

## Increasing Inequality in Social Exclusion Occurrence: The Case of Sweden During 1979–2003

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**Abstract** In this paper, we examine the risk of social exclusion among the Swedish population from a longitudinal perspective. In the empirical analysis, a person is considered socially excluded if he or she suffers from at least two of the following six welfare problems: chronic unemployment, economic problems, health problems, experiences of threat or violence, crowded housing and lack of interpersonal relationships. Our three main findings are as follows: There is no evidence that immigrants have been better integrated into Swedish society *over time* from the perspective of social exclusion risk. Instead, there are weak signs that their situation has become worse. Further, even though men are worse off than women as regards the odds for social exclusion, there are weak signs that their relative situation has improved *over time*. Finally, compared to couples without children, there is clear evidence that the odds for social exclusion for singles with children have increased *over time* and that the odds for social exclusion for couples with children have decreased *over time*. We can, therefore, conclude that among these groups, the inequality has increased *over time*. To be able to make these conclusions, we have fitted several specifications of a logistic regression model with random effects for panel data to our data set.

**Keywords** Inequality · Longitudinal analysis · Social exclusion

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## 1 Introduction

A mission of the welfare state is to hinder the accumulation of welfare problems and social exclusion among its population. This mission has also been on the agenda of the member states of the European Union since the union took an initiative to fight against poverty and social exclusion (European Union 2000). This also means that the member states of the union, including Sweden (Government Offices of Sweden 2003), have drafted national action plans for addressing different kinds of welfare problems. Further, these initiatives are part of a larger policy agenda within the union to guarantee a favorable interaction of different policies, such as economic, political and social policies.

That there is a need for national engagement against social exclusion in Sweden as well is demonstrated in this paper. For example, the odds for men to be excluded are 1.6 times higher than for women; the odds for exclusion for singles with children are 5.5 times higher than for couples without children; and the odds for immigrants to be excluded are 3.9 times higher than for native Swedes. A person with all these vulnerable characteristics has approximately 34 times higher odds for social exclusion than does a person who is a female native Swede without children and living in a relationship. Moreover, an individual's age group, education level and socio-economic class affect the odds for social exclusion.

Turning to the three main findings in the paper, there is no evidence that immigrants have been better integrated into Swedish society *over time* from the perspective of social exclusion risk. Instead, there are weak signs that integration has become worse. Of course, this is a negative finding for an ambitious welfare state like Sweden that has been experiencing a large influx of immigrants for several decades. Moreover, even though men are worse off than women when it comes to the odds for exclusion, there are weak signs that their relative situation has improved *over time*. Finally, compared to couples without children, there is clear evidence that the odds for exclusion for singles with children have increased *over time* and that the odds for exclusion for couples with children have decreased *over time*. In other words, the discrepancy between singles and couples with children has increased *over time*.

How have we arrived at these findings? Starting with defining social exclusion, it goes without saying that it is a complicated concept to define, which is demonstrated by the voluminous literature on the subject. We have nonetheless chosen to use the following *definition of social exclusion* in the empirical analysis: a person is socially excluded when he or she suffers from at least two of the following six welfare problems: chronic unemployment, economic problems, health problems, experiences of threat or violence, crowded housing and lack of interpersonal relationships. This definition is in harmony with the recent Swedish action plan against poverty and social exclusion, meaning that we are able to quantify the extent to which Sweden would have been successful thus far if we imagine that the action plan had been established some decades ago. We will discuss the social exclusion concept more carefully in Sect. 2. Further, since the significance of sex, family type and nationality background are in focus in the empirical analysis, we will discuss relevant previous research in Sect. 3.

The data set used in the empirical analysis is an annual survey of living conditions in Sweden (*Undersökningen av levnadsförhållanden, ULF*). To be more precise, we use an unbalanced panel involving four waves; the first was gathered 1979 (3,231 respondents), the second during the period 1986–1987 (3,593 respondents), the third during the period 1994–1995 (4,394 respondents), and the fourth during the period 2002–2003 (3,859 respondents). This gives a total number of respondents of 7,967, which means that most but not all of the individuals in the data set are followed over several waves. Further, since the

aim of the empirical analysis is to identify which variables explain a person's risk of being socially excluded, we include the following six variables in the data set: sex, age group, family type, nationality background, education level and socio-economic class. We will discuss all variables in the data set in Sect. 4.

Turning to a suitable empirical model for our problem, a model with a binary response variable is an obvious choice as the response variable records whether or not a person is socially excluded. Therefore, our model is a logistic regression model for panel data since there is also a time dimension in the data set. Thus, our estimation results will be presented as odds ratios for social exclusion. We will fit several specifications of the regression model to our data set in Sect. 5, and the paper is concluded with our main findings in Sect. 6.

## 2 Defining and Measuring Social Exclusion

Social exclusion is a popular term that often appears in public policy and in discussions on social welfare in general. There is also a great deal of literature on social exclusion. However, the term is not very straightforward for defining or operationalizing for analytical purposes. At any rate, the concept of social exclusion was first implemented in France in the 1960s, where it was first used when talking about the poor, and in the 1970s the term "*exclusion sociale*" was used when referring to individuals with different kinds of disadvantages such as being mentally and physically handicapped, abused children, aged invalids, asocial persons, substance abusers, etc. (Edgren-Schori 2000; Silver 1995).

Anyhow, social exclusion is understood somewhat differently in the national debates in different countries, and more weight may be placed on certain aspects of exclusion depending on issues that are crucial in a certain country. The emphasis may, for example, be on issues that are the current subject of policy-making or on problems that are especially evident in a given society at that moment in time (Silver 1995). In its agenda against poverty and social exclusion, the European Union has pointed out some aspects that should be considered when talking about exclusion in the entire union. The following eight aspects have since been identified in a report from the Government Offices of Sweden concerning the national action plan against poverty and social exclusion for the years 2003–2005 (Government Offices of Sweden 2003):

1. Developing an inclusive labor market and promoting employment as a right and opportunity for all;
2. Guaranteeing an adequate income and resources to live in human dignity;
3. Tackling educational disadvantage;
4. Preserving family solidarity and protecting the rights of children;
5. Ensuring good accommodation for all;
6. Guaranteeing equal access to quality services (care, cultural, health, legal, recreational, social, transport);
7. Improving the delivery of services; and
8. Regenerating areas of multiple deprivation.

Essentially, the welfare problems that we treat as social exclusion indicators in this paper correspond quite closely to these eight aspects.

Atkinson (1998) has identified three central themes that one should be aware of when discussing social exclusion. These are relativity, agency and dynamics. *Relativity* means that social exclusion is taking place in a certain society and in the context that is relevant in

just that society. For example, the material standard that is considered necessary for a reasonable standard of living in one society may not be the same in another society, or in the same society at a different time period. Thus, technological inventions that were seen as luxury items a few years ago may today be available to the vast majority.

*Agency* in social exclusion refers to the fact that it is important to identify the agents related to the occurrence of exclusion, that is, who is responsible for the exclusion process. This theme, involving the search after agents causing social exclusion, is especially important in studies in which the emphasis is on the stratification of the life course and on the societal institutions as inequality-causing actors. An example of this would be the stratification that is mediated through the educational system. In this paper, our aim is not to analyze the agency aspect or the stratification of the life course aspect.

The *dynamics* of social exclusion are related to the fact that it is not just the current circumstances that affect the exclusion. What has happened in the past and what the expectations are for the future are also relevant factors in the exclusion process. This theme is an important aspect in this paper. We pay, in other words, special attention to changes *over time*. The dynamic nature of exclusion has also often been discussed in the literature. For example, Byrne (2005) defines social exclusion as “*changes in the whole society which have consequences for some of the people in that society*” (p. 1). Therefore, exclusion comes from a stratification generating social change.

The literature on social exclusion consists of studies of different groupings of people. For instance, those who are deprived, illiterate, long-term unemployed, poor, single parents, social assistance recipients, substance abusers and residents living in deficient housing and disreputable neighborhoods have been objects of research on exclusion. However, since some researchers have found only weak correlations between these kinds of disadvantages, the *accumulation* of welfare problems has been treated as social exclusion, which means that it is the experience of multiple disadvantages that is problematic (Bradshaw and Finch 2003; Gallie et al. 2003; Silver 1995).

A useful definition of social exclusion is, therefore, simply to say that some form of accumulation of welfare problems *is* exclusion. According to previous studies, it might be two problems (Bask 2005, 2007) or just one (Burchardt et al. 2002), or even the length of the period during which a person is suffering from a certain problem (Chakravarty and D'Ambrosio 2006). It is, of course, also possible to use a variable that takes values from, say, 0 to 6 depending on how many welfare problems a person is suffering from. However, such a definition means that we focus on the degree of exclusion, or the deepness of multiple disadvantages, instead of exclusion as a state of being.

Therefore, in this paper, we define social exclusion as follows: a person is excluded when he or she suffers from at least two of the following six welfare problems: *chronic unemployment, economic problems, health problems, experiences of threat or violence, crowded housing and lack of interpersonal relationships*. This definition is in harmony with the previously mentioned Swedish action plan against poverty and social exclusion (Government Offices of Sweden 2003), and it is also in accordance with the accumulation argument. This does not mean that we claim that our definition is superior to other definitions of exclusion. Instead, defining social exclusion as the suffering from at least two of the six aforementioned welfare problems is just one of several possibilities, and empirically examining other definitions should naturally be part of future research.

Finally, we should mention that the terms *poverty* and *social exclusion* have often been used synonymously in the literature. However, this has been questioned by Halleröd and Heikkilä (1999), among others, who argue that exclusion has to do with a range of issues

relating to individuals' integration into society, meaning that it is a somewhat broader concept than poverty.

### 3 Previous Research on the Significance of Sex, Family Type and Nationality Background

Three categories of individuals have, in previous analyses, shown to be in a greater risk for social exclusion in Sweden, both in a static analysis of a specific year in time (Bask 2005) and in a dynamic analysis when the same respondents have been followed for slightly more than two decades (Bask 2007).

#### 3.1 Men Versus Women

Much of the discussion on public policy is concerned with the disadvantageous situation for women on the labor market. This is because there is a great deal of literature that shows that there are labor-market disparities between men and women (Cohen and Huffman 2003; Petersen and Morgan 1995). However, if we broaden the perspective somewhat, the situation may be the other way around. Several of the most socially excluded groups such as alcoholics, drug addicts and homeless in the Swedish society are men. For instance, about three of four homeless are men (Socialstyrelsen 2006).

In fact, we know that men in Sweden have a higher propensity to suffer from social exclusion than women do. For example, Bask (2005) finds that the odds for men to be excluded are 1.4 times higher than for women, and the data set used in this cross-sectional analysis consists of as many as 70,838 respondents as well as a richer set of explanatory variables than can be found in this paper. In this paper, we will examine the general changes *over time* in the social exclusion occurrence between men and women in Sweden.

#### 3.2 Different Family Types

Many marriages result in divorce. The divorce rate started to accelerate in Europe during the second half of the 1960s, and this increase has continued over the decades. In fact, the total divorce rate in Sweden in the 1990s was among the highest in Europe, ranging from 44 to 55%. There is also a high prevalence of non-marital unions in Sweden that are even less stable than marriages (Council of Europe 2003; Liu and Vikat 2004).

The discussion on the objectives for family policy is at any rate often loaded with strong feelings. A prominent example of this is when a previous leader of the Left Party of Sweden (i.e., *Vänsterpartiet*), Gudrun Schyman, proclaimed "*death to the family*" (Schyman 2002). This proclamation led to a massive discussion around the nuclear family and its possible destructiveness towards women due to an unequal division of domestic tasks and women's experience of violence at home. But the prevalence of stable relationships is, and should be, important from the view of social policy since it has been shown that children of divorced parents have it worse off compared to their counterparts.

For instance, children of divorced parents tend to start families of their own earlier, and their families are in turn at greater risk for family dissolution than are families with parents who do not have divorced parents themselves (Bernhardt and Gähler 2003). Moreover, children from families who have experienced family dissolution tend to have a lower educational attainment compared to those in stable two-parent families. Of course, there are different reasons a family is a one-parent family, but it can be mentioned that children

from families in which the single parent is a widow show a higher educational attainment than do families with a divorced parent (Jonsson and Gähler 1997).

Fritzell and Lundberg (2000) show that there were large differences in the accumulation of welfare problems in Sweden during the 1990s in disfavor of singles, especially those with children. We also know from previous research that people who suffer from closely related welfare disadvantages have a greater propensity to suffer from a relationship breakdown. This effect is double-sided since it has been shown that those who initially score high on a deprivation index are less likely to enter into a relationship (Halleröd and Bask 2008).

Finally, Bask (2007) shows that being a single with children in Sweden is one of the main factors for a person to be socially excluded when the same respondents are followed *over time*. In fact, the odds for this category of people to be excluded are 4.0 times higher than for couples without children. In the cross-sectional analysis in Bask (2005), this figure is 5.8. All these findings taken together demonstrate that the family type is an important factor in analyzing increasing inequality *over time*.

### 3.3 Immigrants Versus Native Swedes

In the year 2003, the proportion of immigrants among the Swedish population was about 12%, and approximately 16% of all people living in Sweden had an immigrant background (Statistics Sweden 2009).<sup>1</sup> Previous research has also revealed apparent disparities in the risk of social exclusion between immigrants and the native population that are true challenges for the Swedish welfare state. For instance, Bask (2005) finds that immigrants suffer from exclusion more often than native Swedes do, and that first-generation Swedes and immigrants from the Nordic countries are better off compared to other immigrants.<sup>2</sup> Thus, country of birth is a significant factor in multiple deprivations in Sweden (Fritzell and Lundberg 2000; Korpi et al. 2007).

Immigrants are overrepresented among homeless in Sweden as well. Nordic immigrants are mainly homeless due to substance abuse, whilst non-Nordic immigrants are more often unemployed and have economic and mental health problems (Socialstyrelsen 2006). Further, Bask (2005) finds that time spent in Sweden reduces the risk of social exclusion, and Bask (2007) finds that after more than 20 years in Sweden, immigrants are still more at risk of suffering from exclusion than native Swedes are. Therefore, in this paper a closer look will be taken at the situation for immigrants, but also for first-generation Swedes, when it comes to the risk of being socially excluded and the relative development *over time* compared to native Swedes.

## 4 Data Set Used in the Empirical Analysis

The data set used is the annual survey of living conditions in Sweden (*Undersökningen av levnadsförhållanden, ULF*), which is a unique data set in the sense that it is one of the oldest and broadest data sets in the world within this field. We use an unbalanced panel involving four waves. To be more precise, the first wave was gathered in the year 1979, the

<sup>1</sup> Having an immigrant background means that the person is born abroad or that both parents are born abroad.

<sup>2</sup> Being a Nordic immigrant means that the person comes from any of the countries Denmark, Finland, Iceland and Norway. In the year 2003, Nordic immigrants constituted about 26% of the stock of immigrants and about 22% of the inflow of immigrants.

second during the period 1986–1987, the third during the period 1994–1995, and the fourth during the period 2002–2003.

Since most youngsters have not yet reached their class position or finished their education before age 25, and many elderly are already retired by age 65, an individual had to be in the age span of 25–64 years to be included in a wave in the panel. This resulted in a total of 7,967 respondents in the data set with the number of respondents in each wave being 3,231, 3,593, 4,394 and 3,859, respectively. Thus, the data set includes both a longitudinal part and a cross-sectional part in the sense that most of the individuals have been followed over time, but a few of them are captured only in one wave.

#### 4.1 Dependent Variable in the Analysis

The dependent variable, which is the number of welfare problems, originally takes values from 0 to 6. However, we have dichotomized this variable so that those suffering from at least two welfare problems are considered to suffer from social exclusion, and the six problems are, as mentioned, chronic unemployment, economic problems, health problems, experiences of threat or violence, crowded housing and lack of interpersonal relationships.

A variable showing whether an individual has experienced *chronic unemployment* is used when analyzing the labor market situation; the definition of this variable is that this individual has experienced periods of unemployment during the past 5 years that make up a total of at least 6 months. The reason we focus on chronic unemployment is that the economic and social consequences are minor during shorter periods of unemployment, at least for younger people (Halleröd and Westberg 2006). The variable is coded 1 for people who have experienced chronic unemployment and 0 for those without this experience.

A variable showing if a person has *economic problems* is comprised of two variables in the data set. The first concerns a person's cash margin, and asks whether one can acquire a certain amount of money during a period of 1 week. The relativity aspect is addressed by adapting the amount of cash to the price level each year, and the amount in the year 2003 was 14,000 SEK. The second variable deals with the ability to pay regular expenses. Specifically, it asks whether an individual has had difficulty paying regular expenses such as food, rent and other bills during the past year. We have combined these two variables so that those who have answered that they do not have a cash margin and have also had problems meeting regular expenses are considered to have economic problems. In this case, the variable is coded 1. Otherwise, it is coded 0.

To determine whether an individual is suffering from *health problems*, we use a variable that asks directly about the respondent's health condition in which several responses are available. This variable has been dichotomized so that those alternatives that indicate at least fairly good health are considered to reflect no problems with health, meaning that the variable is coded 0, whereas the remaining alternatives indicate problems with health, meaning that the variable is coded 1. The validity of self-rated health has been demonstrated in previous research (George 2001; Kennedy et al. 1999). *Experiences of threat or violence* are measured with a variable asking whether a person has been exposed to threat or violence during the past year. This question is important in trying to determine whether a person is vulnerable and cannot feel safe and secure. In this case, the variable is coded 1. Otherwise, it is coded 0.

To determine whether an individual is suffering from *crowded housing*, we use a variable that measures the space in the apartment or house he or she is living in. An individual has crowded housing if he or she is living in an apartment or a house with less than one bedroom per person, which is in accordance with Swedish housing policy. Spouses, however, can share a bedroom. The variable is coded 1 for those who have



crowded housing and 0 for those who do not. A variable called close friend is, finally, used as an indicator of *lack of interpersonal relationships*. A close friend is defined as a friend, outside the family, with whom one can discuss anything. Of course, it would also be possible to use a variable that focuses on relationships between family members. However, we believe that a close friend outside the family is a better measure of integration since good relationships exclusively with family members could be an indirect sign of lack of integration into the surrounding society.

#### 4.2 Explanatory Variables in the Analysis

As explanatory variables, we have included *sex*, *age group*, *family type*, *nationality background*, *education level* and *socio-economic class*.

The first variable is sex and has two categories, men and women. When analyzing the effect of age, we have grouped the individuals into four groups: 25–34, 35–44, 45–54 and 55–64 years. To determine the risk of social exclusion when it comes to family type, we use a variable involving four family types: couples without children, couples with children, singles without children and singles with children. We have also divided the sample into three groups according to their nationality background. These groups are native Swedes, first-generation Swedes and immigrants. Native Swedes are those who were born in Sweden to Swedish parents, first-generation Swedes are those who were born in Sweden but have at least one foreign-born parent, and immigrants are those who were born abroad.

Turning to education levels, they are as follows: university, two years of college, high school, vocational school, compulsory school and not completed any formal education. Socio-economic classification, which is done according to a Swedish classification schema, is the final explanatory variable and it resembles the well-known EGP schema (Erikson and Goldthorpe 1992). This variable includes nine socio-economic classes: higher white collar, middle white collar, lower white collar, skilled blue collar, unskilled blue collar, self-employed, farmers, students and individuals who do not fit into any of these classes.

#### 4.3 Descriptive Statistics of the Data Set

See Table 1 for a description of the panel as percentages of individuals with a certain characteristic, including figures representing the degree of social exclusion at each wave in the data set.

We will not occupy space here by commenting on all figures in the table, but one thing is worthy of mention. There are weak but visible signs that the individuals in later waves in the panel are older compared to those in earlier waves. Of course, the reason for this is that most but not all individuals are followed over several waves. This, however, is not a problem in the empirical analysis since the parameter estimates (produced by the XTLOGIT procedure in STATA) are robust for unbalanced panels (Maume 2004; Pendergast et al. 1991).

Tables 2, 3, 4, 5 present the accumulation of welfare problems within certain categories of people in each wave in the panel. To be more precise, we list the percentages of people with a specific number of welfare problems, the groups under scrutiny being sex, family type and nationality background.

Starting with sex, it is apparent that social exclusion is more common among men than among women in each wave in the panel, and that this difference was largest in the first wave when it was 3.1% points. In the other waves, this difference has varied between 1.3 and 1.6% points. Recall that a person is socially excluded in a specific wave if he or she suffers from at least two welfare problems.



**Table 1** Percentages of individuals with a certain characteristic

Variable	Year 1979 (%)	Years 1986–1987 (%)	Years 1994–1995 (%)	Years 2002–2003 (%)
Socially excluded	8.8	7.6	8.9	8.1
Men	49.8	50.1	49.2	48.8
Women	50.2	49.9	50.8	51.2
25–34 Years	32.4	27.3	20.1	20.2
35–44 Years	26.1	29.5	23.4	21.4
45–54 Years	21.3	22.3	31.4	25.2
55–64 Years	20.2	20.9	25.0	33.2
Couples without children	28.8	34.7	37.8	39.8
Couples with children	48.6	41.7	36.9	33.9
Singles without children	17.8	19.9	21.1	21.1
Singles with children	4.7	3.7	4.2	5.2
Swedes	88.3	85.4	83.3	82.7
1st-Generation Swedes	2.6	3.5	4.5	6.2
Immigrants	9.1	11.0	12.2	11.1
University	7.9	10.4	13.8	22.6
College	9.6	13.8	16.4	15.8
High school	10.3	10.0	10.7	15.2
Vocational school	30.0	34.0	35.9	31.7
Compulsory school	41.6	30.8	23.1	14.7
Not completed education	0.5	1.0	0.1	0.1
Higher white collars	9.9	11.0	13.1	15.8
Middle white collars	15.9	17.6	17.9	22.5
Lower white collars	14.6	16.0	15.3	13.8
Skilled blue collars	15.0	15.3	15.5	16.5
Unskilled blue collars	28.8	27.7	23.6	19.4
Self-employed	7.1	6.5	8.1	7.8
Farmers	3.6	1.7	1.2	0.8
Students	2.1	2.0	3.8	3.2
Others	2.9	2.0	1.5	0.4

Moving on to family type, it is a stable ordering of the sub-groups over the waves in the panel; singles with children are worst off when it comes to being socially excluded, and are followed by singles without children, couples with children and, finally, couples without children who are best off. The only exception is found in the first wave, where singles without children are worse off compared to singles with children. Another finding, which is striking, is that the percentage among singles with children who are socially excluded increases *over time*. In the first wave, this figure was 12.6%, and in the fourth wave, as many as 25.9% among singles with children were excluded. This finding is remarkable since the degree of social exclusion among all respondents has oscillated without trend throughout the whole sample period.

**Table 2** Percentages of individuals with a specific number of welfare problems

Year 1979				
Number of welfare problems	Men (%)	Women (%)		
0	50.6	62.2		
1	39.0	30.5		
2	9.2	5.9		
3	1.0	1.2		
4	0.2	0.2		
5	0.0	0.0		
6	0.0	0.0		
	Couples without children (%)	Couples with children (%)	Singles without children (%)	Singles with children (%)
0	62.4	56.4	49.5	47.7
1	34.1	34.0	36.1	39.7
2	3.0	8.3	12.1	9.9
3	0.4	1.0	2.3	2.0
4	0.1	0.3	0.0	0.7
5	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0
	Swedes (%)	1st-Generation Swedes (%)	Immigrants (%)	
0	58.6	48.1	38.0	
1	33.8	42.0	40.8	
2	6.6	6.2	17.1	
3	0.9	1.2	3.5	
4	0.1	2.5	0.7	
5	0.0	0.0	0.0	
6	0.0	0.0	0.0	

Finally, when it comes to nationality background, we again have a stable ordering of the sub-groups over the waves in the panel: Native Swedes are always best off and immigrants are always worst off when it comes to being socially excluded. Moreover, the percentage among native Swedes who are excluded is never above 10%, and the percentage among immigrants who are excluded is, with one exception, never below 20%.

To summarize, it is clear that being a man, a single with children or an immigrant is not a promising characteristic for someone with thought to the risk of social exclusion. But we would like to do more in this paper than simply look at figures expressing the risk of exclusion for a person with a specific characteristic. What we would like to do is estimate the risk for a person characterized by a set of characteristics to be socially excluded. This is because a single figure in Tables 2, 3, 4, 5 can only give a vague idea about which people are more prone than others to be excluded. Let us, therefore, move on to the main section in this paper in which we fit several specifications of a regression model to our data set.

**Table 3** Percentages of individuals with a specific number of welfare problems

Years 1986–1987				
Number of welfare problems	Men (%)	Women (%)		
0	55.0	66.9		
1	36.7	26.1		
2	7.1	5.9		
3	1.0	0.9		
4	0.2	0.2		
5	0.0	0.0		
6	0.0	0.0		
	Couples without children (%)	Couples with children (%)	Singles without children (%)	Singles with children (%)
0	66.3	60.8	54.9	44.0
1	29.5	31.5	33.2	38.1
2	3.9	6.6	9.0	15.7
3	0.1	0.9	2.6	1.5
4	0.2	0.1	0.3	0.7
5	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0
	Swedes (%)	1st-Generation Swedes (%)	Immigrants (%)	
0	62.7	54.4	49.0	
1	30.8	38.4	34.4	
2	5.8	4.8	12.2	
3	0.5	1.6	4.1	
4	0.2	0.8	0.3	
5	0.0	0.0	0.0	
6	0.0	0.0	0.0	

## 5 Empirical Analysis

The aim here is to fit an empirical model to data in an attempt to explain the extent of social exclusion. Therefore, since the response variable records whether or not an individual is socially excluded, a model with a binary response variable is an obvious choice. Further, since there is a time dimension in the data set, we have chosen a logistic model for panel data as our regression model.

First of all, we do not include the six explanatory variables directly in the regression model. Instead, we create six sets of dummy variables, that is, one set of dummy variables for each explanatory variable. Moreover, the category within each explanatory variable that is least likely to be associated with social exclusion is used as the reference case for the other categories within the same variable. For example, since people in the age group 55–64 years are in the most favorable situation (as we will see below in the empirical analysis), this category within the age group variable is the reference case for the other age

**Table 4** Percentages of individuals with a specific number of welfare problems

Years 1994–1995				
Number of welfare problems	Men (%)	Women (%)		
0	56.2	66.0		
1	34.2	25.9		
2	7.5	6.7		
3	1.5	1.1		
4	0.6	0.3		
5	0.0 (1 person)	0.0 (1 person)		
6	0.0	0.0		
	Couples without children (%)	Couples with children (%)	Singles without children (%)	Singles with children (%)
0	69.3	58.7	55.0	39.6
1	26.4	31.3	32.2	39.0
2	3.9	7.5	10.3	16.5
3	0.2	1.9	1.9	2.7
4	0.1	0.6	0.7	1.6
5	0.0	0.1	0.0	0.5
6	0.0	0.0	0.0	0.0
	Swedes (%)	1st-Generation Swedes (%)	Immigrants (%)	
0	64.3	59.0	41.0	
1	28.8	28.2	38.0	
2	5.7	9.2	15.5	
3	0.9	3.1	3.2	
4	0.2	0.5	2.1	
5	0.0 (1 person)	0.0	0.2	
6	0.0	0.0	0.0	

groups. An exception to this rule is found in the dummy variables for the time effect since, in this case, the first wave in the panel is the natural reference case.

### 5.1 Regression Model

To be more specific, we estimate the following regression model:

$$\log \left[ \frac{P(y_{ij} = 1)}{1 - P(y_{ij} = 1)} \right] = \beta_0 + \beta_1 t_{ij} + \beta_2 x_{ij} + \beta_3 t_{ij} x_{ij} + \varepsilon_i + v_{ij}, \quad (1)$$

where  $y_{ij}$  records whether individual  $i$  in wave  $j$  is socially excluded ( $y_{ij} = 1$ ) or not ( $y_{ij} = 0$ ), meaning that  $P(y_{ij} = 1)$  is the probability for exclusion,  $\frac{P(y_{ij}=1)}{1-P(y_{ij}=1)}$  is the odds ratio for exclusion, and  $\log \left[ \frac{P(y_{ij}=1)}{1-P(y_{ij}=1)} \right]$  is the log odds ratio for exclusion. At the right-hand side of (1), we find terms that may explain the variation in the log odds ratio for social

**Table 5** Percentages of individuals with a specific number of welfare problems

Years 2002–2003				
Number of welfare problems	Men (%)	Women (%)		
0	60.5	65.9		
1	30.6	26.7		
2	6.9	6.0		
3	1.7	1.0		
4	0.3	0.4		
5	0.1	0.0		
6	0.0	0.0		
	Couples without children (%)	Couples with children (%)	Singles without children (%)	Singles with children (%)
0	68.8	64.8	56.4	38.3
1	26.9	28.6	30.3	35.8
2	3.7	5.3	10.2	19.9
3	0.5	1.1	2.6	3.5
4	0.1	0.2	0.5	2.5
5	0.1	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0
	Swedes (%)	1st-Generation Swedes (%)	Immigrants (%)	
0	65.7	57.7	48.2	
1	27.9	33.1	31.4	
2	5.2	7.1	15.2	
3	1.0	1.3	3.8	
4	0.2	0.8	1.4	
5	0.0 (1 person)	0.0	0.0	
6	0.0	0.0	0.0	

exclusion, which is a constant ( $\beta_0$ ), a term for the time effect ( $\beta_1 t_{ij}$ ), a term that contains dummy variables for the explanatory variables ( $\beta_2 x_{ij}$ ), a term that contains interaction terms for the wave in the panel and the dummy variables ( $\beta_3 t_{ij} x_{ij}$ ), a random effect term ( $\varepsilon_i$ ) and a disturbance term ( $v_{ij}$ ). The first wave in the panel is coded 1, the second wave is coded 2 and so on and, in our specific sample,  $i \in [1, \dots, 7967]$  and  $j \in [1, \dots, 4]$ .

Be aware of the hierarchical structure in the regression model in (1) that is visible in the sum  $\beta_0 + \varepsilon_i + v_{ij}$ : (1)  $\beta_0$  is the average of all log odds ratios in the whole population; (2)  $\varepsilon_i$  is the deviation of the average of all log odds ratios for individual  $i$  from the average of all log odds ratios in the whole population; and (3)  $v_{ij}$  is the deviation of the log odds ratio for individual  $i$  in wave  $j$  from the average of all log odds ratios for individual  $i$ . That the individual-specific term  $\varepsilon_i$  is a random effect term means that we are able to estimate the effects of time-invariant dummy variables such as those for nationality background.

See Table 6 for the estimation results, where the parameter estimates in the regression models are the odds ratios for social exclusion. In the first regression model, there are no

**Table 6** Regression models when interaction terms for one variable are included

Variable	Odds ratio	P-value	Odds ratio	P-value	Odds ratio	P-value
Year 1979						
Years 1986–1987	<b>0.752</b>	0.004	<b>0.807</b>	0.040	0.838	<b>0.738</b>
Years 1994–1995	0.974	0.780	1.117	0.357	1.166	0.930
Years 2002–2003	0.996	0.973	1.223	0.177	1.245	0.925
Women						
Men	<b>1.604</b>	0.000	<b>2.191</b>	0.000	<b>1.606</b>	<b>1.605</b>
Time * Men			0.886	0.053		0.000
55–64 years						
25–34 Years	1.232	0.081	1.224	0.091	1.235	1.242
35–44 Years	1.210	0.107	1.202	0.121	1.224	1.217
45–54 Years	1.009	0.931	1.008	0.939	1.027	1.015
Couples without children						
Couples with children	<b>2.017</b>	0.000	<b>2.024</b>	0.000	<b>3.577</b>	<b>2.013</b>
Singles without children	<b>3.290</b>	0.000	<b>3.273</b>	0.000	<b>3.175</b>	<b>3.276</b>
Singles with children	<b>5.549</b>	0.000	<b>5.576</b>	0.000	<b>2.625</b>	<b>5.553</b>
Time * Couples with children					<b>0.791</b>	0.006
Time * Singles without children					1.010	0.915
Time * Singles with children					<b>1.314</b>	0.041
Swedes						
1st-Generation Swedes	1.412	0.055	1.414	0.053	<b>1.439</b>	1.244
Immigrants	<b>3.864</b>	0.000	<b>3.867</b>	0.000	<b>3.905</b>	<b>2.701</b>
Time * 1st-generation Swedes						1.048
Time * Immigrants						1.145

**Table 6** continued

Variable	Odds ratio	P-value	Odds ratio	P-value	Odds ratio	P-value
<b>College</b>						
University	1.184	0.333	1.171	0.366	1.181	0.343
High school	<b>1.510</b>	0.010	<b>1.492</b>	0.013	<b>1.487</b>	0.014
Vocational school	<b>1.566</b>	0.002	<b>1.565</b>	0.002	<b>1.547</b>	0.002
Compulsory school	<b>2.185</b>	0.000	<b>2.182</b>	0.000	<b>2.160</b>	0.000
Not completed education	<b>4.811</b>	0.000	<b>4.727</b>	0.000	<b>4.756</b>	0.000
<b>Higher white collars</b>						
Middle white collars	<b>1.504</b>	0.022	<b>1.497</b>	0.024	<b>1.508</b>	0.022
Lower white collars	<b>1.589</b>	0.018	<b>1.588</b>	0.019	<b>1.592</b>	0.019
Skilled blue collars	<b>2.982</b>	0.000	<b>2.958</b>	0.000	<b>2.998</b>	0.000
Unskilled blue collars	<b>2.979</b>	0.000	<b>2.979</b>	0.000	<b>3.021</b>	0.000
Self-employed	<b>1.945</b>	0.002	<b>1.959</b>	0.002	<b>1.978</b>	0.002
Farmers	<b>2.575</b>	0.003	<b>2.563</b>	0.003	<b>2.610</b>	0.003
Students	<b>3.798</b>	0.000	<b>3.799</b>	0.000	<b>3.837</b>	0.000
Others	<b>8.707</b>	0.000	<b>8.996</b>	0.000	<b>9.249</b>	0.000
Constant	exp(−5.395)		exp(−5.493)		exp(−5.551)	
Log-likelihood	−4,189.179		−4,187.298		−4,177.825	
Log-likelihood score			3.762	0.052	<b>22.708</b>	0.000

*Note* Significant parameters at the 5% level are in bold. The log-likelihood score is a test of whether the inclusion of more explanatory variables significantly improves the model fit. The log-likelihood score is a comparison with the first model that does not include any interaction terms



interaction terms. In the other regression models, however, we have augmented the baseline model with interaction terms for time and sex (second model), time and family type (third model), and time and nationality background (fourth model).

We will begin the discussion with the findings in the first regression model, starting with the findings for the main explanatory variables in the analysis, which are sex, family type and nationality background.

## 5.2 Sex, Family Type and Nationality Background

If we start with the importance of *sex*, *family type* and *nationality background*, the odds for men to be socially excluded are 1.6 times higher than for women. Consequently, we confirm the typical result in the literature that men among the Swedish population are more vulnerable to exclusion than women are.

Turning to family type, this variable has a huge effect on the social exclusion risk. Couples without children have, not surprisingly, the lowest risk of being excluded, whereas singles with children have 5.5 times higher odds for exclusion than do couples without children. The odds ratios for singles without children and couples with children are 3.3 and 2.0, respectively. When it comes to nationality background, native Swedes are in the most favorable situation, and those who are born in Sweden but have at least one foreign-born parent have 1.4 times higher odds for exclusion than do native Swedes. Moreover, the odds for immigrants to be excluded are 3.9 times higher than for native Swedes. All odds ratios above are significant at the most conservative significance levels, except the figure for first-generation Swedes, which is significant at the 10% level.

## 5.3 Age Group, Education Level and Socio-Economic Class

Turning to the figures for *age group*, *education level* and *socio-economic class*, most are significant at the 5% level. As already noted, people in the age group 55–64 years are in the most favorable situation, and the odds ratios for the other age groups vary between 1.0 and 1.2. However, it is only the youngest people who are significantly worse off than those in the oldest age group, though only at the 10% level.

Not surprisingly, a higher education level is associated with a lower risk of social exclusion. Those with a college education are best off, whereas the odds ratio for those without any formal education is 4.8. The other odds ratios vary between 1.2 and 2.2, and all figures except those for university education are significant at the 5% level. Higher white collars are most safe from social exclusion, whereas the odds ratios for the other categories vary between 1.5 and 8.7. All figures are significant at the 5% level. The ranking of odds ratios is also as expected; white collars are better off than blue collars, and self-employed and farmers are better off than students.

## 5.4 Time Effect

Since there is a time dimension in the data set, we have included dummy variables for the *time effect*, whereby the first wave in the panel is the natural reference case. It turns out that only the figure for the years 1986–1987 is significant at the 5% level. Specifically, the situation during the years 1986–1987 was better compared to the year 1979 since the odds ratio is 0.8. This is not surprising as the 1980s in Sweden, at least during the decade's second half, were characterized by a booming economy. The situation was clearly different

in the year 1979, in the aftermath of the first oil crisis, when the Swedish economy was suffering from stagflation. The other two figures that catch the time effect are not significant at any conventional significance level.<sup>3</sup>

### 5.5 Absolute Risk of Social Exclusion

To be able to estimate a person's absolute risk of exclusion, we have to specify the full set of characteristics of this person according to the model that is fitted to data. Thus, if we continue with our example and assume that the two people belong to the most favorable categories when it comes to age group, education level and socio-economic class, and we evaluate the social exclusion risks in the years 2002–2003, we estimate them to be 0.5 and 13.5%, respectively.<sup>4</sup> On the other hand, if we evaluate the exclusion risks in the year 1979 assuming that the two people are in the age span 25–34 years, have not completed any formal education and are unskilled blue collars, the estimated risks are 7.4% and as high as 73.4%, respectively.<sup>5</sup>

### 5.6 Interaction Effects for Time and Sex, Time and Family Type, and Time and Nationality Background

The other regression models in Table 6 allow us to answer questions such as whether immigrants have become better integrated into Swedish society *over time* from the perspective of social exclusion risk. This is because we estimate interaction terms for the wave in the panel and sex, family type and nationality background, respectively.

First, even though men are worse off than women when it comes to the odds for social exclusion, there is a weak sign (at the 10% level) that their relative situation has improved *over time*. Moreover, compared to couples without children, there is clear evidence (at the 5% level) that the odds for exclusion for singles with children have increased *over time* and that the odds for exclusion for couples with children have decreased *over time*. Finally, there is no evidence that immigrants have become better integrated into Swedish society *over time*. However, we should be cautious with the findings for sex and nationality background since the inclusion of interaction terms for these explanatory variables did not significantly (at the 5% level) improve the model fit to data.

In Table 7, we have included interaction terms for two explanatory variables. To be more precise, we have augmented the baseline model (first model) with interaction terms for the wave in the panel and both sex and family type (second model), both sex and nationality background (third model), and both family type and nationality background (fourth model).

Here, the second and fourth models have a significantly (at the 5% level) better fit to data than the baseline model, whereas the third model is not significantly better at any conventional significance level. Therefore, focusing on the second and fourth models, there

<sup>3</sup> See Table 9 in the Appendix for regression models fitted to each wave in the panel. Of course, we cannot statistically compare parameter estimates from different models. On the other hand, there is no need to do so since we fit several regression models in this paper that are designed for cross-sectional data with a time dimension.

<sup>4</sup> This is because the first odds =  $\exp(-5.395) \times 0.996$  implies the probability =  $\text{odds}/(1 + \text{odds}) \approx 0.00450$ , and the second odds =  $\exp(-5.395) \times 0.996 \times 34.392$  implies the probability =  $\text{odds}/(1 + \text{odds}) \approx 0.13457$ .

<sup>5</sup> This is because the first odds =  $\exp(-5.395) \times 1.232 \times 4.811 \times 2.979$  implies the probability =  $\text{odds}/(1 + \text{odds}) \approx 0.07420$ , and the second odds =  $\exp(-5.395) \times 1.232 \times 4.811 \times 2.979 \times 34.392$  implies the probability =  $\text{odds}/(1 + \text{odds}) \approx 0.73379$ .

**Table 7** Regression models when interaction terms for two variables are included

Variable	Odds ratio	P-value	Odds ratio	P-value	Odds ratio	P-value	Odds ratio	P-value
Year 1979								
Years 1986–1987	<b>0.752</b>	0.004	0.884	0.317	<b>0.790</b>	0.025	0.824	0.101
Years 1994–1995	0.974	0.780	1.295	0.134	1.063	0.623	1.116	0.490
Years 2002–2003	0.996	0.973	1.456	0.107	1.129	0.446	1.156	0.496
Women								
Men	<b>1.604</b>	0.000	<b>2.052</b>	0.000	<b>2.156</b>	0.000	<b>1.608</b>	0.000
Time * Men			0.909	0.136	0.891	0.067		
55–64 Years								
25–34 Years	1.232	0.081	1.230	0.085	1.233	0.079	1.245	0.068
35–44 Years	1.210	0.107	1.219	0.096	1.208	0.111	1.232	0.080
45–54 Years	1.009	0.931	1.027	0.802	1.013	0.903	1.034	0.757
Couples without children								
Couples with children	<b>2.017</b>	0.000	<b>3.563</b>	0.000	<b>2.020</b>	0.000	<b>3.614</b>	0.000
Singles without children	<b>3.290</b>	0.000	<b>3.080</b>	0.000	<b>3.261</b>	0.000	<b>3.142</b>	0.000
Singles with children	<b>5.549</b>	0.000	<b>2.849</b>	0.010	<b>5.578</b>	0.000	<b>2.686</b>	0.014
Time * Couples with children			<b>0.793</b>	0.007		<b>0.786</b>	<b>0.786</b>	0.005
Time * Singles without children			1.020	0.828		1.012	1.012	0.895
Time * Singles with children			1.276	0.072		<b>1.304</b>	<b>1.304</b>	0.047
Swedes								
1st-Generation Swedes	1.412	0.055	<b>1.441</b>	0.043	1.242	0.645	1.263	0.622
Immigrants	<b>3.864</b>	0.000	<b>3.907</b>	0.000	<b>2.777</b>	0.000	<b>2.655</b>	0.000
Time * 1st-generation Swedes					1.049	0.753	1.050	0.749
Time * Immigrants					1.133	0.131	1.158	0.078

**Table 7** continued

Variable	Odds ratio	P-value	Odds ratio	P-value	Odds ratio	P-value
College						
University	1.184	0.333	1.170	0.370	1.166	0.379
High school	<b>1.510</b>	0.010	<b>1.473</b>	0.016	<b>1.487</b>	0.013
Vocational school	<b>1.566</b>	0.002	<b>1.547</b>	0.002	<b>1.568</b>	0.002
Compulsory school	<b>2.185</b>	0.000	<b>2.159</b>	0.000	<b>2.183</b>	0.000
Not completed education	<b>4.811</b>	0.000	<b>4.701</b>	0.001	<b>4.675</b>	0.001
Higher white collars						
Middle white collars	<b>1.504</b>	0.022	<b>1.503</b>	0.023	<b>1.500</b>	0.023
Lower white collars	<b>1.589</b>	0.018	<b>1.591</b>	0.019	<b>1.587</b>	0.019
Skilled blue collars	<b>2.982</b>	0.000	<b>2.982</b>	0.000	<b>2.953</b>	0.000
Unskilled blue collars	<b>2.979</b>	0.000	<b>3.021</b>	0.000	<b>2.985</b>	0.000
Self-employed	<b>1.945</b>	0.002	<b>1.988</b>	0.001	<b>1.946</b>	0.002
Farmers	<b>2.575</b>	0.003	<b>2.605</b>	0.003	<b>2.539</b>	0.004
Students	<b>3.798</b>	0.000	<b>3.837</b>	0.000	<b>3.838</b>	0.000
Others	<b>8.707</b>	0.000	<b>9.463</b>	0.000	<b>9.013</b>	0.000
Constant	exp(-5.395)		exp(-5.626)		exp(-5.457)	
Log-likelihood	-4,189.179		-4,176.712		-4,186.142	
Log-likelihood score			<b>24.934</b>	0.000	<b>25.838</b>	0.108

Note Significant parameters at the 5% level are in bold. The log-likelihood score is a test of whether the inclusion of more explanatory variables significantly improves the model fit. The log-likelihood score is a comparison with the first model that does not include any interaction terms

is clear evidence (at the 5% level) that the odds for social exclusion for singles with children have increased *over time* and that the odds for exclusion for couples with children have decreased *over time*, both compared to couples without children. Moreover, there is no evidence that immigrants have become better integrated into Swedish society *over time* from the perspective of social exclusion risk. Instead, there is a weak sign (at the 10% level) that integration has become worse.

Finally, in Table 8, we have augmented the baseline model (first model) with interaction terms for the wave in the panel and all three explanatory variables that we have a special focus on in this paper. That is, interaction terms for time and sex, time and family type, and time and nationality background.

Even though this model has a significantly (at the 5% level) better model fit to data than the baseline model, only one of the odds ratios for the interaction terms is significant at the 5% level. The finding that still holds is that the odds for social exclusion for couples with children have decreased *over time* compared to couples without children. Figures that are significant at the 10% level are that the odds for exclusion for singles with children have increased *over time* and that the odds for exclusion of immigrants have also increased *over time*, both compared to the reference cases.

Finally, that all results found above in this section are not driven by characteristics among men or women per se in the sample can be confirmed by estimating separate models for men and women.<sup>6</sup>

## 6 Conclusions

In this paper, we have examined the risk of social exclusion among the Swedish population from a longitudinal perspective. For this aim, we have used an unbalanced panel involving four waves from the years 1979, 1986–1987, 1994–1995 and 2002–2003, with the total number of respondents in the sample being 7,967. Further, we have identified a person as socially excluded when he or she suffers from at least two of the following six welfare problems: chronic unemployment, economic problems, health problems, experiences of threat or violence, crowded housing and lack of interpersonal relationships.

We have found weak signs that the situation for men compared to women concerning social exclusion risk has improved *over time*. However, the discrepancy between couples and singles with children regarding the same risk has increased *over time*. Thus, also keeping in mind that couples without children are least likely to be associated with exclusion, this calls for a policy that supports the existence and survival of the two-parent family. Finally, there was no evidence that immigrants have become better integrated into Swedish society *over time* from the perspective of exclusion risk. Instead, we have found weak signs that integration has become worse, which is also a negative finding for an ambitious welfare state like Sweden. We have fitted several specifications of a logistic regression model with random effects for panel data to the data set to be able make these conclusions.

We are aware of the fact that some of the probably most excluded groups in society, the homeless, are not represented in the data set. We think, however, that our analysis can give important insights into the increasing inequality between certain groups in Sweden *over time* and even if the homeless as a group are not represented in the data set, we have identified other groups to whom public policy should target in order to fight social exclusion.

<sup>6</sup> To be more precise, that the results are not driven by characteristics among men or women is clear since virtually the same odds ratios in the two regression models are significant. See Table 10 in the Appendix.

**Table 8** Regression model when interaction terms for three variables are included

Variable	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value
Year 1979				
Years 1986–1987	<b>0.752</b>	0.004	0.867	0.248
Years 1994–1995	0.974	0.780	1.233	0.231
Years 2002–2003	0.996	0.973	1.343	0.217
Women				
Men	<b>1.604</b>	0.000	<b>2.019</b>	0.000
Time * Men			0.915	0.166
55–64 Years				
25–34 Years	1.232	0.081	1.240	0.074
35–44 Years	1.210	0.107	1.227	0.086
45–54 Years	1.009	0.931	1.033	0.760
Couples without children				
Couples with children	<b>2.017</b>	0.000	<b>3.600</b>	0.000
Singles without children	<b>3.290</b>	0.000	<b>3.057</b>	0.000
Singles with children	<b>5.549</b>	0.000	<b>2.897</b>	0.009
Time * Couples with children			<b>0.788</b>	0.005
Time * Singles without children			1.021	0.817
Time * Singles with children			1.269	0.078
Swedes				
1st-Generation Swedes	1.412	0.055	1.264	0.621
Immigrants	<b>3.864</b>	0.000	<b>2.705</b>	0.000
Time * 1st-generation Swedes			1.050	0.748
Time * Immigrants			1.149	0.095
College				
University	1.184	0.333	1.165	0.383
High school	<b>1.510</b>	0.010	<b>1.468</b>	0.017
Vocational school	<b>1.566</b>	0.002	<b>1.549</b>	0.002
Compulsory school	<b>2.185</b>	0.000	<b>2.159</b>	0.000
Not completed education	<b>4.811</b>	0.000	<b>4.642</b>	0.001
Higher white collars				
Middle white collars	<b>1.504</b>	0.022	<b>1.505</b>	0.023
Lower white collars	<b>1.589</b>	0.018	<b>1.590</b>	0.019
Skilled blue collars	<b>2.982</b>	0.000	<b>2.978</b>	0.000
Unskilled blue collars	<b>2.979</b>	0.000	<b>3.029</b>	0.000
Self-employed	<b>1.945</b>	0.002	<b>1.974</b>	0.002
Farmers	<b>2.575</b>	0.003	<b>2.581</b>	0.003
Students	<b>3.798</b>	0.000	<b>3.882</b>	0.000
Others	<b>8.707</b>	0.000	<b>9.492</b>	0.000

**Table 8** continued

Variable	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value
Constant	$\exp(-5.395)$		$\exp(-5.592)$	
Log-likelihood	-4,189.179		-4,175.300	
Log-likelihood score			<b>27.758</b>	0.000

*Note* Significant parameters at the 5% level are in bold. The log-likelihood score is a test of whether the inclusion of more explanatory variables significantly improves the model fit. The log-likelihood score is a comparison with the first model that does not include any interaction terms

## Appendix

See Tables 9, 10.

**Table 9** Regression models for each wave in the panel

Variable	Year 1979		Years 1986–1987		Years 1994–1995		Years 2002–2003	
	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value
Women								
Men	<b>1.932</b>	0.000	<b>1.353</b>	0.027	<b>1.416</b>	0.002	<b>1.495</b>	0.001
55–64 Years								
25–34 Years	1.052	0.806	1.417	0.084	<b>1.453</b>	0.040	0.701	0.098
35–44 Years	0.970	0.887	1.076	0.722	<b>1.492</b>	0.026	1.140	0.511
45–54 Years	1.070	0.740	1.000	0.999	0.986	0.935	1.128	0.489
Couples without children								
Couples with children	<b>2.627</b>	0.000	<b>1.664</b>	0.003	<b>1.883</b>	0.000	1.317	0.138
Singles without children	<b>3.207</b>	0.000	<b>2.420</b>	0.000	<b>2.597</b>	0.000	<b>2.836</b>	0.000
Singles with children	<b>3.084</b>	0.000	<b>4.075</b>	0.000	<b>4.211</b>	0.000	<b>5.706</b>	0.000
Swedes								
1st-Generation Swedes	1.366	0.367	1.037	0.913	<b>1.589</b>	0.037	1.345	0.224
Immigrants	<b>2.696</b>	0.000	<b>2.571</b>	0.000	<b>2.917</b>	0.000	<b>3.429</b>	0.000
College								
University	0.939	0.869	1.019	0.959	1.117	0.658	<b>1.713</b>	0.039
High school	0.978	0.943	0.987	0.966	<b>1.842</b>	0.009	<b>1.669</b>	0.049
Vocational school	1.428	0.209	1.144	0.597	<b>1.822</b>	0.003	1.317	0.258
Compulsory school	<b>1.809</b>	0.035	1.541	0.090	<b>2.443</b>	0.000	1.599	0.080
Not completed education	2.745	0.051	2.372	0.080	<b>51.805</b>	0.000	-	-



**Table 9** continued

Variable	Year 1979		Years 1986–1987		Years 1994–1995		Years 2002–2003	
	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value
Higher white collars								
Middle white collars	1.253	0.505	1.974	0.103	1.283	0.336	1.675	0.065
Lower white collars	1.506	0.249	2.235	0.074	0.773	0.372	<b>2.820</b>	0.001
Skilled blue collars	<b>2.479</b>	0.008	<b>4.146</b>	0.001	1.569	0.092	<b>3.880</b>	0.000
Unskilled blue collars	<b>2.287</b>	0.014	<b>4.345</b>	0.000	<b>1.884</b>	0.015	<b>3.786</b>	0.000
Self-employed	2.014	0.063	<b>3.013</b>	0.022	0.920	0.791	<b>2.378</b>	0.013
Farmers	1.432	0.446	<b>5.947</b>	0.002	1.323	0.638	<b>4.269</b>	0.015
Students	1.864	0.210	<b>6.280</b>	0.000	<b>3.243</b>	0.000	<b>3.987</b>	0.000
Others	<b>5.851</b>	0.000	<b>9.011</b>	0.000	<b>4.656</b>	0.000	<b>95.632</b>	0.000
Constant	exp(−4.458)		exp(−4.711)		exp(−4.319)		exp(−4.647)	
Pseudo-R2	0.084		0.089		0.115		0.131	

*Note* Significant parameters at the 5% level are in bold. Standard errors are robust

**Table 10** Regression models for men and women

Variable	Men		Women	
	Odds ratio	<i>P</i> -value	Odds ratio	<i>P</i> -value
Year 1979				
Years 1986–1987	<b>0.609</b>	0.000	0.933	0.644
Years 1994–1995	0.797	0.080	1.150	0.344
Years 2002–2003	0.843	0.224	1.158	0.370
55–64 Years				
25–34 Years	1.013	0.935	<b>1.508</b>	0.026
35–44 Years	1.106	0.522	1.335	0.118
45–54 Years	0.940	0.667	1.104	0.538
Couples without children				
Couples with children	<b>2.394</b>	0.000	<b>1.564</b>	0.005
Singles without children	<b>3.561</b>	0.000	<b>3.042</b>	0.000
Singles with children	<b>2.040</b>	0.049	<b>6.299</b>	0.000
Swedes				
1st-Generation Swedes	1.395	0.181	1.453	0.150
Immigrants	<b>4.310</b>	0.000	<b>3.435</b>	0.000

**Table 10** continued

Variable	Men		Women	
	Odds ratio	P-value	Odds ratio	P-value
College				
University	1.232	0.381	1.099	0.712
High school	1.375	0.138	<b>1.863</b>	0.011
Vocational school	<b>1.864</b>	0.001	1.318	0.196
Compulsory school	<b>2.530</b>	0.000	<b>1.839</b>	0.007
Not completed education	<b>6.093</b>	0.001	2.414	0.319
Higher white collars				
Middle white collars	1.268	0.293	<b>1.995</b>	0.024
Lower white collars	<b>1.663</b>	0.045	1.774	0.083
Skilled blue collars	<b>2.323</b>	0.000	<b>4.482</b>	0.000
Unskilled blue collars	<b>2.348</b>	0.000	<b>4.210</b>	0.000
Self-employed	1.451	0.151	<b>3.385</b>	0.002
Farmers	2.106	0.051	<b>3.258</b>	0.050
Students	<b>2.382</b>	0.007	<b>6.146</b>	0.000
Others	<b>12.622</b>	0.000	<b>8.697</b>	0.000
Constant	exp(−4.689)		exp(−5.678)	

Note Significant parameters at the 5% level are in bold

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