Income Mobility Statistics in Sweden – Compilation and Measurement

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Preface

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Contents

Abstract

This paper presents the development of new statistics on intragenerational income mobility in Sweden, based on longitudinal data in administrative registers. The statistics, referred to as Total Population Income Mobility statistics (TPIM), cover the period 2000–2016 and are published annually. The income concepts used in the mobility statistics consist of individual disposable income during the entire period, 2000–2016, and equivalised disposable income during a shorter period, 2011–2016.

The aim of the paper is to give a description of the new longitudinal data source, as well as to present some results on income mobility in Sweden during the period 2000–2016. In doing so, we will relate the new data source to already existing sources of longitudinal data, in particular the EU-SILC, and look into how results differ depending on data source used.

Results show that overall mobility, measured as the proportion of people changing their position (deciles) in the distribution of individual disposable income over six-year time periods, is at the same level both at the beginning and at the end of the analysed period (2000–2016). There is considerable tail rigidity in the distribution. More than twice the share remain in the top and bottom deciles compared to both the middle of the distribution over a six-year period and over the longer period 2000–2016. Young people have a greater tendency than elderly people towards upward mobility; the same also applies to men compared with women, although this gap is closing.

With regard to mobility in equivalent disposable income, we use Shorrocks mobility index to analyse income mobility and the effect of mobility on longer-term income inequality. Young people have comparably high mobility, also in equivalent incomes. However, mobility among elderly people is driven by capital gains to a larger extent than among young people. Overall, capital gains drove approximately 30 percent of the mobility between 2011–2016; the corresponding figures for age cohorts 20–29 and 65 years and older were 4 percent and 55 percent respectively.

Mobility also has an equalising effect on longer-term incomes. The Gini coefficient decreases by approximately 10 percent when inequality in long-term income is set in relation to the annual average between 2011–2016. Previous research indicates that the reduction in inequality in equivalised disposable income, measured as the change in the Gini coefficient when extending the period of measurement from one to six years, stretches from 6.5 percent in the United States during the period 1983–1988 (Burkhauser & Poupore 1997) to 15.3 percent in Denmark during the period 1994–1999 (Gangl 2005). Aaberge et al (2002) found, for instance, that the reduction in Sweden during the period 1986–1990 was 9.7 percent.

Regarding persistent at-risk-of-poverty (PAROP), we have compared estimates from the TPIM and SILC. Although the SILC-based estimates for Sweden are in line with comparable Nordic countries, they are remarkably lower compared with estimates from the TPIM. Looking at PAROP as a share of the at-risk-of-poverty (AROP) indicator, the Swedish SILC seems to underestimate the share of people living in persistent at-risk-of-poverty.

1. Introduction

Traditionally, cross-sectional surveys have been the cornerstone of income distribution statistics at statistical offices. These surveys provide a basis for analysis of the distribution of income at a given point in time or development over time using repeated cycles of cross-sectional data.

However, the ability of cross-sectional surveys to provide insight into the development of income over time for individuals or households is limited. Furthermore, the standard period of reference in these surveys is 12 months, where annual income is the standard variable on which the analysis is based. However, annual income may be greatly affected by temporary events such as childbirth, studies, unemployment or house sales. Consequently, due to the volatile nature of annual income, conclusions based on cross-sectional data risk being misleading and somewhat arbitrary regarding, for instance, poverty analysis.

By using longitudinal data as a complement to the cross-sectional data, the analysis of, for example, poverty or inequality can be broadened. The longitudinal approach can shed light on matters, such as the extent of social mobility in a society, the possibility to raise one's income and in doing so leave poverty, and to what extent income mobility affects income inequality in the longer-term.

This paper presents the development of new statistics on income mobility at Statistics Sweden, based on longitudinal data from administrative registers. The statistics, referred to as Total Population Income Mobility statistics (TPIM), are the result of a project on income mobility conducted by Statistics Sweden in 2015, leading up to initial publication in 2016. The statistics are published annually, and up to this point, cover the years 2000–2016.

There are different dimensions of income mobility. One such dimension is the period of time over which mobility is measured. These statistics, and thus, this paper, focus on intragenerational mobility, that is, changes in income during the lifetime of individuals, in contrast to intergenerational mobility, which refers to income changes between generations of parents and children.

The rest of this paper is structured as follows. Section 2 describes the longitudinal data sources in Sweden, with a focus on TPIM. Section 3 looks into statistical methodology and indicators used in TPIM, while Section 4 presents some results on income mobility in Sweden in the period 2000–2016. In this section, we will also look into the EU-SILC indicator Persistent at-risk-of-poverty rate, and how results differ depending on the source it is based on.

2. Data sources

Statistics Sweden has a long tradition of using income data from administrative registers. The cross-sectional household income distribution survey has combined register data with survey data since its launch in the mid-1970s. The register data stretches back to the 1960s; at that time, it was comprised primarily of tax data. Over time, more administrative registers have been made available, such as tax-free transfers from the Social Insurance Agency, which has resulted in more comprehensive statistics.

However, the administrative data, which covers the whole population, have not been used very frequently for longitudinal analysis. Statistics Sweden has had two separate surveys on national income statistics. The income distribution survey (Household's finances), mentioned earlier, is a cross-sectional sample survey with approximately 17 000 households that combines administrative income data with self-reported questions about household composition, employment, child care, etc. The second survey is a cross-sectional total population survey based entirely on administrative registers, with emphasis on incomes and taxes on an individual basis.

As a complement to the above surveys, Statistics Sweden has produced a longitudinal database based on administrative data called LINDA (Longitudinal Individual Database). This database consists of a panel sample of individuals and their household members and is representative for the population in Sweden during the period 1960 to 2016. The database has been used as a source for longitudinal statistics or statistics on income mobility primarily by researchers and policy-makers, but not by Statistics Sweden.

However, since 2016, based on the total population income and tax register, Statistics Sweden has developed entirely new statistics on intragenerational income mobility – the Total Population Income Mobility statistics (TPIM). These statistics cover the period 2000-2016, and are published on an annual basis. Statistics using the household as an income-sharing unit are available for the period 2011-2016, while statistics covering the entire period use the individual as an income-sharing unit.

The European Union Statistics on Income and Living Conditions (EU-SILC) has a longitudinal approach, due to the four-year panel collected in the survey. The main longitudinal indicator in the EU-SILC is the Persistent at-risk-of-poverty rate (PAROP), which stretches over a period of four years. This indicator is also produced in TPIM, and in Section 4, we take a closer look at estimates of PAROP and how they compare, based on the different surveys.

The rest of this section presents, in more detail, the possible sources at Statistics Sweden for longitudinal analysis and statistics on income mobility. Table 1 shows an overview of the sources of income statistics based on micro data at Statistics Sweden.

Table 1. Overview of income surveys in Sweden

Survey	Available years	Type of survey	Sample size	Mode of data collection	Data collection unit
Household's Finances (HEK)	1975–2013	CS	17 000 ind.[1]	CATI, adm.	I/HH
Income and tax statistics	1968–2016	CS	TPS	Adm.	I
Longitudinal Individual Data Base, LINDA	1960–2016	L	3% + 20% foreign born	Adm.	I/F
Total Population Income Distribution Statistics, TRID	2011–2016	CS	TPS	Adm.	I/HH
Total Population Income Mobility Statistics, TPIM	2000–2016	L	TPS	Adm.	I/HH
EU-SILC	2003–2016[2]	CS/L	11 700 ind.[1]	CATI, adm.	I/HH

CS = Cross-sectional, L = Longitudinal, TPS = Total Population Survey, CATI = Computer Assisted Telephone Interview, Adm. = Administrative records, HH = Household, F = Family, I = Individual

2.1 Total Population Income Mobility

The Total Population Income Mobility Statistics is a totally register-based income statistics survey, both on an individual and household level. The statistics are available for the period 2000–2016 on an individual level and for the period 2011–2016, on a household level. These statistics are annual, which means that the period of coverage is extended by one year every year.

The survey, published for the first time in 2016, covers statistics on intra-generational income mobility. It is based entirely on administrative data, primarily from the Swedish Tax Agency and the Swedish Social Insurance Agency.

During the development of TPIM, a longitudinal register was created, containing all the variables necessary to produce the statistics. The register consists of all registered persons in Sweden during the period 1991–2016. Data regarding the current income concept is only available from the year 2000, while data on the older, previously used, income concept is available from 1991, hence the chosen starting point of the register. Data from different registers are linked on an individual level by using personal identity numbers. However, one particular problem when constructing a longitudinal register is that approximately 1000 people change their personal identity number every year. This is most often due to incorrect registration of birth date or sex in connection with immigration or birth. Consequently, a person may exist in a register with more than one personal identity number, or in different registers with different personal identity numbers. However, this is dealt with by applying already existing procedures when merging different datasets.

2.1.1 The income-sharing unit

The income-sharing unit in the statistics is both the individual and the household to which the individual belongs.

[1] A sample of individuals is used to reach households in both the HEK and the SILC, the "selected respondent" approach. The sample constitutes a network sample of households.

[2] Refers to income years, that is, the SILC 2017 refers to the income year 2016.

The population of individuals and households are both based on the Total Population Register (TPR) at Statistics Sweden. The population of individuals consists of those persons who, in accordance with legislation, ordinances and other regulations that apply to the population register, are registered in Sweden on 31 December each year.

In 2011, a dwelling register was established in Sweden, based on a decision by the Riksdag (Swedish Parliament) to move from a questionnaire-based census, which was the case in 1990, to a completely register-based population and housing census in 2011. To enable linking between dwelling units and residents, the Swedish Tax Agency is responsible for registering those who live in multi-dwelling buildings in dwelling units rather than in properties, as previously. Since 2011, the TPR receives identities based on dwelling unit, address, and property from the Swedish Tax Agency, which enables the production of register-based household statistics. A household refers to the person or persons who are registered in the same dwelling on 31 December each year.

The new dwelling register led to the cancellation of the household income distribution survey, Household's finances; it was replaced by a new cross-sectional total population household income distribution survey, TRID. TRID is available from 2011 and has been the official national household income distribution survey at Statistics Sweden since the income year of 2014.[3]

TPIM is to some extent the result of the development of TRID, as it enabled access to household composition on register for the entire population in income statistics. However, there are some challenges regarding quality when using registered persons and a household concept based on dwellings in the statistics.

One important aspect of quality is under- and overcoverage in the TPR. People who should be registered, but are not, lead to undercoverage, while people who are registered even though they should not be lead to overcoverage. Deficiencies in the reporting of births, deaths, immigration and emigration result in coverage errors. At regional level, deficiencies in the reporting of migration between different regions result in coverage problems.

Undercoverage due to immigrants not registering is likely to be very small in the TPR, regarding that there is a strong incentive for a person to actually register their residence. Anyone who is not registered lacks many rights, such as being unable to receive child allowance or open a bank account. However, persons who immigrate to Sweden are registered at the point in time when they are entered in the population register at the Swedish Tax Agency. In periods with high volumes of immigration, the administrative process tend to take longer, which leads to late

[3] The surveys Household's Finances and TRID were carried out in parallel for three years. This fact has been used in order to analyse the effect on the statistics when going from a sample survey to a register-based survey. The main differences between the surveys are the design (sample vs. register-based), the household definition (actual vs. formal) and the operational definition of disposable income. The overall picture of the income distribution shows that income inequality is somewhat smaller when based on TRID. This applies both to the Gini coefficient and to other distributional measures such as the percentile ratios P95/P05, P90/P10 and P80/P20 (Statistics Sweden, 2016).

notifications from the Swedish Tax Agency to the population register at Statistics Sweden.

Emigrants cause overcoverage if emigration is not reported. Past studies suggest that the Total Population Register contain a significant number of people who no longer live in the country. For this reason, this is considered to be the most serious deficiency in quality in the population register.

In the most recent population study at Statistics Sweden, a model was used to estimate the size of the overcoverage using a non-activity approach, where people who did not leave any marks in administrative registers were given a tag in a non-activity variable. The variable was used to estimate the size of the overcoverage. In the year 2000, the estimated overcoverage was 35 000 persons, or 0.4 percent of the population. This share has been rising and was 0.6 percent in 2010 and nearly 0.8 percent in the latest estimate for 2014.

Domestic migration contributes to both undercoverage and overcoverage at the regional level. Late notifications or failure to register migration within Sweden contributes to coverage deficiencies. There is no estimate available of how many persons are incorrectly registered. Students comprise a group that poses a particular problem, as they, to some extent, neglect to register a new address when leaving their family home to study at university.

The use of a formal household definition based on administrative registers also imposes some quality problems. Incorrect links to a dwelling, which can be due to an incorrectly reported dwelling number, affect both composition (household type and household status), and size, both with regard to the household to which a person actually belongs, but are not registered in, as well as the household in which they are registered but do not belong.

Furthermore, in a survey based on an interview, there is a possibility to collect information on the household composition and whether or not the household members actually have common board or housekeeping. When it comes to household composition based on administrative data, persons living as cohabitants pose a particular problem. This refers to persons who are not married or registered partners with each other, but who live together under marriage-like conditions. This is a common living arrangement in Sweden, especially among young people. Two people who are registered in the same dwelling and have one or more children in common (biological or adoptive children), are defined as cohabitants. To form cohabitants of persons without common children, a model is used based on the following criteria:

- persons registered in the same dwelling
- persons at least 18 years old
- persons are of the opposite sex
- the age difference between the persons is less than 15 years
- the persons are not closely related, and
- only one possible cohabitant couple can be formed within a household.

Studies have shown that this model gives the lowest percentage of incorrect classifications compared with the Labour Force Survey, which contains a question on the composition of the household (Statistics Sweden, 2014).

In order to reduce the effect of overcoverage in the statistics and to take account of the fact that the reference period of the income data is annual, the population of individuals and households are delimited as described below.

In statistics with an individual approach:

- Persons should be registered in the TPR both at the start and end of the income year.
- Persons should have a disposable income not equal to zero (negative income is allowed in the definition of disposable income in Swedish income statistics).

In statistics with a household approach:

- All adult persons in the household should be registered in TPR both at the start and end of the income year.
- The disposable income of the household should not be equal to zero.
- All persons in the household should be registered at a property (excluding some persons living in institutions and persons whose whereabouts are unknown).
- At least one person in the household must be 18 years or older.

This reduces the number of individuals by 3 percent and the number of households by 2.4 percent.

2.1.2 Income data and income definition

Income from administrative registers has been used in Sweden since the 1960s, as mentioned earlier. Initially, the administrative registers consisted of tax data. Over time, administrative registers containing other types of incomes, as well as tax data on a more detailed level, have been made available. Tax-free transfers were included in the income and tax register at Statistics Sweden in the 1980s. Table 2 shows an overview of the income concept used in national income distribution statistics and corresponding sources of administrative data.

Table 2. Overview of the income concept and corresponding administrative data in the Total Population Income Distribution Statistics in Sweden (TRID and TPIM)

Income concept	Administrative register
Income from employment	
Employee income	Tax register
Income from self-employment	Tax register
Property income including capital gains	Tax register
Transfers received	
Pensions including private pensions	Swedish Pensions Agency / National Government Employee Pensions Board / Tax register
Sickness benefits	Swedish Social Insurance Agency
Labour market assistance	Tax register
Family related allowances	Swedish Social Insurance Agency
Social assistance	National Board of Health and Welfare
Housing allowance	Swedish Social Insurance Agency
Child support	Swedish Social Insurance Agency / model based estimates
Study grants including study loans	Swedish Board of Student Finance
Transfers paid	
Taxes and social security contributions	Tax register
Private pension savings	Tax register
Study loans	Swedish Board of Student Finance
Child support	Swedish Social Insurance Agency / model based estimates

Students at universities in Sweden are eligible for student aid, of which study loans is a major part. Approximately 70 percent of the students eligible for study aid also take study loans (Swedish Board of Student Finance, 2017) and approximately 40 percent of the equivalised disposable income of students consists of study loans. Taking this into account, it is difficult to describe the economic situation of students in Sweden without including study loans.

In 2006, Statistics Sweden introduced a revised income concept. The differences compared to the previously used concept are that capital losses are included and deduction for private pension insurance is treated as a negative item. The revised income concept is used from 1991 in the sample survey Household's Finances and from the year 2000 in statistics covering the whole population (e.g. TPIM).

The main difference between the income concept used in Swedish income distribution statistics and the income concept used in the EU-SILC is the inclusion of capital gains in national statistics. However, a significant portion of the statistics are available even when capital gains are excluded.

Statistics Sweden uses a national equivalence scale in the calculations of equivalent disposable income. The scale is based on estimates made on the Swedish HBS and thus, are adapted to Swedish conditions. The scale assigns a value of 1 to the household head, 0.51 to the spouse/partner to the household head, 0.6 to other adults, 0.52 to the first child 0-19 years old, and 0.42 to other children 0–19 years old.

2.2 LINDA[4]

LINDA is a longitudinal database based on administrative data. The database consists of a large panel of individuals and their family members, which is representative for the population during the period 1960 to 2016. The panel consists of approximately 3 percent of the population, with an extra sample of foreign born persons consisting of 20 percent of all foreign born persons. Overall, the database covers approximately 1.6 million people, when family members are clustered to the sample person.

The income-sharing unit in LINDA is the family. Between 1968–1998, this is based on tax data and a concept used for tax purposes of cohabitants and married individuals. Between 1991–2016, an alternate family concept is available, based on persons registered at properties and mutual relationships. Both family concepts are based on administrative data and involve some quality issues concerning cohabitants with no common children, who are primarily coded as singles, that results in an underestimation of cohabitants. In addition to the family concept, a household concept from the Population and Housing Census, based on whether or not individuals reside together, is included during census years.

The database has been the major source for longitudinal studies in Sweden and has been the primary source among researchers and policy makers interested in income mobility analysis.

[4] See Edin and Fredriksson (2000) for a more detailed presentation of the database. Information is also available on Statistics Sweden's webpage, www.scb.se/le1900-en.

2.3 EU-SILC

Sweden has a long tradition of measuring living conditions, one of the most important surveys being the Swedish Living Conditions Surveys (LCS), which has been carried out on a yearly basis since 1975. The EU-SILC, the European equivalent of the LCS, was implemented in most EU countries in 2003 and 2004. This survey makes it possible to compare information on income, poverty, social exclusion, housing, work, education and health among different countries, both at household and individual level. In 2008, the Swedish LCS and SILC were partly integrated into a single survey, although with two separate output datasets.

SILC is a longitudinal survey and the current annual sample size in Sweden is 2 900 individuals or 11 900 individuals over a four-year period. The response rate is around 50 percent. The survey provides two types of yearly data, cross-sectional data referring to a certain time or period, and longitudinal data focusing on changes over the four-year panel period. SILC contains two types of variables, primary (collected every year) and secondary (collected less frequently on an ad-hoc basis) variables. Most income variables in the Swedish SILC are sourced from the Income and Tax register.

As already mentioned, one of the differences between SILC and national Swedish income statistics is the treatment of capital gains, which is normally included in the national statistics, but excluded in SILC. Another important disparity between the two statistical sources is the definition of households. In SILC, households are defined in accordance with the household concept as described in the Canberra Report (UNECE, 2011), where the focus is the sharing of incomes and costs. The information on who actually belongs to the household is based on information given during the interview with the respondent. In the register-based national income statistics, the household is based purely on register information.

Sweden is one of the SILC countries that uses data based on administrative registers on income, education and other data. Instead of sampling complete households, which is the case in many other SILC-countries, Sweden uses a sample of individuals (selected respondents), the selected respondent model (SR). In the case of split households, only the selected respondent is followed.

The two data sources also use different equivalence scales. The table below illustrates how needs are assumed to change as household size increases according to the different scales (the age of children is set in order to simplify the comparison). The example shows that overall consumption weights are lower according to the scale used in SILC, suggesting greater economies of scale than on the Swedish scale. The differences arise from the weights assigned to children and other persons, which are given greater weight according to the Swedish scale.

Table 3. Comparison between equivalence scales used in EU-SILC and Swedish national statistics

	SILC, modified OECD scale	Swedish equivalence scale
1 adult	1	1
1 adult, 1 child (<10 yrs)	1.3	1.52
1 adult, 2 children (<10 yrs)	1.6	1.94
2 adults	1.5	1.51
2 adults, 2 children (<10 yrs)	2.1	2.45
3 adults, 3 children (<10 yrs)	2.9	3.47

3. Methodology and concepts

There are many different dimensions of income mobility. One such dimension is the period of time over which mobility is measured. Individual income changes between different periods during the life time of a person is referred to as intragenerational mobility, while income changes between generations of parents and children is referred to as intergenerational mobility. The focus of this paper is on intragenerational mobility.

There are also different concepts of mobility. Jäntti and Jenkins (2015) classify income mobility into the following categories: positional change, individual income growth, reduction of longer-term inequality and income risk. In this paper, we will focus on positional change and the reduction of longer-term inequality as concepts of mobility. We will also look into the incidence of low income over time by using the Eurostat indicator Persistent at-risk-of-poverty rate.

3.1 Positional change

By ranking people by income, changes in income affect positional mobility only in so far as these changes alter each person's position relative to the position of others (Jäntti & Jenkins, 2015). In Section 4, we will use transition matrices and persistency in income groups (quintiles and deciles) to analyse the positional change in income.

By using a transition matrix, a simple measure of mobility built on trace has been proposed in Prais (1955) and Bibby (1975), the Prais-Bibby index,

$$M_T = 1 - \frac{(trace\ \boldsymbol{P})}{n}$$

where **P** is a matrix of dimension n*n and each cell p_{ij} is the proportion of individuals who move from income group i to income group j over a period years. The elements on the diagonal (pii) represent stayers and the off-diagonal terms pij represent movers. If everyone stays in the same class, the trace of matrix P is n. The trace is less than n if some individuals move away from their income group. The Prais-Bibby index is a form of immobility ratio or immobility mean, which summarises the positional change by capturing the clustering on the leading diagonal of the transition matrix. In this paper, we will use the term Immobility Mean (IM), which equals 100 if complete immobility prevails (i.e., the percentage of all persons who retain the same rank between two periods), where an index of mobility can be calculated as 100-IM.

3.2 Reduction of longer-term inequality

In order to analyse mobility in the form of reduction of inequality in longer-term incomes, we will use the Shorrocks measure of income rigidity (Shorrocks, 1978). Shorrocks conceptualised income mobility as the degree to which income equalisation occurs as the observation period is lengthened. In this case, mobility is the opposite of rigidity, hence mobility can be defined as M = 1 – R, where R is Shorrocks' rigidity measure. R can then be expressed as

$$R = \frac{G(t_{1,\dots,}t_m)}{\sum_{k=1}^{m} w_k G_k}, \text{ where } w_k = \frac{\bar{Y}_k}{\sum_{i=1}^{m} \bar{Y}_i}$$

where $G(t_{1,\dots,}t_m)$ is an inequality measure (in our case, the Gini coefficient) over a period of $t_{1,\dots,}t_m$ years, G_k the annual inequality estimate and w_k the weight of the annual inequality estimate for each year during the same period. The weight being

the ratio of the mean income in each year, $\bar{Y}_k$, to the mean income $\bar{Y}_i$ over period $t_1, \ldots, t_m$. The mobility measure takes a value between 0 and 1 (or alternatively 0 and 100 when expressed in percentage), where 0 means no mobility and 1 represents complete mobility.

It is possible to apply a wide range of inequality indices to Shorrocks' measure, such as the Theil index or, as in our case, the Gini coefficient. Our choice of the Gini coefficient as the inequality measure depends heavily on its widespread use, both as a measure of inequality in itself, and in combination with the Shorrocks measure of mobility. In mobility literature, Shorrocks' R is an established measure when it comes to analysing the effect of mobility on inequality in longer-term incomes, and is often used by both researchers and organisations. In this case, the widespread use of Shorrocks also affected our choice of measure, as it enables comparisons with other studies on the same topic.

However, the choice of inequality index affects the estimate of R. Shorrocks (1981) shows that the estimate of R relies on the choice of inequality index and that the Gini coefficient tends to show greater values of R than other inequality indices (e.g., the Theil index). This is due to the fact that in the long term, the accumulation of incomes will average out temporarily high and low incomes, which primarily affects the tails of the distribution. This, in combination with the relative insensitivity of the Gini coefficient to income transfers in the top and bottom, results in the relative high values of R.

One other aspect of the Shorrocks measure is that it treats equalising and disequalising changes in essentially identical fashion. Consequently, neither the sign nor the relative magnitude of R convey any information on whether the mobility process (relative base year) is an equalising or a disequalising one (Fields, 2009).

3.3 Persistent at risk of poverty

One of the Europe 2020 headline indicators, and a commonly used indicator on relative income poverty or social exclusion is the at-risk-of-poverty (AROP) indicator. According to this indicator, a person is at risk of poverty if they live in a household with an equivalised disposable income less than 60 percent of the median income in the country.

Research has shown that a temporary drop in income resulting in income poverty is less harmful than a persistent low income. There are several reasons why a person or a household could be at temporary risk of poverty due to temporary factors such as short-term unemployment or taking time off work for studies, travel or taking care of a family member.

It is sometimes possible for a household to handle a short-term drop in income by cutting down on costs or taking loans (UNECE, 2017, s. 89). From a policy perspective, it is therefore important to identify the group of households with persistent low income.

There are several measures on persistent poverty, the most well-known being the persistent at-risk-of-poverty (PAROP) indicator, which has been published by Eurostat since 2008. The persistent at-risk-of-poverty rate is defined as the share of the population living in households with an equivalised income less than the at-risk-of-poverty threshold in the current year and at least two out of the three preceding years. (UNECE, 2017)

Why four years? The indicator was developed by Eurostat and is based on the EU-SILC, where the available data is dependent on the panel duration, which is currently four years. Some researchers have studied persistent at-risk-of-poverty over a period of five years (Jonsson, 2010), and the possible extension of the SILC panel from four to six years would give the opportunity to study persistent at-risk-of-poverty over a period of six years. From a register perspective, there is, in theory, no upper limit of the possible duration period in years to calculate the indicator. However, there are several problems linked to using a longer period, such as the fact that not all individuals would be included during all years.

4. Results

4.1 Individual perspective

In this section, mobility will be measured as positional movement in the income distribution between different periods. As stated in Section 2, disposable income covering the whole population is only available at an individual level for the entire period, 2000–2016. Individual disposable income is, among other things, suited for analysing aspects of gender equality.

Table 4 shows a transition matrix of income mobility between the 2000 and 2016. The bold diagonal marks the proportion of people who were in the same decile in 2016 as in 2000 (movements in the distribution between the start and the end year are not considered here). An often-displayed pattern in mobility statistics is tail rigidity, in which people in the tails of the distribution to a higher level remain in their initial income group, whereas people in the middle of the distribution are more mobile. To a certain degree, this is due to the fact that distribution of income tends to be more compact in the middle than at the top and the bottom, which results in people in the middle of the distribution needing to move a shorter distance in order to change position. Nearly four tenths of the people who were in decile 10 at the start of the period remain in the same decile 16 years later, while two tenths have moved to the lower half of the distribution. People in decile 1 are more mobile; where three tenths remain in the initial group while 33 percent have moved to the upper half of the distribution.

Table 4. Transition matrix, all persons aged 20– , 2000–2016

Decile in 2000	Decile in 2016									
	1	2	3	4	5	6	7	8	9	10
Decile 1	**31.1**	12.5	8.0	7.1	8.2	7.4	6.8	6.5	6.3	6.0
Decile 2	22.4	**19.9**	10.7	7.2	8.1	7.6	6.9	6.4	5.9	4.9
Decile 3	14.3	20.5	**15.6**	8.9	9.5	8.5	7.2	6.1	5.1	4.2
Decile 4	9.8	14.4	15.5	**11.1**	12.6	11.5	9.1	7.0	5.2	4.0
Decile 5	6.4	11.4	13.2	12.2	**13.0**	13.8	11.4	8.5	5.9	4.1
Decile 6	4.5	8.0	11.8	12.3	11.8	**14.3**	13.7	10.9	7.7	4.9
Decile 7	3.5	5.4	10.2	12.6	10.6	12.5	**14.8**	13.8	10.3	6.4
Decile 8	2.8	3.5	7.5	13.2	10.2	9.9	13.1	**16.1**	14.6	9.1
Decile 9	2.5	2.4	4.5	10.1	9.8	8.5	9.9	14.7	**20.6**	16.9
Decile 10	2.7	1.9	2.9	5.3	6.2	6.1	7.0	9.9	18.3	**39.5**

The immobility mean for this transition matrix is 19.6, meaning that, on average, nearly two tenths of the population remain in their initial position at the end of the period. The immobility mean for the three subperiods 2000–2005, 2006–2011 and 2011–2016 are 33.2, 34.2 and 33.5 respectively, indicating that when measured as the proportion of people changing their position (decile) in the distribution, mobility is approximately the same when comparing the first and the last subperiods, with a slight decrease in the middle.[5] It is also possible to decompose the statistics into different subgroups, with one matrix per subgroup, and accordingly it is possible to calculate immobility means per subgroup. According to Statistic Sweden's Income report 2015 (Statistics Sweden 2017), based on

[5] Transition matrices for the three subperiods are available in Appendix B.

calculations of the immobility mean during the period 2000–2015 (average of moving six-year periods during the entire period), women had slightly higher mobility than men, immigrants who were men were more mobile than men born in Sweden, while the opposite was true among women immigrants. Younger people were more mobile than older people and people with upper secondary education as their highest level of education had higher mobility than people with lower levels of education. However, this method of measuring mobility (or immobility) does not provide information about the distance moved or the direction of movement.

Table 5 shows an example of how a rather straightforward application of transition matrices can be used to estimate the direction of mobility (and to some extent the distance covered) in different subgroups.[6] This is done by measuring the proportion of people moving from the lower half (decile 1–5) of the distribution to the upper half (decile 6–10) and vice versa. We apply this to the three previously mentioned subperiods to be able to analyse changes over time. The overall trend seems to be a slight decrease in both upward and downward mobility. Men have both higher upward as well as downward mobility than women, although the trend seems to show a closing gap between men and women. Men have the highest upward pressure in their twenties, while among women, this is the case in the ages 30–49 years. Among both men and women, the highest downward pressure occurs during the years after retirement.

The differences between immigrants and people born in Sweden diminish over the period of measurement. However, there are large discrepancies depending on the region of birth. People born in other Nordic countries show a low tendency of upward mobility and fairly high downward mobility, while people born in Africa (a continent with relatively high levels of migration to Sweden) experience a rather high tendency of upward mobility.[7] Unsurprisingly, education seems to be an important factor in the ability to move up in the distribution, as well as in maintaining the position in the upper half.

An important aspect to take into account when analysing trends over time and when looking at different subgroups is demographical changes in society. Appendix A shows some statistics on this topic for the years 2000 and 2016.

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[6] There are different ways of capturing the distance and direction of movement. The Bartholomew index (Bartholomew (1973), for instance, expresses mobility in terms of average income boundaries crossed over from year t (initial year) to year t+s (destination year, where s ≥ 1) as

$$M_B = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n}|i-j|\boldsymbol{p}_{ij}$$

where $\mathbf{p}$ is a matrix of dimension n*n where each cell p_{ij} is the proportion of individuals who move from income group i to income group j over a period years.

[7] In the case of people born in other Nordic countries, this might, to some extent, be due to data quality issues. A not uncommon phenomena in the border regions is that people born in other Nordic countries reside in Sweden, while still working in their home country. This results in lack of information about the income of these individuals in administrative registers, as these commuters pay their taxes where they work. An ongoing project is looking at the possibility of exchanging income data between the Nordic countries in order to enhance the quality of statistics.

Table 5. Upward and downward mobility by gender, age, country of birth and level of education

	Upward mobility (%)*			Downward mobility (%)*		
Cohort	2000/2005	2006/2011	2011/2016	2000/2005	2006/2011	2011/2016
All persons 20– years	**21.7**	**21.5**	**20.7**	**21.7**	**21.5**	**20.7**
Men	27.4	25.2	23.6	26.0	24.7	22.9
20–29 years	47.2	48.5	46.0	14.3	13.0	12.4
30–49 years	35.4	32.6	30.7	12.4	12.0	12.0
50–64 years	20.5	17.2	16.7	23.6	25.4	24.4
65–79 years	5.0	4.6	5.0	44.0	49.2	45.9
80– years	4.4	4.0	4.1	34.2	41.5	36.7
Born in Sweden	28.2	26.1	23.7	18.1	19.2	19.2
Foreign born	23.5	22.0	23.7	26.4	24.6	21.3
Nordic countries excl. Sweden	17.3	12.6	11.6	24.1	27.8	26.9
EU excl. Nordic countries	21.1	20.3	21.4	25.9	25.7	21.4
Europe excl. EU28	26.2	23.7	25.1	26.3	22.2	18.7
Africa	27.4	25.9	29.4	29.9	24.5	21.2
North America	27.6	26.3	26.0	25.5	21.1	19.0
South America	28.3	27.2	24.8	23.6	20.6	19.6
Asia	26.8	26.5	28.5	34.8	24.7	20.5
Oceania	44.5	41.0	44.3	19.7	18.0	15.6
Primary / lower secondary edu.	16.9	14.7	11.9	26.2	29.6	31.1
Upper secondary education	32.6	28.2	23.7	17.0	18.2	19.0
Post-secondary education	49.1	46.1	39.8	15.0	15.0	15.5
Women	18.3	19.2	18.8	18.8	19.7	19.4
20–29 years	30.7	32.2	33.1	31.2	28.5	27.1
30–49 years	26.5	29.3	28.9	20.2	16.5	14.4
50–64 years	12.6	11.5	11.0	26.7	27.7	26.0
65–79 years	4.4	4.3	4.3	58.6	61.4	56.4
80– years	3.8	4.6	4.5	53.5	54.0	51.4
Born in Sweden	18.3	19.5	18.8	25.5	24.2	22.8
Foreign born	18.0	17.1	18.6	29.3	27.6	23.9
Nordic countries excl. Sweden	12.9	11.7	10.6	27.6	28.4	28.2
EU excl. Nordic countries	16.2	16.7	17.6	29.4	26.4	23.2
Europe excl. EU28	19.5	17.3	19.0	32.6	27.1	21.9
Africa	31.8	23.7	26.3	26.0	27.0	21.8
North America	22.9	22.3	24.0	28.7	24.4	21.5
South America	23.4	21.1	21.7	26.4	26.2	22.1
Asia	23.0	20.9	22.6	33.8	29.0	22.4
Oceania	30.2	31.9	27.3	21.8	23.1	19.0
Primary / lower secondary edu.	10.8	9.2	8.4	39.0	43.9	43.6
Upper secondary education	18.7	18.1	15.7	28.2	27.2	27.1
Post-secondary education	37.4	37.9	34.1	18.5	17.8	17.4

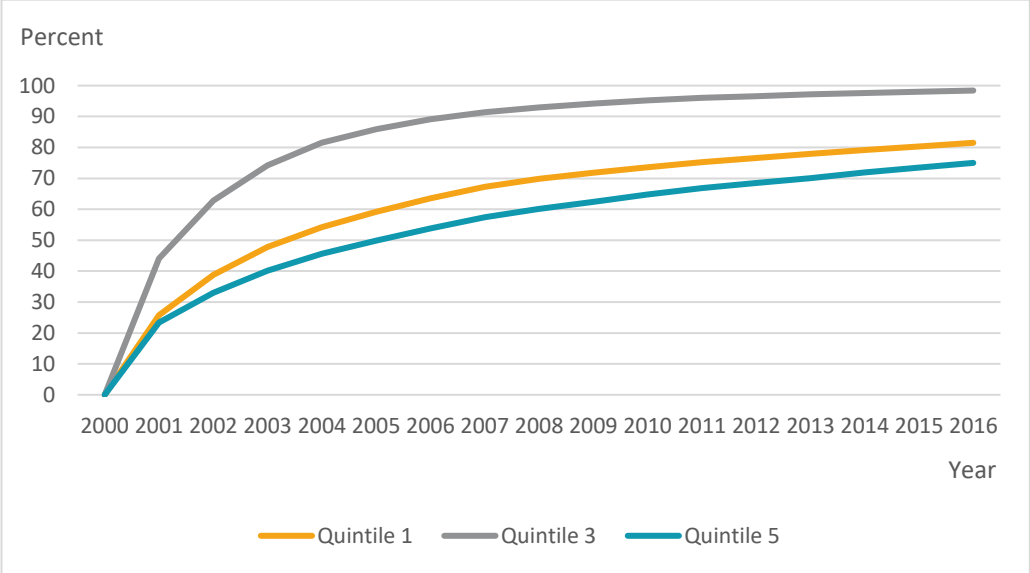
* The proportion of people moving from the lower half (decile 1–5) of the distribution to the upper half (decile 6–10) and vice versa.

As seen in the demographical statistics, Sweden experienced a large population increase in the period 2000–2016; over 1 million people or a 12.5 percent increase. Migration (net) contributed approximately 870 000 persons. Asia, Africa and European countries, excluding the Nordic countries, account for a large part of immigration to Sweden. The proportion of people who have reached retirement

age has increased by 2.6 percentage points, and constitutes nearly two tenths of the population, while the age cohorts 0–19 and 20–64 years old have seen their share of the population shrink. The overall level of education has increased during the period. For instance, the proportion of people 20–74 years old with post-secondary education as their highest level of education was 39 percent in 2016, compared to 28 percent in 2000.

An alternative way of analysing income mobility is to measure the proportion of people who leave their initial income group over a period of time. Figure 1 shows the rate at which people who are in quintile 1, 3 and 5 in 2000 change income group over the years up until 2016. Already after one year, a large proportion had left their initial income group. After that, the proportion continued to increase, but at a slower pace. People in the highest quintile are least prone to leave their position, while the opposite is true among people in the middle quintile. After five years, 50 percent of the people who were in quintile 5 in 2000 had changed group, while the corresponding figure among people in quintile 3 was 86 percent.

Figure 1. The proportion of people who leave their initial income group, 2000–2016

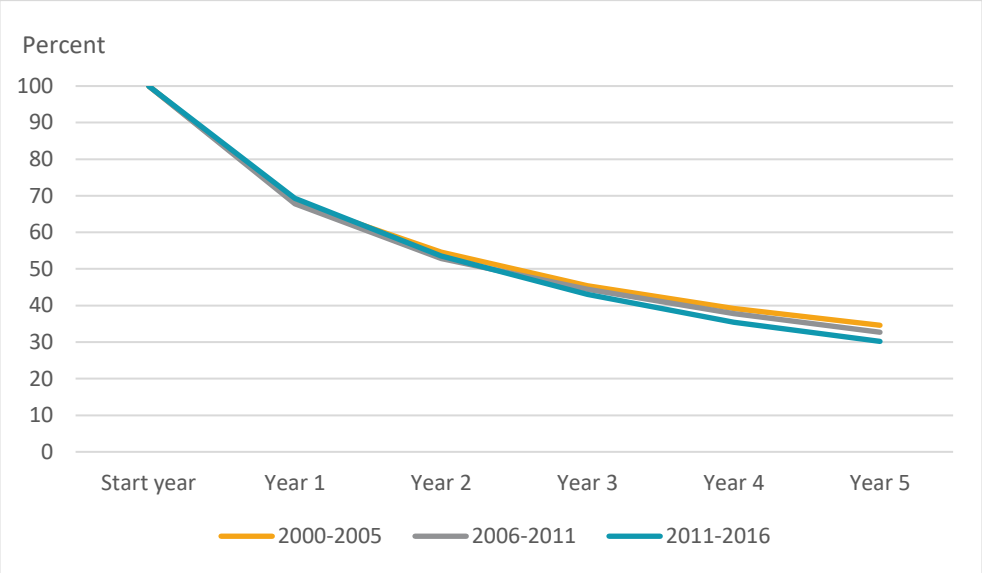


By turning Figure 1 upside down, one can focus on the stayers instead of the movers. People with persistently low income are often of extra interest, both from an individual perspective regarding the often economically difficult situation these people face, and from a societal perspective. From a policy perspective, it is of interest to study whether the proportion of people with persistently low income increases or decreases over time and which groups are at greatest risk of experiencing low income on a long-term basis.

As seen in Figure 2, there are only small differences in persistency between the different subperiods, especially during the first years following the start year. However, it seems that the persistency over a six-year period has decreased slightly since the beginning of the twenty-first century.

Table 6 displays the persistency in decile 1 among different subgroups in the most recent subperiod, 2011–2016, as well as the composition of decile 1 in 2011 and 2016 (when the population is held constant).

Figure 2. Persistency in decile 1, proportion of people who remain in their initial income group, 2000–2005, 2006–2011 and 2011–2016



Overall, 30 percent of the population remain in decile 1 throughout the entire period. Women, immigrants, elderly and people with a low level of education are at greater risk of experiencing persistently low income. Among the groups listed, women, immigrants and people with low level of education also are overrepresented in decile 1 in 2011 compared to the overall population. These groups are therefore characterised by overrepresentation in decile 1, combined with a high degree of low income on a long-term basis. However, due to movements within the distribution, immigrants, in fact, constitute a lower proportion of the total population in decile 1 in 2016 than in 2011.

Table 6. Composition of the population by subgroup, decile 1 in 2011 and 2016 and persistency in decile 1 in the period 2011–2016

	Proportion of population (%)			
	Year 2011		Year 2016	
Cohort	All persons	Persons in decile 1	Persons in decile 1	Proportion (%) in decile 1 2011–2016
All persons	**100**	**100**	**100**	**30.2**
Men	49.2	43.3	38.6	24.8
Women	50.8	56.7	61.4	34.1
Born in Sweden	84.4	71.7	73.9	29.0
Foreign born	15.6	28.3	26.1	33.2
20–29 years	17.3	42.0	22.3	15.3
30–49 years	36.2	24.6	24.0	26.6
50–64 years	25.4	16.2	22.6	40.2
65–79 years	17.2	12.8	25.2	62.2
80– years	3.9	4.4	6.0	51.8
Primary / lower secondary edu.	18.7	26.8	33.0	42.5
Upper secondary education	46.0	42.4	43.1	26.6
Post-secondary education	34.3	27.8	20.8	21.2

4.2 Household perspective

In this section, mobility in equivalised disposable income will be analysed. Mobility will be measured using the Shorrocks mobility index, which, in addition to letting us analyse the mobility between different groups, also gives us the opportunity to analyse the effect of income mobility in longer-term income inequality. As in the previous section, we will look deeper into the concept of persistently low income, this time by using the Eurostat indicator Persistent at-risk-of-poverty (PAROP).

4.2.1 Reduction of longer-term inequality

By using the Shorrocks mobility index, mobility estimates for different subgroups can be calculated, where the reduction in longer-term income inequality in relation to annual income inequality is interpreted as mobility.

Table 7 shows the relative reduction in income inequality among different subgroups as the period of measurement is extended from one to six years. As already shown, young people have comparably high mobility, while there are relatively small differences between the other age cohorts. Women, both single and with children, have more volatile incomes than men, and immigrants are less mobile than people who are born in Sweden. One interesting aspect is that the effect of capital gains differs significantly between groups. Capital gains drive approximately 30 percent of overall mobility between 2011–2016. The incomes of elderly people are fairly immobile when capital gains are ignored, while the opposite is the case among young people. This is not surprising, as young people own capital to a lesser extent. The effect of capital gains on the mobility of the elderly is probably due to realisation of property as they sell their houses and move to smaller (and cheaper) accommodation.

If we look at different types of households, relatively high mobility among single women with children only depends on capital gains to a small extent. This may, instead, be the result of going back and forth between work and parental leave and a shift from wage to social transfers, such as parental allowance, as the main source of income for some periods of time.

Table 7. Income mobility 2011–2016, Shorrocks mobility index (%)

Cohort	Including capital gains	Excluding capital gains	Contribution to mobility from capital gains (%)*
All persons aged 20–	10.8	7.5	30.6
Women living alone	13.0	8.7	33.1
Men living alone	11.6	8.8	24.1
Single women with children	14.1	13.3	5.7
Single men with children	12.8	11.1	13.3
Cohabiting without children	10.8	6.1	43.5
Cohabiting with children	9.9	8.0	19.2
20–29 years	19.5	18.7	4.1
30–49 years	10.0	7.7	23.0
50–64 years	9.6	6.0	37.5
65–79 years	9.7	4.2	56.7
80– years	11.9	5.3	55.5
Born in Sweden	11.2	7.7	31.3
Foreign born	9.8	7.9	19.4

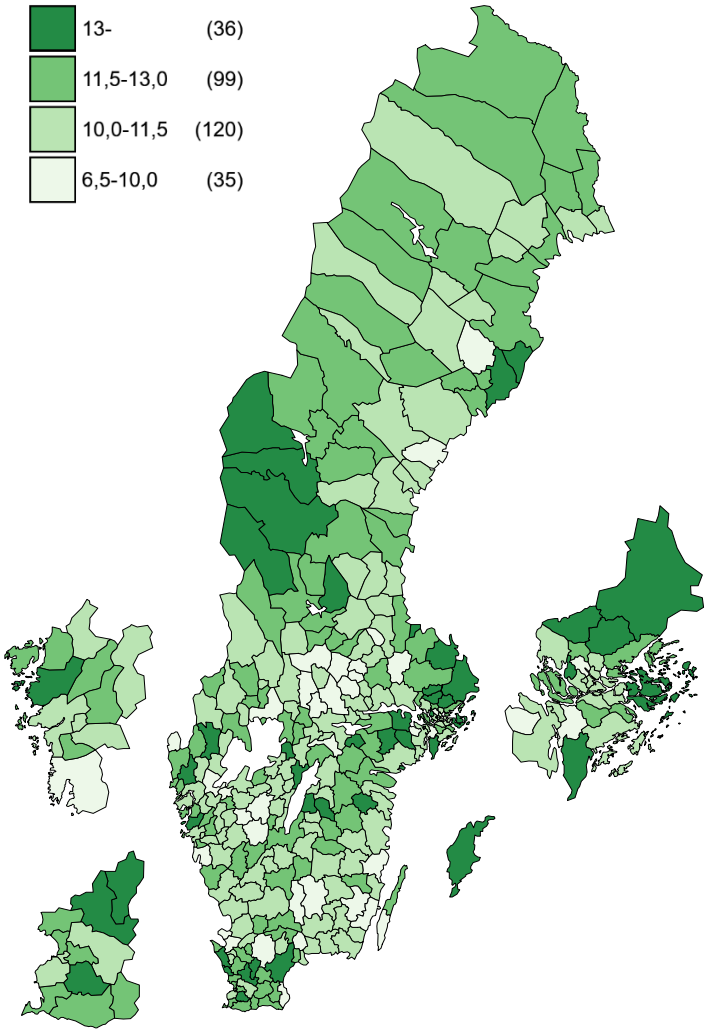
* Derived as 100 – (Excluding capital gains/Including capital gains)

Since TPIM covers the whole population, we are able to carry out regional analysis of income mobility. Figure 3 shows the mobility in Sweden's 290 municipalities for the period 2011–2016, measured using Shorrocks mobility index. Darker colours represent a higher degree of mobility.

As shown, mobility is higher in urban areas surrounding Stockholm, Gothenburg and Malmö. The highest degree of mobility, 15.9, is in Vallentuna municipality, which lies in the Stockholm region, followed by Åre, a classical winter sports municipality in northern Sweden. Overall, the picture of regional mobility in Sweden is fairly scattered, making it difficult to come to any significant conclusions. However, these figures on a regional level, are also available for subgroups, such as type of households, region of birth and age, which make it possible to refine the analysis.

Figure 3. Shorrocks mobility index by municipality, 2011–2016

The three excerpts on the sides display the counties (and municipalities) that include the three largest cities in Sweden: Stockholm (east), Gothenburg (southwest) and Malmö (south). Sweden's two largest islands, Gotland and Öland, are located off the southeast coast.



Instead of looking at different subgroups, we now focus analysis on overall inequality and the impact of mobility on inequality in longer-term incomes. Figure 4 shows the effect of income mobility on inequality when the period of measurement is extended from one to six years, measured as Shorrocks R. As shown, income mobility lowered longer-term inequality by approximately 11 percent in the period 2011–2016, and capital gains contributed approximately 30 percent to overall reduction.

Figure 4. The effect of income mobility on income inequality when the period of measurement is extended, Shorrocks R (%), 2011–2016

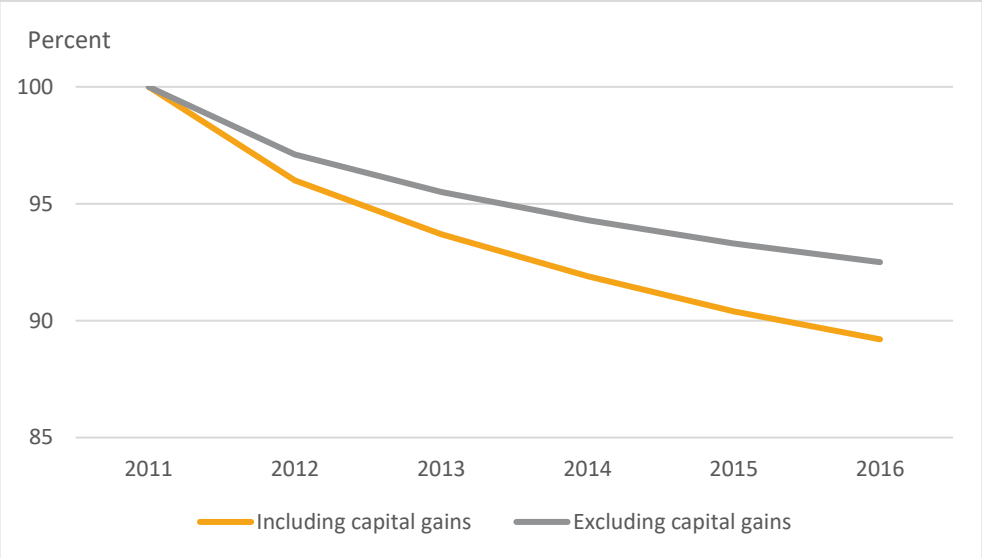


Table 8 gives a more detailed look at the change in income inequality when the period of measurement is extended. The first part of the table shows annual inequality, followed by the average of these years (A) and the long-term estimates (B). The Gini coefficient decreases by approximately 10 percent over a six-year period (B relative A) and the difference between P90 and P10 is reduced by nearly 6 percent. Previous research indicates that the reduction in inequality in equivalised disposable income, measured as the change in the Gini coefficient when extending the period of measurement from one to six years, stretches from 6.5 percent in United States in the period 1983–1988 (Burkhauser & Poupore 1997) to 15.3 percent in Denmark in the period 1994–1999 (Gangl 2005). Aaberge et al (2002) found, for instance, that the reduction in Sweden in the period 1986–1990 was 9.7 percent.

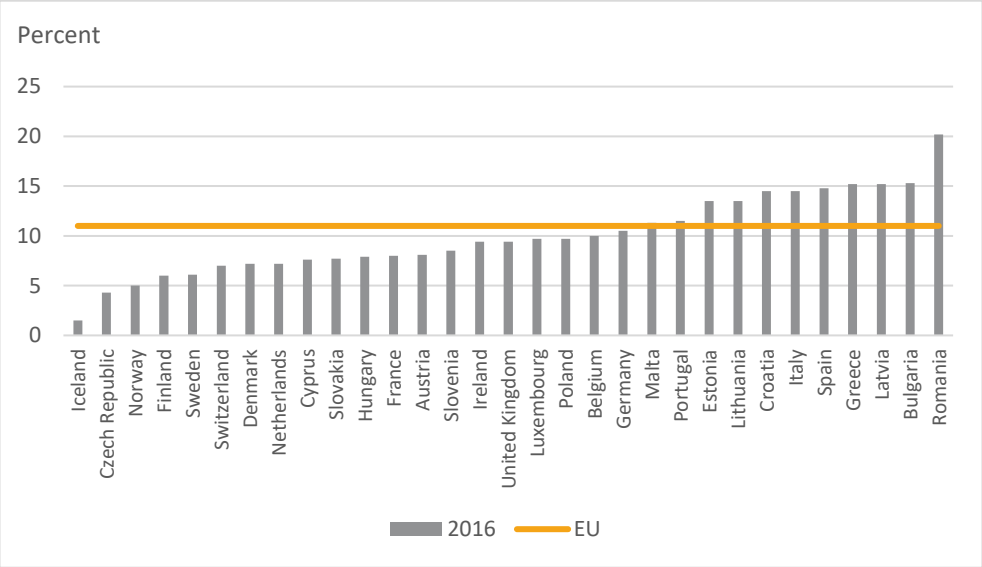
Table 8. The effect of income mobility on income inequality, 2011–2016

Year/period	P90/P50	P10/P50	P90/P10	Gini
2011	1.72	0.55	3.14	0.290
2012	1.73	0.55	3.12	0.286
2013	1.74	0.56	3.12	0.289
2014	1.77	0.55	3.20	0.301
2015	1.80	0.55	3.27	0.316
2016	1.79	0.55	3.22	0.320
Annual average 2011–2016 (A)	1.76	0.55	3.18	0.300
Long-term income 2011–2016 (B)	1.71	0.57	2.99	0.269
Difference (A-B)/B*100 (%)	-2.5	3.6	-5.9	-10.4

4.2.2 Persistent at risk of poverty

Another complementing way of trying to measure poverty dynamics is the persistent at-risk-of-poverty (PAROP) measure as described in 3.3. Based on data from the EU-SILC, Eurostat has been publishing this indicator since 2007 (income reference year 2006). Sweden is among the countries with low PAROP rates, 6 percent compared to the European average of 11 percent.

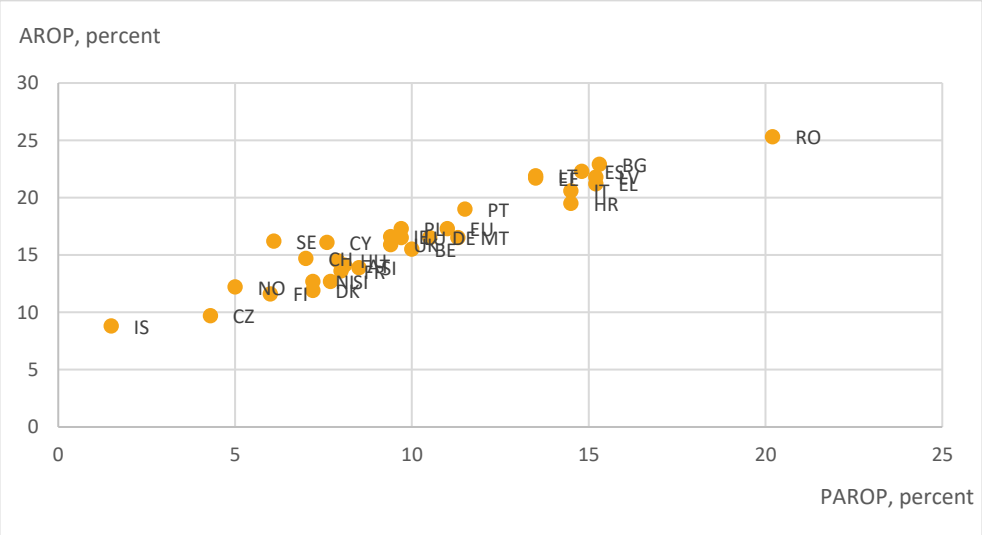
Figure 5. Persistent at-risk-of-poverty rate, EU countries and Iceland, Norway and Switzerland, SILC 2016 (income reference year 2015)



Source: Eurostat SILC Database, ilc_li21

Jenkins and Van Kerm (2014) have shown that there is normally a near to linear relationship between the persistent at-risk-of-poverty indicator and the at-risk-of-poverty indicator, that is, the higher the at-risk-of-poverty rate, the higher the persistent at-risk-of poverty rate.

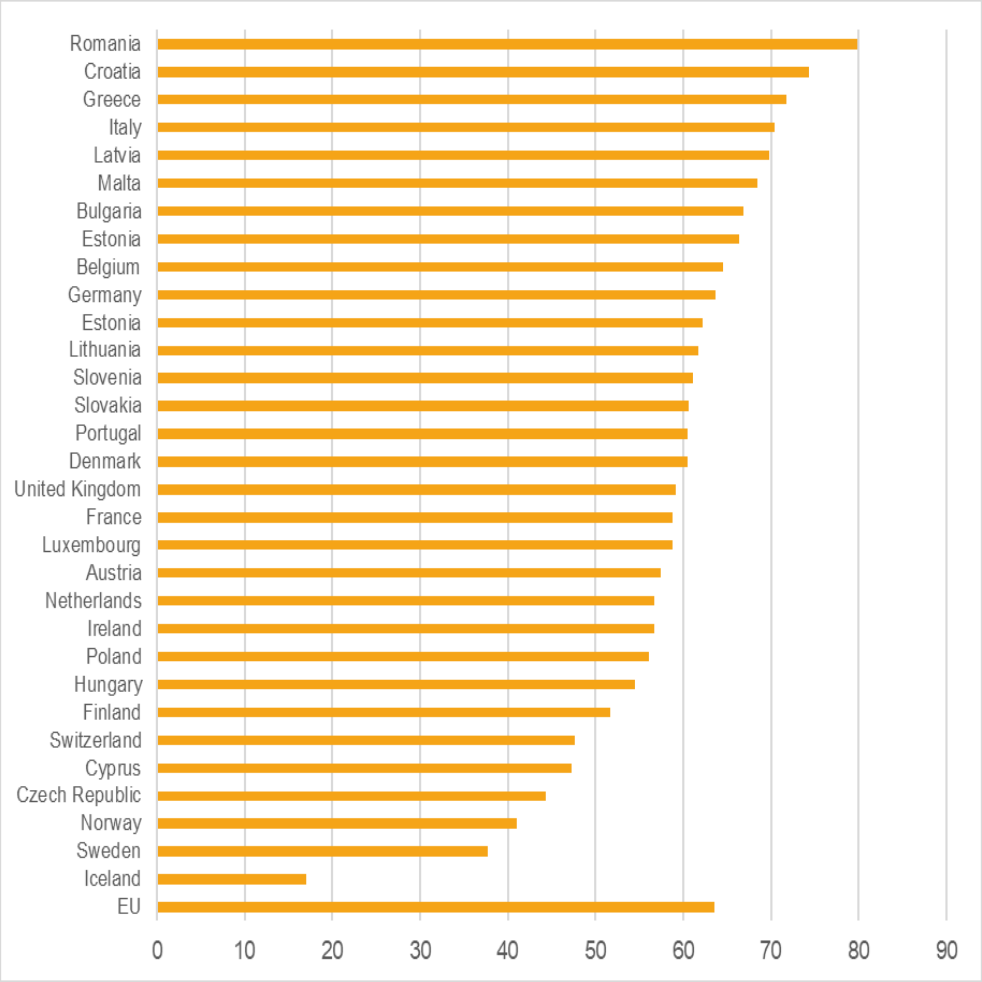
Figure 6. Relationship between persistent and current at-risk-of-poverty rates, EU countries and Iceland, Norway and Switzerland, SILC 2016 (income reference year 2015)



Source: Eurostat SILC Database, ilc_li21, ilc_li02

In a comparison of the Swedish AROP of 16 percent to the EU average of 17 percent, one might also expect a PAROP figure close to the EU average. However, the SILC-based PAROP, although more or less in line with comparable Nordic countries, is lower than expected.

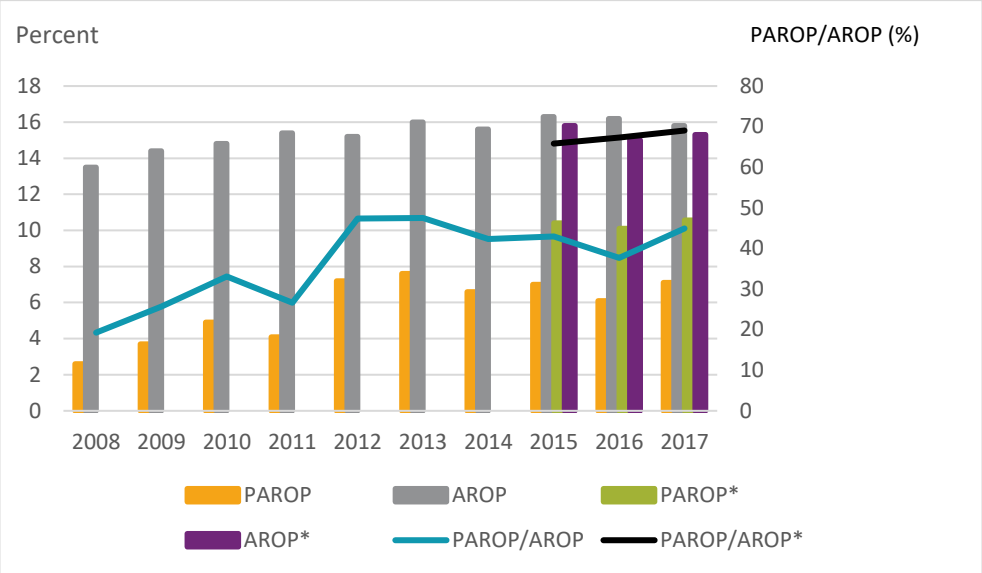
Figure 7. PAROP as share of AROP, EU countries and Iceland, Norway and Switzerland, SILC 2016 (income reference year 2015)



Source: Eurostat SILC Database, ilc_li21

With regard to PAROP as a share of AROP (see Figure 7 above), the estimate for Sweden is 38 percent, compared to the EU average of 64 percent. There may be various reasons for this, such as country differences in the development of the current poverty rate and different poverty entry and exit rates. There may also be a problem with attrition in the panels. Jenkins and Van Kerm (2017) have identified two main problems related to attrition in SILC panels. The first problem is the fact that the sample size used to calculate PAROP is smaller than the sample size in the first wave, which will lead to larger standard errors and wider confidence intervals. The second problem is the possible bias due to non-random attrition in the panel.

Figure 8. At-risk-of-poverty rate, persistent at-risk-of-poverty rate and PAROP as share of AROP, 2008–2017, SILC years



Sources: Estimates based on SILC (Eurostat SILC Database, ilc_li21, ilc_li02) except those marked with an asterisk, which are based on TPIM (adjusted to SILC standard).

As described in Section 2 national Swedish income statistics are now completely based on register data. Taking into account the conceptual differences between SILC and register-based indicators, it is possible to produce comparable figures. As already mentioned, the cross-sectional SILC-based indicators, such as the AROP, are now in line with the register-based equivalents. However, in comparing PAROP from SILC with the register-based indicator and the people at persistent risk of poverty as a share of people at risk of poverty, it seems that the Swedish SILC underestimates PAROP.

Until 2015, the estimation procedure of the Swedish SILC did not use any auxiliary information and the estimator used only non-response adjusted design weights. From the survey year 2016, the cross-sectional estimation procedure uses auxiliary information in the calibration. This has reduced non-response bias for several important cross-sectional indicators, such as the AROP.[8] A similar approach will be developed for the longitudinal part of SILC, and will hopefully address some of the problems with bias in the panel. Any other methodological problems with the panel also need to be investigated.

We will conclude with a brief look at the length of the panel period in SILC, and how different lengths affect estimates of the persistent at-risk-of poverty rate. There is an ongoing discussion concerning a possible extension of the duration of the SILC panel from four to six years. Irrespective of any problems that may arise from an extended panel (in which attrition is an important factor), an extension would give an opportunity to study persistency over a longer period than is

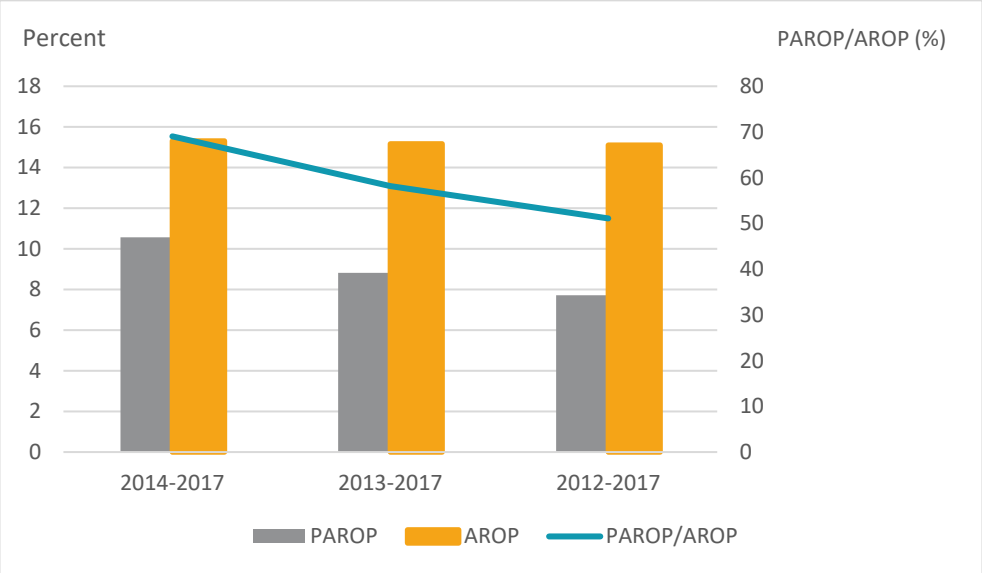
[8] New calibrated weights have been implemented in the cross-sectional SILC datasets from 2008 and onwards, as published in the SILC database: http://ec.europa.eu/eurostat/web/income-and-living-conditions/data/database

currently possible with the four-year panel.[9] As previously stated, the length of the PAROP indicator is determined primarily by the constraints imposed by the survey design. With a longer panel, the indicator could be calculated over five or six years, for instance, instead of four years.

By using TPIM, we can construct PAROP indicators consisting of five and six year panels to analyse the effect of an extended period on the rate of persistency.[10] Figure 9, below, shows estimates based on a regular four-year panel for the period 2014–2017, followed by estimates for five-year and six-year panels (all with 2017 as the base year).

As expected, the persistent at-risk-of poverty rate declines as the panel is extended, from 10.6 percent, to 8.8 percent in the five-year example, to 7.7 percent with a six-year panel. Consequently, the ratio of the persistent risk to the risk in the survey year is reduced from 69 percent in the regular panel to 51 percent in the six-year panel.

Figure 9. Proportion of population at risk of poverty and persistent at risk of poverty with extended length of periods, based on TPIM, SILC years



An interesting issue when looking at the effect of an extended period for the PAROP estimates is how this affects different subgroups. As shown in Figure 10 below, the greatest decline occurs among young adults, while the elderly are affected to a lesser extent. This is not surprising, as young people can increase their

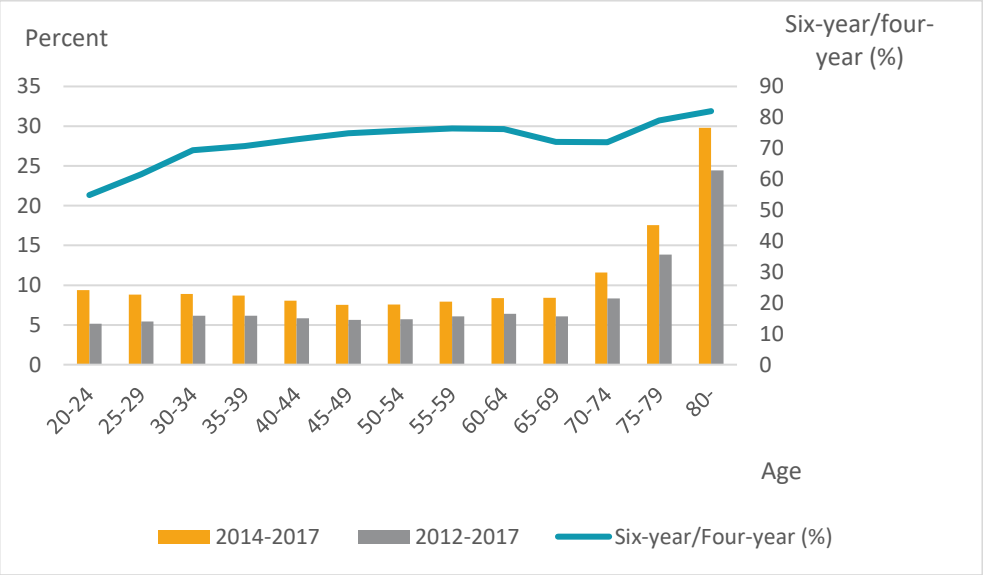
[9] See Jenkins and Van Kerm (2017) for a thorough review of the problems with attrition in longitudinal surveys.

[10] Here, PAROP with the extended panels is defined as:

- Five-year panel: equivalised disposable income below the at-risk-of-poverty threshold in the current year and at least three out of the preceding four years.
- Six-year panel: equivalised disposable income below the at-risk-of-poverty threshold in the current year and at least four out of the preceding five years.

income more easily as they establish themselves on the labour market. Opportunities for the elderly, on the other hand, to increase their income are limited; more than eight out of ten in the oldest age cohort who were at persistent risk of poverty in the regular four-year panel, remain at persistent risk of poverty in the six-year approach.

Figure 10. Persistent at-risk-of-poverty rate by length of panel periods, based on TPIM, SILC years



With regard to different types of households, there are no major differences in decline between single or cohabitant, or with or without children. Instead, the significant difference lies between different age cohorts of the same household type, following the same pattern as above.

5. Concluding remarks

The aim of this paper has been to give a description of the new totally register-based income mobility statistics in Sweden. While Statistics Sweden have been producing longitudinal data sources for a long time, the difference here is that the new statistics is based on the entire resident population, and that it includes formal households, based on a dwelling concept. The register-based approach enables analysis of specific groups, as well as at a regional level.

Both at national and international level, there is a growing interest for longitudinal analysis and questions such as to what degree poverty is transitory or persistent. The new longitudinal data source and the new income mobility statistics are a response to this growing interest. These statistics can be regarded as a complement to the regular cross-sectional income distribution statistics.

While these new statistics have a national approach regarding the income concept and equivalence scale, the EU-SILC remains the main source for internationally comparable statistics. The work done to reduce the non-response bias for cross-sectional indicators, such as the AROP in SILC, will continue with the longitudinal part. This will likely reduce the differences in PAROP estimates between the two sources.

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Appendix A

Table A1. Population demographics for Sweden, 2000 and 2016

	Number of persons		Proportion of total population	
Cohort	2000	2016	2000	2016
All persons	**8 882 792**	**9 995 153**	**100**	**100**
All persons aged 20-	**6 743 414**	**7 704 547**	**75.9**	**77.1**
Men	**4 392 753**	**5 013 347**	**49.5**	**50.2**
0-19 years	1 098 054	1 182 237	12.4	11.8
20-29 years	564 495	696 238	6.4	7.0
30-49 years	1 237 697	1 309 587	13.9	13.1
50-64 years	842 875	912 840	9.5	9.1
65-79 years	490 104	715 115	5.5	7.2
80- years	159 528	197 330	1.8	2.0
Born in Sweden	3 910 651	4 123 252	44.0	41.3
Foreign born	482 102	890 095	5.4	8.9
Nordic countries excl. Sweden	120 642	104 331	1.4	1.0
EU excl. Nordic countries	93 433	176 791	1.1	1.8
Europe excl. EU28	87 579	122 161	1.0	1.2
Africa	30 609	103 949	0.3	1.0
North America	13 142	18 897	0.1	0.2
South America	25 270	33 771	0.3	0.3
Asia	109 440	325 840	1.2	3.3
Oceania	1 861	3 567	0.0	0.0
Primary / lower secondary edu.	750 697	559 426	12.6	8.2
Upper secondary education	1 425 913	1 652 641	24.0	24.2
Post-secondary education	774 699	1 174 710	13.0	17.2
Women	**4 490 039**	**4 981 806**	**50.5**	**49.8**
0-19 years	1 041 324	1 108 369	11.7	11.1
20-29 years	544 385	655 628	6.1	6.6
30-49 years	1 190 324	1 255 713	13.4	12.6
50-64 years	832 751	897 684	9.4	9.0
65-79 years	588 221	754 848	6.6	7.6
80- years	293 034	309 564	3.3	3.1
Born in Sweden	3 964 523	4 087 404	44.6	40.9
Foreign born	525 516	894 402	5.9	8.9
Nordic countries excl. Sweden	159 330	138 389	1.8	1.4
EU excl. Nordic countries	101 333	168 780	1.1	1.7
Europe excl. EU28	89 250	127 321	1.0	1.3
Africa	24 724	90 809	0.3	0.9
North America	12 043	17 961	0.1	0.2
South America	25 725	35 874	0.3	0.4
Asia	111 710	312 730	1.3	3.1
Oceania	1 268	2 008	0.0	0.0
Primary / lower secondary edu.	677 308	420 442	11.4	6.1
Upper secondary education	1 378 593	1 437 536	23.2	21.0
Post-secondary education	868 280	1 459 459	14.6	21.3

The category Missing for country of birth and level of education respectively are not presented in the table, which means that the proportion of people does not add up to 100 percent. Figures regarding the level of education are based on the population 20–74 years old.

Appendix B

Mobility statistics for the subperiods 2000–2005, 2006–2011 and 2011–2016.

Table B1. Transition matrix, all persons aged 20-, 2000–2015

Decile in year 2000	Decile in year 2005									
	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Decile 1	**50.1**	13.8	8.2	6.5	5.5	4.5	3.7	3.0	2.4	2.5
Decile 2	22.3	**36.4**	12.9	7.8	6.1	4.7	3.6	2.7	1.9	1.7
Decile 3	7.8	23.8	**31.9**	12.1	8.0	5.8	4.1	3.0	2.0	1.6
Decile 4	5.5	10.2	22.4	**24.2**	14.2	9.2	6.0	4.0	2.5	1.8
Decile 5	3.7	5.9	9.8	20.6	**22.1**	16.6	9.8	5.8	3.4	2.2
Decile 6	2.7	3.5	5.9	11.5	18.9	**22.3**	17.5	9.8	5.3	2.6
Decile 7	2.1	2.2	3.6	7.4	11.1	17.9	**23.8**	18.4	9.5	3.9
Decile 8	1.7	1.6	2.2	4.7	7.1	10.1	18.2	**27.5**	20.2	6.8
Decile 9	1.7	1.3	1.6	3.0	4.2	5.8	9.2	19	**35.5**	18.8
Decile 10	2.4	1.4	1.5	2.2	2.7	3.2	4.2	6.8	17.3	**58.2**

IM: 33.2

Table B2. Transition matrix, all persons aged 20-, 2006–2011

Decile in year 2006	Decile in year 2011									
	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Decile 1	**48.5**	12.4	7.8	7.5	6.6	5.0	4.1	3.3	2.6	2.2
Decile 2	22.4	**37**	11.1	7.8	6.6	5.0	3.7	2.8	2.0	1.6
Decile 3	8.1	24.5	**33.9**	10.7	7.6	5.3	3.8	2.8	1.9	1.5
Decile 4	6.2	10	21.9	**24.1**	14.7	8.8	5.8	4.0	2.6	1.9
Decile 5	4.1	6.1	9.4	20.5	**23.1**	16.2	9.2	5.7	3.4	2.2
Decile 6	2.8	3.7	6.1	11.0	17.4	**24.8**	16.7	9.4	5.2	2.8
Decile 7	2.2	2.3	3.9	7.6	10.1	17.3	**25.9**	17.6	9.0	3.9
Decile 8	1.7	1.5	2.5	5.2	6.8	9.2	18.3	**29.0**	19	6.8
Decile 9	1.6	1.0	1.5	3.0	4.3	5.4	8.3	18.9	**37.0**	18.9
Decile 10	2.3	1.5	1.8	2.6	2.8	3.1	4.0	6.5	17.2	**58.2**

IM: 34.2

Table B3. Transition matrix, all persons aged 20-, 2011–2016

Decile in year 2011	Decile in year 2016									
	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Decile 1	**45.1**	11.7	8.2	9.2	8.0	5.9	4.3	3.1	2.2	2.2
Decile 2	27.9	**32.9**	10.3	7.8	6.8	5.0	3.6	2.5	1.5	1.6
Decile 3	8.1	30.2	**31.4**	8.8	7.0	5.0	3.7	2.6	1.6	1.7
Decile 4	6.1	10.5	24.8	**24.5**	12.1	8.0	5.6	3.8	2.4	2.3
Decile 5	4.0	6.0	10.2	21.4	**23.6**	14.3	8.9	5.6	3.2	2.7
Decile 6	2.5	3.3	6.0	11.0	19.4	**25.0**	15.7	9.1	4.7	3.2
Decile 7	1.8	2.0	3.7	7.2	10.2	19.4	**26.1**	17.0	8.3	4.3
Decile 8	1.5	1.3	2.4	5.0	6.6	9.5	19.9	**29.4**	17.7	6.8
Decile 9	1.3	0.9	1.5	2.9	4.1	5.1	8.5	20.5	**38.5**	16.8
Decile 10	1.8	1.2	1.6	2.1	2.3	2.7	3.6	6.4	19.9	**58.4**

IM: 33.5

Figure B1. The proportion of people who leave their initial income group, quintile 1

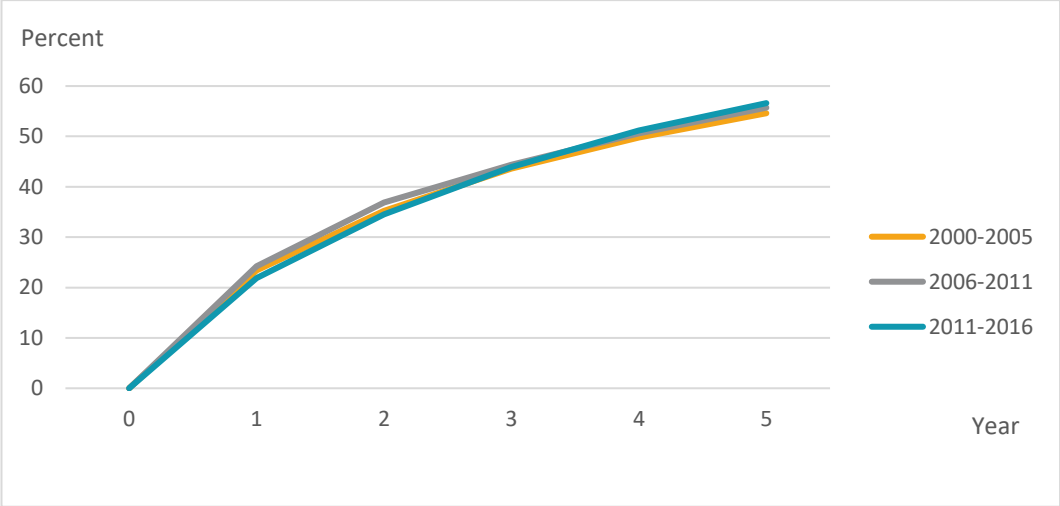


Figure B2. The proportion of people who leave their initial income group, quintile 3

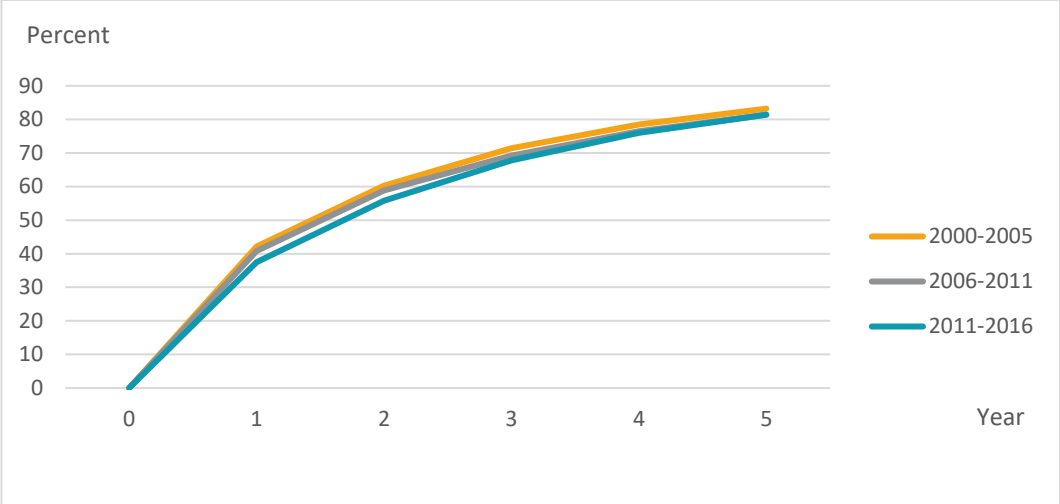
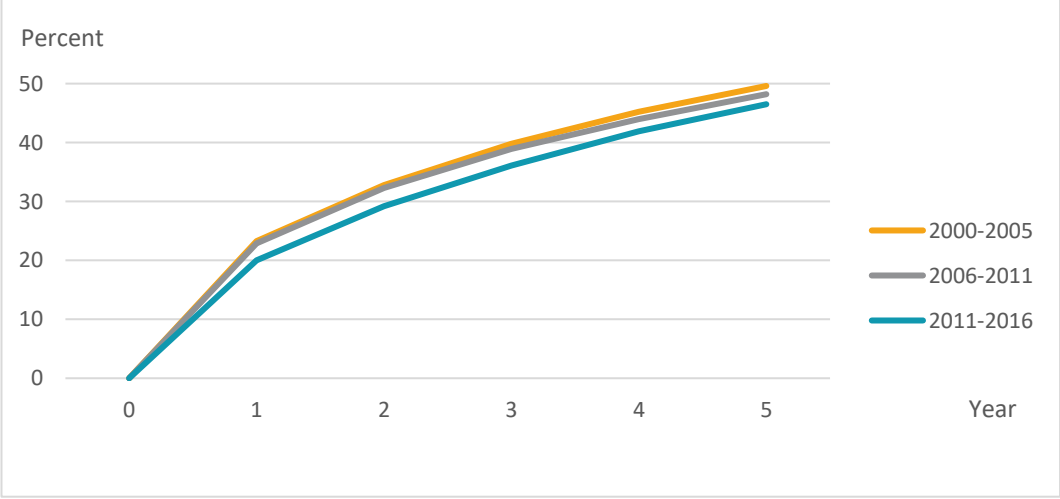


Figure B3. The proportion of people who leave their initial income group, quintile 5



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