difference between city and hinterland in the cities is relatively small in the larger urban zones of Rotterdam and The Hague and in the zones of the medium-sized cities of Tilburg, Enschede and Arnhem (one to five percent points). The difference between city and peri-urban area is larger in the larger urban zone of Eindhoven (nine percent points) and especially in the larger urban zones of Amsterdam, Utrecht and Groningen (thirteen percent points).

Secondly, inhabitants of working age with a higher secondary education are relatively more numerous in the peri-urban areas than in the cities. The only exception is Groningen, where proportion of inhabitants is higher in the city than in the peri-urban area, although that difference is small (one percent point). Big differences are found in the larger urban zones of the four large cities and in the larger urban zone of Eindhoven. The differences vary from thirteen percent points in the larger urban zone of Amsterdam to seven percent points in the larger zone of Eindhoven.

Thirdly, the pattern between city and peri-urban area in the various larger urban zones varies more with respect to the working age residents with only primary or lower secondary education. No difference between city and peri-urban area exists in the larger urban zones of Amsterdam and Enschede. The population with these educational qualifications are equally numerous in both spatial units of these larger urban zones. On the other hand, this population group is overrepresented in Rotterdam, The Hague, Arnhem and Heerlen in comparison to the peri-urban areas of these cities. The overrepresentation varies from six percent points in Rotterdam and The Hague to two percent points in Arnhem. Finally, the population group is underrepresented in the cities of Utrecht, Eindhoven, Tilburg and Groningen in comparison to their peri-urban areas. This underrepresentation is fifteen percent points in the city of Groningen, but considerably smaller in the other cities, varying from two percent points in Eindhoven to five percent points in Utrecht.

Table 9.7
City and peri-urban area: difference in educational qualifications of inhabitants aged 15–64

	Qualified at ISCED levels 1–2	Qualified at ISCED levels 3–4	Qualified at ISCED levels 5–6
Larger urban zones (LUZ)	*in % of inhabitants aged 15–64*		
LUZ large cities			
Amsterdam	0	–13	13
Rotterdam	6	–10	4
The Hague	6	–9	2
Utrecht	–5	–8	13
LUZ medium-sized cities			
Eindhoven	–2	–7	9
Tilburg	–4	–2	5
Groningen	–15	1	13
Enschede	0	–1	1
Arnhem	2	–4	2
Heerlen	4	–1	–3

To get an over-all picture of the difference with regard to the educational qualifications of the working age population, the distribution in the peri-urban areas was reweighted according to the ISCED categories in the same computation manner as in chapter 8. Next, we compared the reweighted scores for the individual cities with those computed for their peri-urban area. The main conclusions are that the working age populations:

a. in the cities of Amsterdam, Utrecht, Groningen, Eindhoven, Tilburg and Enschede have higher educational qualifications than the working age population in the peri-urban areas of these cities. Striking differences exist in the extent to which this is the case. The largest difference in the educational qualifications exists in the larger urban zone of the cities of Groningen, Utrecht and Amsterdam; a smaller difference in the larger urban zones of Eindhoven, Tilburg and Enschede.
b. in the cities and the peri-urban area of Rotterdam and Arnhem are equally qualified.
c. in the cities of The Hague and Heerlen are educationally less qualified than the working age population in their peri-urban area.

Looking at the variation in the reweighted scores for the ten cities and for the ten peri-urban areas one can observe a larger variation in the scores for the cities than in the scores for the peri-urban areas. That variation is twice as large in the cities than in the peri-urban areas. This means that there is a greater disparity in the educational qualifications of the working age population between the cities than there is between their peri-urban areas.

9.5 *Concluding remarks*

In this chapter the differences between the ten Urban audit II cities and their peri-urban area have been examined. In particular, the question was whether the differences followed the lines distinguished in section 3 between the four types of larger zones from an urbanisation viewpoint. The result of the analysis in section 4 is generally negative.

An exception can be made for the three large urban zones of Amsterdam, Rotterdam and The Hague that are highly urbanised. This category distinguishes itself from the other three groups of larger urban zones in some respects. These relate to demographic aspects, housing aspects, labour participation, income disparities and the educational qualifications of the inhabitants.

The three largest cities differ much more from their peri-urban area in demographic aspects than the other cities. The three cities house more migrants and single parent households. The same holds true for the difference of these cities with regard to the households at risk of poverty. The three largest cities have more households living on less than half of the national average income and on social security benefits than the other cities in relation to their peri-urban areas.

This situation applies partly to the labour participation rate of the male and female population of working age and the proportion of the working age population with only primary or lower secondary education in the large cities in comparison to the corresponding population in their peri-urban areas. They share that position with the other large city, Utrecht, as far as the labour participation of the male population of working age is concerned and the share of inhabitants with primary or lower secondary education only; and with three other medium-sized cities for the labour participation rate of women of working age.

The three big cities also distinguish themselves from the other cities in comparison to their peri-urban areas with respect to the share of households renting a dwelling privately. They occupy an intermediary position in this respect between the cities in the larger urban zones of Utrecht; Eindhoven, Tilburg and Groningen and the larger urban zones of Enschede, Arnhem and Heerlen. Noteworthy is that the cities in this last group of larger urban zones show the smallest difference with their peri-urban area.

The final conclusion can therefore only be that local and regional aspects have to be taken into account to understand the differences between the Urban Audit cities and their peri-urban area. The extent to which city and peri-urban area are urbanised plays a role, but only for the larger urban zones of the three large cities, and only to a certain extent.

Annotations

1) The latter data source was added due to the specific algorithm that was used in the cluster analysis chosen for the delineation of the urban regions. This algorithm consists of a symmetric criterion, which takes the number of commuters from area A to area B in both directions into account in order to stress the mutual connectedness between the local units within an urban region (Vliegen, 2004b).
2) The surrounding area is the area within a radius of one kilometre. The actual computation has been based on the grids of 500 x 500 meter of the national grid square. Consequently, the surrounding area had also to be defined in terms of those grid squares. The surrounding area consists of thirteen grid squares in this respect, namely a grid square at a distance of zero kilometre (the own grid square) and twelve grid squares at a distance from zero to one kilometre from the own grid square. The final classification consists of five classes, namely 2,500 addresses or more per km^2, 1,500–2,500 addresses per km^2, 1,000–1,500 addresses per km^2, 500–1,000 addresses per km^2 and less than 500 addresses per km^2 (Van de Stadt and Vliegen, 1993).
3) For the definition of disposable income see the annotation in chapter 8.

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10. Cities under the microscope Some results of the Urban Audit II

Mathieu Vliegen

In the two preceding chapters we presented the main findings for the ten cities in the Netherlands that participated in Urban Audit II. The focus in chapter 8 was on the differences between the ten Urban Audit II cities, especially between the large and the medium-sized cities. Chapter 9 focused on the differences between the ten cities in relation to their peri-urban areas. In the current chapter we review the main Urban Audit findings for the sub-city districts of the various cities. The central theme is differences in the inner-city differentiation. Three issues are treated. First, the range in the inner-city differentiations and differences between the Urban Audit cities with regard to that range. Second, the homogeneity or heterogeneity of the spatial distributions within each Urban Audit city and differences between the cities in this respect. Third, the accumulation of inner-city disparities and differences between the Urban Audit cities in this respect.

10.1 Introduction

Many phenomena are unequally distributed at the sub-city level, with social and economic disparities between districts as a consequence. The disparities in cities and their consequences have been documented and analysed in detail in the Netherlands for some time (see, for example, Knol, 1998). The Dutch government is very interested in the disparities. Its Major Cities Policies focus on urban renewal, particularly in certain neighbourhoods of the large and medium-sized cities. Urban renewal at the sub-city level is also a policy issue at the EU level. Examples are the Community Initiative URBAN with programmes for depressed European urban neighbourhoods, and Objective 2 of the Structural Funds with similar programmes for the period 2000–2006.

With these European policy objectives in mind, the need at the European level for comparable urban statistics at the spatial level of sub-city districts is self-evident. The collection of such statistics within the framework of the Urban Audit II primarily serves analyses to better understand the social imbalances within European cities. The statistics collected at the sub-city level in the Urban Audit are restricted to about 30 key variables in demography, social and economic aspects, education and environment.

This chapter shows some major findings of the Urban Audit II at the sub-city level. Like in chapter 8 and 9 they are restricted to a few census and census related topics. The methodology and the data sources used were described in chapter 8. All statistical data collected at the sub-city level can be consulted and downloaded from the website of Statistics Netherlands (http://www.cbs.nl/en/publications/articles/regional/urban-audit-II.htm). Before presenting the major findings for the sub-city districts this chapter will deal with the delimitation of the sub-city districts of the Urban Audit cities in the Netherlands in section 10.2. Section 10.3 reviews the range in differentiation of the sub-city districts and section 10.4 their homogeneity or heterogeneity. Section 10.5 explores the accumulation of disparities at the sub-city level. The chapter concludes with some final remarks.

10.2 Delimitation of the sub-city districts

The concept of the sub-city district has been introduced in order to be able to analyse social imbalances within the Urban Audit cities at the European level. For that purpose Eurostat recommended delimiting the sub-city districts in such a way that they (a) should be internally as homogeneous as possible and (b) should show a maximum variation between them. For practical reasons, they should also have a target of twenty thousand inhabitants each, with a variation between five thousand and forty thousand (Carlquist, 2002).

Statistics Netherlands consulted the Netherlands City Network of Departments for Research and Statistics on the delimitation of the sub-city districts in Dutch Urban Audit cities. It was decided to add two other criteria. The first refers to the city's neighbourhoods (census tracts), which are co-ordinated nation-wide by Statistics Netherlands. These should be used as the building blocks. The second relates to larger sub-city territorial units for administrative purposes. They should be left intact in those cities, where such units exist.

The actual delimitation of the sub-city districts took place in close co-operation between Statistics Netherlands and the Departments for Research and Statistics of the ten Urban Audit cities, using their knowledge of the internal structure of the cities. Statistics Netherlands took care of (a) a well-balanced distribution of the districts between the cities according to the average number of inhabitants in relation to the target population criterion and (b) of an adequate application of the criteria of homogeneity and maximum variation using the average disposable annual income per capita for the year 2000 as an indicator [1)].

Table 10.1 gives a summary of the results of the actual delimitation. For every city it contains (a) the number of sub-city districts delimited, (b) the average population per district as well as the variation in the population figures between the districts,

and (c) the variation in the average disposable annual income per capita between the districts.

It should be noted that the number of inhabitants in 2 out of the 161 sub-city districts delimited is below the threshold of five thousand. Both are located in Eindhoven. One of these sub-city districts is expected to grow rapidly during the next few years; the other one has a completely different social structure from the surrounding districts.

The average sub-city district population is the highest in Enschede, while that city has also the lowest variation in the number of inhabitants between its districts. Eindhoven has the lowest average sub-city population. The highest variation in the number of inhabitants between the sub-city districts is found in The Hague. So is the highest variation between the average disposable income per capita between the sub-city districts (€ 9,400). This is followed by Amsterdam (€ 8,400); the lowest variation is found in Enschede (€ 1,900).

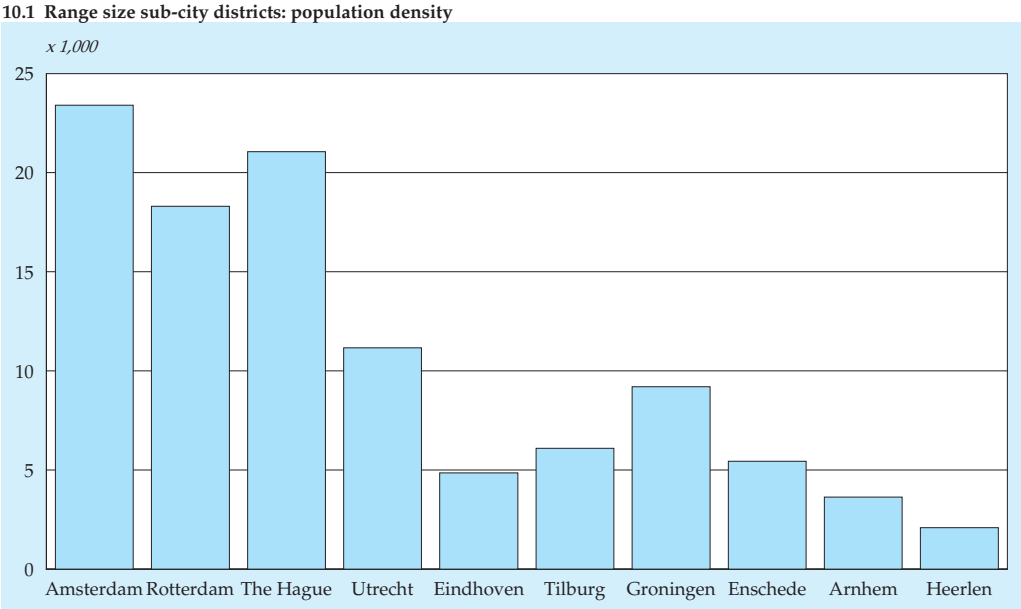
10.3 *Inner-city differentiation: ranges between the sub-city districts*

The Urban Audit cities can be compared in more than one way with regard to differentiation occurring in each city. The first way is to look at the highest and lowest values of the sub-city districts. The range between those sub-city districts is

Table 10.1
Sub-city districts per city

	Number of districts	Population			Average disposable income per capita	
		Average	Minimum	Maximum	Minimum	Maximum
					euro	
Large cities						
Amsterdam	37	19,850	9,280	33,880	8,600	17,000
Rotterdam	31	19,200	9,440	30,160	7,800	14,000
The Hague	26	17,010	6,460	33,630	7,300	16,700
Utrecht	15	17,090	6,750	26,470	8,400	14,500
Medium-sized cities						
Eindhoven	13	15,650	1,690	27,780	10,300	13,700
Tilburg	12	16,320	6,430	31,010	8,400	13,100
Groningen	9	19,360	12,170	27,300	8,800	13,600
Enschede	6	25,070	19,220	25,520	8,700	10,600
Arnhem	7	19,900	14,160	26,770	8,500	12,200
Heerlen	5	19,030	10,350	21,890	9,500	12,800

10.1 Range size sub-city districts: population density



then used as the criterion for the comparison between the Urban Audit cities with regard to their inner-city differentiation. This kind of comparison will take place in this section.

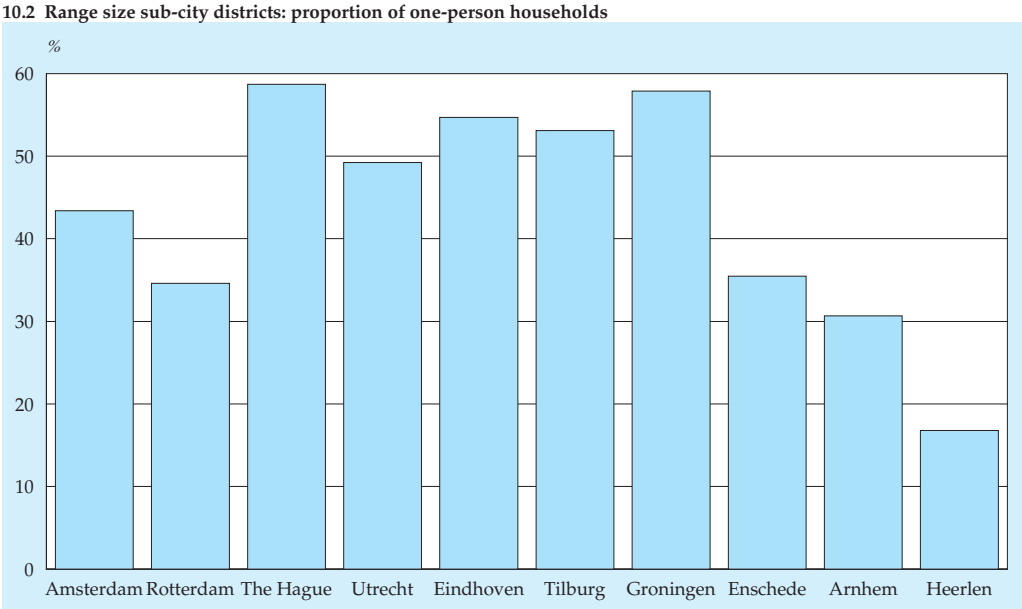
10.3.1 Population density

Every Urban Audit city shows a great variety in the population density of its sub-city districts. In every city densely populated districts alternate with less densely populated ones. But not every city has the same variation in density. Three groups of cities can be distinguished in this respect (Figure 10.1). The first group consists of the three large cities of Amsterdam, The Hague and Rotterdam. These cities show the largest range in population density between their sub-city districts, varying from 23,400 inhabitants per km² in Amsterdam to 18,300 inhabitants per km² in Rotterdam. The next group consists of the large city of Utrecht and the medium-sized city of Groningen. The third group consists of the other five medium-sized cities, which ranges vary from 6,090 inhabitants per km² in Tilburg to 2,090 inhabitants per km² in Heerlen.

10.3.2 Households

One-person households are not only overrepresented in cities in comparison to more rural areas, but they are also overrepresented in some particular districts within cities. The differentiation in the location of one-person households can be

10.2 Range size sub-city districts: proportion of one-person households

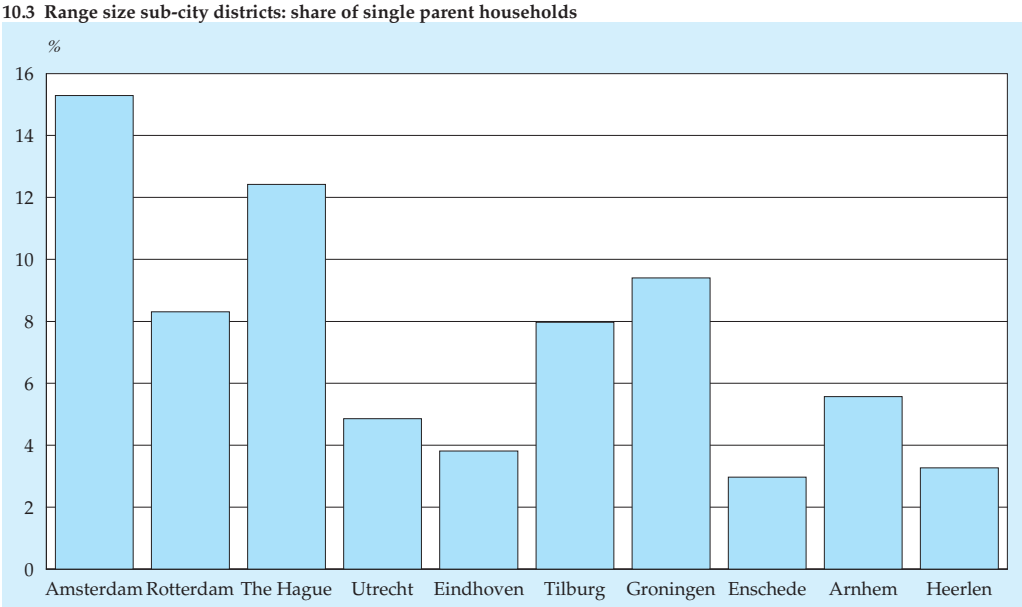


very large in some cities. The largest is found in The Hague and Groningen (Figure 10.2). The range between the sub-city districts with the lowest and the highest proportion of one-person households in those cities amounts almost to 60 percent points. Eindhoven, Tilburg and Utrecht are also characterized by a large range between the two types of sub-city districts of about 50 percent points. The smallest inner-city range is found in the smallest medium-sized city of Heerlen, where it amounts to only 17 percent points. The inner-city range in the other cities varies from 43 percent points in Amsterdam to 31 percent points in Arnhem.

The difference between the cities with regard to the spread of single parent households shows a different pattern from the preceding one (Figure 10.3). Amsterdam and The Hague are the cities with the largest range between the sub-city districts with the lowest and highest proportion of this household type. In Amsterdam this range amounts to fifteen percent points and in The Hague to twelve percent points. The second group consists of Groningen, Rotterdam and Tilburg. The difference between the sub-city district with the lowest and the one with the highest share of single parent households varies around eight percent points in these cities. The range for the other five cities varies from six percent points in Arnhem to three percent points in Heerlen.

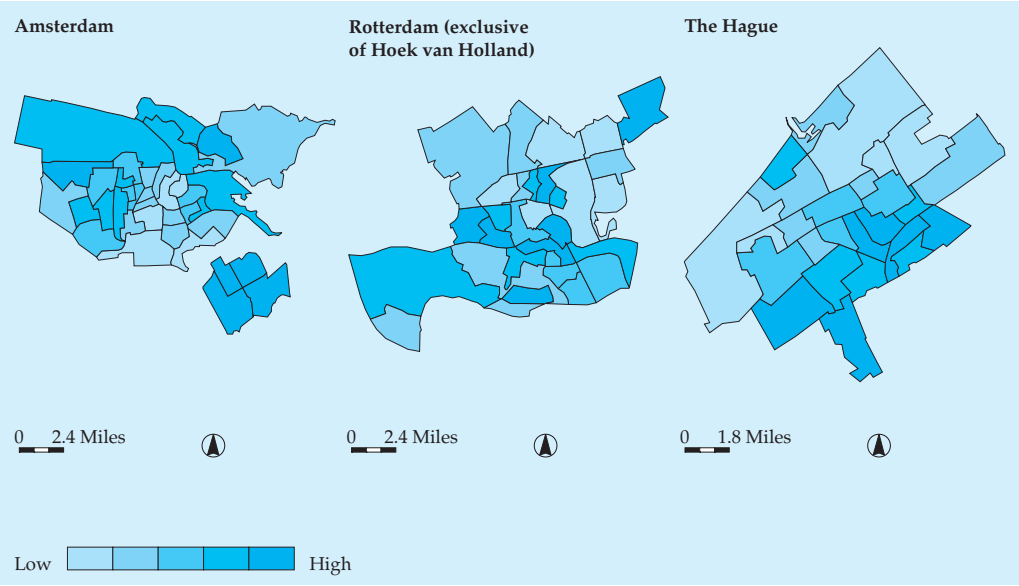
In chapter 8 we pointed out that single parent households are mostly found in Amsterdam, Rotterdam and The Hague. Those cities are also characterised by a large spread of this household type, especially in Amsterdam and The Hague. It is,

10.3 Range size sub-city districts: share of single parent households



therefore, interesting to examine the distribution of single parent households for these three cities more in detail with a view to determine certain spatial patterns in that distribution. For that purpose map 10.1 has been constructed for these three cities.

Map 10.1 Three largest cities: share of single parent households per sub-city district

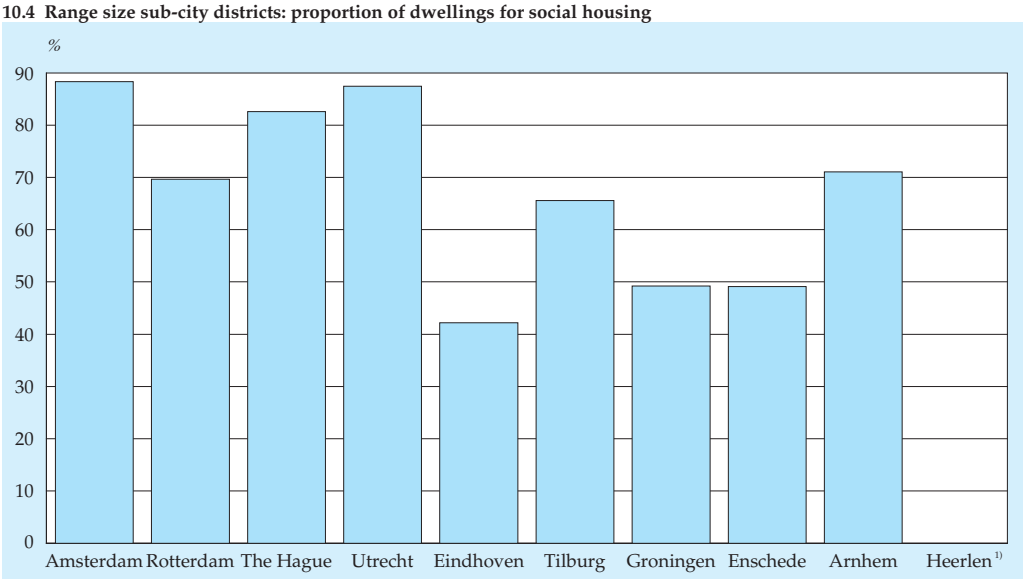


The map shows that spatial concentrations of districts with a low and a high proportion of single parent households exist in all three cities. In Amsterdam the sub-city districts with many single parent households are mainly located in the south-eastern, northern and western part of the city, while the sub-city districts with few single parent households are concentrated in districts extending from the centre to the southern part of the city. In Rotterdam the sub-city districts with many single parent households are located in a ring of a number of contiguous districts south to the centre district and partly to its north. The sub-city districts with few single parent households are mainly found in the centre and in the north-eastern part of the city. In The Hague a clear distinction exists between the eastern part of the city, in which the sub-city districts with many single parent households are concentrated, and the northern and southern part of the city where one finds few single parent households.

10.3.3 Social housing

The differentiation with respect to social housing is large in all Urban Audit cities (Figure 10.4). The largest range between the sub-city district with the lowest and the highest proportion of such dwellings is found in Amsterdam, Utrecht and The Hague. In Amsterdam this amounts to 88 percent points, in Utrecht to 87 percent points and in The Hague to 83 percent points. The range is also relatively large in Rotterdam, Arnhem and Tilburg, with about 70 percent points in Rotterdam and

10.4 Range size sub-city districts: proportion of dwellings for social housing



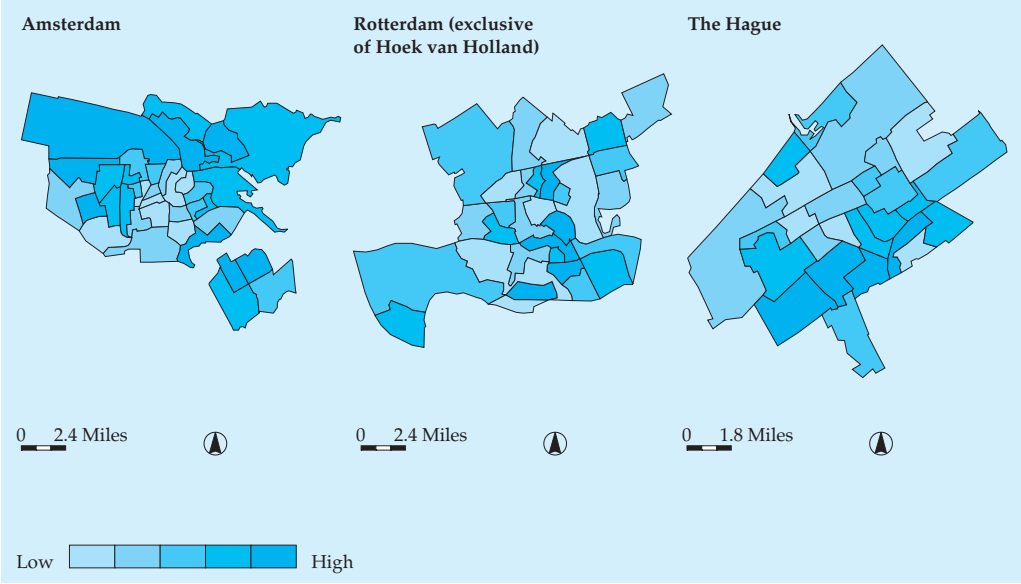
1) No figures are available for the subcity district of Heerlen.

Arnhem, and 66 percent points in Tilburg. The cities of Groningen, Enschede and Eindhoven have the smallest range, varying from almost 50 percent points in Groningen and Enschede to 43 percent points in Eindhoven. Unfortunately, no figures are available for the sub-city districts of Heerlen.

Social housing is a very important type of housing for households in the large cities, especially in the two largest ones: Amsterdam and Rotterdam. Looking at the spatial distribution of the dwellings for social housing in the three largest cities in more detail, one finds almost similar patterns as those observed for the spatial distribution of the single parent households over the districts (Map 10.2).

The districts with many dwellings for social housing purposes in Amsterdam, for example, are mainly located in the south-eastern and northern part of the city, while the districts with a low proportion of social housing are found in an area extending from the centre to the southern districts. The spatial concentration of sub-city districts with many dwellings for social housing in Rotterdam is mainly south and north of the city centre. The districts with relatively few dwellings for social housing are mainly concentrated in a ring located to the north and to the south, around the districts with much social housing. In The Hague social housing is mainly located in the eastern part of the city with the south-eastern districts as its centre of gravity. The sub-city districts with relatively few dwellings for social housing are mainly concentrated in districts south-west of the city's centre.

Map 10.2 Three largest cities: proportion of dwellings for social housing per sub-city district



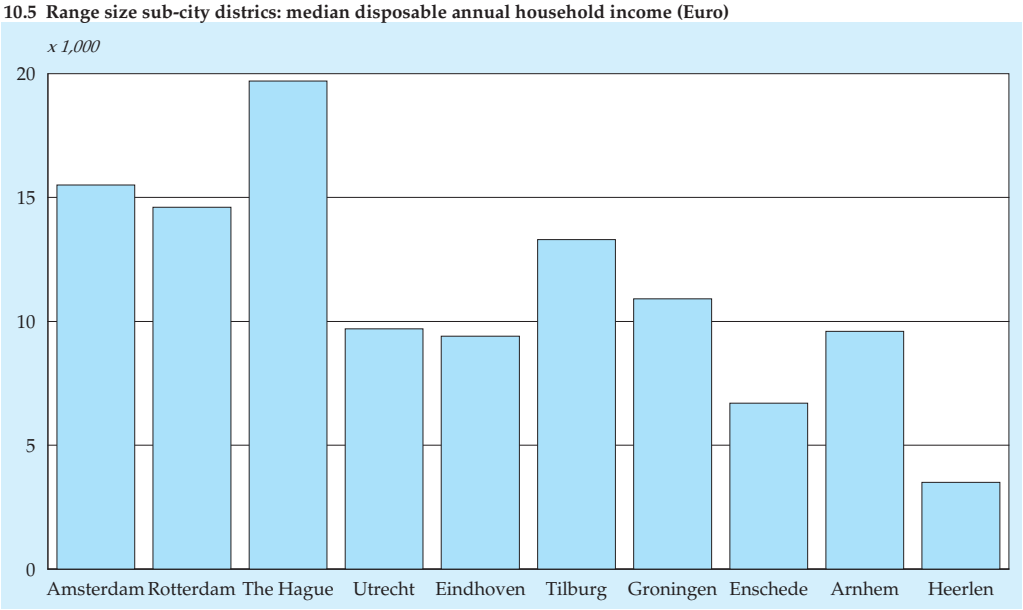
10.3.4 Income disparities

The Hague is the city with the largest range of median disposable annual household income (Figure 10.5). The difference between the districts with the lowest and the highest median disposable annual household income in this city amounts to € 19,700. This amount is even higher than the median disposable annual household income in the lowest income districts of Amsterdam, Rotterdam, The Hague, Groningen, Arnhem and Enschede.

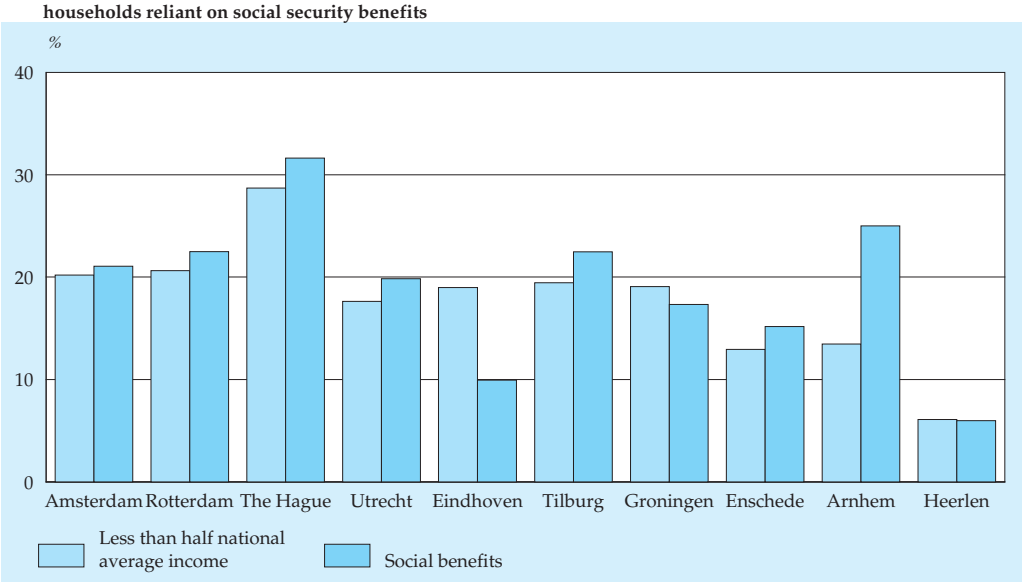
The spread of the median disposable annual household income between the lowest and highest sub-city district is also quite large in Amsterdam, Rotterdam and Tilburg, ranging between about € 15,000 in Amsterdam and Rotterdam to € 13,300 in Tilburg. There are also considerable differences between the lowest and highest income districts in Groningen, Utrecht, Arnhem and Eindhoven, ranging from € 10,900 in Groningen to € 9,400 in Eindhoven. The cities with the smallest range between the districts with the lowest and the highest median annual disposable household income are Enschede and Heerlen. The range between the respective sub-city districts in Heerlen amounts only to € 3,500.

The Hague is also the city with the largest range between the districts with the lowest and the highest share of households living on less than the national average income (Figure 10.6). The range amounts to almost 30 percent points. The range is smaller in the other three large cities and in Eindhoven, Tilburg and Groningen. The

10.5 Range size sub-city districs: median disposable annual household income (Euro)



10.6 **Range size sub-city districts: proportion of households with less than half of the national average income, and households reliant on social security benefits**

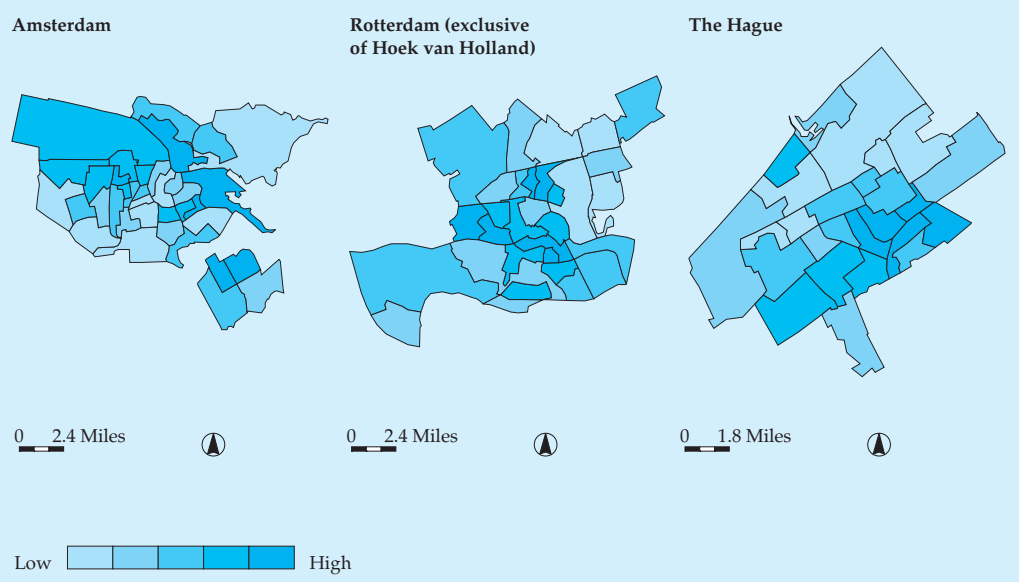


range between the districts with the lowest and highest proportion of households living on less than the national average income varies from 21 percent points in Rotterdam to 18 percent points in Utrecht. The range amounts to 13 percent points in Enschede and Arnhem. The smallest inner-city range is again found in Heerlen, namely only six percent points.

The largest range in the location of the households living on social benefits is again found in The Hague (Figure 10.6). In the district with the highest share of households living on social benefits, one out of three households relies on social benefits. In the district with the lowest share this is only the case for one percent of the households.
Noteworthy is also that the range between the lowest and highest district in Arnhem amounts to 25 percent points. This is larger than the ranges in the other three large cities and in Tilburg, where the districts with the lowest and highest proportions of households reliant on social benefits have about a 20 percent point range. The lowest ranges are found in Eindhoven with ten percent points and in Heerlen with six percent points.

Relatively many households living on social security are found in the three large cities. Therefore, it is interesting to analyse the distributions of this household type more in detail. The spatial patterns found resemble the spatial clustering of districts found for the single parent households described above.

Map 10.3 Three largest cities: proportion of households reliant on social security benefits per sub-city district



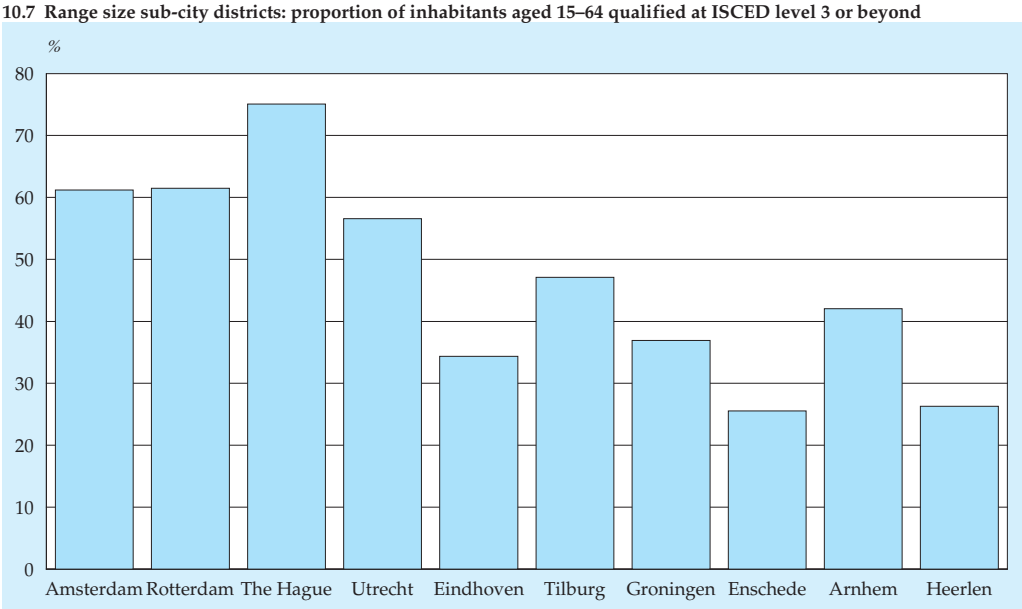
The sub-city districts with relatively many households living on social security benefits in Amsterdam are mainly concentrated in the (south)-eastern and northern part of the city, while the sub-city districts with relatively few households of this type are located in an area extending from the city centre to the southern part and from there to the south-western outskirts. The sub-city districts with relatively many households reliant on social security benefits in Rotterdam are practically all concentrated in a ring around the centre of the city, while the sub-city districts with relatively few such households are found in the north-eastern part. In The Hague, the sub-city districts with relatively many households on social security are again found in the eastern part of the city, and the districts with relatively few households on benefits are in the north and centre.

10.3.5 Educational qualifications

There is differentiation in educational qualifications in every city, but not to the same extent. This finding can be illustrated by the proportion of inhabitants aged 15–64 with at least a certificate at the higher level of secondary education (ISCED level 3 or more) at the sub-city district level.

The range between the sub-city district with the lowest and the highest proportion of those inhabitants is larger in the four large cities than in the six medium-sized cities (Figure 10.7). Furthermore, it turns out that from the four large cities The

10.7 **Range size sub-city districts: proportion of inhabitants aged 15–64 qualified at ISCED level 3 or beyond**



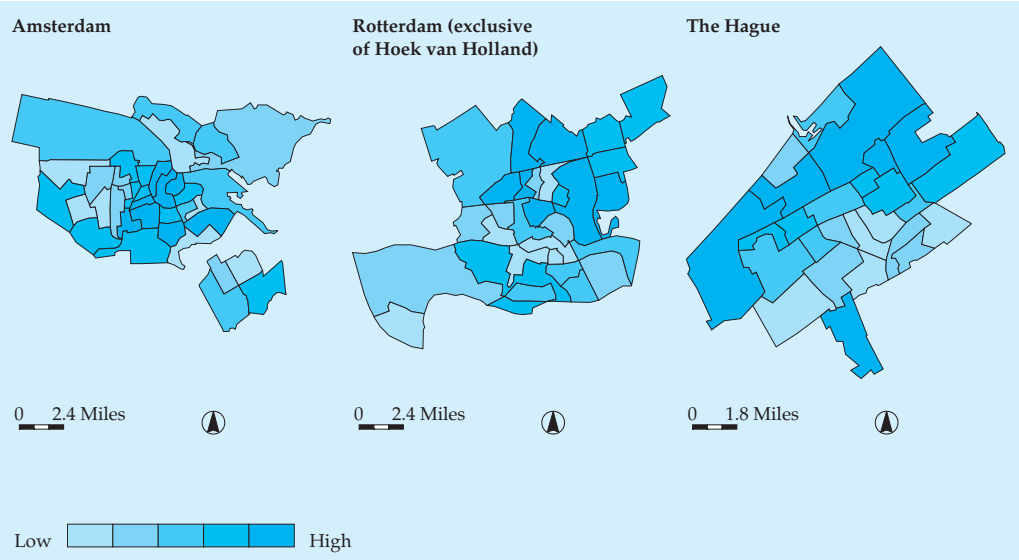
Hague has the largest range between the lowest and the highest district. Those districts differ by 75 percent points! The range between the districts with the least and most highly educated inhabitants in the other three large cities is substantially smaller, varying from 61 percent points in Amsterdam and Rotterdam to 57 percent points in Utrecht.

From the six medium-sized cities, the largest range between the districts with the least and most highly educated inhabitants is found in Tilburg and Arnhem, amounting to over 40 percent points. The smallest range is found in Enschede and Heerlen; however, it still amounts to 26 percent points.

The high ranges in the three large cities with regard to the educational qualifications make it tempting to analyse the spatial distribution of those inhabitants. Inner-city patterns emerge from this analysis that are quite similar to the patterns observed for the other three topics.

The sub-city districts in Amsterdam with a high proportion of relatively highly educated inhabitants are mainly concentrated in the area extending from the centre district to the southern part of the city. From there, however, it extends to the eastern part of the city. The sub-city districts with a low proportion of such inhabitants are specifically concentrated in the western and partly in the south-eastern part of the city. The sub-city districts in Rotterdam with a high concentration of more highly educated inhabitants are located in the centre district and from there extending to

Map 10.4 Three largest cities: proportion of inhabitants aged 15–64 qualified at ISCED level 3 of beyond per sub-city district



the north-eastern part of the city; the districts with a low concentration of such inhabitants are located for the greater part south to the centre and partly in districts north of the centre. In The Hague again, there is a clear distinction between the eastern part of the city where the sub-city districts with a lower concentration of highly educated inhabitants are located, and the northern and southern part of the city, where one finds the sub-city districts with higher concentrations of highly educated inhabitants.

10.4 *Differentiation within the cities: homo versus heterogeneity*

This section goes one step further in the comparison of the cities with regard to their differentiation. The question raised here is whether the spatial distribution of the various district characteristics in every city can be qualified in terms of homogeneity or heterogeneity, and if so, whether differences exist between the cities in this respect.

An analysis in terms of homogeneity or heterogeneity can be performed by comparing the standard deviation of the distribution of the various district characteristics for each city, since the standard deviation measures the spread of those characteristics. A low standard deviation indicates a more or less equal distribution of a characteristic over a city's sub-city districts. Consequently, the city

is more or less homogeneous in that respect. A large standard deviation indicates an unequal distribution of a characteristic over the city's sub-city districts and, consequently the city can be qualified as more or less heterogeneous.

To perform such an analysis it is necessary to standardize the standard deviation, since that analysis refers to the spatial distribution of various district characteristics. Standardizing can be done by dividing the standard deviation of the distributions of the various characteristics by the city's value of that characteristic. In this way one gets the so-called variation coefficients. These coefficients make it possible to compare the ten Urban Audit cities in terms of more or less homogeneity with regard to the differentiation in the various characteristics.

Such a comparison, however, is only qualitative, since no generally accepted thresholds exist on where the value size of the variation coefficient is to be interpreted as homogeneous or heterogeneous. Sometimes thresholds of .25 and 1.00 are used for that interpretation. A threshold smaller than .25 indicates very little spread, and consequently the respective spatial distribution would be qualified as homogeneous. A variation coefficient larger than 1.00 would indicate a substantial spread and the spatial distribution would consequently be interpreted as heterogeneous. These thresholds are not to be taken for granted. It is therefore better to look at the differences in spread between spatial units than to their levels for this kind of interpretation (Knol, 1996).

The variation coefficients for the spatial distribution of the various district characteristics treated in section 3 are presented in table 10.2. The following main observations can be made from the table with regard to the difference between the cities in homogeneity or heterogeneity of their sub-city districts.

Rotterdam and Enschede are the most heterogeneous cities with regard to the spatial distribution of their inhabitants per km^2. Less heterogeneous in terms of population density are (a) Amsterdam and Groningen, (b) Tilburg and Utrecht and (c) The Hague and Arnhem. The cities of Eindhoven and Heerlen can be qualified as the least heterogeneous in this respect.

The four medium-sized cities of Tilburg, Eindhoven, Enschede and Groningen are less homogeneous with regard to the spatial distribution of one-person households over their sub-city districts than the four large cities and the other two medium-sized cities.

The medium-sized cities of Groningen and Tilburg and the large cities of The Hague and Amsterdam are more heterogeneous with regard to the distribution of single parent households than the other six cities, particularly Enschede, Heerlen and Eindhoven.

The large cities of The Hague and Utrecht and the medium-sized city of Eindhoven are the most heterogeneous cities with regard to the spatial distribution of social housing over their sub-city districts. Also the medium-sized cities of Groningen and Arnhem are quite heterogeneous in this respect. The least heterogeneous cities are Rotterdam and Eindhoven.

Almost no difference in homogeneity between the cities exists with regard to the distribution of the median disposable annual income of the households in their districts. The least homogeneous in this respect is The Hague; the most homogeneous Heerlen.

Tilburg and The Hague and to a certain extent also Eindhoven and Groningen are the least homogeneous cities with regard to the spatial distribution of households living on less than half of the national average income in comparison to the other six cities, particularly in comparison to the city of Heerlen.

The Hague and Utrecht and the medium-sized cities of Tilburg and Arnhem are the most heterogeneous cities with regard to the distribution of households on social security benefits in comparison to the other cities and to Heerlen, Eindhoven and Amsterdam in particular.

The Hague and Rotterdam are the least homogeneous cities with regard to the distribution of inhabitants aged 15–64 with at least a certificate of higher secondary

Table 10.2
Variation coefficients for the distributions on population density, household structure, social housing, income disparities and educational qualifications at the level of the sub-city districts

	Population density	One-person households	Single parent households	Dwellings for social housing	Median disposable annual household income	Households		Inhabitants aged 15–64 qualified at ISCED level 3 or beyond
						with less than half of the national average income	reliant on social security benefits	
Large cities								
Amsterdam	1.51	0.20	0.47	0.42	0.16	0.23	0.30	0.21
Rotterdam	1.77	0.19	0.34	0.30	0.16	0.23	0.37	0.28
The Hague	0.84	0.22	0.55	0.76	0.21	0.37	0.56	0.31
Utrecht	1.22	0.22	0.34	0.57	0.13	0.27	0.56	0.24
Medium-sized cities								
Eindhoven	0.56	0.34	0.29	0.34	0.11	0.32	0.29	0.15
Tilburg	1.32	0.39	0.58	0.57	0.18	0.38	0.56	0.22
Groningen	1.47	0.30	0.64	0.46	0.19	0.30	0.42	0.17
Enschede	1.75	0.31	0.26	0.39	0.11	0.23	0.36	0.14
Arnhem	0.77	0.20	0.39	0.45	0.15	0.26	0.51	0.21
Heerlen	0.34	0.16	0.28	.	0.07	0.11	0.28	0.18

education in comparison to the other cities and to Enschede, Eindhoven, Groningen and Heerlen in particular.

Looking at this list of observations one has to conclude that besides The Hague, there are certain medium-sized cities with a less homogeneous spatial structure. The Hague is an exceptional city in this respect. This city has the most heterogeneous spatial structure of all ten urban cities, not just of the large cities. The medium-sized cities with a less homogeneous spatial structure are the three largest ones, namely Eindhoven, Tilburg and Groningen.

Finally, there is less homogeneous spatial distribution in almost all ten cities in dwellings for social housing, single parent households and households reliant on social benefits.

10.5 Differentiation within cities: accumulation of disparities

Various studies show that the relatively low quality of the urban housing market in the cities as well as the selective migration into and out of the city contribute to the concentration of less well-to-do population groups in the cities, such as concentration of low incomes, unskilled workers, unemployed people, social benefits claimants and less educated people (Van der Wouden, 1996; Netherlands Bureau for Economic policy Analysis, 2000). It is, therefore, logical to suppose that a relationship exists at the level of the sub-city districts between the social housing characteristic on the one hand and the other characteristics touched upon on the other hand. The maps presented above for the three large cities already indicate the existence of such a relationship.

The question to be answered in this section is twofold. First, which relationships exist between the social housing characteristic and the other characteristics at the spatial level of the sub-city districts for the Urban Audit cities? And second, if such inner-city relationships exist for the cities, do those relationships differ in strength between the cities?

In order to be able to answer those questions, we have computed correlation coefficients for every city between the relative size of dwellings for social housing in the sub-city districts on the one hand, and the relative size of certain household types, income disparities and educational qualifications in those districts on the other. The correlation coefficients are presented in table 10.8.

For the interpretation of these correlation coefficients we assume a substantial relationship between the social housing characteristic in a district and another characteristic of that district when the correlation coefficient is at least .70. About

fifty percent of the variance in that relationship is then explained. It can then be safely assumed that there is a concentration of another specific characteristic in a sub-city with a high concentration of social housing.

Looking at the strength of the correlation coefficients in this sense, it turns out that no substantial relationship exists between the extent of social housing and the number of one-person households at the sub-city district level in any of the ten cities. The distribution of one-person households is, therefore, independent from the distribution of the dwellings for social housing.

Such independence from the social housing aspect does not apply for the other characteristics. It turns out that a substantial inner-city relationship exist between social housing and (a) the number of single parent households, in four cities; (b) the number of households living on less than half of the national average income, in five cities; (c) the number of households on social security benefits, in eight cities; (d) the number of inhabitants with lower qualifications in education, in five cities; and (e) the median disposable annual household income, in four cities.

Looking at the individual cities, we found that the largest number of substantial disparities relating to the social housing characteristic occurs in the large city of Utrecht and in the medium-sized city in Tilburg. In sub-city districts of both cities

Table 10.3
Correlation coefficients for the distribution on dwellings for social housing with the distributions on household structure, income disparities and educational qualifications at the level of the sub-city districts

	One-person households	Single parent households	Median disposable annual household income	Households		Inhabitants aged 15–64 qualified at ISCED level 3 or beyond
				with less than half of the national average income	reliant on social security benefits	
Large cities						
Amsterdam	-.36	.61	–.61	.32	**.74**	**–.86**
Rotterdam	-.09	.67	–.47	.46	.61	**–.72**
The Hague	-.02	**.70**	–.64	**.70**	**.78**	–.63
Utrecht	-.03	**.82**	**–.75**	**.77**	**.84**	**–.76**
Medium-sized cities						
Eindhoven	.08	.61	–.50	.47	**.75**	–.56
Tilburg	.27	**.87**	**–.70**	**.77**	**.96**	**–.89**
Groningen	.13	.58	–.68	**.75**	**.85**	–.61
Enschede	.50	.67	**–.92**	**.88**	**.83**	–.46
Arnhem	-.11	**.93**	**–.82**	.55	**.93**	**–.91**
Heerlen	.	.	.	.	.	.

with many dwellings for social housing one finds a relatively large concentration of single parent households, of households on a lower median disposable annual income and on half of the national average income, of households on social security and of inhabitants with lower educational qualifications. In sub-city districts of both cities with less social housing, on the other hand, one finds there a relatively small concentration of single parent households, of households on a lower median disposable annual income, of households on social security and of inhabitants with lower educational qualifications.

The medium-sized city of Arnhem is the third city in line where the inner-city differentiations are substantially accumulating. In the sub-city districts with many dwellings for social housing one comes across all categories of inhabitants mentioned at the cities of Utrecht and Tilburg with exception of the households living on half of the national average income.

Fourth in line with respect to a substantial accumulation of disparities are The Hague and Enschede. The sub-city districts with many dwellings for social housing in The Hague have an especially large concentration of three types of households, namely single parent households, households on half of the national average income and households on social security. In similar sub-city districts in Enschede, on the other hand, one comes across a large concentration of households at risk of poverty, namely households with a lower median disposable annual income, households on half of the national average income and households on social security benefits.

Less substantial disparities in relation to social housing are found in Amsterdam and Groningen. In the sub-city districts with many dwellings for social housing in Amsterdam there is a large concentration of households on social security and of inhabitants with less educational qualifications. In similar sub-city districts in Groningen, on the other hand, one finds a large concentration of households at risk of poverty, namely households with an income of less than the national average and households on benefits.

The cities with the least disparities in relation to social housing are Rotterdam and Eindhoven. In the sub-city districts with many dwellings for social housing in Rotterdam one only comes across a large concentration of inhabitants with less educational qualifications. In similar sub-city districts in Eindhoven one finds a large concentration of households that are reliant on social security benefits.

To summarize, in every city one can observe a large concentration of one or more specific population categories in their sub-city districts with predominantly dwellings for social housing. The number of such categories varies, however, from city to city. The population category most often found in such sub-city districts is

households on social security benefits. No concentration of one-person households is found in such sub-city districts.

10.6 Some concluding remarks

In this chapter the ten Urban Audit cities in the Netherlands were compared in terms of their differentiation at the level of their sub-city districts. Three approaches were used for that comparison.

The first approach referred to the differences between cities with regard to the range between the lowest and the highest sub-city district of the various characteristics. Generally speaking, The Hague and Groningen turned out to be the cities with the largest ranges of household characteristics, while Heerlen and Enschede have the smallest ranges. The largest range with regard to social housing was found in the three largest cities: Amsterdam, Utrecht and The Hague. The smallest range was found in Eindhoven and Enschede. Unfortunately no data on the social housing aspect are disposable for Heerlen. The largest income disparities were observed in Amsterdam, Rotterdam and The Hague; the smallest in Heerlen and Enschede. The Hague, Amsterdam and Rotterdam are the cities with the largest range in educational qualifications; Heerlen and Enschede with the smallest ranges.

The second approach referred to the differences between cities with regard to homogeneity/ heterogeneity. The medium-sized cities of Tilburg and Groningen showed the largest heterogeneity between their sub-city districts with regard to household characteristics, while Heerlen and Rotterdam showed more homogeneity between their districts in this respect. Dwellings for social housing are most equally spread over the sub-city districts in Rotterdam, Eindhoven and Enschede; while the most unequal spread was found in The Hague, Utrecht and Arnhem. More heterogeneity in income disparities was found in the cities of The Hague and Tilburg; more homogeneity in this respect in Heerlen and Enschede. The most unequal distribution of the more highly educated inhabitants was found in The Hague, Rotterdam and Utrecht; the more equal distribution in Enschede and Eindhoven.

The third and last approach referred to the accumulation of disparities connected with the distribution of social housing. In this respect Utrecht, Tilburg and Arnhem turned out to be the most segregated cities in that respect. The least segregated cities in this respect are Eindhoven and Rotterdam.

Annotations

1) For the definition of disposable income see the annotation in chapter 8.

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11. The Netherlands: commuter country

Mathieu Vliegen and Henk Oroh

Censuses are the most important source for statistics on commuters and commuter flows at a low regional level. The Virtual Census of 2001 in the Netherlands is the first data source in thirty years that offers such statistics again. Quantitative information about the phenomenon of commuting is indispensable for understanding regional labour markets; especially the relationship between local employment and the locally employed labour force. It is also important for understanding traffic flows between the places of residence and employment. In this chapter we review the main findings about commuters and the commuting flows. They relate to the balance between local employment and the local labour force and outgoing and incoming commuting, commuter characteristics and commuter flows at the level of the COROP regions – known as the NUTS 3 regions at the European level.

11.1 Introduction

Commuting has expanded enormously in the Netherlands, especially since World War II. A steadily growing proportion of the economically active population is working outside the area of their residence. Various factors contributed to the growth of the phenomenon, such as the change from an agricultural to an industrialised service-based economy; the rapid developments of transportation facilities in the public transport sector and the huge increase in the number of cars leading to more mobility; the process of suburbanisation, in which more and more households moved from the city to its surrounding area while remaining economically tied to the city; a strong increase in the participation of women in the labour market; and, finally, the government town and country planning policies, especially in the sixties and seventies, designating certain areas to absorb the population growth of the large cities.

Commuter figures provide insight in regional labour markets and traffic flows, and in the resulting traffic congestion. In this chapter we will pay attention to the significance of commuter figures for regional labour markets, presenting the main findings on the balance between employment and the employed labour force and in and outbound commuting at the local level. We review some commuter characteristics, and address commuter flows at the level of the COROP regions.

Before going into these issues section 11.2 gives some information on the sources used for the compilation of commuter data in the Virtual Census of 2001 in the

Netherlands. Sections 11.3 and 11.4 review the main findings at the local level. Section 11.3 investigates the relationship between labour force and employment and the balance between the two; section 11.4 reviews outgoing and incoming commuter issues. Section 11.5 gives some details on the characteristics of the commuters and the average distance they cover to get to work. Section 11.6 deals with the commuting at the level of the COROP regions from the analytical viewpoint of self containment or autonomy with respect to the commuting flows between those regions. The chapter concludes with some final remarks.

11.2 *Sources used*

To produce data on commuting, it was necessary to impute the municipality of employment (i.e. the location of the working address) into the Social Statistical Database (SSD) that was used to compile the census tables (see chapter 13). The methodology for the imputation was developed in a research project on the integration of 1998 data from the municipal population registers and the Survey on Employment and Earnings (SEE) (Corpeleijn and Heerschop, 2002).

The essence of the imputation consisted of the integration at the micro-level of the SSD data with data on the enterprises at the level of the local units depending on them. The sources used for the integration were the SEE with data on 31 December 2000 for the employees, the Tax register for people with an entrepreneurial income with data of 1 January 2001, and the Agricultural survey 2001 for self-employed persons. In enterprises with more than one local unit, assumptions had to be made about the minimal distance between a person's municipality of residence and his or her municipality of employment. The results of the imputations were checked with the aggregated data at the municipal level from the SEE. The figures on the inter-municipal commuting flows can be downloaded from the website of Statistics Netherlands (http://www.cbs.nl/en/publications/articles/General/census-2001/census-2001.htm).

This procedure does not make it possible to distinguish between persons commuting to a fixed municipality of employment, persons commuting to more than one municipality of employment, and persons without a fixed municipality of employment (for example, agents and people working in the transport sector). For the latter the municipality of employment is the place where the enterprise for which they work is located. The compilation procedure for commuting data does not make it possible either to distinguish between people commuting daily ('commuters proper') and people not commuting daily, as was customary in the previous post World War II censuses (Statistics Netherlands, 1952, 1965 and 1982).

11.3 *Labour force and employment*

The relative size of the local employed labour force and of local employment varies considerably between the individual municipalities. The relative size of the employed labour force varies from 34 percent in the municipality of Vaals in South-Limburg on the German and Belgian border to 72 percent in the municipality of Voorhout, designated by the government as a targeted growth community for the Leiden urban region. The variation in the relative size of the local employment is larger: from 15 percent in the municipality of Onderbanken (in South-Limburg on the German border) to more than 150 percent in the municipality of Diemen in the Amsterdam urban agglomeration. [1)]

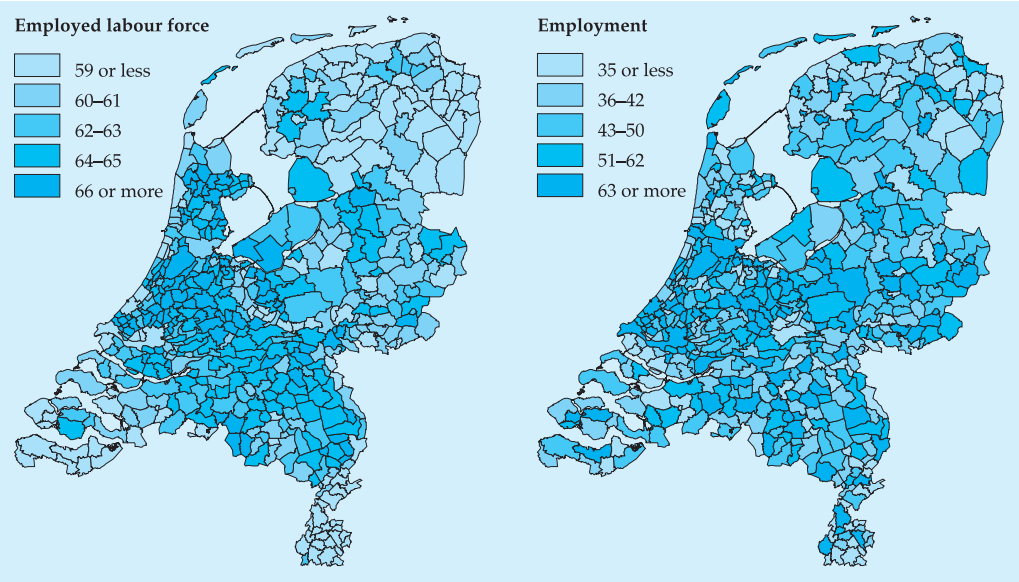
Map 11.1 shows the spatial distribution of the relative size of the locally employed labour force and local employment in detail. This map consists of two sub-maps: the one on the left refers to the spatial distribution of the employed labour force; the one on the right to the spatial distribution of the local employment.

The left map shows that the lowest participation rates in the labour market are located especially in the more peripheral areas of the country, namely: in the three northern provinces of Groningen, Friesland and Drenthe; in the south-western province of Zeeland; and in the south-eastern province of Limburg. Low participation rates are also found in the large cities of Rotterdam and The Hague and their urban agglomerations. High participation rates are found in the western part in the country, especially in the middle of the urban conurbation of the Randstad. The area corresponds more or less to the Green Heart. Other large areas with high participation rates are found in the northern part of the province of North Holland and to the east of Amsterdam and Utrecht (the city of Almere and parts of the regions Het Gooi and the Utrechtse Heuvelrug).

The map on the right on the spatial distribution of the relative size of the local employment shows a completely different picture. High employment rates are found in almost all large and medium-sized cities in every part of the country as well as in the urban agglomeration of Utrecht and Amsterdam. Lower employment rates are found in smaller municipalities, especially in municipalities located around the large and medium-sized cities, and around some urban agglomerations. Examples of low employment areas are located north-east of Groningen and north of Leeuwarden in the northern part of the country; areas near the urban agglomerations of Amsterdam, Utrecht and Rotterdam; and the area between Maastricht and Heerlen in the south of Limburg.

The major difference between the spatial distribution of the local employed labour force and local employment lies in their structure. The spatial distribution of the locally employed labour force is more regionally oriented, while the spatial

Map 11.1 Employed labour force and employment per 100 resident population aged 15–74 per municipality



distribution of local employment is more based on an urban-rural distinction. This difference in structure can be illustrated by the figures on both phenomena for the various urbanisation categories of the municipalities, as measured by the address density of the surrounding area (Van de Stadt and Vliegen, 1994).

It turns out that the relative size of the employed labour force hardly differs among the municipalities belonging to various urbanisation categories (Table 11.1). The relative size of the employed labour force is only a little bit smaller in very strongly urbanised municipalities. This finding corresponds with its spatial pattern described above.

There are large differences among municipalities belonging to the various urbanisation categories with regard to local employment. Employment varies from 79 per 100 residents aged 15-74 in the very strongly urbanised municipalities to 40 per 100 residents of the same age group in the non urbanised municipalities (Table 11.1). That variation in size indicates a strong influence of the urban factor in the spatial distribution of the employment. That finding corresponds with the spatial pattern described above. These differences already indicate a considerable flow of commuters between municipalities.

11.4 *Commuting: in and outbound*

Commuting between municipalities has expanded enormously since World War II. The figures in table 11.2 show that the employed labour force working outside their

Table 11.1
Locally employed labour force and local employment by urbanisation category of the municipalities

	Total resident population aged 15–74	Employed persons residing in the area		Employed persons working in the area	
		absolute	per 100 resident population aged 15–74	absolute	per 100 resident population aged 15–74
	x 1,000	*x 1,000*	*%*	*x 1,000*	*%*
Urbanisation category					
Very strongly urbanised	2,152	1,279	59	1,694	79
Strongly urbanised	3,122	1,931	62	2,166	69
Moderately urbanised	2,547	1,585	62	1,590	62
Weakly urbanised	2,567	1,590	62	1,278	50
Not urbanised	1,649	1,009	61	666	40
Total	12,037	7,395	61	7,395	61

municipality of residence increased from 15 percent in 1947 to 51 percent in 2001. The increase is even more impressive because the number of municipalities has halved since 1947, the average number of inhabitants increased from 9.5 to 31.7 thousand, and the average land area from 31.4 km² to 67.0 km².

Commuting can be considered from the viewpoint of the residence of the commuters as well as from the viewpoint of their employment area. In the first case one speaks of outgoing or outbound commuting, in the second case from incoming or inbound commuting. Both types can substantially differ in absolute and relative size, not only for the individual municipalities but also for groups of municipalities.

At the level of the individual municipalities, there is a large differentiation in both types of commuting. The employed labour force working outside their municipality of residence varies from 16 percent in the Dutch Wadden Island of Texel to 85 percent in the municipality of Westervoort (located in the urban region of Arnhem). The share of employed persons coming from one municipality of

Table 11.2
Employed persons working outside their municipality of residence (outbound commuters), 1947–2001

	Unit	1947	1960	1971	2001
Outbound commuters					
absolute	*1,000*	544	1,108	1,616	3,794
in % of employed labour force	*%*	15	21	34	51
Number of municipalities	*1*	1,015	992	872	504
Average municipal inhabitants	*1,000*	9.5	11.5	15.0	31.7
Average municipal area land	*km²*	31.4	32.9	38.1	67.0

residence that accounts for the employment in another municipality varies even more, namely from 8 percent in the Dutch Wadden Island of Terschelling to 90 percent in the municipality of Diemen in the Amsterdam urban agglomeration. The Dutch Wadden islands all have very few in or outbound commuters.

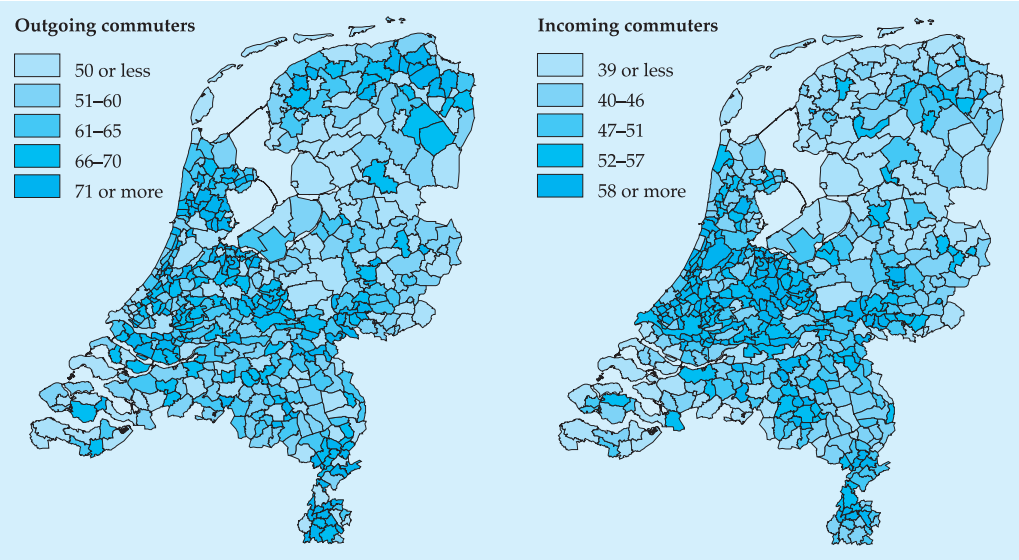
The spatial commuting pattern at the local level is portrayed in map 11.2. This map also consists of two sub-maps: one for the outbound, and one for inbound commuters. The two maps show a different spatial pattern for both commuting types.

The municipalities with the highest proportion of outgoing commuters (over 71 percent of the employed labour force) are located around or close to the large and several medium-sized cities. Typical examples are the municipalities north of Amsterdam, many of which belong to its urban region; the municipalities to the south and east of Rotterdam; and municipalities located north-west and south-east of the city of Utrecht. Examples of municipalities located around or close to medium-sized cities include municipalities north-east of Groningen, those located near Arnhem and Nijmegen, and municipalities located between Maastricht, Heerlen and Sittard-Geleen. Small percentages of outgoing commuters (less than 50 percent of the employed labour force) are found in the large and medium-sized cities. They are also found in some typical rural areas in the province of Zeeland, the Northern provinces, and the Dutch Wadden Islands.

The spatial pattern of incoming commuters is dominated by a continuous area of a very large number of municipalities located in the NUTS 3 region of Utrecht and the adjacent NUTS 3 region of Het Gooi. The area is characterised by the highest proportion of inbound commuters (58 percent of municipal employment or more). A second large area with high proportions of inbound commuters consists of a large number of municipalities located to the south, south-west and west of the city of Amsterdam. One even finds an extension of this area towards Leiden and from there to The Hague. The highest proportions of inbound commuters are not found in the cities themselves but in surrounding areas. This is not the case in Utrecht, the fourth largest city, which belongs to the municipalities with the highest number of inbound commuters. Medium-sized cities are also rarely among the municipalities with the highest proportion of incoming commuters. Exceptions are Leeuwarden in the north, Arnhem in the east, and 's-Hertogenbosch and Heerlen in the south of the country. A relatively small number of inbound commuters is again found in municipalities located in the province of Zeeland, the Northern provinces, and the Wadden Islands.

The difference between the spatial distribution of the out and inbound commuters at the local level can also be characterised as urban-rural based or regionally oriented. However, this characterisation is less strict than the above one with respect to the local employment and the locally employed labour force. This can be derived from the two structures described above, which is corroborated by the relative figures on

Map 11.2 Outgoing commuters per 100 employed persons resident in the municipal area and incoming commuters per 100 employed persons working in the municipal area



both phenomena for the various urbanisation categories of the municipalities. The urban factor in the spatial distribution of outbound commuters at the local level is paramount, since the percentage of the locally employed labour force working outside their municipality of residence varies considerably: from 38 percent in very strongly urbanised municipalities to 62 percent in the non-urbanised municipalities (Table 11.3). In other words, the less urbanised a municipality is, the more employed persons of their labour force are working outside their municipality of residence.

The very strongly, strongly and moderately urbanised municipalities show no difference among themselves in the percentage of incoming commuters accounting for the employment in those municipalities. It amounts to 53–54 percent (Table 11.3). Their structure of the spatial distribution is predominantly regionally oriented. This is not the case for the weakly and non-urbanised municipalities. The percentage of inbound commuters accounting for the employment in those municipalities is considerably lower than for the other municipalities. This finding is indicative of a bigger influence of the urban factor in the spatial distribution of the incoming commuters in those municipalities.

11.5 *Commuter characteristics*

What are the characteristics of the commuters and what is the average distance of their journey to work? Three characteristics will be addressed, namely age,

Table 11.3
Out and inbound commuters by urbanisation category of the municipalities

	Outbound commuters		Inbound commuters	
	absolute	per 100 employed persons resident in the area	absolute	per 100 employed persons working in the area
Urbanisation category	*x 1,000*	*%*	*x 1,000*	*%*
Very strongly urbanised	482	38	897	53
Strongly urbanised	908	47	1,143	53
Moderately urbanised	852	54	857	54
Weakly urbanised	925	58	613	48
Not urbanised	627	62	284	43
Total	3,794	51	3,794	51

household position and the economic activity of the companies for which they are working. These will be considered separately for men and women, given their situation on the labour market.

Men commute more often than women: 55 percent of the employed men are working outside their municipality of residence, while 46 percent of the employed women do. Both men and women commute most in the age between 25 and 34 (Table 11.4). The older men and women commute less; women up to the age of 55 commute less than men as age increases. The difference between young men and women amounts to four percent points; for the age 25–34 it increases to 6 percent points, and for age 35–54 to 12 percent points. That difference between men and women falls to 10 percent points for age 55 and older.

Table 11.4
Commuters and their journey to work by sex and age

	Commuters			Journey to work: average distance		
	Total	Men	Women	Total	Men	Women
Age	*in % of the employed persons*			*km*		
under 25	47	49	45	28	29	27
25– 34	56	59	53	28	31	25
35– 54	51	56	44	27	30	23
55 or older	43	46	36	33	35	27
Total	51	55	46	28	30	24

Men do not only commute more often than women, but the male commuters also cover more distance. Men cover thirty kilometres on average, female commuters average six kilometres less (Table 11.4). Men cover more distance than women in every age group, but not equally at every age. The difference is only two kilometres for people under 25. As age increases that difference in distance becomes larger, amounting to eight kilometres for the commuters over 55.

Men commute more often than women, regardless of age, but also regardless of their position in the household (Table 11.5). However, men and women are working more outside their municipality of residence when there are no children in their household. Six out of ten men living with a partner and without children commute, the same is the case for eleven out of twenty women living with a partner but without children.

The presence of children in the household affects the commuting status for the married wife, the female partner and the single female parent. The difference in commuting between male and female partners increases from four percent points when there are no children in their household, to nine percent points when there are. The difference is even larger for married couples. It amounts to six percent points between husbands and wives when there are no children in the household, and to thirteen percent points if there are. The influence of the presence of children on the difference in commuting status of the partners is larger in the case of marriage than in cohabitation.

The influence of the presence of children on the commuting status of an employed parent is the strongest for the single parent. Male as well as female single parents commute less than unmarried or married partners with children. There is a considerable difference between male and female single parents in this respect, however, amounting to 12 percent points.

The presence of children in a household is of less importance for the distance to the work place. That distance varies for male single parents, spouses and partners with children between 29 and 31 kilometres, and amounts to 32 and 33 kilometres for male spouses and partners without children. A similar small difference is found among women. Female single parents, spouses and partners with children cover 22 to 25 kilometres and female spouses and partners without children cover 24 and 26 kilometres. The largest difference is found between the married and unmarried couples. The difference between men and women in married couples with or without children amounts to six kilometres, in partners without children it amounts to nine kilometres and for partners with children to seven kilometres.

Working in or outside the municipality of residence is also influenced by economic activity. Commuting by people employed in the primary sector occurs relatively

Table 11.5
Commuters and their journey to work by sex and position in the household

	Commuters			Journey to work: average distance		
	Total	Men	Women	Total	Men	Women
Position in the household	*in % of the employed persons*			*km*		
Child	50	52	46	27	28	24
Living alone	49	51	46	32	33	29
Spouse without child(ren)	52	54	48	29	32	26
Spouse with child(ren)	52	57	44	29	31	25
Cohabitant without child(ren)	57	59	55	29	33	24
Cohabitant with child(ren)	52	56	47	27	29	22
Lone parent	42	51	39	26	29	25
Other member	47	48	44	34	36	29
Member institutional household	44	45	41	30	31	27
Total	51	55	46	28	30	24

seldom, since many self-employed farmers are working at their own address. Only about one out of four persons employed in this sector is working outside their municipality of residence (Table 11.6). Persons employed in the trade, hotel and restaurant sector also often work in their municipality of residence. Working outside the municipality of residence is predominantly for the persons employed in all other economic sectors. However, the extent to which the phenomenon occurs varies most in the two other commercial services sectors (57 percent), and least in the non-commercial services (51 percent).

Employed women commute less than employed men in all economic sectors. The largest difference in the commuting status between men and women is found in the construction sector. Men employed in this sector differ from their female colleagues by 17 percent. The smallest difference in commuting behaviour between men and women is found in the primary sector and the transport and communication sector. The difference amounts to only three percent.

Commuters working in the financial and business activities sector cover the largest distance to their workplace; on average 35 kilometres. The distance covered by commuters working in the primary sector is only one kilometre less. Commuters working in industry and the non-commercial tertiary sector cover the smallest distance, namely 24 kilometres.

There is no difference in commuting distance between men and women working in the transport and communication sector and almost no difference for those working in the industry. The largest difference between male and female commuters exists in the non-commercial tertiary sector (nine kilometres) and in the primary sector (eight kilometres).

Table 11.6
Commuters and their journey to work by sex and economic activity

	Commuters			Journey to work: average distance		
	Total	Men	Women	Total	Men	Women
Economic activity	*in % of the employed persons*			*km*		
Primary sector	24	25	22	34	36	28
Secondary sector						
Mining, manufacturing, energy	56	58	48	24	24	23
Construction	54	56	39	28	28	25
Tertiary sector: commercial						
Trade, hotels, restaurants	44	49	38	29	31	25
Transport, communication	57	58	55	30	30	30
Financial intermediation, business activities	57	60	52	35	38	31
Tertiary sector: non-commercial services	51	56	48	24	29	20
Total	51	55	46	28	30	24

11.6 Employed labour force, employment and commuting at the level of the COROP regions

11.6.1 Employed labour force and employment

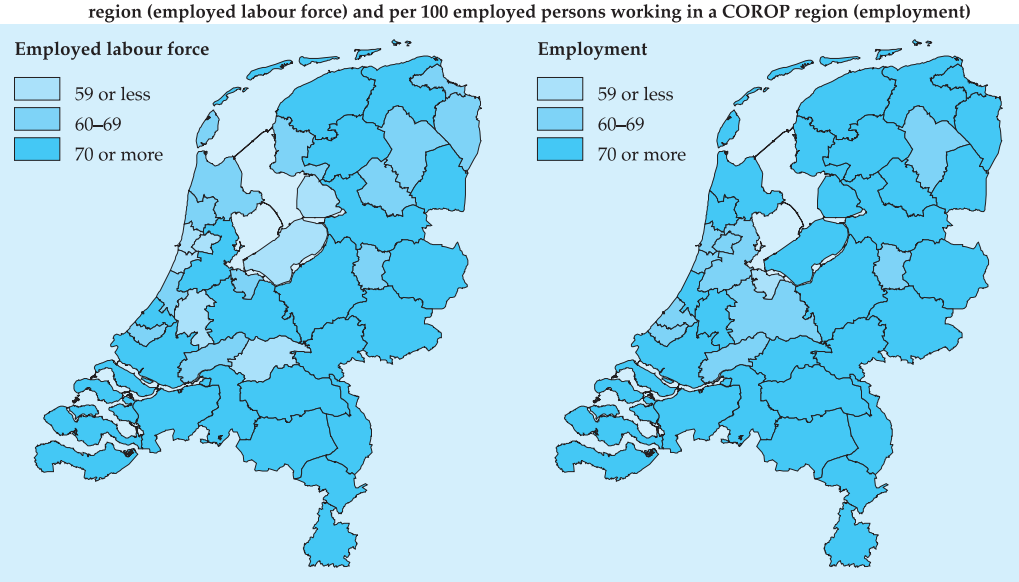
Having reviewed the main findings on the employed labour force, employment and the commuting phenomenon at the local level, we will now focus on the findings at the level of the COROP regions – at the European level known as NUTS 3 regions (see Map 11.4 in the Annex to this chapter). The COROP regions are a statistically based territorial subdivision in between the administrative levels of the provinces and the municipalities. This territorial subdivision came into existence in the late sixties as a consequence of the expansion of regional economic policy in the Netherlands. Starting point of the delimitation was an existing territorial subdivision into 80 nodal regions for secondary school planning at that time, which was already an adaptation of an earlier design based on commuting patterns from the Census of 1960. Although adapted to the provincial boundaries, the 40 COROP regions were considered at that time as the most appropriate geographic units for regionalising statistics on the value added for the various economic activities and gross fixed capital formation by type and destination (Vliegen, 1999).

Since commuting patterns indirectly played a role in the delimitation of the COROP regions, it is interesting to analyse the relationship between the employed labour force and employment from a commuting viewpoint at the COROP level. To what extent can the COROP regions be considered geographic areas within which people

both live and work? This question implies two more questions, namely (a) to what extent do COROP regions provide jobs for the resident workers, and (b) to what extent do COROP regions enable their resident workers to have a job within their area. The criterion for the investigation of the first question is as follows: the number of employed persons working and residing in the COROP region per 100 employed persons working in that region (the employment criterion). The criterion for the investigation of the second question is formulated in a similar way, namely: the number of employed persons residing and working in the COROP region per 100 employed persons resident in that region (the employed labour force criterion).
To be able to judge the extent to which a geographical area can be considered a region within which people both live and work, we use the threshold proposed by Eurostat of 70 percent for both criteria. A geographic area satisfying this threshold for both criteria is autonomous or self contained (Eurostat, 1992).

It turns out that 22 of the 40 COROP regions satisfy the 70 percent threshold for the labour force criterion and 29 do so for the employment criterion (Map 11.3). Almost half of the 40 COROP regions satisfy the 70 percent threshold for both. Moreover it turns out that 13 COROP regions satisfy the 70 percent threshold for only one of the criteria. Finally, eight COROP regions do not satisfy the threshold of either. The lowest value of both criteria is still over 50 percent. The lowest value for the employed labour force criterion, 54 percent, is found in the COROP regions Flevoland and Zaanstreek; the lowest value for the employment criterion is 59 percent and was found in the COROP region Het Gooi en Vechtstreek.

Map 11.3 Employed persons residing and working in the COROP regions per 100 employed persons residing in a COROP region (employed labour force) and per 100 employed persons working in a COROP region (employment)

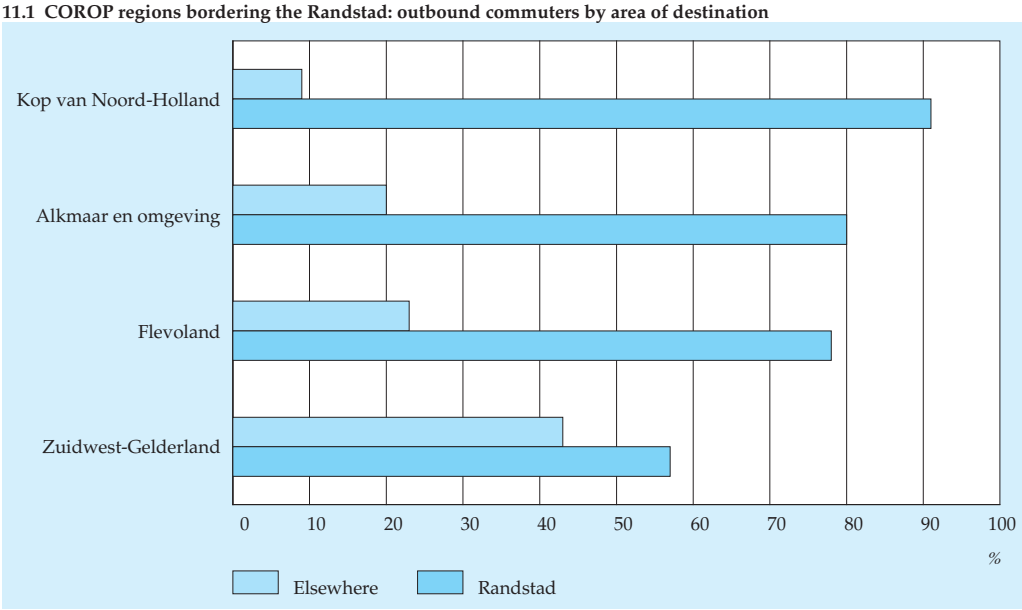


11.6.2 Outbound commuting and its geographic areas of destination

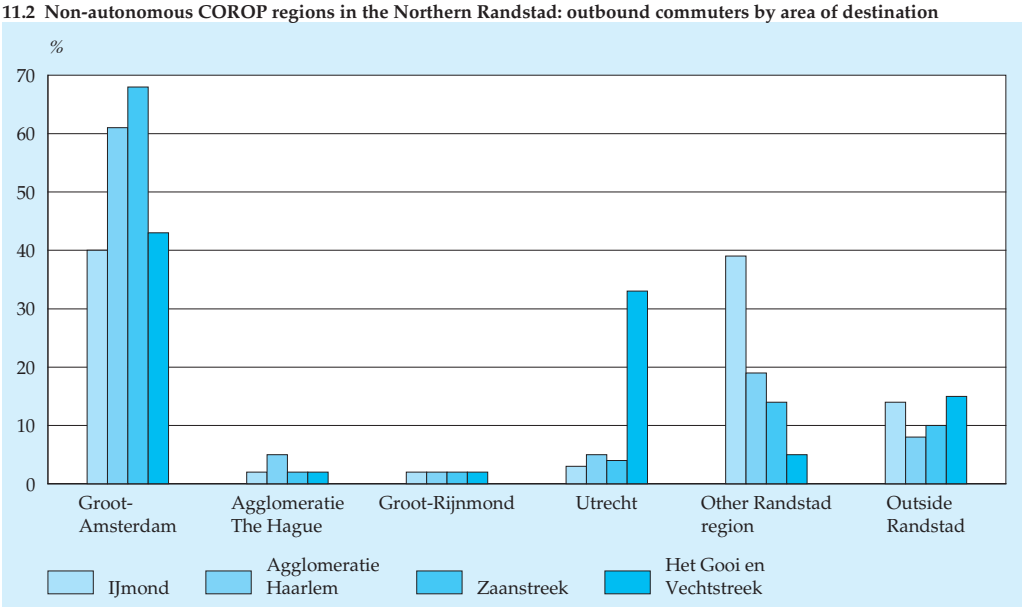
The spatial pattern of the COROP regions that do not satisfy the threshold for a self-contained labour market shows that most of these regions are in the western and northern part of the country (Map 11.3). The regions in the western part are located (a) in the Randstad with the urban agglomerations of Amsterdam, Rotterdam, The Hague and Utrecht as its centres, and (b) bordering that urban conurbation. Almost all regions in the north are located in the provinces Groningen and Drenthe.
No clear delimitation of the Randstad exists. For analytical purposes almost all COROP regions in the three western provinces are considered as part of the Randstad. Those COROP regions are the regions numbered 17 and 20–30 on map 11.4 (see Annex).

Looking more closely at the outbound commuter flows of the four COROP regions bordering the Randstad that are not self-contained (regions 16, 18, 19 and 40 on map 11.4) it turns out that those flows are mostly toward that urban conurbation (Figure 11.1). The outbound flow is very large in the case of the COROP regions of the Kop van Noord-Holland and Alkmaar en omgeving (regions 18 and 19) located to the north of the Randstad and the COROP region Flevoland (region 40) to the east. The outbound flow varies from 91 percent for the Kop van Noord-Holland to 78 percent for Flevoland. The outflow from the COROP region Zuidwest-Gelderland (region 16) towards the Randstad amounts only to 57 percent.

11.1 COROP regions bordering the Randstad: outbound commuters by area of destination



11.2 Non-autonomous COROP regions in the Northern Randstad: outbound commuters by area of destination

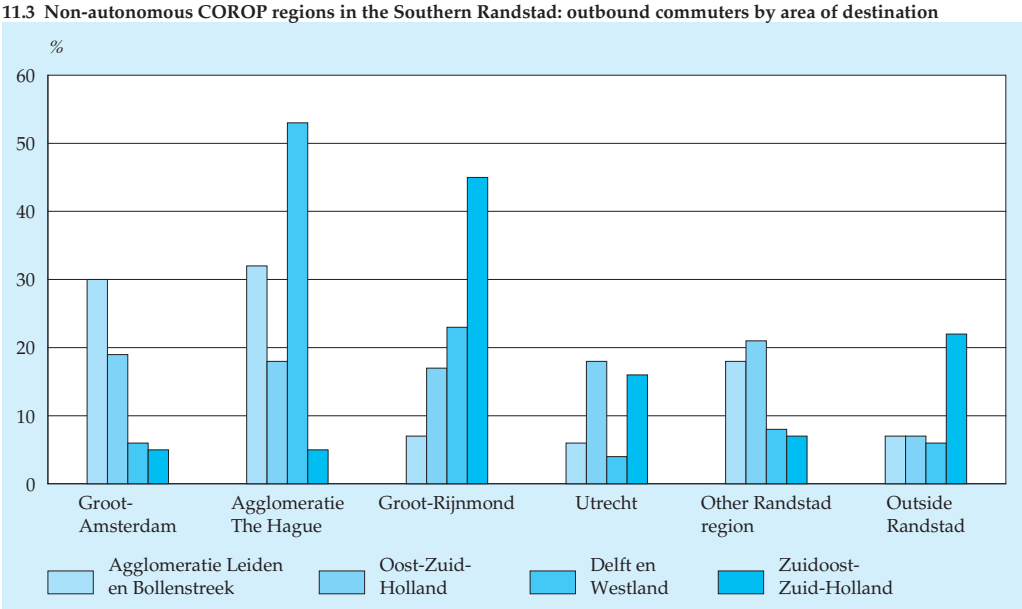


The eight COROP regions in the Randstad conurbation that do not satisfy the threshold for a self-contained labour market can be distinguished in four COROP regions located in the so-called northern wing of that urban conurbation (COROP regions 20, 21, 22 and 24 on map 11.4) and four COROP regions in its southern wing (COROP regions 25, 27, 28 and 30 on map 11.4).

The outbound commuter flows of the four COROP regions located in the northern wing of the Randstad mainly go to the Amsterdam agglomeration (COROP region 23): as do a large majority of about two thirds of the outgoing commuters from the Haarlem agglomeration and the Zaanstreek (COROP regions 21 and 22), and a small majority of about forty percent from Het Gooi en Vechtstreek and the IJmond (COROP regions 24 and 20) (Figure 11.2). Other important commuting flows in the northern wing of the Randstad are (a) a flow from the COROP region Het Gooi en Vechtstreek (one third of its outgoing commuters) to the COROP region of Utrecht (region 17), and (b) a flow from the COROP region IJmond to other COROP regions in the Randstad, especially the Haarlem agglomeration (two thirds of the flow) and the Zaanstreek (one fifth of the flow).

Turning now to the four COROP regions that do not satisfy the threshold for a self-contained labour market in the southern wing of the Randstad we find a more varied spatial pattern in the outgoing-commuter flows. As expected, the regions of The Hague (COROP region 26) and Rotterdam (COROP region 29) are the main destinations for the outgoing commuters of those four COROP regions. The

11.3 Non-autonomous COROP regions in the Southern Randstad: outbound commuters by area of destination



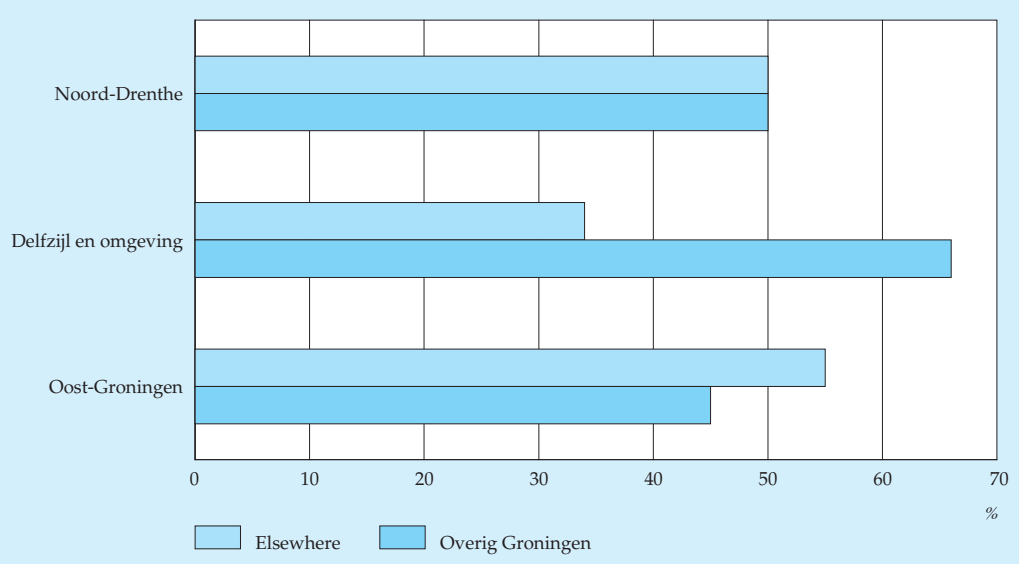
Amsterdam COROP region (region 23) and the Utrecht COROP region (region 17) are also of some importance in this respect (Figure 11.3).

Half of the outgoing commuter flow from the Delft and Westland region (COROP region 27) is directed towards the The Hague agglomeration and one quarter towards the Rotterdam region. The Rotterdam region is also a key destination for the outgoing commuter flow from the Zuidoost-Zuid-Holland region (COROP region 30); almost half of the flow is directed towards it. The Utrecht COROP region is also of some importance for the outgoing-commuter flow of the Zuidoost-Zuid-Holland region, since about one sixth of that flow is destined for the Utrecht COROP region.

The COROP regions of The Hague and Amsterdam are the main destinations for the outbound commuters of the Leiden and Bollenstreek region (COROP region 25): almost one third of its outgoing commuters are working either in the Amsterdam COROP region or in the The Hague COROP region. The neighbouring COROP regions of the Haarlem agglomeration (COROP region 21) and Oost-Zuid-Holland (COROP region 28) turn out to be also of some importance. Three out of ten outbound commuters from the Leiden COROP region to another Randstad region are working in the Haarlem agglomeration and almost four out of ten of the outgoing commuters in the COROP region of Oost-Zuid-Holland.

The outbound commuter pattern of the Oost-Zuid-Holland region (COROP region 28) can be characterised as very multi-targeted. Its outgoing commuters working in

11.4 Non-autonomous COROP regions around COROP-region 'Overig Groningen': outbound commuters by area of destination



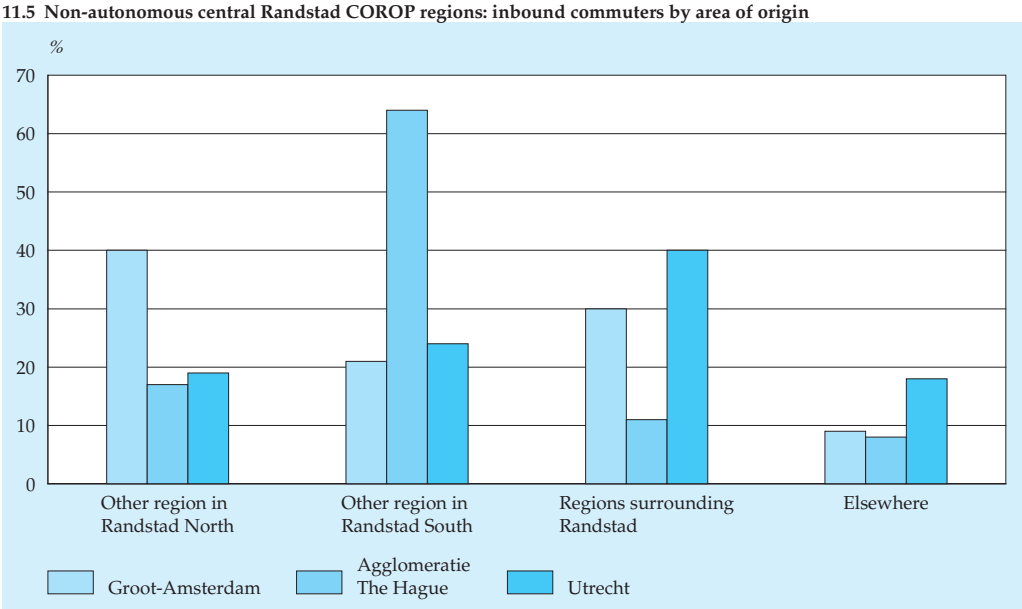
the COROP regions of the four large cities: almost one fifth of its flow to each region. The neighbouring Leiden region is also of importance, since two thirds of the outgoing-commuters of the Oost-Zuid-Holland region to another Randstad region is working in the Leiden region.

Turning to the COROP regions not satisfying the threshold for a self-contained labour market in the provinces of Groningen and Drenthe it turns out that a large majority of the outgoing commuters of the Delfzijl region (COROP region 02) is oriented toward the region with the city of Groningen as centre (COROP region 03). Two thirds of its outbound commuters work in the Groningen region (Figure 11.4). About half of the outbound commuters from the other two regions (COROP regions 01 and 07) have their workplace in the Groningen region. By far the most of the outbound flow from all three COROP regions to another COROP region is directed towards neighbouring regions.

11.6.3 Inbound commuting and its geographic areas of origin

The COROP regions not satisfying the threshold for a self-contained or autonomous geographic area of employment are all located in the major urban conurbation of the Randstad with the exception of two regions, namely Noord-Drenthe en Zuidwest-Overijssel (Map 11.3). The Randstad regions consist of three out of the four central regions (COROP regions of Amsterdam, The Hague and Utrecht) and of six regions that do also not satisfy the threshold for a self-contained labour market

11.5 Non-autonomous central Randstad COROP regions: inbound commuters by area of origin



(COROP regions 20, 21, 22 and 24 in the northern wing, and COROP regions 27 and 30 in the southern wing).

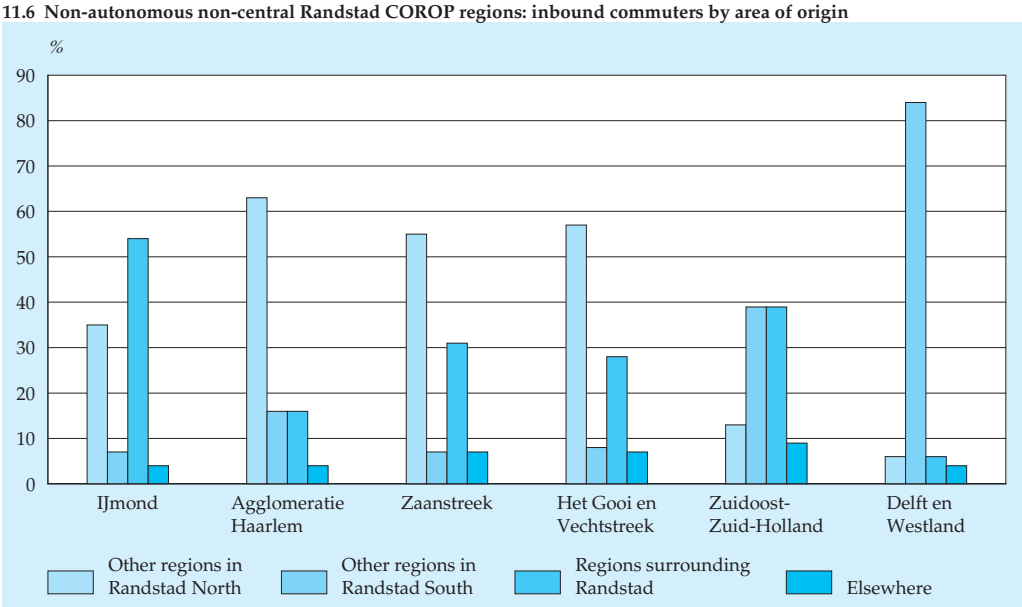
The three central COROP regions of Amsterdam, The Hague and Utrecht supply much employment: more than their employed labour force. The regions consequently have a large positive balance of incoming commuters. The question is: which COROP regions supply these commuters?

It turns out that about sixty percent of the inbound commuters of the Amsterdam region come from another Randstad region, mostly from a region in the northern wing (Figure 11.5). Thirty percent comes from the surroundings of the Randstad. Of this Flevoland (COROP region 40) supplies about forty percent and the two COROP regions to the north of the Randstad (COROP regions 18 en 19) supply together a similar percentage.

Four out of five of the inbound commuters of the agglomeration of The Hague come from another Randstad region, mostly from a COROP region in the southern wing. Regions surrounding the Randstad supply another ten percent.

Contrary to those two central regions, the COROP region of Utrecht attracts as many incoming commuters from a Randstad region as from a region outside the Randstad: about two fifths from either. The northern and southern wings are almost equally represented in the inflows from another region in the Randstad.

11.6 Non-autonomous non-central Randstad COROP regions: inbound commuters by area of origin



The other six Randstad regions that do not satisfy the threshold for a self-contained or autonomous geographic area of employment get a majority of their supply of incoming commuters from other Randstad regions, except IJmond (Figure 11.6). More than fifty percent of all incoming commuters into the COROP regions Haarlem agglomeration, Zaanstreek and Het Gooi en Vechtstreek (regions 21, 22 and 24) come from a region in the northern wing. Most incoming commuters into the COROP regions Delft en Westland and Zuidoost-Zuid-Holland (regions 27 and 30) come from a region in the southern wing. That majority is larger for the COROP region Delft en Westland (over 80 percent) than the corresponding majority for the COROP region Zuidoost-Zuid-Holland (40 percent).

The COROP region IJmond draws a majority of its incoming commuters from surrounding regions of the Randstad, especially from the regions Alkmaar en omgeving en Kop van Noord-Holland (COROP regions 19 and 18). Both regions account for two thirds of those commuters. However, the Randstad regions, especially those in the northern wing, are still supplying about 40 percent of the inbound commuters of the IJmond region.

Regions surrounding the Randstad are also important as supply regions of inbound commuters for the regions Zaanstreek, Het Gooi en Vechtstreek and Zuidoost-Zuid-Holland (COROP regions 22, 24 and 30). The main suppliers for the Zaanstreek region are the two regions located to its north (COROP regions 18 en 19); for Het Gooi en Vechtstreek the COROP regions Flevoland (region 40) and Veluwe (region

13); and for Zuidoost-Zuid-Holland its surrounding COROP regions of Zuidwest-Gelderland (region 16), Midden-Noord-Brabant (region 34) and West-Noord-Brabant (region 33).

One last word about the incoming commuters of the COROP region Noord-Drenthe (region 07). The main supplier of those commuters is the Groningen region (COROP region 03) followed by the two other COROP regions in the province of Drenthe (regions 08 and 09).

11.7 *Some concluding remarks*

The Netherlands is a real commuter country since more than half of the employed labour force is working in another municipality than their municipality of residence. Therefore, it comes as no surprise that the spatial patterns of the locally employed labour force and local employment differ considerably from each other. The spatial pattern of the local employment has a predominantly urban component since employment is mostly located in cities. Of more interest is the fact that it is spreading out to municipalities belonging to the larger urban agglomerations. It is also interesting to see that the spatial pattern of the locally employed labour force has a predominantly regional component. Lower participation rates in the labour market are mainly found in the north, south-west and south-east on the country's periphery. Higher participation rates are found in the western part of the country.

A similar difference is found in the spatial pattern of the out and inbound commuters. The urban component is key in the spatial pattern of the outbound commuters. The least urban municipalities have the most employed persons working outside their municipality of residence. The regional factor is more important in the spatial pattern for the incoming commuters, at least for the most urbanised municipalities. It is less important for the less urbanised and more rural municipalities. Here the (non-) urban factor is predominant in the spatial pattern of incoming commuters.

It was found that men in the employed labour force commute more than women regardless of age, household position or economic activity. Needless to say that the presence of children has a negative effect on the commuting status of married women, female partners and the female single parents.

An analysis of commuting patterns at a higher regional level was performed for the COROP regions. The analysis focused on the extent to which the NUTS 3 regions in the Netherlands can be considered self-contained or autonomous regions with respect to the commuting flows. Most of the NUTS 3 regions are still self-contained. The non-autonomous NUTS 3 regions are predominantly located in the western

part of the country. In itself this is not surprising, since they form part of the larger conurbation of the Randstad. The relatively large commuter flows of these regions directed towards the central COROP regions and towards one another bear witness to this.

Annotations

1) The low rates found for Onderbanken and Vaals and some other border municipalities are probably underestimated due to the sources used to construct the Social Statistical Database. Those sources do not allow for a count of employed persons resident in the Netherlands but working in Belgium or Germany, or employed persons residing in Belgium or Germany but working in the Netherlands.

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Annex

Map 11.4 COROP regions

12. The results of the 2001 Census in the Netherlands, the United Kingdom and some other European countries

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In this chapter various results of the 2001 Census for nine European countries are compared. These countries are: the Netherlands, Norway, Sweden, Finland, Estonia, Switzerland, Slovenia, Greece and the United Kingdom. The comparisons concern demographic, economic and education variables. Also the costs of the different types of censuses are compared between countries. Certain results of the Netherlands and the United Kingdom are compared in more detail. The comparison between the two countries concerns the population structure, the population by marital status, the elderly population by residence, the foreign born population, the population by educational attainment and the population by economic activity and employment status.

12.1 The Dutch 2001 census compared to other countries

More than fifty countries participated in the 2001 Census Round. Most countries chose a day in 2001 as their reference day, although they chose many different days. As it will take a long time before all countries finish the tables required by the international organisations, the Netherlands took the initiative to make some simple comparisons among nine countries that were relatively quick in compiling the set of tables for Eurostat.

The calculations in this chapter are the authors' own and are based on the set of standard tables produced from census data for Eurostat by nine different countries. It is expected that there are definitional differences between the countries which will affect comparisons. Also the statistics produced by the authors do not necessarily reflect the way the countries usually choose to present their data. Furthermore, they may not be considered in some cases to be the definitive source of information on these topics. The nine countries are the Netherlands (NL), Norway (NO), Sweden (SE), Finland (FI), Estonia (EE), Switzerland (CH), Slovenia (SI), Greece (GR) and the United Kingdom (UK). The nine countries differ in size, but all except the United Kingdom have a fairly small number of inhabitants compared to France and Germany.

The nine countries are members of the European Union (EU) or the European Free Trade Association (EFTA). The Netherlands joined the European Community at the

start in 1958, the United Kingdom joined in 1973 and Greece in 1981. The European Community became the European Union in 1995 when Sweden and Finland joined. Estonia, the most northern of the ten accession countries, and Slovenia, the most northern part of the former Yugoslavia, joined the EU in 2004. Norway and Switzerland are EFTA members and work closely together with the EU countries. Norway is also a member of the European Economic Area (EEA). The EEA agreement came into force on 1 January 1994. EEA countries are the EU 15, Norway, Iceland and Liechtenstein. Switzerland did not join the EEA, but works together with the EU countries on a bilateral basis. Statistics is one of the issues on which the EEA countries work together. The aim of the statistical co-operation in the EEA is to build a European Statistical System that gives a coherent and comparable description of the economic, social and environmental developments in the EEA countries.

The nine countries that are compared have different census reference dates: 31 March 2000 (Estonia), 5 December 2000 (Switzerland), 1 January 2001 (The Netherlands, Sweden and Finland), 18 March 2001 (Greece), 29 April 2001 (United Kingdom), 3 November 2001 (Norway) and 31 March 2002 (Slovenia).

Table 12.1 presents the estimated costs of the 2001 censuses, the population and the area of the nine countries. Estonia, Slovenia, Greece and the United Kingdom held traditional censuses, Switzerland used a combination of a traditional census and register information to produce the census tables. Norway relied largely on registers but conducted a census for some missing housing variables. Sweden and Finland held entirely register-based censuses and the Netherlands performed a virtual census based on existing registers and surveys. The 2001 census costs for Norway, Estonia, Switzerland, Slovenia, Greece and the United Kingdom include enumeration costs. In the Netherlands, Sweden and Finland such enumeration costs do not exist for the 2001 census, so the costs presented in table 12.1 for these three countries are rough indicators of the extra costs of producing census tables for the international organisations and of analysing and publishing the results. Table 12.1 shows that the costs per inhabitant in those countries that required completion of a census form for the census were much higher than the countries that did not have enumeration costs.

In table 12.1 the population densities among the nine countries can be compared. The Netherlands has the highest population density, followed by the United Kingdom and Switzerland. The population density in the Nordic countries (Norway, Sweden and Finland) and in Estonia is relatively low. Slovenia and Greece occupy a middle position.

Table 12.2 presents some simple demographic comparisons of 2001 census data for the nine countries. The data presented in table 12.2 are calculated from the tables

Table 12.1
Comparison of nine countries according to the 2001 census results

	NL	NO	SE	FI	EE	CH	SI	GR	UK
Cost of the Census (in millions of euros)	3.0	14.6	1.0	0.8	10.2	99.1	8.0	49.7	367.4
Population (x 1,000,000)	16.0	4.5	8.9	5.2	1.4	7.3	2.0	10.9	58.8
Area (x 1,000 km²)	41.5	323.9	450.0	338.1	45.1	41.3	20.3	132.0	242.5
Cost of the Census per inhabitant (in euros)	0.2	3.2	0.1	0.2	7.3	13.6	4.0	4.6	6.2
Population density (persons per km²)	386	14	20	15	31	177	99	83	242

produced for the international organisations and sent to Eurostat. They were checked by the different countries that produced the tables. Remarkable differences exist between the nine countries. The percentage of the population that is female is by far the highest in Estonia. The percentage of the population that is single is high in the Nordic countries, low in Switzerland and especially low in Greece. For the percentage of singles the Netherlands, Estonia, Slovenia and the United Kingdom occupy a middle position.

Non-nationals form a high percentage of the population in Estonia and Switzerland, where it is relatively difficult to get the nationality. The population of Finland and Slovenia contain an extremely low percentage of non-nationals. In Slovenia the non-national population includes only those with stated foreign citizenship. Finland also has an extremely low percentage of people born outside the country. Nationality data is not available for the UK because data on citizenship is not collected in the UK census. In most countries the percentage of the population born abroad is greater than the percentage that are non-nationals. However, not all non-nationals are persons born outside the country, i.e. these groups are not nested.

Table 12.3 presents two indicators to make a simple economic comparison of the nine countries. Different definitions and ways of collecting the data may hamper the comparisons. The percentage of the population that is economically inactive is relatively high in Greece. For this indicator Switzerland has the lowest score. When

Table 12.2
A demographic comparison according to the 2001 census results

	NL	NO	SE	FI	EE	CH	SI	GR	UK
	in % of the total population								
Women	50.5	50.4	50.5	51.2	53.9	51.0	51.2	50.5	51.4
Singles	44.7	48.4	49.8	47.1	44.1	42.1	44.5	39.7	44.3
Non-nationals	4.2	4.1	5.4	1.8	20.0	20.5	1.9	7.0	.
People born outside the country	10.1	6.9	11.3	2.6	19.2	21.6	8.6	10.3	8.3

Table 12.3
An economic comparison according to the 2001 census results

	NL	NO	SE	FI	EE	CH	SI	GR	UK
	in % of the total population								
Economically inactive population	52.5	48.5	51.8	50.8	53.3	45.8	51.7	57.8	52.1
	in % of the economically active population								
Unemployed persons	2.5	2.3	3.8	12.5	13.8	4.0	6.7	11.0	5.7

we compare the unemployed, as percentage of the economically active population, distinct groups can be discerned. Finland, Estonia and Greece have relatively many unemployed people, whereas in the Netherlands, Norway, Sweden and Switzerland unemployment was low. Slovenia and the United Kingdom occupy a middle position.

Table 12.4 presents two educational indicators to compare the nine countries. Different definitions and ways of collecting the data may hamper the comparisons as well in table 12.4. All countries have difficulties fitting their national education classification into the ISCED codes. For all countries compared except Estonia and Slovenia the OECD (2003) study also gives some information about the education indicators in 2001. A somewhat different population is considered and therefore the absolute results are hard to compare. However, the relative differences in percentages of people with primary and tertiary education in the OECD study agree to a reasonable extent to the results of the censuses. Norway has a high quality education register and an extremely low percentage of the population aged 15–74 with a primary level of education or less. Also Slovenia has a very low percentage of primary educated people. Finland, Switzerland, Greece and the United Kingdom have a relatively high percentage of people with primary education. The percentage of the population aged 15–74 with a tertiary level of education shows less variation among the nine countries than the percentage with a primary level of education. Estonia, Finland and Norway have the highest percentages and Greece and Slovenia the lowest. The following section provides a more detailed comparison of the UK and Netherlands census data.

12.2 *Comparison of the UK and Netherlands Census Data*

The 2001 UK census used a different methodology to standard censuses, and all previous UK censuses, it was called the 'one number census' (ONC). Previous UK census methodologies were based on taking a count of the population (enumeration) and looking at demographic indicators, and then population

Table 12.4
An educational comparison according to the 2001 census results

	NL	NO	SE	FI	EE	CH	SI	GR	UK
	in % of the total population								
Population 15–74 with a primary level of education or less [1)]	16.5	4.1	15.6	37.2	11.3	33.5	5.5	38.1	29.3
Population 15–74 with a tertiary level of education	18.8	22.9	20.2	24.6	24.8	17.5	13.3	14.4	19.9

[1)] Including level of education unknown.

estimates were made based on a combination of these two components. The ONC estimated the level of under enumeration in the census and combined this with the census count, to calculate a single population estimate. Under enumeration was estimated by completing a very large, independent census coverage survey (300,000 households) and using dual system estimation [1)]. The aim of the ONC was to create a single person level database, that was the best estimate of what would have been collected if 2001 census had not been subject to under enumeration. Therefore, tabulations derived from this database will automatically include compensation for under enumeration for all variables and at all levels of geography, and will be consistent with ONC population figures.

12.2.1 Population structure

Figure 12.1 and table 12.5 show the Dutch population is younger than the UK population in age structure. The Netherlands has more of its population distributed in working ages and under age 5, and less over age 60 than the UK. Both the mean and the median ages of the populations reflect this. The mean age of the UK population is 39.1 years and the mean age of the Dutch population is 38.3 years. The median ages for the populations are 37.9 for the UK and 37.5 the Netherlands.

Table 12.5
The population in the United Kingdom and the Netherlands by age group and sex

	Males		Females		Total	
	UK	NL	UK	NL	UK	NL
	%					
Age group						
0–15	21.25	20.47	19.15	19.15	20.17	19.80
16–59	60.13	63.58	58.01	60.36	59.04	61.95
60+	18.62	15.96	22.84	20.49	20.79	18.25
0–15	21.25	20.47	19.15	19.15	20.17	19.80
16–79	75.97	77.53	75.41	76.41	75.68	76.97
80+	2.77	2.00	5.45	4.44	4.15	3.23

Figure 12.1 shows a standardised population pyramid for the UK and the Netherlands. The population structures are similar in each country for both men and women. However, there are several differences between the UK and the Netherlands. Under age 5 there are proportionately fewer people in the UK population compared to the Netherlands, and then over age 5 the UK has relatively more people until age 22. The Netherlands has a higher proportion of its population between ages 22 and 55 than the UK. Then at older ages, in particular over 60 years old, the UK has relatively more people than the Netherlands.

Table 12.5 shows differences in the percentage population distributions. The UK has around 2.5 percent fewer of its population aged 16–59 years, also the Netherlands has a smaller percentage of its population that are very elderly (over 80 years old).

12.1 The population in the United Kingdom and the Netherlands by age and sex

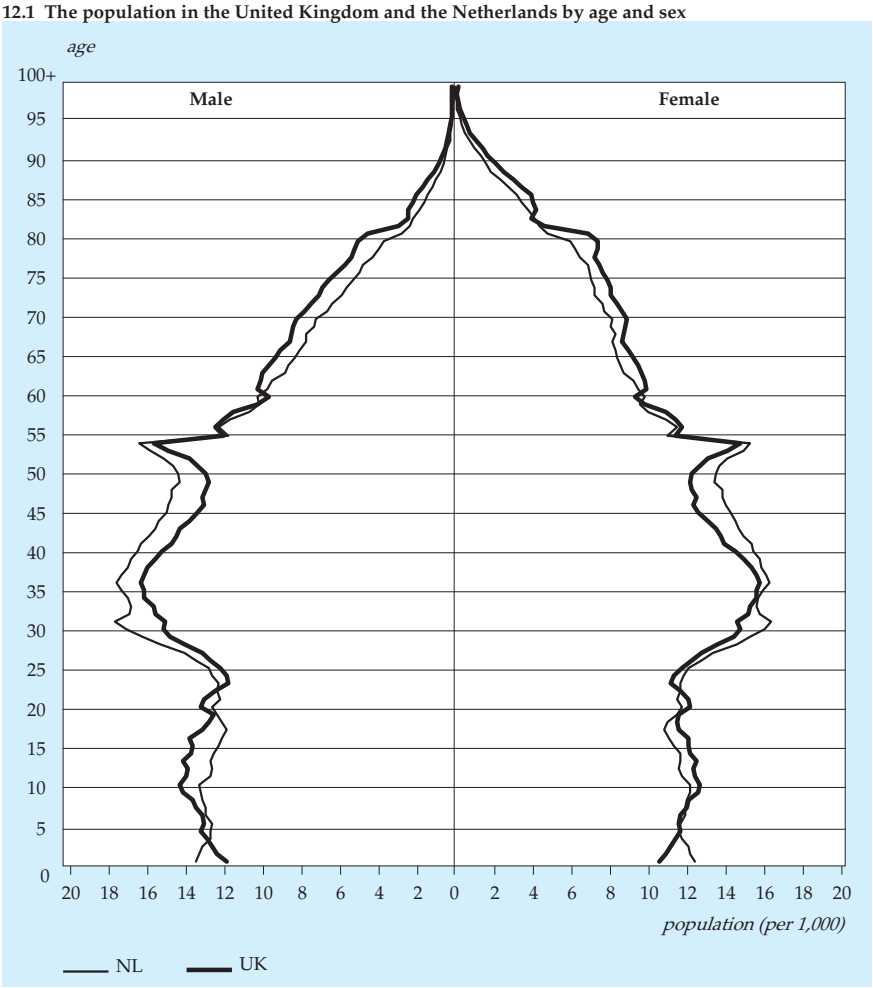


Table 12.6
Dependency ratios in the United Kingdom and the Netherlands

	Youth (0–15)	Aged (65+)	Overall (0–15 and 65+)
UK	0.34	0.35	0.69
NL	0.32	0.29	0.61

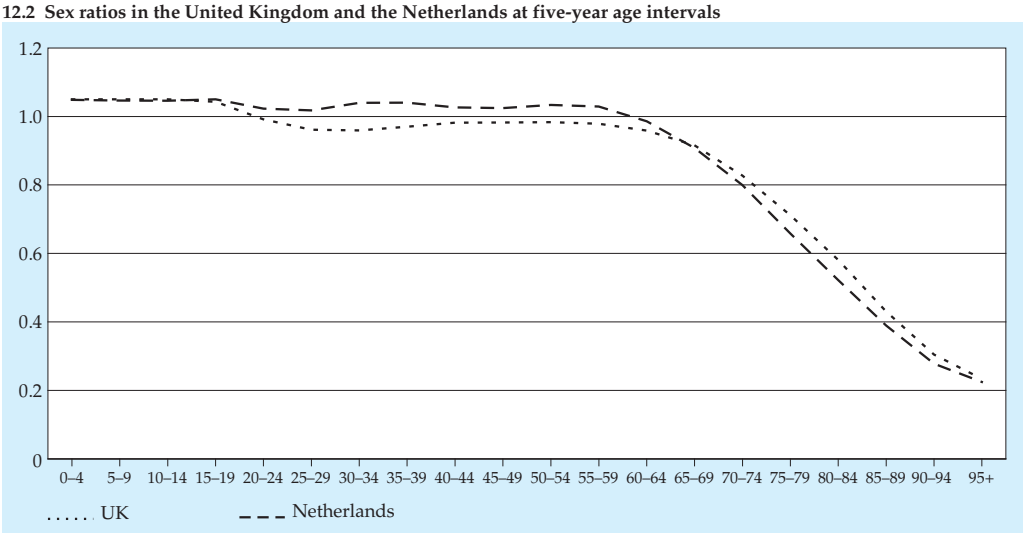
The dependency ratios (dependants defined as aged 0–15 or 65 and over) in table 12.6 show that the UK has a higher population dependency ratio than the Netherlands. This means that every 100 people of working age have to support approximately 69 dependants in the UK, compared to 61 dependants in the Netherlands. The pattern of dependency is different between the UK and the Netherlands; in the Netherlands children are a bigger component of the dependants ratio than the elderly, whereas the opposite is true for the UK.

Figure 12.2 shows that the sex ratio is above 1 (more men than women) from birth until age 60–64 in the Netherlands, whereas the UK sex ratio falls below 1 at age 20–24. This is likely to be a reflection of different patterns of migration by sex for the United Kingdom and the Netherlands. At older ages there is a slightly greater excess of females in the Netherlands population compared to the UK population.

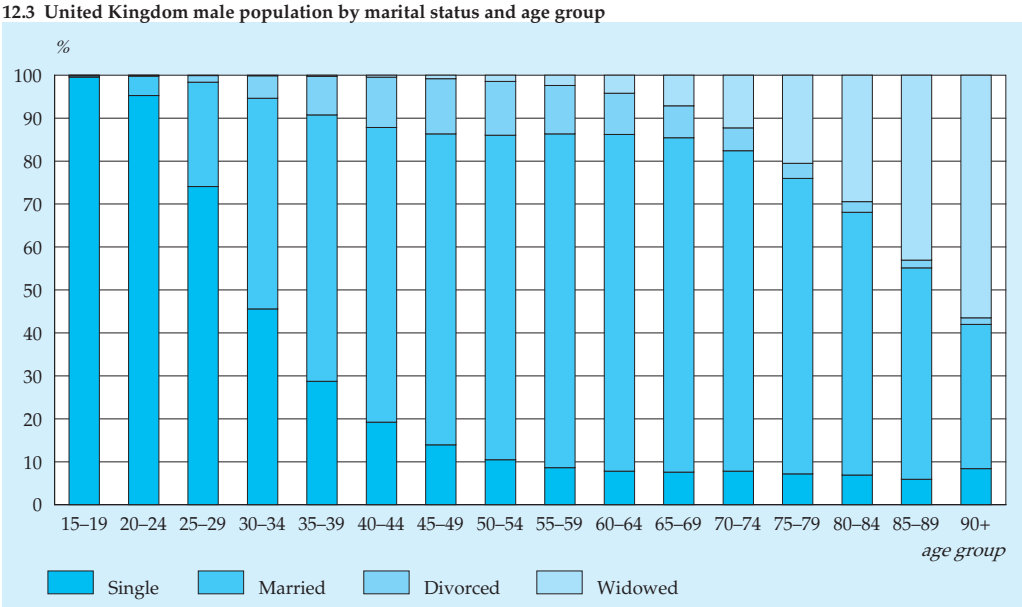
12.2.2 Population by marital status

The patterns of the male population by marital status and five-year age groups shown in figure 12.3 and figure 12.4 are similar between the Netherlands and the

12.2 Sex ratios in the United Kingdom and the Netherlands at five-year age intervals

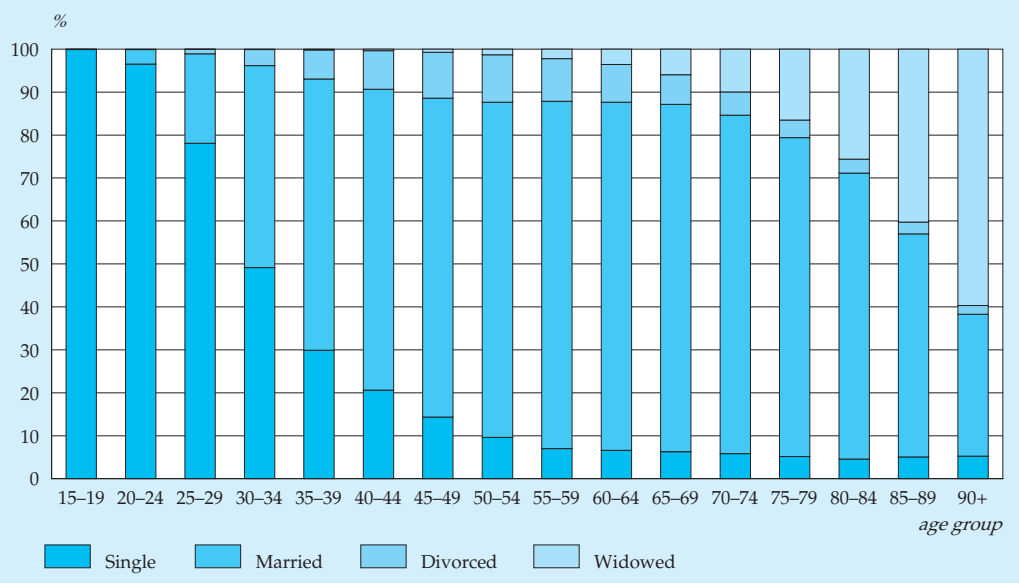


12.3 United Kingdom male population by marital status and age group



UK. There are some small differences, such as slightly higher percentages of married men in the UK at ages under age 35, in particular at age 25–29, where the proportion is 3.5 percentage points higher in the UK. In the UK there are also somewhat higher

12.4 Netherlands male population by marital status and age group



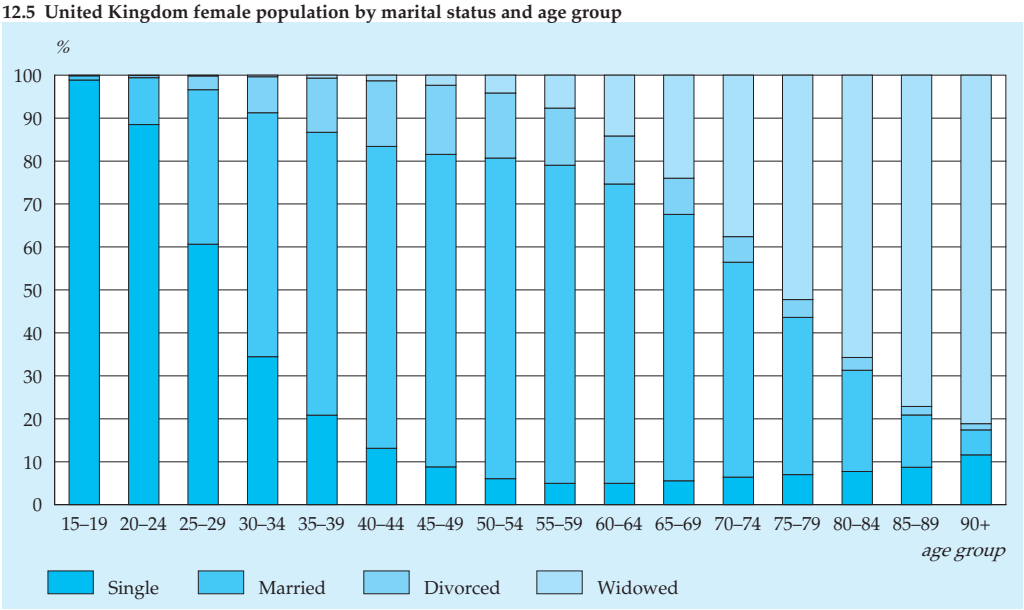
percentages of the population who are divorced in the younger and middle aged groups, although the UK and the Netherlands display similar levels of percentages divorced at older ages (over 65 years). The male population of the Netherlands has relatively more men who are married in every age category between ages 35–39 and 85–89.

Figures 12.5 and 12.6 show that female marital status patterns are similar between the UK and the Netherlands, in particular in the youngest three age groups and over age 65. Compared with the UK, there are proportionately more women married in the Netherlands in every age group from age 30 to 74. In particular between ages 30–34 and 40–44 the Netherlands has 3 percentage points more married women at each age group compared to the UK. As with the male population below age 65 the percentage of the female population classified as divorced is greater in the UK. Between ages 35–39 and 45–49 there are 3 percentage points more divorced women at every age group in the UK population compared to the Dutch population.

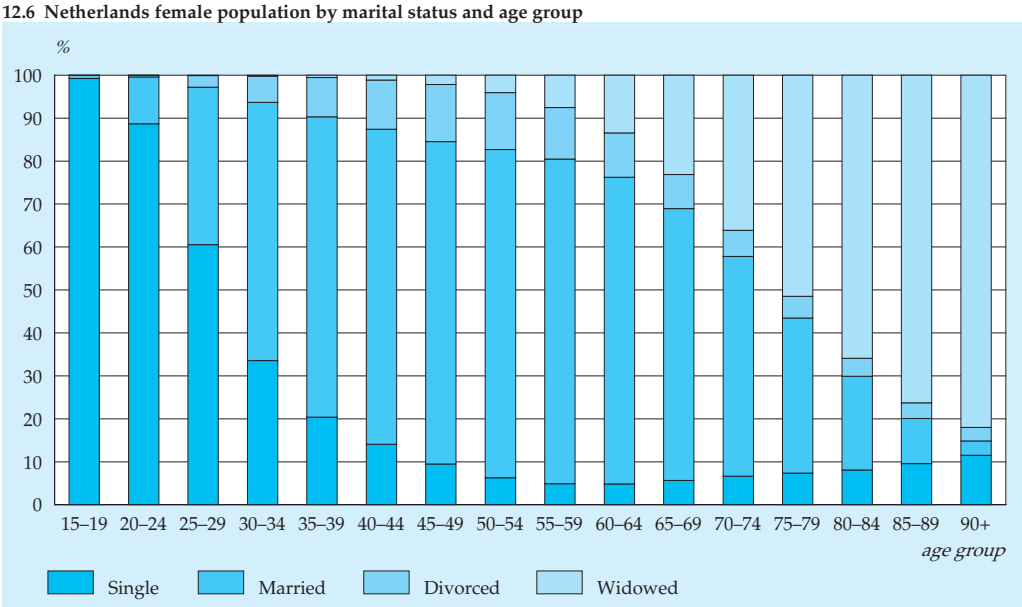
12.2.3 Elderly population residence

Table 12.7 shows that for the elderly population aged 70 and over, a much higher proportion of the elderly in the Netherlands live in health care institutions and institutions for retired or elderly persons.

12.5 United Kingdom female population by marital status and age group



12.6 Netherlands female population by marital status and age group



12.2.4 Foreign born population

Table 12.8 shows the foreign born population distributions of the Netherlands and the UK are broadly similar. In both the UK and the Netherlands the foreign born population make up around one in ten of the total population.

The Netherlands has 1.5 percent more people in its population who were born outside the country than the UK. The regions with noticeably different percentages between the UK and the Netherlands are Europe and Central and South America. The Netherlands has a higher percentage of residents born in Central and South America than the UK.

At every age the percentage of the Netherlands population who were born in the UK is higher than the percentage of the UK population who were born in the Netherlands. However, this is a reflection of the relative size of the UK and Dutch populations. Table 12.9 shows the relative risks for being born in one country and living in the other and indicates a relationship opposite to the one described. At every age there is a much higher 'risk' of being Dutch born and living in the UK than there is of being UK born and living in the Netherlands.

12.2.5 Population by educational attainment[2)]

For figures 12.7–12.10 the categories of lower secondary and upper secondary educational attainment were combined to make an overall secondary educational

Table 12.7
Elderly population in institutions [1] in the United Kingdom and the Netherlands by sex and age group

		Age group		
		70–79	80–89	90+
		in % of the total population		
Males	UK	1.5	5.5	18.2
	NL	1.9	10.2	33.5
Females	UK	2.1	10.3	31.7
	NL	3.3	18.4	47.1
Total	UK	1.8	8.7	28.7
	NL	2.7	15.7	44.2

[1] Institutions are defined as health care institutions and institutions for retired or elderly persons.

Table 12.8
Population by region of birth in the United Kingdom and the Netherlands

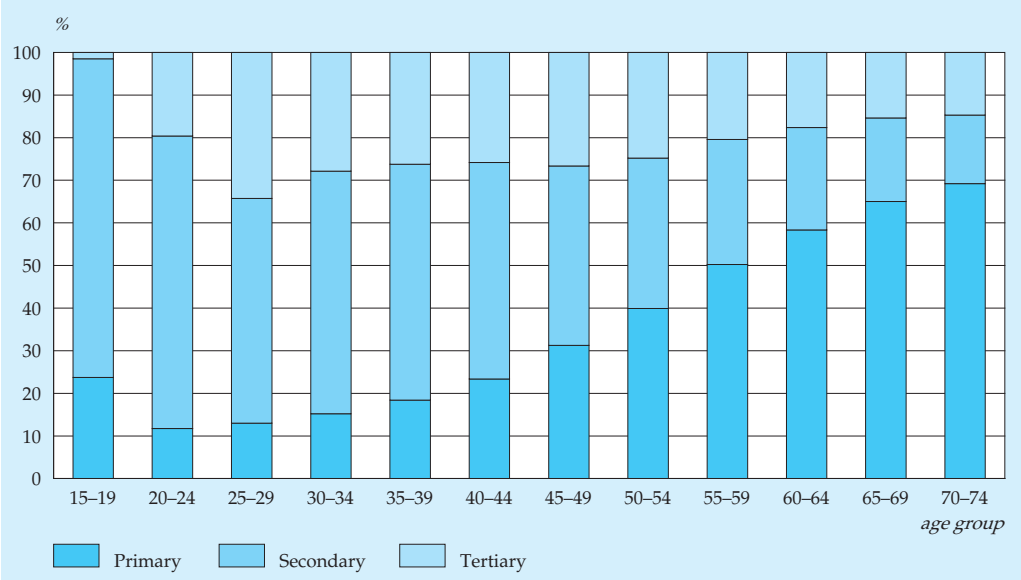
	Region of birth								
	Parent Country	Europe	Middle East	Asia	North America	Central & South America	Africa	Oceania	Other
	%								
UK	91.67	2.89	0.17	2.51	0.40	0.57	1.42	0.29	0.07
NL	89.90	3.81	0.32	2.01	0.19	1.44	1.72	0.08	0.53

Table 12.9
Relative risks for being born in one country and living in the other by age group

	Approximate percentage likelihood of being Dutch born and living in the UK [1]	Approximate percentage likelihood of being UK born and living in the Netherlands [2]
	%	
Age group		
0–14	0.19	0.04
15–24	0.29	0.06
25–34	0.40	0.14
35–44	0.31	0.14
45–54	0.27	0.13
55–64	0.26	0.08
65+	0.28	0.03

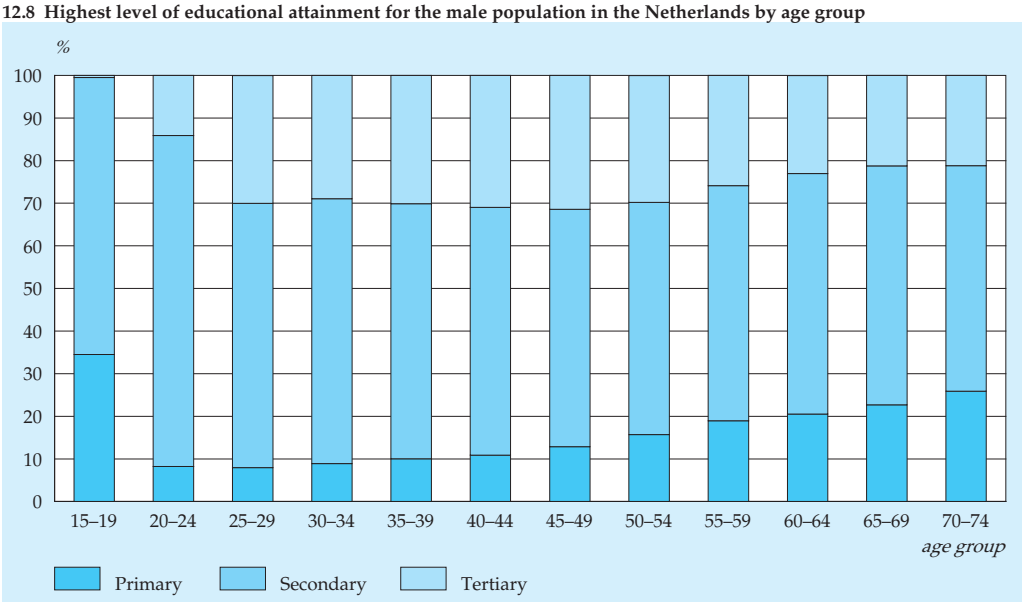
[1] Calculated by dividing the Dutch born population in the UK by the overall Dutch population for each age group.
[2] Calculated by dividing the UK born population in the Netherlands by the overall UK population for each age group.

12.7 Highest level of educational attainment for the male population in the United Kingdom by age group

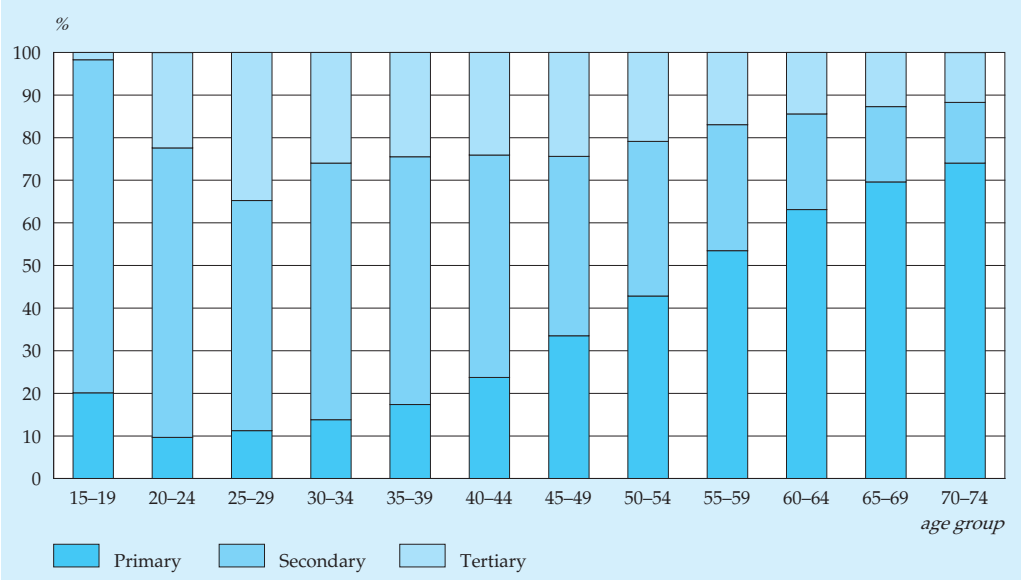


attainment category. This is because there were large differences between the UK and the Netherlands in the secondary level attainment data, which are likely to be due to differences in classification. As mentioned previously it is difficult to classify

12.8 Highest level of educational attainment for the male population in the Netherlands by age group



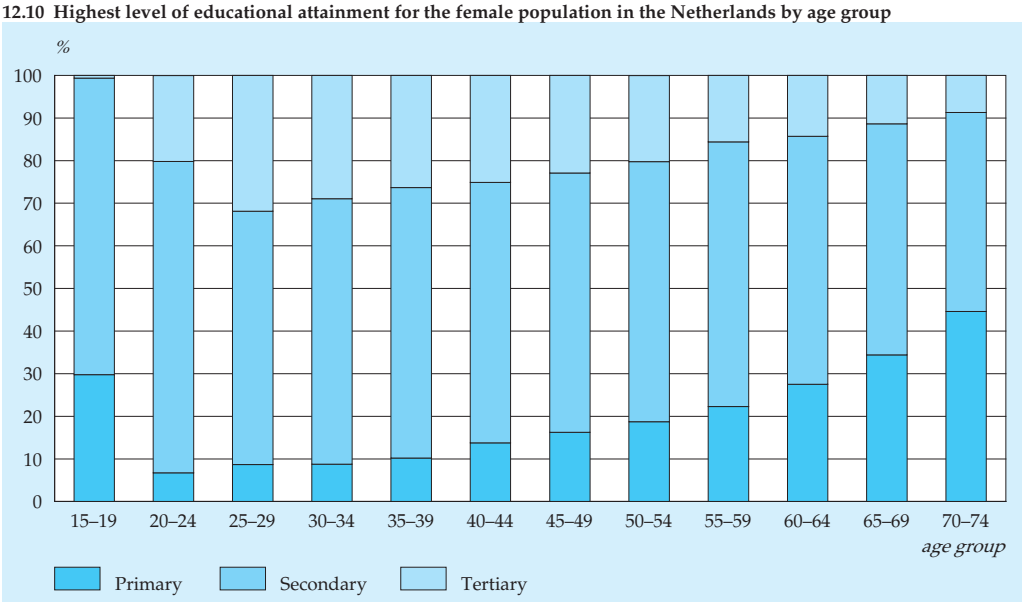
12.9 Highest level of educational attainment for the female population in the United Kingdom by age group



education data for countries to the ISCED classification, and it must be borne in mind that this hampers international comparisons.

The patterns of educational attainment shown in figures 12.7–12.10 are quite different between the populations of the Netherlands and the UK. Within the UK

12.10 Highest level of educational attainment for the female population in the Netherlands by age group



patterns of educational attainment by age are similar between the sexes. However, within the Netherlands there are quite large gender differences at the older ages. The biggest differences between the UK and the Netherlands are found in the distributions of primary and secondary educational attainment.

The percentage of males and females with only primary level educational attainment increases with every age group from 20–24 to 70–74 years old, but the increases are much more marked in the UK populations compared to the Dutch populations. In the UK the percentage of the population with only a primary educational attainment rises from around 10 percent at age 20–24 years to close to 70 percent at age 70–74. Whereas in the Netherlands this percentage rises from roughly 7 percent to 26 percent for men and 45 percent for women.

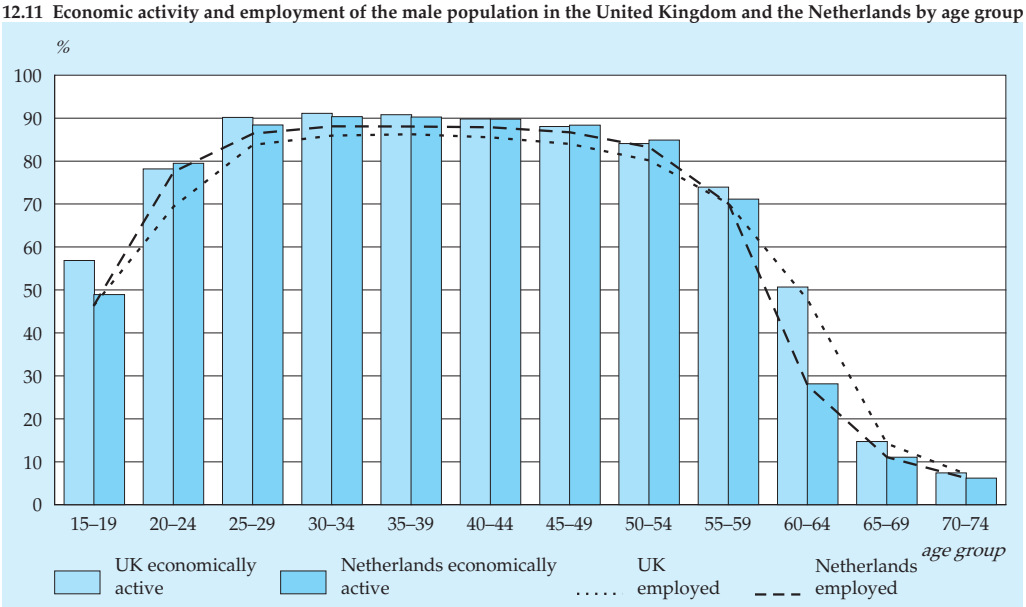
The pattern of secondary level educational attainment is also different between the UK and the Netherlands. At older ages the percentage of UK population with secondary level educational attainment decreases quite markedly, as the percentage of the population with only primary educational attainment rises. However, relative to the UK the percentage of the Dutch population with secondary educational attainment remains quite stable and high over the age range. So from ages 55–59 onwards there is a difference of over 25 percentage points between the percentage of the Dutch and the UK populations that have attained secondary level qualifications. At younger ages this difference is under 10 percentage points.

The distribution of men and women with tertiary educational attainment is broadly similar for the Netherlands and the UK. Younger cohorts generally show higher proportions attaining tertiary level qualifications. Men in the Netherlands are an exception, their level of tertiary educational attainment has remained stable, although it was already relatively high compared with the United Kingdom for older cohorts, being roughly 30 percent for all ages between 25 and 54. Furthermore, at every age group over age 60 more than one in five Dutch men has a tertiary qualification. The most recent cohort to have completed higher education (25–29 year olds) in the UK show a noticeable increase in the percentage with tertiary educational attainment compared to percentage of the next oldest cohort (30–34 year olds) with tertiary qualifications.

12.2.6 Population by economic activity and employment status

Figures 12.11 and 12.12 show that overall a greater percentage of the UK population is economically active compared to the population of the Netherlands. Figure 12.11 shows that the UK and Netherlands populations have similar percentages of economically active men, except for below 30 years old and over 60 years old, when the UK has a greater percentage classified as economically active. However, as a percentage of the whole population more men are employed in the Netherlands in

12.11 Economic activity and employment of the male population in the United Kingdom and the Netherlands by age group



every age group from age 20 up to age 50. The difference is around 3 percentage points, except for 20–24 years where it is 8 percentage points. Above 55 years the UK has higher proportions of employed men than the Netherlands.

12.12 Economic activity and employment of the female population in the United Kingdom and the Netherlands by age group

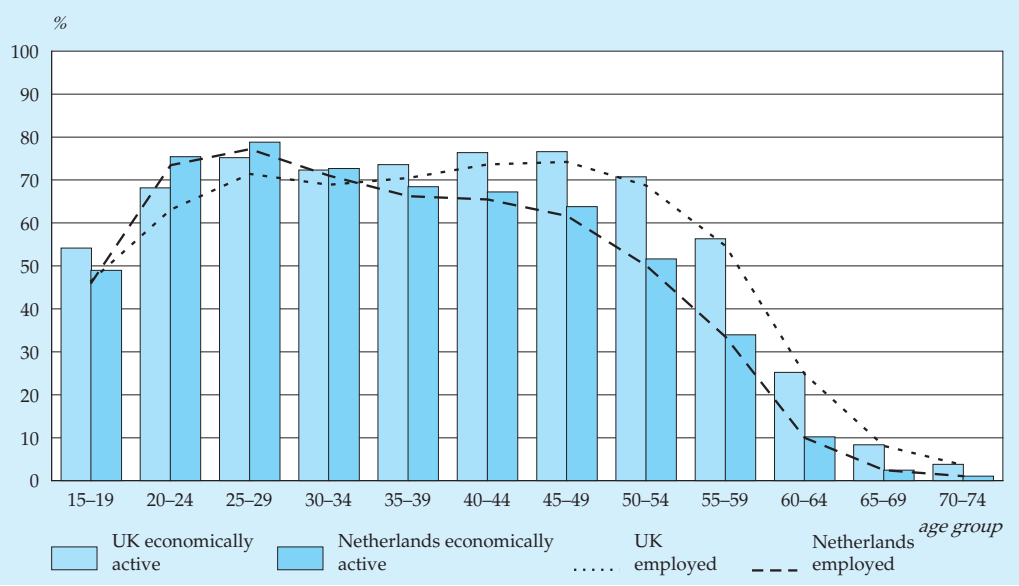


Figure 12.12 shows that a greater percentage of 16–19 year old women are economically active in the UK compared with the Netherlands, whilst the Netherlands has relatively more women aged 20–34 who are economically active. Then after age 35 at every age group there are relatively more economically active women in the UK than in the Netherlands.

The female populations of the UK and the Netherlands show quite large differences in percentages employed. Under age 30 the Netherlands has a higher percentage of employed women. From age 16–19 to age 25–29 both the UK and the Netherlands have an increasing percentage of women who are employed, the percentage of women employed then decreases from age 25–29 to age 30–34. After age 30–34 the percentage of women employed decreases in each older age group in the Netherlands. However, in the UK the percentage of women employed increases from age 30–34 to age 45–49. Then employment levels start to decrease again but remain higher than the percentages in the equivalent age groups in the Netherlands.

So at every age after 30–34 years a greater percentage of women are employed in the UK than in the Netherlands, and quite a large gap develops between female employment levels in the UK and the Netherlands. For example, at 50–54 years old only 50 percent of Dutch women are employed compared with 68 percent of UK women.

Table 12.6 presented dependency ratios for the UK and the Netherlands, a further refinement of this are economic dependency ratios whereby dependants are defined as aged 0–15 or 65 and over or 16-59 and economically inactive. The economic dependency ratios for the UK and the Netherlands are 111.8 and 114.9 respectively. This means 100 economically active people are supporting approximately 112 economically inactive people in the UK and approximately 115 economically inactive people in the Netherlands. These dependency ratios show an opposite relationship to that of the overall dependency ratios in table 12.6. The economic dependency ratios show the UK economically active population has fewer economically inactive dependants to support relative to the Netherlands. However, the difference between economic dependency ratios for the UK and the Netherlands is smaller for the overall dependency ratios.

Annotations

1) For further information on the ONC methodology please see: http://www.statistics.gov.uk/census2001/pdfs/oncguide.pdf.
2) There are some issues with the comparability of the education data. The UK had a category of people whose educational status was 'other qualification', these people could not be fitted into the ISCED categorisation of educational attainment. Therefore, they

were excluded from the population in the calculation of the education comparison. For men the percentage of an age group classified as 'other educational qualification' ranged from 21.7 percent (15–19 year olds) to 2.1 percent (20–24 year olds), with the average for the whole age range (15 to 74) of 9.7 percent. For women the percentage of an age group classified as 'other educational qualification' ranged from 21.3 percent (15–19 year olds) to 1.57 percent (20–24 year olds), with an average for the whole age range of 5.9 percent. Also the Netherlands had a post secondary category that was included with tertiary qualifications, which may have affected the comparison with the UK.

Reference

OECD, 2003. Education at a glance. OECD Publications, Paris, France.

13. The use of administrative registers and sample surveys in the Dutch Census of 2001

Frank Linder

Until the 1970s, population censuses in the Netherlands were organized in the traditional way, by national enumeration. Then the willingness of citizens to participate in a census started to decline, partly because of privacy considerations. In order to fulfil the need of information for policy and research purposes, new data sources had to be explored. For the Census Programme 2001 an alternative was found in the so-called Virtual Census. The Virtual Census of 2001 uses the Social Statistical Database (SSD) as its source. The SSD contains a huge amount of data on demographic and socio-economic issues. It is constructed by micro-linking several administrative registers and sample surveys. A micro-integration process ensures coherence, consistency and completeness of the SSD-data.

13.1 Introduction

The first traditional Population Census in the Netherlands, as laid down by Royal Decree, was held in 1829. [1)] It was the start of a hundred and forty year period in Dutch history, during which fourteen traditional censuses were carried out. The final census in this series dates from 1971. Since then a growing distrust in the objectives of a government collecting all sorts of information about its citizens developed. It marked an era in which society became less co-operative, forcing Statistics Netherlands to find alternatives for the traditional population census. Instead of field enumeration, Statistics Netherlands explored administrative registers and sample surveys as new data sources in order to get the necessary census information.

For the 1981 and 1991 Census Rounds demographic data were drawn from the Population Register. Data on socio-economic characteristics, such as on labour and education, were provided by the Labour Force Survey. These sources, however, were used separately, which means that no special attention was paid to coherence of the information at the micro-level. Moreover, table totals in one source could be different from corresponding totals in the other. To overcome this consistency problem, table results were reweighted to the level of the Population Register totals (for the experiences with the Census of 1981 see Vliegen and Van de Stadt, 1988; for the compilation of the 1991 Census see Corbey, 1994).

For the Census 2001 Programme (Eurostat, 1999) Statistics Netherlands launched a new approach, which is unique in Europe (Eurostat, 2003). One of the most important achievements of the nineties in the area of social statistics is that an increasing amount of socio-economic statistical information can be acquired from administrative registers. Comprehensive and detailed information is now available on employment and social security. By micro-linkage and micro-integration of demographic and socio-economic data from a wide variety of administrative registers and sample surveys, Statistics Netherlands created a Social Statistical Database (SSD). The SSD contains coherent and detailed information on persons, households, jobs and (social) benefits. Therefore it is an appropriate data source for the Population Census of 2001. Consistency of sample survey and register (sub)-totals is achieved by the method of repeated weighting, a new advanced weighting technique. The application of this method will be discussed in full extent in chapter 14.

Section 13.2 describes the relevant underlying data sources of the SSD, which were used for the purpose of the Dutch Census 2001. Section 13.3 discusses the combining of these data sources, in particular the micro-linkage process and the micro-integration process. Section 13.4 goes into the creation of the SSD. Section 13.5 deals with the SSD- harmonisation according to the Census 2001 guidelines (Eurostat, 1999). Section 13.6 comes with some concluding remarks.

An extensive treatment of the data sources and methods, which were used in order to compile the Census 2001 Table Programme, is given in Linder (2003). An abridged version of this paper is to appear in a special issue of the Journal of Austrian Statistics, Summer 2004.

13.2 Data sources

The Virtual Census 2001 is based on the Social Statistical Database (SSD). The underlying data sources of the SSD are described in the following subsections. An overview of the data sources used for the 2001 Census Programme is presented in table 13.1.

Population Register (PR)
The Population Register (PR) contains demographic information on every inhabitant of the Netherlands (Prins, 2000). The Population Register is built from the municipal population registers, which are of outstanding quality nowadays. Municipalities have a major incentive to record all their inhabitants because the allocation of central government funds is mainly based on population size.
The Census Programme requires a population concept in which people are counted at the place where they usually reside. This is the *de jure* concept. Persons who are

temporarily absent at the time of the census, migrants, homeless people and others who have no 'usual' place of residence are also to be included in the *de jure* population. In the latter case, according to the guidelines of the Census Programme (Eurostat, 1999), an address ought to be assigned where they are enumerated or registered. The PR meets the requirements of the *de jure* concept because it registers the population at the usual place of residence. Moreover, the PR also encompasses (nearly) all homeless people. They are sometimes registered at their shelter address, for example the Salvation Army, or at the location from where they receive social assistance benefits. These are points where the PR compares favourably to a traditional census. With field enumeration, there is always a chance that the homeless people are overlooked or that persons, who are temporarily staying at the enumeration address but who usually reside elsewhere, are counted by mistake.

Even though the PR seeks to optimally record every person in the population, it is by no means perfect. People may move to live elsewhere and forget to notify the authorities. Therefore, municipal population registers are not always up-to-date. Another example of improper registration in the PR is when two persons are registered at separate addresses but actually live together. They have a financial incentive to be registered at different addresses if one person is employed and the other is on welfare. This is because the person receiving benefits might loose them when the social security agency finds out they are living together.

An important population group that the PR misses are the people who live in the country without the authorities' knowledge, many staying illegally. This population group is not present in the census population. Illegal residents pose a problem for statistical offices because, on the one hand, they participate in the economy and as such they are included in economic statistics. On the other hand, they are not covered by demographic statistics. It is very unlikely that they would be enumerated in a traditional census though. Statistics Netherlands has made an attempt to estimate the size of the illegal population, but since there is hardly any information this proved very difficult. The official estimate of the number of illegal residents on 1 January 2001 by Statistics Netherlands is one with a wide margin: between 46 thousand and 116 thousand people (Hoogteijling, 2002).

The PR also provides household information, such as household size, household composition, household type and household status. The household type indicates whether someone is living in a private or in an institutional household. [2)] The household status refers to the position (e.g. child, spouse, cohabitant, single parent and living alone) of a person living in a private household. For about 93 percent of all households it is easy to determine the household composition and status. For the remaining households the relationship of the persons within the household is not quite clear. For example, it is difficult to distinguish between partners living together and two students sharing an apartment. In these cases the household

variables are imputed by means of a probabilistic model that is based on known relationships between persons in comparable households in the Labour Force Survey [3] (Harmsen and Israëls, 2003).

Jobs register and sample survey (employees)
Until the Census of 1971, data on economic activity of the population were always collected by enumeration. For the next two censuses, in 1981 and 1991, the Labour Force Survey (sampling fraction 5 percent in 1981, and 1 percent in 1991) served as a source for this kind of information. In the nineties Statistics Netherlands got a complete register on jobs (volume based) at its disposal, the Employee Insurance Schemes Registration System for Employees (EIS-Employees). The use of registers puts an end to the problems with sampling errors, but most administrations are not designed for statistical purposes. Therefore some data pollution is unavoidable. This means that extensive checks and edits are required before the data are fit for statistical use.

One drawback of the EIS-employees register as a source for the census is that it lacks information on two variables needed for the Census Programme, namely 'time usually worked' and 'place of work'. These variables can be found in the Survey on Employment and Earnings (SEE). The SEE is a large-scale survey among enterprises, in which the data are mainly obtained by electronic data interchange (EDI) from payroll administrations. The survey contains information about earnings and working hours of employees as well as some characteristics of their jobs. The SEE has a complicated sampling design: the data of most large enterprises are available on a register basis, whereas a sample is taken for the smaller enterprises.

Jobs register (self-employed persons)
Information on the jobs of self-employed persons (with or without personnel) is to be found in the register of final income tax assessments on profits of self-employed persons (FiTap). Unfortunately, the FiTap-register does not possess data on the exact period of income. Therefore, it is assumed that those who were registered somewhere in 2000 were also self-employed persons on the Census reference date of 1 January 2001. But the assumption may lead to an overestimation of the number of self-employed persons on this date. While compiling the Census 2001 table programme, information was still lacking for approximately 40 thousand self-employed persons (5%). Their tax assessment was not yet ready, probably because there were disputes with the fiscal authorities. [4]

FiBase-register
The FiBase-register is a fiscal administration. It stores data on labour and social security income that is subject to advance tax payments. The register also covers life insurances and pensions from former activities. It is therefore appropriate to trace

those persons in the economically inactive population who are retired, which is information the Census asks for. The FiBase-register is also used to complete missing data on jobs and benefits in the micro-integration process (see section 13.3).

Table 13.1
Overview of the data sources used in the 2001 Census Programme

	Source	Statistical unit	Integral or sample/ number of records in reference period	Reference period	Census variables
1.	Population Register (PR)	Person	Integral/ 16.0 million records (private household version: 6.9 million records)	1 Jan. 2001	– Sex – Age – Country of birth – Country of citizenship – Country of residence a year prior to census – Region of residence – Marital status – Family status – Family situation – Family nucleus type – Private household composition – Household status – Household size – Number of children – Other persons in household (outside the family nucleus)
2.	Employee Insurance Schemes Registration System – Employees (EIS-Employees)	Job	Integral/ 6.5 million records	22–31 Dec. 2000	– Employee – Branch of economic activity (NACE) – Gross wage before deduction of social insurance premiums (auxiliary variable)
3.	Survey on Employment and Earnings (SEE)	Job	Selective sample/ 3.0 million records	22–31 Dec. 2000	– Employee – Time usually worked – Place of work
4.	Register of final income tax assessments on profits of self-employed persons (FiTap)	Self-employed person	Integral/790 thousand records (missing about 5 percent records)	Volume 2000	– Self-employed person – Branch of economic activity (NACE)
5.	Employee Insurance Schemes Registration System – Unemployment insurance (EIS-UI)	Benefit	Integral/440 thousand records	Volume 2000	No census variables
6.	Employee Insurance Schemes Registration System – Disablement insurance (EIS-DI)	Benefit	Integral/ 1.0 million records	Volume 2000	No census variables
7.	Social Assistance Benefits Administration (SABA)	Benefit	Integral/ 580 thousand records	Volume 2000	No census variables
8.	FiBase-register (register of advance tax payments)	Income transaction	Integral/7.2 million records (employee jobs); 2.7 million records (pensions/ life insurance)	31 Dec. 2001	– Employee: yes/no. – Pensions / life insurance benefits (retired persons)
9.	Labour Force Survey (LFS)	Person	Sample/2000: 120 thousand records; 2001: 110 thousand records	2000 and 2001	– Educational attainment level – Occupation – Unemployment – Attending education – Engaged in family duties

This overview is partially extracted from Van der Laan (2000b), page 23.

Labour Force Survey (LFS)

The Labour Force Survey (LFS) is a household sample survey. It is needed for census information that is not (yet) available in registers. It concerns census variables such as occupation and educational attainment levels. The LFS is also used to define that part of the economically active population that is unemployed, and to define those in the economically inactive population who are engaged in family duties as their main current activity or who attend educational institutions full-time.

The LFS is a survey on private households, in which the survey population is restricted to persons aged 15 years and older. It is a continuous survey, meaning that sampling and surveying of persons is spread throughout the year. The sample size is actually quite small; some 100 thousand persons are sampled, which is approximately one percent of the total population. The consequence is that estimation for small subpopulations at a detailed level, which is often asked for in the Census Table Programme 2001, may be unreliable or even impossible. For this reason two LFS-surveys, 2000 and 2001, were joined to create more mass for the Census compilation process. In fact, information up to one year before the census reference date (1 January 2001) and up to one year after the reference date has been gathered in this way. In general the above mentioned LFS census variables are relatively stable within the period of a year, so that it can be assumed that they represent the situation at reference date without much error.

Remaining data sources

Some registers only play an indirect part in the 2001 Census. It concerns the Employee Insurance Schemes Registration System–Disablement insurance (EIS-DI), Employee Insurance Schemes Registration System–Unemployment insurance (EIS-UI) and the Social Assistance Benefits Administration (SABA). No variables of these sources are used for the census, but the registers are essential in the micro-integration process of jobs and benefits. This will be discussed in detail in the next section.

13.3 Combining data sources, micro-linkage and micro-integration

Policymakers and scientists nowadays increasingly demand comprehensive and coherent statistical information that provides insight in the complex relationships between the various aspects of social and economic life. Therefore, in an environment in which so many data sources on social issues are available, there is a great stimulus and challenge to extend the scope and to improve the quality of social statistics (Al and Bakker, 2000).

One great advantage of the social data sources nowadays is the availability of linkage-keys in the data files. There is no need anymore to present statistical information from isolated sources. On the contrary, the possibility to link several data files and to combine all kinds of information out of it, adds a new dimension to the processing of social statistics. For example, one can nowadays get information on employees (source: jobs register) who are married and of non-European descent (source: PR). There is also a value added in the sense that it is possible to get more reliable and complete information when there are two or more sources with respect to the same subject.

Micro-linkage

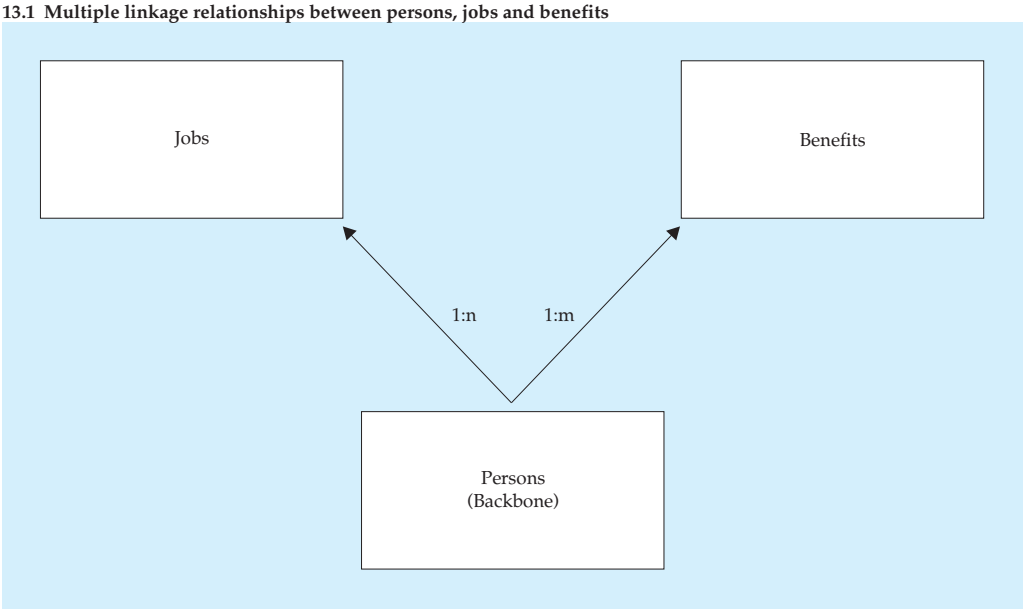
Most of the present administrative registers are provided with a unique linkage key. It is the so-called social security and fiscal number (SoFi-number), a personal identifier for every (registered) Dutch inhabitant and those abroad who receive an income from the Netherlands and have to pay tax over it to the Dutch fiscal authorities.

To prevent misuse of the SoFi-number, Statistics Netherlands recodes it for statistical processing into a so-called Record Identification Number (RIN-person). Personal identifiers, such as date of birth and address, are replaced by age at the reference date and RIN-address. This is all done in accordance with regulations of the Dutch Data Protection Authority to protect the privacy of the citizens.

Since the SoFi-number is in use by social security administrations and tax authorities, one may expect it to be of excellent quality. A limited amount of SoFi-numbers may be registered with incorrect values in the data files, in which case linkage with other files is doomed to fail. However, in general, the percentage of matches is close to one hundred percent. Abuse of SoFi-numbers, for example by illegal workers, may occur in some cases, which results in a false match. Sometimes there are indications of a mismatch. An example of this is when the jobs register and the PR are linked and the worker turns out to be an infant. Another example is, when the FiBase shows an unusually high income for a worker, when it is in fact the sum of the incomes of all people using the same SoFi-number.

All social statistics data files can be linked to the PR. In practice this means that these data files are all indirectly linked to each other via the PR. Therefore the PR can be considered the backbone in the set of social data sources. When linking the PR and the jobs register, or the PR and a register of social benefits, it is a linkage between different statistical units (persons, jobs, benefits). In that case multiple (1:n) linkage relationships can exist because someone can have more than one job or can benefit from several social benefits.

13.1 Multiple linkage relationships between persons, jobs and benefits



In household sample surveys, like the LFS, records do not have a SoFi-number. For those surveys an alternative linkage key is used, which is often built up by a combination of the following personal identifiers:
– sex;
– date of birth;
– address. [5)]

This sort of linkage key will usually be successful in distinguishing people. However, it is not a 100 percent unique combination of identifiers. Linking may result in a mismatch in the case of twins of the same sex. False matches may also occur when part of the date of birth or the postal code and house number is unknown or wrong. Another drawback is that the linkage key is not person but address related, which may cause linkage problems if someone has recently moved. When linking the PR and the LFS with this alternative key, and tolerating a variation between sources in a maximum of one of the variables sex, year of birth, month of birth or day of birth, the result is that 96 to 97 percent of the LFS records will be linked.

In its linkage strategy, Statistics Netherlands tries to maximize the number of matches and to minimize the number of mismatches. So, in order to achieve a higher linkage rate, more efforts are made to link the remaining unlinked records by means of different variants of the linkage key. For example, leaving out the house number and tolerating variations in the numeric characters of the postal code. To keep the probability of a mismatch as small as possible, some 'safety' devices are built in the

linkage process. This last linking attempt accomplishes an extra one percent matches.

In the end about two to three percent of the LFS records could not be linked to the PR. All together this is a good result, but selectivity in the micro-linkage process is not to be ruled out. If the unlinked records belong to a selective subpopulation, then estimates based on the linked records may be biased, because they do not represent the total population. Analysis in the past has indicated that the young people, in the 15–24 age bracket, show a lower linkage rate in household sample surveys than other age groups. The reason for this is that they move more frequently, therefore they are often registered at the wrong address. The linking rate for persons living in the four large cities Amsterdam, Rotterdam, The Hague and Utrecht is lower than for persons living elsewhere. Ethnic minorities also have a lower linkage probability, among other things because their date of birth is often less well registered (Arts et al., 2000).

From March 2004 the PR is going to serve as a sampling frame for the LFS. The prospect will be a matching rate of almost 100 percent, and no more linkage selectivity problems will occur.

Micro-integration

Successfully linking the PR with all the other data sources mentioned, makes much more coherent information on the various demographic and socio-economic aspects of each individual's life available. One has to keep in mind, however, that some sources are more reliable than others. Some sources have a better coverage than others, and there may even be conflicting information between sources. So, it is important to recognise the strong and weak points of all the data sources used.

Since there are differences between sources, we need a micro-integration process to check data and adjust incorrect data. It is believed that integrated data will provide far more reliable results, because they are based on an optimal amount of information. Also the coverage of (sub) populations will be better because when data are missing in one source we can use another source. Another advantage of integration is that users of statistical information will get one figure on each social phenomenon, instead of a confusing number of different figures depending on what source has been used.

During the micro-integration of the data sources the following steps have to be taken (Van der Laan, 2000a):

a. harmonisation of statistical units;
b. harmonisation of reference periods;
c. completion of populations (coverage);
d. harmonisation of variables, in case of differences in definition;

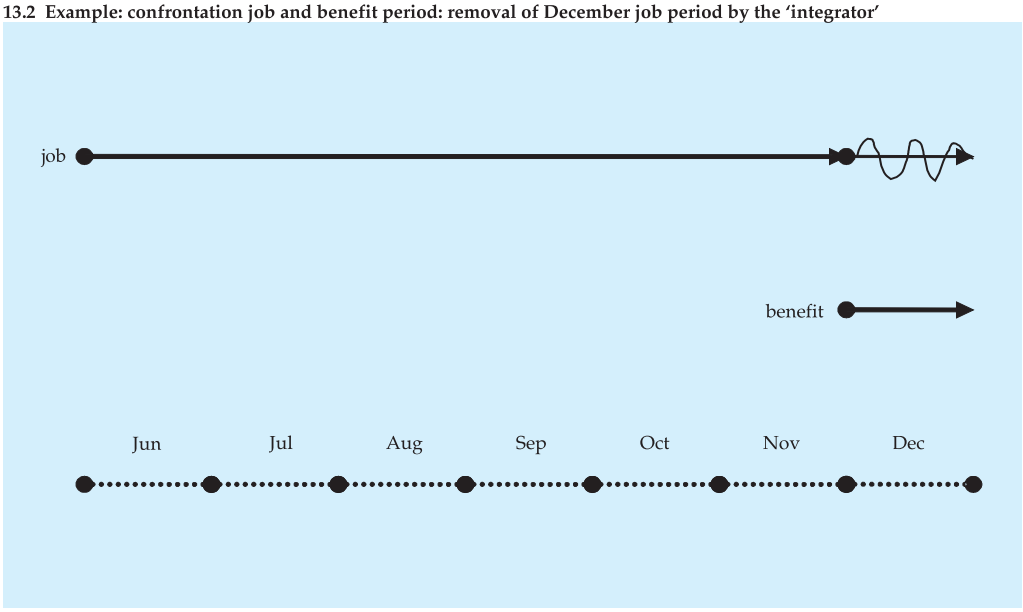
e. harmonisation of classifications;
f. adjustment for measurement errors, when corresponding variables do still not have the same value after harmonisation for differences in definitions;
g. imputations in the case of item non-response;
h. derivation of (new) variables; creation of variables out of different data sources;
i. checks for overall consistency.

All steps are controlled by a set of integration rules and fully automated.

One example of how micro-integration works is the case in which data from the jobs register are confronted with data from the register of benefits. Both jobs and benefits are registered at volume base, which means that information on their state is stored at any moment in the year instead of at one reference day. Analysts of the jobs register know that the commencing date and the termination date of a job are not registered very accurately. It is important though to know whether or not there is a job at the reference date, in other words whether or not the person is an employee. With the help of the register of benefits it is sometimes possible to define the job period more accurately.

Suppose that someone becomes unemployed at the end of November and gets unemployment benefits from the beginning of December. The jobs register may indicate that this person has lost the job at the end of the year, perhaps due to administrative delay or because of payments after job termination. The registration

13.2 Example: confrontation job and benefit period: removal of December job period by the 'integrator'



of benefits is believed to be more accurate. When confronting these facts the 'integrator' could decide to change the date of termination of the job to the end of November, because it is unlikely that the person simultaneously had a job and benefits in December (figure 13.2). Such decisions are made with the utmost care. As soon as there are convincing counter indications of other jobs register variables, indicating that the job was still there in December, the termination date will in general not be adjusted.

13.4 *The Social Statistical Database (SSD)*

The micro-linkage and micro-integration process of all the available data sources result in the end in the Social Statistical Database (SSD), a whole set of integrated micro-data files in their definitive stage. The SSD contains coherent and detailed demographic and socio-economic statistical information on persons, households, jobs and (social) benefits. A major part of the statistical information is available on volume base. An extensive discussion on the SSD is found in Arts and Hoogteijling (2002).

The PR serves as backbone in this set of files (16 million records on 31 December 2000). Furthermore, the SSD contains the integrated jobs file of employees (7.4 million records on 31 December 2000) and the integrated jobs file of self-employed persons (790 thousand records on 31 December 2000). Its sources were the EIS-Employees, the SEE, the FiTap and the FiBase. The jobs file is partially register and partially sample based. For example, a variable as 'time usually worked' comes from the SEE-sample and is only available for 3 million out of the 7.4 million records.

The main steps during the micro-integration process of the jobs file are:
- eliminating records (e.g. records applying to benefits instead of jobs; zero wage);
- merging records (e.g. different records probably belonging to the same job);
- adjusting date of commencement or termination (e.g. as a result of confronting jobs and benefits, see example above);
- adjusting wage;
- completion of missing data;
- addition of variables (from one source to another source where they are missing).

The SSD also has a set of integrated files of benefits, final EIS-UI-file (440 thousand records in 2000), final EIS-DI-file (1 million records in 2000), final SABA-file (580 thousand records in 2000) and a final file of 'other benefits' (5.6 million records in 2000) of which most records originate from the FiBase, including pensions and life insurances benefits. Apart from completion, the FiBase also plays a role in adjusting

records in the integration process of benefits. The steps worth mentioning in integrating the files of benefits are:
– eliminating records (when all sources indicate that no sum of money has been paid out);
– adjusting date of commencement or termination (in case of administrative inaccuracy, for example after confronting with jobs);
– completion of missing data.

In trying to imagine what the SSD looks like, one should not think of a large-scale file with millions of records and thousands of variables. It would be very inefficient to store the integrated data as such. Furthermore, the issue of data protection prevents Statistics Netherlands from keeping so much information together. Instead, all the integrated files in their final stage are kept separately. There is just one combining element which is the linkage key RIN-person, present in every integrated file. So, whenever users demand a selection of variables out of the SSD set, only the files with the variables demanded will be supplied. These can easily be extracted from the set and linked by means of the linkage key.

13.5 SSD harmonisation with Census 2001 guidelines

For the compilation of the Census 2001 the data were obtained from the SSD. Demographic information was to be found in the PR, the backbone of the SSD. Data on the employed population were extracted from the integrated jobs file (employees and self-employed persons). Information on the retired population was obtained from the integrated files of benefits (records on exclusive pensions and life insurance benefits for people aged 55–64). For the remaining part of the Census Table Programme, information that could not be found in registers, the LFS-file (the joint 2000 and 2001 file) was the main supplier of data.

Before tabulation Statistics Netherlands had to make the SSD-data meet the Census 2001 Programme guidelines (Eurostat, 1999). The outlines of the SSD harmonisation with the Census 2001 guidelines are:
– harmonisation of statistical units;
– harmonisation of reference periods;
– derivation of census variables.

Hamonisation of statistical units
Much of the required census information deals with demographic aspects and is supplied by the PR. The population unit in the PR is the individual person, which is also the level demanded in most tables of the Census 2001 Programme. However, some of the census tables refer to the private household level. Therefore a household version of the PR had to be derived. Since, the household status is known of almost

every person in the PR, as well as the household the person belongs to, this can easily be achieved by aggregation of PR-records from person level to household level.

The relevant statistical unit in labour issues is the employee and not the job. If an employee has more than one job, it has been decided to refer to the characteristics of the main job. So, if the branch of economic activity and the working hours of an employee are to be tabulated, those of the main job are taken. The main job is defined as the job with the highest gross wage.

Hamonisation of reference periods

To select the data from the SSD in accordance with the reference date of the Dutch Census, which is 1 January 2001, one has to harmonise the reference periods. This means that demographic data in the PR are selected according to the situation on 1 January 2001. Reference periods in the case of the jobs file are harmonised by making a selection of employees with a job (of at least 1 hour a week) in the period of 22–31 December 2000.

The reasons for a slight deviation of the Census reference date are the following. First, information on jobs at 1 January 2001 was not yet available. Second, every year the job patterns show a dip in the last week of December. It is likely that many flexible workers jobs terminate before the end of the year. Therefore, 31 December is less appropriate as a choice for a representative reference date. To get the number of self-employed persons at Census reference date we take the complete file of self-employed persons, since no reference period is known of their jobs. The retired population in the age class of 55–64 are selected by tracing persons in the FiBase who have an income exclusively from pensions or life insurance benefits at the end of the year 2000. The age variable is measured at 1 January 2001.

The relevant LFS-variables for the Census are educational attainment level, occupation, and a variable 'current activity', which indicates whether a person is unemployed, attending full-time education or is engaged in family duties. As stated before, the LFS is a continuous survey, which is conducted throughout the year. Therefore, the LFS-information on the survey date will not always be valid at the Census reference date of 1 January 2001. Suppose the LFS finds that someone is unemployed at the survey date. If the integrated jobs file indicates that this person has a job at the Census reference date, he or she will be qualified as employed for the Census. This means that the information from the integrated jobs file overrules the LFS-information. It prevents the incorrect classification of the person as unemployed at the reference date.

Derivation of census variables

The Census Programme guidelines (Eurostat, 1999) are not very clear on how to deal with persons with a mix of (economic) activities. Therefore Statistics Netherlands defined some priority rules to make an unambiguous choice in (economic) activity.

13.3 Derivation of the main (economic) activity of the population out of the SSD

(Economic) activity		PR	Integrated jobs register employees (SEE included) [1]	Integrated jobs register self-employed persons [2]	Integrated files of benefits (pensions/no other income) [3]	LFS
employee (6.8 mln)			SEE			
self-employed persons (0.6 mln)						
unemployed (0.2 mln)						
retired (2.3 mln)						
full-time education (2.8 mln)						
engaged in family duties (1.3 mln)						
other (economically) inactive (2.0 mln)						

[1] Persons under 16 years of age with an employee job are by definition in full-time education. People aged over 75 are by definition retired.
[2] Self-employed persons over 75 are by definition retired.
[3] Only records are extracted of persons aged 55–64 who have an income exclusively from pensions or insurance benefits.

Figure 13.3 gives an overview of the SSD-files used to derive the main (economic) activity of a person in the population. The horizontal axis presents the variables and the vertical axis presents the records. The activity-column in the figure shows the number of persons by (economic) activity.

The census variable '(economic) activity of a person' is defined in the following way:

1. People from 0 to 3 years old are by definition 'other economically inactive';
2. People from 4 to 15 years old are by definition 'attending full-time education', even if they have a job;
3. People over 75 years old are by definition 'retired'. This also applies to the few persons aged over 75 who are still working;

4. People in the ages 65–74 and without job are by definition 'retired';
5. People in the ages 55–64 and with an income exclusively [6] from pension or insurance benefits are by definition 'retired'; We know from experience that the number of people aged under 55 with a pension or insurance benefit for retirement purposes is very limited;
6. People in the ages 16–74 who have an employee's job (of at least 1 hour a week) are 'economically active' and have the employment status 'employee';
7. People in the ages 16–74 who have a job as a self-employed person and no employee's job are 'economically active' and have the employment status 'self-employed person'. [7]

What remains is the population in the ages 16–74 that is neither employed nor retired. Some are economically active although 'unemployed'. Others are 'economically inactive', but they are active in another sense, either 'attending full-time education' (restricted to persons of at most 30 years old), being 'engaged in family duties' or being 'other economically inactive'. No register information is available to distinguish between all these activities, only LFS information. Data on activities for the non-employed and non-retired population is almost all sample-based, which means that the population size of unemployed persons and non-retired economically inactive persons can only be estimated in the repeated weighting process (see chapter 14).

It should be noted that the LFS-information on economic activity in the remaining group is based on subjective statements made by the respondents in the survey. So, if a LFS respondent aged 16–64, who is neither employed nor retired according to SSD registers, considers himself unemployed his economic activity will be 'unemployed' for the census, no matter if he has unemployment benefits or not. Suppose the respondent classifies himself incorrectly as unemployed, then the only other possibility is that he is economically inactive. This is because it has been checked beforehand, in information from the SSD job registers, whether this person has a job or not.

13.6 Concluding remarks

Statistics Netherlands has innovated its methods of data collecting and data processing for the compilation of the Census Table Programme 2001. The most important elements in the new approach are the use of a combination of administrative registers and sample surveys as data sources, and the application of repeated weighting, a new methodology to estimate numerically consistent tables from this data source. The result is called a virtual census, because the results for some characteristics of the population are based on estimates instead of enumeration.

The new way of producing census tables proved to be a succesful and much cheaper alternative for the costly census projects of the past. No special effort had to be made to collect data, as the data sources used for the 2001 Census were already part of the regular statistical programme of Statistics Netherlands. Most data came from registers, and only some supplementary information was needed from sample surveys. This means that the implementation of the 2001 Census Programme hardly caused any response burden. Moreover the data processing time for the 2001 Census was just a fraction of what it would have been in a traditional census.

One disadvantage of the new approach is that the sample size of the surveys used is not always sufficient to guarantee reliable estimates in every respect. This applies in particular to the census tables that demand detailed information for small subpopulations, which is certainly not a hypothetical case. The small sample problem shows up, for example, in tables in the Census Programme 2001 that are specified at a detailed regional level, such as municipalities. A traditional census would not have such a problem. So, the problem of low cell size will have to be solved, for example, by oversampling small subpopulations. Increasing the sample size is not always sufficient, because in the actual case even the joint LFS 2000 and 2001 could not prevent low cell sizes in all tables. Another solution for the small sample problem would be to develop administrative registers with data that are now obtained by sample surveys.

When one compares the present way of compiling census tables with those used in the Censuses of 1981 and 1991, the Census Programme 2001 may have required some more production time but the estimates in cross tabulations of register and survey information are more accurate. First, because the statistical information has gained much more coherence because of combining the data sources. Second, because more auxiliary information could be used in the estimation methods than in the past since more registers are available. Third, because much effort has been made to achieve overall numerical consistency.

Annotations

1) In fact there was a census before. It took place in 1795, before the Netherlands was a kingdom (see chapter 1).
2) The information in the population register on whether someone is living in an institutional household, and if so in what kind of institution, was obtained by linking the PR with the Register of Addresses of Institutional Households (AIH).
3) The result of the imputation is that the distribution of the household variables is reliable at the meso-level. However, at the micro-level errors may show up, for example when the PR is linked with the administration of social assistance benefits. The registered benefit sum may differ from the standard sum that the imputed

household type is legally entitled to because the imputation model only imputes on the basis of demographic variables within the PR.

4) Some of the unobserved self-employed persons may at the same time have an employee job. In those cases they will by priority be defined as an employee (see section 13.5). Because of this, the undercoverage of self-employed persons in the Dutch Census 2001 will in the end be less than 5%.

5) In fact, the combination of a postal code (mostly related to the street) and house number is used as substitute for the address. The postal code consists of four figures, followed by two letters.

6) The reason that the income must consist exclusively of pensions or insurance benefits, is so that the income is for retirement purposes only and not some form of additional income.

7) A person who is self-employed and who also has an employee job is by definition classified as an employee for the Census 2001. This applies for 167 thousand out of 776 thousand self-employed persons (aged 16–74). So, only 608 thousand persons are considered self-employed for the Census 2001.

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14. The method of repeated weighting in the 2001 Census

José Gouweleeuw and Marijke Hartgers

Tables for the Dutch Census of 2001 are based on data that Statistics Netherlands already had available from registers and surveys. In order to obtain a set of numerically consistent tables, we used the method of repeated weighting. A prototype software package (VRD) was developed by Statistics Netherlands to estimate sets of tables using the method. In this chapter we describe the process of repeated weighting and the way it was applied to the census tables. We present some problems we encountered and their solutions, such as the occurrence of categories with few observations. Finally, we demonstrate the effect of repeated weighting on the estimates.

14.1 Introduction.

The tables for the Dutch Census of 2001 are based on a virtual census instead of a complete enumeration. In this virtual census data from several sources (registers, as well as surveys) that were already available at Statistics Netherlands have been combined. The Census of 2001 includes a total of forty extensive tables. Thirty tables concern demographic variables in relation to other variables from registers and surveys such as occupation and branch of activity. For these thirty tables the method of estimation is discussed. The remaining tables deal with housing and commuting. The estimation method used for these tables is beyond the scope of this chapter.

Tables that are based on register information only can be counted directly from the register. Tables containing information from surveys have to be estimated. We used the method of repeated weighting to combine survey and register information. This method was developed by Statistics Netherlands in order to be able to estimate sets of tables that are numerically consistent. Statistics Netherlands developed a prototype software package to estimate table sets with this method as well. The package is called VRD, which stands for Filling (in Dutch 'Vullen') Reference Database.

The process of repeated weighting includes three steps. First, the relevant information has to be extracted from the data sources (registers and surveys) and put into rectangular data blocks. Second, a set of weights has to be assigned to each data block. And finally numerically consistent table estimates are generated from the data blocks. In this chapter we describe the throughput and the output of the

process of estimating tables for the Dutch Census of 2001 using the method of repeated weighting.

The organisation of this chapter is as follows. There is a short description of the process of repeated weighting in section 14.2. Section 14.3 provides information about the used variables and the tables that had to be compiled. Section 14.4 describes the data blocks that were used in the process. Section 14.5 shows the process to derive starting weights for repeated weighting. Some problems that arose in the process of estimation are mentioned in section 14.6. These problems are all connected with rare categories that occur in the surveys used. Section 14.7 shows some results: estimates obtained by repeated weighting are compared with the estimates on the basis of starting weights alone. Finally, section 14.8 gives the processing of the results; rearranging the results to get the output desired by Eurostat and the process of suppression of cells based on too few observations.

14.2 The method of repeated weighting

The tables for the Census of 2001 were composed of data that was already available at Statistics Netherlands. Some variables could be derived from registers, such as demographic variables, and whether or not a person is employed. The value of these variables is known for all records in the population. For other variables (such as educational attainment, occupation, etc.) the value is only known for a sample survey. Tables containing these variables have to be estimated.

A problem that arises from estimating tables from a sample survey is that the estimates based on different surveys can be numerically inconsistent. Because of the survey error, the estimated total of a variable can differ from the actual population value – as long as the difference is within the sampling margin. Also, when two tables are estimated from different data sources, and these tables have a common margin, the estimates of the margin will usually differ. For example, suppose country of birth is contained in the register, and the table [educational attainment × country of birth] has to be estimated from a survey. In that case, estimates on country of birth can be derived from the estimated tables and these will in general differ from the true population values that are known from the register. The method of repeated weighting has been developed to avoid such inconsistencies. This method ensures that estimates and counts from different sources are in fact numerically consistent; see for example Kroese and Renssen (1999 and 2000) and Houbiers et al. (2003). The main purpose of repeated weighting is cosmetic: to avoid differences in estimates caused by survey errors.

The method of repeated weighting can be used to estimate a set of relatively simple and well-defined tables consistently. The idea is to use more than one set of sample

weights for each survey. For each table that is to be estimated, the weights are adjusted (if necessary) to ensure that the margins this table has in common with other already estimated tables are all exactly equal. The method of repeated weighting uses the calibration properties of the regression estimator; see Särndal et al. (1992). Each table can in principle be estimated with a different set of weights, even if the same survey is used. The method of repeated weighting is extensively discussed in Houbiers et al. (2003). In this section it is briefly described as applied for the census.

First of all the set of tables that has to be estimated is considered. Each table is characterized by one count variable and one or more classification variables. The count (or quantification) variable specifies what exactly is counted in the table. For the census, this is usually the number of persons or households in the population. The classification (or dimension) variables describe which groups in the population are counted, for example gender or age. A classification variable completely divides the population into a number of disjoint groups. There can be different levels of one classification variable, for example age in one-year classes and age in five-year classes. The classification level of the variable is denoted by a number within brackets behind the name of the variable, where the highest number is associated with the most detailed classification, for example Age(1), Age(2), for age in five and one-year classes. For the method of repeated weighting it is crucial that the different levels of a classification variable are hierarchical. This means that each class on a higher level can be constructed by joining complete classes on a lower level. When different levels of one classification variable are indeed hierarchical, it is possible to state the common margins of tables that relate to different levels of that variable. For example, Age(1) is a table margin of Age(2).

Next, the available sources (registration and/or survey) are considered for all variables. These sources have to be linked at the micro level. The sources for the census and the linking process are extensively discussed in chapter 13. The linking process creates a database of microdata, which contains one record for each element in the population. The variables in the registration are available for every element. For some elements there is additional survey information available from one or more surveys. From this database, rectangular, completely filled data blocks are extracted. Every data block contains all records that have a certain maximal collection of variables in common. For example, there is a register block containing records for all elements in the population and all variables that are available in the registers. Another example is a block based on one survey that contains records for all elements in the survey, and all variables in the registration and in the survey. More complicated blocks, composed of two or more surveys, are also possible.

From these rectangular data blocks, the desired tables have to be counted or estimated. First of all, each rectangular data block is assigned a set of starting

weights for repeated weighting. In a register block, each element stands only for itself, so every record has a starting weight equal to one. For a data block that contains survey information, the starting weights are determined in such a way that there is a correction for the non-response in the survey. Moreover the variance of the estimates is reduced as much as possible by using auxiliary information. Since this information is usually contained in the publication weights, these publication weights are the starting point for the determination of the starting weights. The determination of the starting weights for repeated weighting will be more extensively described in section 14.5.

Once the starting weights are determined, the tables can be estimated. There are a few rules that apply in estimating the tables. First, each table has to be estimated from the largest data block that contains all necessary variables for this table. Second, all margins of the table that can be estimated from a larger data block than the table itself, must be estimated first.
When estimating the desired table, the already estimated margins have to be taken into account. Third, when possible a table has to be estimated using the starting weights. If this cannot be done consistently (because using the starting weights leads to a numeric inconsistency with an already estimated table), repeated weighting is used.

When using repeated weighting, we examine first of all which margins a table has in common with already estimated tables. The (estimated or counted) population totals of these common margins are used as the known population totals on which the regression estimator is calibrated. In practice calibrating means that the starting weights are adjusted slightly in order to satisfy the restrictions of the known margins. The extent of the adjustment depends on the table itself, as well as the tables that are already estimated. In principle, every table can be estimated using a different set of weights.

In theory it is possible to estimate a set of tables completely consistent by using repeated weighting. In practice, however, a number of estimation problems occur. A frequently occurring problem is the so-called sampling zero: some category in the population is not observed in the sample, which makes a calibration impossible.
Relations between different variables are a second problem. These relations can be the result of edit rules between two different variables. For example, there is a relation between the variables economic status and occupation. Only people who are working have an occupation. These relations between variables have to be taken into account when specifying the variables and the tables. A third problem is that of mutually inconsistent margins. Given the data and the desired margins, the inside of the tables cannot possibly be filled. All these problems will be discussed in section 14.6.

In order to estimate tables by repeated weighting, Statistics Netherlands has developed a prototype software package called VRD. Once the variables, with all levels and hierarchical relations between the levels and the data blocks are entered in VRD, the desired tables can be exported (as far as the tables consist of register information only) or estimated (in case survey information is involved for one of the variables in the table).
A number of things have to be specified before VRD can be used to estimate the desired tables by repeated weighting:

1. The variables on all levels with all categories.
2. The hierarchical relations between the different levels of each classification variable.
3. The tables that have to be estimated.
4. The composition of the rectangular data blocks.

The variables (with categories and hierarchical relations) and tables are discussed in section 14.3, the rectangular data blocks are the main subject of section 14.4.

14.3 Tables and variables

This chapter deals with the thirty tables that are estimated by using the method of repeated weighting. Many of these tables consist of one or more subtables. So the amount of tables to be estimated was in fact a bit more than thirty. Some tables are composed of register information only. These tables can directly be counted from the register. Other tables use survey information as well, and have to be estimated. For these tables, repeated weighting is used.

After the tables were carefully inspected, the classification variables to be used with all their categories from all their possible levels and the hierarchical relations between them were specified. Because of expected problems from cells with few observations in some detailed tables, some classification variables were given more levels than was actually needed. This made the estimation process more flexible. When a category with no, or too few, observations was encountered during estimation, it was easy to take a less detailed level from the variable and start the estimation again.

In table 14.1 all the variables used to compose the tables for the Dutch Census of 2001 are presented, together with the number of levels of each classification variable and the data source. The list of variables is split into two parts. In the first part all the classification variables on persons are considered, with the count variable 'persons'. The second part consists of variables that were used to make the tables where household is quantified (object type 'households'). Except for the count variable 'households' there is another quantification variable, household size.

The data sources mentioned in table 14.1 are the central Population Register (PR), the Labour Force Survey (LFS), the Survey on Employment and Earnings (SEE) and the Social Statistical Database (SSD). The PR is a register and the backbone of the census, the LFS and the SEE are surveys and the SSD is a combination of registers containing information about, among others, employees, employers and pensions (see chapter 13 and Linder, 2003, for an extensive description of all these data sources). Note that some variables are based on a combination of register and survey information. This usually implies that the first levels of the variable are determined by register information only (and thus available for every record in the population), whereas the more detailed levels are based on survey information as well, and thus only available for the records corresponding to the survey.

After the variables were specified, the next step was to specify the (sub)tables that had to be estimated or composed. Because two different types of object (persons and households) were counted, we had to run at least two VRD-sessions. Due to

Table 14.1
Specification of the variables

Variable description	Number of levels	Source
Variables of object type persons		
Gender	1	PR
Age	7	PR
Household position	3	PR
Type of household	5	PR
Household size	3	PR
Place of residence one year prior to the census	2	PR
Country of citizenship	5	PR
Country of birth	1	PR
Region (NUTS)	5	PR
Educational attainment	5	LFS + PR
Economic activity [1)]	3	LFS + SSD
Economic status [2)]	7	LFS + SSD
Occupation	4	LFS + SSD
Job size [3)]	3	SEE + SSD
Branch of industry (NACE)	6	SSD
Count variable 'persons'	quantification variable	PR
Variables of object type households		
Core of the household	2	PR
Type of household	3	PR
Number of children in the family	6	PR
Number of children <25 years of age	6	PR
Number of children <18 years of age	6	PR
Number of children <6 years of age	6	PR
Type of household/economic status partners	3	LFS + SSD
Number of economically active persons	2	LFS + SSD
Household size	quantification variable	PR
Count variable 'households'	quantification variable	PR

1) Employed, unemployed, retired and other economically inactive.
2) Employee, employer, unemployed, attending educational institutions, retired, engaged in family duties, other economically inactive.
3) Employee with fulltime, long parttime, short parttime job; employer, not employed.

expected problems with categories that have few observations, in combination with the fact that many (sub)tables do not have the whole population as a target, it was decided to run several sessions for the object type persons. Each of these sessions had its own target population. In the first session the subtables for the children younger than 15 years of age were included. For this group the values of the variables can be derived from the information of registers only. Moreover, this group is excluded from the population in many tables. For similar reasons, it was wise to take the over 75 year olds in a separate session. Finally, there were two sessions for people of 15–74 years of age. One for the total and one for the persons in private households. The latter session was necessary because there was insufficient information about the institutional households, whereas this information was not needed in the tables.

In a nutshell: five VRD-sessions were run, one with the object type households and four with the object type persons. (Sub)tables that do have the whole Dutch population as a target were due to the preceding action estimated in three parts: <15 years; 15–74 years; 75 years and older. In order to obtain the desired Eurostat tables, these parts had to be combined.

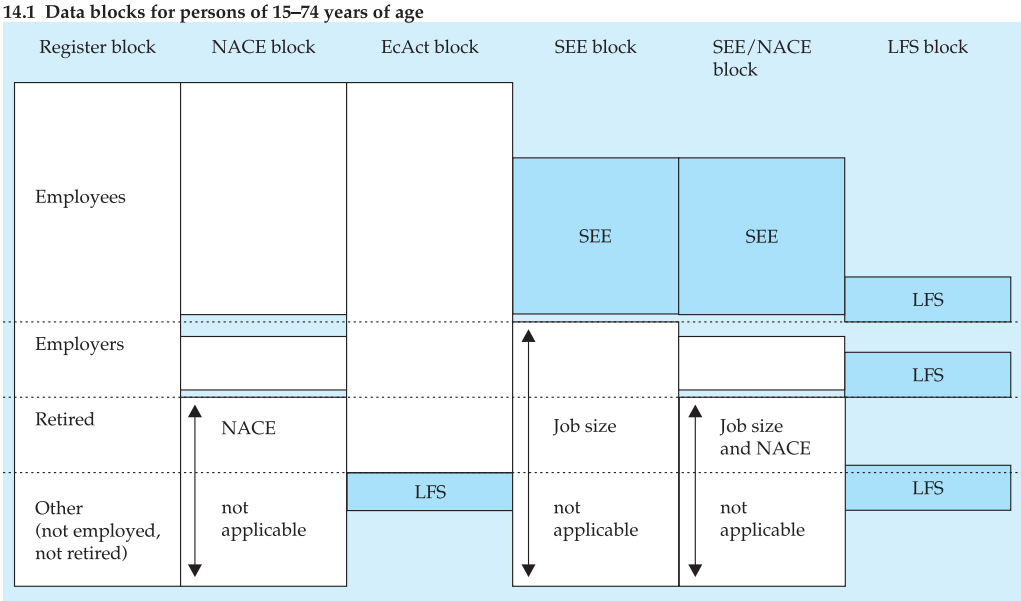
14.4 *Deriving data blocks*

As described in section 14.2, the method of repeated weighting uses rectangular, completely filled micro data blocks. As an illustration, we present the data blocks for the persons of 15–74 years of age in this section. That VRD session was the most extensive, using all data blocks distinguished. The data blocks are graphically presented in figure 14.1. Each data block consists of all the records that have a certain set of variables in common, and for each record all these common variables are included. For the use of the VRD session on persons of 15–74 years of age we constructed six rectangular data blocks. They will be presented in order of their size.

The first data block is a register block. It contains all register information from the PR and SSD. The register block holds all the records of the target population of persons aged 15–74 (12,036,171). In reference to table 14.1, all the variables with data source PR were included in the first data block, as well as the first level(s) of the variables that combine information from registers and surveys. Only those levels that do not make use of the survey information are included in this register block. From this block, tables with register information only can be exported, they do not have to be estimated.

The second data block is called the NACE block (11,985,413 records). It contains all the records of persons of 15–74 years of age who are not employed, as well as the employed persons for whom the NACE code is known. To put it the other way round: the NACE block holds all the records of the target population, except those

14.1 Data blocks for persons of 15–74 years of age



records for which the NACE code is not known. The NACE block contains in fact register information, but it is dealt with as a survey block. It has been created in order to be able to divide the unknown NACE codes evenly over the known NACE codes. The block contains all the variables presented in the register block and the variable branch of industry (NACE), and is used to estimate all tables in which branch of industry is combined with register information only.

The third block is called the EcAct block (8,793,530 records). It contains all the records of all employed and retired persons in the register, completed with all non-employed, non-retired persons in the LFS. This block has been created to be able to estimate all tables in which economic status is combined with register information only. When estimating economic status for some group in the population using the EcAct block, the number of employees, employers and retired persons is always counted from the register, and will thus not lead to estimation problems (as could be the case when the same table is estimated from the LFS block). The EcAct block contains all variables from the register, and the variables economic status and economic activity.

The fourth block is called the SEE block (8,144,956 records). It is the largest of the (real) survey blocks. It contains the records for all the employees of 15–74 years of age in the SEE survey, as well as all the people aged 15–74 who are either employer or not employed. The variables in this block are the SEE-variable job size and all the variables from the register block. The SEE block is used to estimate tables in which job size is combined with register information only.

The fifth block is called the SEE/NACE block (8,109,261 records). This block contains all records in the intersection of the NACE and SEE blocks. So it contains all the records from the SEE block except the ones for which the NACE code is unknown. The variables in this block are: all the variables from the register block, branch of industry (NACE) and job size. This block is used to estimate one table in which branch of industry, job size and register information are combined.

The sixth block is the LFS block (163,741 records). This block contains the fewest records, but the most variables of all the blocks. As the sample size of the LFS is quite small (1 percent of the total population in private households), a union was made of two years of the LFS (2000 and 2001). This made it possible to make more reliable estimations for smaller subpopulations. The LFS block contains all variables in the register and the variables economic status, economic activity, educational attainment and occupation, and it is used to estimate all tables that involve educational attainment and/or occupation, combined with register information and/or economic status or activity.

Note that there is no block that contains an intersection of the LFS block with the SEE block or NACE block. This was superfluous, since there are no tables that combine variables from the LFS (educational attainment, occupation) with variables from the NACE block (branch of industry) or the SEE block (job size).

14.5 Determination of starting weights

For each of the data blocks that are described in section 14.4, a set of starting weights for repeated weighting had to be determined. This had to be done separately for each block. The starting weights are determined in three steps.

First of all, a set of initial weights has to be determined for each data block. There are two types of blocks in the census. The first type contains all the records from the sample of some survey (such as the LFS block as described in section 14.4). In that case, the publication weights of the survey are used as initial weights. The second type of block is part register and part survey. An example of such a block is the EcAct block, that contains all working and retired persons in the register, as well as all the non-working, non-retired persons in the LFS. For the second type of block, all records associated with the sample survey have the publication weight of that survey as an initial weight, and all other records have an initial weight equal to one. By using the publication weights in both types of blocks it is assumed that the sampling design and correction for (possibly selective) non-response are already taken into account. Furthermore it is also assumed that auxiliary information is used in the determination of these publication weights to reduce the variance.

In the second step, the initial weights have to be rescaled to form block weights. This means that the weights sum to the right population total on 1 January 2001. This is not automatically the case, since a block may consist of more than one survey. For example, the LFS block consists of the LFS of 2000 and 2001, so the weights will sum to approximately twice the population size on 1 January 2001. Even if a block contains all records of one survey only, the publication weights may add to a different population total because of a difference in reference periods.

In the third and last step, the block weights can be calibrated on a number of population totals. The weights that are the result of this last calibration are the starting weights for repeated weighting. For this last calibration, we consider the tables that have to be estimated using repeated weighting. The starting weights are derived in such a way that we can use them without further adjustment to estimate as many tables as possible.

For illustration purposes we will describe these steps more closely for the LFS block in the VRD session for persons of 15–74 years of age. This block contains all records in the LFS in 2000 or 2001. Each record has a publication weight in the LFS in 2000 or in 2001, and this is used as an initial block weight.

Next, the initial weights have to be scaled to block weights. Note that the LFS weights sum to twice the population size. Let N be the size of the total population on 1 January 2001. Let n_{00} resp. n_{01} be the sample size (more accurately, the response size) of the LFS in 2000, resp. 2001, and let $w_{00,i}$, $i = 1,\ldots, n_{00}$ resp. $w_{01,i}$, $i = 1,\ldots, n_{01}$ denote the publication weights in the LFS for 2000, resp. 2001. The weights for the LFS records of 2000, will be multiplied by

$$\frac{N}{\sum_{i=1}^{n_{00}} w_{00,i}} \times \frac{n_{00}}{n_{00} + n_{01}}, \text{ and similar for 2001: } \frac{N}{\sum_{i=1}^{n_{01}} w_{01,i}} \times \frac{n_{01}}{n_{00} + n_{01}}.$$

Note that the first factor for each year ensures that the weights of each year of the LFS sum to the right population total on 1 January 2001. The second factor then averages the weights of 2000 and 2001, taking the sample (response) sizes in each year into account. In the VRD session for persons aged 15–74, this means that the LFS weights in 2000 have to be multiplied by 0.56, and the LFS-weights of 2001 have to be multiplied by 0.52

Finally, the block weights for the LFS can be calibrated on population variables to construct the starting weights for repeated weighting. The calibration model is chosen in such a way, that as many tables as possible can be estimated with the starting weights (and thus in the repeated weighting process, no further adjustment has to be made). It is not possible to choose a model that allows all tables that are estimated from the LFS block to be estimated with the starting weights. First of all,

such a model would be too extensive, and lead to numerous sampling zeros. Secondly, some of the tables that are estimated from the LFS block have a margin that has to be estimated from another block (the EcAct block) first. Such a table can never be estimated using starting weights. The following model is used for the calibration of the block weights in the LFS block:
[Gender × Age(7)] + [Age(6) × Economic status(3)] + [Nuts3 × Gender × Economic status(3)] + [Nationality(2)].
Here Age(7) is age in one-year classes, Age(6) is Age(7), where 15–19 years is one category, and 70–74 is one category. Economic Status(3) divides the population in four categories: 'employees', 'employers', 'retired' and the rest, and Nationality(2) divides the population in three categories: 'the Netherlands', 'other EU' and the rest. When using this model, only the tables [Gender × Age (on any level) × Educational attainment (any level)] can be estimated using the starting weights. For all other tables that use information of the LFS block, the weights will have to be slightly adjusted (by using repeated weighting) in order to be consistent with the register and other tables.

14.6 *Problems arising in practice*

Once the metadata on all variables is determined, the data blocks have been derived and each record in the blocks has been assigned a starting weight, we can estimate the tables. This estimation was done with the help of the VRD software program described in section 14.2. Theoretically all tables can be estimated. In practice however, the estimation process ran into several problems.

Sampling zeros are the first problem. It means that not all categories in the population are represented in the sample. Sampling zeros make it impossible to get consistent estimates. However, all problems concerning sampling zeros can be identified on forehand. For each table, it can be established whether all categories that occur in the population, do also occur in the sample. If this is not the case, it should be determined which cells of the table can be estimated, in order to fill at least a part of the table. A part of the table can usually be estimated by omitting one variable at a time, or by considering one of the variables on a lower hierarchical level, i.e. by using a less detailed classification.

Consider for example the following table:
[Gender × Age(7) × Educational attainment(5) × Nationality(2)].
Here Age(7) is age in one-year classes, Nationality(2) is a division in three groups: 'the Netherlands', 'other EU' and 'other' and Educational attainment(5) is the finest level (12 groups). This table should be estimated from the LFS block, since educational attainment is only available in the LFS. However, the margin table [Gender × Age(7) × Nationality(2)] can be derived from the register. The estimate

that is made from the LFS block should be consistent with this margin. This is not possible, since the LFS does not contain records of 71-year old men of an 'other EU' nationality for example. Since it is not possible to estimate [Gender × Age(7) × Educational attainment(5) × Nationality(2)] consistently, it was investigated which parts of the table could indeed be estimated consistently. This turned out to be the following list:
[Gender × Age(7) × Nationality(2)]
[Age(7) × Educational attainment(5) × Nationality(2)]
[Gender × Age(7) × Educational attainment(5)]
[Gender × Age(5) × Educational attainment(5) × Nationality(2)] (with Age(5) in five-year classes).
Using these four (consistently) estimated tables, parts of the original table could be filled.

In general, categories in a table that are rare in the population are also rare in the sample, and sometimes even missing. The following properties are all rare in the population, and can therefore easily lead to sampling zeros (especially when crossed with other, detailed variables, as for example age in one-year classes):
- A nationality different from the parent country. When nationality is combined with gender, age and another variable in the LFS, this often leads to sampling zeros in one or more categories.
- Employed persons of 60 years and older. When for example occupation is combined with age or nationality, this leads to sampling zeros for some categories involving persons aged over 60.
- Some Nuts3-area's do not have many residents. When Nuts3 is combined with a variable that has to be estimated from a sample, it can lead to sampling zeros in small Nuts3 areas (as for example 'Zaanstreek' or 'Delfzijl e.o.'). Of course a similar argument holds for Nuts5.
- Persons of 65 years and older are under-sampled in the LFS. Therefore any LFS variable combined with gender and age in one-year classes can easily run into sampling zeros in age categories over 65.

A second problem in estimating the tables is caused by edit rules that exist between variables. In the repeated weighting process, relations between different variables are not taken into account automatically. This may lead to inconsistencies in two estimated tables; which is undesirable. Take for example the variables Economic status(4) and Economic activity(3). The categories of these variables are enumerated in figure 14.2. Note that every person employed according to Economic activity(3) is either an employer or an employee according to Economic status(4). It is thus immediately clear that there exists a strong relation between Economic status(4) and Economic activity(3). The number of unemployed persons in any table using economic activity should exactly equal the number of unemployed persons using economic status. This is not done automatically and could lead to inconsistency in

estimated tables. The problem was solved by estimating extra tables in which the variables involved in these edit rules are crossed.

14.2 Categories of economic status and economic activity

Economic status (4):	Economic activity (3):
employee	employed
employer	
unemployed	unemployed
retired	retired
other	other

A third problem that occurs when estimating the tables is that some tables have to be consistent with a lot of the previously estimated common margins. This can lead to an inconsistent set of conditions that has to be satisfied, which makes it impossible to (consistently) estimate the table. This usually occurs for tables that are estimated late in the process, especially when these tables have one or more categories that are based on only a few observations. This makes it impossible to estimate the complete table. Sometimes partial tables can be estimated so as to have at least parts of the original table filled.

As an example of this last problem, consider the table [Nuts3 × Age(1) × Occupation(2) × Educational attainment(3)] that has to be estimated for all persons of 15–74 years of age. Here Age(1) divides the population into two groups ('under 35', 'over 35'). Occupation(2) is a division into 12 groups (10 different occupations, 'occupation unknown' and 'not employed') and Educational attainment(3) is a division into 7 groups. If this table is the first table that is estimated, it has to be consistent with the register only, and there is no problem in estimating the table. However, in practice this turned out to be the last table to be estimated after three margin tables had already been estimated. There was no estimate for the table that is consistent with these margins, so the table could only be estimated in part.

14.7 *Results*

This section shows the effect of repeated weighting on the estimates. As stated in section 14.2, the main purpose of repeated weighting is purely cosmetic: to avoid differences caused by survey errors. Therefore, the effect of repeated weighting ought to be small. Some tables can be estimated directly using the starting weights, and therefore these tables are not affected by repeated weighting. This is the case for tables where educational attainment, or economic status is crossed with gender and age in one-year classes.

When tables can not be estimated consistently using the starting weights, the weights are adjusted slightly by repeated weighting so as to obtain consistency. The effect of repeated weighting can be shown by comparing the new estimates with those obtained by using the starting weights without any further adjustment. This has been done for the table [Gender × Occupation(2)], and the results can be found in table 14.2. Note that this table has been estimated from the LFS. Table 14.2 shows that the estimates for the different categories are indeed affected by repeated weighting. However, the effect of repeated weighting is marginal; for most estimates it is 1% or less. Note that for ISCO-COM 3, the estimate of the number of men is decreased by repeated weighting, whereas the estimate for women is increased. Therefore the total for ISCO-COM 3 is affected less by repeated weighting, than the estimate for the separate categories. This principle holds in general for the effect of repeated weighting: the effect is larger in a table where more variables are crossed.

14.8 *Processing the results*

When the tables were estimated, the output had to be rearranged to form the output Eurostat desired. This meant that for some variables, two or more categories had to be joined in order to obtain the desired table. The Eurostat table required many manipulations that will not be described in detail here.

Once the tables were available, attention had to be given to the accuracy of the results. For some tables, very detailed information was estimated using survey

Table 14.2
The effect of repeated weighting on the estimates

Variable and category	Men		Women	
	starting weights estimate	repeated weighting estimate	starting weights estimate	repeated weighting estimate
	x 1,000			
Occupation				
ISCO-1 (legislators, senior officials, managers)	699.2	695.6	229.4	231.1
ISCO-2 (professionals)	710.7	705.4	493.5	499.8
ISCO-3 (technicians and associate professionals)	613.0	607.8	633.1	640.9
ISCO-4 (clerks)	272.4	271.9	569.4	569.4
ISCO-5 (service workers, shop and market sale workers)	257.6	259.2	546.7	541.5
ISCO-6 (skill agricultural and fishery workers)	77.7	78.3	27.4	27.0
ISCO-7 (craft and relative workers)	678.5	677.3	34.7	34.8
ISCO-8 (plant and machine operators and assemblers)	400.7	398.8	47.6	47.9
ISCO-9 (elementary occupations)	266.0	272.4	253.2	250.5
ISCO-0 (armed forces)	34.4	34.2	2.8	2.8
Occupation unknown	277.7	287.2	269.1	261.2
Not employed	1,759.5	1,759.5	2,881.9	2,881.9

information of the LFS; using the LFS or the EcAct block. Some of the estimates are based on only a few observations. This leads to a large variance, which is unacceptable. Estimates with a large variance are usually not published but suppressed. The problem now was to decide which estimates have to be suppressed, and which could be published. Formulas exist for the variance of the repeated weighting estimator, as stated in Houbiers et al. (2003). For the census it was impossible to compute these variances, since not all necessary conditions were satisfied. By using a rough approximation of the variance, we developed a rule of thumb (see also chapter 1), to decide which cells should be published and which suppressed:

– Cells with less than 10 observations are always suppressed.
– Cells with 25 or more observations are always published.
– Cells with 10–24 observations are only published if they form a part of a breakdown (for example by age or gender), in which no cells with less than 10 observations occur, and at least 50% of the cells in the breakdown have more than 25 observations.

The threshold of 25 observations corresponds with an estimated relative inaccuracy of at most 20% (approximately). This rule of thumb was applied to all estimates based on the LFS.

Suppose for example that for some level of educational attainment, the number of observations is 11 for men and 26 for women. Then the total for men and women together can be published since it is based 25 observations or more; as can the estimate for women. The estimate for the men can be published because of the last rule of thumb. Men are part of a breakdown (gender), there are no cells in this breakdown with less than 10 observations. The women have 26 observations and they are exactly 50% of the breakdown, so at least 50% of the cells in the breakdown have 25 observations or more.

Estimates that have to be suppressed are usually combinations of variables that are rare in the population. For example, it is rare for very young people to have a high educational attainment. In tables on occupation, the number of observations may be small for the youngest and the oldest age groups (as the first group is not yet working, and the last is already retired). Furthermore, women in the army are rare, as are men engaged in family duties. Young girls engaged in family duties are also rare.

Despite the fact that some problems were encountered during the estimation process, the Dutch Census of 2001 contains a lot of relevant information. Most of the (sub)tables could indeed be filled and only some very detailed parts had to be left out. Suppressed cells only occurred in less important parts of the tables. Also the census was carried out in just nine months, and the costs were considerably lower than those of a traditional census. So it can be stated that the method of the Dutch Census 2001 is a success.

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