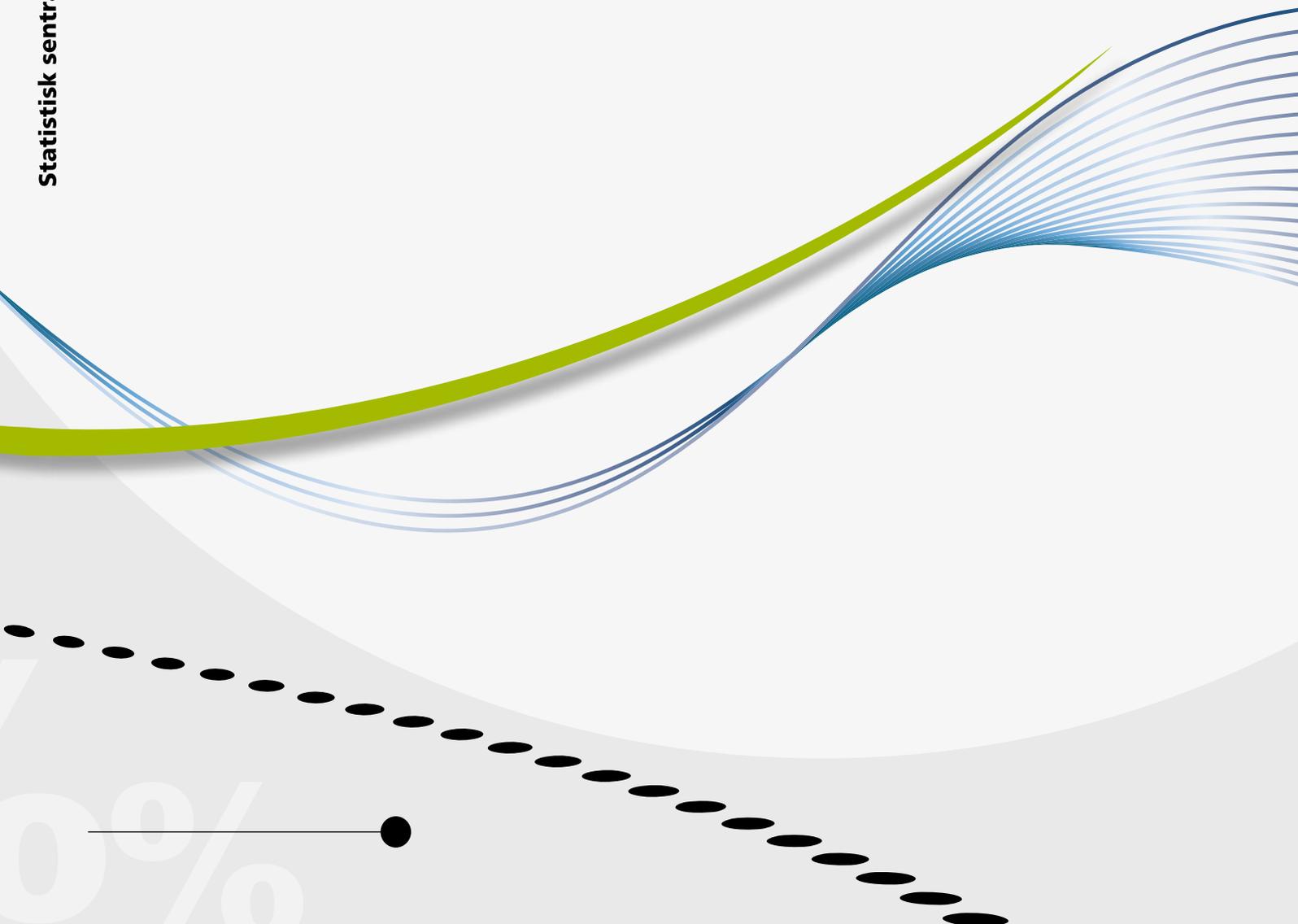


Bjart Holtmark

Multinomial logit estimation of transition probabilities for workers in government sector, municipal sector, private sector with and without contractual pensions (AFP) and self-employed



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Symbols in tables	Symbol
Category not applicable	.
Data not available	..
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Less than 0.5 of unit employed	0
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Preface

Estimation of transition probabilities for employment in different sectors of the economy has been necessary to analyze accumulation of entitlements for occupational pensions in these sectors. The work on the estimates described in this memorandum and the preparation of the memorandum has been financed by the Norwegian Ministry of Labor and Social Affairs.

Statistics Norway, 13 September 2017

Kjetil Telle

Sammendrag

For å kunne analysere befolkningens samlede opparbeiding av rettigheter og fremtidige utbetalinger for tjenstepensjon i statlig og kommunal virksomhet, er dagens regelverk for disse ordningene innarbeidet i mikrosimuleringsmodellen MOSART. Men for å kunne levere gode analyser på dette feltet, er det også nødvendig med kunnskap om hvordan ansatte opparbeider seg ansiennitet i statlig og kommunal sektor, og dermed også hvordan arbeidskraften beveger seg inn og ut av disse sektorene. I modellen er de yrkesaktive enten selvstendig næringsdrivende, ansatt i privat bedrift med AFP, privat uten AFP, eller statlig eller kommunal virksomhet. Ved å innarbeide estimerte overgangssannsynligheter for sektorendring i modellen, gir simuleringer estimerer på de offentlig ansattes ansiennitet og dermed opparbeidede pensjonsrettigheter. Dette notatet dokumenterer hvordan slike overgangssannsynligheter i MOSART er estimert.

Abstract

To analyze the population's total work-up of rights and future payments for occupational pensions in public sectors, the current regulations for these schemes are incorporated into the microsimulation model MOSART. But in order to be able to deliver good analyzes in this field, knowledge about how employees accumulate seniority in the state and municipal sector, and thus how the labor moves in and out of these sectors, is also required. In the model, individuals are working either as self-employed, employed in a private enterprise without AFP, privately with AFP, or governmental or municipal activities. By incorporating estimated transition probabilities for sector change in the model, simulations provide estimates of the seniority's seniority and thus earned pension rights. This note documents how such transition probabilities in MOSART are estimated.

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1. Introduction

The micro-simulation model MOSART is among other things, used for estimation of future public pension expenses, see for example Fredriksen (1998), Fredriksen (2015) or Christensen, Fredriksen, Lien, and Stølen (2012). To make the model more suitable for this task, it is crucial that the model provides information on how employees in the public sector accrue rights to receive public pensions. Crucial information is then the stability of the work force in the public sector. It has therefore been necessary to estimate transition probabilities for employees and self-employed in their choice of sector. The five sectors specified have been as follows (see also Table 2.1):

- The group of self-employed (index 1)
- Employees in the private sector *without* “contractual pensions” (without AFP, index 2)
- Employees in the private sector *with* “contractual pensions” (with AFP, index 4)
- The government sector (index 6)
- The municipal sector (index 7)

Note that the sector’s indexes, 1, 2, 4, 6, and 7, respectively, are used in most of the diagrams. For ‘historical’ reasons there are no sectors with indexes 3 and 5, see Fredriksen and Knudsen (2015).

MOSART also models enter and exit to the labour market and how individual entering the labour market choose among the five sectors. The explanatory variables for this choice are education, gender and age and the parameters were estimated based on historical data. However, these estimations are not described in this note, neither is exit from the labour market.

This paper first presents the model applied for estimation of the coefficients that determines the transfer probabilities. Next, it describes the data that have been used in the estimation and provides some highlights of how employees are distributed among the sectors mentioned. Finally, it describes the estimation method and results.

The diagrams in this version of the paper focus on the age dummy coefficients. The paper could be extended with corresponding diagrams with other coefficients to the extent that users find this useful.

2. The model

A multinomial logit regression model was applied in estimation. The applied simulation model is as follows:

$$p_{rs}(\mathbf{x}_{rs}) = \frac{1}{1 + e^{-(b_{rs0} + \mathbf{b}_{rs}\mathbf{x}_{rs})}} \quad (1)$$

where $p_{rs}(\mathbf{x}_{rs})$ is the probability that an individual will be in sector s in period t given that the considered individual was in sector r in period $t-1$, given the vector of explanatory variables \mathbf{x}_{rs} , see the list of explanatory variables given in Table 2.2. The parameter b_{rs0} is a constant while \mathbf{b}_{rs} is the transposed vector of estimated coefficients.

The logit model was used because this model implies that $0 < p_{rs}(\mathbf{x}_{rs}) < 1$. For example, linear regressions model would not always give simulated probabilities within these limits. Because there are not only two categories of sectors, but five, a

multinomial logit model was chosen. This implies that the sum of the probabilities equals 1.

It should here be noted that coefficients are estimated separately for men and women. Hence, there should have been footscripts for gender as well. To increase readability, these footscripts are skipped in the description of the model.

Table 2.1 The five sectors specified in MOSART

Sector index	Sector name
1	Self-employed
2	Private sector without AFP*
4	Private sector with AFP*
6	Government
7	Municipalities

* AFP (avtalefestet pensjon) is a contractual pension system for early retirement.

Table 2.2 Explanatory variables in the estimation model

Variables	Comments to variables
Education category	Dummies for 29 education categories are included, see complete list in Table 2. Category 1 (primary school is the reference category).
Change of education category	A dummy for change of education category
Seniority in leaving sector	Dummy variables for seniority in the five sectors, of which 11 dummies for seniority 1 – 11 years and one for seniority of 12 or more years. For seniority in leaving sector, 1 year seniority is the reference category. For the other sectors, 0 years seniority is the reference category.
Break in income history	This is a dummy for individuals with a break of one or more years as an individual included in the data set. Such a break could occur for example if an individual's income for a period drops below the basic amount (grunnbeløpet). A reason for such drops in incomes could be education, which again could give reasons for change of sector.
Income quintile	Quintiles defined separately for each gender. See Table 2.3. Quintile 1 is the reference category.
Age	There are dummies for each one year age group, 25 – 60 years. The age group 20 – 24 is the reference category.
Immigration region	Only individuals born abroad with no known parents or grandparents born in Norway, are defined as immigrants here. Three categories of immigrants: (i) Western Europe, USA and Canada, (ii) East European EU-members, (iii) Rest of the world. Individuals without immigration background, is the reference category.

Table 2.2 lists the explanatory variables (the vector $\mathbf{x}_{r,s}$) while Table 2.4 specifies the education categories. The explanatory variables used in estimation are age, pensionable income, seniority in the five sectors, education category, and immigration category. Since the time resolution in MOSART is single years, annual observations have been applied.

Table 2.3 Upper income limits of the quintiles*

Quintile	Women	Men
1	112 532	162 203
2	149 088	200 369
3	178 304	238 057
4	214 963	304 398
5	-	-

*As explained in the next section, incomes were deflated using a wage index where 1993=100. The wage index in 2014 was 244.

Table 2.4 Education categories

Indexes	Comments
1	Primary school (reference category)
2	Folk high school (folkehøyskole)
9	Unknown education (most often immigrants)
Upper secondary schooling:	
22	Economics and administration
23	Electrical, mechanical and machine trades
24	Building and construction
25	Other fields of science and trades
26	Healthcare
27	Other
211	General studies (gymnas)
Tertiary education, lower degree:	
31	Humanities, lower degree
32	Education, lower degree
33	Social sciences, lower degree
35	Economics and administration, lower degree
36	Engineering, lower degree
37	Other fields of science, lower degree
38	Nursing and caregiving, lower degree
39	Other fields of health, lower degree
310	Other tertiary education, lower degree
Tertiary education, higher degree:	
41	Humanities
42	Education
43	Social sciences
44	Law, higher degree
45	Economics and administration, higher degree
46	Graduate engineering
47	Other fields of science, higher degree
48	Medicine
49	Dental studies
491	Other fields of health, higher degree
410	Other tertiary education, higher degree

3. The data

The coefficients are estimated based on registry data for all residents of Norway during the period 1995 - 2014. Figures from 1994 and earlier are not included in the applied data set as they do not contain information on sector affiliation. Moreover, the data set is meant to include only individuals who “are working” and is therefore excluding students and pensioners. However, these categories could be defined in different ways. The following specifications clarify the definitions applied:

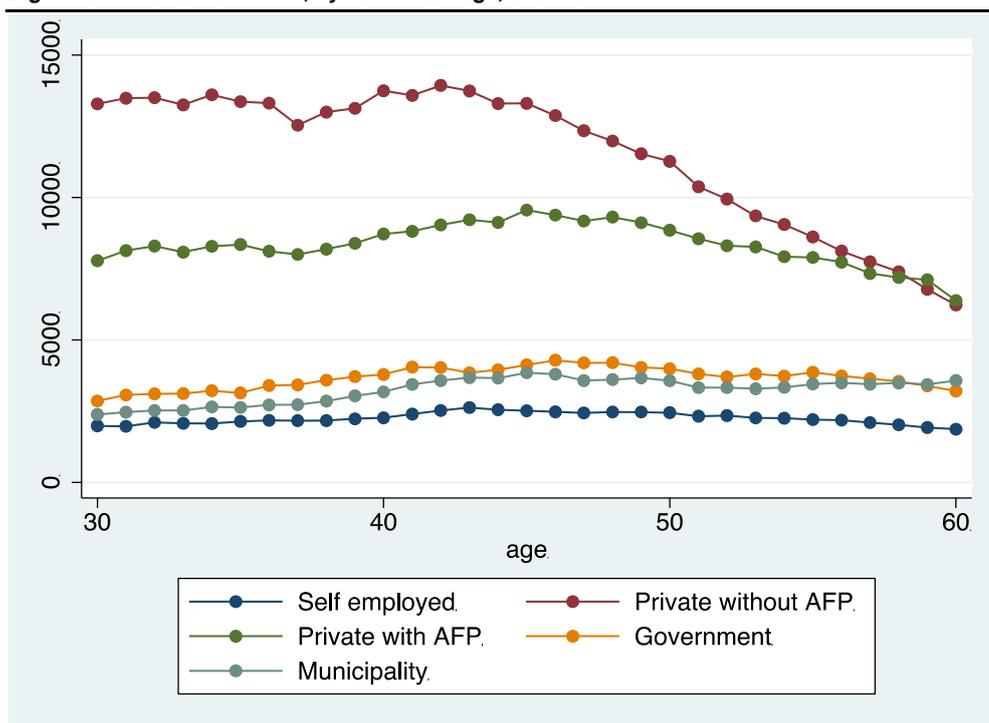
- Only individuals aged 20 – 61 years are included in the data set.
- Because this document describes estimation of how self-employed and employees choose between sectors, data set includes only observations where individuals have income status 1 or 2. Income status 1 means that the individual have working income during the whole year, while income status 2 means that the individual starts working during the year and have working income for the rest of the year. In any case, for an observation to be included in the data set, the total labour income must exceed one “basic amount” (grunnbeløp). The income-variable used is wage-deflated pension-giving income. The base year is 1993. Also the basic amount is deflated to 1993.
- Students of age 29 or younger are excluded from the data set irrespective of their income status. Students of age 30 years or more are *included* in the data set if they have income status 1 or 2.
- Observations related to individuals who have retired are excluded.

Figure 3.1 and Figure 3.2 show the number of men and women in the different sectors, in 2014 for different ages. Before the estimation results will be presented in the next section, a few comments on these numbers will be provided.

Generally, private sector, but especially private sector without AFP, is the most important sector for men, although the number of men working in this sector is declining by age when men have passed an age of 42, see Figure 3.1. Private sector without AFP employs a significant share of women also, especially the relative young women, see Figure 3.2. Also for women, the age profile shows a declining number of employees in this sector as age exceeds approximately 42 years. However, municipalities are indeed more important, and the most important sector for women, at least if they are older than 33 years. This is in sharp contrast to men. The share of men working in municipalities is relatively low for all age groups. For almost all age groups there are twice as many women in the municipalities as men. Regarding the government sector, also here there is most women. However, the number of women in government sector is only slightly higher than the number of men in this sector.

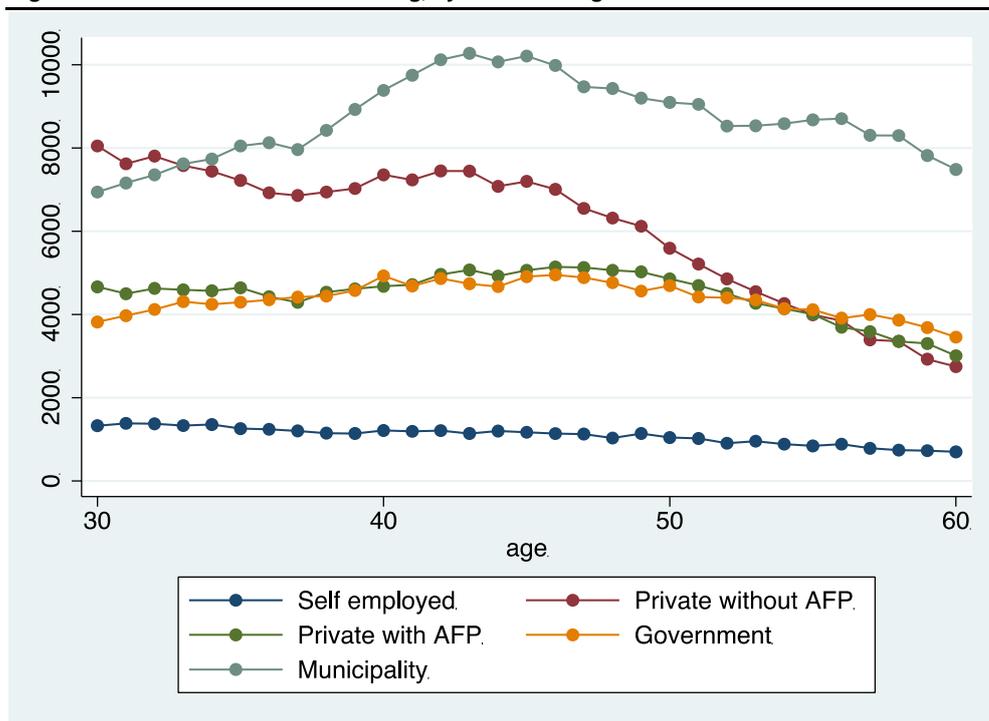
The high number of women in the municipal sector and the high number of men in private sectors should be seen in relation to their level and types of educations as well as career choices by men and women. First, typically a large share of low-skilled female workers tends to work in the municipalities although an even higher number of the low-skilled female workers are in private sector with AFP. For unskilled men, there is a high share working in private firms without AFP. Moreover, there is a high number of men with education within building and construction, for example engineers. They typically also have their work in private firms. In contrast, many women have education as teachers as well as within nursing and other health- and caregiving fields of work. These groups of women, especially the teachers, but also women within health care tend to work in the municipalities.

Figure 3.1 Number of men, by sector and age, in 2014.



Source: Statistics Norway.

Figure 3.2 Number of women working, by sector and age.



Source: Statistics Norway.

4. Estimation results

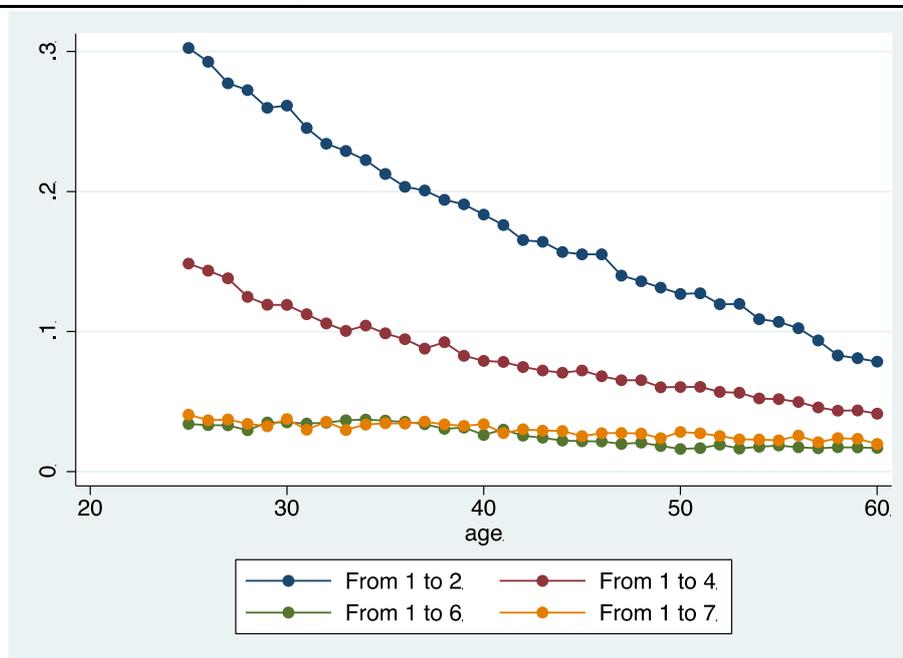
As background for the following presentation of results, keep in mind that the reference group consists of the individuals aged 20 – 24. Note also that diagrams

containing estimates of the coefficients also show the uncertainty of the estimates (95 per cent confidence intervals).

First, consider Figure 4.1, which shows the probabilities that a self-employed male switches to sector 2, 4, 6 or 7, when it is not controlled for other explanatory variables. These probabilities are declining almost monotonically by age. In comparison, Figure 4.2 shows the estimated coefficients of the age dummies for men leaving self-employment. It follows from equation (1) that with positive coefficients the considered age-class has a higher probability of a transfers compared to the reference group, which includes those aged 20-24. And the higher is the coefficient value, the higher is the difference. Regarding a negative coefficient, it is the other way around. It follows that Figure 4.2 shows that also when other factors are controlled for, the probability that a male should leave self-employment and enter private sector is almost monotonically declining by age. When self-employed men have passed a certain age, there is also a declining probability that they switch to the public sectors.

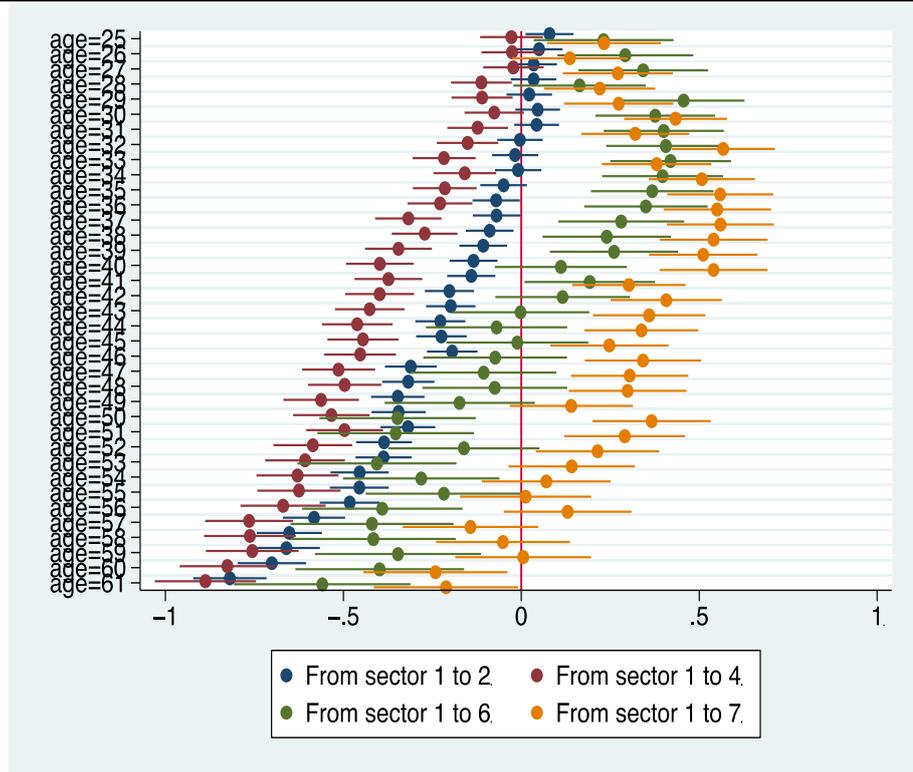
Consider also Figure 4.3, which shows the coefficients related to seniority as self-employed and the individuals' income quintiles. Considering the diagrams, it becomes clear that interactions between income effects, effects of seniority and age effects play a role here. For example, regarding men moving from self-employment to a municipality, the estimation shows a strong negative effect of income: The higher is the income of self-employed; the lower is the probability of a move to the municipal sector (Figure 4.3). Hence, the declining profile of the blue curve of Figure 4.1 to some extent is a result of increasing incomes during individual careers.

Figure 4.1 Men's probability* of leaving self-employment (sector 1), by age and entering sector. Men leaving the work force are not included.



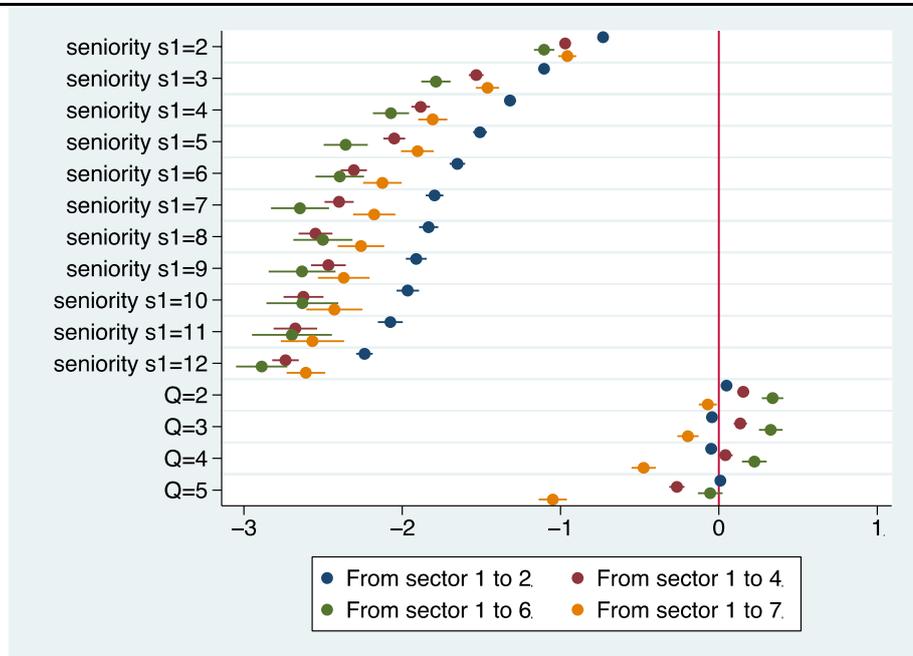
* The use of the term *probability* could lead to different interpretations of these number and the numbers in other corresponding diagrams. For interpretation, this diagram for example shows that 30 percent of men aged 25, who were self-employed in year t , will be working in the private sector without AFP (sector 2) in year $t+1$.
Source: Statistics Norway.

Figure 4.2 Men leaving self-employment (sector 1), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

Figure 4.3 Men leaving self-employment (sector 1), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

Next, consider Figure 4.4 and Figure 4.5, which show uncontrolled probabilities and age dummy coefficients related to women’s moves from self-employment (sector 1) to other sectors, respectively. Figure 4.5 shows a similarly significant negative effect of age for women on the probability of leaving self-employment

(sector 1) as for men (cf Figure 4.2). However, regarding interactions with income and seniority effects, the profile of especially the yellow curve in Figure 4.4 (the uncontrolled probabilities of women's transfers to municipalities) probably partly is explained by effects of seniority and income effect. For women, the coefficients for income quintiles show that higher incomes to some extent increase the probability of moving to the government sector and to private sector with AFP (Figure 4.6). This effect is especially strong regarding movements to the government sector.

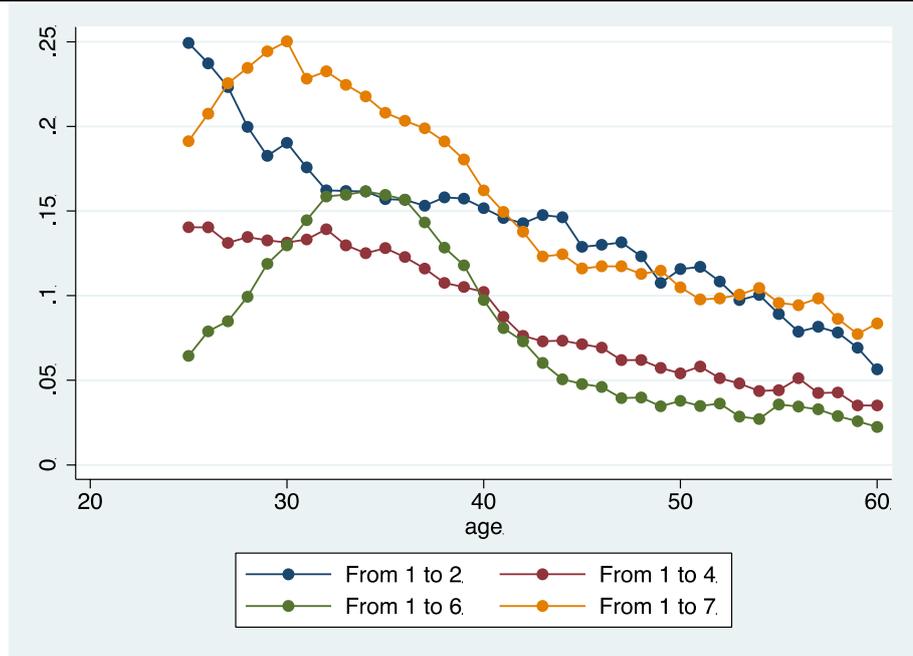
Seniority reduces the probability of leaving self-employment. However, this effect is less significant with respect to movements to private sector without AFP (Figure 4.6).

A break in income history increases the probability of leaving self-employment. However, this applies also to the probability of leaving the other sectors, see Table 4.1.

Table 4.1 Estimated coefficients related to two groups of dummy variables

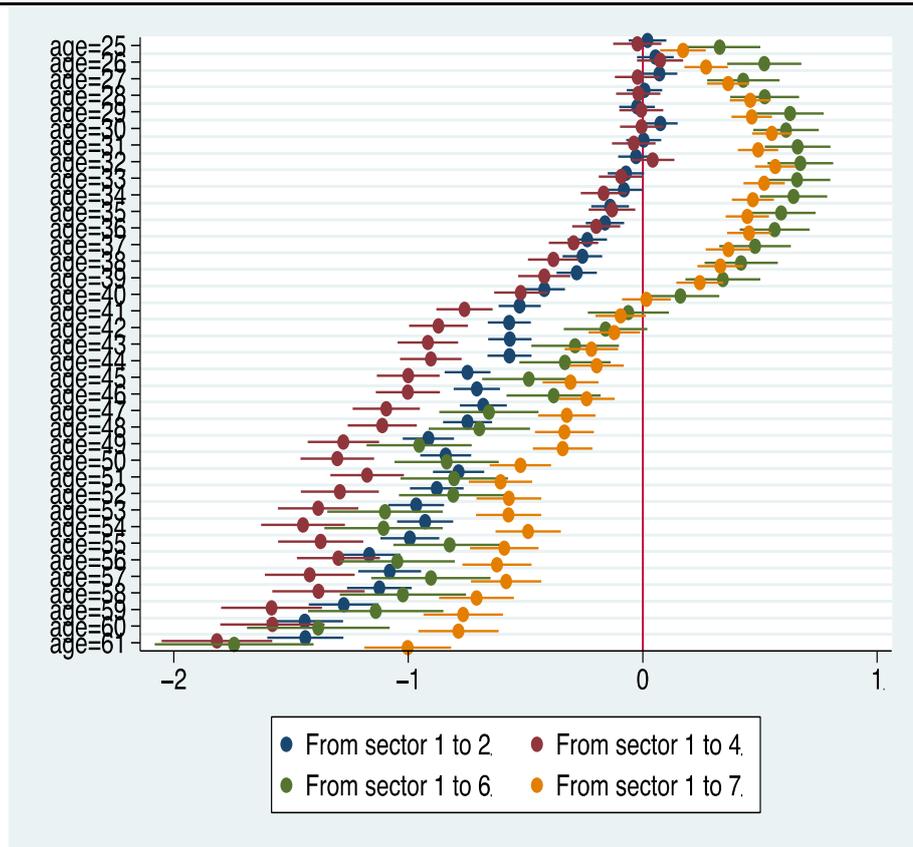
	Break income history		Change education category	
	Men	Women	Men	Women
From self-employment (sector 1) to:				
Private without AFP	1.33	1.53	1.37	1.28
Private with AFP	1.24	1.34	1.06	0.97
Government	1.32	1.58	1.43	1.60
Municipalities	1.56	1.47	1.12	1.20
From private without AFP to:				
Self-employment	1.27	1.01	-1.14	-1.07
Private with AFP	1.24	1.25	0.19	0.24
Government	1.48	1.43	0.57	0.79
Municipalities	1.72	1.51	0.30	0.51
From private with AFP to:				
Self-employment	1.61	1.23	-1.26	-1.22
Private without AFP	1.91	1.93	0.23	0.37
Government	2.09	1.98	0.52	0.80
Municipalities	2.42	2.27	0.33	0.51
From government to:				
Self-employment	1.48	0.41	-1.59	-2.14
Private without AFP	1.84	1.80	0.62	0.69
Private with AFP	1.79	1.70	0.55	0.34
Municipalities	1.43	1.57	0.03	0.28
From municipalities to:				
Self-employment	1.50	0.58	-1.32	-1.85
Private without AFP	1.79	1.66	0.38	0.31
Private with AFP	1.76	1.59	0.36	0.14
Government	1.54	1.47	0.66	0.67

Figure 4.4 Women’s probability of leaving self-employment (sector 1), by age and entering sector. Women leaving the work force are not included.



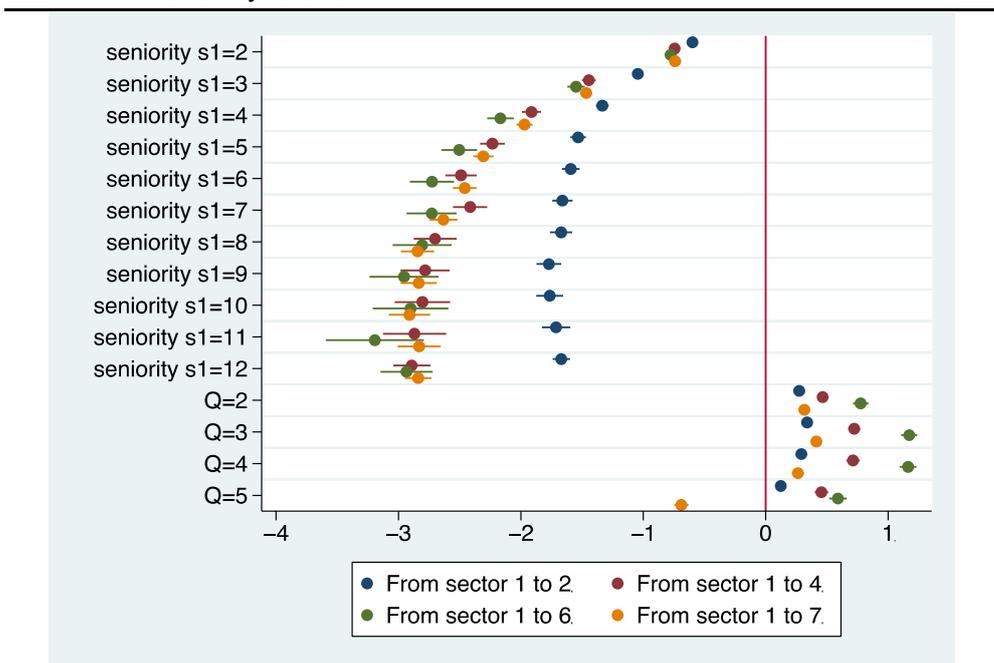
Source: Statistics Norway.

Figure 4.5 Women leaving self-employment (sector 1), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

Figure 4.6 Women leaving self-employment (sector 1), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.

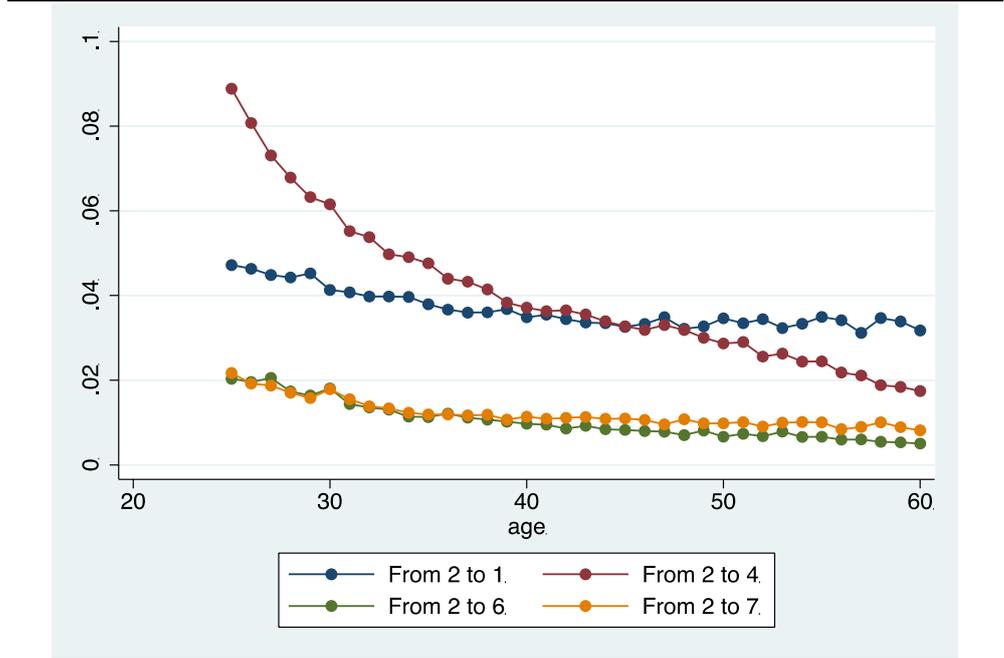


Source: Statistics Norway.

Figure 4.7 shows the uncontrolled probability of that a male employed in private sector without AFP goes to another sector, by age and entering sector. The most common moves are to either self-employment or to private sector with AFP. Moves to private sector with AFP vary more by age than moves to the other sectors, with a decreasing trend during the career. A comparison with Figure 4.8 shows that when it is controlled for the other explanatory variables, it is especially middle aged men who tend to move to public sector.

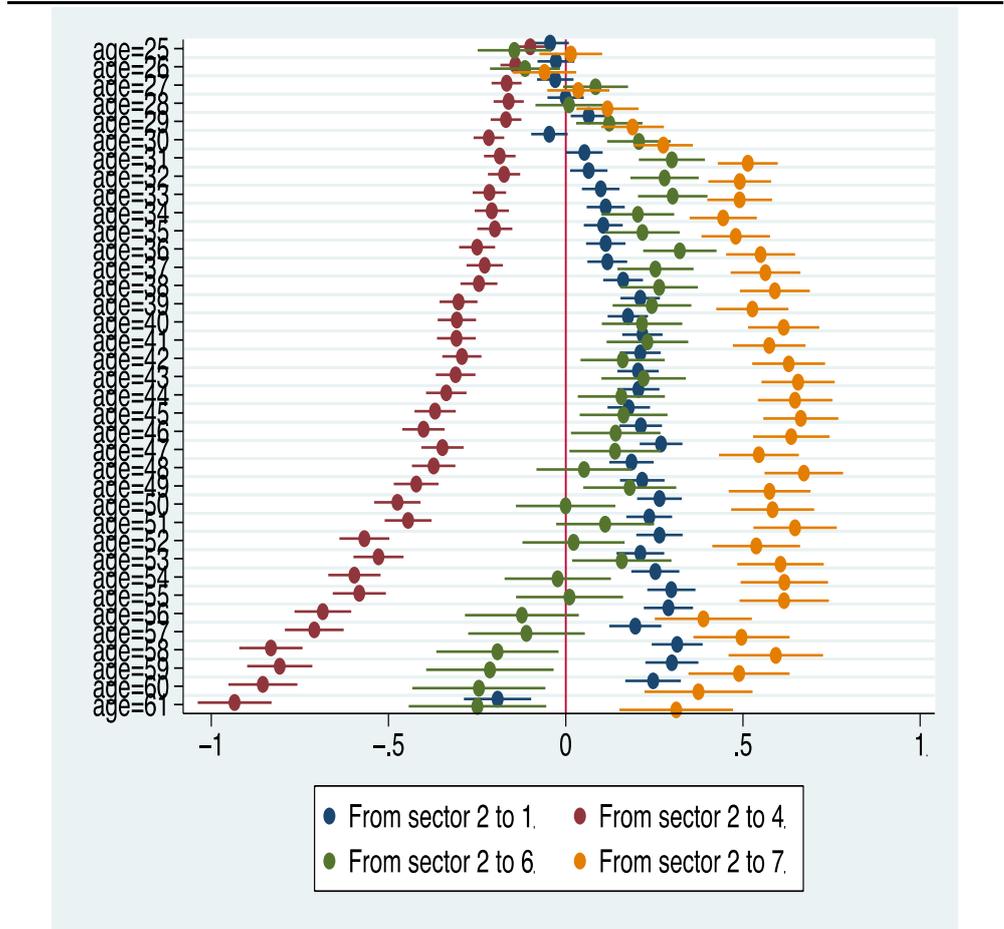
There is found to be decreasing probability of leaving private sector without AFP as income increases (Figure 4.9). This effect applies to all possible moves, but is especially strong for moves to public sectors. Although not shown here, there is found to be a significant negative effect of being an immigrant from Eastern Europe on the probability of males' moves to the public sectors. At the same time, breaks in income history significantly increases the probability of men leaving private sector without AFP, irrespective of entering sector, see Table 4.1

Figure 4.7 Men's probability of leaving private sector without AFP (sector 2), by age and entering sector. Men leaving the work force are not included.



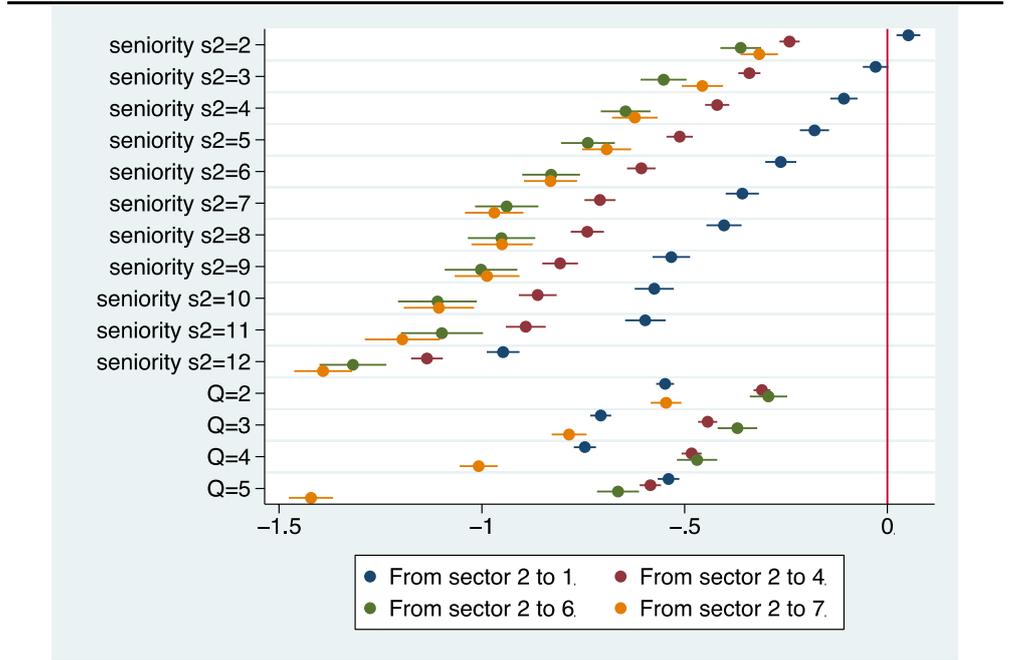
Source: Statistics Norway.

Figure 4.8 Men leaving private sector without AFP (sector 2), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

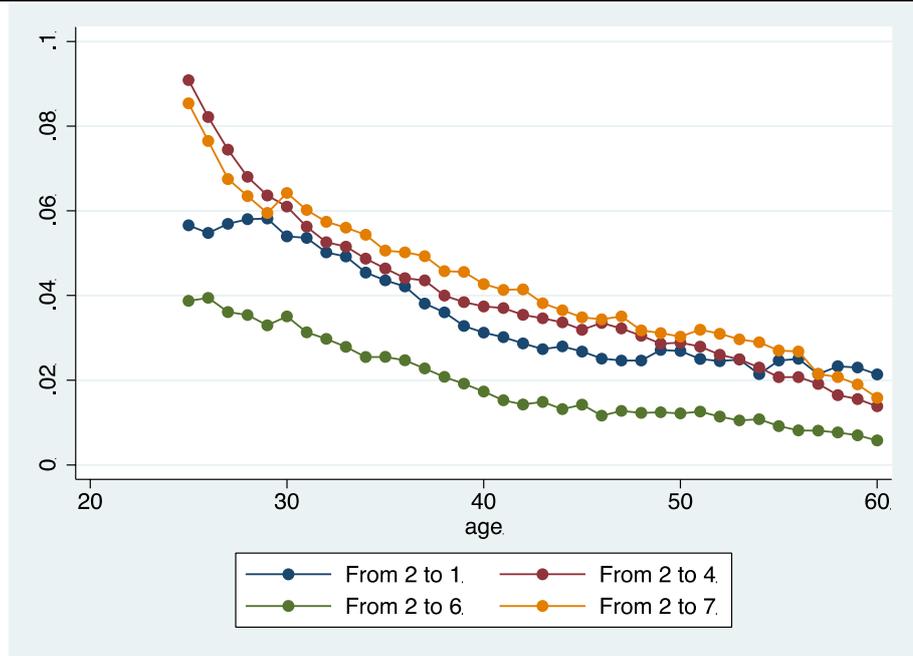
Figure 4.9 Men leaving private sector without AFP (sector 2), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

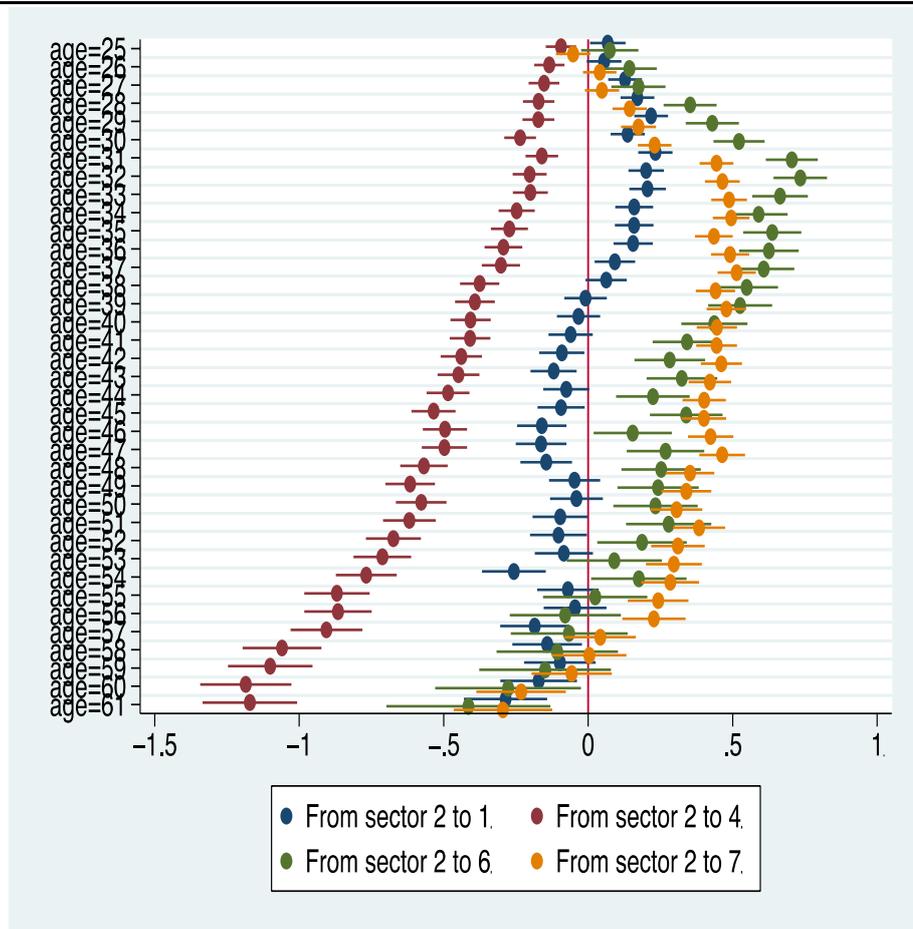
Figure 4.10 shows the probability that women in private sector without AFP move to another sector. Irrespective of entering sector, these probabilities are decreasing by age. However, when controlled for the other explanatory variables, it is made clear that the effect of age is more mixed, see Figure 4.11. This applies specially to moves to the public sectors. It should also be noted that the estimation results show that the probabilities of moving to two public sectors are declining with seniority (Figure 4.12). And especially the probabilities of women’s moves to the public sectors are declining with rising incomes.

Figure 4.10 Women’s probability of leaving private sector without AFP (sector 2), by age and entering sector. Women leaving the work force are not included.



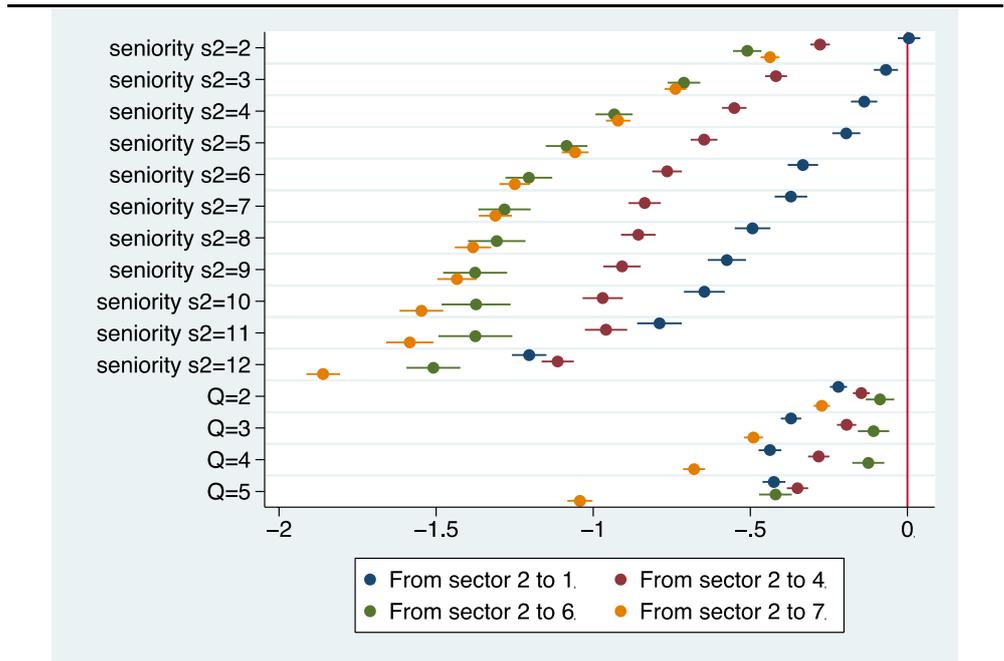
Source: Statistics Norway.

Figure 4.11 Women leaving private sector without AFP (sector 2), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

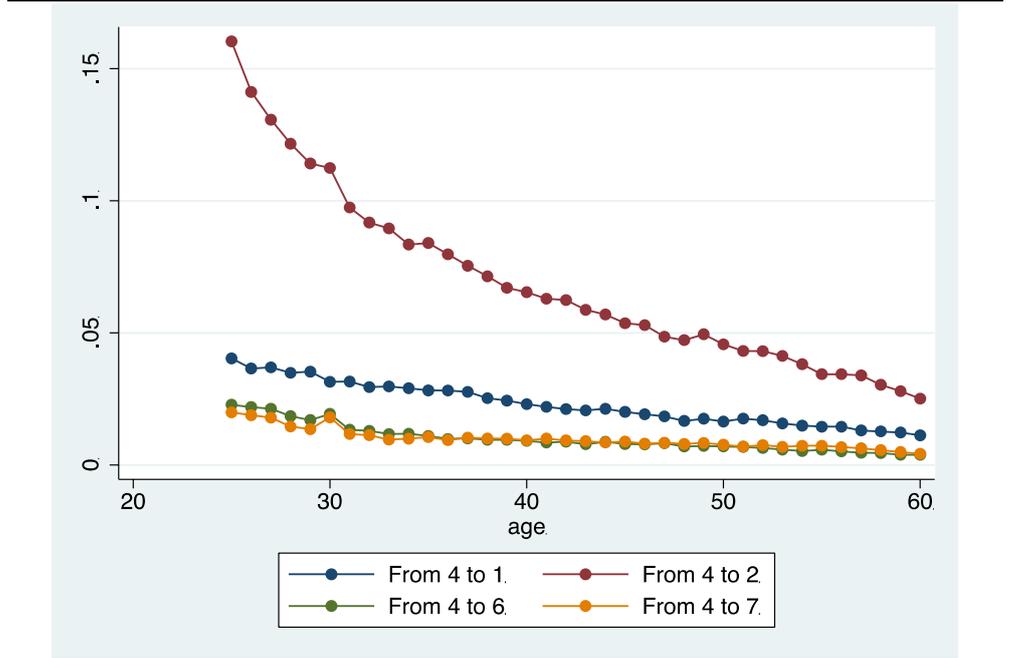
Figure 4.12 Women leaving private sector without AFP (sector 2), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

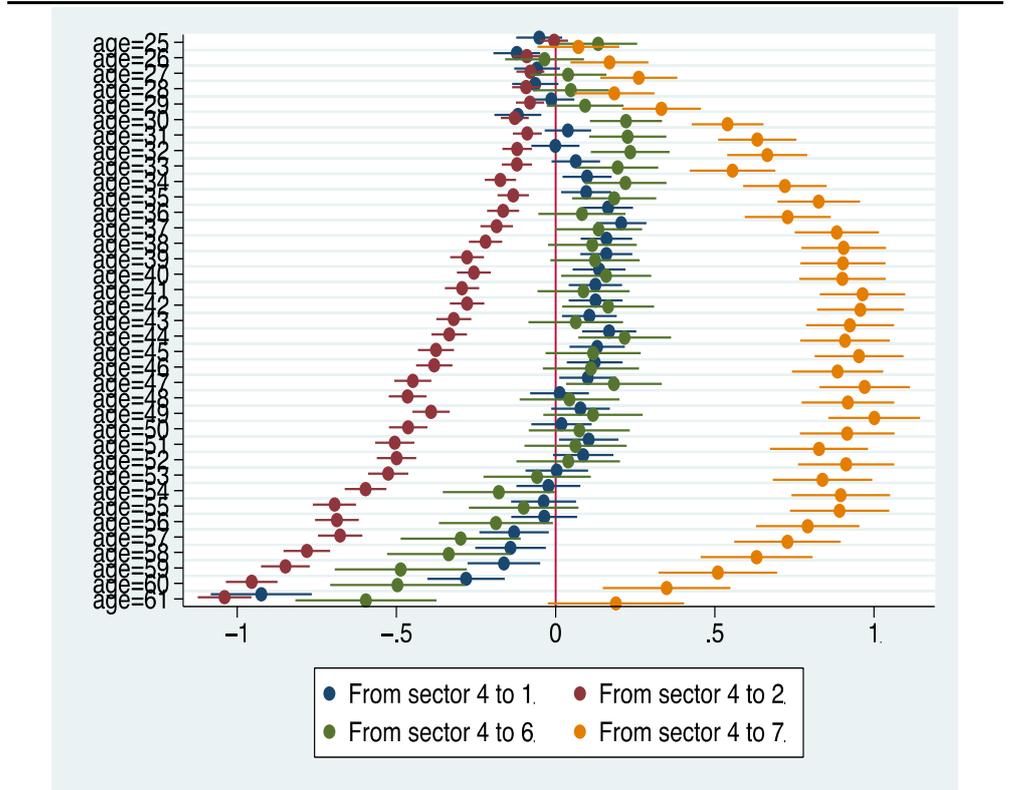
Figure 4.13 shows that men working in private sector with AFP, if they leave, have a strong tendency to move to private sector without AFP. However, this probability is significantly declining with age. This age-effect is still strong when we control for the other explanatory variables, see Figure 4.14. The estimation results also show that seniority reduces the probability of leaving private sector with AFP (Figure 4.15). Furthermore, high income levels reduce significantly the probability of moves to the municipalities and self-employment (Figure 4.15). Although not shown here, men’s moves from private sector with AFP to the public sectors are significantly less likely for male immigrants from Eastern Europe. The probabilities of transfers to all sectors increase with break in income histories (Table 4.1) A reasonable explanation to this is of course that the break in income history has been caused by one or years spent with education.

Figure 4.13 Men's probability of leaving private sector with AFP (sector 4), by age and entering sector. Men leaving the work force are not included.



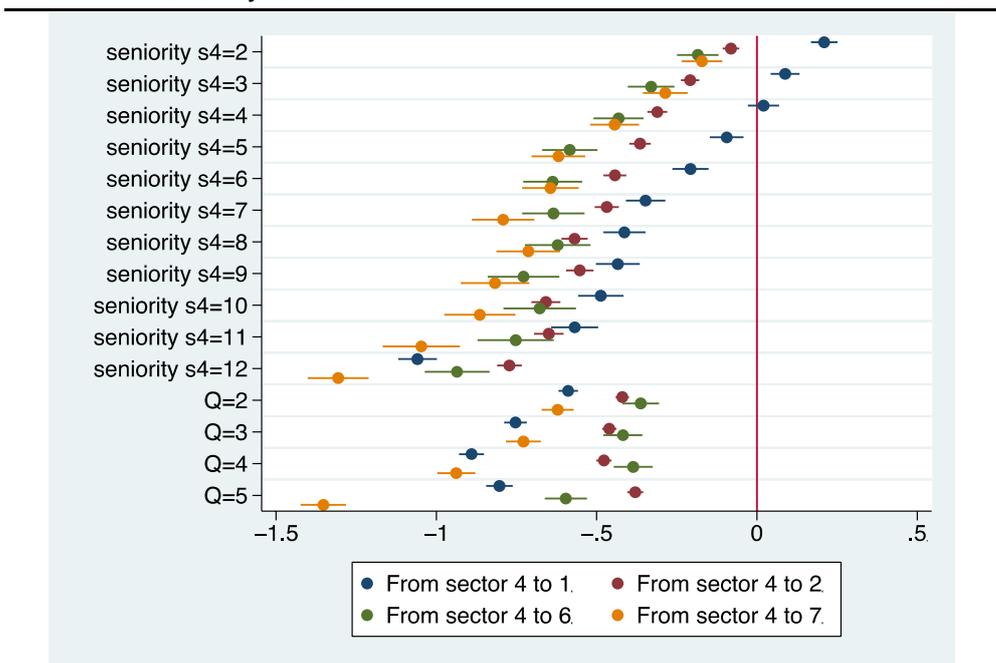
Source: Statistics Norway.

Figure 4.14 Men leaving private sector with AFP (sector 4), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

Figure 4.15 Men leaving private sector with AFP (sector 4), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.

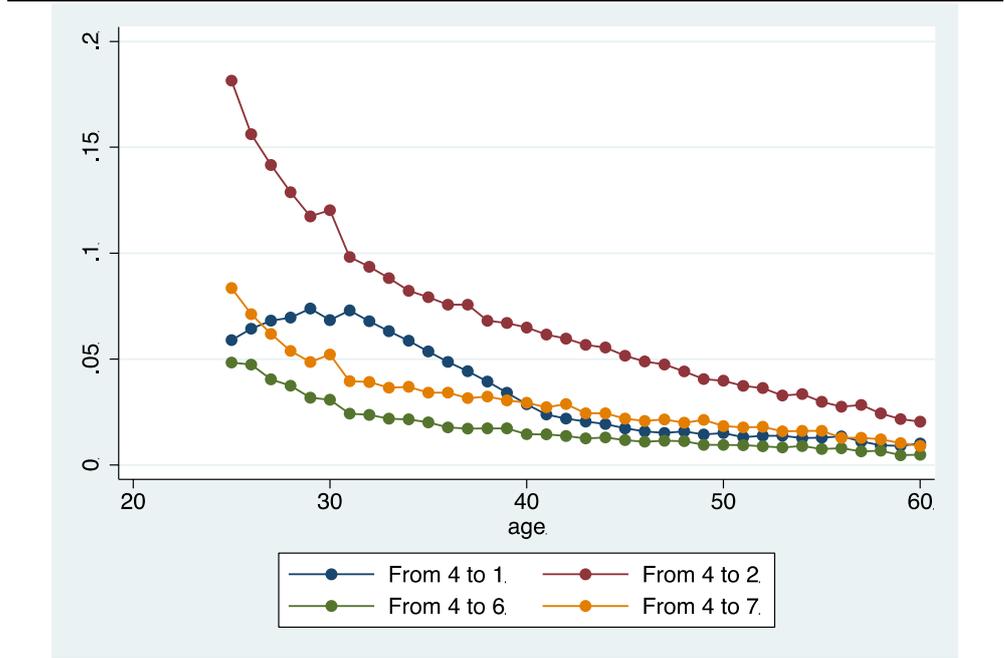


Source: Statistics Norway.

Also for women in private sector with AFP (sector 4), the most common entering sector is private sector without AFP, see Figure 4.16. The probability that a female employee in private sector with AFP, moves to private sector without AFP is declining by age. This conclusion applies also when it is controlled for other explanatory variables (Figure 4.17). Especially for relatively young women, a significant share also switch to self-employment and for all age groups, the total number of women with transfers to the public sector is significant.

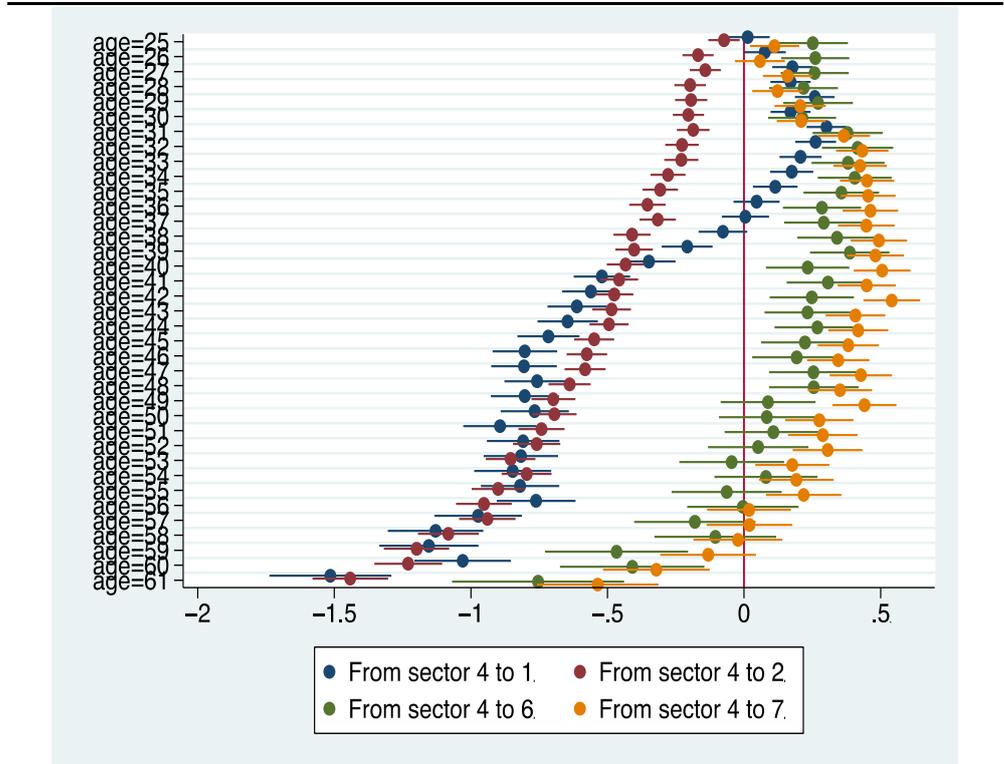
The estimation results show that women’s income levels negatively influence the probabilities of transfers from private sector with AFP to the two public sectors and private sector without AFP (Figure 4.18). It should also be noted that breaks in income histories significantly increase this group’s probability of transfers. This is also the case for a change of education category, although the effects here are somewhat smaller. However, a change of education category significantly reduces the probability of women’s transfers from private sector with AFP to self-employment (Table 4.1).

Figure 4.16 Women’s probability of leaving private sector with AFP (sector 4), by age and entering sector. Women leaving the work force are not included.



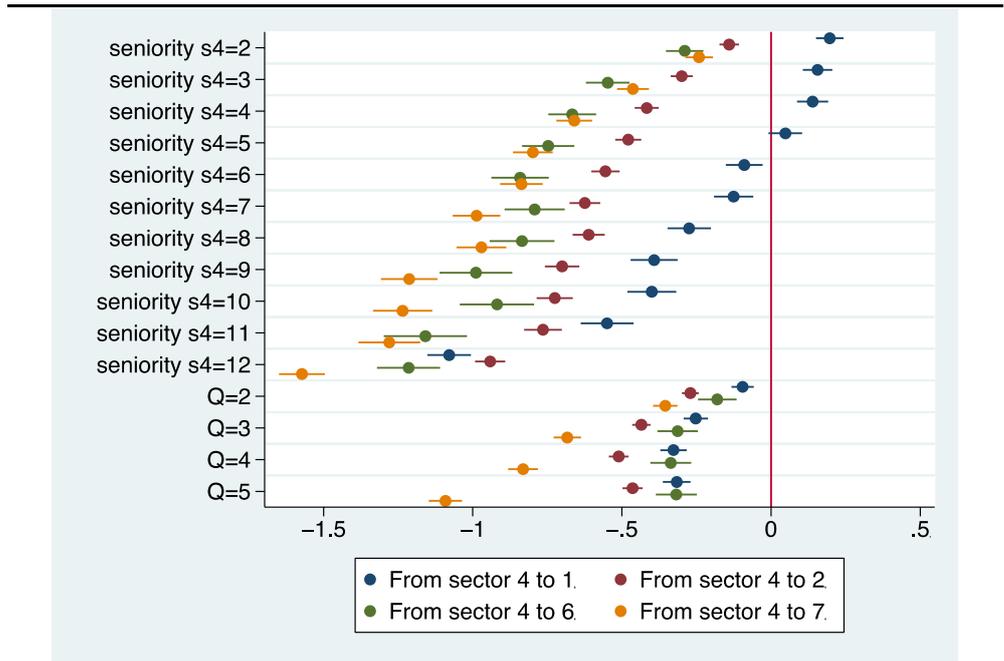
Source: Statistics Norway.

Figure 4.17 Women leaving private sector with AFP (sector 4), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

Figure 4.18 Women leaving private sector with AFP (sector 4), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.

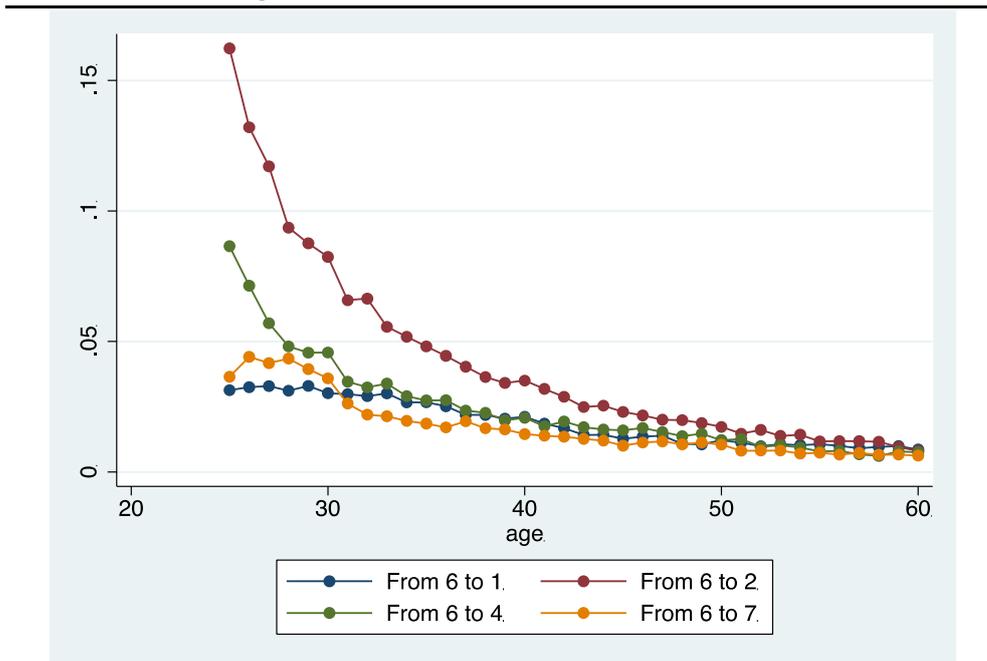


Source: Statistics Norway.

Figure 4.19 and Figure 4.22 show the age-specific probabilities of transfers from government sector, for men and women, respectively. Men most frequently move to private sector without AFP, while the picture is more mixed for women in the government sector. If they are less than 40 years old, moves to self-employment are most frequent, while older women most frequently move to the municipal sector.

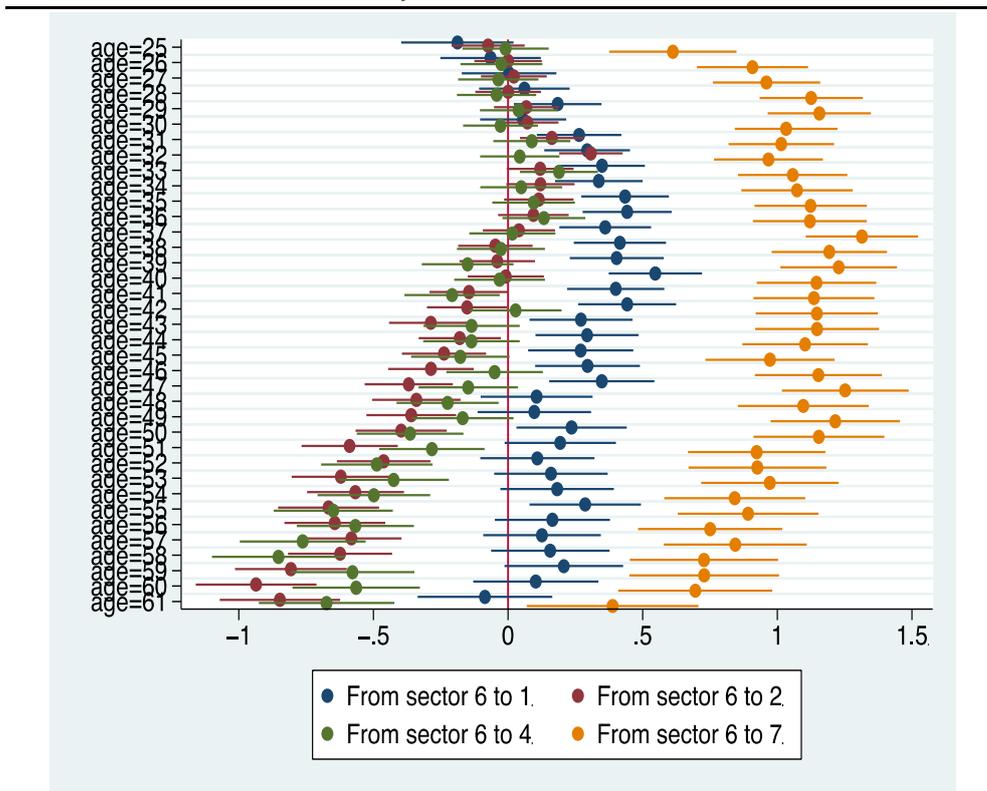
For both men and women in the government sector, high incomes reduce the probability of leaving. This effect is especially strong if the entering sector is the municipal sector.

Figure 4.19 Men's probability of leaving government (sector 6), by age and entering sector.
Men leaving the work force are not included.



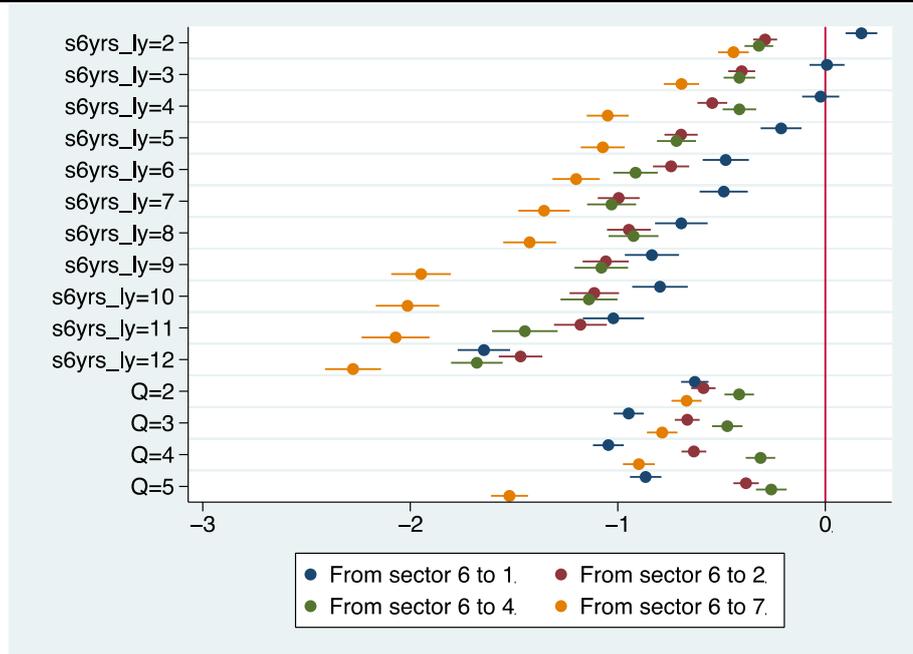
Source: Statistics Norway.

Figure 4.20 Men leaving government (sector 6), by age and entering sectors. Estimates of the coefficients of the dummy variables.



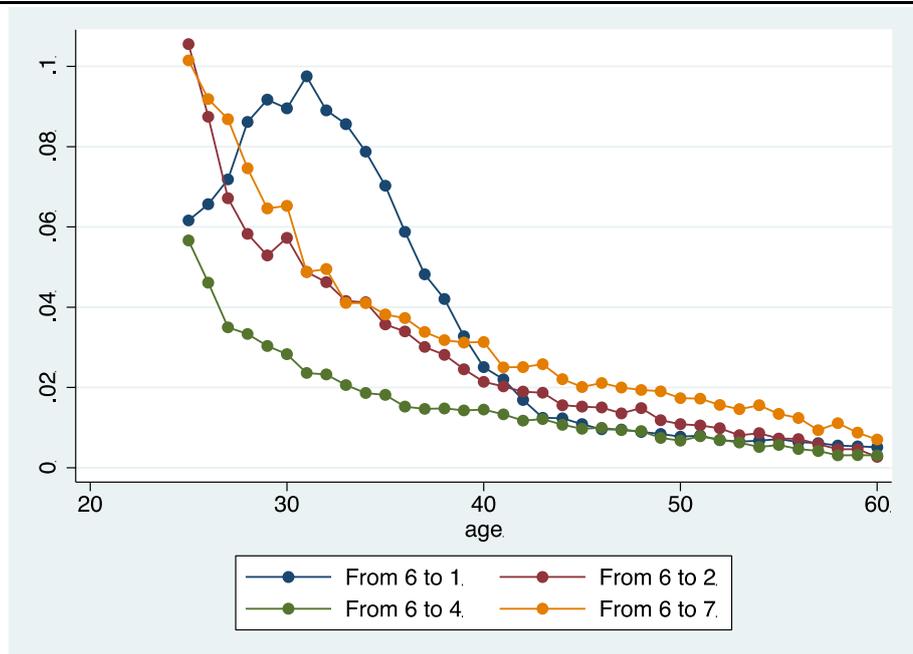
Source: Statistics Norway.

Figure 4.21 Men leaving government (sector 6), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.



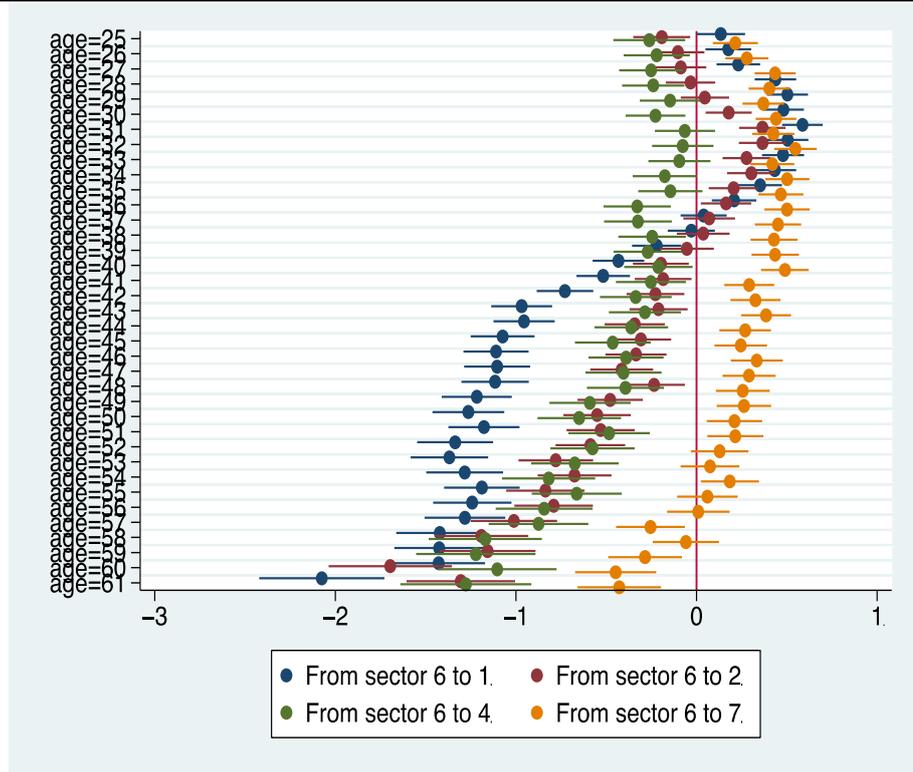
Source: Statistics Norway.

Figure 4.22 Women's probability of leaving government (sector 6), by age and entering sector. Women leaving the work force are not included.



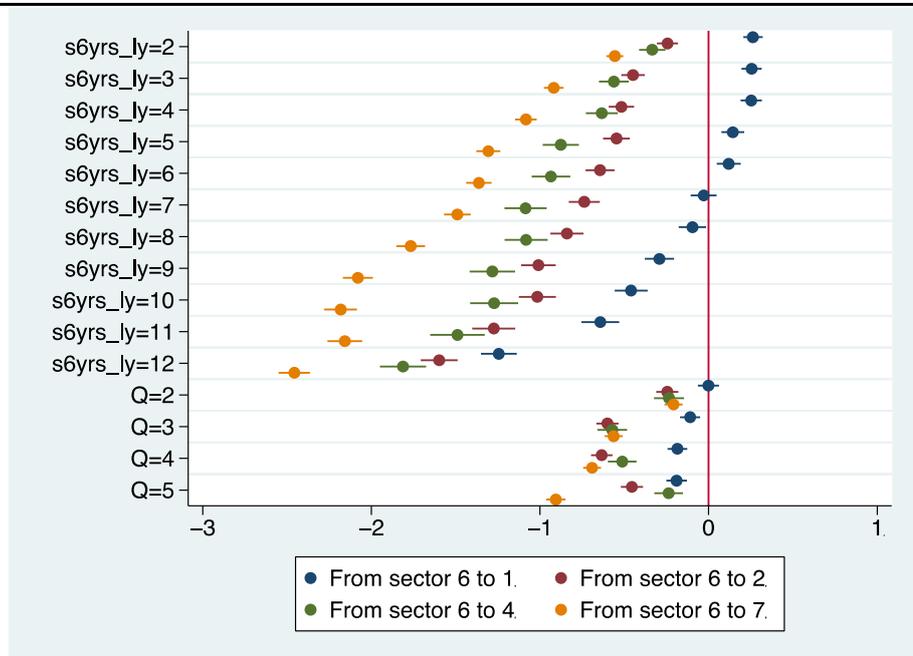
Source: Statistics Norway.

Figure 4.23 Women leaving government (sector 6), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

Figure 4.24 Women leaving government (sector 6), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.

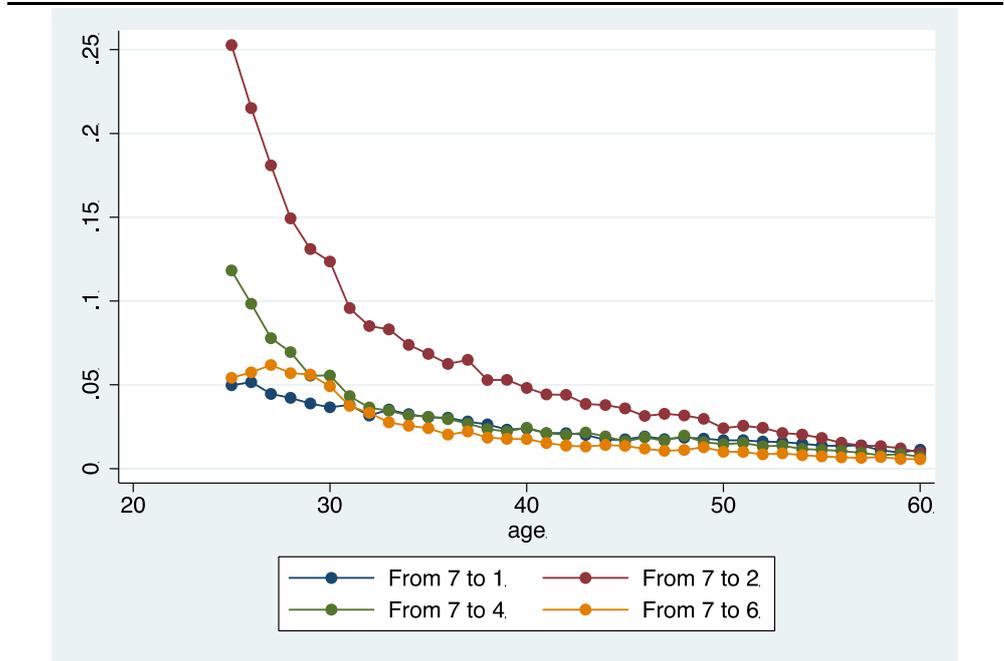


Source: Statistics Norway.

Figure 4.25-Figure 4.30 show that the patterns related to transfers from the municipal sector are somewhat similar compared to transfers from the government sector. And the estimated coefficients also show a similar picture. However, income levels do not play the same important role for transfers from the municipal

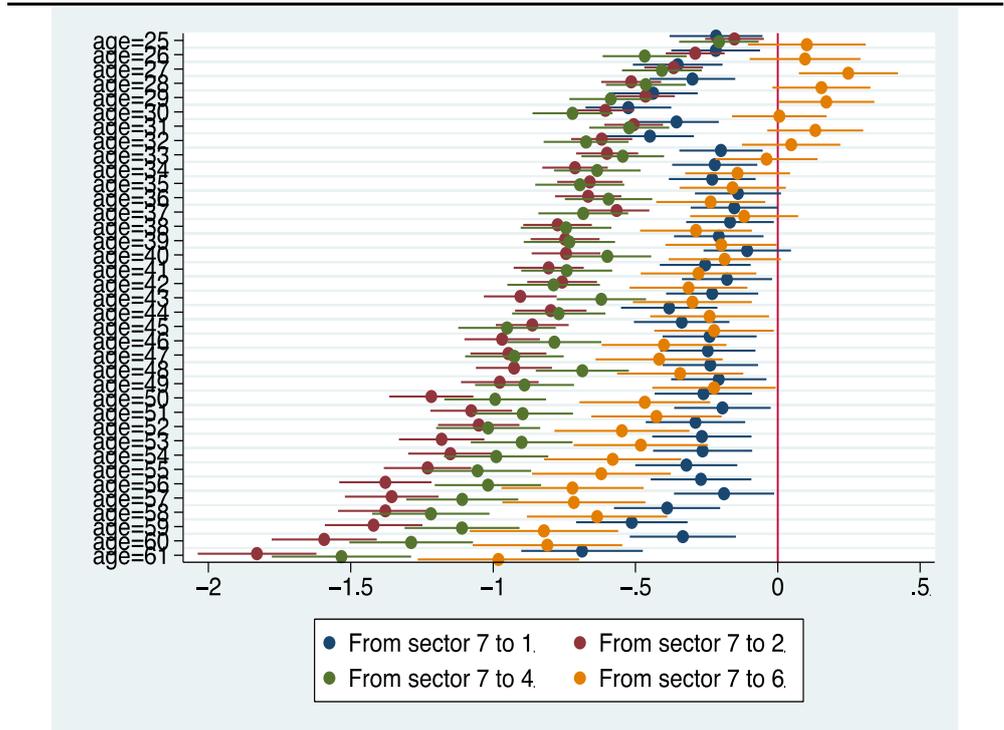
sector as transfers from the government sector. But for both men and women the probability of transfers from the municipal sector increases significantly after break in income histories (Table 2.2).

Figure 4.25 Men's probability of leaving a job in a municipality (sector 7), by age and entering sector. Women leaving the work force are not included.



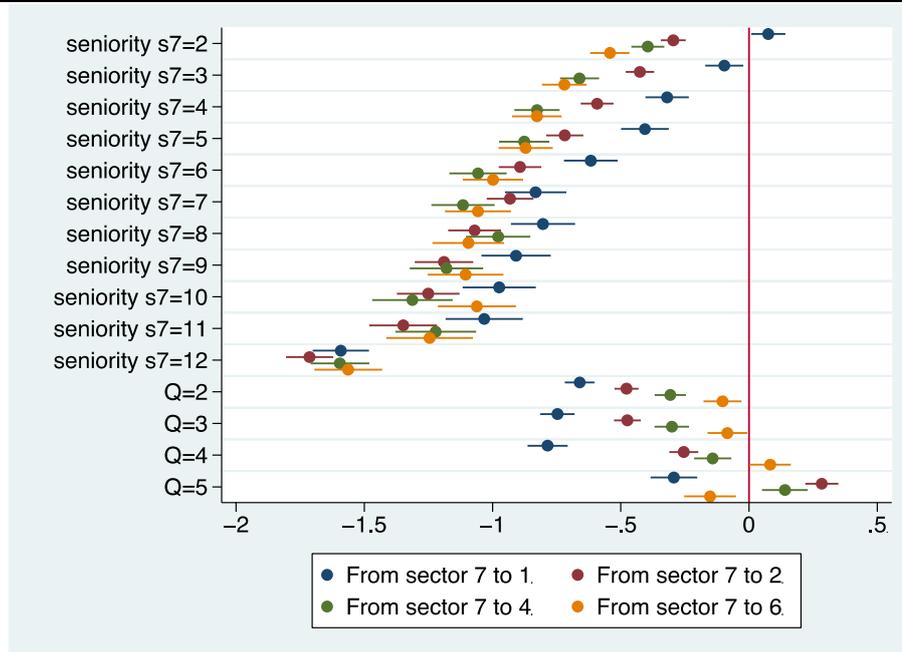
Source: Statistics Norway.

Figure 4.26 Men leaving a municipality (sector 7), by age and entering sectors. Estimates of the coefficients of the dummy variables.



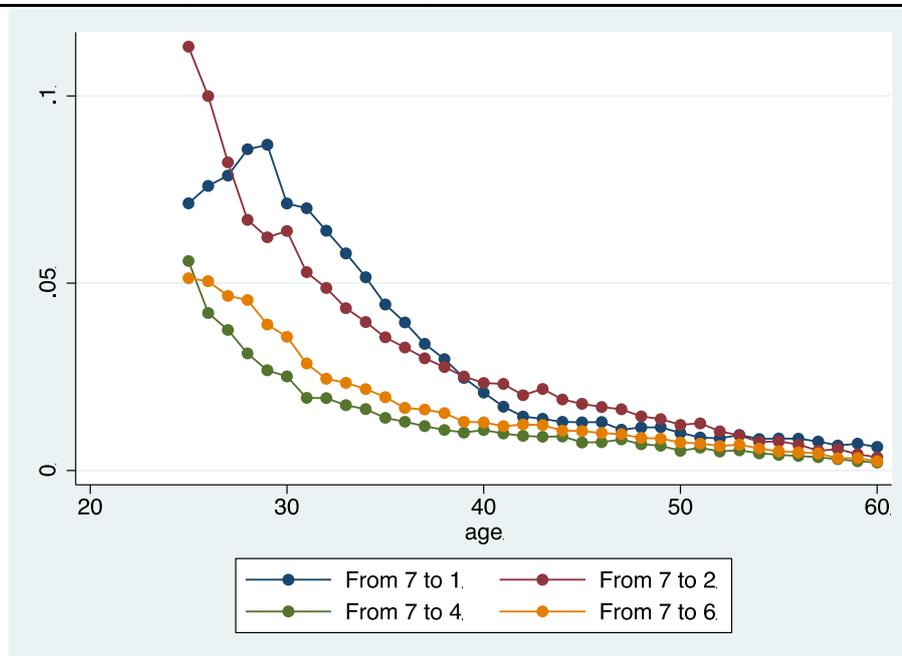
Source: Statistics Norway.

Figure 4.27 Men leaving a municipality (sector 7), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.



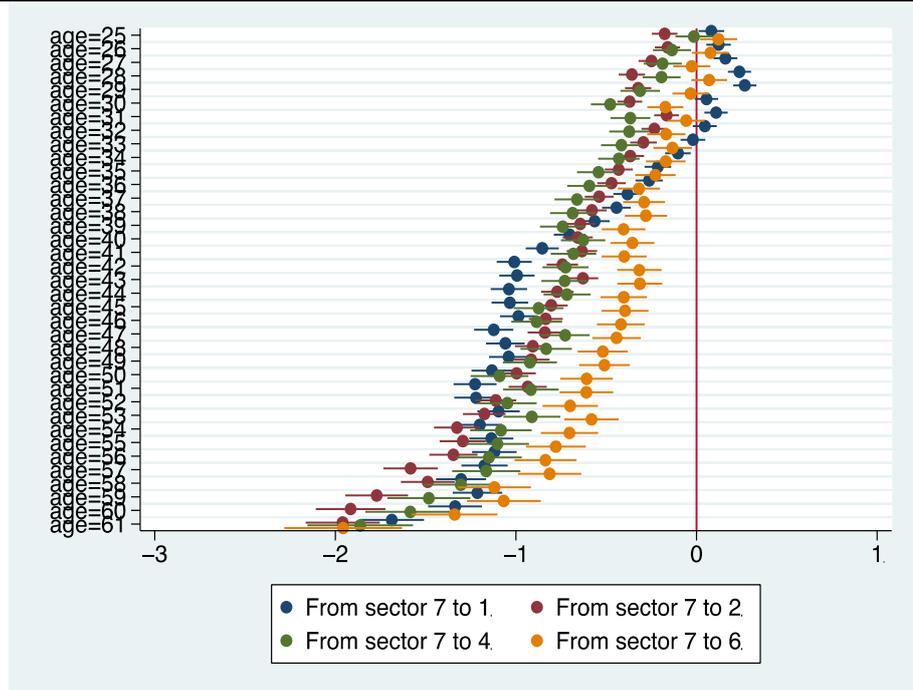
Source: Statistics Norway.

Figure 4.28 Women’s probability of leaving a job in a municipality (sector 7), by age and entering sector. Women leaving the work force are not included.



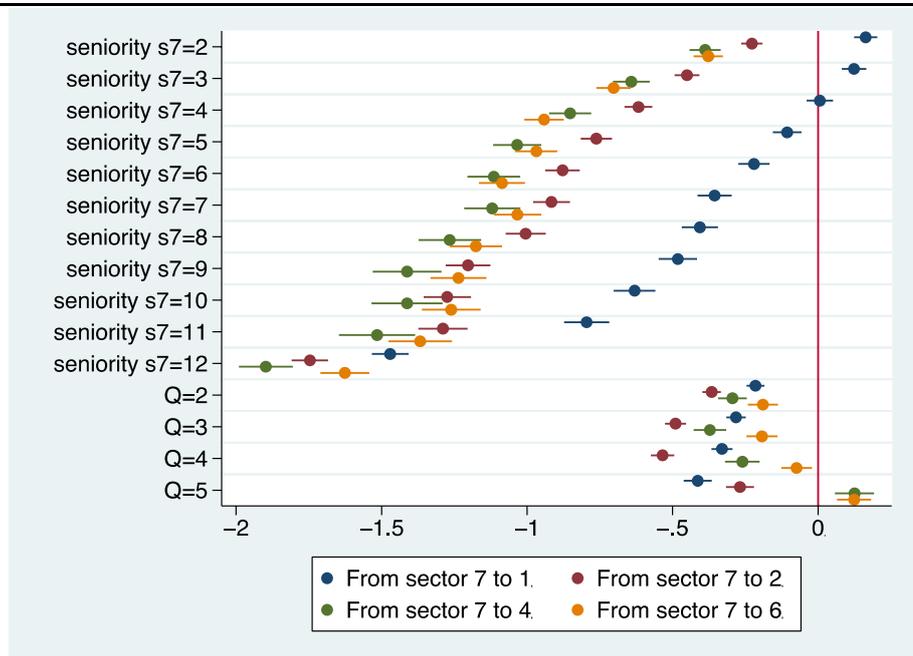
Source: Statistics Norway.

Figure 4.29 Women leaving a municipality (sector 7), by age and entering sectors. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

Figure 4.30 Women leaving a municipality (sector 7), by entering sectors. Variables included here are seniority of leaving sector, quintiles, immigrant categories, break in income history, and change of education status. Estimates of the coefficients of the dummy variables.



Source: Statistics Norway.

5. Concluding comments

Before it was decided to use the applied estimation model, other setups were considered and tested. Especially, it was checked whether variables as geographical location and number and age of children could be important explanatory variables.

However, it was not found that inclusion of these variables presented coefficients significantly different from zero. Hence, it was concluded that inclusion of these variables would complicate the programming of MOSART without giving much value added to model simulations.

Before the final estimation model was chosen, it was also estimated with the use of polynomials related to age, instead of dummies. However, it was found that it would be necessary to apply fourth degree polynomial to give satisfactory profiles of the age structures. And fourth degree polynomial gave at the same time coefficients with large confidence intervals. Hence, after all it appeared that to use single-year age dummies will give better and more reliable representations of the many different profiles of age-related changes in transfer probabilities.

A weakness with the data set is that we have information about sector belonging back to 1995 only. Hence, we do not have information on how seniority for more than 19 years influences transfer probabilities. For the same reason, the data set has relatively few observations with relatively long seniority below this limit. Seniority of 12 years or more was therefore defined as a single seniority group to have reasonably significant coefficient estimates.

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