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Use of register data on wealth in Danish SDG poverty indicator

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Use of register data on wealth in Danish SDG poverty indicator

By Jarl Quitzau and Daniel F. Gustafsson

Statistics on relative poverty rely heavily – sometimes exclusively – on income in a particular year. For monitoring the Sustainable Development Goals on poverty, Statistics Denmark has developed an indicator for relative poverty that takes educational activity and wealth into account as well. The indicator is introduced in the first part of the paper followed by an introduction to the demographics and level of relative poverty in Denmark. Then we make the case for a wealth criterion by looking, at wealth distribution for people below the low-income threshold.
Then we explore the correlation between our various register-based indicators and subjective poverty indicators from the EU-SILC. The results indicate that excluding students and adding the wealth criterion wealth improves this correlation. This leads back to the wealth indicator and to a discussion of the advantages and disadvantages of net wealth versus financial wealth in estimating poverty.
Finally, we look at the persistence of relative poverty and touch on some of the advantages and disadvantages of measuring single-year poverty as opposed to persistent poverty. These results are highly relevant when discussing poverty and distribution of income, as failing to acknowledge the composition of the lower-income groups may lead to policy measures that target an incorrect population.

Background

Denmark is among the 193 countries that have signed on to the Sustainable Development Goals. To monitor target 1.2 on poverty reduction, Statistics Denmark has developed a multi-dimensional indicator for *relative poverty*. The indicator is based on administrative data. It combines data on income, wealth, census and educational activity. The indicator was implemented in 2017. Inspiration for the indicator stems from a former national definition of poverty suggested by a group of national experts on poverty in 2013[1].

The indicator on relative poverty is a multidimensional poverty indicator. It measures the number of people with equivalized disposable income and equivalized net-wealth below 50 per cent of the annual median disposable income. It excludes households in which the primary breadwinner is a student, and it excludes young people who lived part of the year with their parents above the thresholds for relative poverty.

The first criterion is well known internationally as an indicator for relative poverty, economic exclusion and income inequality. The OECD defines poverty as having below 50 per cent of median income. Eurostat defines people below 60 per cent of the median income as being *at risk of poverty*. Finally, the criterion is promoted as an indicator for SDG target 10.2 on social and economic inclusion. In this paper we denote people with less than 50 percent of the median income as the *low income* group.

In 2013, a national Danish expert group defined poverty as being involuntary. One of the main issues with only measuring the amount of people with low income is that this includes large groups that have low income by choice. This could be students or people who are able to sustain their standard of living based on accrued wealth.

[1] Expertgroup on poverty; Andersen, Ploug, Pedersen, Sjursen et al.

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With regard to students in Denmark, it is worth noting that youngsters on average move away from their parents at 20 years old[2]. This is a fairly young age compared to most other developed countries. This means that most students enrolled in tertiary education are living in their own household. This is part of the reason why 28.7 per cent of the population between 20 and 29 years old had income below 50 per cent of the median income in 2019. Almost two out of three of these are living in households in which the primary breadwinner is a student.

However many students live in highly subsidized housing and seeking an education is an investment into the future. For most students the period of low-income living is foreseeable. Once they have completed their studies, most will enter the labor market and obtain a living well above any poverty threshold. As studying is assumed to be a voluntary activity in the large majority of cases, students are not counted as being relatively poor in the Danish indicator. Nor are young people who have moved away from a household that is otherwise above the low-income threshold in the income year. Once students have been reclassified as non-poor, the share of relatively poor 20 – 29 year olds is reduced from 28.7 to 10.3 per cent in 2019.

The remaining criterion is equivalized net wealth below the poverty threshold. The data source is Statistics Denmark's full population register on wealth. This register contains data on the market value of real estate, value of cars based on sales prices of second-hand cars, financial assets including bank deposits and quoted stocks, pension wealth and on the other hand liabilities. A list of the available wealth components is available at www.statbank.dk/formue7. The register does not cover all types of wealth components. Bar/Cash, the value of unquoted stocks, value of furniture, paintings and debt to the public sector are examples of components not covered by the register. Statistics Denmark are working on a revision of the register. The value of unquoted stocks and debt to the public sector is expected to be added to the register by the end of 2022.

The wealth register has the 31st of December as its reference date. Wealth data is collected by the tax authorities at this date. For the wealth criterion for the relative poverty indicator, it was decided to use wealth at the beginning of the year instead of at the end of the year. The idea is that wealth at the beginning of the year is a better representation of the assets available to the household for the rest of the year. Furthermore, there is some time delay with the wealth register. Using data for wealth at the beginning of the year has also historically improved the timeliness of the poverty estimates by one to two months.

The Danish indicator on relative poverty uses net wealth excluding the value of pensions. This is also in line with the recommendation by the 2013 expert group on poverty in Denmark. The reasoning behind the exclusion of pensions is that the pension wealth is not liquid for non-pensioners (or at least it will be subject to very high tax rates if withdrawn) and even for pensioners, there are strict rules on how and when pension savings can be paid out, depending on the type of pension scheme.

Finally, it was decided to use the household equivalized net wealth. The assumption here is that the economies of scale are the same regardless of whether one looks at income or wealth. Thus the household wealth is adjusted using the household size and age of the household members using the OECD-modified scale.

The effect of applying the selected wealth criterion on 20-29 year olds is limited due to the low levels of wealth in this age group. It only reduces relative poverty rates from 10.3 to 9.3 per cent. Overall, the wealth criteria reduces the relative poverty rate from 5.3 per cent to 4.4 per cent in 2019.

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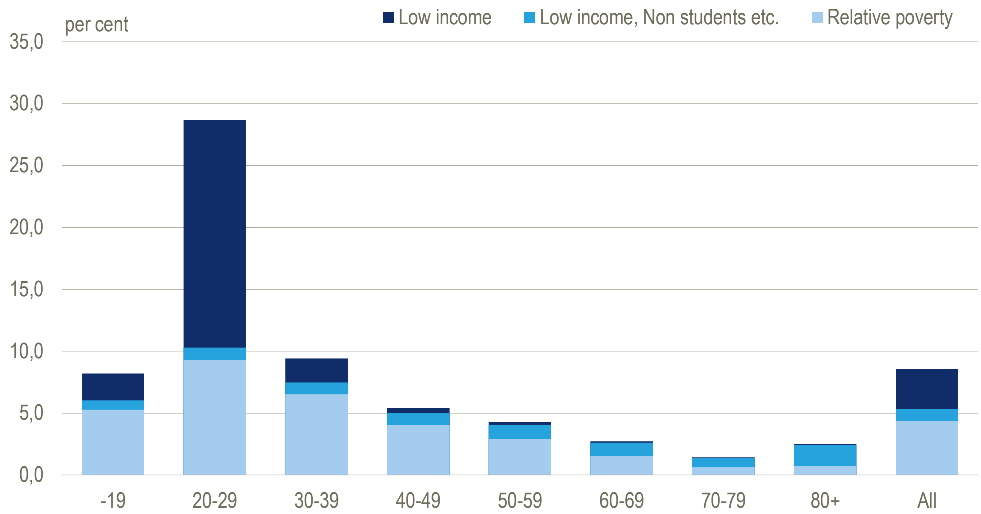
[2] Eurostat, Statistics explained (Links in references)

Figure 1. Share of population in relative poverty by age group, 2019



Source: Statistics Denmark. Population, income and wealth registers

As seen in figure 1, the largest share of persons living in relative poverty is in the younger half of the population. This is mainly due to younger persons having lower incomes in general. The prevalence of relative poverty at ages 60 and above is rather low. While 2.5 per cent of people above the age of 80 had low income only 0.7 percent remained in the group of relatively poor once the wealth criteria had replied. The low levels of poverty among the elderly is primarily due to the old-age pension and housing benefits, which in most cases provide an income that is well above the poverty line[3].

Demographics of relative poverty

Looking at persons with an income below the poverty line, the difference to the rest of the population becomes apparent on a set of demographic factors. While males make up 49.7 per cent of the population, they make up 55.3 per cent of persons in relative poverty. Marital status also differs across the two groups. 37 per cent of the population is married; the same applies to only 16 per cent of persons in relative poverty. 8.5 per cent of the population has foreign citizenship, the share of foreign citizens of persons in relative poverty is 35.5 per cent.

Table 1 lists the different activity statuses of the entire population and the persons living in households in relative poverty. Not surprisingly, the largest differences are found in employment and unemployment. 41 per cent of the population is employed, only 14.3 per cent of the persons in relative poverty were employed in 2019. The opposite is true of the unemployed; 4.3 per cent of the population were unemployed in 2019, whereas 28.6 per cent of persons in relative poverty were unemployed. There is a larger share of persons in self-employment and on sick leave, both of these will be looked at in more detail later. Students are underrepresented because households with student breadwinners have been removed from the indicator. There is a slight overrepresentation of children in relative poverty compared to the entire population.

Table 1. Over/under representation of relative poverty by Socioeconomic status, 2019

	Entire population	Relative poverty
	Per cent	
Self-employed	2.9	4.2

[3] CEPOS, Lundby-Hansen, Heiberg, Sloth

Employees	41.0	14.3
Unemployed	4.3	28.6
Sick leave, other leave	0.7	2.4
Students	10.0	6.8
Children	16.3	19.9
Other	24.8	23.8

Source: Statistics Denmark. Population, income and wealth registers

Distribution of wealth below the poverty line

To illustrate the effect of removing persons with a certain amount of equivalized net wealth, the distribution of wealth at the top of the distribution can be informative. Persons with an income under 50 per cent of the median income in general has low net wealth. 75 per cent of the low-income group have a net wealth of below DKK 53,000 (roughly EUR 7,000). However, a significant share of the group has more substantial wealth. 5 per cent of the group has net wealth of above DKK 800,000 and 1 per cent of the group has net wealth of above DKK 3,200,000. This wealth at the top of the distribution is exacerbated by removing students, as the younger age groups typically figure at the bottom of the wealth distribution. When removing the 56,000 persons with wealth exceeding the poverty line, the median net wealth becomes 0 and by design no-one has net-wealth exceeding the poverty threshold.

Table 2. Equivalized net wealth percentiles by poverty definition, 2019

	Low income	Low income, non-students etc.	Relative poverty
N	491,713	306,399	250,263
	DKK		
25th percentile	-16,207	-34,145	-55,531
50th percentile	5,631	3,486	0
75th percentile	53,407	38,463	9,276
90th percentile	349,268	520,233	31,147
95th percentile	801,262	1,163,352	58,322
99th percentile	3,195,125	4,550,286	107,285

Source: Statistics Denmark. Population, income and wealth registers

Correlation between objective and subjective poverty

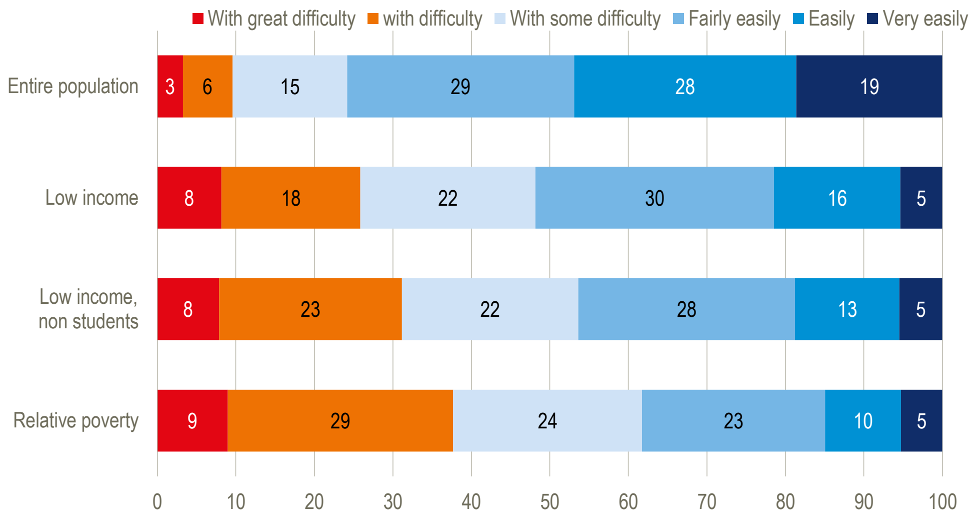
In an attempt to illustrate the value of the additional criteria of excluding students and wealthy households, we have linked the objective register based indicators with subjective indicators on poverty. Statistics Denmark provides data for EU-SILC. By using personal civil registration numbers (CPR numbers), Statistics Denmark is able to link the objective and the subjective indicators on poverty from EU-SILC. One such indicator is the “ability to make ends meet”.

Figure 2 illustrates how excluding students and wealthy households improves the correlation between the objective indicator and the ability of the households to make ends meet economically. In 2019, a total of 26 per cent of low-income families had *difficulty* or *great difficulty* making ends meet according to SILC data. However once students are excluded, this share increases to 31 per cent. Once the wealthy are excluded and we arrive at the Danish indicator for *relative poverty,* the share increases further to 38 per cent.

The improved correlation between subjective and objective indicators does seem to imply that using the criteria on educational activity and wealth improves the quality of the objective indicator. However, it is also worth noting that at the extremes –

households that have *great difficulty in* or *can very easily* make ends meet – the effect of the additional criteria is small and non-significant in 2019.

Figure 2. Ability to make ends meet by poverty definition



Source: Statistics Denmark. EU-SILC and Population, income & wealth registers.
Note: SILC 2019 has 5,741 completed interviews. Of these, 256 households have low income and 91 fall under the definition of relative poverty. Thus, there is significant statistical uncertainty related to the results.

It is not possible to achieve perfect correlation between subjective and objective indicators on poverty, but it may be possible to make improvements. One factor leading to differences is the household composition. The register-based indicator uses a relatively strict definition of the household. It does not allow for more than two adults above the age of 25 in the household. This means that some grown children living with their parents, and vice versa, are registered in their own households and thus could erroneously be categorized as poor, while others in fact support them economically. In SILC, the respondents define the household. This is likely to provide more accurate household definitions.

Another issue with the register-based indicators is missing information. Improving the registers is an on-going process. In recent years, Statistics Denmark has started collecting transfers between households in SILC, imputing the value of unlisted stocks, and collecting new data on debt to the public sector for the wealth register and quasi social transfers in kind, such as discounts for childcare expenses. These new additions can be used to increase the quality of objective indicators in the years to come. We consider the correlation between subjective and objective indicators an important tool when trying to improve the quality of poverty indicators.

Table 3 shows the difference between persons living in households in relative poverty across a number of different subjective poverty indicators. All in all, the levels are similar across the low-income and the relative poverty definitions, but there is a higher share of poverty across indicators for relative poverty. This indicates a higher correlation between relative poverty and subjective poverty. The indicators about holiday, facing unexpected expenses and making ends meet, in particular, display a large differences in percentage points across the definitions.

Table 3. Household indicators of subjective poverty, 2019.

	Low-income household?		Household in relative poverty?	
	Yes	No	Yes	No

	Per cent			
Cannot afford one week annual holiday away from home	31.8	11.2	44.0	12.2
Cannot afford a meal with meat, chicken, fish or vegetarian equivalent every second day	9.7	2.1	10.7	2.5
Cannot afford to face unexpected financial expenses (DKK 10,000)	57.1	22.0	75.7	23.7
Cannot afford a computer	4.0	1.7	10.6	1.6
Cannot afford a car	32.8	7.3	31.6	9.0
Difficult to make ends meet (with great difficulty, with difficulty)	31.0	8.2	41.1	9.4
Repayment of debts from hire purchase or loans is a heavy burden	7.2	3.0	14.5	3.0
Cannot afford to replace worn-out furniture	33.3	10.5	38.1	11.9

Source: Statistics Denmark. EU-SILC and Population-, income- and wealth registers
Note: SILC 2019 has 5,741 completed interviews. Of these, 256 households have low income and 91 fall under the definition of relative poverty. Thus, there is significant statistical uncertainty related to the results.

The persons not in relative poverty seem to score higher on the subjective poverty measures compared to low-income households. For instance, 44 per cent of households in relative poverty indicated that they could not afford one week of annual holiday away from home, while this only applied for 32 per cent of low-income households. This indicates that students and people with wealth above the low-income threshold who are not considered to be poor in Denmark do indeed have higher standards of living than those who remain below the poverty threshold.

Table 4. Personal indicators of subjective poverty, 2019

	Low-income household?		Household in relative poverty?	
	Percent			
	Yes	No	Yes	No
Could not afford medical examination or treatment, last 12 months	0.0	0.3	0.0	0.3
Could not afford dental examination or treatment, last 12 months	15.9	3.4	25.0	3.9
Cannot afford to replace worn-out clothes, buy some new	21.6	4.3	36.5	4.9
Cannot afford two pairs of properly fitting shoes	7.7	2.1	7.4	2.5
Cannot afford get-together with friends/family for a drink/meal at least once a month	7.1	3.3	10.5	3.4
Cannot afford to regularly participate in a leisure activity	19.3	6.0	26.1	6.6
Cannot afford to spend a small amount of money each week on yourself	31.6	9.3	38.4	10.5
Cannot afford internet connection for personal use at home	1.2	0.4	3.6	0.5

Source: Statistics Denmark. EU-SILC and Population-, income- and wealth registers
Note: SILC 2019 has 5,741 completed interviews. Of these, 256 households have low income and 91 fall under the definition of relative poverty. Thus, there is significant statistical uncertainty related to the results.

The personal-level indicators display similar results to the household-level indicators, in that the deprivation indicators are slightly higher for those not living in relative poverty households, compared to low-income households. Especially replacing worn-out clothes and the ability to afford dental treatment are markedly different across the definitions. For instance, 25 per cent of people in relative poverty indicated that they needed, but could not afford, dental care. This only applied for 16 per cent of the broader low-income group. On the other hand, medical treatment is mainly publicly funded in Denmark and is therefore not very useful for measuring poverty.

Net-wealth or financial wealth?
When buying a house in Denmark, it is normal to finance the purchase by taking up loans. The Danish real-estate credit system allows households to borrow up to 80 per cent of the house value – and in many cases with non-repayment installments. This is the primary reason why Denmark has one of the highest levels of household debt relative to GDP, only surpassed by Norway in the OECD[4]. This system of borrowing also inflates house prices, which means that the high level of debt is in most cases covered by the assets owned by the households.

The high levels of debt, assets and not least pension wealth mean that financial wealth in terms of bank deposits, quoted stocks and bonds only constitutes 17 per cent of the total assets (pension wealth included) and 24 per cent of the net wealth[5].

Net wealth excluding pensions was selected partly due to the precedent use of net wealth in the former national Danish definition of poverty, as suggested in 2013 by the national Danish expert group on poverty, and partly because financial wealth only constitutes a minor part of overall wealth in Denmark. It was not a decision that was thoroughly debated when the indicator was designed.

However, it is interesting to consider whether to observe net wealth or only financial wealth. One advantage of only including financial wealth is that it is for the most part fully liquid. Especially in relation to the feeling of poverty, a case can be made that liquid wealth may provide a much stronger sense of financial security. Real estate and valuable assets such as cars are valuable, but might be difficult to sell. This could be because the household might be, or feel, dependent on the asset. Some might not consider it an option to sell the family home. Finally, it may simply be difficult to find a buyer for the asset in the short term.

Furthermore, collecting the value of financial assets in surveys is relatively easy for statisticians. In contrast, estimating the values of real estate and cars can be fairly difficult for survey respondents and difficult to estimate precisely using registers.

Our preliminary analysis for this paper actually suggests that financial wealth does indeed perform better than net wealth when observing the correlation with subjective poverty indicators. For the current indicator of relative poverty, we use the annual low-income threshold (50 per cent of the median income) as the threshold for net wealth as well. If this criterion is replaced by a new criterion of financial wealth below the low-income threshold for three months, the level of relative poverty is roughly maintained. However as shown in figure 3, it seems that the criterion of low financial wealth performs better in terms of correlation with the SILC indicator on *making ends meet*.

However the strong counter argument in favor of net-wealth remains. Can a household really be considered to be poor if they have valuable assets in their

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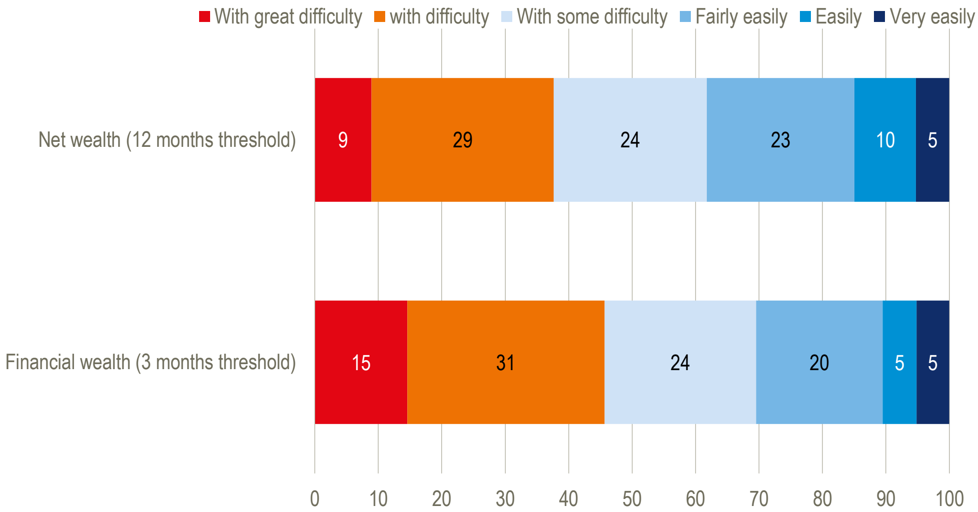
[4] OECD webpage (see references)

[5] www.statistikbanken.dk/formue1

possession – assets that if sold could ensure at least a year of sustained living above the poverty threshold?

It is worth noting that the sample is rather small. In 2019, there were slightly fewer than 100 households in SILC living in relative poverty. Stratification has been implemented in the following years. This should ensure a larger sample of low-income households, which may provide an even better base for making a decision. However, our preliminary analysis does suggest that using only financial wealth for the indicator of relative poverty might very well be preferable, both in terms of quality, and in terms of feasibility for data collection in countries with less developed registers on wealth. This is definitely an idea we may consider in the years to come.

Figure 3: Relative poverty by ability to make ends meet. Various wealth criteria. 2019.



Source: Statistics Denmark. EU-SILC and Population, income & wealth registers
Note: SILC 2019 has 5,741 completed interviews. Of these, 256 households have low income and 91 fall under the definition of relative poverty. Thus, there is significant statistical uncertainty related to the results.

Persistent poverty

The former national definition of poverty included the criteria that the person had to be below the poverty threshold for three years consecutively to be considered poor. However, as an important part of the SDG guidelines is that figures must be timely and up-to-date, it was decided to proceed with a one-year threshold. The primary reasoning behind this decision was that, in the event of an increase in poverty levels, this criterion would only show this increase four years after it happened. Let us assume that a person fell below the threshold for relative poverty in 2015 and remained poor. Then he would have to be poor in 2015, 2016 and 2017. Then it would take another year for the data to be processed and published and the indicator would thus only show the increase in November 2018. That is a time lag of 4 years.

In 2015 and 2016, Denmark actually experienced a large increase in single-year relative poverty. This was in part due to the arrival of many immigrants, combined with lowered cash benefits for families with children. This is the main driver behind the fact that single-year poverty decreased in 2019 and 2020, but persistent poverty for 3 or 4 years straight is currently still increasing[6]. While persistent risk of poverty might be very interesting for research in the long run, it seems to perform poorly in terms of timeliness compared to a single-year threshold.

[6] www.statibank.dk/ifor51

Table 4 shows the number of successive years spent under the respective poverty lines, by those below the lines in 2019. The pattern is approximately the same across the two definitions, although there is a somewhat larger persistence in the low-income definition. Two-thirds of the persons below the low-income threshold line in 2019 were there the year before. The share of persistent low-income households is further reduced to 47.7 per cent for the 3-year duration, 32.7 per cent for the 4-year duration, and 21.7 per cent of low-income households have been below the low-income line for 5 years. This is roughly the same for persons in relative poverty, but the level is consistently around 5 percentage points lower.

Table 4. Duration of relative poverty by definition. For people in relative poverty in 2019

	2 years	3 years	4 years	5 years
Low income	63.8	44.7	30.3	20.1
Relative poverty	58.1	39.3	25.2	15.4

Source: Statistics Denmark. Population, income and wealth registers

This implies that approximately one-third of the persons in poverty have just entered poverty in 2019. This raises the question of whether they exit the low-income group just as quickly. Of those who entered the low-income group in 2019, 54 per cent were still there in 2020. For the relative poverty group, the number was 43 per cent.

It seems that the composition in the low-income group is more persistent than the group in relative poverty. This effect is almost entirely due to the exclusion of students, education typically being of a multiannual nature.

When looking at entry into and exit from poverty in 2018, 21 per cent are not below the poverty line in any of the adjacent years.[7] 19 per cent of those under the poverty line in 2018 were also under the poverty line in 2017 only to find themselves above the line in 2019. A similar number of persons (17 per cent) were not below the poverty line in 2017, but were in the following two years. The remaining 44 per cent were below the poverty line in all three years.

The share of persons below the poverty line in one year and above it in the adjacent years, merits a more detailed look. For the sake of brevity, we will refer to the concept of being below the relative poverty line in 2018, and not in 2017 or 2019, as single-year poverty in 2018.

There is substantial heterogeneity in the share of poor persons in single-year poverty. The socio-economic group most likely to be below the relative poverty threshold in only a single year is students. This is probably because they are not the primary breadwinners of the household, as they are either living with their parents or an employed partner in most cases.

About one-third of employees below the poverty threshold in 2018 were not below the line in any of the adjacent years. The main explanation for this is probably short-term unemployment, as persons are not categorized as unemployed that year unless they are unemployed for more than half the year. Therefore, a person having 7 months of employment and 5 months of unemployment will be counted as employed for the year.

Persons on leave are also likely to only be in relative poverty for a single year. This includes both sick leave and publically paid parental leave. The persons on parental leave fit this pattern very well, because the benefits received during long spells of

[7] Here we will transition to looking at poverty in 2018 and the adjacent years, because measures implemented in response to the COVID-19 pandemic distort the movements across the poverty lines, especially when looking at subgroups in the population.

parental leave are lower than the typical wage and the duration of parental leave is typically about a year.

The two groups most likely to be below the poverty line in multiple years are persons unemployed for more than 6 months and persons not elsewhere classified (but outside the labor force). Almost nine in ten were below the poverty line in 2018, and were also there in at least one of the adjacent years.

Table 5. Adults in single-year poverty, 2018

	Number of persons	Share of poverty in 2018 (Per cent)
Self-employed	2321	23.1
Employees	14021	34.1
Unemployed	6606	10.3
Sick leave, other leave	677	29.4
Students	6730	41.3
Other	6509	13.0
Total	36864	20.0

Source: Statistics Denmark. Population, income and wealth registers

The share of single-year poverty for the self-employed is relatively low, but contains some interesting results. The share of single-year poverty varies greatly depending on the number of employees employed by the person. Two-thirds of self-employed persons employing 5 or more persons are out of poverty in each of the adjacent years. This is reduced to one-third for the self-employed with 1-4 employees and one-fifth for self-employed persons without employees. This could be interpreted as two different groups of self-employed persons. Without employees, many self-employed persons are in essence independent contractors whose income varies and the life time of the firm is smaller. When the firm is larger and has more employees, there are more opportunities for utilizing different tax structures to defer income to other years and thus generate low or negative income in a single year.

Table 6. Self-employed persons in single-year poverty, 2018

	Number of persons	Share out of poverty in 2019
5+ employees	152	64.4
1-4 employees	424	34.3
No employees	1682	20.1

Source: Statistics Denmark. Population, income and wealth registers

References

Eurostat, Statistics explained
https://ec.europa.eu/eurostat/statistics-explained/index.php?oldid=494351

Expertgroup on poverty - report
Andersen, Andersen, Ploug, Fløten, Pedersen og Sjursen; En dansk fattigdomsgrænse; juni 2013.
https://www.ft.dk/samling/20121/almdel/sou/bilag/263/1257640.pdf

CEPOS on basic income for pensioners
Lundby-Hansen, Heiberg, Sloth; Ny pensionist check; April 2022
https://cepos.dk/media/6183/ny-pensionist-check_en-folkepensionist-modtager-i-forvejen-14400-kr-efter-skat_langt-over-lavindkomstgraensen.pdf

OECD Household debt to GDP levels
https://data.oecd.org/hha/household-debt.htm

Statistics Denmark, ressources
www.statbank.dk/20518 (tables inequality and poverty)
www.statbank.dk/3542 (tables on wealth)

Documentation of the wealth statistics:
https://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/personal-assets-and-liabilities

Description of indicator on relative poverty:
https://www.dst.dk/ext/arbejde-loen-og-indkomst/Relativ_fattigdom_SDG--pdf